

## ORTHODONTIC TREATMENT WITH SCHWARZ PLATE IN A PEDIATRIC PATIENT: CASE REPORT

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**Aim:** the objective of this study is to present the clinical case of an 8-year-old girl treated with an upper Schwarz plate. The treatment aims to achieve maxillary expansion through controlled activations, evaluating the benefits and limitations of this technique in light of scientific literature.

**Methods:** the 8-year-old patient underwent orthodontic treatment with an upper Schwarz plate. The therapeutic protocol included activating the appliance with a quarter-turn of the screw once a week. The effects of the expansion on the upper arch were monitored, assessing both clinical improvements and potential side effects.

**Results:** the Schwarz plate is a removable device commonly used for transverse expansion in growing patients. Among the

main advantages reported in the literature are ease of use, less invasiveness compared to fixed expanders and the possibility of removal for oral hygiene. However, some studies highlight limitations such as reliance on patient compliance, potentially longer treatment times, and lower efficacy compared to fixed expanders in cases of more severe skeletal discrepancies.

**Conclusions:** the treatment with an upper Schwarz plate has proven to be a valid therapeutic option for transverse expansion in growing patients, provided that there is adequate patient compliance. The literature suggests that, although its effectiveness is lower than that of fixed expanders in some cases, this technique represents a less invasive and more acceptable alternative for children and their families.

## AMCOP® BIOACTIVATORS IN PAEDIATRIC PATIENTS: AN INNOVATIVE APPROACH

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**Aim:** this report analyzes the results obtained using AMCOP® bioactivators in a patient undergoing dental growth and development. This orthodontic approach, based on bioactivators, is an innovative method for treating malocclusions during the developmental phase, which is crucial for the proper growth of bones and teeth. The study aims to evaluate the effectiveness of this treatment in an 8-year-old child, a period when orthodontic intervention can significantly impact dental and skeletal development.

**Methods:** the patient is an 8-year-old with mixed dentition. A thorough examination was conducted, including clinical dental assessment, radiographs, cephalometry, photographs, and dental impressions. The diagnosis revealed skeletal Class II

with a dento-skeletal open bite. Treatment with AMCOP® bioactivators, a non-invasive, targeted solution, was chosen.

**Results:** Bioactivator SC4 was used for treatment. Over 1 year and 7 months, significant improvements in dental position and functionality were observed. The patient is currently monitored for dental permutation, with ongoing treatment using bioactivators.

**Conclusions:** orthodontic treatment with bioactivators has proven effective in intercepting malocclusions during the dental developmental phase. Natural stimulation of dental and skeletal structures helped correct the open bite and improve the alignment of permanent teeth. This non-invasive approach, combined with constant monitoring, produced lasting results, promoting the physiological development of dentition and masticatory function.

## ORTHOPEDIC-FUNCTIONAL TREATMENT OF A GROWING PATIENT WITH SKELETAL CLASS II

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**Aim:** evaluation of the effectiveness of combined orthopedic and functional treatment in improving arch and facial shape, function, and aesthetics of a growing-age patient with skeletal class II.

**Methods:** an 8-year-old patient underwent an extraoral examination that revealed a reduction of the lower third of the face, a convex profile, and a narrow smile with wide buccal corridors. Intraoral examination showed the presence of a class II division II malocclusion in mixed dentition with retroinclined upper central incisors and proinclined upper lateral incisors, tooth crowding, and deep bite. Cephalometric analysis of teleroadiography in latero-lateral projection diagnosed a class II skeletal malocclusion with a slightly hyperdivergent growth

pattern. Combined orthopedic and functional treatment of the growing patient involved the use of a rapid palatal expander, activated twice daily for 15 days and then used passively for 6 months, followed by Sander's device. In the final phase of treatment, the eruption of the definitive tooth elements was guided using the functional Occlus-o-Guide® device.

**Results:** two years of treatment resulted in frontal and lateral facial harmonization, a wider smile, class I occlusion, dental alignment, and normalization of overbite.

**Conclusions:** the results of this case report emphasize the importance of accurate diagnosis and the effectiveness of orthopedic-functional treatment in eliminating interferences that block an individual's potential for growth and development.

## BRUXISM AND ELECTROMYOGRAPHY: AN INNOVATIVE APPROACH FOR DIAGNOSIS AND TREATMENT

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**Aim:** bruxism is the habit of grinding or clenching teeth, often associated with stress, dental misalignments, or muscular abnormalities. While it can be diagnosed clinically, electromyography is an advanced technique for monitoring muscle activity, detecting contraction intensity and frequency. This study focuses on using EMG to diagnose and treat bruxism in a 43-year-old patient with typical signs of the disorder, both at night and during the day. The aim is to evaluate the effectiveness of EMG in monitoring muscle activity, distinguishing bruxism from other conditions, and assessing treatment effectiveness.

**Methods:** a high-sensitivity EMG device, Teethan, was used to monitor the patient's muscle activity in real time. Several recording sessions were performed to assess contraction intensity and frequency. Clinical evaluations confirmed the diagnosis of bruxism. Post-treatment monitoring assessed the effectiveness of therapeutic measures.

**Results:** EMG data analysis showed significant muscle activity, with higher contraction frequency during stress periods. EMG monitoring excluded other muscle pathologies, confirming the bruxism diagnosis. After specific treatments (bite guards), EMG data showed a significant reduction in contraction intensity and frequency, indicating treatment effectiveness.

**Conclusions:** EMG has proven essential in diagnosing, assessing bruxism intensity and frequency, and monitoring treatment effectiveness. It provided objective data on the patient's muscle condition, confirming the diagnosis and distinguishing bruxism from other muscle disorders. Treatment results were clearly evident in the reduction of muscle activity recorded after treatment. EMG with Teethan is a useful and accurate tool for managing bruxism, potentially improving patients' quality of life and optimizing treatment plans.

## EN MASS MAXILLARY DISTALIZATION IN A SKELETAL AND DENTAL CLASS 2 CASE WITH INFRAZYGOMATIC MINISCREW

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**Aim:** the purpose of this orthodontic treatment was to treat an adult patient with full dental and skeletal class 2 malocclusion using two miniscrews in an infrazygomatic position for the en masse distalization of the upper arch.

**Methods:** twin brackets and molar tubes with MBT prescription were used and two infrazygomatic miniscrews measuring 2.3 x 15 mm were inserted in the Infrazygomatic Crest (IZC). Before starting orthodontic treatment, the pa-

tient underwent extraction of 18.28.38 and 48 elements.

**Results:** the orthodontic treatment lasted 30 months and ended with the achievement of a class 1 occlusion.

**Conclusions:** thanks to the routine use of miniscrews, it is often possible to avoid tooth extractions and blur the boundaries between orthodontic treatment and orthognathic surgery. The infrazygomatic crest is the elective site for TADS placement in the treatment of Class II with distalization.

## MANAGEMENT OF THIRD CLASS IN DECIDUOUS DENTITION: A CASE REPORT

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**Aim:** the aim of this study is to evaluate interceptive therapy with orthopaedic braces in third skeletal class patients with deciduous dentition.

**Methods:** female patient, 5 years and 6 months old. Anamnesic collection: born by eutocic delivery, breastfeeding until 6 months, no familiarity with class III. Motivation to cooperate. Good oral hygiene, accompanied by both parents. Patient's request: correction of class III malocclusion. Intraoral and extraoral photographs of the patient were taken, orthopantomography and telerradiography in latero-lateral projection were requested. Skeletal diagnosis resulting from cephalometry class III Dental diagnosis: class III molar and canine, left ante-

rior and lateral reverse bite, OVJ negative, OVB increased. Aesthetics: concave profile, slight facial asymmetry in the frontal plane, labial incompetence, protruding lower lip. Treatment options with orthopaedic devices: Delaire's mask, ERP.

**Results:** it was decided to correct the transverse discrepancy with conventional ERP cemented on bands on deciduous teeth with internal and external arms for Delaire's Mask, in order to obtain a corrected PA dimension. We obtained the correction of third class.

**Conclusions:** the motivation for the chosen treatment plan was dictated by the patient's age and the need to intercept this malocclusion and avoid surgery.

## SURGICAL AND ORTHODONTIC MANAGEMENT OF AN 11-YEAR-OLD FEMALE PATIENT WITH PIERRE ROBIN SYNDROME: A CASE REPORT

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**Aim:** craniofacial malformations associated with Pierre Robin Syndrome (PRS) pose significant orthodontic challenges due to skeletal discrepancies, dental crowding, and space limitations. This study outlines the treatment plan for an 11yo Female patient with a history of cleft palate repair, demonstrating that, despite these complexities, a functional and esthetically satisfactory outcome is achievable through a well-structured approach.

**Methods:** the initial evaluation revealed a skeletal Class I with bimaxillary retrusion, severe crowding with impaction of 34-45, vestibular position of 33, reduced incisor inclination, and an increased interincisal angle, OJ, and OB. The upper arch treatment includes a TPV for derotation of 16-26 and multibracket therapy to align the teeth and resolve crowding. In the lower arch, the extraction of impacted 35-45 will facilitate anterior

space recovery via controlled incisor proclination, allowing proper alignment of 33-43 and the subsequent repositioning of 33. A connective tissue graft in the anterior region is being considered to prevent gingival recession due to incisor proclination.

**Results:** expected improvements include correction of incisor inclination, normalization of the interincisal relationship, reduction of Overjet and Overbite, and optimal arch alignment. Proper space management and biomechanics should prevent unfavorable compensations and promote long-term stability.

**Conclusions:** this case highlights that, despite the orthodontic and skeletal challenges of PRS, a multidisciplinary approach can lead to a functional, stable, and esthetically favorable outcome.

## ORTHODONTIC TREATMENT: EXTRACTIVE CASES

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**Aim:** extraction orthodontic treatments represent a well-established therapeutic modality for the correction of complex malocclusions, mainly characterized by severe dental crowding, incisor protrusion, or moderate skeletal discrepancies. The primary objective of this strategy is to create the necessary space for dental alignment, resolution of crowding, improvement of the facial profile, and achievement of correct occlusion.

**Methods:** the decision to opt for an extraction approach is based on a careful diagnostic analysis that includes clinical, cephalometric, and study model evaluations of the patient. Factors such as the extent of crowding, the interincisal angle, the position and protrusion of the incisors, the facial biotype, and the patient's aesthetic expectations play a crucial role in treatment planning.

**Results:** the most common extractions involve premolars, strategically selected to maximize occlusal and aesthetic benefits while minimizing undesirable effects. The orthodontic mechanics used in extraction cases aim at retracting the incisors and closing the extraction spaces, with careful anchorage control to prevent unwanted tooth movements. Although extraction treatments are effective in resolving specific malocclusions, it is essential to carefully consider the potential disadvantages, such as increased treatment time, the need for greater patient cooperation, and the potential impact on the facial profile, which must be evaluated individually.

**Conclusions:** extraction orthodontic treatments remain a valid therapeutic option for the management of certain malocclusions, allowing for stable and functional results with an improvement in smile and facial profile aesthetics, provided there is an accurate diagnosis and meticulous treatment planning.

## ORTHODONTIC EXTRUSION OF CANINES INCLUDED: CASE REPORT

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**Aim:** the objective of the present study is to demonstrate the effectiveness of the extrusion of included canines and placement in the arch by the surgical-orthodontic approach.

**Methods:** the upper canine is the most commonly intruded tooth after the third molar, with rates from 0.2% to 2.8%. The prevalence of palatal impaction is higher than vestibular impaction 85% vs 15%. When inclusion is suspected, a detailed history, objective examination, and photographic and radiographic check-ups should be performed. Localization is critical in the choice of surgical approach (palatal or vestibular).

A 20-year-old female patient presented to our observation, in the first canine and molar class, with permanence of dental el-

ements 5.3 and 6.3. After CBCT analysis, it was possible to assess the actual position of included elements 1.3 and 2.3. It was decided to extrude the two deciduous canines, exposure the 13 and 23, and application of orthodontic buttons with orthodontic traction anchored trans-palatal bar. Multibrackets therapy (ROTH) with the use of self-ligating brackets and elastic springs in areas 13 and 23 to preserve the post-extraction space of the deciduous.

**Results and conclusions:** it is correct to try to reposition the included canines in the arch, these are irreplaceable elements within the oral cavity both functionally in lateral movements and aesthetically in the projection of the smile line.

## EARLY TREATMENT OF ANTERIOR AND POSTERIOR CROSSBITE IN A SKELETAL CLASS III PATIENT

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**Aim:** this case report describes the orthodontic treatment of a 10-year-old male patient with skeletal Class III malocclusion with anterior and posterior dental crossbite.

**Methods:** extraoral examination shows a concave profile with increased prominence of the chin and mandibular asymmetry to the right side. Intraoral examination revealed an Angle's molar Class II on the right side and a Class III on the left side, deviation of the lower dental midline of 4 mm to the right side, unilateral posterior crossbite between teeth 1.6 and 4.6, anterior crossbite (involving teeth 1.1-2.1-2.2 and 3.2-3.1-4.1-4.2), overjet of -2 mm and overbite of 2 mm. Cephalometric analysis revealed a skeletal class III (ANB -1.7, Wits -3.8) with retrusion of the maxilla (SNA

77.2) with a hypodivergent vertical growth pattern (FMA 20.3), highlighting the presence of a sagittal and transversal maxillary deficit. Treatment involved a Rapid Palatal Expander (RPE) to increase the maxillary transversal width combined with a Delaire facemask to promote maxillary advancement and improve overjet for a total treatment duration of 9 months.

**Results:** skeletal and dental class I were properly achieved, as well as a good transversal width of the maxilla.

**Conclusions:** early orthodontic treatment with RPE and a Delaire facemask proved effective in addressing the skeletal and dental discrepancies, leading to significant functional and aesthetic improvements.

## ORTHODONTIC TREATMENT FOR ANTERIOR CROSSBITE CORRECTION AND SMILE IMPROVEMENT IN AN ADULT PATIENT

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**Aim:** this case report describes the orthodontic treatment of a 24-year-old female patient with anterior crossbite on the right side and aesthetic concerns.

**Methods:** extraoral examination showed a flat profile with slight mandibular asymmetry to the right side. Intraoral examination revealed a bilateral Angle's molar Class I, anterior crossbite involving teeth 1.2-1.3 and 4.2-4.3, lower midline deviation of 2.2 mm to the right side, upper and lower dental crowding > 3 mm, overjet of 1 mm, overbite of 3 mm and reduced mesiodistal width of tooth 1.2 compared with tooth 2.2. Cephalometric analysis revealed a skeletal Class I (ANB 1, Wits -1.6) with a hypodivergent vertical growth pattern (FMA 15). Treatment involved dentoalveolar expansion using a Hyrax expander bonded on maxillary first molars for 9

months with a Z-spring applied to reposition tooth 1.2 vestibularly in addition to fixed multibracket MBT appliances with ceramic brackets for a total treatment duration of 26 months. Intermaxillary elastics were used to allow proper occlusal settling and moreover mesial and distal space was left at tooth 1.2 for the prosthetic rehabilitation of microdontic lateral incisor.

**Results:** the anterior crossbite, midline deviation and dental crowding were successfully corrected while the indirect veneer addressed the crown size discrepancy between maxillary lateral incisors.

**Conclusions:** the present case reported the importance of combining orthodontic and prosthetic treatment, allowing optimal finalization of multidisciplinary cases.

## TREATMENT OF MAXILLARY LATERAL INCISORS AGENESIS AND IMPACTED MAXILLARY CANINES WITH FIXED APPLIANCES: CASE REPORT

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**Aim:** the aim of this case report is to display the orthodontic therapy in a patient with agenesis of permanent maxillary lateral incisors and impacted maxillary permanent canines using fixed appliances.

**Methods:** a 12-year-old female patient presented with mixed dentition and orthodontically demonstrating a molar bilateral second class, slightly increased overbite, agenesis of elements 12 and 22 and elements 13 and 23 impacted and mesially inclined. Skeletally the patient showed a tendency to skeletal second class with a mesodivergent pattern.

The treatment plan involved orthodontic therapy with brackets on upper and lower arches, together with surgical exposure of the impacted upper canines and the use of miniscrews as

skeletal anchorage for their traction. Afterwards, upper canines were moved in position 12 and 22 along with the mesialization of posterior teeth and ending of the case in second molar class. The increased overbite was solved with lower posterior extrusion and lower anterior intrusion. The final OPT demonstrates a good root parallelism with no root resorption or osteolytic lesions.

**Results and conclusions:** the proposed orthodontic treatment provided a successful and esthetic solution to the lateral incisors agenesis and the resolution of maxillary canines' impaction. The smile esthetics was ultimately improved with the direct restoration of maxillary canines into lateral incisors.

## MULTIPLE SUPERNUMERARY TEETH IN A NON-SYNDROMIC 14-YEAR-OLD PATIENT: A CASE REPORT

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**Aim:** teeth formed in excess of the normal dental formula are defined as *supernumerary*. The presence of multiple supernumerary teeth is associated with some genetic syndromes, such as cleidocranial dysplasia and familial adenomatous polyposis, but most cases are idiopathic and non-syndromic. The aim of the study was to present a case of non-syndromic supernumerary premolars.

**Methods:** a 14-year-old boy presented to the Department of Orthodontics, Sapienza University of Rome. Radiographic examination showed the presence of 3 supernumerary premolars, of which 2 located in the upper jaw (1 left and 1 right) and 1 located in the lower jaw. The upper-left supernumerary premolar was associated with an impacted maxillary canine. A CBCT was prescribed to study the position and relation of the

supernumerary teeth to the adjacent anatomical structures and to plan the combined surgical and orthodontic treatment.

**Results:** the treatment plan consisted of surgical extraction of all 3 supernumerary teeth and element 6.3. A trans-palatal bar was cemented to the upper first molars and a TMA cantilever with a hook was used to anchor the elastic traction on the canine.

**Conclusions:** a follow-up orthopantomographic radiography was requested to monitor the position of element 2.3 and also revealed a new supernumerary tooth developing in the 4th quadrant, non-detectable in the previous 2D and 3D radiographic examinations. Therefore, both early diagnosis and appropriate follow-up with panoramic radiographs are extremely important as the risk of developing further supernumerary premolars persists.

## A SURGICAL-ORTHODONTIC TREATMENT PROPOSAL FOR A PATIENT WITH FIBROUS DYSPLASIA: LITERATURE REVIEW AND CASE REPORT

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**Aim:** Fibrous Dysplasia (FD) is a rare mosaic disorder characterized by replacement of physiological bone and marrow by expansile fibro-osseous lesions. Data on its incidence is scarce due to its rarity and the lack of epidemiological studies. It is often diagnosed as an incidental finding. Craniofacial FD has a detrimental effect on the alveolar bones of the maxilla and mandible, affecting occlusion and teeth. Dental crowding and malocclusion are the most commonly reported dental anomalies in FD patients – this is a direct consequence of the rapid expansion of the alveolar bone, which results in the incorrect positioning of teeth. This clinical case focuses on a patient with FD and a reducible disc dislocation of the left temporomandibular joint. The patient presents with a third skeletal class, hyperdivergence, bilateral cross-bite and crowding.

**Methods:** the proposed treatment plan is divided into different phases: pre-treatment evaluation with skeletal, occlusal and functional analysis; maxillary expansion (SARPE) to correct the maxillary contraction; pre-surgical fixed orthodontic treatment with evaluation of possible strategic extractions; orthognathic bimaxillary surgery to correct the skeletal discrepancy and facial asymmetry; post-surgical orthodontic trimming and coronoplasty of element 1.4; bi-arch retention at the end of treatment to stabilize results.

**Results:** improved aesthetics, correction of malocclusion and long-term occlusal stability are expected. The literature review suggests that although surgery may have a stimulating effect on dormant lesions, this risk is more relevant in patients whose growth isn't complete.

**Conclusions:** the complexity of the case prolongs the treatment time and requires a high degree of patient cooperation.

## SURGICAL ORTHODONTIC TREATMENT WITH LOW-IMPACT AESTHETIC CUSTOMIZED LINGUAL APPLIANCE IN A PATIENT WITH SEVERE SKELETAL CLASS III AT THE END OF GROWTH

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**Aim:** this case demonstrates the management of orthodontic-surgical treatment using a customized lingual technique for precise dental movement planning and pre-visualizing of the final result.

**Methods:** patient at the end of growth presented with hypomaxillia, excessive torque in the upper anterior sector, mandibular overdevelopment with dental compensation in the lower anterior sector and an accentuated Spee curve typical of skeletal Class III. Treatment involved extractions of teeth 14 and 24, using Ni-Ti arches for alignment. Steel arches with Extra Torque 13° in the upper arch and Extra Extra Torque 21° in the lower arch were employed to close the upper extraction spaces, decompensate the lower arch, flatten the Spee curve and correct angulation of the anterior teeth. This decompensation facilitated the elongation of the arch line for proper occlu-

sion post-surgery. Digital planning of the orthodontic appliance and surgical movements led to improved occlusal results and facial aesthetics. Finishing was done with Beta-Titanium 18 x 18 arches and vertical elastics.

**Results:** the customized lingual appliance was effective in achieving the desired orthodontic-surgical outcomes, with no limitations during the surgical preparation phase. The appliance allowed pre-visualization of the final tooth positions, aiding in precise arch movement while maintaining invisibility throughout treatment.

**Conclusions:** the orthodontic-surgical treatment, combining a customized lingual appliance and digital planning, produced excellent functional and aesthetic results, meeting the patient's expectations.

## EARLY TREATMENT OF SKELETAL CLASS II MALOCCLUSION WITH RAPID MAXILLARY EXPANSION: A SPONTANEOUS IMPROVEMENT

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**Aim:** this case report describes the orthodontic treatment of an 8-year-old male patient with skeletal Class II malocclusion associated with a transverse maxillary deficit.

**Methods:** extraoral examination showed a convex profile and slight mandibular asymmetry to the right side. Intraoral examination revealed a bilateral Angle's molar Class II, lower midline deviation of 2.5 mm to the right side, unilateral posterior crossbite involving teeth 1.6 and 4.6 and overjet of 7 mm with overbite of 0.1 mm. Cephalometric analysis revealed a skeletal class II (ANB 5.1, Wits 4.5) with the presence of a mild maxillary protrusion (SNA 84) and normodivergent vertical growth

pattern (FMA 22.8). Treatment involved a Rapid Palatal Expander (RPE) with an activation protocol of 1 rotation per day for 35 days and a total treatment of 12 months to correct the transverse maxillary deficiency.

**Results:** following RPE, overjet and overbite values were corrected, and spontaneous improvement of the Class II malocclusion was observed related to a forward position of the mandible.

**Conclusions:** early RPE effectively corrected the transverse deficiency, resulting in spontaneous Class II improvement and enhanced facial aesthetics. These findings emphasize the importance of timely intervention in young patients.

## TWO-PHASE ORTHODONTIC TREATMENT OF SKELETAL CLASS II MALOCCLUSION IN A GROWING PATIENT

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**Aim:** this case report describes the orthodontic treatment of an 8-year-old male patient with skeletal Class II malocclusion due to mandibular retrusion and severe upper incisor proclination.

**Methods:** extraoral examination showed a convex profile, slight mandibular asymmetry to the left side, labial incompetence and lower lip interposition between the dental arches. Intraoral examination revealed a bilateral Angle's molar Class II, unilateral posterior crossbite involving teeth 2.6 and 3.6, lower anterior crowding of 1.5 mm and increased overjet and overbite (8 mm and 4.5 mm, respectively). Cephalometric analysis revealed a skeletal class II (ANB 5, Wits 2.51) with a retrusion of mandible (SNB 77) and hypodivergent vertical

growth pattern (FMA 18). The treatment followed a two-phase approach: the first phase involved the functional appliance SN1 for 18 months to resolve skeletal Class II while expanding the maxillary arch; the second phase, initiated after the eruption of permanent dentition, involved fixed multibracket MBT appliances for 18 months to refine dental alignment and optimize occlusal relationships.

**Results:** the two-phase treatment successfully improved skeletal and dental relationships, reducing overjet, deep bite and transverse discrepancies.

**Conclusions:** early intervention allowed for optimal skeletal development, while the final fixed appliance allowed the proper occlusal settling for a long-term stability of the results.

## FIXED MULTIBRACKET ORTHODONTIC TREATMENT IN A PATIENT WITH PIERRE ROBIN SEQUENCE AND DELAY IN COGNITIVE DEVELOPMENT: A CASE REPORT

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**Aim:** the aim of this work is to present a clinical case of a 13-year-old patient affected by Pierre Robin Sequence (PRS) who was treated with fixed multibrackets therapy. PRS is a rare pathology associated with micromandibulia, glossoptosis and cleft palate. The main objective of the treatment was tooth alignment and occlusion improvement to improve oral hygiene and aesthetics (as requested by the patient and his family).

**Methods:** the patient, who underwent previous surgery to treat the cleft palate, showed a skeletal and dental class II, labial incompetence and micromandibulia, complete permanent dentition, very severe crowding, ogival palate and increased overjet. The patient was initially uncompliant, since PRS can lead to a delay in cognitive development.

A classic 4 extraction fixed orthodontic treatment was performed together with the use of class II elastics. The aim of this treatment was to improve the dental alignment and the dental and skeletal relationship and to facilitate teeth brushing by the patient. The treatment lasted 18 months and, at the end of it, the patient received upper and lower removable retainers.

**Results:** improved tooth alignment and improved dental class II, solving crowding and optimizing occlusion for better brushing and to facilitate social relationships.

**Conclusions:** although this was a complex case, considering patient's clinical history and limited compliance, the treatment achieved a good orthodontic compromise, improving function, oral hygiene and aesthetics.

## ORTHODONTIC TREATMENT AND CLEIDOCRANIAL DYSOSTOSIS: TWO CASES REPORT

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**Aim:** the aim of this work is to present the orthodontic treatment of two patients affected by cleidocranial dysostosis who presented its typical features: micromaxillia combined with the impaction of all the permanent teeth. The orthodontic treatment aimed at recovering the largest number of the impacted teeth while providing a better oral function and occlusion.

**Methods:** both patients came to our attention in the early mixed dentition period and showed reduced palatal diameter, family history of impacted permanent teeth.

Both patients were first treated with Rapid Palatal Expander (RPE) and then they underwent the sequential extraction of the deciduous teeth combined with the orthodontic/surgical recovery of the permanent ones.

The orthodontic treatment was long and it ended with multibracket fixed appliance and the recovery of the impacted upper canines. At the end of the orthodontic treatment, both patients received a fixed retainer in the lower jaw and a removable one in the upper.

**Results:** permanent teeth occlusion as well as tooth alignment and oral function was achieved with multidisciplinary treatment (orthopedic and orthodontic treatment and surgical impacted permanent teeth exposure).

**Conclusions:** taking into account clinical history and familiarity, the treatment achieved good orthodontic results, not only from an aesthetic point of view but also from a functional one, considering the initial condition of the patient. Compliance of the patient in a long time orthopedic and orthodontic treatment was crucial.

## COMPLETE DIGITAL WORKFLOW FOR A FULLY INDIVIDUALIZED CASTED RAPID-PALATAL-EXPANSION DEVICE: A CASE REPORT

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**Aim:** the aim of this case report is to evaluate if a fully digital approach, avoiding the traditional analog impression, can be successful in generating a faster workflow improving the collaboration between the orthodontist and the lab technician with a benefit on time and costs.

**Methods:** a 7-year-old patient presented with a class I malocclusion, transverse maxillary deficiency with a mono-lateral crossbite on the right side and a functional mandibular shift. The first step consisted of taking digital impressions of both jaws and of the bite, using an intraoral scanner. Following the scanning process, the STL-files were sent to the laboratory using the direct link. The device was then designed by the technician using appliance designer software according to the clinician's preferences. The CAD-CAM process ended with the

manufacturing of a completely individualized appliance respecting fully the teeth anatomy and the interdental spaces. Finally, the device was inserted in the mouth with a very simple and easy technique.

**Results:** at the end of the 30-day rapid protocol period of expansion the device was left in situ for 9 months for retention before debonding.

**Conclusions:** a complete digital workflow based on CAD/CAM for fabricating orthodontic appliances gives the possibility to eliminate the patient discomfort of conventional impressions and the dimensional changes or other drawbacks of the traditional impression material. Moreover, no separators are needed and also the chair-side time in the orthodontic office is reduced. However, this digital approach is subject to a learning curve.

## METAL-FREE PALATAL EXPANSION: A CASE REPORT

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**Aim:** the aim of this study is to illustrate a new concept for approaching maxillary expansion with a metal-free fixed automatic appliance.

**Methods:** ZeroExpander® in PA12 is a complete CAD-CAT full digital and automatic metal-free fixed device. It is designed to expand the maxilla in a pre-programmed automatic way using deciduous teeth as anchorage. PA12 is a biocompatible, lightweight, and durable material with thermal stability up to 185°C. Due to its higher flexural strength compared to other polymers, PA12 ensures effective and controlled expansion without requiring patient compliance.

To present this innovative system, we illustrate a clinical case of a 6-year-old girl with a transverse palatal deficiency, left-side crossbite, and mixed dentition.

**Results:** at the end of the treatment, a new intraoral scan was performed to compare it with the initial situation. The intercanine diameter, the distance between the palatal cusps of the deciduous molars, and the permanent molars were compared. The achieved intercanine diameter (31.29 mm) is greater than the initial diameter (26.16 mm) but smaller than the planned one (34.24 mm). At the level of the second deciduous molars, the achieved expansion (38.15 mm) is greater than both the planned expansion (36.18 mm) and the initial measurement (32.50 mm).

**Conclusions:** despite minor discrepancies between the planned and final outcomes, ZeroExpander® proved to be an effective device for correcting palatal deficiency and crossbite.

## SURGICAL-ORTHODONTIC RESOLUTION OF AN IMPACTED UPPER 17 IN A 19-YEAR-OLD PATIENT

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**Aim:** tooth impaction is a common condition in dental practice. This case report highlights the importance of strong collaboration between surgical and orthodontic skills in multidisciplinary cases.

**Methods:** a 17-year-old female patient presented to our department requesting orthodontic treatment. She exhibited a Class III malocclusion with an open bite, along with impaction of teeth 17 and 37. The treatment plan included extraction of teeth 18 and 48 to create space for the eruption of the second molars, and fixed multibracket therapy with extraction of teeth 14, 24, 34, and 44. Posterior crowding is often resolved through germectomy of third molars and spontaneous eruption of the second molars. However, in this case, surgical exposure of both upper and lower second molars was necessary,

followed by specific orthodontic traction to achieve proper alignment with the rest of the dentition.

**Results:** treatment lasted two years. Posterior crowding was resolved through combined surgical and orthodontic approaches. Proper alignment of the second molars was achieved, and Class I molar and canine relationships were established and maintained. Functional and aesthetic occlusion improvements were observed.

**Conclusions:** the success of complex surgical-orthodontic cases involving impaction or inclusion depends on effective surgical access to allow precise orthodontic traction of the impacted teeth. Surgical skills are just as crucial as orthodontic expertise. The combination of both disciplines is essential to the success of such cases.

