# MINIMALLY INVASIVE RESTORATIVE-GUIDED ORTHODONTIC TREATMENT FOR UPPER MISSING LATERALS

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**Aim:** the purpose of this case report was to show the application of a minimally invasive restorative- driven orthodontic treatment aimed at enhancing predictability and aesthetic outcomes in the orthodontic treatment of bilateral maxillary lateral incisor agenesis (MM x I2) in a growing patient.

**Methods:** we have presented the case of a female patient who underwent a two-phase treatment, the first at 8 years old and the second at 12 years old. At the beginning of the second phase, temporary composite restorations were performed according to final shape on the canines in order to improve space management during the treatment and better fine- tune the final position prior definitive restorations. At the end of the second orthodontic phase, flow composite restorations were performed with the injection technique on the 6 maxillary anterior teeth.

**Results:** in the first orthodontic phase, the correction of the crossbite and a induced mesial eruption of the canines were achieved. In the second orthodontic phase, the gingival margins were managed together with the preparation of spaces and volumes for the final restorations with injection of flowable resins replicated from initial digital mock-up.

**Conclusions:** this case report highlights the success and predictability of a staged orthodontic- minimally invasive restorative treatment in a young patient with MM x I2. A detailed diagnostic wax-up and the use of injection technique ensure predictable, aesthetically pleasing results while maximally preserving the dental structure.

# DIGITAL PLANNING AND FABRICATION OF MSE FOR PATIENTS WITH THIN PALATAL BONE: A CASE REPORT

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**Aim:** the aim of this study demonstrates that cad-cam technology and selective laser fusion can be successfully used to treat transverse maxillary deficit in patients with a palatal bone thickness of less than 2.5 mm.

**Methods:** in the clinical case of a 33-year-old patient with a maxillary midline deviation and other dental issues, the main goal was to resolve the transverse maxillary deficit and crossbite. However, the miniscrews insertion site had a bone thickness of less than 2 mm, so two additional anterior miniscrews were planned. The bushings were fabricated by the selective laser fusion technique (SLM) and placed in a placement guide with the MSE.

**Results:** traditionally, MSE devices are made using stone models, but recently, digital MSE planning based on the patient's CBCT image has been suggested. This method improves the accuracy of treatment by defining the ideal position of the MSE relative to facial skeletal structures and miniscrew insertion sites. It optimizes expansion biomechanics and reduces the risk of adverse effects. Through the use of digital technology, it has been discovered that some patients have a palatal bone thickness of less than 2.5 mm. To address this, a CAD/CAM workflow is proposed for producing an MSE with two additional miniscrews, positioned laterally or anteriorly.

**Conclusions:** this clinical case explored the possibilities of modifying the MSE appliance for selective cases with poor palatal anchorage bone. With the digital workflow and technology, the appliance design can be customized for each specific case.


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# THE IMPORTANCE OF THE FUNCTIONAL RETENTION AFTER CORRECTION OF CROSSBITE

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**Aim:** to present a case of unilateral posterior cross-bite case treated with the appliance Function generating bite highlighting the importance of maintaining it even after the correction of malocclusion.

**Methods:** a mixed dentition male patient (age 6.4 [y.m]) with right unilateral posterior cross bite (5.2-1.6) was presented. Data collected were medical history, model casts ($T_0$ before, $T_1$ after, $T_2$ after follow-up), OPT, intra and extraoral photos, LL and PA teleRX and respective cephalometric tracing.
Intermolar Distance (IMD) was measured with a digital caliper on maxillary study casts ($T_0$, $T_1$, $T_2$). FGB was manufactured with acrylic resin, resilient steel posterior bites to prevent occlusal contacts between opposing teeth during orthodontic movement and expansion springs.

**Results:** the malocclusion was successfully treated in 8 months ($T_0$-$T_1$). Follow-up time was 4,5 [y/m] ($T_2$). IMD was 33.68 mm at $T_0$; it increased by 4.81 mm at $T_1$; not only relapse was avoided, but a further 0.51 mm increment was obtained at $T_2$.

**Conclusions:** the maintenance of function generating bite even after the correction of the malocclusion, in addition to performing a functional retention, has allowed a further improvement in respect of growth.

# ARTIFICIAL INTELLIGENCE: PLANNING AND COMMUNICATION, APPLICATIONS IN ORTHODONTICS

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**Aim:** artificial intelligence has pioneered new perspectives in the dental field. The purpose of the poster is to present a case in which intelligent systems have enabled predictable and sustainable work in orthodontics by improving planning and patient communication.

**Methods:** the planning of our treatment involved the use of a program with which best matching between scanner and CBCT data was performed. Upon completion of orthodontic treatment, the case was finalized by direct restorations in order to achieve an excellent esthetic result.

**Results:** through segmentation and tissue recognition, a three-dimensional model of the patient's initial condition was printed. It provided a valuable aid in planning the most suitable orthodontic device and simplified communication with the patient.

**Conclusions:** data analysis, advanced diagnosis, treatment planning and communication are the pillars on which artificial intelligence is based, enabling the best solution to be achieved even in complex orthodontic cases such as the one presented.

# REPLACEMENT OF PALATALLY IMPACTED CANINES WITH FIRST PREMOLARS: AN ALTERNATIVE APPROACH

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**Aim:** the repositioning of impacted maxillary canines is essential to ensure good aesthetics and proper function to the patient. In many cases, Palatally Impacted Canine (PICs) can be successfully recovered with a combined orthodontic-surgical approach; however, if the inclusion is bilateral, the prognosis may not be positive; thus, clinicians should consider an alternative approach.