## YOUNG PATIENT TREATED WITH FUNCTION GENERATING BITE: CASE REPORT

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**Aim:** the aim of this case is to present the therapy management of a young patient whose chief complaint was to improve his function. The proposed treatment was based on function generating bite.

**Methods:** the 10-year-old male patient presented molar class II on the right and neutral on the left, skeletal class I with ipodivergent pattern, increased overjet and overbite. He presents a scissor bite on the 2.5 element. It has been used a function generating bite with inferior lip bumper in order to obtain the

development and remodeling of the inferior alveolar bone thanks to distancing of the lower lip from the lower frontal group. Furthermore, a coil has been added on 2.5 to correct the scissor bite.

**Results and conclusions:** in conclusion, the FGB achieved orthodontic correction and also corrected masticatory function. It has been solved the scissor bite on the 2.5 element, the deep bite and the increased overjet. An esthetic improvement of the smile has been obtained.

## MULTIPLE DENTAL IMPACTION IN A PATIENT WITH REFSUM'S DISEASE: A CASE REPORT

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**Aim:** Refsum's disease is a rare metabolic disorder characterized by anosmia, cataracts, early onset retinitis pigmentosa, and neurological symptoms, such as peripheral neuropathy and cerebellar ataxia. Other clinical features include deafness, ichthyosis, skeletal abnormalities, and cardiac arrhythmia. From a biochemical point of view, it is characterized by the accumulation of phytanic acid in plasma and tissues, no alterations in dental development are described. To the best of our knowledge no evidence links Refsum's disease to dental impaction. The present study reports a case patient with Refsum's disease who manifests impaction of multiple teeth.

**Methods:** a 24-year-old female patient affected by Refsum's syndrome was referred to the Department of Orthodontics,

Catholic University of the Sacred Heart, Rome, Italy requesting oral rehabilitation. The patient reported masticatory difficulties, functional limitations and aesthetic discomfort due to the lack of dental elements. Intraoral examination revealed the presence of elements 3.1, 5.4 and 7.4, and probably 2.5 as residual root fragment. The orthopantomography (OPG) revealed the impaction of numerous dental elements and an irregular crown and root development of the impacted teeth.

**Results:** the genetic mutations in Refsum's disease could affect the dental tissues, as derived from the same embryonic sheet of the tissues involved in the syndrome.

**Conclusions:** further studies are needed to investigate potential oral pathognomonic signs of Refsum's disease.

## INTEGRATED SURGICAL-ORTHODONTIC MANAGEMENT OF BILATERAL PALATALLY IMPACTED CANINES IN CLASS II PATIENT WITH MAXILLARY INCISOR ANOMALIES: A CASE REPORT

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**Aim:** maxillary canine impaction and misalignment is a common orthodontic issue in permanent dentition due to different causes. A combined surgical-orthodontic approach is often required to ensure proper alignment and function. The aim of this case report was to illustrate the smile rehabilitation through the simultaneous

surgical exposure and orthodontic alignment of two impacted maxillary canines, in conjunction with the management of the agenesis of the upper right lateral incisor and a conoid-shaped upper left lateral incisor.

**Methods:** following the completion of the multibracket fixed orthodontic phase to establish proper anchorage, the upper deciduous canines were extracted. A full-thickness palatal flap was surgically created to facilitate the traction of the permanent canines, and an orthodontic eyelet with passive metal

looped ligatures was placed. One-week post-surgery, traction was initiated using the double-arch technique. Subsequently, elements 2.2 and 5.2 were extracted. To improve both the aesthetics and functionality of the canines, restorative treatment was carried out following orthodontic treatment.

**Results:** the impacted canines were successfully repositioned into the dental arch with proper alignment, function, and aesthetics. The final phase involved composite restorations of the canines to mimic lateral incisors, achieving a harmonious smile.

**Conclusions:** this multidisciplinary approach allowed a functional and aesthetic restoration, demonstrating the effectiveness of combining orthodontic traction, surgical exposure, and restorative techniques in managing complex impaction cases.

## USE OF THE PEDIATRIC SLEEP QUESTIONNAIRE (PSQ) AS A TOOL FOR ASSESSING QUALITY OF LIFE AND SLEEP IN A PATIENT WITH ADENOID HYPERTROPHY PRE- AND POST-ORTHODONTIC TREATMENT WITH ERP AND DELAIRE MASK

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**Aim:** to evaluate PSQ as the sole prognostic tool in an oral breather, given the high cost of PSG associated with orthodontic therapy using ERP and Delaire mask.

**Methods:** a 7-year-old child with 80% adenoid hypertrophy and Class III malocclusion with bilateral crossbite presented to the ENT for respiratory difficulties. A combined ENT and orthodontic therapy with ERP and Delaire mask was decided to assess potential changes through a multidisciplinary approach. The PSQ was chosen as the sole monitoring tool due to the high cost of PSG. The parent completed the PSQ questionnaire pre- and post-orthodontic treatment, addressing the child's sleep quality and quality of life. The PSQ consists of 22

questions with responses of YES, NO, or DON'T KNOW, calculating the probability of high respiratory risk by summing all YES responses divided by the total number of questions (22). A value >0.33 indicates a high risk of respiratory problems.

**Results:** at the beginning of treatment, our patient had a PSQ value of 0.1, which improved to 0.

**Conclusions:** in this specific case, it emerged that at the beginning of orthodontic therapy, the PSQ score was low, and an improvement in respiratory quality was observed. The questionnaire proved to be easy and quick to complete, but it is important to emphasize that it cannot be used as the sole monitoring tool.

## SOCIAL STRESS: THE IMPACT ON TEMPOROMANDIBULAR DISORDERS

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**Aim:** the aim of this review is to analyze the consequences of prolonged use of social media, considering both emotional effects (anxiety, stress, depression) and functional effects, with a specific focus on myo-articular dysfunction. Continuous exposure to virtual interactions through social media can increase muscle tension, which over time may impair the control of muscles responsible for mouth opening and closing, affecting chewing, swallowing, and speech.

**Methods:** the research was conducted on the main electronic databases (PubMed, Scopus, Medline). The keywords used were “stress and TMJ,” “social media and muscle stiffness,” and “social networks and neck tension.” For this literature review, articles published from 2023 onwards were examined, and only 20 articles met the inclusion and exclusion criteria.

**Results:** studies have shown that prolonged muscle hyperactivity caused by social stress can result in soreness in the masticatory muscles, limited mouth opening, jaw locking, jaw clicking, headaches, dizziness, neck and shoulder stiffness, and a sensation of blocked ears. Moreover, limiting social network use to one hour per day has been associated with a significant reduction in temporomandibular disorders and an improvement in social relationships.

**Conclusions:** this review shows that TMJ disorders may be caused by prolonged use of social media. Therefore, practicing “digital detox” (periodic disconnection) by limiting social media use and promoting offline activities such as physical exercise, meditation, face-to-face interactions, and creative hobbies is beneficial.

## LRP6 GENE MUTATION: MULTIPLE AGENESIS AND ORTHO-PROSTHETIC PLANNING

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**Aim:** the aim of this study is to illustrate the orthodontic-prosthetic protocol for a patient with an LRP6 gene mutation.

**Methods:** the patient, an 11-year-old male, presents with an exon 3-11 deletion of the LRP6 gene, associated with selective dental agenesis type 7. The treatment plan consists of an initial phase involving prosthetic rehabilitation of the edentulous area in the lower arch using a removable resin device. This will later be replaced, after the complete development of the mandibular arch, with a fixed implant-supported prosthesis. In the upper arch, selective ameloplasty of the canines is planned to compensate for the absence of lateral incisors, along with a fixed prosthetic solution for the posterior region. Additionally, orthodontic treatment is included to improve and restore proper intra- and inter-arch occlusion.

**Results:** in the first phase of treatment, the removable prosthesis successfully restored masticatory, phonatory, and aesthetic functions, with excellent patient acceptance. In the maxillary arch, a conservative approach with ameloplasty was performed, and subsequent orthodontic and prosthetic phases will be completed.

**Conclusions:** this case report highlights the importance of early diagnosis, continuous follow-up, and a multidisciplinary therapeutic approach in patients with oligodontia. A personalized treatment plan adapted to the patient’s growth and dentition, ensures optimal functional and aesthetic outcomes, ultimately improving overall oral health and quality of life.

## ORTHODONTIC TRACTION OF VESTIBULAR IMPACTED MAXILLARY CANINE THROUGH VISTA TECHNIQUE: A CASE REPORT

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**Aim:** this research investigates the reaction of the gingival tissues to the subperiosteal pressure of the nickel-titanium coil during the traction of an impacted maxillary canine at the vestibular level through VISTA technique.

**Methods:** in this case report a 12-year-old patient came to our observation for the treatment of the vestibular impaction of dental element 1.3. The VISTA technique was therefore required. A CBCT was requested from the patient before performing the surgical intervention. Subsequently, the surgical intervention was carried out under local anesthesia, which involved two incisions: one at the level of the impacted canine for its exposure, and the other at the site for positioning the orthodontic mini-screw at the level of the second premolar, thereby creating a subperiosteal tunnel connecting the inci-

sions. A Ni-Ti coil was then inserted within the subperiosteal tunnel, connecting the orthodontic mini-screw and the button previously bonded on the canine. A control photograph was taken one week after the intervention, and subsequently, a new scan and photograph were performed one month later.

**Results:** the photographs and scans performed one month later show a recession of the gingival tissues up to the exposure of the underlying nickel-titanium spring. A condition of generalized gingivitis was observed in the treated area, compounded by the patient's poor hygiene.

**Conclusions:** the VISTA technique proved, for this patient, to be not respectful of the gingival tissues. New scientific studies will be necessary to evaluate the correlation with the traction force of the Ni-Ti coil and with oral hygiene.

## BONNET'S LINGUAL ELEVATOR IN ORTHODONTIC INTERCEPTIVE THERAPY AND MYOFUNCTIONAL THERAPY

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**Aim:** a child's proper development while growing up could be affected by bad habits and parafunctions, such as prolonged dummy use, thumb sucking and breathing abnormalities, which could lead to an open mouth attitude or even growth pattern.

However, speech therapy and the interruption of bad habits may be necessary but not sufficient for the correction of the open bite. Nevertheless, there are interceptive orthodontic devices such as Bonnet's Night Lingual Elevator that guarantee the expected result. The purpose of this study is to highlight how important it is to combine the two therapies in case of an open bite in order to avoid the recurrences that would occur if only speech therapy were used.

**Methods:** a group of 20 patients with mixed dentition and anterior open bite, caused by spoiled habits or atypical swallowing, was evaluated. Half of the patients underwent myofunc-

tional speech therapy; the other half also associated with Bonnet's Lingual Elevator device. The ELN acts as a lingual sheath for functional tongue reeducation.

Patients have worn the device for a whole year. The speech therapy carried out by the patients included the use of lingual elastics, instruments to relax facial muscles contracted due to atypical swallowing, and wooden chopsticks to improve lip incompetence. The exercises were performed both with and without the food bolus chewing in place.

**Results and conclusions:** two years after treatment, it appears that the patients who took ELN did not relapse, unlike those who, on the other hand, only underwent myofunctional speech therapy of which some had relapsed. To conclude, Bonnet's lingual elevator is an excellent support to myofunctional speech therapy for the resolution of anterior open bite, especially in long-term stability.

## INTERDISCIPLINARY CLINICAL MANAGEMENT OF AN AVULSED AND REIMPLANTED LATERAL INCISOR: A CASE REPORT

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**Aim:** this study aims to investigate the long-term stability of an avulsed and reimplanted maxillary lateral incisor in an adolescent patient.

**Methods:** an 11-year-old male patient presented to the emergency department for avulsion of tooth 12, accompanied by a fracture of the buccal alveolar wall and gingival laceration at the site of trauma. The clinical management involved the collaboration of three highly specialized professionals: the Oral Surgeon assessed the viability of the reimplantation both clinically and radiographically and subsequently performed a suturing procedure on the buccal portion of the tooth site. The Orthodontist implemented passive bonded splint on the adjacent teeth to stabilize the reimplanted tooth. The splint was removed only after 12 weeks due to the presence of a buccal alveolar fracture. The Endodontist conducted close clinical and radiographic follow-ups at 1, 2, 3, and 6 months. During these

follow-ups, no mobility, presence of fistulae, or symptoms were observed, along with an absence of signs indicative of ankylosis, and the vitality test consistently showed a slightly positive outcome. At the 6-month follow-up, discoloration and an initial process of root resorption were noted, prompting the decision to proceed with endodontic treatment of the tooth. **Results:** after 2 years of follow-up, the patient reported no symptoms; the tooth exhibited no ankylosis, was stable, and the periodontal health was satisfactory.

**Conclusions:** therapeutic success in patients with avulsion of a dental element treated with reimplantation is contingent upon the time elapsed from avulsion to reimplantation, which should be performed as soon as possible according to clinical guidelines, and upon a multidisciplinary clinical management approach that involves heterogeneous and highly specialized professionals.

## SYNERGY BETWEEN TADS AND LASER MELTING DEVICES: A NEW PROTOCOL FOR ORTHODONTIC ANCHORAGE - A CASE REPORT

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Skeletal anchorage represents one of the most effective strategies in managing complex orthodontic movements, especially in cases of early anchorage loss in the posterior sectors. This case report describes the use of a fully digital workflow for the design and fabrication of customized devices, manufactured through laser melting technology, by reusing pre-existing palatal miniscrews to achieve controlled retraction of the upper canines and incisors.

Following the extraction of teeth 14 and 24, a rapid loss of posterior anchorage was observed, requiring a skeletal anchorage system to control anterior tooth movement. A digital project was developed using CBCT and intraoral scans, designed with dedicated CAD software, and realized through laser melting technology to produce two custom-made anchorage devices.

The palatal miniscrews, initially placed between teeth 16/15 and 26/25 to support a failed skeletal expansion device, remained stable and optimally positioned, allowing their reuse within the new treatment protocol.

The biomechanical approach included alignment with thermal archwires, progressing to a 16 x 22 stainless steel archwire. This setup enabled the activation of 300 g coil springs for the controlled and gradual distalization of the upper canines.

The integration of customized devices with skeletal anchorage and conventional orthodontic biomechanics optimized treatment efficiency and control. This case highlights the clinical potential of combining digital innovation with daily orthodontic practice, improving precision and predictability even in challenging anchorage conditions.

## MARPE ON A 14-YEAR-OLD MALE PATIENT WITH BILATERAL CROSS BITE: A CASE REPORT

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**Aim:** the aim of this case report is to describe a case of maxillary expansion in a growing male patient with bilateral crossbite using a skeletal anchorage expander. The case is then completed with the use of a fixed orthodontic appliance.

**Methods:** the patient is 14 years old at the start of treatment and presents with: hypodivergent skeletal Class II, contracted maxilla with bilateral crossbite, mild dental Class II with increased overjet and decreased overbite. There is spacing in both the upper and lower arches with a large interincisal diastema. The treatment plan involves an initial phase of palatal expansion anchored by two mini-screws and bands on the upper first molars. The design of the device and the positioning of the mini-screws were planned to use CBCT; the appliance was delivered following a “one-visit” protocol. A total of 38 activations were performed, one per day. At the end of the activation phase, the patient presented with a noticeable interincisal di-

astema. The case was completed with an Alexander Discipline fixed appliance, with a total treatment duration of 22 months.

**Results:** at the end of treatment, a good bilateral Class I was achieved with proper arch forms and transverse diameters, corrected overjet and overbite, and healthy supporting tissues.

**Conclusions:** this case report demonstrates how the use of a mini-screw anchored expander allows for maxillary expansion and resolution of significant bilateral crossbite even during the peak growth period. The support provided by the mini-screws is crucial for properly opening the suture, preventing the entire force from being applied to the permanent first molars, thus avoiding unwanted dental effects and excessive stress on the supporting tissues. Another advantage is the provision of absolute anchorage for space closure mechanics.

## A MODIFIED HAWLEY PLATE RETAINER TO CORRECT THE POST-ORTHODONTIC SCISSOR-BITE OF UPPER SECOND MOLARS: A CASE REPORT

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**Aim:** this study aims to describe a personalized approach using a modified Hawley plate to correct a scissor bite on elements 1.7 and 2.7 by moving the teeth palatally.

**Methods:** a 14-year-old female patient came for a check-up at the Department of Orthodontics, Catholic University of the Sacred Heart, Rome, Italy. Intraoral examination revealed Angle's molar and canine Class I on both sides. Cephalometric analysis showed a normodivergent pattern (FMA 23,8°), a skeletal Class I relationship (ANB 2°) and bimaxillary retrusion. The patient had previously undergone a fixed multibracket therapy. At the end of treatment, the patient started wearing a Hawley retainer for the upper arch and an Essix retainer for the lower arch. During the follow-up visit, it was found that the upper

second molars were erupting buccally, determining a bilateral scissor-bite.

**Results:** the clinicians bonded buttons on the vestibular surface of the maxillary second molars. Intraoral elastics (4.5 Oz. 1/8) were worn between the buttons and a pin placed on the Hawley plate. The patient was instructed to wear intra-oral elastics 20 hours a day. After two months, the maxillary second molars were repositioned palatally and the scissor bite was connected.

**Conclusions:** the present approach achieved the goal of correcting the scissor-bite with no need for an additional orthodontic appliance, modifying the same retainer used by the patient.

## LINGUAL ORTHODONTIC RETREATMENT OF A CLASS II MALOCCLUSION WITH ANTERIOR OPEN BITE IN AN ADULT PATIENT

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**Aim:** a 26-year-old woman came for an orthodontic evaluation; she has gone through a previous orthodontic treatment and at the moment she had retainers from 12 to 23 and from 33 to 43. She presented a skeletal class II, a canine and molar class II relationship and an anterior open bite.

**Methods:** the aim of the retreatment was to solve his malocclusion giving her the best function, aesthetic and stability possible. It was opted to treat her with a lingual orthodontic treatment involving the use of elastics. From the beginning, we knew that the case would finish in class II.

We bonded the customized lingual system in November 2023 and that is the sequence that was followed:

1. 0.16 Ni-Ti Wire upper and lower till the first molars;
2. 16 x 22 Ni-Ti archwires, the second molars were included in the appliance at this stage;
3. 18 x 25 Ni-Ti;
4. 16 x 24 SS with second class elastics;
5. 18 x 18 Beta-Ti with intercuspitation elastics.

**Results and conclusions:** the lingual appliance was removed after 18 months of active treatment. The treatment was concluded as planned in second molar class with a correct overbite, the patient really appreciates the result. Now she is going to do an aesthetic rebuilding on the cuspids of the canines.

## COMPARISON OF SKELETAL AND AIRWAY CHANGES BETWEEN SUBJECTS WITH CLASS II MALOCCLUSION TREATED WITH FUNCTIONAL THERAPY IN THE PRE-PUBERTAL PHASE AND PUBERTAL PHASE

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**Aim:** to evaluate the bone-level and upper airway changes induced by the Twin Block device in patients with Class II malocclusion from mandibular retrusion, using 2D imaging techniques, and to compare any changes between the pre-puberty and pubertal phases and during the growth peak.

**Methods:** twenty patients (9 males; 11 females) with Class II malocclusion treated with Twin Block were analyzed and latero-lateral telerradiographs, acquired at the beginning of treatment (T0) and at the end of treatment (T1), were used.

The sample was divided into two study groups, Pre-Peak group and Peak group, each consisting of 10 subjects, classified according to skeletal maturity assessed at T0, by the Cervical Vertebral Maturity method (CVM).

The patients were instructed to wear the device 24 hours a day, except during meals and oral hygiene, and were followed every 4 weeks.

To assess the effects of the Twin Block on skeletal effects and upper airway dimensions, latero-lateral radiological images at T0 (before treatment) and T1 (at the end of treatment) were plotted using cephalometric software (DeltaDent).

Data was processed using IBM SPSS Statistics version 20, M-DEAP version 2 and Microsoft Excel 365. The t-test was used to determine whether there is a significant difference in cephalometric tracings between subjects.

**Results:** the results show clear differences between the pre-treatment group and the post-treatment group in several cephalometric measurements. Comparison between Pre-peak and Peak groups showed no significant differences except for H-C3a1 and Height (th) values, which were found to be statistically significant ( $p < 0.05$ ).

**Conclusions:** functional Twin Block therapy was effective not only in improving dental and mandibular position, but also in positively influencing upper airway development.

## EARLY TREATMENT OF PATIENTS IN SKELETAL CLASS III WITH ELASTODONTIC APPLIANCES, VARIATION OF OVERJET AND PROJECTION OF POINT A: TWO GROUPS COMPARED

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**Aim:** the study aimed to evaluate the modification of the overjet and the projection of the point A in the orthodontic treatment of Class III malocclusion in patients with anterior cross-bite and negative ANB. All the selected patients had mixed dentition with an age between 4 and 6 years.

**Methods:** 20 patients were selected, between females and males, aged between 4 and 6 years. Ten patients, of which 7 females and 3 males, corresponding to group A, were treated with elastomers, in particular with EF KIDS® appliances. The patients of this group were asked to wear the appliance for two hours a day and all night. They were also asked to perform daytime exercises, while using them. The treatment on the patients of group A lasted 1 year. The second group, group B, composed of ten patients, 7 males and 3 females, was asked to come to the check-up every 3 months without using any device, for a period of one year.

**Results:** all patients in group A presented a resolution of the anterior cross bite with an increase in the overjet and an improvement in the projection of point A with respect to the Frankfurt plane. Patients in group B presented in 50% of cases (5 patients, 3 females), an improvement in the anterior cross bite and overjet.

**Conclusions:** the resolution of the anterior cross bite, the improvement in the projection of point A and overjet are attributable both to the use of the device and to the compliance of the patients. In fact, it has been seen that in patients aged between 4 and 6 years, with mixed arches but in the absence of the first upper molar, it is possible to start early treatment with EF KIDS® if the patient is fully cooperative. In this case, there will be a resolution of the crossbite and an advancement of point A. In the absence of cooperation or in the absence of treatment, only in 50% of cases will the same result be observed. The result seems to be independent of gender.

## RELATIONSHIP BETWEEN OCCLUSION AND POSTURE: MULTIDISCIPLINARY APPROACH IN ORTHODONTIC DIAGNOSIS

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**Aim:** this study investigates the relationship between occlusion and posture, aiming to establish a correlation between these factors and demonstrate how a multidisciplinary approach can improve patient outcomes in orthodontic treatment.

**Methods:** patient data was analyzed by sex, age, Angle class anomalies, parafunctions, treatment reasons, and issue origin (ascending or descending). Postural evaluations were performed using a podoscope for foot symmetry, a scoliometer, and a stabilometric platform to measure load distribution. Measurements were taken under normal occlusion and occlusion deprogramming conditions, with cotton rolls and eye references. The hip rotator test was also included.

**Results:** the study found a significant link between the resolution of occlusal problems and the improvement of postural issues. Patients in their developmental stages showed notable improvements, while older patients experienced limited changes due to more entrenched issues. These findings highlight the role of age in the success of orthodontic treatments.

**Conclusions:** the study suggests that orthodontic treatment can address both occlusal and postural dysfunctions effectively. It also explains why some treatments fail, citing the neglect of external factors affecting the stomatognathic system. This reinforces the need for a comprehensive, interdisciplinary approach to ensure optimal patient outcomes and prevent recurrences.

## CORRELATION BETWEEN HEAD AND CERVICAL POSTURE AND MALOCCLUSION

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**Aim:** this literature review explores the relationship between cranio-cervical posture and sagittal skeletal malocclusions, focusing on cervical curvature, head posture, and the influence of skeletal classification on craniofacial development.

**Methods:** the available scientific literature was examined, selecting studies published between 2015 and 2025 that explore the relationship between cranio-cervical posture and skeletal malocclusions of Class I, II, or III. The studies were analyzed and qualitatively synthesized to identify key trends, methodologies, and emerging findings in the field.

**Results:** significant correlations emerged between sagittal skeletal malocclusions and cranio-cervical posture. Class II malocclusion was linked to increased cervical curvature and

forward head posture, whereas Class III individuals exhibited a straighter cervical column and a more posterior head position. Morphological variations in cervical vertebrae were also noted, particularly in relation to head posture and craniofacial structure. However, considerable heterogeneity was found across studies regarding sample populations, measurement techniques, and classification criteria.

**Conclusions:** these findings highlight a strong interrelationship between cranio-cervical posture and sagittal skeletal classification, underscoring its clinical relevance for orthodontic diagnosis and treatment planning. Further longitudinal studies are needed to establish causal relationships and optimize orthodontic management strategies.

## MANAGEMENT OF LEE-WAY SPACE IN MIXED DENTITION USING A LINGUAL ARCH: A LITERATURE REVIEW

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**Aim:** crowding and early loss of deciduous teeth are common challenges during the transition from mixed to permanent dentition. The aim of this systematic review is to evaluate the efficacy of the passive lingual arch in preserving arch length and managing leeway space, while analyzing its effects on the linear and angular positioning of permanent teeth.

**Methods:** a systematic literature review was conducted using PubMed, Scopus and Web of Science. After screening 255 articles, 7 studies meeting the predefined selection criteria were included and utilized to compile the PICO table.

**Results:** the selected studies agree that the application of a passive lingual arch is effective in preserving arch length. Ob-

served changes in the linear and angular positions of permanent teeth - specifically, distal tipping of molars and labial inclination of incisors - were considered indicative of the technique's efficacy. However, one author did not report these changes, noting only the prevention of mesial tipping and lingual displacement of molars and incisors.

**Conclusions:** the use of a passive lingual arch during the transition from mixed to permanent dentition is advantageous for correcting mild anterior crowding, maintaining space after early loss of deciduous molars, and preventing impaction of permanent premolars. This appliance can be applied following an accurate diagnosis and a well-defined treatment plan.

## CORRELATION BETWEEN FACIAL MORPHOLOGY AND OSAS SEVERITY IN CHILDREN: A SYSTEMATIC REVIEW

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**Aim:** Obstructive Sleep Apnea Syndrome (OSAS) is a condition characterized by repeated interruptions in breathing during sleep, caused by a complete or partial obstruction of the upper airway. This review examines recent literature on the facial morphology of children with OSAS, assessed through photographic analysis, and its correlation with disease severity.

**Methods:** a literature search was conducted in Medline-PubMed, Scopus, and WoS, including studies published in English between 2019 and 2024 focusing on children. Keywords: sleep apnea, facial morphology, craniofacial photography.

**Results:** out of 196 studies analyzed, 4 were selected, highlighting a correlation between craniofacial characteristics and OSAS severity.

1. Tyler et al. (2022) reported an association between a more obtuse facial convexity angle and severe OSAS.
2. Sutherland et al. (2019) found that a larger cervicomental angle and a higher lower-to-upper facial height ratio were linked to disease severity.
3. Wang et al. (2023) identified lower facial width (FFW) as a key parameter in OSAS.
4. Hsueh et al. (2022) observed a significant increase in the mandibular plane angle in children with OSAS.

**Conclusions:** a correlation exists between OSAS and craniofacial parameters such as facial convexity, cervicomental angle, lower-to-upper facial height ratio, lower facial width, and mandibular plane angle. However, the current literature remains limited, underscoring the need for further research.

## THE USE OF QUESTIONNAIRES IN PAIN ASSESSMENT DURING ORTHODONTIC TREATMENTS: A NARRATIVE REVIEW

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**Aim:** the objective is to identify the questionnaires and promote an approach that considers both the intensity of pain and its emotional and psychological components.

**Methods:** a narrative review of the available scientific literature on major pain assessment tools was conducted. Both unidimensional questionnaires, such as the Visual Analog Scale (VAS) and Numerical Rating Scale (NRS), and adaptations of questionnaires for pediatric patients (Wong Baker type, and multidimensional questionnaires, such as the McGill Pain Questionnaire, were analyzed, with attention to their advantages and limitations in clinical practice.

**Results:** the analysis revealed that unidimensional questionnaires like VAS and NRS are widely used and provide clear measurements of pain intensity. However, these tools fail to

capture emotional and psychological aspects of pain. Multidimensional questionnaires have proven to be more comprehensive in identifying the implications of pain in the patient's experience. Furthermore, integrating standardized questionnaires into clinical practice can facilitate cūpersonalized treatments and improve patient comfort.

**Conclusions:** the use of questionnaires to assess pain during orthodontic treatments represents a fundamental practice for improving the quality of care. While unidimensional scales are useful for measuring pain intensity, a multidimensional approach is essential to address psychological and emotional implications. The review highlights the need to implement more comprehensive tools in clinical practice to ensure more effective and patient-centered treatments.

## ADVERTISING IN ORTHODONTICS: SCIENTIFIC EVIDENCE OR MARKETING STRATEGY?

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Medical journals and social media platforms are a popular source of information for clinicians, and advertisements can provide an important source of information and education for health care providers, raising awareness regarding new techniques, products and services.

The aim of this study is to evaluate the scientific reliability of advertising claims related to orthodontic products, across both traditional journals and social media platforms.

A systematic literature search was conducted using Medline/PubMed and Web of Science databases. The following keywords were used: orthodontic advertisement, evidence-based medicine, social media, medical journals, marketing, ortho-

dontic products. Articles published between 2012 and 2024 were included.

Only 28-35% of journal ads included references, and less than 2% were supported by high-level evidence. On Instagram, 60% of claims were false and only 1.7% were objectively true. YouTube content proved slightly more reliable than TikTok, but overall quality remained low. Most claims focused on reduced treatment time and improved comfort.

In modern health care, in which an evidence-based approach is recommended, contemporary appraisal of the quality of evidence cited in social media platforms and orthodontic journal advertisements is important.

## THERAPY WITH ELASTODONTIC APPLIANCE IN GROWING PATIENTS: EFFECTS ON AIRWAY STRUCTURES

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**Aim:** elastodontic therapy has gained increasing attention as a non-invasive approach to treating malocclusions and promoting harmonious craniofacial development. Among its potential benefits, recent studies suggest a positive influence on upper airway dimensions, which could lead to improved respiratory function. This study aims to evaluate the effects of elastodontic treatment on the upper airways in growing patients, focusing on specific parameters of airway patency.

**Methods:** a total of 30 growing patients undergoing elastodontic treatment were selected for this study. The treated group was compared with a control group consisting of 30 untreated subjects of similar age and craniofacial characteristics. Cephalometric radiographs were used to assess upper airway dimensions before and after the treatment period. The analysis focused on key airway measurements, particularly the Superi-

or Pharyngeal Airway Space (SPAS) and Inferior Airway Space (IAS), to determine the impact of elastodontic therapy on respiratory function.

**Results:** the statistical analysis revealed a significant increase in the patency of the upper airways in the treated group compared to the control group. Notably, the SPAS and IAS parameters showed measurable expansion, indicating that the use of elastodontic appliances contributed to improved airflow. These findings suggest that elastodontic therapy may play a role in optimizing upper airway morphology during growth.

**Conclusions:** elastodontic devices have demonstrated the ability to expand the pharyngeal air spaces, offering functional benefits to the upper airways. Further research is warranted to explore the long-term implications of elastodontic therapy on airway development and its potential role in preventing respiratory disorders.

## EFFECTS ON NASO-LABIAL UNIT OF RAPID MAXILLARY EXPANSION IN UNILATERAL CLEFT LIP AND PALATE PATIENTS

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**Aim:** patients with cleft lip and palate often present underdevelopment of the maxilla, which requires correction through palatal expansion. This study aims to investigate the effects of rapid maxillary expansion on the soft tissues of the naso-labial unit, in patients with cleft lip and palate.

**Methods:** 20 patients (16 males and 4 females) with unilateral cleft lip and palate on the left side, between 7 and 15 years (mean age 10, 46 years), were enrolled for this study. They underwent rapid palatal expansion with Hyrax appliance. Stereophotogrammetric scans (Vectra M3) were acquired on the day of appliance placement and after the conclusion of activations. Then these 3d images have been processed using the software Vectra Analysis Module, which compares pre and post naso-labial unit measurements.

**Results:** this study evidenced a mean increase in the naso-labial unit area of 0,11 mm<sup>2</sup>, with a standard deviation of 0,80 mm<sup>2</sup>. Furthermore, the increase in volume was about 1,64 cc. Every measurement refers to the right side of patients.

**Conclusions:** rapid palatal expansion is an orthodontic treatment widely used among patients with cleft lip and palate. This study showed that treatment with hyrax palatal expander affects positively the growth of soft tissues of the naso-labial unit, resulting in an increase of surface area and volume. In conclusion, it is important to know the effects that orthodontic treatment can have on soft tissues, to choose the best treatment option.

## PREVALENCE OF SLEEP-RELATED BREATHING DISORDERS IN CHILDREN AND ADOLESCENTS UNDERGOING ORTHODONTIC TREATMENT: A SURVEY BASED ON PSQ IN THE DENTAL COMMUNITY

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**Aim:** Obstructive Sleep Apnea (OSA) is clinically and socially relevant condition, unfortunately still highly underdiagnosed, especially in pediatric age. Therefore, this study primarily aimed to assess the prevalence of OSA in the Italian population of school age; secondly, to evaluate the effect of orthodontic treatment on the risk of OSA, compared to untreated controls.

**Methods:** the parents of patients aged between 5 and 16 years at the UOSD Pediatrics and Paediatric Emergency Room of San Salvatore dell'Aquila Hospital were asked to answer the Pediatric Sleep Questionnaire - Sleep Related Breathing Disorders (PSQ-SRBD). The PSQ-SRBD is a screening questionnaire with a specificity of 83% and a sensitivity of 81%. Four

questions have been added for this specific research protocol, to assess the presence of enuresis.

**Results:** from a first collection of 298 questionnaires, it was found that the patients recruited had: mean age 115±29.7 months, mean weight 37.5±15.7 kg and mean height 137.1±15.7 cm. Of the total number of questionnaires collected, 16.4% were positive for OSA diagnosis.

**Conclusions:** the first phase of the study carried out an epidemiological analysis which revealed the prevalence of subjects with OSA in the sample analysed. The future prospects include a significant expansion of the study sample, as well as analyzing the difference between subjects who have received orthodontic treatment or not.

## INTEGRATED SCORING EVALUATION OF PALATAL EXPANSION NEED IN GROWING PATIENTS: MULTIDIMENSIONAL DIAGNOSTIC APPROACH

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**Aim:** palatal expansion is a primary treatment for correcting transverse maxillary deficiency. Traditional assessments based on single anatomical or functional parameters may not fully capture the morpho-functional complexity of each case. This study proposes a composite diagnostic index to objectively and systematically evaluate the need for palatal expansion, with a focus on posterior crossbite severity.

**Methods:** an integrated multidimensional index was developed, encompassing three main domains:

1. skeletal: ANB, SNA, SNB, cranio-maxillary cephalometric angle, WALA ridge, and Lateral Asymmetry Index;
2. morpho-structural: facial symmetry, midline alignment, arch constriction, and lip posture;
3. functional: Presence of posterior crossbite, anterior-posterior

crowding, swallowing pattern, breathing type, and masticatory side preference.

Each parameter was weighted using a progressive scoring system to reflect clinical severity.

**Results:** the index was applied to 30 growing patients with suspected transverse deficiency. Scores were compared with clinical classifications and final treatment decisions. Statistical analysis revealed a significant positive correlation between the index scores and the therapeutic need for expansion.

**Conclusions:** the proposed composite index serves as a potential clinical aid for selecting candidates for maxillary expansion, promoting a standardized and systematic approach to transverse discrepancy assessment in growing patients.

## CEPHALOMETRIC ANALYSIS OF CLASS II MALOCCLUSION CORRECTION WITH WIN LINGUAL APPLIANCE ASSOCIATED TO HERBST

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**Aim:** the purpose of the study is to provide quantitative data on cephalometric changes in patients with Class II malocclusion undergoing lingual orthodontic treatment combined with Herbst appliance.

**Methods:** the study examined 50 subjects, 29 males and 21 females, under 18 years old, with class II malocclusion. Each subject underwent lateral telerradiographs before (T0) and after (T1) orthodontic treatment, which were used for cephalometric measurement.

Patients with previous or extractive orthodontic treatments, congenital craniofacial anomalies or systemic diseases affecting craniofacial development were excluded from the study.

**Results:** the analysis revealed significant changes in all dental parameters, allowing for the normalization of overjet and over-

bite, with mean values reduced by 3,06 mm and 3,60 mm respectively. Changes in U1 position relative to FH and SN plane were observed, along with a 7,23° IMPA increase.

Furthermore, the mean inter incisive angle was reduced by 9,26°. Significant changes were noted in the skeletal component with an increase of SNB angle, which lead to a reduction of ANB angle.

The only statistically significant change in soft tissue is the position of upper lip relative to E plane, whose value reduced from -2,20 mm to -4,48 mm. Changes in nasiolabial angle and the position of the lower lip were not statistically significant.

**Conclusions:** cephalometric assessment showed statistically significant variations in all dental parameters, including a 7° IMPA increase, modifications in SNB and ANB and in U1 position to E-plane values.

## MINISCREW-ASSISTED RAPID PALATAL EXPANSION: EFFICACY AND SAFETY IN USE

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**Aim:** Miniscrew-Assisted Rapid Palatal Expansion (MARPE) has found use as an alternative to traditional and surgically assisted rapid palatal expansion, particularly in patients in late adolescence and young adults. The aim of this study is to evaluate the efficacy and safety of MARPE, using the most up-to-date data analysis in literature.

**Methods:** the research was conducted by evaluating the literature published in 2019-2025 on the following databases: PubMed, Cochrane and Google Scholar. Keywords used were: MARPE, microimplant, maxillary expansion. The study focused on the success of the treatment, and the possible presence of side effects, alterations of the soft tissues and airways. Inclusion criteria: *in vivo* review, age between 15-40, both gen-

res. Works with abstracts, case reports, and presence of previous maxillofacial surgery treatments were excluded.

**Results:** our analysis included 65 studies and revealed that MARPE improves suture expansion with fewer skeletal, soft tissue and airway side effects compared to traditional methods. The technique shows high efficacy in subjects up to 25 years of age.

**Conclusions:** the results support MARPE as a valid alternative for maxillary expansion in late adolescents and adults compared to the traditional and surgical methods. In these patients, MARPE could be considered a standard procedure in orthodontic treatment plans. The success of the treatment and the reduced side effects compared to traditional treatment are verified. However, it is importance a long-term follow-up of clinical trials.

## TEMPOROMANDIBULAR JOINT DYSFUNCTION AND TENSION-TYPE HEADACHE: EFFICACY OF BOTULINUM TOXIN TYPE A

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**Aim:** temporomandibular joint dysfunction is often accompanied by symptoms, such as tension-type headache. Patients with these disorders frequently report the onset of masseter muscle pain. The aim of the review is to evaluate the efficacy of botulinum toxin type A injections for the treatment of masseter muscle pain.

**Methods:** the search was performed on the main electronic databases (PubMed, Scopus, Medline, Google Scholar). The keywords used were tension-type headache, TMJ dysfunction, botulinum toxin, and masseter pain. For this literature review, articles from 2021 to date were examined and

only ten articles met the inclusion and exclusion parameters.

**Results:** some studies have highlighted a reduction in tension-type headache following botulinum toxin injection; only a few studies showed an ineffective reduction of the muscle contraction responsible for the pain.

**Conclusions:** at this time, we can only conclude that there is not enough evidence to decide whether it is effective or not, that the studies conducted so far, although imperfect, suggest that it could be effective in the treatment of pain syndromes and that better designed studies are needed to give us better indications than we have now.

## GERD PATIENTS: ASSOCIATION WITH OSA AND ANTHROPOMETRIC CHARACTERISTICS

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**Aim:** Gastroesophageal Reflux Disease (GERD) and Obstructive Sleep Apnea (OSA) are two closely related diseases. The objective of this study is to evaluate the correlation between GERD and OSA, investigating the role of anthropometric characteristics of the patient such as obesity and partial edentulism.

**Methods:** for this work we administered the Berlin Questionnaire for the identification of the risk of OSA to a group of 120 patients. Anthropometric characteristics, partial edentulism and the presence or absence of GERD were evaluated. Only 70 patients met the inclusion criteria.

**Results:** the Pearson chi-square test showed a significant relationship between the presence of GERD and the high risk of

OSA ( $p < 0.001$ ). Similarly, a correlation was highlighted between edentulism and high risk of OSA ( $p = 0.022$ ). The results of the ANOVA analysis showed a significant difference in BMI between the groups with and without high risk of OSA ( $p < 0.001$ ).

**Conclusions:** the results of the analysis suggest that GERD, OSA and partial edentulism are interconnected conditions that require an integrated approach for their management. These results highlight the need for a new approach that requires close collaboration between dentists and medical specialists, which is crucial for the early diagnosis, prevention and treatment of these disorders.

## COMPARING THE EFFECTIVENESS OF SURGICAL TECHNIQUES FOR ACCELERATING ORTHODONTIC MOVEMENT: A SYSTEMATIC REVIEW

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**Aim:** various surgical procedures to accelerate tooth movement, like Corticotomy (CO/TC), Piezocision (PZ), Flapless Corticotomy (FC) Periodontally Accelerated Osteogenic Orthodontics (PAOO), and Micro-Osteoperforations (MOPs), have been proposed in orthodontics. This systematic review aimed to determine if one of these techniques is more effective than others in accelerating orthodontic movement or reducing treatment time.

**Methods:** the study adhered to PRISMA guidelines and searched PubMed and Scopus for Randomised Clinical Trials (RCTs) comparing two or more surgical techniques to facilitate orthodontic movement. The Cochrane Risk of Bias tool (RoB 2.0) was used for bias risk assessment.

**Results:** 13 RCTs were included. Only 4 studies reported a statistically significant difference between the tested surgi-

cal techniques. Specifically, Abbas found a higher rate of canine displacement with CO *versus* PZ, Chandra reported a shorter treatment duration with PAOO *versus* CO, Fernandes showed a higher rate of canine retraction with CO *versus* PZ, and Khlef's 2022 study statistically reported a higher rate of mass retraction with traditional corticotomy *versus* FC, though the author questioned its clinical significance. This lack of significant difference was supported by 8 other studies.

**Conclusions:** the review concluded that no major differences emerged between the various surgical techniques in increasing tooth displacement. In most studies, the procedures appeared valid and comparable in accelerating tooth movement, with no clinically significant differences in efficacy or side effects.

## MAD AND POSTURE: LONG-TERM EFFECTS – A LITERATURE REVIEW

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**Aim:** this literature review examines the effects of Mandibular Advancement Devices (MAD) on posture in patients with Obstructive Sleep Apnea Syndrome (OSAS). The objective is to evaluate long-term postural changes, with a particular focus on the head, neck, and lumbosacral areas, emphasizing how these zones are affected by this condition and the potential improvements achievable through prolonged use of the device.

**Methods:** a systematic literature search was conducted using PubMed, Scopus, and Web of Science, selecting studies published between 2014 and 2024 with the following keywords: “MAD Posture”, “OSAS Posture”, “Head Posture OSAS” and “MAD OSAS”. Nine articles meeting specific selection criteria

were included, focusing on the effects of MAD on posture in OSAS patients.

**Results:** findings indicate that MAD use improves head posture by reducing muscle hypertonicity and cervical pain.

Postural balance, especially in the lumbosacral region, also showed improvement, leading to a lower risk of falls and increased stability. However, not all OSAS patients exhibit postural imbalances, suggesting individual variability in response to treatment.

**Conclusions:** MAD is an effective option not only for OSAS treatment but also for improving posture and sleep quality.

While results highlight positive effects on different body areas, some uncertainties remain regarding its influence on postural balance.

## TWIST EFFECT: THE NIGHTMARE OF FIXED RETAINERS

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Once an orthodontic therapy is completed, long-term stability and durability of the treatment results become the main concern for both the orthodontist and the patient. Although fixed retainers have shown excellent results in this regard, demonstrating long-term aesthetic and functional effectiveness, it has been found that between 0.1% and 5% of patients experience failures and unexpected adverse effects over time. These movements are sometimes not related to the tendency of the tooth to return to its initial position before treatment, and they occur mainly in the anterior region. They are independent of the type of fixed retainer (whether only on the canines or the anterior six teeth) or the type, thickness, or material of the wire used. These complications range from

fracture, failure of bonding, to the so-called “twist effect.” The latter occurs with an opposite tilt of the contralateral canines in which one canine is tilted in the buccal/vestibular direction and the other canine is tilted in the lingual/palatal direction, while the fixed retainer remains perfectly attached to the teeth. It occurs mainly in the lower arch and has a prevalence of 1.1%. This effect takes place from 6 months to 12.5 years after orthodontic treatment with the fixed retainer in place. The average time of its onset is four to six years after retainer bonding. This literature review aims to evaluate the factors reported in the literature that may be related to this adverse effect and to determine how relevant they may be in its development.

## NUMERICAL ANALYSIS OF MADs WITH ELASTIC BANDS FOR OSA TREATMENT

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**Aim:** the study aims to evaluate, through a Finite Element Methods (FEM) simulation approach, the biomechanical effects, specifically displacements and stress distributions, of Mandibular Advancement Devices (MADs) with and without orthodontic elastics bands applied in patients affected by Obstructive Sleep Apnea (OSA).

**Methods:** a 3D anatomical model, including bone, teeth, PDLs, and a Herbst-like appliance, was reconstructed from tomographic scans of a healthy young female subject. Two FE models were created: one with and one without vertical orthodontic elastics. The elastics were modeled as linear springs, and boundary conditions were applied to mimic physiological forces. Material properties were assigned from literature, including nonlinear behavior for PDLs. The models were disre-

tized into ~3.4 million tetrahedral elements and simulated using ANSYS software.

**Results:** the use of orthodontic elastics effectively controlled mandibular opening by limiting vertical displacement of the lower arch. A slight rotation of the splints and increased stress in anterior regions were observed, particularly in maxillary and mandibular incisors. Without elastics, larger mandibular opening occurred, causing greater stress on posterior mandibular PDLs. Elastics induced a preload of 2.285 N, generating localized stress near the attachment points in the canine area.

**Conclusions:** MADs combined with vertical orthodontic elastics enhance treatment efficacy by reducing mandibular opening during sleep. However, increased stress in the anterior periodontal region suggests caution in patients with pre-existing periodontal issues.

## DIGITALIZATION OF OCCLUSAL PARAMETERS FOR ACCURATE AND REPRODUCIBLE ORTHODONTIC PLANNING

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**Aim:** this pilot study aimed to evaluate retrospectively the reproducibility and methodological error of various occlusal parameters on models of the upper and lower dental arches and pre- and post-treatment teleradiographs of patients treated with fixed orthodontics appliances.

**Methods:** digital casts of arches were obtained using the Medit 500 intraoral scanner. Occlusal parameters of models were analyzed by Medit Link software. The outcomes evaluated were the buccal-incisal inclination of incisors and second premolars, arch shape, arch perimeter, mesiodistal diameters of dental elements, crowding per arch, Spee curve, Wilson curve, transverse diameters at the canines, second premolars and first molars, and millimeters recovered by extractions and stripping. EBO Cephalo-

metric analyses were performed by WebCeph software. Pre- and post-treatment cephalometric tracings were overlaid to assess millimeters lost by average or minimal anchorage.

**Results:** measurements were repeated one week apart to assess methodological error. Intra-operator reliability was tested using paired t-tests and Intra-class Correlation Coefficients (ICC). Random error was calculated using Dahlberg's formula. Results showed high reliability with ICC values ranging from 0.56 to 0.61 and random error between 0.5 and 0.9 mm. Statistical analysis was performed with SPSS ( $p < 0.05$ ).

**Conclusions:** the parameters demonstrated methodological error and intra-operator variability within acceptable limits for occlusion analysis purposes.

## ANALYSIS OF THE IMPACT OF ELASTODONTIC APPLIANCES ON AIRWAY SPACE AND HYPERDIVERGENCE IN PATIENTS WITH A CLASS II DENTO-SKELETAL PATTERN

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**Aim:** this retrospective study investigates dento-skeletal changes associated with treatment using an elastodontic mandibular advancement device, focusing on its influence on pharyngeal airway dimensions. Additionally, it evaluates whether therapy affects skeletal divergence parameters alongside airway changes.

**Methods:** a sample of 24 growing patients treated with elastodontic devices was selected for analysis. They were compared with a control group of 25 untreated subjects with similar skeletal characteristics. Lateral cephalometric radiographs, taken before and after treatment, were assessed to identify changes in skeletal structures, dental relationships, and pharyngeal airway dimensions. Statistical analyses determined the significance of differences between the two groups.

**Results:** results demonstrated a statistically significant increase in airway dimensions following treatment, supporting the effectiveness of the elastodontic device in enhancing upper airway patency. Specifically, SPAS showed a significant increase (coeff.: 1.92;  $p = 0.004$ ), with no correlation to sex or age ( $p > 0.05$ ). Similarly, IAS exhibited a significant increase (coeff.: 1.56;  $p = 0.012$ ). However, no substantial modifications were recorded in hyperdivergent skeletal parameters.

**Conclusions:** this study confirms that functional therapy with elastodontic devices leads to significant improvements in airway dimensions and may optimize airway function in patients with skeletal Class II. However, their influence on skeletal divergence remains modest.

## SLEEP MEDICINE EDUCATION IN UNDERGRADUATE ITALIAN DENTAL SCHOOL PROGRAMS

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**Aim:** aim of this study was to evaluate the current state of sleep education in undergraduate Dental school programs. It was hypothesized that all programs would offer some degree of education.

**Methods:** to conduct this study, after receiving the ethics committee approval, an anonymous online Google form questionnaire was distributed via email to the course directors of all Italian Undergraduate dental schools. Email addresses of the program directors were collected through their institution website. The questionnaire (taken from the validated tool by the American Academy of Neurology Sleep Section) included questions regarding the resources available and the amount of sleep education offered.

**Results:** of the 37 programs invited, only 7 responded (18,9% response rate). Of those programs providing a response, 62.5% of the Undergraduate dental schools reported not offering any training in sleep medicine. Training for Obstructive Sleep Apnea (OSA) was reported to be provided in 5 of 7 programs (71,4%).

**Conclusions:** the low response rate may underscore the limited interest and concern regarding this subject. Despite the request from the Italian ministry of Health for dentists to screen for OSA, dentists do not receive adequate training at an undergraduate level to be able to do so.

## FAILURE RATE OF IMMEDIATELY LOADED ORTHODONTIC MINISCREW: A RETROSPECTIVE STUDY

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**Aim:** the aim of this study was to evaluate the failure rate of inter-radicular orthodontic miniscrews (TADs) used as skeletal anchorage and immediately loaded with orthodontic-type forces.

**Methods:** the sample consists of a group of 236 subjects enrolled from 2006 to 2019 at two different private dental clinics. The inserted TADs (Aarhus System American Orthodontics®) are all self-drilling and self-tapping, cylindrical, based on a Ti6Al4V alloy, with a threaded portion of 6 or 8 mm length, with some heads with brackets and others with through holes, having a mucosal neck length of 1.5 mm. Failure was defined as (1) fracture (2) screw mobility/loss in less than 3 months of orthodontic loading.

**Results:** a total of 404 screws were inserted; among them 56% (n = 226) of the screws were inserted in the maxillary

bone (164 screws in the buccal side, MX; 62 in the palatal side, P), while 44% (n = 178) in the mandibular buccal side (MD).

The overall failure rate was 10%; among the failed screws (n = 44), 27% (n = 12) failed in MX (and all were 6 mm), 16% (n = 7) were placed in P, and 57% (n = 25) in MD. Only 7% (n = 3) reported fracture; the fractured screws were all inserted in the MD.

**Conclusions:** success rate in MX and P is higher than MD probably, due to both the favorable conditions of adherent gingiva and the less resistant cortical bone compared to mandibular bone, where more insertion torque is required. This would explain how among the failed screws (n = 44), the fractured ones had all been placed in MD.

## EVALUATION OF MIDPALATAL SUTURE IN PATIENT BORN AFTER 2000: NEW POSSIBILITIES FOR MINIMALLY INVASIVE TREATMENT

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**Aim:** scientific evidence confirms that over the past centuries, humans have undergone an evolutionary process leading to changes in growth rates and duration.

The development of the maxilla is influenced by this variation between skeletal age and chronological age. The aim of this study is to assess chronological age and maxillary suture stages.

By analyzing suture maturation stages, it is possible to determine the appropriate orthodontic device for palatal expansion.

Stages A, B, and C allow for the use of a dentally anchored Rapid Palatal Expander (REP), while Stage D may require a Miniscrew-Assisted Rapid Palatal Expander (MARPE). Stage E necessitates Surgical-Assisted Rapid Palatal Expansion (SARPE).

**Methods:** a total of 310 patients (144 M, 166 F) born after the year 2000 were evaluated for the midpalatal suture using

CBCT (240 x 190 mm) and classified according to Dias' system. A statistical model was developed based on these data.

**Results:** no statistically significant difference was found between Males and Females up to Stage C.

Stages A and B are most commonly observed in individuals up to 12 years of age.

Stage C is predominantly found in individuals between 10 and 16 years of age.

Stage D is more frequently present in individuals aged 14 to 19 years.

Stage E is observed in individuals aged 17 years and older.

**Conclusions:** the variation in growth rates and duration in new generations allows clinicians to treat transversal deficits at a higher chronological age compared to the past.

## USE OF MANDIBULAR ADVANCEMENT DEVICES IN OSA PATIENTS AND EVALUATIONS OF POSITIONAL SHIFTS

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**Aim:** the aim of the present study was to evaluate the effect of Mandibular Advancement Device (MAD) treatment in patients with mild to severe OSA, focusing on cardiorespiratory effects. Specifically, the Apnea-Hypopnea Index (AHI), Oxygen Desaturation Index (ODI), and position shifts during sleep were analyzed.

**Methods:** one-hundred-three patients, over 23 years old and diagnosed with OSA, were retrospectively recruited. Inclusion criteria were Body Mass Index (BMI) <34 kg/m<sup>2</sup>, non-smokers, no comorbidities, and treatment with MAD. Two polysomnographic evaluations were conducted: one at baseline (T0) and another one after 3 months of MAD treatment (T1). AHI, ODI, total number of position changes (NPS), and position change index (PSI) were evaluated. Since the data were not normally

distributed, the Wilcoxon signed rank test was used to compare results between T0 and T1. Spearman's correlation test was used to analyze the correlation between parameter differences at T1 and T0. Statistical significance was set at  $p < 0.05$ .

**Results:** after the treatment with MAD, there was a reduction in both AHI and ODI, as well as a decrease in NPS and PSI. In addition, the authors evaluated the correlation of NPS and PSI with AHI and ODI, showing that the reduction in ODI occurred in association with the number of NPS and PSI. There is no statistical significant correlation between positional indicators and AHI.

**Conclusions:** MAD treatment reduced the severity of OSA by improving cardiorespiratory parameters (AHI and ODI) and reducing positional shifts during sleep.

## GROWING PATIENTS WITH CLASS II DIVISION 1 MALOCCLUSION: THE EFFECT OF FUNCTIONAL TWIN-BLOCK DEVICE

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**Aim:** the aim of this study was to evaluate the effects of the functional Twin Block device in the treatment of Class II division 1 malocclusions. This type of malocclusion is characterized by dental and skeletal discrepancies related to an alterate position of the maxilla or mandible, but frequently the cause may be a combination of these two alterations.

**Methods:** two groups were considered: 1) Twin Block group (TB): 30 subjects (11M, 19F, main age 10.7y/o); 2) Control group: 21 subjects with untreated class II (10M, 12F, main age of 10,1 y/o). Inclusion criteria were: prepubertal growth phase evaluated with CVM method ( $CS < 3$ ); skeletal Class II ( $ANB^\circ > 4^\circ$ ); molar Class II; overjet  $\geq 4$  mm; no previous or concomitant orthodontic treatment; no craniofacial malformations; no

agenesis; treatment without extractions. The cephalometric analysis was conducted to evaluate dento-skeletal changes.

**Results:** the results observed in the TB group can be summarized as follows: correction of the  $ANB^\circ$  angle by  $-1.6^\circ/\text{year}$ ; increase of the  $SNB^\circ$  angle by  $1.1^\circ/\text{year}$ ; correction of Wits by  $-2.1$  mm/year; correction of the overjet by  $-2.9$  mm/year; correction of the molar relationship by  $-2.6$  mm/year. Considering the Pancherz analysis, the comparison between the groups with regard to the Pg-OLP distance is statistically significant, Pg point undergoes a protrusion of 3.7 mm/year in the TB group.

**Conclusions:** the treatment with Twin Block resulted in an effective correction of the Class II division 1 malocclusions, consequence of improving mandibular favorable position.

## DENTO-ALVEOLAR CHANGES AFTER MAXILLARY HYBRID EXPANSION AND MULTI-BRACKET THERAPY: A COMPARATIVE STUDY AT TWO DIFFERENT (VERTEBRAL) MATURATION STAGES

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**Aim:** the aim of this study was to evaluate the dentoskeletal effects of a hybrid expander and multi-brackets therapy, considering two groups of patients with different Cervical Vertebral Maturation (CVM) stages.

**Methods:** the sample was divided into two groups based on CVM stages: stage 1 (CS1-CS2, mean age 10.21 y.o.) and group 2 (CS5-CS6, mean age 17.14 y.o.).

Each patient was treated with a palatal expansion by using

a hybrid expander and then with a multi-bracket appliance.

**Results:** significant differences in trasversal expansion were found in all groups and no significant differences were found among groups for longitudinal changes of torque.

**Conclusions:** the tooth-bone-borne maxillary expander and the multi-bracket appliance produced a significant clinical expansion with negligible dental compensation and showed no differences in regard to trasversal diameter changes and torque values.

## ORTHODONTIC MANAGEMENT OF THE PATIENT WITH SPECIAL NEEDS: OUR PROTOCOL

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**Aim:** in Italy 3% of the pediatric population is affected by disabilities, presenting challenges for orthodontic treatment. Since these patients are currently treated only in hospitals, despite the possibility of alternative care, we developed this protocol to facilitate the provision of orthodontic care outside the hospital environment.

**Methods:** over the past 12 months, 90 patients with disabilities have been treated at the University Hospital of Marche Region. Selection criteria were based on the disability and cooperation levels of patients and their families. Oral and psychological conditions were assessed prior to treatment. Hygienists play a crucial role in guiding children through dental care. Following the initial visit, photographs and impressions were collected to start the treatment. These steps stabilize adherence to the treatment plan with ongoing collaboration between orthodontists and hygienists.

**Results:** among the 90 patients, 31 had Down syndrome, 14 had rare diseases, 33 had developmental delays and 12 had neurological disorders. Of these patients 37.7% presented with Class III malocclusion, 28.8% had transverse deficiencies, 21.1% had Class II malocclusion, and the rest had Class I malocclusion. The protocol achieved a 96% success rate in terms of treatment adherence and occlusal improvement, with only 4% dropouts due to poor oral hygiene or treatment abandonment. The appliances used included orthopedics 51 %, braces 26%, functional appliances 19.5% and aligners 3.5%.

**Conclusions:** this approach ensures continuity in orthodontic care and emphasizes cooperation over the reduction of treatment time. This is a reproducible protocol that considers both oral and systemic health, confirming that patients with special needs can be successfully treated in private practice.

## AGE-RELATED MATURATION PATTERNS OF MIDPALATAL AND CIRCUMAXILLARY SUTURES: A THREE-DIMENSIONAL RADIOLOGICAL ANALYSIS

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**Aim:** this retrospective study aimed to assess the degree of maturation of the midpalatal and circumaxillary sutures at different ages by analyzing wide-field-of-view (FOV) Cone Beam Computed Tomography (CBCT) scans, using classifications previously accepted in literature.

**Methods:** the study included 200 CBCT scans of patients aged 10-60 years with full suture visibility.

After anonymizing, two independent operators assessed suture maturation: for the midpalatal (MPS) and zygomatico-maxillary (ZMS) sutures, Angelieri's classifications were used; the transpalatal (TPS) and pterygomaxillary (PMS) sutures were classified as open or closed, according to Govaerts et al. Descriptive analysis was performed, stratifying the sample into 10-year age groups. A correlation matrix was em-

ployed to correlate each suture maturation with patient demographics.

**Results:** the sample had a mean age of  $32.3 \pm 13.8$  years and a female predominance (122 F; 78 M). MPS and ZMS followed a similar trend, with most individuals in stages B and C in the 10-20-year group, progressing to stages D and E, and stage E predominating in the 51-60-year group. The TPS was open in 61.4% of the 10-20-year group, decreasing to 3.1% in the 51-60-year group. The PMS showed early closure, with 92% of the 10-20-year group having closed sutures. The correlation matrix revealed moderate associations between age and MPS ( $r = 0.46$ ) and ZMS ( $r \approx 0.44$ ), with strong bilateral symmetry in ZMS ( $r = 0.74$ ).

**Conclusions:** suture maturation showed clear age-related progression, highlighting the role of age in clinical decision-making.

## VERTICAL EFFECTS OF EXPANSION PROTOCOL WITH CLEAR ALIGNERS IN HYPERDIVERGENT GROWING PATIENTS: A RETROSPECTIVE STUDY

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**Aim:** the aim of this investigation was to cephalometrically study the short-term skeletal and dental modifications induced by Clear Aligners (CA) in a sample of 20 patients in mixed dentition with an increased vertical dimension.

**Methods:** twenty patients (9M,12F, age  $8.9 \pm 1.6$  years) in mixed dentition with hyperdivergent growth (FMA  $>28^\circ$ , SN<sup>^</sup>GoGn $>35^\circ$ ), maxillary deficiency  $<6$  mm, and CS1-CS2 maturation stage were treated with Invisalign First following a standardized expansion protocol. Lateral cephalograms were taken at baseline (T1) and after expansion (T2). Sagittal, vertical, and dental parameters were assessed: SNA ( $^\circ$ ), SNB ( $^\circ$ ), ANB ( $^\circ$ ), WITS (mm), FMA ( $^\circ$ ), SN-GoGn ( $^\circ$ ), Ar-Go<sup>^</sup>GoMe ( $^\circ$ ), POccl<sup>^</sup>PF ( $^\circ$ ), SN<sup>^</sup>POccl ( $^\circ$ ), N-Me (mm), N-Ans/Ans-Me (%), SN<sup>^</sup>ANS-PNS ( $^\circ$ ), Overjet (mm), Over-

bite (mm), IMPA ( $^\circ$ ), IncSup<sup>^</sup>PF ( $^\circ$ ), U6-PP (mm), L6-MP (mm), Sum (mm). T2-T1 differences were analyzed using a paired t-test ( $P < 0.05$ ).

**Results:** FMA and SN<sup>^</sup>GoGn angles decreased slightly, though not significantly. A significant change was observed in N-Me ( $p < 0,05$ ). Upper anterior facial height (N-ANS) showed an increase ( $p < 0,05$ ) while lower anterior facial height (ANS-Me) showed a reduction ( $p < 0,01$ ).

**Conclusions:** CA allowed effective control of vertical dimensions during expansion in hyperdivergent patients. The treatment protocol positively influenced patients' vertical growth vector, with a slight mandibular anterior rotation and a reduction in lower facial height, contributing to an overall improvement in facial balance and vertical skeletal control.

## VERTICAL DIMENSION CHANGES IN A GROUP OF GROWING PATIENTS TREATED WITH CLEAR ALIGNERS

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**Aim:** the aim of the present study was to compare the vertical dimension changes, before and after treatment, in a group of growing patients treated with clear aligner.

**Methods:** the studied sample was composed of n. 25 subjects (13 females and 12 males, mean age of  $8.7 \pm 1.6$  years), enrolled from private practice, treated by Invisalign First system. The inclusion criteria were inter-transitional phase of mixed dentition, good oral hygiene, mild to moderate dentoalveolar crowding calculated by Little's Irregularity Index, hyperdivergent pattern (FMA > 28°, SN-GoGn > 36°, ArGo°GoMe > 137°), assessed by cephalometric analysis performed on the lateral cephalogram and good compliance in wearing the removable appliances. All the patients in an active permutation phase, those with a severe skeletal transverse discrepancy and normo-hypodivergent patients (FMA < 28° and SnGoGn < 36°) were excluded from the study. Pre- (T0) and post-treat-

ment (T1 after 18 months) lateral cephalograms were collected from all the selected patients. Nine cephalometric parameters (FMA, SN°GoGn, PF°Poccl, SN°Poccl, ANS-PNS°Go-Me, SN°ANS-PNS, ArGo°GoMe, SGo/NMe, N-ANS/ANS-Me) both angular and linear, were measured and recorded for each cephalogram.

**Results:** statistically significant changes were observed between T0 and T1  $p < 0.005$ . Skeletal divergence and growth projection improved considerably after 18 months of treatment, FMA ( $p = 0.0009$ ) and SN-GoGn ( $p = 0.0002$ ); while the occlusal plane PF°Poccl and the orientation of the maxillary plane SN°ANS-PNS, in relation to the skull bases, did not seem to change significantly.

**Conclusions:** Invisalign First can control the patient's vertical condition, so representing a good therapeutic choice in hyperdivergent growing patients.

## MACHINE LEARNING FOR PREDICTING SHORT- AND LONG-TERM CRANIOFACIAL GROWTH IN INDIVIDUALS WITH UNTREATED CLASS III MALOCCLUSION

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**Aim:** to develop a Machine Learning-based model to predict growth of Caucasian subjects with untreated Class III malocclusion in the short- and long-term.

**Methods:** a longitudinal sample of 144 Caucasian subjects with untreated Class III malocclusion was selected (80% training data; 20% test data). Cephalograms of the patients of the test group were divided into short- and long-term observations. Sixteen cephalometric landmarks were digitized in a X Y Cartesian coordinate system. The trained model was a Graph Neural Network. A one sample t-test and the Euclidean distances between predicted and observed values were calculated.

**Results:** in the short-term prediction, 16 subjects were examined. On the X Y-axis, the following cephalometric points were statistically significant: SX, PgY, BY, PNSY, NY and SY. Mean

Euclidean distance between predicted and actual values revealed high values for the mandibular points Go (2.6 mm), Me (1.9 mm), Gn (1.9 mm), Pg (2.0 mm), and B (2.0 mm). In the long-term prediction, 13 subjects were examined. On the X Y-axis, the following cephalometric points were statistically significant: MeX, GnX, PgX, BX, BY and PtY. Mean Euclidean distance between predicted and actual values revealed high values for the mandibular points Go (3.1 mm), Me (4.3 mm), Gn (4.1 mm), Pg (4.5 mm), and B Point (4.1 mm).

**Conclusions:** the ML-based prediction model was accurate for the majority of the landmarks. Cephalometric mandibular landmarks (Go, Me, Gn, Pg and B Points) showed the highest mean Euclidean distances between predicted and observed values, indicating lower prediction accuracy.

## ACCELERATION OF EXTRACTION SPACE CLOSURE WITH LOW-LEVEL LASER THERAPY: CASE REPORT

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**Aim:** this case report concerns a patient in whom extractions of first premolars were performed to evaluate the effectiveness of LLLT in accelerating orthodontic movement.

**Methods:** the patient is 15 years old and presents severe crowding >10 mm, third molar and canine class of both right and left and cross-bite between elements 1.3 and 4.2-4.3 and between 2.3 and 3.2-3.3. Multibrackets therapy with Damon systematics and extraction of elements 1.4, 2.4, 3.4 and 4.4 in combination with LLLT was proposed as orthodontic therapy. The first laser session was performed two weeks after the extractions using the splith-mouth method. The laser was applied to elements 1.3 and 3.3 for a total of 3 laser sessions spaced 14 days each. After each application, elements were activated on both sides. For evaluation of tooth displacement, two scans were taken: the first scan at the first laser application (T2), and the second scan 14 days after the last laser

session (T5). The two scans were superimposed to take measurements. To evaluate canine displacement, the points taken as reference are the distance between the cusp of the canine in T2 and in T5 and the distance between the midpoint of canine's gingival margin in T2 and in T5. To analyze anchorage loss, landmarks are the distance between the middle fossa of first molar in T2 and in T5 and the distance between the most mesial point of first molar in T2 and in T5. These distances were evaluated on both sides in order to measure the differences in tooth displacement.

**Results:** the results obtained for canine displacement in T2 and T5 and the results of measurements on the first molar in T2 and T5 were in favor of the irradiated side.

**Conclusions:** these results suggest that the application of LLL allows greater canine translation with less molar anchorage loss on the irradiated side compared with the control side.

## CBCT PLANNED ORTHO-PERIO TREATMENT WITH CLEAR ALIGNERS IN A 72-YEAR-OLD PATIENT WITH SEVERE INCISOR PROCLINATION

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**Aim:** CBCT integration during clear aligners therapy allows the practitioner to obtain a 3D model with roots, crown, and bone for a more accurate treatment planning. Such technology, consenting to better control the force systems and to simulate root movements along with crown movement, may be crucial especially when treating complex periodontal cases. This case report aims to demonstrate a successful approach in a 72-year-old patient with severe incisor proclination and periodontal issues.

**Methods:** clinical examination showed the presence of both generalized gum recessions and non-carious cervical lesions especially in the anterior area, while the lateral radiography evidenced a severe incisor proclination with edge-to-edge anterior contacts and a skeletal Class II. Patient's chief complaint was smile aesthetic, so the therapeutic treatment envisaged

just the alignment of the anterior region. To reach these aesthetic goals 4.1 extraction was planned with CBCT integration in order to better respect periodontal tissues.

**Results:** the treatment lasted eighteen months and consented to: gain an adequate overjet and overbite, reduce incisors proclination and manage gum recessions; this without impacting the posterior sector and matching patient's aesthetic requests respecting periodontal tissues. At the end, to assure the treatment stability over time, removable contention devices were applied.

**Conclusions:** the findings from the present clinical case showed that clear aligners treatment planning integrated with CBCT analysis allows to correct teeth proclination and alignment, improving both the periodontal condition and patient's aesthetic, managing precisely root position.

## HOW EFFECTIVE IS THE CLINCHECK SOFTWARE BY INVISALIGN IN ASSESSING THE PREDICTABILITY OF MAXILLARY EXPANSION MOVEMENTS?

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**Aim:** this prospective study compares the amount of maxillary expansion predicted by the ClinCheck software of Invisalign with the actual expansion achieved after 28 weeks of treatment with the Invisalign Palatal Expander.

**Methods:** digital models of 21 patients (12 females and 9 males) aged between 18 and 26 years, who met Invisalign's selection criteria, were analyzed. The Kolmogorov-Smirnov test was applied to verify the normal distribution of the sample, and the level of significance was set at  $P \leq 0.05$  for all statistical analyses.

**Results:** the amount of expansion predicted by ClinCheck does not always correspond to the actual expansion achieved.

The predictability of the ClinCheck software in maxillary expansion movements depends on various factors, including the type of expansion required, patient characteristics, and the biomechanics of the aligners.

**Conclusions:** ClinCheck provides a useful prediction of maxillary expansion, but its accuracy is limited, especially in significant transverse movements.

To improve results, a programmed overcorrection is often necessary, and in some cases, combining other orthodontic techniques may be beneficial to achieve more effective and stable expansion.

## A CASE OF RIGHT UNILATERAL POSTERIOR CROSSBITE TREATED WITH A FUNCTIONAL APPLIANCE

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**Aim:** this case report illustrates the correction of a unilateral right crossbite in mixed dentition using a functional appliance in a young patient.

**Methods:** this case report presents a female patient aged 5 years and 10 months with Class II dental on the right and left sides, skeletal Class I, mesodivergent ( $SpP^{\wedge}GoGn = 24^{\circ}$ ), unilateral right crossbite extending from tooth 5.3 to tooth 1.6, and anterior open bite. The patient was treated with the functional appliance Function Generating Bite (FGB) appliance made of stainless steel, acrylic resin, and resilient metal bite planes. Chewing patterns were recorded before and after treatment with both soft and hard boluses. In the initial phase of treatment, the FGB appliance was used at home and during the night; after the crossbite correction, it was used only at night.

**Results:** using FGB, the right crossbite and the anterior open bite were corrected and an improvement of masticatory patterns was observed.

Before treatment, there was a high percentage of reverse chewing cycles on the crossbite side (78% for soft bolus and 91% for hard bolus), and a low percentage on the unaffected side (12% for soft bolus and 2% for hard bolus).

After the crossbite correction with functional treatment, the percentage of reverse chewing cycles was much reduced on the former malocclusion side (33% for soft bolus and 13% for hard bolus).

**Conclusions:** the FGB appliance successfully corrected the unilateral right crossbite, at the same time improving the masticatory function.

## TOTAL FACE APPROACH (TFA) 3D CEPHALOMETRY AND SUPERIMPOSITION IN ORTHOGNATHIC SURGERY: EVALUATION OF THE VERTICAL DIMENSIONS IN A CONSECUTIVE SERIES

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**Aim:** cephalometry is fundamental in diagnosis, analysis, and planning of orthodontic surgical treatment as it reveals skeletal relationship between the upper and lower jaw as well as facial aesthetic parameters. Nevertheless, 3D cephalometry has still not become the exam of choice in orthognathic treatment. The aim of this study is to evaluate the advantages and disadvantages of these methods in orthognathic surgery.

**Methods:** in a sample of 13 patients undergoing bimaxillary orthognathic surgery a chin-vertex CBCT exam was prescribed prior to orthodontic treatment and 12 months after surgery. The DICOM files uploaded to Materialise Simplant Ortho software pro 2.1 (Materialise Co., Leuven, Belgium) were analyzed following the multiplane 3D Total Facecephalometry protocol (TFA).

**Results:** results comparing pre-op and post-op TFA 3D cephalometry, were then evaluated considering reference values re-

ported in literature. The CBCT, carried out pre- and post-surgery, were subsequently analyzed employing the superimposition method using cranial base as reference.

**Conclusions:** the TFA 3D cephalometry allows the assessment of various bones, considering the right proportion with others. This 3D analysis was carried out evaluating the relationship between skeletal structures making the approach especially flexible and dynamic. The 3D visualization allows the determination of the extent of skeletal disharmony. Multiplane 3D TFA allows the clinician to locate where major or minor skeletal discrepancies are found with respect to ideal parameters and is also useful in classifying skeletal intermaxillary relation. The superimposition method is highly intuitive but does not provide information on the quantity and location of osteotomic movement.

## MULTIDISCIPLINARY TREATMENT OF THE APERT SYNDROME: A RETROSPECTIVE CASE SERIES

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**Aim:** this study aims to evaluate the orthodontic treatment protocols applied to patients with Apert Syndrome, a rare genetic disorder caused by mutations in the FGFR2 gene, in collaboration with the Maxillo-Facial Surgery Unit, through a retrospective analysis of patients treated between 2005 and 2018.

**Methods:** six patients (3 males, 3 females) diagnosed with Apert syndrome and treated with orthodontic-surgical protocols were included. Clinical data, orthodontic interventions and surgical procedures were reviewed, together with orthodontic timing and duration of therapy. All patients exhibited severe midface hypoplasia, anterior open bite, crossbite, and multiple dental anomalies such as agenesis, ectopic eruptions, and microdontia. The mean age at first consultation was 10.2 years

and treatments included rapid palatal expansion, Le Fort I and III osteotomies with distraction, and comprehensive orthodontic care.

**Results:** palatal expansion often required repetition due to relapse and the treatment duration was significantly longer than in non-syndromic patients, due to delayed eruption, poor oral hygiene, and compromised tissue response to orthodontic forces.

**Conclusions:** orthodontic treatment in Apert Syndrome requires close collaboration within a multidisciplinary team considering the complex skeletal and dental anomalies and the long treatment timeline. A clear, age-based treatment protocol is essential to achieve functional and esthetic improvements, ultimately enhancing the patient's quality of life.

## IDEAL SITE AND ANGULATION FOR PALATAL MINISCREW PLACEMENT: A NARRATIVE REVIEW

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**Aim:** orthodontic miniscrews are Temporary Anchorage Devices (TADs) that offer absolute anchorage. The insertion of TADs in the palate supports distalization, intrusion, expansion, and space closure. The purpose of this narrative literature review is to identify the ideal site and angle for standardizing the insertion of TADs in the palate.

**Methods:** the research was conducted on March 2025 using PubMed and Scopus databases using the search terms: “Palatal miniscrew” AND “Site” OR “Angulation”.

**Results:** in the literature, CBCT assessment has identified the insertion of TADs in the anterior portion of the palate as ideal. Several studies claim that the region of the third palatal wrinkle (in paramedic position, 2-4 mm lateral to the mediopalatal su-

ture) has a total bone thickness between 5-10 mm, a cortical bone thickness close to 1-2 mm and a mucosal depth between 2 and 3 mm. The insertion angle depends on the anatomy of the specific site; although it is recommended to insert the TADs perpendicular to the surface of the palatal bone (about 10-30° from the occlusal plane) in the region between the first and second molar, angles between 60°-90° are suggested. In the anterior palate there is a tendency to tilt, while in the posterior areas inclination offers an anatomical advantage.

**Conclusions:** the ideal site for the insertion of palatal TADs is the anterior region, close to the third palatine wrinkle, with an angle ranging from 10-30° in the area between the first and second molar, up to 60-90° further back.

## STABILITY OF PALATAL RUGAE PRE- AND POST-PALATAL EXPANSION: A NARRATIVE LITERATURE REVIEW

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**Aim:** Palatal Rugae (PR) are unique anatomical structures located in the anterior third of the hard palate. PR exhibit individual characteristics, maintaining their configuration over time and resisting damage from intense trauma. PR are used as stable reference points in the superimposition of intraoral scans to make precise measurements, such as evaluating changes due to orthodontic treatments, growth, or other modifications over time. The purpose of this narrative review is to examine the stability of PR before and after Palatal Expansion (PE).

**Methods:** the research was conducted on March 2025 using PubMed and Scopus databases using the search terms: “Palatal Rugae” AND “Palatal Expansion”.

**Results:** the first PR and points near the midline of the palate appear more stable compared to other rugae. Some studies

indicate alterations in the length of specific rugae following PE, especially the second and third. It is observed that the transverse distances between the rugae, between the medial and lateral points, increase after expansion, reflecting the widening of the palate. The third PR shows more marked transverse changes. Literature demonstrates that Rapid Palatal Expansion (RME) is associated with more changes than Slow Palatal Expansion (SPE). However, data on the effects of SARPE or MARPE on PR are limited. Patient age is a relevant factor; age-dependent effects of RME on palate volume and morphology have been observed.

**Conclusions:** PE is associated with transverse changes and generally reduced stability of PR, with considerations for orthodontic and forensic applications.

## EAGLE'S SYNDROME CLINICAL AND RADIOGRAPHIC MANIFESTATIONS: AN INTERDISCIPLINARY APPROACH

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**Aim:** the Eagle Syndrome (ES) is a condition caused by the elongation of the styloid process or by the ossification of the stylohyoid ligament. Symptoms are variable and different, depending on the variant: in the classic form, patients may present with pain, dysphagia, tinnitus, and paraesthesia, while in the vascular variant, neurovascular complications may occur. Symptoms may appear spontaneously or be triggered by head movements. The typical radiographic imaging may help for differential diagnosis with other conditions. This study aims to analyze the clinical and radiographic characteristics of the syndrome, in order to improve diagnostic protocols.

**Methods:** the research was conducted in the PubMed and Google Scholar databases and studies published between 2020 and 2025 were selected. The keywords used for the

search were: "Eagle syndrome", "styloid calcification", "Eagle syndrome imaging" and "styloid process".

**Results:** the diagnosis of ES is based on medical history, on clinical examination with palpation of the styloid process, and confirmation through imaging. Radiographic imaging allows classification of the styloid process by structure, angulation, and calcification elements useful for evaluating the interference with nearby structures and taking treatment decisions.

**Conclusions:** as the ES may need differential diagnosis in patients with orofacial pain and neurovascular symptoms, clinicians need to know the clinical symptoms and radiographic appearance. Radiographic imaging, particularly 3D CT, is essential to identify the pathological process and plan treatment decisions.

## COMPARISON OF PAIN LEVELS ASSOCIATED WITH CLEAR ALIGNERS AND FIXED APPLIANCES: A NARRATIVE REVIEW

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**Aim:** the objective of this review is to evaluate if there is a difference in pain levels experienced by patients undergoing treatment with clear aligners versus traditional braces.

**Methods:** a comprehensive review of literature was conducted using PubMed, Cochrane, Scopus, Google scholar, clinical trials and opengray databases with no time restriction. Comparative studies analyzing pain levels between clear aligners and fixed appliances were also included.

**Results:** after removing duplicates and screening titles, abstracts and full texts, the literature indicated that patients treat-

ed with clear aligners experienced lower pain levels than those using conventional fixed appliances, particularly during the initial days of treatment. However, this difference diminished over time.

**Conclusions:** with moderate level of certainty, the finding suggest that patients undergoing orthodontic treatment with clear aligners experience less pain compared to those with fixed appliances, particularly in the initial days of treatment. However, the difference diminishes over time, with no significant variations observed after three months.

## UP TO DATE IN SPORTS-RELATED DENTAL TRAUMA AND PREVENTION: A LITERATURE REVIEW

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**Aim:** dental trauma is the most prevalent type of injury affecting the oro-facial region with an incidence ranging from 18 to 30%. This work aims to provide an update on dental traumatology in different sports, analyzing its incidence and the main treatment protocols for different types of trauma. It also aims to raise awareness of the importance of prevention and emphasizes the need for long-term follow-up to reduce the risk of complications.

**Methods:** the screening was performed using databases such as PubMed, Medline, Scopus, and Web of Science, applying appropriate keywords and criteria.

**Results:** dental trauma is a major concern in sports, affecting up to 30% of athletes. Most affected are adolescents (11-15 yo) and young adults (18-21 yo). Upper incisors are

the most involved, especially if proclined and in Angle Class II malocclusion. Periodontal ligament injuries are among the most complex: luxations can be managed by manual, surgical, or orthodontic repositioning, the latter showing good healing and outcomes. The prognosis of avulsions depends on the time before reimplantation. Prevention plays a key role: mouthguards significantly reduce both the frequency and severity of injuries, while timely treatment lowers the risk of complications.

**Conclusions:** dental trauma in sports is common and requires prompt management. Tailored protocols - from restorative to orthodontic - are essential for successful results. Prevention and prolonged follow-up are crucial to reduce long-term risks and preserve dental health in athletes.

## ORTHODONTIC STABILITY AND ITS INFLUENCE ON STOMATOGNATHIC HEALTH

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**Aim:** Temporomandibular Disorders (TMD) are common in dental and orthodontic practice, often involving pain, joint sounds, and functional impairment. These conditions affect the temporomandibular joints, masticatory muscles, and related structures. Given their link with malocclusion, this study explores how orthodontic stability - defined by proper dental alignment and balanced occlusal, muscular, and joint function - impacts the health of the stomatognathic system, and whether it may help prevent or manage TMD.

**Methods:** a literature search was performed in PubMed, Scopus, and Web of Science using the keywords "orthodontics", "occlusal prematurities", and "temporomandibular joint". Studies published from 2010 onward were included. Eligible papers included clinical, observational, and systematic re-

views exploring the link between orthodontics and TMD. The analysis focused on premature contacts, joint overload, and their impact on muscle activity and stomatognathic function.

**Results:** TMD affects 7-30% of the population, with higher incidence in adolescent females. Pain is the most common reason for clinical visits. Some studies suggest a link between occlusal instability and TMD, but findings remain inconsistent due to methodological variability and limited multivariate analysis.

**Conclusions:** stable orthodontic occlusion may support stomatognathic function and reduce TMD risk; however, more well-designed studies are needed to clarify its clinical role. TMD screening is recommended before orthodontic therapy to ensure a tailored, multidisciplinary approach.

## ORTHODONTIC MANAGEMENT OF POST-TRAUMATIC AVULSIONS IN PRIMARY TEETH: A REVIEW

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**Aim:** traumatic avulsion of primary teeth is a frequent condition in pediatric patients, with potential repercussions on craniofacial growth and the eruption of permanent dentition. This review analyzes orthodontic strategies for post-traumatic management, focusing on space maintenance, eruption guidance, and long-term malocclusion prevention.

**Methods:** a literature review was conducted using databases such as PubMed, Scopus, and Medline. Articles published between 2000 and 2025 were selected, including clinical studies and guidelines on post-traumatic management of primary teeth.

**Results:** the articles meeting the inclusion and exclusion criteria highlighted that early loss of primary teeth may cause

space loss, dental migration, and malocclusions. Space maintainers help prevent crowding and tooth tipping; functional orthodontic appliances and eruption guidance plates support proper eruption of permanent teeth. In anterior regions, pediatric prosthetic devices improve aesthetics and phonetics. Orthodontic monitoring allows early interception of occlusal anomalies and timely treatment planning.

**Conclusions:** the adoption of preventive orthodontic strategies after primary tooth avulsion is recommended to avoid occlusal disturbances and ensure harmonious eruption of permanent dentition. Regular follow-ups are essential to monitor craniofacial development and to intercept and minimize the consequences of early primary tooth loss.

## IMPACT OF FUNCTIONAL APPLIANCES ON UPPER AIRWAY DIMENSION IN CHILDREN WITH OBSTRUCTIVE SLEEP APNEA: A SYSTEMATIC REVIEW

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**Aim:** Obstructive Sleep Apnea Syndrome (OSAS) is a prevalent sleep-related breathing disorder in children, frequently linked to craniofacial abnormalities such as mandibular retrognathia in Class II malocclusions. This systematic review aims to assess the effectiveness of functional appliances in modifying upper airway structures and improving respiratory function in pediatric patients diagnosed with OSAS.

**Methods:** following PRISMA guidelines, the review was carried out searching for articles published between 2004 and 2024 PubMed, Scopus, Web of Science, Embase, and Cochrane Library databases. The inclusion criteria focused on growing children ( $\leq 14$  years old) with OSAS and skeletal Class II malocclusions who underwent treatment with functional appliances.

**Results:** out of 1,298 initially screened articles, only four were included; they reported a significant increase in upper airway dimension, with an average expansion of approximately 21% after FA treatment. Cephalometric and tomographic analyses demonstrated an enlargement of the superior posterior airway space by roughly 0.5 mm, contributing to improved respiratory function. However, variations in measurement techniques led to inconsistencies regarding changes in soft palate length and hyoid bone position.

**Conclusions:** functional appliances appear to be an effective option for increasing upper airway dimension and mitigating OSAS symptoms in children. Nevertheless, the limited number of studies, small sample sizes, and short follow-up durations highlight the need for further research to validate long-term efficacy and establish standardized assessment protocols.

## INFLUENCE OF GNATHOLOGICAL EVALUATION ON ORTHODONTIC PLANNING: A LITERATURE REVIEW

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**Aim:** to evaluate the impact of gnathological analysis on orthodontic treatment planning, assessing how the integration of functional and structural assessments of the stomatognathic system can influence therapeutic decisions and improve treatment outcomes.

**Methods:** a systematic literature search was conducted through PubMed, Scopus, and Web of Science to identify relevant publications from 2000 to 2025. The inclusion criteria encompassed clinical studies and official guidelines addressing the role of gnathological evaluation in orthodontic diagnostics and planning. Particular attention was given to the assessment of Temporomandibular Joint (TMJ) function, muscular balance, mandibular dynamics and occlusal relationships beyond habitual occlusion.

**Results:** the selected articles highlighted that gnathological analysis enables the detection of functional disturbances such as Temporomandibular Disorders (TMDs), occlusal instability, neuromuscular imbalance, and skeletal discrepancies often not evident in routine orthodontic records. Evaluations including TMJ palpation, instrumental jaw tracking, and the use of mounted models in centric relation were shown to enhance diagnostic accuracy and support individualized therapeutic strategies. Integrating these tools improved the predictability and long-term stability of orthodontic outcomes.

**Conclusions:** gnathological analysis represents a valuable component of comprehensive orthodontic diagnosis. Its integration enhances the precision of treatment planning, reduces the risk of relapse, and contributes to the functional health and overall well-being of the patient.

## EVALUATION OF MANDIBULAR CONDYLE IN PATIENTS WITH UCH AND IN PATIENTS WITH SKELETAL CLASS III: A LITERATURE REVIEW

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Unilateral condylar hyperplasia is a condition of morphological alteration of the mandibular condyle, which leads to a progressive facial asymmetry of the lower third of the jaw. The diagnostic tools to assess condylar growth are based on the percentage differences in isotope uptake, which is higher in the condyle with hyperplasia. Thus, the use of SPECT and scintigraphy has no value in cases of bilateral condylar hyperplasia. There is a hypothesis that some patients with a

class III occlusal and skeletal relationship present a bilateral condylar hyperplasia.

A class III skeletal malocclusion can also present with a similar clinical picture.

The aim of this study is to compare the condylar volume at a radiographic level in patients with UCH and in patients with a skeletal class III, useful for a first early differential diagnosis.

## TREATMENT OF ATYPICAL SWALLOWING: STATE OF THE ART

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**Aim:** atypical swallowing, or deviated swallowing, is a disorder that generally occurs in childhood and involves an alteration in the act of swallowing in which the tongue exerts a push on the teeth, sometimes interposing itself between the dental arches, causing malocclusions, dental misalignment, difficulty in chewing, oral breathing, difficulty in pronouncing some phonemes and aesthetic problems. The purpose of this work is to identify the best therapeutic options according to the literature to treat atypical swallowing.

**Methods:** a search was conducted on PubMed using the key words “atypical swallowing” and “treatment of atypical swallowing”.

**Results:** from the research conducted, it emerged that the main therapeutic approaches to treat atypical swallowing are 4:

1. myofunctional therapy: therapy that re-educate the oral muscles;
2. orthodontic therapy: aimed at correcting dental misalignment;
3. speech therapy: exercises aimed at restoring correct muscle function;
4. multidisciplinary approach: the combination of myofunctional therapy, orthodontics and the treatment of oral breathing leads to better and longer-lasting results.

**Conclusions:** in conclusion, the combination of myofunctional and orthodontic therapy, with the collaboration between orthodontist and speech therapist, associated with the correction of oral breathing, is the most effective treatment to correct atypical swallowing and, consequently, prevent malocclusions.

## TRANSVERSAL MODIFICATIONS IN THE MIDFACIAL COMPLEX IN PATIENTS TREATED WITH MINISCREW-ASSISTED RAPID PALATAL EXPANSION (MARPE): A SYSTEMATIC REVIEW OF RCTS

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**Aim:** Miniscrew-Assisted Rapid Palatal Expansion (MARPE) is a treatment option to manage transverse maxillary deficiency in late adolescents and adults, where conventional RPE could lead to dentoalveolar side effects. The potential impact of MARPE on the midfacial structures due to suture activation remains unclear. Therefore, the aim of this systematic review is to clarify this aspect.

**Methods:** the research for articles published until March 4<sup>th</sup> 2025 was carried out in the following databases: PubMed, Scopus, Embase and Cochrane Library. The risk of bias was assessed using the Cochrane tool for Randomized Controlled Trials (RoB 2). RCTs performing transverse midfacial measurements on pre- and post-operative CBCTs of patients treated with MARPE were included.

**Results:** the initial database search produced 1602 results. Eight RCTs met the inclusion criteria and so they were selected for this study. Most studies showed a greater expansion of nasal cavity in Tooth-Bone-Bone group (TBB) compared to Tooth-Bone group (TB). Five years post-expansion circum-maxillary sutures showed a significant difference of around 1 mm in the frontomaxillary suture and 1.5-2.5 mm in the zygomaticomaxillary sutures in the TBB group compared to the TB group. One study found out that longer miniscrews led to a greater increase in the zygomatic process width.

**Conclusions:** according to this study, MARPE seems to significantly affect the midfacial complex with more pronounced skeletal changes in the nasal region with TBB devices, suggesting their potential benefit in cases with upper airways obstruction by reducing nasal airway resistance.

## CORRELATIONS BETWEEN OBSTRUCTIVE SLEEP APNEA SYNDROME AND PERIODONTITIS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Aim:** this study aimed to assess the connection between Obstructive Sleep Apnea Syndrome (OSAS) and periodontitis, investigating various hypotheses that suggest a link between respiratory disorders and periodontal disease.

**Methods:** a literature review was conducted using PubMed, Google Scholar, Cochrane Library, and Proquest databases, following PRISMA guidelines. The PECOS protocol (Population, Exposure, Control, Outcome, Study) was used to guide the search strategy or consistent article selection. The Joanna Briggs Institute (JBI) critical appraisal tool was applied for evaluating cross-sectional studies, while case-control studies

were assessed using the Newcastle-Ottawa Scale (NOS). Ten studies, involving 88,040 participants, were included.

**Results:** the meta-analysis revealed a statistically significant association between OSAS and periodontitis, with an Odds Ratio (OR) of 2.4620 (95%-CI: 1.7345-3.4946,  $p \leq 0.0001$ ). This suggests a potential relationship between the two conditions.

**Conclusions:** the findings suggest a possible association between OSAS and periodontitis. However, further research is needed to confirm this connection and understand the underlying mechanisms.

## ESTIMATE OF PLASTIC CONSUMPTION FOR ALIGNER PRODUCTION. HOW CAN WASTE BE REDUCED?

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**Aim:** the aim is to analyze the global trend of aligners, quantify the plastic used annually for the production of clear aligners and seek useful strategies for recycling and reducing plastic consumption.

**Methods:** the research was conducted on the main databases: PubMed, Scopus, Web of Science and Google Scholar. A market research was also conducted on the main current journals. Pairs of aligners were weighed in order to have an estimate of the quantity of plastic used annually for the production of aligners.

**Results:** the global clear aligners market size accounted for USD 4.50 billion in 2024 and its projected to surpass around USD 47.7 billion by 2032, and it is poised to reach a CAGR of 26.5%. North America is the leading region in the clear aligners market, accounting for over 45% of global revenue. The Asia Pacific region is expected to experience the highest growth rate in the clear aligner market. The models, the aligner

and in most cases, the packaging, are all made of plastic. A pair of aligners with their packaging weighs approximately 4.3 g. The average number of sets of aligners is 40. 12595.2 tons is the minimum annual production of plastic of which 2201.5 tons are classified as infectious health care waste unsuitable for conventional recycling.

**Conclusions:** in order to reduce the amount of nanoplastics we could act on the workflow - through the use of 3D printing or the use of recycled plastic for the production of models -, raise awareness among clinicians and patients on the issue and promote collaborations between aligner manufacturers and waste management companies such as TerraCycle. Once collected, the waste will be sent to TerraCycle, where it will be cleaned and melted into hard plastic that can be reshaped to create new products. Some companies have specific containers for used aligners, while unused ones with their packaging can be thrown in plastic.

## A SYSTEMATIC REVIEW ON TOOTH-BORNE, BONE-BORNE AND HYBRID PALATAL EXPANSION DEVICES: EFFECTIVENESS AND EFFICIENCY

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**Aim:** the palatal expander is a fixed orthodontic device used in the treatment of transverse dysplasia of the upper jaw. The device acts on the median palatine suture by applying constant forces over time. The result can be achieved by anchoring: skeletal, dental and hybrid. The aim of our study is to evaluate the effectiveness and efficiency of the various types of anchorage in relation to the evidence reported in the literature.

**Methods:** a scoping review of the literature was conducted using the following databases: PubMed, Google Scholar and Elsevier. The keywords used were: "Tooth-Borne palatal expanders; Bone-Borne palatal expanders; Hybrid anchorage in palatal expansion".

**Results:** when choosing a dental anchorage device, one must take into consideration the side effects that the device imparts

on the upper jaw, such as limited skeletal movement, dento-alveolar tipping, root resorption and harmful periodontal effects. An alternative could be hybrid anchorage, a surgically and minimally invasive choice. It allows for maximum control and efficient distribution of applied forces. Purely skeletal anchorage, on the other hand, allows for less variation in the angle of the palatal vault and the distance between the cusps of the first molars, as well as a statistically reduced risk of dental effects.

**Conclusions:** based on the evidence, each device analysed effectively achieves an increase in transverse diameters of the upper jaw. But skeletal anchorage provides better and predictable results, with long-term result stability in both adolescent and adult patients.

## NICKEL ALLERGY AND ORTHODONTIC THERAPY: REVIEW IN PEDIATRIC DENTISTRY

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Hypersensitivity to nickel, a material often used in the construction and design of orthodontic devices, is a pathology very often underestimated and ignored in the dental field and is not detected in the anamnesis by operators especially in patients of pediatric age (0-12) resulting in unpreparedness to the onset of symptoms and lengthening of therapy times

The study examines the correlation between the onset of symptoms of hypersensitivity to nickel in paediatric patients, crossing studies and researches, and the application of orthodontic devices made entirely from this element or with an alloy containing a certain percentage of Nickel and the identification of nickel-based devices free in order to provide potential alternatives for patients with positive results for this disease.

After identifying the type of pathology, etiopathogenic mechanisms and symptoms, research carried out and stud-

ies collected focused on various observations in the orthodontic pediatric-field, understanding the incidence of the pathology between age of patients and orthodontic devices: then they focused of the research of alternative materials with which to realize fixed devices with brackets and wires, and the study of three cases, treated at the UOC of the Umberto I hospital, with declared hypersensitivity in case of anamnesis and treated with devices made of completely nickel-free material.

The work concludes with a series of conclusions drawn from all these studies that recommend the collection of adequate anamnesis, with dermatologists and allergologists for the identification of symptoms and causative agents, and in case of positive, the application with the alternatives treated in this paper.

## AUTOIMMUNE THYROIDITIS AND TEMPOROMANDIBULAR DISORDERS: A LITERATURE REVIEW AND CASE REPORT

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**Aim:** the aim of this study is to investigate the possible correlation between autoimmune thyroiditis and Temporomandibular Disorders (TMD).

**Methods:** a 13-year-old female patient presented with ultrasound-confirmed autoimmune thyroiditis.

Orthodontic evaluation revealed mandibular deviation to the right, Class II malocclusion, and reported TMD.

A literature review was conducted focusing on studies employing Mendelian randomization, clinical epidemiology, and immunoendocrine mechanisms in the context of TMD and thyroid autoimmunity.

**Results:** genetic studies support a causal link between autoimmune thyroid diseases (especially hypothyroidism) and

TMD via shared immunoinflammatory pathways. Clinical research corroborates the frequent coexistence of TMD in patients with thyroid autoimmunity.

In the presented case, ultrasound evidence of thyroiditis, combined with TMD symptoms, aligns with mechanisms described in the literature.

Before starting orthodontic therapy, the patient had been treated for painful symptoms with gnatological treatment.

**Conclusions:** clinical and imaging findings in this case, aligned with recent research, suggest that autoimmune thyroid conditions may contribute to TMD. A multidisciplinary follow-up - including endocrinological, orthodontic, and maxillofacial assessment - is recommended.

## A RADIATION FREE ALTERNATIVE TO CBCT VOLUMETRIC RENDERING FOR SOFT TISSUE EVALUATION

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**Aim:** the aim of the present study is to evaluate whether a “radiation free” method using 3D facial scan can replace Cone Beam Computed Tomography (CBCT) volumetric rendering of soft tissue of the patient to assess maxillofacial surgery outcomes and compare the reference points and angular measurements of patient facial soft tissue.

**Methods:** facial soft tissue scan of the patient’s face, before and after orthognathic surgery and a CBCT of the skull for volumetric rendering of soft tissues were carried out. The 3D acquisitions were processed using Planmeca ProMax 3D ProFace® software (Planmeca USA, Inc.; Roselle, Illinois, USA). The participants were positioned in a natural position during the skull scanning. Three sagittal angular measurements

were performed (Tr-NA, Tr-N-Pg, Ss-N-Pg) and two verticals (Go-N-Me, Tr-Or-Pg) on facial soft tissue scan and on the patient’s 3D soft tissue CBCT volumetric rendering.

**Results:** a certain correspondence has been demonstrated between the measurements obtained on the Proface and those on the CBCT.

**Conclusions:** a radiation free method was to be considered an important diagnostic tool that works in conditions of not subjecting the patient to harmful ionizing radiation and it was therefore particularly suitable for growing subjects. The soft tissue analysis based on the realistic facial scan has shown sufficient reliability and reproducibility even if further studies are needed to confirm the research result.

## MASTICATION IN BILATERAL POSTERIOR CROSSBITE PATIENTS BEFORE AND AFTER FUNCTIONAL TREATMENT WITH FGB

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**Aim:** to evaluate the effects of Bilateral Posterior Crossbite (BPXB) treatment with Function Generating Bite (FGB) on mastication before and after the malocclusion's correction.

**Methods:** this prospective study included 71 subjects: 19 patients with occlusally symmetric BPXB, i.e., patients with the same number of posterior teeth in crossbite on both sides (M = 9; F = 10; age 9.3±2.2 [yr.mo]); 32 patients with occlusally asymmetric BPXB, i.e., with more teeth in crossbite on one side (prevalent side) than the other (non-prevalent side; 19 patients with more teeth in crossbite on the right side, M = 7; F = 12; age 8.2±1.6; 13 patients with more teeth in crossbite on the left side, M = 7; F = 6; age 9.6±1.9); 20 controls (M = 8; F = 12; age 10.2±1.7). The percentage of Reverse Chewing Cycles (RCCs) was recorded with the K7-I<sup>®</sup> kinesiograph using stand-

ardized soft (SB) and hard (HB) boluses before (T0) and after (T1) the malocclusion's correction with FGB.

**Results:** BPXB was corrected in all included patients. At T0, the percentage of RCCs in BPXB was significantly increased compared to controls (SB, HB, p <0.0001); symmetric BPXB showed no difference in RCCs between the sides, whereas asymmetric BPXB showed significantly more RCCs on the prevalent side. At T1, the percentage of RCCs was significantly reduced in both symmetric BPXB patients (SB, p = 0.003; HB, p <0.001) and asymmetric BPXB patients (prevalent side: SB, HB, p <0.00001; non-prevalent side: SB, p = 0.01; HB, p = 0.0002).

**Conclusions:** functional correction of BPXB with FGB significantly improved mandibular kinematics during chewing.

## EVALUATION OF COMPLICATIONS ASSOCIATED WITH THE USE OF TEMPORARY ANCHORAGE DEVICES (TADS) IN ORTHODONTIC TREATMENT

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**Aim:** the study aims to assess the complications related to the use of Temporary Anchorage Devices (TADs) and their incidence in patients undergoing orthodontic treatment.

**Methods:** this study analyzed 94 IMTEC 3M UNITEK TADs used as temporary anchorage devices in orthodontic patients. For each patient, the initial clinical examination, photographs, radiographs, cephalometric tracing, and study models were recorded. The placement of the mini-screws was standardized, with immediate post-insertion loading. The analyzed variables included insertion pain (graded on a 5-point scale), spontaneous or secondary loss of the implant, and soft tissues trauma. The interaction of the mini-implants with hard tissues was assessed radiographically, while any damage to adjacent teeth was evaluated through vitality tests.

**Results:** a total of 85.1% of patients reported no pain during insertion, while 11.2% experienced mild pain, and 3.2% reported moderate pain. Spontaneous implant loss occurred in 7 patients, replaced with no further complications. Soft tissues trauma was observed in 2 cases for implants and in 11 cases for auxiliary devices, all of which were resolved with repositioning. In 3 patients, a minor contact between the mini-screw and the dental root was detected, without clinical or radiographic consequences.

**Conclusions:** the complications encountered were minimal and easily manageable, without affecting orthodontic treatment outcomes. TADs are confirmed to be safe and effective devices, particularly for patients with poor compliance or requiring maximum anchorage.

## CEPHALOMETRIC ANALYSIS IN UNILATERAL POSTERIOR CROSSBITE PATIENTS

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**Aim:** this observational study aimed to evaluate the craniofacial characteristics of Unilateral Posterior Crossbite (UPXB) mixed dentition patients using cephalometric analysis.

**Methods:** 102 age- and gender-matched patients were included: 51 with UPXB (M = 19; F = 32; mean age  $\pm$  SD =  $7.6 \pm 1.4$  [yr.mo]) and 51 controls (C; M = 19; F = 32; mean age  $\pm$  SD =  $7.9 \pm 1.3$ ). Lateral cephalometric tracings were analyzed, considering the following cephalometric values: SpP<sup>^</sup>GoGn [°], SpP<sup>^</sup>Oc [°], Oc<sup>^</sup>GoGn [°], SN<sup>^</sup>GoGn [°], SpP<sup>^</sup>CoOr [°], CoGo<sup>^</sup>GoGn [°], A-Po [mm], and AN<sup>^</sup>B [°].

**Results:** cephalometric analysis showed that the value of SpP<sup>^</sup>CoOr was significantly reduced ( $p = 0.003$ ) in the UPXB group (mean  $\pm$  SD =  $-3.5^\circ \pm 4.4$ ) compared to controls (mean

$\pm$  SD =  $-1^\circ \pm 4$ ), indicating that, on average, the mandible was significantly more posteriorly rotated in UPXB patients. The value of SpP<sup>^</sup>GoGn showed a non-significant tendency ( $p = 0.08$ ) to be increased in UPXB patients (mean  $\pm$  SD =  $27.8 \pm 5.3$ ) compared to controls (mean  $\pm$  SD =  $26 \pm 5.1$ ). There was no significant difference in the other values between the two groups.

**Conclusions:** cephalometric analysis showed that mixed dentition UPXB patients were characterized by significantly more clockwise mandibular rotation than controls. Treatment strategies for UPXB correction should be aimed at improving the clockwise rotation of the mandible, as well as controlling the vertical dimension.

## EFFECTS OF INCISOR PROCLINATION ON ALVEOLAR BONE HEIGHT AFTER ORTHODONTIC TREATMENT WITH CLEAR ALIGNERS

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**Aim:** to assess changes and correlations between dental torque variations and periodontal modifications before and after orthodontic treatment with clear aligners, using CBCT.

**Methods:** 8 patients in permanent dentition undergoing non-extraction treatment for mild to moderate crowding were retrospectively analyzed. CBCT scans before and after treatment were evaluated with Horos 3.0 software. Bone changes were assessed using the long axis of the tooth and the CEJ as reference points. Bone height was measured from CEJ to bone crest. The buccolingual bone thickness was measured at 3 levels along the root (4, 8, and 12 mm). Measurement variations ( $\Delta$ ), in both planes, were calculated to quantify bone remodeling. Changes in buccolingual inclination were measured

as the angle between the perpendicular to the occlusal plane and the crown tangent.

**Results:**  $\Delta$  bone height showed a reduction on both sides of anterior teeth, with greater remodeling on the palatal side. A reduction in vestibular bone thickness at 4 mm ( $-1.5$  mm) and an increase at 12 mm ( $+2.1$  mm) were also observed in the anterior teeth. On the palatal side, bone thickness increased at 4 mm from the CEJ ( $+1.1$  mm) and a reduction at 12 mm ( $-1.8$  mm). Regarding buccolingual inclination, a  $5^\circ$  increase was observed in the anterior teeth.

**Conclusions:** crowding treatment with clear aligners in non-extraction cases should be planned considering potential variations in the buccolingual inclination of anterior teeth and modifications in alveolar bone thickness on both vestibular and palatal aspects.

## ANALYSIS OF MAXILLARY ARCH ASYMMETRIES IN PATIENTS WITH UNILATERAL CROSS-BITE

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**Aim:** the aim of the present study is to evaluate three-dimensional asymmetries of the upper jaw in patients with unilateral cross-bite and functional mandibular deviation.

**Methods:** nine patients (9-13 years) were retrospectively analyzed. Maxillary asymmetry was assessed using smile photographs and digital arch models, reoriented via the bipupillary axis with Overlay 2.1. Models were mirrored in Meshmixer along a vertical plane through the nasal filter. Discrepancies in three spatial planes were quantified using Medit Compare (colorimetric analysis) and Adobe Illustrator (measurements on canine, molars, and premolars).

**Results:** transverse: maximum at molars ( $\mu$  3.16 mm), intermediate at premolars/deciduous ( $\mu$  2.92 mm), minimal at canines ( $\mu$  2.28 mm).

Vertical: mild asymmetry at molars ( $\mu$  0.83 mm).

Antero-posterior: peaks at premolars/deciduous ( $\mu$  1.82 mm) and canine/molar ( $\mu$  1.3 mm).

**Conclusions:** inferential analysis revealed no significant differences in the vertical/transverse plane but showed a trend toward significance ( $<0.2$  mm) in transverse canine vs molar (permanent/deciduous) comparisons. This may indicate a negative result or a potential false negative due to limited sample size.

## EFFECTIVENESS OF WALA RIDGE FOR ANALYZING TRANSVERSAL SKELETAL DISCREPANCIES: INTEGRATED ANALYSIS OF CBCT AND DIGITAL MODELS

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**Aim:** the evaluation of transverse maxillary dimensions is essential for orthodontic diagnosis and planning. However, first-level radiographic examinations, such as the postero-anterior telecranium, have limitations in analyzing transverse skeletal disharmonies. Clinical assessment can also be affected by tooth position and occlusal compensations. The Wala Ridge, described by Andrews, represents a useful anatomical landmark for evaluating the ideal arch form and could provide information on the transverse dimension of the basal bone.

**Methods:** this retrospective study analyzed 36 patients undergoing CBCT and intraoral scanning. Patients with permanent dentition and Class I, II and III skeletal classification were included, while those with mixed dentition, agenesis, cleft lip-palate or other craniofacial malformations were excluded.

Measurements were made by identifying a reference at the level of the Wala Ridge on element 3.6, using Meshmixer software. CBCT images and intraoral scans were overlaid and analyzed with Blue Sky Plan, evaluating three parameters: Wala Ridge Distance (WRD), Basal Bone Distance (BBD) and Inter-molar Distance (IMD).

**Results:** descriptive analysis shows a mean of 55.70 for BBD, 56.47 for WRD, and 53.03 for IMD. Regression analysis indicates that IMD (0.531) and WWD (0.001) in relation to BBD.

**Conclusions:** the results confirm that WWD is a more reliable indicator than IMD for assessing mandibular transverse dimension. Its significant correlation with BBD supports its use as a parameter of reference in orthodontic analysis.

## 3D CBCT ANALYSIS OF PULP VOLUMES IN IMPACTED VS HEALTHY CONTRALATERAL CANINES

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**Aim:** this study aims to evaluate the volumetric differences in the pulp volume between impacted canines and their healthy contralateral counterparts in the same patients, assessing potential implications for tooth vitality and clinical decisions related to traction, extraction, or retention.

**Methods:** measurements were performed on CBCT scans of ten patients (age 12-17) with unilateral impacted canines. The pulp volumes of the maxillary canines were measured using MIMICS Medical software® (version 22.0). Segmentation masks were applied to highlight the different tissue densities within the tooth; the pulp areas were semi-automatically selected by two independent operators. The volumes of the pulp were then calculated by the MIMICS software using optimal resolution.

**Results:** in 5 patients, the impacted canine had a larger pulp volume, while in the other 5, the healthy canine had a larger pulp volume.

- Mean pulp volume (impacted canines): 29.34 mm<sup>3</sup> (±9.22 mm<sup>3</sup>);
- mean pulp volume (healthy canines): 26.67 mm<sup>3</sup> (±5.26 mm<sup>3</sup>);
- paired t-test: t = 1.14, p = 0.285.

**Conclusions:** no significant difference was observed between the pulp volumes of impacted and contralateral healthy canines. Although the mean pulp volume of impacted canines was slightly higher, the difference was not statistically significant (p >0.05). These findings suggest that canine impaction does not consistently influence pulp volume in the sample studied. However, due to the high standard deviation in impacted canines, inter-individual variability may warrant further investigation with a larger sample size.

## LOWER INCISORS INCLINATION IN A GROUP OF GROWING PATIENTS TREATED WITH CLEAR ALIGNERS AND CLASS II ELASTICS

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**Aim:** to analyze the inclination of lower incisor in growing patients with Class II malocclusion treated with elastics and clear aligners.

**Methods:** a sample of 20 patients (11 M and 9 F, mean age 14.6±1.2 years) was collected from daily private practice. The inclusion criteria were full permanent dentition (excluding third molars), Class II molar relationship (2,5-4 mm), no or moderate crowding (0-3 mm), normo-divergence of bony bases (FMA = 25±3), no history of orthodontic treatment. The treatment protocol for each group included non-extraction strategies, no IPR and the use of Class II elastics for at least 16 hours per day. The treatment provided the application of Invisalign clear

aligner system and the absence of any other auxiliaries apart from Invisalign optimized attachments.

For each subject of the study, dental and aesthetic measurements, both millimeter and angular were performed on the lateral cephalogram at time T0 (before treatment) and time T1 (after treatment).

**Results:** in the short term (T1-T0 = 18 months), the analysis of the results showed no statistically significant changes in all evaluated parameters. Therefore, there is no statistically significant change in the inclination of the lower incisors.

**Conclusions:** the use of Class II elastics in treatment with clear aligner allows a good control of the lower incisors' inclination (IMPA = 90±5°).

## INTERCEPTIVE TREATMENT OF DISPLACED MAXILLARY CANINES USING INVISALIGN FIRST

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**Aim:** this retrospective study aimed to evaluate the preventive effects of Invisalign® First in reestablishing the physiologic eruption process and reducing the risk of maxillary canine impaction in growing children.

**Methods:** this study examined 9 growing subjects (mean age:  $9.1 \pm 1.5$  years) with 13 early maxillary displaced canines in the intermediate mixed dentition, treated with Invisalign® First without prior orthodontic treatment. The analyzed criteria for displaced canines included: absence of palpation of the canine bulge, the canine inclination to the midline  $>25^\circ$ , and the canine crown overlap with the lateral incisor root (sectors 2-5). Panoramic radiographs at T1 and T2 were analyzed for five angular measurements ( $\alpha$ ,  $\beta$ , and  $\sigma$  for canines;  $\eta$  and  $\pi$  for first

premolars), two linear measurements (D1 and D2 for canines), and crown position (sectors 1-5). The statistical comparison of T2-T1 changes in radiographic measurements were analyzed with a paired t-test, while sector s distribution was assessed using the Chi-square test.

**Results:** at the end of active treatment, significant reductions were observed in  $\alpha$  ( $-14.71^\circ$ ),  $\beta$  ( $-6.57^\circ$ ),  $\pi$  ( $-12.21^\circ$ ), and D1 ( $-6.17$  mm). Significant increases occurred in  $\sigma$  ( $+12.57^\circ$ ),  $\eta$  ( $+12.79^\circ$ ), and D2 ( $+1.76$  mm). The Chi-square test showed a significant change in canine position distribution after treatment.

**Conclusions:** Invisalign® First appeared to be an effective interceptive treatment for guiding maxillary canine eruption and reducing impact risk in growing children.

## PROTOCOL FOR DIGITAL GUIDED INSERTION OF FIRMAEXP PALATAL TADS

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**Aim:** this study aims to present a new protocol for the guided placement of palatal mini-screws FirmaEXP (Sweden & Martina SpA), utilizing a surgical guide designed in CAD/CAM.

**Methods:** the new protocol involves an initial digital planning phase starting with the scan of the patient's upper arch. The pre-insertion .stl file (T0) is superimposed on the CBCT trough the ARCHIPLAN 3D software (Software Suite by Sweden & Martina SpA). This overlay ensures the correct placement of the FirmaEXP mini-screws and subsequently creates a customized surgical guide. The mini-screws can be 8 or 11 mm length and 1.8 mm diameter and are inserted using a mechanical contra-angle iSD900 NSK (NSK/Nakanishi Inc.) with a torque of 25 N, after local anesthesia administration. The insertion is followed by a new intraoral scan with the application of scan bodies to obtain the intraoral position of the mini-screws, from which the post-insertion .stl file (T1) is obtained. The

overlay of T0 and T1 files allows the evaluation of the accuracy and predictability of the FirmaEXP mini-screws guided placement.

**Results:** this protocol represents a valid alternative for planning and inserting palatal TADs in a secure and guided procedure. Through pre-insertion (T0), the anatomical insertion site can be properly assessed, avoiding damage to important structures. Additionally, it allows for the selection of the most suitable screw regarding length. The post-insertion .stl files (T1) is a useful tool for analyzing positioning and creating a record before starting treatment.

**Conclusions:** this protocol minimizes the risks traditionally associated with TADs, offering a more reliable method for achieving optimal orthodontic anchorage, as well as enhanced safety use for the clinician, and improved patient outcomes.

## FOLLOW-UP TO DENTAL REIMPLANTATION AFTER 72 HOURS POST-TRAUMA: CASE REPORT

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**Aim:** the objective of this case report is to evaluate the evolution of late dental reimplantation by traumatic avulsion.

**Methods:** reimplantation of an upper left central incisor was performed in an adult patient after 72h after avulsion, a period in which the element was not preserved according to what are the guidelines. The patient presented to the clinic after hospital regimen where reimplantation had been performed without adequate splinting. Extraction of the element was performed, and the element was subsequently treated with endodontic therapy and an apicoectomy. The element was subsequently reimplanted into the socket and splinted from 1.2 to 2.2 with a passive orthodontic arch for a period of 6 months.

**Results:** in the first six months since the splinting was performed there was no altered mobility, no discoloration at the element, no soft tissue changes, and no symptoms were reported by the patient. In the six months following the removal of the splinting, all of the above parameters remained unchanged. radiographically there is no evidence of: bone loss, internal and/or external resorption, infectious processes and rhizolysis.

**Conclusions:** the case described demonstrates the possibility of medium- to long-term maintenance of a tooth element reimplanted late following traumatic avulsion and in less than optimal condition. However, this is a single case from which the prognosis of late reimplantation in avulsed teeth cannot be extrapolated.

## UNILATERAL CONDILAR HYPERPLASIA A MULTIDISCIPLINARY APPROACH: A CASE REPORT

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**Aim:** unilateral condylar hyperplasia is a rare condition characterized by excessive growth of one mandibular condyle, leading to facial asymmetry and occlusal dysfunction. This case report aims to describe the diagnosis and multidisciplinary management of a patient with unilateral condylar hyperplasia.

**Methods:** a female patient, aged 19, presented with facial and occlusal asymmetry, including a right-deviated lower midline, Class III molar and canine relationship on the left side, and Class I on the right. Based on clinical intraoral and extraoral examinations, along with imaging (including CBCT), a diagnosis of unilateral condylar hyperplasia was confirmed. The treatment plan involved an early combined surgical and orthodontic approach. Simultaneous upper and lower bonding using

passive self-ligating system was performed, followed by a left condylectomy and post-surgical orthodontic treatment for occlusal refinement.

**Results:** post-treatment evaluation showed a significant improvement in facial symmetry and occlusal balance. Follow-up assessments revealed stable results with no signs of relapse. The combination of an early surgical approach followed by post-operative orthodontic treatment successfully corrected the skeletal and dental discrepancies.

**Conclusions:** this case highlights the importance of an interdisciplinary approach in managing unilateral condylar hyperplasia. Early diagnosis and a personalized treatment plan are crucial to achieving long-term functional and esthetic outcomes.

## THE EFFECTIVENESS OF THE HERBST APPLIANCE FOR PATIENTS WITH CLASS II MALOCCLUSION: A CASE REPORT

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**Aim:** the aim of this poster was to present the effectiveness of the Herbst appliance in a growing patient with skeletal class II malocclusion.

**Methods:** a female patient of 11-year-old girl showed a convex and unaesthetic facial profile due to severe mandibular deficiency and lip incompetence. The intraoral examination showed permanent dentition, bilateral class II molar and canine relationship, increased OVJ (12 mm) and OVB (6 mm), transverse deficiency with the four first molars head-to-head. The cephalometric analysis confirmed the diagnosis of skeletal class II with mandibular retrusion (SNA = 81°, SNB = 74°, ANB = +7°, Witts = +5), increased inclination of the incisors (Upp.Inc/ANS-PNS = 117°, IMPA = 84° LowA-Pg = -5 before treatment) and normodivergent vertical growth pattern (SN/GoGn = 35°). The malocclusion was treated with an orthopedic

palatal expansion with a RPE followed by the advancement of the mandible with the Herbst appliance. The telescoping arms were activated every ten weeks bilaterally (2 or 3 mm). In the first 11 months of treatment, only the upper arch was bonded (MBT prescription, .022" x .028" slot) to achieve leveling and alignment during mandibular advancement. After removal of Herbst's appliance, the lower arch was also bonded.

**Results:** after 30 months of treatment, the patient presented an Angle's class I occlusion a Skeletal class I normal values of OVJ (2 mm), and OVB (2,5 mm). The cephalometric analysis showed (SNA = 8°; SNB = 77,5°; ANB = 3,5°; Witts = +2; Upp.Inc/ANS-PNS = 105°; IMPA = 97,5°; Low incisor/A-Pg = +1) after treatment.

**Conclusions:** the use of Herbst in growing patients can promote mandibular growth without patient's compliance.

## 3D PLANNING OF A CLASS II PRE-SURGICAL ORTHODONTIC TREATMENT: A CASE REPORT

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**Aim:** to present a case of a skeletal Class II 35-year-old patient, with maxillary and mandibular retrusion, by means of the following treatment plan: pre- and post-surgical orthodontic treatment and 3D-planned orthognathic surgery.

**Methods:** extraoral examination revealed convex profile and labial incompetence at rest. At intraoral examination, the patient presented a bilateral molar dental Class I, open bite, proclination of upper and lower incisors, and lower dental crowding. The lateral cephalogram showed a hyperdivergent (FMA = 32.6°) skeletal Class II (ANB = 8.8°). The treatment plan included the extraction of the four impacted wisdom teeth and the four first premolars, followed by fixed orthodontic treatment for obtaining space-closure, dental alignment and open-bite resolution. The second phase of treatment involved orthog-

nathic surgery using 3D planning software SureSmile®, to achieve mandibular advancement, mentoplasty and upper jaw impaction.

**Results:** the therapy proceeds according to the established objectives, improvement of the profile, labial competence, open bite correction, improvement of the inclination of the incisors and resolution of crowding.

**Conclusions:** dental alignment and correct inclination of upper and lower incisors with respect to their bone bases were established and contributed to the improvement of the open bite and elimination of dental compensations. Maxillofacial surgery will restore the correct functional and aesthetic intermaxillary bone relationships, which will be followed by post-surgical orthodontic treatment in order to refine the case.

## ORTHODONTIC TREATMENT WITH CLEAR ALIGNERS IN A CASE WITH OLIGODONTIA AND ATYPICAL SWALLOWING: A CASE REPORT

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**Aim:** to report a clinical case of a 9-year-old child with oligodontia and atypical swallowing, treated with clear aligners and myofunctional therapy.

**Methods:** the patient was referred for orthodontic treatment for oligodontia. Extraoral examination revealed a flattened profile. Intraoral examination revealed the absence of multiple elements in the upper arch and lower arch. The orthopantomography showed the absence of all the lateral incisors, canines, first premolars and lower central incisors. Treatment with Clear Aligners (Nuvola Junior<sup>®</sup>) aimed to reduce the upper interincisor diastema and correct the excessive vestibular torque of the incisors, as well as to provide a mechanical stop for tongue

thrusting between the interdental spaces. In association, speech therapy exercises for re-educating lingual function were taught.

**Results:** the therapy with Clear Aligners in the patient with oligodontia allowed to restore the continuity of the dental arch, filling the spaces of the missing teeth. Myofunctional therapy can be carried out, since the palate is free from appliances.

**Conclusions:** the synergy between speech therapist and orthodontist allowed to choose the most suitable device to obtain a tongue education in complex case of multiple agenesis even in such a complex case.

## SCISSOR BITE IN AN ADULT PATIENT TREATED WITH CLEAR ALIGNERS: A CASE REPORT

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**Aim:** this case report describes the orthodontic treatment of a bilateral posterior scissor bite in an adult patient with clear aligners.

**Methods:** the present study reported a case of a 34-year-old female patient. Extraoral examination showed a flat profile. Intraoral examination revealed a bilateral Angle's molar class I, overjet of 4.2 mm, overbite of 2 mm, posterior scissor bite of teeth 1.7 and 2.7 and more than 3 mm of lower dental crowding. Furthermore, the patient presented a reduced mesiodistal width of tooth 1.2 compared with 2.2. Cephalometric analysis revealed a skeletal class I (SNA 84; SNB 80; ANB 4; WITS -1) with a normodivergent vertical growth pattern (FMA 28) and mild flaring of the lower incisors (IMPA 95). Treatment consisted of a first stage of 16 clear aligners changed every two weeks combined with the night-time

use of criss-cross elastics (6 ½ oz, 1/4") on the right side between teeth 17 and 47 and on the left side between teeth 27 and 37. Additional 10 aligners were requested for the refinement phase, for a overall treatment duration of 13 months. Interproximal spaces mesially and distally to tooth 1.2 were left for the conservative restoration of this microdontic lateral incisor.

**Results:** the treatment successfully improved the inter-arch relationships, with a complete correction of the crowding and the bilateral scissor bite.

**Conclusions:** the present multidisciplinary case report showed the efficiency of the association between clear aligners and auxiliaries to correct bilateral scissor bite and to manage the interproximal spaces for conservative restorations.

## ORTHODONTIC MANAGEMENT OF TRANSMIGRATED IMPACTED LOWER CANINE USING A LINGUAL ARCH: CASE REPORT

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Mandibular canine impaction and transmigration are rare conditions, and there are very few studies concerning these occurrences. It is difficult for the dental practitioner to find reliable data concerning epidemiological features and diagnostic protocols for these events. The aim of this study is to identify a classification system and a specific protocol for the management of impacted mandibular canines. A clinical case is presented to illustrate the application of the proposed management approach.

The patient, a 12-year-old male in mixed dentition, presents with intraosseous impaction and mesioversion of the tooth 3.3. A CBCT scan was performed to assess the position of the impacted mandibular canine relative to the adjacent anatomical structures. The impacted mandibular canine was classified as type 1 according to Mupparapu's classification. The decision was made to recover the impacted mandibular canine through a

combined orthodontic-surgical approach. This involved the surgical exposure of the impacted canine and the application of a chain for orthodontic and the placement of a lingual arch with a steel arm to which the traction was attached.

The management of impacted mandibular canines requires a multidisciplinary approach. During the surgical procedure and the phases of orthodontic traction, it is crucial to preserve dental and periodontal structures to prevent complications. It follows that an accurate diagnosis and treatment planning are essential to ensure the best possible outcome for the patient. Although the impaction and transmigration of mandibular canines is a rare clinical condition, it is essential to shed light on the most predictable treatment options to establish effective treatment protocols. Further studies are needed to better understand the outcomes of treatment for such rare and complex clinical cases.

## ORTHODONTIC-SURGICAL RECOVERY OF 4 IMPACTED PERMANENT TEETH: A CASE REPORT

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**Aim:** the aim of this work is to present a case report of an adolescent patient (14-year-old) affected by four permanent teeth inclusion (1.3, 2.3, 4.3, 4.4) with complete root formation and class II malocclusion division 2, treated with fixed orthodontic appliance and early class 2 elastics.

**Methods:** after four months of orthodontic treatment, which included occlusal release for the Class II Division 2 malocclusion and the use of early light elastics (3.5 oz), mandibular repositioning was achieved, resulting in the complete correction of the sagittal occlusal relationships. Ten months after bonding, surgical uncapping of teeth 1.3 and 2.3 was performed, followed by direct traction of these teeth using the upper steel arch. Two months later, teeth 4.3 and 4.4 were un-

capped, and traction was applied via pins crimped to the lower steel working arch.

**Results:** after 24 months, all the orthodontic goals therapy have been achieved. The surgical orthodontic recovery of the 4 impacted elements was completed and the class II malocclusion was completely corrected by occlusal unlocking which allowed the mandible to be repositioned through early class 2 elastics, which were maintained throughout the treatment.

**Conclusions:** this case report shows how elaborate auxiliary appliances are not necessary for the recovery of impacted dental elements, provided that these teeth do not present unfavourable inclination or angulations.

## COMBINED ORTHODONTIC-SURGICAL APPROACH FOR THE TRACTION OF AN IMPACTED CANINE: A CASE REPORT

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**Aim:** severely impacted canines present a complex clinical scenario, especially when their eruption path threatens adjacent roots. This case report outlines the orthodontic-surgical management of a maxillary canine (tooth 13) in a 13-year-old female, where specific biomechanical strategies were adopted to avoid root resorption of the lateral incisor.

**Methods:** initial CBCT imaging revealed a close proximity and potential conflict between the canine and lateral incisor roots. To avoid lateral incisor resorption, a vestibular traction was applied to distance the canine from the lateral root and correct its axial inclination. Once the canine was safely repositioned, gingivoplasty and bone tunnelization were performed to continue traction. Due to its extreme buccal position, to avoid dehiscence and ensure healthy eruption, the

canine was guided to erupt palatally. Finally, orthodontic treatment continued with controlled forces and anchorage via a transpalatal bar.

**Results:** the chosen approach effectively redirected the canine's eruption, avoiding root resorption and significant periodontal damage. Palatal emergence was managed conservatively, preserving mucogingival integrity and ensuring functional alignment.

**Conclusions:** careful planning based on CBCT imaging and staged biomechanics allowed for successful alignment of a high-risk impacted canine. This case highlights the importance of adapting surgical and orthodontic protocols to anatomical constraints to minimize complications and optimize both function and aesthetics.

## CHANGES IN OCULAR PARAMETERS FOLLOWING RAPID MAXILLARY EXPANSION WITH MINI-SCREW-ASSISTED RME

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**Aim:** to evaluate the effects of mini-screw-assisted Rapid Maxillary Expansion (RME) on visual function by analyzing changes in ocular parameters before, during, and after treatment.

**Methods:** a patient underwent RME with a device anchored to mini-screws, activated once daily for 3 weeks. After active expansion, a 6-month retention phase followed. Ophthalmologic parameters were assessed at three stages: pre-expansion, post-expansion, and after retention. Exams included cover tests (near and distance), left eye vision, extraocular motility, motor convergence (NPA), and fusional vergences.

**Results:** data showed substantial changes in ocular parameters. The cover test varied significantly, and left eye vision

declined post-treatment. Extraocular motility revealed coordination adaptations. Motor convergence (NPC and NPA) and fusional vergences were also altered, indicating an impact of maxillary expansion on ocular dynamics.

Additionally, the treatment corrected the patient's unilateral crossbite.

**Conclusions:** mini-screw-assisted RME led to both orthodontic correction and measurable changes in visual parameters. These findings suggest a possible link between skeletal facial changes and ocular function. Further studies are needed to confirm these outcomes and support interdisciplinary monitoring of RME patients.

## CEPHALOMETRIC ASSESSMENT OF MAXILLOFACIAL MORPHOLOGY IN SUBJECTS AFFECTED BY ACROMEGALY COMPARED WITH UNTREATED CLASS III INDIVIDUALS AT THE END OF GROWTH

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**Aim:** acromegaly is a multisystem disease of adults, caused by the overproduction of Growth Hormone (GH) by the adenohypophysis. Excess of GH results in bone and soft tissue enlargement. This study aims to compare the cephalometric characteristics of acromegalic patients with healthy subjects in skeletal class III after completion of active growth.

**Methods:** 15 available lateral X-ray of acromegalic patients (9 females, 6 males), who attended the Medical Clinic Department of the Padua Hospital, were analysed through a cephalometry study using Webceph software. The cephalometric data were compared with a control group of untreated class III patients at the end of skeletal growth (CS VI). The mean and standard deviation were calculated for 15 variables considered from cephalometric analysis.

**Results:** the results showed that not all the acromegalic patients were in skeletal class III, unlike the control group. In particular, the case group reported an increased saddle angle compared to the untreated sample, a reduced nasolabial angle and a reduced angle of the lower central incisors to the mandibular plane, compared to the control group.

**Conclusions:** the acromegalic group presented a smaller FMIA (angle of the lower incisor axis to the FH plane) and more labial inclination of the mandibular central incisors, probably due to the macroglossia and the absence of dentoalveolar compensation.

The reduced nasolabial angle confirms the hypertrophy of nose and lips of acromegalic subjects.

## AESTHETIC EVALUATION OF GINGIVAL MARGIN MODIFICATION FOLLOWING EXTRACTION OF MAXILLARY FIRST PREMOLARS

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**Aim:** orthodontic treatment increasingly prioritizes aesthetics. While anterior aesthetics are well-studied, the impact on posterior gingival exposure remains unclear. This study evaluates the effect of upper first premolar extractions on posterior gingival aesthetics using 3D scans.

**Methods:** a retrospective case-control study analyzed 48 patients: 24 with upper first premolar extractions and 24 without. The clinical crown length ratio between the canine and the adjacent tooth was compared using an independent samples t-test. The null hypothesis assumed no significant difference between groups.

**Results:** the extraction group had a lower crown length ratio (0.67) than the non-extraction group (0.86), with a significant

difference ( $p < 0.001$ ). Extraction cases showed increased posterior gingival exposure, with 97.5% exhibiting a scar between the canine and second premolar. The second premolar had a shorter crown than the first, further exposing gingiva. Upper first premolar extraction may negatively affect smile aesthetics. Pre-treatment evaluation should assess premolar visibility during smiling. Extracting the second premolar instead may reduce aesthetic concerns.

**Conclusions:** corrective strategies, such as orthodontic intrusion and cusp reconstruction, or alveolar preservation techniques (e.g., Tiefengraber's method), can help minimize these effects. This study underscores the need for personalized treatment planning that balances function and aesthetics.

## SKELETAL EFFECTS ON GLENOID FOSSA AFTER FUNCTIONAL TREATMENT WITH TWIN-BLOCK APPLIANCE

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**Aim:** the aim of this study was to evaluate the skeletal effects of Twin-Block therapy on the glenoid fossa, specifically assessing its horizontal and vertical positional changes.

**Methods:** two groups of skeletal Class II patients were analyzed, each consisting of 43 subjects. Group 1 included patients treated with the Twin-Block appliance, while Group 2 comprised untreated controls. Inclusion criteria for both groups were:

1. skeletal Class II with mandibular retrusion (SNB <78°), Angle Class II Division 1 or 2;
2. absence of craniofacial syndromes;
3. absence of dental agenesis;
4. no previous orthodontic treatment.

Additional inclusion criteria for Group 1 included:

1. patients in the pre-peak or peak of mandibular growth, evaluated by the MPM method (*Perinetti et al., 2017*);
2. achievement of canine and molar Class I relationships with normal overjet and overbite at the end of treatment;

3. availability of complete photographic and radiographic documentation, both before (T0) and after treatment (T1).

All lateral cephalograms were oriented to the Frankfurt plane and analyzed with ViewBox 4 software (dHAL Software, Kifissia, Greece). The parameters measured were horizontal and vertical F-S distances and Co-Gn. For each parameter, the difference between T1 and T0 (or delta) was determined and used for statistical analysis.

**Results and conclusions:** Significant differences in delta values were found between the two groups. The Twin-Block group showed anterior remodeling of the glenoid fossa (average displacement of +0.86 mm), whereas untreated patients exhibited posterior remodeling (mean shift of -1.02 mm), with an overall difference of 1.88 mm between the two groups. This study suggests that Twin-Block therapy also influences glenoid fossa, contributing to skeletal correction and treatment success.

## MORPHOLOGICAL EVALUATION OF THE AIRWAYS IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA SYNDROME

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**Aim:** the aim of this study is to evaluate the correlation between the severity of OSA and some radiographic/hypopharyngeal, retroglossal, and retropalatal and soft palate, the increase in soft palate thickness, reduced the reduction of the retro-palatal, and hypopharyngeal airway spaces, and the positioning of the hyoid bone.

**Methods:** twenty patients were recruited from the Department of Dentistry at the Nostra Signora del Buon Consiglio University Clinic, Tirana. The sample included two groups: the working group, consisting of 10 patients, and the control group, consisting of 10 healthy patients. Patients with OSA were further divided into two groups based on BMI: obese OSA and non-obese OSA. All patients underwent standard lateral cephalometry, and 21 variables were considered to obtain information on craniofacial skeletal and soft tissue morphology.

**Results:** obese patients showed higher AHI than non-obese patients. Additionally, compared to the control group, obese patients with OSAS showed significant differences in:

1. decrease in the posterior airway space;
2. increased in soft palate thickness;
3. increased NSBa angle;
4. increased in tongue length;
5. increased tongue height.

Furthermore, obese patients had a longer tongue, a more anteriorly displaced hyoid bone, and an anteropositioned mandible compared to the control group.

Significant predictors for all patients were MPH and ANS-PNS.

**Conclusions:** this study revealed the existence of a correlation between the severity of OSAS and the reduction of hypopharyngeal, retroglossal, and retropalatal airways spaces as well as the anterior position of the hyoid bone.

These factors can have a significant impact on the severity of OSAS and are of crucial importance for diagnosis and treatment planning.

## EFFECTS OF RAPID PALATAL EXPANSION IN PEDIATRIC PATIENTS AFFECTED BY OSAS

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**Aim:** the Rapid Palatal Expansion (RPE) widens the upper jaw and also affects the nasal cavity. Paediatric Obstructive Sleep Apnea Syndrome (OSAS) is characterized by events of partial or total obstruction of the upper airways during sleep. The aim of the study is to investigate effects of RPE on sleep respiratory parameters, with particular attention to the changes from the end of palatal disjunction to twelve months after expander removal.

**Methods:** in the study, 20 subjects have been examined (age between 7 and 13 years). Each subject underwent a home polygraphy before the start of treatment (T0), after finishing RPE activations with the device still in place (T1) and twelve months after the removal of the expander (T2). At the same time, patients have been requested to fill in the validated Italian version of the Pediatric Sleep Questionnaire (PSQ).

**Results:** from the first polygraphy, the subjects have been identified positive for OSAS considering an AHI higher than 1 event/h as an index of pathology. A significant improvement in all sleep parameters is observed, with a decrease in AHI at T1 of 56% compared to T0, which subsequently reaches 86% at T2. The supine AHI goes from an average of 2.63 events/h at T1 to 0.79 events/h at T2. The ODI also drops by 50% at T1 and then improves further at T2 by 62% compared to T0.

**Conclusions:** the study shows an improvement in all respiratory sleep parameters following palatal expansion in OSA patients. This improvement increases over time, reaching statistically significant values one year after device removal.

## ELASTODONTIC DEVICES AND SLEEP DISORDERS: A PROSPECTIVE STUDY ON ORAL BREATHERS

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**Aim:** this study aims to evaluate the effects the efficacy of the Eq. Eptamed Universal elastodontic device on pediatric oral breathers with class II malocclusion and sleep-disordered breathing and to improve sleep quality and malocclusion while preventing related complications.

**Methods:** twenty patients aged 6-12 years with class II malocclusion and oral breathing, due to untreated adeno-tonsillar hypertrophy, were enrolled in the University Dental Clinic of Perugia. The initial assessment included clinical examination, intra-/extra-oral photos, radiographic exams, and sleep questionnaires (including the Berlin Questionnaire), that are repeated at each follow-up. Exclusion criteria regarded previous orthodontic treatment, systemic diseases, and periodontal con-

ditions. After the enrollment, patients were given the Eq. Eptamed Universal device, to be worn nightly for six months, and the MORELLATO M-04 smartwatch, which records sleep data, oxygen saturation and heart rate. Follow-ups at 30, 90, and 180 days analyze occlusal and respiratory changes.

**Results:** the study is ongoing, but initial evaluations show an improving sleep quality, reduction of nocturnal awakenings and an increase in oxygen saturation.

**Conclusions:** the Eq. Eptamed Universal device appears to be effective in improving sleep quality, correcting oral breathing and malocclusion in patients who cannot or do not wish to undergo adenotonsillectomy surgery. As the study is still ongoing, the results require further observation.

## PERIODONTAL HEALTH DURING ORTHODONTIC TREATMENT: COMPARISON OF PATIENTS UNDERGOING ORTHO-TREATMENT WITH FIXED APPLIANCES AND CLEAR ALIGNERS

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**Aim:** the aim of this study is to evaluate the periodontal indexes in patients undergoing orthodontic treatment with fixed appliances and clear aligners at T0, T1 and T2.

**Methods:** a group of 20 adolescents aged 11-17 undergoing orthodontic treatment was initially collected, 10 with fixed appliances and the other 10 with clear aligners. Patients from both groups were visited at baseline and given a professional dental hygiene, then they were instructed with adequate dental hygiene home procedures the same way. At T0, they were probed to evaluate PPD (Probing Pocket Depth) and BoP (Bleeding on Probing) and PSR (Periodontal Screening Record) were calculated. Then PCR O'Leary with the aid of a bitonal plaque detector was collected.

**Results:** data extraction is still ongoing. Results were collected in a simplified periodontal chart, while a modified one was used for patients who had not all permanent teeth at the time of the visit.

The same examination protocol was used in the follow-up after a month and after three months from the beginning of the study, equal to T1 and T2. Then, results were collected and compared for statistical analysis.

**Conclusions:** in agreement with scientific literature, preliminary results show how dental hygiene procedures practised by patients, although they are the same, lead to better periodontal indexes (PSR, BoP and PCR) in patients with clear aligners compared to the fixed appliances group.

## MASTICATION IN OCCLUSALLY SYMMETRIC AND ASYMMETRIC BILATERAL POSTERIOR CROSSBITE PATIENTS

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**Aim:** Bilateral Posterior Crossbite (BPXB) is a severe malocclusion associated with maxillary hypoplasia. BPXB may involve the same or a different number of teeth between the sides, i.e., it may be occlusally symmetric or asymmetric. This study aimed to evaluate the masticatory function in BPXB and the association between the masticatory alterations and the occlusal symmetry or asymmetry of BPXB.

**Methods:** this observational study included 170 participants: 130 patients with BPXB (65 occlusally symmetric BPXB, i.e., same number and type of posterior teeth in crossbite between the sides, F = 33, M = 32, median age 9.6 (8.2-13) [yr.mo]; 65 patients occlusally asymmetric BPXB, F = 30, M = 35, median age 9.9 (8.3-13.6), and 40 controls (F = 25, M = 15, median age 10.2

(9.4-11.6)). The masticatory function was evaluated by detecting the percentage of Reverse Chewing Cycles (RCCs) recorded with a kinesiograph using standardized soft and hard boluses.

**Results:** the frequency of RCCs was significantly increased in all BPXB patients compared to controls ( $p < 0.000$ ). In symmetric BPXB patients, there were no significant differences in the frequency of RCCs during chewing on the left or the right side. In asymmetric BPXB patients, the frequency of RCCs was significantly increased during chewing on the side with relatively more teeth in crossbite ( $p < 0.000$ ).

**Conclusions:** the masticatory function was significantly altered in all BPXB patients and was differently affected by the malocclusion's symmetric or asymmetric occlusal features.

## ACCURACY AND CONSISTENCY OF ARTIFICIAL INTELLIGENCE-BASED CHATBOTS *VERSUS* CLINICIANS AS PUBLIC SOURCES OF INFORMATION ON ORTHODONTICS: A CROSS-SECTIONAL STUDY

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**Aim:** the widespread use of Large Language Models (LLMs) in generative AI across medical and dental fields, especially orthodontics, has sparked concerns about their accuracy. This study preliminarily assesses the accuracy and consistency of chatbots *versus* clinicians in responding to common orthodontic queries.

**Methods:** the study analyzed 8-item orthodontic questionnaire identified through Google searches and chatbot interactions. These were addressed by popular chatbots (ChatGPT4, Claude-3-Opus, Gemini 2.0 Flash Experimental, Microsoft Copilot, and DeepSeek) and two dentist groups (specialists and non-specialists). Two experts rated chatbot responses using the GQS scale. Descriptive statistics and Chi-square tests compared responses among specialists,

non-specialists, and chatbots. Chatbot performance was evaluated by median and interquartile range of GQS scores per chatbot and per question.

**Results:** specialists demonstrated slightly higher expertise than generalists in Q3 ( $p = 0.041$ ) and Q4 ( $p < 0.001$ ), particularly compared to chatbots. Generalists appeared marginally more experienced than chatbots. Based on GQS scores, chatbots performed most accurately on Q3 (median = 4.50), with DeepSeek being the most accurate AI (median = 4.00).

**Conclusions:** the disparate responses across the three categories highlight the need for further clinical studies to clarify common knowledge on malocclusion. Currently, chatbots are not yet capable of replacing human clinicians in diagnostic decision-making.

## PREVALENCE OF SELF-CORRECTION IN ATYPICAL SWALLOWING WITH TONGUE INTERPOSITION IN EARLY CHILDHOOD: A LONGITUDINAL ANALYSIS

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**Aim:** to evaluate swallowing patterns in children aged 3-5 to investigate the incidence of self-correction of atypical swallowing with tongue interposition.

**Methods:** the study enrolled three-year-old children from Chiavari (Italy) preschools, born in 2008 and 2009, totaling 240 children. Parents completed a questionnaire about their child's clinical history, nutrition, and oral hygiene before each clinical examination. Following WHO criteria, two examiners performed clinical examinations for each child at ages 3, 4, and 5. Examinations were done in classrooms under natural light with disposable gloves and masks in line with infection control protocols.

**Results:** the overall prevalence of atypical swallowing with tongue interposition was 13.2%, with no significant differences by age (15% at 3, 12% at 4, 14% at 5). A high self-correction rate (80.5%) was observed, with an incidence rate of 6.3%. The pattern persisted from ages 3 to 5 in only 19.5% of children with tongue interposition. A significant correlation ( $P$ -value  $< 0.001$ ;  $RR = 17$ ) was found between Non-Nutritive Sucking Habits (NNSH) and atypical swallowing.

**Conclusions:** given the high self-correction rate, observation is recommended for children with atypical swallowing from age 3 until age 5. The high prevalence after age 3 and its strong correlation with NNSH suggest it may perpetuate poor oral habits, potentially affecting dental arch development.

## COMPARISON OF PERIODONTAL STATUS IN PATIENTS TREATED WITH FIXED THERAPY AND PATIENTS TREATED WITH CLEAR ALIGNERS

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**Aim:** this study compares the effects on periodontal health between fixed therapy with Damon brackets and clear aligners with the Invisalign system, focusing on changes in gingival recession.

**Methods:** ten patients (aged 19-29) were recruited and then divided into two groups: Group A consists of 5 patients treated with Damon brackets and Group B consists of 5 patients treated with Invisalign. All patients had good periodontal health and minor gingival recessions (Miller Class I-II).

Assessments were performed at T0 (baseline), T1 (1 month), and T2 (3 months). Clinical measurements were taken with the PCP UNC 15 periodontal probe, and digital measurements were obtained via intraoral scans using the Carestream CS

3500 scanner. Data analysis was conducted using Meshlab (2016.12) software, and statistical significance was assessed with Student's T-Test ( $P < 0.01$ ).

**Results:** patients in Group A had an average gingival recession of 0.846 mm (SD = 0.167 mm). Patients in Group B had a lower recession of 0.473 mm (SD = 0.157 mm). T-Test results ( $P = 0.0066$ ) confirmed a statistically significant difference, indicating that clear aligners lead to less gingival recession compared to fixed appliances. Group A showed a higher Plaque Index (PI) and Bleeding on Probing (BoP).

**Conclusions:** patients treated with clear aligners had better periodontal health than those with fixed braces. Clear aligners should be preferred for patients at risk of periodontal issues.

## ASSESSING THE INFLUENCE OF MALOCCLUSION ON ADOLESCENTS' GENERAL AND ORAL HEALTH-RELATED QUALITY OF LIFE AND PARENTAL PERCEPTION

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**Aim:** to investigate how malocclusion affects adolescents' general Health-Related Quality of Life (HRQoL) and Oral Health-Related Quality of Life (OHRQoL), based on both patients' and parents' reports.

**Methods:** 238 adolescents (10-18 years) were recruited at their first orthodontic consultation at the University of Naples Federico II. Patients and caregivers completed digital questionnaires: Oral Health Impact Profile-14 (OHIP-14) and Pediatric Quality of Life Inventory (PedsQL) for adolescents; Parental-Caregiver Perceptions Questionnaire-16 (PCP-Q-16), Family Impact Scale-8 (FIS-8), and the parent version of PedsQL (P-PedsQL) for caregivers. Statistical analyses: ANOVA, Kruskal-Wallis, chi-square tests, and Spearman's correlations ( $p < 0.05$ ).

**Results:** 57.6% of participants showed a severe need for orthodontic treatment (IOTN-DHC). No significant score differences were found across IOTN-DHC groups. Reduced overjet (OVJ) was linked to lower Physical Function scores ( $p = 0.026$ ). According to caregivers, both increased and reduced OVJ correlated with poorer OHRQoL ( $p = 0.043$ ). Moderate correlations emerged between OHIP-14 and PCP-Q-16 scores ( $Rho = 0.335$ ), and between PedsQL and P-PedsQL scores in Psychosocial, Physical, and Total domains ( $Rho = 0.2798, 0.3295, 0.300$ ).

**Conclusions:** OVJ variations impact adolescents' OHRQoL, supporting the need for early orthodontic intervention. Moderate patient-parent agreement highlights the importance of considering both views in orthodontic care.

## CONVENTIONAL ORTHODONTIC VS CLEAR ALIGNER THERAPY: A CROSS-SECTIONAL STUDY FOR THE EVALUATION OF OCCLUSAL CONTACTS IN GROWING PATIENTS

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**Aim:** proper occlusal contacts are essential for masticatory efficiency, stress distribution, and long-term orthodontic stability. This study aimed to assess occlusal contacts in growing patients treated with Clear Aligner Therapy (CAT) or Fixed Appliance Therapy (FAT).

**Methods:** twenty-four patients (12 FAT, 12 CAT) were analyzed. Occlusal contacts were evaluated by measuring the minimum distance between upper and lower digital scans, using a color-coded map. Five parameters were assessed: Maximum Contact Point (MCP), Occlusal Contact Surface (OCS, all points at 50  $\mu$ m from MCP), Near Occlusal Contact Surface (NOCS, all points at 350  $\mu$ m from MCP), half-mm contact area (all points at 0.5 mm from MCP), and one-mm contact area (all points at 1 mm from MCP). Group comparisons were performed using the Wilcoxon test.

**Results:** FAT showed significantly greater total occlusal contacts in OCS compared to CAT ( $p < 0.05^*$ ). FAT patients had fewer anterior contacts across OCS, NOCS, half-mm, and one-mm areas ( $p < 0.05^*$ ), indicating a more favorable antero-posterior ratio.

No significant differences were found between left and right hemiarches and in most single-tooth contacts, except for the second premolar, which reported higher contacts in the FAT group ( $p < 0.05^*$ ).

**Conclusions:** fixed appliances may be more effective than clear aligners in achieving adequate occlusal contacts in growing patients, especially in total contact surface and antero-posterior ratio. Further research is required to validate these findings.

## RELIABILITY OF MOBILE ORTHODONTIC RETAINER OVER TIME AS A TREATMENT TO PREVENT RECURRENCES

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**Aim:** the aim of the study is to analyze the coronal and root stability of lower teeth treated with mobile retainers.

**Methods:** this cross-sectional study involved 20 patients with an age range of 19 to 60 years. Eligible patients were those who finished orthodontic therapy with a correct axis of the incisor group in relation to the mandibular plane (IMPA angle  $90^\circ \pm 5^\circ$ ), finished therapy with correct contact between upper and lower incisors according to the six keys of Andrews' ideal occlusion. The population sample was 20 patients divided into 10 female and 10 male patients, with mobile transparent retainer placed at the same session as the skidding. Two orthopantomograms were taken of each patient, one T0 time of the skidding and at the subsequent placement of the fixed retainer and one at T1, the next control session. Through the soft-

ware Gimp it was possible to draw on the orthopantomograms on which several points were marked and reference lines drawn to compare data collected at the two times.

**Results:** the Cramer-von Mises test confirmed that the variables observed at the two different time points are indeed from the same population, indicating a homogeneous distribution between the groups. This suggests that the observations collected at T0 and T1 follow a Gaussian distribution, supporting the hypothesis of stability in tooth position over the period considered.

**Conclusions:** through the analysis of our study, it emerges how reliable proper mobile retainer is as a stable means of avoiding unwanted movement and occurrence of recurrence in the mandibular lower sector.

## AN *IN VITRO* COMPARISON OF COMMONLY USED BIOMATERIALS FOR POSTERIOR BITE-RAISINGS

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**Aim:** this *in vitro* study aimed to compare the physical properties of commonly used dental materials for fixed posterior bite-raising, along with an experimental resin composite. Vickers microhardness (HV) data were collected to assess mechanical behaviors such as plastic deformability, wear, and elasticity, which are essential for predicting clinical performance.

**Methods:** a review of 21 articles identified 5 materials for fixed posterior occlusal elevations: Harmonize Kerr, Band and Built, Ultra Band-Lok, Leone F3\_72-01, and Transbond TX, along with the experimental composite Composite M-I A2 by CNR. Twelve specimens (10 mm x 4 mm x 8 mm) were produced. Hardness testing was performed using a Leica VMHT device with a standard Vickers pyramid indenter, applying a 500-gram

load for 20 seconds. The relationship between Vickers microhardness and the applied load was also examined at various weights (25, 50, 100, 200, 300, 500, 1000 grams).

**Results:** materials showed varying hardness, with Harmonize Kerr being the hardest and Transbond XT the softest. The indentation tests revealed a linear correlation between the applied load and indentation length. In this context, Composite M-I A2 demonstrated the best performance.

**Conclusions:** hardness can affect clinical outcomes. However, while hardness is important, it may not be the sole factor in clinical material selection and in particular for patients with high chewing loads, such as bruxists, for whom the dependence of hardness on the applied load will be crucial for clinical outcomes.

## A NOVEL METHOD OF REVERSE ENGINEERING FOR THE EVALUATION OF THE ACCURACY OF THE INNER SURFACE OF A 3D PRINTED CLEAR REMOVABLE RETAINER

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**Aim:** this study describes a method to obtain a repeatable and accurate digital reproduction of the inner surface of a 3D-printed removable retainer, allowing comparison with the inner shape of a 3D-planned clear aligner using reverse engineering software.

**Methods:** a patient with full permanent dentition, no third molars, orthodontic treatment, prosthesis, retainers, decay, or fillings was selected. An intraoral scan was taken with iTero Element 2, exporting upper and lower STL models via OrthoCAD. Two removable retainers were digitally designed with Direct-Aligner uDesign beta (0.7 mm thickness, 0.05 mm offset) and printed using SprintRay Pro95 (100 µm layer thickness) with KeySplint Soft® resin. Post-processing included washing with isopropyl alcohol and polymerization with SprintRay Pro

Cure. The external surface of the 3D-planned retainers was digitally removed, leaving only the inner surface. A plaster impression was taken from the physical retainers using rigid silicon and cast in a vacuum environment. The impression was scanned with inEosX5, and the resulting STL files were compared with the inner surface of the 3D-planned aligners using Geomagic Control X. A best-fit matching was performed, using the 3D plan as a reference.

**Results and conclusions:** matching results showed a 64% fit for the upper retainer and 56% for the lower, with a 0.1 mm error range. This reverse engineering workflow enables various analyses, including sectional and linear comparison, coupling assessment, and color mapping to identify discrepancies between the planned and printed surfaces.

## MICROPLASTIC RELEASE FROM ORTHODONTIC ALIGNERS: CAN IT BE INFLUENCED BY WEAR TIME, MATERIAL AND MANUFACTURING PROCESS? A RAMAN-SEM STUDY

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**Aim:** this *in vitro* study investigated the release of Microplastics (MPs) from Clear orthodontic Aligners (CA) subjected to a mechanical friction protocol in artificial saliva for 7 (T1) and 14 (T2) days.

**Methods:** CA from 10 manufacturers (Alleo-[AL], Flexi Ligner-[FL], F22 Aligner-[F22], Invisalign-[INV], Lineo-[LIN], ArcAngel-[AR], Ortobel-[OR], SureSmile-[SS], Spark-[SP], and Graphi-[GP]) were tested. Two CA per group were immersed in artificial saliva and stirred for 5 hours/day to simulate physiological mechanical friction at T1 and T2. For each timing, the artificial saliva was vacuum-filtered through 1.6µm pore-size membranes. Raman Microspectroscopy (RMS) and SEM were used to identify the polymer matrix and analyze MPs' number, size and shape. Data were analyzed with one-way ANOVA and Tukey's test.

**Results:** RMS identified F22, INV and GP as polyurethane-based, while AL, FL, LIN, AR, SS, OR and SP as polyethylene terephthalate-based. An increasing trend in MPs detachment from T1 to T2 was found. SEM revealed the highest MPs counts in AL, AR, FL, OR and LIN at T1 and T2. SP and SS highlighted a greater detachment of MPs at T1, however numerically lower than the previous groups ( $p < 0.05$ ). MPs sizes varied significantly ( $p < 0.05$ ), with most ranging from 5-20 µm, though some reached 100-200 µm.

**Conclusions:** this study showed that the MPs release from CA presented time-dependent differences. These findings suggest aligners should be replaced after 7 days to minimize potential health risks, due to the MPs ingestion.

## ANALYSIS OF THE RESISTANCE OF ORTHODONTIC COMPONENTS TO MOUTHWASHES, DISINFECTANTS AND STERILIZER: AN *IN VITRO* STUDY

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**Aim:** fixed orthodontic appliances play a crucial role in altering the oral biofilm, exposing patients to an increased risk of caries and periodontal diseases. Therefore, the literature recommends chlorhexidine- and fluoride-based mouthwashes for routine oral hygiene. Additionally, since orthodontic appliance components are not sterile when unpacked, they should be disinfected and sterilized before use. This study aims to evaluate whether commercially available mouthwashes, disinfectants, and sterilizers can damage orthodontic components through Scanning Electron Microscopy (SEM) analysis.

**Methods:** commonly used fixed appliance components were examined: brackets, Ni-Ti arch, metal and elastic ligatures. The tested substances included two mouthwashes (Broxo Din, BioXtra), two disinfectants (Gioclorex, Farmecol 70), and one

sterilizer (EC ster). Each component was analyzed via SEM at T0 (untreated) and at T2 (treated). The immersion times were as follows: 3 hours for brackets, 15 minutes for arch and metal ligatures and 7.5 for elastic ligatures in mouthwashes, 1 minute in EC Ster, 5 minutes in Gioclorex and 10 minutes in Farmecol 70.

**Results:** the results indicated that the tested substances did not cause surface damage to brackets, arch, or metal ligatures. However, one disinfectant and the sterilizer led to surface deterioration of the elastic ligatures.

**Conclusions:** for patient's health, all tested substances (safe *in vitro*) should be used for metal components, but only mouthwash and chlorhexidine-based disinfectants for elastic ligatures to avoid damaging them.

## COMPARISON BETWEEN DIFFERENT COMPOSITE RESINS USED FOR CLEAR ALIGNER ATTACHMENTS: A TRIBOLOGICAL ANALYSIS

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**Background:** attachments are features designed to ensure aligner retention and to control tooth movements. The integrity of their configuration is crucial during treatment and is influenced by the properties of the composite resin used to create them.

**Aim:** the aim of this study was to compare the morphology of attachments reproduced using two different composite resins. The analysis evaluated the mechanical properties and the wear performance of two composites by means of tribological tests.

**Methods:** two composite resins with different filler volume and viscosity were compared: a flowable nanocomposite (Connect Flow - CF) and a conventional nanocomposite (Aligner Connect - AC). 10 samples were created and a tribological analysis was performed. Wear evaluation was carried out by means of

a contact probe surface profiler and a TayMap software for the 3D analysis.

**Results:** CF and AC showed similar surface roughness values (respectively, Ra 6.06  $\mu\text{m} \pm 0.95$ , Rt 35.52  $\mu\text{m} \pm 6.38$ ; Ra 6.24  $\mu\text{m} \pm 1.04$ , Rt 35.58  $\mu\text{m} \pm 3.98$ ). Lower values of waviness were observed for AC (Wa = 69.89  $\mu\text{m} \pm 38.04$ ; Wt = 333.89  $\mu\text{m} \pm 138.22$ ) when compared to CF (Wa = 78.56  $\mu\text{m} \pm 35.04$ ; Wt = 365.59  $\mu\text{m} \pm 123.01$ ). CF showed lower values of friction coefficient (0.58  $\pm 0.018$ ) with respect to AC (0.6  $\pm 0.021$ ).

**Conclusions:** both CF and AC revealed similar surface roughness values. However, lower surface waviness was observed for AC, indicating a more uniform surface with fewer macroscopic variations. Given these findings, AC can be considered more suitable for clinical applications where a more homogeneous surface is desired.

## TIP EFFICIENCY OF A CUSTOMIZED LINGUAL APPLIANCE: PERFORMANCE OF WIRES WITH TWO DIFFERENT LIGATURES

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**Aim:** the aim of this *in vitro* experimental study was to investigate the role of the ligature-wire-slot system in achieving better tip control.

**Methods:** a set of customized lingual brackets was used, and a compression/traction machine tested two types of ligatures in combination with three different wires and the tipping angles of each configuration was derived. The wires involved in this study were: 0.016" x 0.022" Ni-Ti, 0.016" x 0.024" SS and

0.018" x 0.025"  $\beta$ III Ti. The types of ligatures were: Alastik Easy-to-tie and Alastik Lingual Ligatures (Alastik, 3M Unitek).

**Results:** a statistically significant difference was found among all wires: full size wires showed the smallest angles (better tip control).

**Conclusions:** wires that completely filled the slot in the bracket showed the best performance in terms of tip control and the role played by the type of ligature was more relevant for wires that are undersized with respect to the slot dimensions.

## EVALUATION OF ENAMEL SURFACES AFTER APPLYING DIFFERENT INTERPROXIMAL ENAMEL REDUCTION TECHNIQUES

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**Aim:** the aim of this study was to assess the effect of different Interproximal Enamel Reduction (IER) techniques on enamel surfaces.

**Methods:** the study included 160 freshly extracted human lower incisors, fixed in plaster and processed with four enamel reduction techniques. The teeth were randomly divided into eight groups (A1-A2, B1-B2, C1-C2, D, E), each containing 20 teeth. Groups A, B, and C were further subdivided. All samples were analyzed using Scanning Electron Microscopy (SEM) (Carl Zeiss EV040 USA). The images revealed streaks from the cutters, and enamel roughness (Ra,  $\mu\text{m}$ ) was assessed. ImageJ software analyzed the SEM images to provide a 3D view

of the enamel surface and calculated the average Ra value and standard deviation (IC 95%). Statistical analysis was conducted to evaluate the roughness.

**Results:** all different IER methods left more or less streaks on the enamel surfaces. The results indicate that all IER methods used in this study left significantly rougher enamel ( $p < 0.05$ ) compared to untreated teeth (group E), except for group C2 (Komet ET9-8 Set 4159 tungsten carbide bur followed by 12 steps of medium-fine-ultrafine 3M Sof-Lex discs).

**Conclusions:** group C2 allowed the removal of interproximal dental tissue, ensuring the least roughness and the lowest morphological alteration of the treated enamel surfaces.

## PATIENTS' PERCEPTIONS OF THE IMPORTANCE OF IMPROVEMENTS AND SIDE EFFECTS FROM MANDIBULAR ADVANCEMENT DEVICE (MAD) THERAPY FOR OBSTRUCTIVE SLEEP APNEA AND SNORING

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**Aim:** international guidelines recommend the use of MAD as an oral device for the treatment of snoring and mild to moderate Obstructive Sleep Apnea (OSA). The aim of this study is to comprehend the most significant improvements and side effects for patients undergoing MAD treatment, to improve dentists' way of communicating and to increase patients' compliance.

**Methods:** a specific questionnaire consisting of 20 questions, including 10 questions on improvements and 10 on side effects, was developed and mailed to 42 patients undergoing MAD treatment. Each question has a range of responses from 1 to 5, where 1 indicates an irrelevant aspect and 5 a very important one.

**Results:** according to literature, most of the patients placed importance on the positive outcomes of treatment, with the most significant being the reduction in snoring and improve-

ment in sleep quality, which were valued with an average of 4.11.

On the other hand, patients attributed lower importance to mainly side effects, which are: difficulty in speaking with the device, tooth mobility, and foreign body sensation.

**Conclusions:** the advantages perceived by the patients appear to outweigh the disadvantages, especially the reduction of snoring, increased productivity, and improved social and intellectual life.

In order to gain and maintain patients' compliance, dentist should focus on explaining how MAD treatment can improve these aspects. Furthermore, the physician should monitor the occlusal changes, which are the only permanent effects that may occur over time. The other side effects are short term and reversible.

## THE PERCEPTION OF EFFECTIVENESS AND EFFICIENCY IN TREATMENT WITH ALIGNERS: A PROSPECTIVE QUALITATIVE STUDY

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**Aim:** the aim of the study is to evaluate the perception of effectiveness and efficiency of treatment with aligners in a sample that includes the evaluation of general dentists, dentists specialized in orthodontics for less than 5 years, and dentists specialized in orthodontics for more than 5 years.

**Methods:** the study involves administering a survey, aimed at exploring various aspects related to the use of aligners, including perceived benefits, encountered difficulties, and opinions regarding the aesthetic and functional outcomes of treatments. The interview, structured through a Google form, contains 25 questions targeted at three categories: general dentists, orthodontists specialized with less than 5 years of experience and orthodontists specialized with more than 5 years of

experience. The form was distributed via direct link and/or QR code. The survey is divided into thematic sections to gather detailed information and provide an overview of dentists' experiences with this technology.

**Results:** no significant discrepancies were found between the responses of the three categories. The majority of professionals considered aligners an effective and efficient alternative to fixed appliances for correcting malocclusions, with greater patient compliance due to both aesthetic and oral hygiene benefits.

**Conclusions:** the collected data provided an in-depth and constructive insight into the use of aligners in dentistry, suggesting potential areas for improvement in both professional training and the usage of the devices.

## SKELETAL *VERSUS* CONVENTIONAL ANCHORAGE IN DENTOFACIAL ORTHOPEDICS: AN INTERNATIONAL MODIFIED DELPHI CONSENSUS STUDY

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**Aim:** to establish consensus of skeletal anchorage versus conventional anchorage in treating: 1. Maxillary transverse deficiency in growing and adult patients, 2. Class II skeletal disharmony due to mandibular retrusion in growing patients, 3. Class III skeletal disharmony in growing patients.

**Methods:** a four-rounds modified Delphi method was conducted. A steering committee performed a literature selection and compiled a list of 33 statements. An international panel of 25 experts in orthodontics agreed to participate. In each round, panelists were asked to rate their level of agreement with each statement using a 5-point Likert scale and provide comments. Statements that reached consensus were either accepted or rephrased. Statements that did not reach consensus were either rephrased, rejected, or split into two statements or merged with another.

**Results:** after the four rounds, 24 statements achieved consensus while 9 were rejected.

The distribution of consensus statements was as follows: Maxillary transverse deficiency: 4 statements; Class II skeletal disharmony: 10 statements; Class III skeletal disharmony: 10 statements.

**Conclusions:** this modified Delphi consensus study aimed to provide guidance for orthodontists in choosing between skeletal and conventional anchorage for various treatment conditions. The study generated 24 consensus statements across three key domains. While the Delphi method provides valuable expert opinions, future studies, including randomized controlled trials, are needed to confirm these findings and address remaining uncertainties.

## COMBINATION OF INFILTRATIVE AND RESTORATIVE TECHNIQUES AFTER ORTHODONTIC TREATMENT IN FRONTAL TEETH: A CASE REPORT

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**Aim:** due to its soluble nature, enamel undergoes continuous cycles of remineralisation and demineralisation. This process involves a continuous exchange between the dental hard tissue and the surrounding environment. When the pH falls below 5.5, hydroxyapatite becomes more soluble, leading to demineralisation. Post-orthodontic white spot lesions have a carious aetiology due to lack of hygiene during multi-bracket orthodontic therapy. The aim of this case report is to establish the efficacy of a combined technique to improve the aesthetics and function of teeth undergoing orthodontic treatment that have developed white and brown spot lesions.

**Methods:** following orthodontic treatment, a patient presented with brown and white spot lesions on the anterior teeth, affecting their aesthetic appearance. The initial approach was chemical and mechanical microabrasion with Opalustre. This was followed by resin infiltration with ICON to take advantage

of the capillary penetration of this low viscosity, low molecular weight resin (TEG-DMA) into the enamel lesions. Finally, the infiltrated restoration on 2.1. was restored with esthetic composite materials.

**Results:** the initial treatment with Opalustre provided good resolution of the brown lesions but accentuated the white spot lesions. Resin infiltration with Icon was crucial in treating the white spot lesions and ensuring aesthetic improvement. Finally, the replacement of the old infiltrated restoration with a new filling provided uniformity in both colour and morphology of the dental element.

**Conclusions:** the patient achieved a significant aesthetic and functional improvement that was stable over time. The combination of different techniques was essential to address the different problems and achieve an overall satisfactory result.

## IDEAL ORTHODONTIC APPROACH TO PREMATURE LOSS OF THE UPPER FIRST PERMANENT MOLAR: A CASE REPORT

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**Aim:** the aim of this case report is to demonstrate how it is possible to effectively treat a case of edentulism of element 26 in a patient requiring orthodontic treatment with the aid of orthodontic miniscrews.

**Methods:** a 24-year-old female patient comes to our observation at the Department of Dentistry and Dental Prosthetics of the Magna Graecia University of Catanzaro. Clinical examination revealed a normodivergent Class I dental malocclusion, previous absence of element 26, and ectopic eruption of elements 18 and 28 with significant radicular-palatal torque. For treatment, a unilateral miniscrew was used as direct anchor-

age in the mesialization mechanics of elements 27 and 28.

**Results:** the use of the unilateral miniscrew allowed dental element 27 to perfectly assume the position of 26, maintaining a complete Class I molar and canine relationship. The profile was fully maintained.

**Conclusions:** the treatment allowed for the correct achievement of occlusion from an aesthetic and functional point of view without having to resort to implantology, prosthetic treatment, or major surgical interventions, but rather favoring the mesialization of elements 27 and 28 by utilizing the natural elements in the resolution of single edentulism.

## EFFICACY OF THE HERBST APPLIANCE IN THE CORRECTION OF MANDIBULAR RETRUSION IN ADULT PATIENT WITH OSA (10 YEARS FOLLOW-UP)

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**Aim:** the aim of this study is to document the treatment of a class II malocclusion in an adult patient with OSA using the Herbst appliance, demonstrating its effectiveness in resolving both problems.

**Methods:** the study was conducted on a 27-year-old male patient with a class II malocclusion due to mandibular retrusion. The anamnesis also reveals the presence of sleep disorders confirmed by polysomnography, through which it was possible to diagnose mild/moderate OSAS.

Both cephalometric analysis and measurement of six parameters related to the posterior airspace were performed on the lateral telerradiograph.

The patient refused surgery, so he was treated with Herbst Miniscope appliance combined with Straight Wire Appliance.

**Results:** after two years, class II malocclusion and OSAS were resolved. The increase in posterior airway caliber, resulting from the achievement of a skeletal class I, confirmed the correlation between the two conditions.

The stability of the results was verified at 1, 5.8 and 10 years after the end of treatment.

**Conclusions:** the Herbst appliance represents an effective device in the correction of mandibular retrusion and OSA in adult patients, ensuring optimal results and long-term stability.

## TREATMENT OF A CLASS II DIVISION II PATIENT AT THE END OF GROWTH USING S8-SGTB ALIGNERS

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**Aim:** the purpose of this study is to demonstrate the therapeutic potential of mandibular advancement using Smartee aligners with the S8-SGTB appliance.

**Methods:** the patient, a 30-year-old male at the end of his growth, presents to our Unit with a Class II, Division 2 malocclusion, with mesorotation of the molars relative to the Ricketts line, a brachycephalic mandibular structure according to Bjork, a retrusive profile, and slight upper dental crowding. The patient is offered treatment to compensate for the malocclusion using Smartee aligners with the S8-SGTB solution, as he rejected both orthognathic surgery and fixed and functional therapy (Herbst). The advantage of using these aligners is to achieve mandibular advancement in patients at the end of

growth. The patient began treatment with Smartee aligners using the S8-SGTB solution in January 2024, attending visits once a month and changing the aligners every 10 days.

**Results:** at the end of the first phase of treatment, the patient achieved mandibular advancement with an Incomplete Class I molar relationship, dento-alveolar expansion of the arch, and an open bite in the posterior sectors.

**Conclusions:** this type of treatment has proven to be a promising alternative to functional devices and orthognathic surgery for achieving mandibular advancement in patients at the end of growth. The second phase of treatment is currently in progress, in which no mandibular advancement is planned.

## FUNCTIONAL GENIOPLASTY: A CLINICAL PROTOCOL TO RE-ESTABLISH THE ANTERIOR LIMIT OF THE DENTITION

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**Aim:** to provide a comprehensive analysis of the indications for “functional” genioplasty, as proposed by J. Delaire, and to explore the implications of this surgical procedure on the decisions that orthodontists must make regarding orthodontic treatment (extractions, anchorage, mechanics, etc.). Indeed, this surgery involves a modification of the position of the pogonion, which is the inferior reference point of the A-pogonion line. This is a crucial element in ensuring precise calculations of spaces.

**Methods:** this study explores the possibility of improving a significantly retruded chin through functional genioplasty and examines the reliability of cephalometric re-evaluation using the proposed method, as illustrated by a representative clinical case. The authors recommend a specific timeline for the ortho-

dontic and surgical management of high-angle Class II patients to achieve the most effective outcomes.

**Results:** patients must undergo genioplasty only after the eruption of their lower canines. After the procedure, a waiting period of 12 to 18 months is advised to allow enhanced labial competence to influence the anterior dentition. Orthodontic movements can be planned only after this phase, based on the newly established A-Pogonion line.

**Conclusions:** “functional” genioplasty is a minimally invasive, low-risk, and well-tolerated surgical procedure that addresses both neuromuscular and skeletal imbalances. However, the orthodontist must thoroughly evaluate these modifications due to the different positioning of the new A-Pogonion line.

## MODIFIED HERBST APPLIANCE TO IMPROVE RETENTION IN YOUNG OSAS PATIENTS WITH PRIMARY TEETH

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**Aim:** to assess the efficacy of an elastomeric resin version of the Herbst appliance in managing Obstructive Sleep Apnea Syndrome (OSAS) in young children. This condition is typically treated using Mandibular Advancement Devices (MAD) or, when required, Rapid Maxillary Expansion (RME). However, using MAD in younger children can be challenging due to the limited mechanical retention of primary teeth.

**Methods:** Herbst appliance was used in a 3 y.o. child with severe obstructive sleep apnea (AHI 9). A removable device was chosen to promote mandibular advancement, increasing the retropharyngeal airspace, also justified by a coexisting pronounced Class II skeletal malocclusion, 11mm overjet, severe Class II primary molars relationship and inadequate sagittal chin projection. A modified Herbst appliance with a high-reten-

tion elastomeric resin (SRIVocap Elastomer, Ivoclar Vivadent) and a metal bar connection for mandibular protrusion was prescribed for nighttime use.

**Results:** six months after using this device, nocturnal apneic episodes decreased and snoring improved (AHI 2). Orthodontically, this resulted in complete resolution of Class II malocclusion, correct molars relationship, improved overjet, overbite and a more aesthetically advanced mandibular position.

**Conclusions:** the device showed excellent stability and efficacy in addressing both skeletal and respiratory issues. Being removable, it relies on good patient compliance, aided by the minimal discomfort. Using elastomeric resin has proven to be a good choice, allowing earlier treatment by improving retention on primary teeth.

## MULTIDISCIPLINARY MANAGEMENT OF A CLASS II MALOCCLUSION IN AN 11-YEAR-OLD FEMALE PATIENT WITH SOFT PALATE CLEFT: A CASE REPORT

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**Aim:** this case report describes the orthodontic treatment of an 11yo Female patient with a soft palate cleft and Class II malocclusion on a mild skeletal Class II pattern, associated with dentoalveolar discrepancy due to space deficiency. The patient had upper/lower arch crowding, a scissor bite between 26 and 36, increased OJ and OB, and multiple retained teeth. The goal was to resolve crowding, correct occlusion, improve esthetics, and manage retained teeth, demonstrating that cleft patients can undergo comprehensive orthodontic treatment.

**Methods:** a Transpalatal Arch was placed for stability, followed by piezoelectric extraction of 13, 23, and 33. Extraction of 44 aimed to facilitate the spontaneous eruption of 45. Fixed Multi Bracket Therapy was started with intermaxillary elastics

for occlusion. A mini-implant was planned for mesialization of 36. Prosthetic treatments were suggested for 14, 24, and 34.

**Results:** resolution of crowding and improved occlusal harmony is expected. Piezoelectric extractions will promote better healing with reduced postoperative discomfort. Spontaneous eruption of 45 is anticipated, optimizing lower arch alignment. The mini-implant for 36 should aid in space closure and improve mastication. The treatment aims to enhance smile esthetics, facial profile, and long-term occlusal stability.

**Conclusions:** this case highlights that patients with clefts can achieve functional and aesthetic improvements through well-planned orthodontic treatment, integrating surgical and orthodontic techniques for stable outcomes.

## TEMPOROMANDIBULAR JOINT DYSFUNCTION IN PSORIATIC ARTHRITIS: CASE REPORT

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**Aim:** the aim is to describe a clinical case in which Temporomandibular joint Dysfunction (TMD) was the first joint manifestation of Psoriatic Arthritis (PA) and to emphasize the importance of an interdisciplinary approach in early recognition and management of this condition.

**Methods:** a case study was conducted on a patient presenting with TMJ pain and dysfunction.

The diagnostic process included a clinical examination of TMJ movement, pain intensity, joint sounds, and mandibular deviations, along with imaging for joint degeneration and laboratory tests to analyze inflammatory markers, rheumatoid factors, and specific PA-related autoantibodies.

A thorough medical and family history was taken to identify any predisposing factors. Following diagnosis, multidisciplinary treatment was initiated, including NSAIDs, antirheumatic drugs (DMARDs), occlusal splints to reduce TMJ stress, and physical

therapy with specific TMJ exercises to restore joint mobility and relieve pain. Collaboration with rheumatologists ensured regular monitoring and adjustments to the treatment plan.

**Results:** imaging confirmed degenerative joint changes, and laboratory tests indicated systemic inflammation consistent with PA.

**Conclusions:** TMD could be an early indicator of PA, necessitating a multidisciplinary approach to ensure timely diagnosis and intervention.

The integration of pharmacological therapy, dental interventions, and physical therapy resulted in significant symptom relief, improved joint function, and the prevention of further deterioration. The integration of pharmacological therapy, dental interventions, and physical therapy resulted in significant symptom relief, improved joint function, and the prevention of further deterioration.

## MULTIDISCIPLINARY TREATMENT OF A PERIO-ORTHO PATIENT USING SARPE AND CLEAR ALIGNERS: A CASE REPORT

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**Aim:** this clinical case describes the orthodontic management of a 52-year-old patient with Class I malocclusion, dental crowding, hyperdivergent Class II skeletal pattern, associated with Maxillary Transversal Deficit (MTD). Patient showed chronic periodontitis with significant loss of supporting tissues. The patient refused invasive surgical solutions and expressed concerns about the impact of Fixed Appliances (FA) on her quality of life. Therefore, by the patient's needs and requests, Surgically Assisted Rapid Palatal Expansion (SARPE) combined with Clear Aligner Therapy (CAT) was chosen.

**Methods:** panoramic radiographs, lateral cephalometric radiographs, intraoral scans and CBCT were used for patient evaluation. The multidisciplinary treatment plan included SARPE to address the MTD with anchorage on two mini-screws. Tooth 31 was periodontally compromised; thus, it was extracted to solve the

lower crowding. The second phase of treatment involved the use of Clear Aligners (CAs) with interproximal enamel reduction (IPR) for both the upper and lower arches. 33 aligners were planned, followed by 13 refinement aligners.

**Results:** extraoral records indicated satisfactory aesthetic results, with a harmonious smile. Class I was maintained, with regular OVJ AND OVB, well-aligned teeth, and coordinated arches. The periodontal condition remained stable with slight improvement.

**Conclusions:** CAT, combined with IPR and procedures like SARPE, allows for the successful treatment of complex orthodontic cases, achieving positive aesthetic and functional outcomes. Predictable results require careful planning and multidisciplinary collaboration to overcome clinical challenges and ensure the best aesthetic and oral health results.

## MANAGEMENT WITH LIGHT FORCES OF A SEVERE MAXILLARY TRANSVERSE DEFICIENCY IN THE PERMANENT DENTITION: A CASE REPORT

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**Aim:** Maxillary Transverse Deficiency (MTD) is a dento-skeletal malocclusion with a prevalence of almost 10% in adults. Leaf Expander (LE), an orthodontic device which performs maxillary expansion through slow, uniform and continuous forces can find application in adult patients (in addition to growing ones): a correct periodontal health status, dental endoinclination and transverse deficit from 4 up to 6 mm are the necessary conditions. This study aims to support MTD correction in the permanent dentition through LE as an effective, efficient and less biologically invasive therapeutic strategy than Miniscrew-Assisted (MARPE) or Surgically-Assisted Rapid Palatal Expansion (SARPE).

**Methods:** a 17-year-old girl, characterized by a severe MTD combined with bilateral posterior and anterior crossbite, came to our observation in 2018. Since the Cervical-Vertebral Matu-

ration (CVM) method detected that the patient had already reached the skeletal maturation, a MARPE was initially proposed to the girl, but refused due to its biological cost; a custom-made LE generating a maximum slow expansion of 6 mm through a 900 g constant force was the alternative treatment adopted.

**Results:** LE normalized maxillary transverse diameter. Moreover, the simultaneous straight wire multibrackets .022 x .028 MBT therapy (January 2019-August 2022) harmonized dental arches' shape and function, achieving Andrews's Six Occlusion Keys, without periodontal damages. Cephalometric parameters were also normalized.

**Conclusions:** the occlusion's stability 1 year after the end of the therapy confirms the therapeutic success.

## MARA-ALIGNERS TREATMENT: AN INNOVATIVE, DIGITAL APPROACH TO CORRECT CLASS II MALOCCLUSIONS

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**Aim:** orthodontic treatment using a combination of MARA (Mandibular Anterior Reposition Appliance) and clear aligners is an effective strategy for treating Class II malocclusions in adolescent patients. This integrated approach combines the functional action of MARA which improves mandibular position, with the aesthetic precision of aligners for tooth movement. The following case report illustrates how hybrid treatments enhance aligners and 3D configuration in the treatment of patients with sagittal and transversal discrepancies making the therapy predictable and short-lasting.

**Methods:** the MARA appliance consists of bands or crowns on the first molars, with horizontal arms on the lower arch and vertical elbows on the upper arch that facilitate mandibular advancement. Mandibular repositioning is achieved with 1-4 mm shims every 4-6 weeks. Clear aligners were used simultane-

ously to guide dental movements and create overjet by adjusting upper or lower arch positions. Treatment planning was performed using MESHMIXER and MAESTRO 3D software.

**Results:** the combination of these two devices resulted in a stable and long-lasting correction, significantly reducing overall treatment time compared to traditional approaches. In conclusion, the MARA-aligner sequential treatment represents an innovative solution, merging the effectiveness of functional therapy with the aesthetic comfort and customization of aligners.

**Conclusions:** the MARA-aligner sequence is a predictable, aesthetic, and minimally invasive solution for adolescent Class II cases. It merges the advantages of functional appliances with digital aligner customization, making it ideal for cases requiring both functional and aesthetic correction.

## MANAGEMENT OF A COMPLEX ORTHODONTIC CASE WITH SEVERE DENTAL ANOMALIES, AGENESIS AND TRANSPOSITIONS, USING INVISALIGN® ALIGNERS WITHOUT ATTACHMENTS

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**Aim:** the treatment aimed to correct the omega-shaped upper arch, manage space for proper alignment of permanent teeth, and address deciduous teeth beyond their eruption age.

**Methods:** 18-year-old patient in skeletal Class I with a normo-verti-bite presented with undetectable canine and molar classes due to dentition abnormalities, agenesis, and retained deciduous teeth. Permanent and deciduous teeth were present beyond their eruption age: agenesis of 1.2, inversion of 1.3 with 1.4, palatal ectopia of 1.5, and retention of 5.2, 5.5, 6.3, 6.5 in the upper arch. Agenesis of 2.2, transposition of 2.3, and loss of space for 2.2, 2.3, and 2.5 palatally were noted. The lower arch showed lingual placement of 8.5 and 4.5, and linguoinclined 3.5 and 4.5. CBCT assessed bone and root struc-

ture. After deciduous extractions (5.5, 6.2, 6.5, 8.5), 44 aligners (+24 for refinement) were used, with no attachments in the upper arch and two rectangular attachments on 3.5 and 4.5. Movements included derotation of 1.6, 1.7, 2.6, 2.7, and a 78.27-degree rotation and vestibular displacement of 2.5.

**Results:** aligners without attachments successfully addressed dentition issues, rotations, and ectopia. Normal overjet and overbite were achieved, with proper posterior contacts and no anterior precontacts on 5.2. Incisor inclination was correct, and space for a future implant in 2.5 was preserved.

**Conclusions:** the decision to avoid attachments was based on the initial arch form, ensuring good aligner fit and precise movement planning to achieve rotation and vestibular translation of 2.5.

## NON-SURGICAL CORRECTION OF HYPERDIVERGENT CLASS III MALOCCLUSION IN ADULT PATIENT

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**Aim:** to evaluate the degree of counterclockwise occlusal plane rotation and Wits appraisal improvement in skeletal Class III malocclusion treatment with the Carriere® Motion™ 3 (CM3) appliance.

**Methods:** a 24-year-old Caucasian male patient presented with a Class III malocclusion diagnosis, concave profile, obtuse nasolabial angle, collapsed labiomental fold, -0.9 mm overjet, 0 mm overbite, increased lower facial height, and hyperdivergent growth pattern.

Intraoral examination revealed the presence of all permanent teeth except for the third molars, with a full crossbite except for teeth 2.1, 2.2, 2.3, 2.6, and 2.7, which were in an edge-to-edge relationship. There was also a midline discrepancy. Class

III canine and molar relationship was due to congenitally uncorrected mandibular prognathism.

The patient refused surgical correction and underwent den-toalveolar compensation using the CM3 appliance, which was followed by Invisalign® clear aligner therapy.

**Results:** lower posterior segment distalization, occlusal plane forward rotation, and Wits appraisal improvement were obtained with CM3 treatment. A slight change in the ANB angle also contributed to orthodontic camouflage of the Class III malocclusion in this adult patient.

**Conclusions:** the CM3 appliance in combination with clear aligners was determined to be a viable non-surgical option to correct skeletal Class III malocclusion in an adult patient.

## CORRECTION OF A SEVERE CLASS II IN A PREADOLESCENCE GIRL USING MYOFUNCTIONAL THERAPY AND MYOBRACE APPROACH

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**Aim:** class II malocclusions are frequently associated with myofunctional dysfunctions that affect craniofacial growth. The approach with myofunctional devices such as Myobrace aims to correct bad habits, promote proper skeletal development, and improve intermaxillary relationships in growing patients.

**Methods:** this clinical case describes the treatment of an 11-year-old girl with a severe skeletal Class II malocclusion associated with lip incompetence and oral breathing pattern.

After a careful clinical and cephalometric evaluation, a myofunctional therapy protocol was initiated using the Myobrace trainer, combined with specific exercises for neuromuscular rebalancing. The device was worn daily according to the recommended protocol, with periodic checks to monitor adaptation and therapeutic response.

**Results:** after 12 months of treatment, a significant improvement in the sagittal relationship between the arches was observed, with a reduction in overjet and spontaneous mandibular advancement. Respiratory function and tongue posture improved, promoting a more natural lip closure and better control of the perioral musculature.

**Conclusions:** the myofunctional approach with Myobrace has proven to be an effective solution for the early treatment of skeletal Class II, improving not only aesthetics and occlusal function but also the long-term stability of craniofacial growth.

Early treatment of myofunctional dysfunctions is crucial to prevent the progression of malocclusion and optimize skeletal development.

## TREATMENT OF A SEVERE OPEN BITE WITH CLEAR ALIGNERS

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**Aim:** this study aimed to assess the clinical outcomes of clear aligner therapy combined with Class II elastics in the correction of a skeletal Class II malocclusion with anterior open bite and transverse discrepancy in an adult patient with a normo-divergent growth pattern.

**Methods:** a 23-year-old female presented to the Orthodontic Department of the University of Naples Federico II with upper incisor protrusion, convex profile, wide buccal corridors, full permanent dentition, bilateral Class II canines, increased overjet, anterior open bite, reduced dental and gingival exposure, and maxillary transverse discrepancy. Cephalometric analysis showed skeletal Class II (ANPg = 8.3°), normodivergent growth (SN<sup>^</sup>GoGn = 36.7°), and proclined lower incisors (L1/GoGn = 106.5°). Treatment involved clear

aligners (43 per arch, weekly changes) with Class II elastics and extraction of upper third molars. A refinement phase with 23 additional aligners improved occlusion and final positioning.

**Results:** superimposed cephalometric tracings revealed distal tipping and intrusion of upper molars, intrusion of lower molars, and reduced lower incisor proclination (L1/GoGn = 102.6°). Transverse control was achieved using Class II elastics on palatal buttons bonded to upper canines to promote maxillary expansion.

**Conclusions:** after 25 months, the patient achieved Class I molar and canine relationships with ideal overjet and overbite, showing high satisfaction with functional and aesthetic outcomes.

## TREATMENT OF A GROWING PATIENT WITH DENTOSKELETAL CLASS II MALOCCLUSION USING A COMBINED HYBRID PALATAL EXPANDER AND HERBST APPLIANCE

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**Aim:** this study aimed to evaluate the effectiveness of the combined use of a Hybrid Palatal Expander and Herbst appliance in treating Class II malocclusion in a growing patient.

**Methods:** a 13-year-old female showed wide buccal corridors, a convex profile, and normal nasolabial angle. Cephalometric analysis confirmed Class II malocclusion (SNA 74.5°, SNB 69.5°, ANB 5.0°). A non-extractive approach was adopted using a Hybrid Expander and Herbst appliance with multibracket systems. A transverse discrepancy was detected, and two miniscrews (11 mm, 2 mm diameter) were inserted using a surgical guide to achieve skeletal expansion. Since the profile did not worsen with the Fränkel manoeuvre, the Herbst device was connected to the expander. Digital

impressions were taken, and expansion started six weeks after placement, with two activations per week. Once the expansion was complete, the upper arch was bonded, and an overjet (OVJ) was created using open coil springs (19 x 25 Ni-Ti arch), allowing for Herbst rod insertion to promote mandibular advancement.

**Results:** the combined use of the Hybrid Expander and Herbst appliance led to faster and more stable correction of the malocclusion.

**Conclusions:** this combined approach proved effective and may serve as a valid alternative for Class II malocclusions with transverse discrepancies. Further studies are needed to confirm long-term stability.

## MALE AND FEMALE FACIAL SOFT TISSUE THICKNESS IN DIFFERENT ORTHODONTIC MALOCCLUSIONS

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**Aim:** the facial profile is determined by the Facial Soft Tissue Thickness (FSTT) and dentoskeletal characteristics. The aim of this study was to evaluate the FSTT in relation to gender and different orthodontic malocclusions, using cephalometric radiography, highlighting any significant differences.

**Methods:** 94 lateral telerradiography-derived cephalograms were analyzed, but only 47 met our criteria.

Radiographically derived cephalograms of male (n = 26) and female (n = 21) orthodontic patients, aged 8 to 12 years, were selected and classified according to their skeletal relationships as Class I (n = 12) and Class II (n = 35), focusing on the measures of ANS-Subnasale, A-STA and J-UL, in relation to class and gender.

**Results:** we used parametric tests (Student's t-test) when the data were normally distributed and non-parametric tests

(Mann-Whitney U test) in cases of non-normal distribution to assess mean differences between the variables included in the study. The three measures used in relation to malocclusions did not show significant differences. While the same parameters referred to gender, show a statistically significant difference for J-UL, and a tendency towards significance for the ANS-Subnasal measure.

**Conclusions:** in this work, the cephalometric measurements examined showed a significant difference between the male and female genders. This leads to considering the gender difference to define a correct treatment plan. However, it is necessary to perform an analysis with a numerically larger sample and consider the other skeletal classes and the other cephalometric measures.

## CLINICAL EFFECTIVENESS OF THE AMCOP ELASTODONTIC APPROACH IN INTERCEPTIVE ORTHODONTICS: A CASE SERIES

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**Aim:** elastodontics is an orthodontic approach that utilizes light, biologically compatible elastic forces to correct malocclusions in growing patients, modulating craniofacial growth, eliminating functional disturbances, and improving dental alignment. These functional devices are particularly effective during developmental stages due to the high plasticity and adaptability of skeletal structures. This study aims to evaluate the clinical effectiveness of a new generation of elastodontic devices - AMCOP Bio-Activators - through the presentation of three clinical cases. The primary objective is to provide an updated overview of the evolution of elastodontics, outlining its current indications and limitations, and to assess the clinical

outcomes following a treatment period ranging from 12 to 18 months.

**Methods:** three clinical cases were analyzed over a treatment period of 12 to 18 months to assess the clinical outcomes of elastodontic therapy using AMCOP Bio-Activators.

**Results:** all treated cases showed significant improvements with effective malocclusion correction achieved within the relatively short treatment duration.

**Conclusions:** AMCOP Bio-Activators demonstrated clinical effectiveness in achieving the desired therapeutic outcomes with minimal demand on patient compliance, reinforcing their role as a valuable tool in interceptive orthodontics.

## GORLIN-GOLTZ SYNDROME: EARLY DETECTION AND MULTIDISCIPLINARY APPROACH

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**Aim:** the aim of this work is to highlight the importance of the dentist in contributing to early diagnosis of Gorlin-Goltz Syndrome (GGS), avoiding and preventing orofacial and systemic complications. The goal is also to establish a proper dental and surgical protocol.

**Methods:** twenty-one patients affected by GGS, aged 5 to 14 years (mean age 8.2 years), including twelve females and nine males, underwent multidisciplinary treatment. In 8 cases GGS was detected by orthodontists.

GGS or Basal Cell Naevus Syndrome is a generalized disorder with autosomal dominant inheritance and variable expressivity. The main symptoms are recurrent multiple jaw keratocysts and basal cell naevi of the skin. Other characteristic signs are

Paget-like cranial appearance, wide flat nose, craniofacial asymmetry, hypertelorism, prognathism, costo-vertebral deformities, calcified falx-cerebri, hyphoscoliosis, palmo-plantar hyperkeratosis.

**Results:** diagnosis of Gorlin-Goltz Syndrome in childhood has been crucial, because the early treatment helped to prevent and reduce jawbones' destruction and prevented severe complications in other organs.

**Conclusions:** dentists have a great responsibility to detect GGS, by identifying signs in dental radiographs. The approach must be multidisciplinary involving specialists from both Dentistry and Medicine, to prevent severe malocclusions, as well as craniofacial anomalies and systemic tumors.

## ORTHODONTIST'S ROLE IN THE AXENFELD-RIEGER SYNDROME: EARLY DIAGNOSIS AND THERAPY

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**Aim:** the aim is to focus on the clinical features, inheritance patterns, pathogenesis, diagnosis and management of Axenfeld-Rieger Syndrome (ARS), a rare genetic disorder characterized by a spectrum of dental, craniofacial, ocular, and others systemic anomalies.

**Methods:** 13 Axenfeld-Rieger patients aged 5 to 21 years old, 4 females and 9 males, had undergone a multidisciplinary treatment.

Common oral manifestations include oligodontia (in deciduous and permanent dentition, with maxillary incisors and canines missing), anodontia, hypodontia, microdontia, enamel hypoplasia, conical-shaped teeth, delayed eruption, taurodontia, misshapen teeth, shortened roots, hyperplastic fraena.

Other clinical features are maxillary hypoplasia, receding upper lip and a prominent lower lip, hypertelorism, telecanthus, a broad flat nose, short stature, a characteristic redundant peri-umbilical skin, a bilateral developmental disorder of the eyes, and a high incidence of secondary glaucoma, typically difficult to control, often leading to significant optic nerve damage.

**Results:** early diagnosis of ARS has been done on 5 patients (aged 5 to 9 old) by orthodontists. Patients were immediately sent to oculistic department to prevent loss of sight.

**Conclusions:** early identification of this hereditary disease and prevention of vision loss can be aided by an orthodontist. This congenital genetic defect requires a multidisciplinary approach, synergizing specialized expertise for comprehensive and optimal patient care.

## THE LEAF PALATAL EXPANDER: AN AGE-INCLUSIVE APPLIANCE - A CASE SERIES

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**Aim:** transverse maxillary deficiency is prevalent in 6-30% of the population. Numerous orthodontic devices have been developed for maxillary expansion. The Leaf palatal Expander (LE) has gained popularity due to its ability to provide light, continuous and predictable forces. A modified version is the Leaf Self Expander, fully preactivated. The Anatomic Leaf Self Expander is its miniaturized form. This study aims to assess the effectiveness and efficiency of these devices across different age groups.

**Methods:** three patients were observed: a 4-year-and-10-month-old girl (patient 1), a 9-year-and-4-month-old girl (patient 2), and a 17-year-old girl (patient 3), all with Transverse Maxillary Deficiency, posterior crossbite and mandibular lat-

erodeviation. After orthodontic evaluation customized expanders were applied: a 6 mm, 450 g Anatomic Leaf Self Expander for patient 1; a 9 mm, 900 g Leaf Self Expander for patient 2; and a 6 mm, 900 g Leaf Expander for patient 3.

**Results:** the expansion was completed, crossbite resolved and mandibular deviation corrected in all cases.

**Conclusions:** the Leaf Expander devices proved effective, efficient and easy to use in correcting transverse maxillary defects in both growing and adult patients. According to literature, in the younger patients, both dento-alveolar expansion and skeletal sutural remodeling contributed to the correction, while in the 17-year-old, only dento-alveolar changes were observed.

## IS ORTHODONTICS A FEMALE-MADE SPECIALITY? THE POSITION OF WOMEN IN ACADEMIC WORLD: AN OVERVIEW OF THE ITALIAN SITUATION

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**Aim:** the present cross-sectional study analyzed the level of the gender gap in the orthodontic field in Italy by focusing on male and female representation in academic positions, scientific societies' leaders and cultural events' speakers.

**Methods:** data regarding gender of professors assigned to teaching units in orthodontics, orthodontic postgraduate schools' directors, orthodontic scientific societies' board of directors, and speakers and scientific organizers of Continuing Medical Education (CME) events about orthodontic were assumed in accordance with web-based information, and binomial tests assessed differences between the two genders' distributions. A Mantel-Haenszel test tested the consistency of trends in genders' representation across the years. Tests were considered significant when p-value <0.05.

**Results:** female proportions among orthodontic professors (33.6%), postgraduate schools' directors (23.1%), and speakers (23.2%) and scientific organizers (6.7%) of CME events were significantly lower than male ones (p <0.001). No differences existed in the two genders' representation in the board of director of societies. However, four out five of their current presidents were male. Men predominance was consistent across the years (p <0.001), even if a growing trend in the female representation from the society's founding to the present was evident for presidency of the SIDO (p <0.001) and SIBOS (p >0.05).

**Conclusions:** overall, results of this study pointed out a significant gender gap in orthodontic academic and leadership positions, as well as in cultural events.

## IMPACT OF FIXED ORTHODONTIC APPLIANCES *VERSUS* CLEAR ALIGNERS ON PATIENT EXPERIENCE, COMPLIANCE AND SATISFACTION: A CROSS-SECTIONAL ANALYSIS

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**Aim:** the aim of this cross-sectional analysis was to compare the perception about esthetics, comfort, pain and related quality of life of patients with different orthodontic appliances, namely Fixed Vestibular Appliances (FVA), Clear Aligners (CA) and Bracket-less Fixed Orthodontic Devices (BFOD).

**Methods:** a 16-items questionnaire was submitted to a sample of patients over 18 years of age who had finished orthodontic treatment for less than two years. For each item, patients were asked to rate their answer on a 0-4 scale, except for the pain assessment for which the Visual Analog Scale (VAS) was used. Differences in FVA, CA and BFOD scores were assessed through ANOVA. Level of significance was set at  $P < 0.05$ .

**Results:** the final sample included 70 subjects in the FVA group, 52 in CA group, and 26 in BFOD group. Comparison

between the groups showed that CA provide for better oral hygiene maintenance, no diet modification and low pain. However, 25% of CA patients lost their devices at least once and 30% did not wear the device for the suggested time. BFOD were found to be the best appliance in ensuring patients' compliance and aesthetics. FVA revealed to lead taste alterations and oral lesions. No differences in need for scaling, average chair-time and social impairment were found among the three groups.

**Conclusions:** FVA, CA and BFOD have different impact on patients' experience, compliance and satisfaction, and thus clinicians should decide on the appropriate device by considering its advantages and disadvantages in relation to the patient's needs and problems.

## COMPARATIVE STUDY ON THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN CEPHALOMETRIC TRACING

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**Aim:** Artificial Intelligence (AI) is transforming various fields of dentistry, including cephalometry. This study compares linear and angular cephalometric measurements obtained using the automated software Smartee™ with those performed manually, assessing their validity and reliability.

**Methods:** thirty digital lateral cephalograms from orthodontic patients with varying skeletal and dental complexity were analyzed. Cephalometric tracing was performed by an experienced operator using standard software (NemoCeph) and by the AI algorithm Smartee™. The results were graphically and statistically compared, considering the manual tracing as the Gold Standard. Reliability was assessed using the Intraclass Correlation Coefficient (ICC), while agreement between the two methods was evaluat-

ed using the T-Test, Pearson Correlation, and Bland-Altman plots.

**Results:** the analysis demonstrated excellent repeatability of the automated tracing ( $ICC = 1$ ) and a high correlation between AI and human operator measurements. The T-Test confirmed good statistical agreement for most values, except for the FMA° angle ( $P\text{-Value} < 0.001$ ), which showed discrepancies.

**Conclusions:** AI-based cephalometry provides high precision and speed while reducing operator-dependent variability. However, it cannot replace the orthodontist, who remains essential for clinical interpretation and treatment planning. A conscious and well-informed use of AI, supported by research and training, can further enhance the integration of these technologies into orthodontic practice.

## PROTOTYPE CUSTOMIZED MOUTHPIECES TO REDUCE RADIATION-INDUCED TONGUE MUCOSITIS IN CARBON-ION RADIATION THERAPY FOR HEAD AND NECK CANCER

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**Aim:** over the years, it has been widely recognised that radiotherapy for patients with tumors in the head and neck region can cause problems in the oral cavity, affecting both the oral mucosa and the tongue; The most common manifestations are mouth ulcers and mucositis. Tongue mucositis has been extensively studied in literature. Over the years, custom-made devices have been developed to protect the tongue from radiation by stabilising the position of the teeth and the lower jaw. The aim was to develop a well-tolerated device to prevent tongue mucositis in patients undergoing Carbon-Ion Radiation Therapy for head and neck cancers.

**Methods:** the first prototype of the device was made on a volunteer nurse from the National Center for Oncological Hadrontherapy, who did not suffer from any pathology; the patient's data were collected, and impressions were taken using an intraoral scanner. Following the production of the first device, modifications were

made based on the patient's comfort in terms of being able to swallow and breathe without difficulty.

**Results:** the device was well tolerated by the patient for the duration of a radiotherapy session. It takes the form of a chewing plate at the level of both arches, with a resin stop that covers the entire palate and another structure to hold the tongue down; both structures, however, allow for the passage of air, making it comfortable to use.

**Conclusions:** in light of our results, this device could be tested in future clinical applications, bearing in mind that the need to take impressions, produce the manufacture, test it with possible modifications and finally deliver it, are all additional time-consuming procedures for the patient. However, as of today, with the help of 3D CAD (Computer Aided Design) technologies, 3D printing systems can be used to produce such a device more easily and rapidly.

## RELEASE OF BIOLOGICALLY ACTIVE MOLECULES FROM ORTHODONTIC CLEAR ALIGNERS

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**Aim:** the main aim of the present study was to assess the possible release of Bisphenol-A (BPA) and other biologically active molecules from clear aligners through chemical analysis.

**Methods:** six types of thermoplastic polymers were tested. The samples were all thermoformed at a pressure of 3 bar and only samples of 4 x 4 mm size were tested *in vitro*. To isolate and distinguish the more polar molecules from the less polar, two solvents with different polarity were used: ethanol (EtOH) and saline solution (NaCl). For each polymer, 5 samples were tested in a volume of 0.3 M absolute EtOH and NaCl according to the following ratios: 1g polymer/1.5 ml saline solution and 1 g polymer/1 ml per EtOH. After 15 days of immersion, the final

solution was recovered, and a Gas chromatography analysis (FTIR) analysis were made, and a Gas Chromatography-Mass Spectrometry (GC-SM) analysis were made; the remaining portion has been kept at -80°C for future *in vivo* evaluations.

**Results:** from the GC-MS analysis of samples of the ethanol extract showed a peak which, although very little abundant, corresponded unequivocally to the derivatized BPA, having the same retention time and mass spectrum as BPA. The sample of the extract with saline solution showed no BPA or other bisphenols.

**Conclusions:** in conclusion, GC-MS analyses revealed that none of the solutions tested showed the presence of bisphenols.

## ANALYSIS OF THE PALATE AND DENTAL ARCHES AFTER TREATMENT WITH RAPID PALATALE EXPANDER AND NITANIUM PALATAL EXPANDER TYPE II

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**Aim:** maxillary dento-skeletal expansion can be achieved using various orthodontic devices that induce structural changes in growing tissues or solely affect the dental arches. The Rapid Palatal Expander (RPE) is the most commonly used appliance for treating transverse maxillary deficiency. However, for mild cases, the Nitanium Palatal Expander Type 2 (NPE-II) serves as an alternative. The NPE-II is a non-compliance, dentally anchored device, but its dento-skeletal effects remain unclear. This study aimed to assess morphological changes in the palate and dental arches in patients treated with NPE-II, comparing them with RPE-treated and untreated subjects.

**Methods:** a total of 150 patients (mean age: 9.2 years) were retrospectively included in the study. Among them, 40 were treated with RPE, 40 were treated with NPE-II, and 70 untreated subjects were selected from a historical control database. Pre- and post-treatment analog models were digitized and analyzed using Mesh-Mixer software. The upper arches were examined to assess changes in intercanine width, intermolar width, and palatal area.

**Results:** statistical analysis revealed no significant differences in palatal width changes among the three groups. However, significant differences were observed in intercanine and intermolar widths.

**Conclusions:** the RPE demonstrated a more pronounced effect on arch reshaping compared to the NPE-2.

## CEPHALOMETRIC-EVALUATED EFFECTS OF SECTOR DISTINGCTED DISTALIZATION IN YOUNG PATIENTS

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**Aim:** evaluate and quantify the skeletal effects of the Carriere<sup>®</sup> Motion<sup>™</sup> III (CM3) appliance in growing patients, comparing the observed skeletal modifications with those typically associated with Facemask (FM) therapy.

**Methods:** a pilot group is currently being recruited among growing patients diagnosed with skeletal Class III malocclusion who have refused both extraoral traction and skeletal anchorage treatments. The intervention consists in the application of the CM3 appliance, placed from the lower canine to the lower molar, aiming to achieve bilateral, Sector-Differentiated Distalization (SDD) of the lower arch using Delaire's facemask. Cephalometric analyses are performed before and after treatment to assess changes in the occlusal relationships of ca-

nines and molars. Additional skeletal measurements include variations in points A and B, Wits appraisal, occlusal plane inclination, and divergence angle.

**Results:** preliminary data from the initial cases indicate that the CM3 appliance may contribute to the orthopedic correction of Class III malocclusion. Skeletal changes, although variable, have been observed in several parameters, supporting the hypothesis that CM3 can produce more than just dentoalveolar effects.

**Conclusions:** despite the limited sample size, the early findings are encouraging and suggest that the CM3 appliance may serve as a valid treatment alternative in growing Class III patients, particularly when conventional orthopedic approaches are contraindicated or declined.

## RAPID PALATAL EXPANSION AND SYMPTOMATIC BURDEN: COMPARISON OF PEDIATRIC PATIENTS WITH CLEFT AND NON-CLEFT LIP AND PALATE PATIENTS

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**Aim:** rapid maxillary expansion is an orthodontic procedure used to treat a transversal deficit in the development of the maxilla. The timing of intervention concerns school age in children between 5 and 14 years of age. The wearing experience may vary between children with cleft lip and palate and non-affected children.

**Methods:** a structured questionnaire was given to parents. The tool included demographics, clinical data, device type, and number of activations. To allow children to report the level of pain, the *Wong-Baker* scale was used, based on facial expressions from “no pain” to “maximum pain”.

**Results:** the cleft lip and palate group recorded systematically higher values: 39.5% referred pain (vs 24.3%), 67.9% in-

creased salivation (vs 45.8%), 78.6% difficulty speaking (vs 52.5%) and 53.6% difficulty swallowing (vs 33.9%). Nose-bleeds, absent in the non-syndromic, is 12% in cleft lip and palate patients.

**Conclusions:** the data underlines a significantly greater symptom burden in patients with cleft lip and palate. The study confirms the effectiveness of monitoring pain and adverse effects during expansion. To improve the patient experience, a more personalized clinical management is proposed with activation protocols adapted according to individual pain tolerance. Provide parents with instructions on managing discomfort and schedule regular follow-ups to identify plaque or food buildups that can cause inflammation and gum irritation.

## VOLUMETRIC EVALUATION OF NASAL CAVITIES AND RETRO-PALATAL AND RETRO-GLOSSAL AIRWAYS VIA CBCT: A CLINICAL STUDY COMPARED WITH A CONTROL CASE

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**Aim:** to assess, via CBCT, volumetric changes in nasal cavities, in retropalatal, and retroglossal airways following Rapid Palatal Expander, compared to an untreated control group.

**Methods:** sixteen subjects (mean age 9.34 years) with unilateral posterior crossbite were treated with a dental-anchored RPE. Eight untreated subjects (mean age 11.11 years) served as controls. All underwent two CBCT scans 12 months apart; in the treated group, the second scan followed one year after therapy initiation. Nasal, retropalatal, and retroglossal volumes were measured using 3D-Slicer. Statistical analysis was performed with STATA. Intragroup differences (T0-T1) were as-

sessed with the Wilcoxon signed-rank or paired t-test; intergroup differences with the Wilcoxon-Mann-Whitney or unpaired t-test. Significance was set at  $p < 0.05$ .

**Results:** although an increase in values was observed in all groups between T0 and T1, statistically significant changes occurred only in the comparison between the treatment and control groups regarding nasal volume.

**Conclusions:** RPE therapy significantly increased nasal volume compared to controls. Non significant volumetric improvements were detected retro-palatal and retro-glossal airways.

## DENTIN HYPERSENSITIVITY AFTER INTERPROXIMAL ENAMEL REDUCTION IN PATIENTS TREATED WITH CLEAR ALIGNERS: DESENSITIZING EFFECT OF DIODE LASER VS SODIUM FLUORIDE

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**Aim:** this study evaluated dentin hypersensitivity and gingival health after IPR in patients treated with clear aligners and compared the desensitizing effect of laser diode vs sodium fluoride.

**Methods:** the study was a triple-blinded RCT. Patients with a history of hypersensitivity, enamel defects, cervical caries, periodontal disease, or pregnancy were excluded. 45 patients with an orthodontic treatment plan including clear aligners and IPR (aged 14-63 yrs) were randomly assigned to 3 groups: Group A (treated with acidulated sodium fluoride gel: 0.33% NaF), Group B (treated with a diode laser: Soft Touch, 810 nm, 0,5W), and Group C (control, no treatment). In all groups, the response to air stimuli and the gingival indices were recorded before (T0) and after IPR (T1), one week (T2), one month (T3), and three months post-treatment (T4). Dentin Hypersensitivity (DH) was assessed using a Visual Analog Scale (VAS) by a

blinded operator, while gingival health was evaluated using Silness and Løe Plaque and Gingivitis Indices. Longitudinal effects were analyzed with Linear Mixed Models, and repeated measures ANOVA; adjustment was used for comparisons.

**Results:** all groups showed an increase in DH immediately after IPR compared to baseline, which subsequently decreased at T2, T3, and T4. The laser group exhibited a statistically significant 10% reduction in DH, with rapid improvement one-week post-treatment and sustained benefits over time. The GI improved or remained stable across all groups, with the laser group showing the most improvements. Moreover, the PI was reduced in all groups.

**Conclusions:** the application of diode laser, after IPR, effectively reduced DH without adversely affecting gingival health. This finding supports the use of laser therapy to manage DH in orthodontic patients undergoing IPR.

## COMPARING STUDY OF EFFICACY OF THE RAPID MAXILLARY EXPANDER II AND SANDER-BITE JUMPING IN THE TREATMENT OF THE SKELETAL CLASS II MALOCCLUSION

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**Aim:** this study aimed to evaluate the efficacy of the Rapid Maxillary Expander II System (RME II) and Sander Bite-Jumping (SBJ) for correcting skeletal Class II malocclusion in growing patients.

**Methods:** one-hundred-five patients, aged 9-13 years, with skeletal class II malocclusion and mandibular retrusion were retrospectively selected. Among them 35 patients were treated with RME II (Group R), 35 with SBJ (Group S), while 35 were untreated patients (Group C). For all the patients cephalometric analyses were performed before (T0) and after (T1) treatment, assessing: the divergence angle (SN-MP), the Lower Facial Height (LFH), mandibular leght (Co-Gn), the Incisor Mandibular Plane Angle (IMPA), overbite, overjet, maxillary incisor angle (1+SN) and the skeletal malocclusion class (ANB). Data

distribution was checked using the Shapiro-Wilk test, and pairwise comparisons and group differences were analysed using t-tests and ANOVA test with Tukey's post hoc test.

**Results:** statistical analysis revealed that statistically significant differences were found for all the cephalometric variables, except for 1+SN. Tukey post hoc test revealed that: SN-MP was 3.22° higher in Group S compared to Group R, LFH was 6.83 mm greater in Group C than in Group R and 4.25 mm greater in Group S than in Group R, IMPA was 4.48° higher in Group S than in Group R, overbite was 2.11 mm lower in Group S than in Group R.

**Conclusions:** both the RME II and SBJ are effective in the management of skeletal Class II malocclusion, but RME II allows better control of occlusal plane inclination.

## EVALUATION OF CHANGES IN HYOID BONE POSITION IN ADULT SUBJECTS TREATED WITH THE HERBST MINISCOPE

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**Aim:** the aim of this study is to determine the variation in hyoid bone position following treatment with the Herbst Miniscope appliance in adult patients with Class II skeletal malocclusion due to mandibular retrusion who are unwilling to undergo orthognathic surgery.

**Methods:** a sample of 18 patients (female range age 14-30, male range age 14-18) with Class II skeletal malocclusion and treated with the Herbst Miniscope appliance for an average duration of 12 months was selected. For each patient, lateral cephalograms were analyzed before and after treatment, and measurements were taken of the hyoid bone distance from the mandibular plane (H-MP) and from the third cervical vertebra (H-C3). The results were analyzed using the T-test and ANOVA.

**Results:** the results obtained demonstrate that there is a correlation between the position of the hyoid bone and the presence of obstructive sleep disorders (OSA). It was seen that an increase in H-MP and H-C3 corresponds to a higher risk of developing OSAS and also an increase in their severity.

**Conclusions:** the position of the hyoid bone was modified by the treatment with Herbst Miniscope. In fact, a reduction in the distance between the hyoid bone and the mandibular plane is evident ( $p < 0.05$ ) with an average decrease in the measured values of 2.29 mm. Statistic is not significant for H-C3 ( $p > 0.05$ ). We can conclude that the Herbst Miniscope device could prove to be an effective aid in the treatment of OSAS.

## EVALUATION OF THE OSSIFICATION OF THE ZYGOMATICOMAXILLARY SUTURE AT DIFFERENT STAGES OF MATURATION OF THE MEDIAN PALATINE SUTURE

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**Aim:** the aim of the study is to assess the correlation and/or the analogy of bone maturation between the Median Palatine Suture (MPS) and the Zygomaticomaxillary Sutures (ZMS) using Cone Beam CT examination, as this may represent a significant prognostic factor in the resolution of transverse maxillary deficiency.

**Methods:** the study was conducted on a sample of 200 patients from different age groups within the patient population of the Department of Odontostomatology at the Magna Graecia University of Catanzaro. The Cone Beam CT of the facial skeleton, used to evaluate the MPS and ZMS, was performed with the Xmind Trium Acteon machine, and the images were analyzed using QuickVision 3D software. Patients were divid-

ed into various groups based on age, sex, and stage of maturation of the sutures, with the latter classified according to the staging system by Angelieri et al. The obtained values were subjected to descriptive statistical analysis and presented in graphs and tables.

**Results and conclusions:** this study showed that, while the degree of ossification of all examined sutures increases physiologically with age, there is no strict correlation between the MPS and ZMS. Nevertheless, these sutures remain crucial in pre-treatment planning for maxillary expansion, as the maturation stage is a decisive factor in selecting the most effective therapeutic approach.