**Methods:** the patient complained of an unsightly appearance of the face, with straight profile, increased lower third, and deviation of the chin to the right. The intraoral examination showed upper transverse constriction, cross-bite on 15 and 25, crowding, and 53, 75 and 85 still present. The X-rays confirmed the absence of permanent 13, 23, 32 and 42, and the proclination of upper incisors. The selected treatment plan included the extraction of both PICs, replaced by the first bicuspids, and second lower deciduous molars.

**Results:** the cross bite and the upper transverse constriction were corrected using a Bonded RME. Then, after extracting PICs and second lower deciduous molars, both arches were aligned using Ni-Ti and stainless-steel wires. In the end, the patient showed a class I molar relationship on both sides, ideal OVB and OVJ, no crossbite and no crowding. The X-rays confirmed a good roots parallelism, and a correct incisors inclination.

**Conclusions:** in patients with bilateral inclusion, the extraction of PICs, replaced by first premolars, is a valid option. This method allows to obtain good functional and aesthetic results, maintaining a detailed front tooth position.

# ORTHODONTIC EXTRUSION OF UPPER LATERAL INCISOR TO IMPROVE THE PROSTHETIC REHABILITATION

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**Aim:** orthodontics should assist prosthodontists by making implant-prosthetic procedures of the anterior area easier, enhancing the aesthetics.

**Methods:** the patient presents all upper incisors rehabilitated with single metal-ceramic crowns. The gingival margin at the level of the 12 was irregular and taller, with inflammation and recurrent abscesses. Periodontal examination revealed probing depths of 9 mm buccally and 7 mm distally, with a radiographically evident bone defect. Peri-apical x-ray had highlighted a distal root perforation caused by the placement of an unsuitable endodontic metal post. The tooth prognosis was poor, considering the root fracture level and the scarce root structure. Clinical and radiographic examinations and aesthetic needs of the patient suggested the extraction of the 12 followed by implant-prosthetic rehabilitation.

**Results:** a slow orthodontic extrusion was performed to increase the thickness of the alveolar bone and to restore and to improve the gingival contouring. A multibracket orthodontic appliance was bonded to perform the required movement. Then, the extrusion was followed by tooth extraction to allow a post-extractive placement of a titanium dental implant. After the osteointegration period, a zirconia abutment with a metal-free crown, created using the CAD-CAM technique, was placed to restore the 12 obtaining an excellent result in the aesthetic area.

**Conclusions:** the extrusion can better maximize the results of the anterior prosthetic rehabilitation, improving patient's aesthetics and social and phycological outcomes.

# ORTHODONTIC FACILITATION IN COMPLEX REHABILITATION TREATMENTS

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**Aim:** the scientific work aims to evaluate the importance of a multidisciplinary approach involving orthodontics, oral surgery and prosthetics in any treatment plan that requires it. The project represented below aims to highlight how the orthodontic intervention was of support for the realization and finalization of the case through alignment of the teeth, improvement of the vertical dimension, of the OVJ and OVB.

**Methods:** the creation of composite elevations to increase the vertical dimension of the posterior sector with the increase in the overjet following the postrotation of the occlusal plane; the bandage in the lower arch for the alignment and proclination of the incisors; surgical intervention via corticotomies to speed up orthodontic treatment and to favor the proclination of the incisors, guaranteeing adequate bone support; resective bone surgery of the upper frontal sector to harmonize the gingival parabolas; the use of the table-top in the posterior sectors, the zirconia bridge in the upper frontal sector and the vestibular veneers in the lower frontal sector.

**Results:** through the posterior augmentations there was an increase in the OVJ such that it was possible to proceed with the orthodontic treatment and the vestibularization of the lower incisors, thus obtaining a relative intrusion and decrease in the OVB and OVJ. There was an improvement in the occlusal plane thanks to the flattening of the curve of Spee. The symmetry and harmony of the smile were obtained with resective surgery. To facilitate chewing, function and aesthetics, a zirconia bridge, table-top in the posterior sectors and vestibular veneers in the lower frontal sector were inserted.

**Conclusions:** the work carried out in the scientific office is a very clear example of how the dental team, in all its branches, is essential for the excellent creation and finalization of complex cases.

# IMPACTED CANINE MANAGEMENT USING DAMON SELF-LIGATING APPLIANCE SYSTEM

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**Aim:** the purpose of this case report is to display the orthodontic therapy in a patient with skeletal class II in a mesodivergent pattern characterized by impacted maxillary permanent canine treated using Damon passive self-ligating appliance system.

**Methods:** a 14-years-old female patient is presented: panoramic X-ray shows element 13 included which is the consequent of the non-reabsorption of the element 53 that is still present in the arch. According to the method of the cervical vertebral maturation of Bacetti and Franchi the patient can be classified in-growing phase CVSMS IV. Diagnosis is detected: skeletal class II for WITS 5,4 and Skeletal class I ANB 2,4 in a mesodivergent pattern; second class bilateral molar and canine left, cannot be evaluated canine right; overjet and overbite increased; skeletal biretrusion; dental biprotrusion with reduced interincisive angle; triangular upper arch; lower more homogeneous; gummy smile.

**Results:** the proposed treatment provided a successful and esthetic option to solve the malocclusion as well as the inclusion of the canine by using self-ligating Damon system. The steps taken to reach the final result are listed below: Phase I: alignment and space recovery for the emergency of 13; Phase II: surgical exposure of the element 13 and consequent traction with dental anchorage; Phase III: finishing, coordination and intercuspidacion of arches.

**Conclusions:** the case was solved by reaching the setting objectives. The final orthopantomography shows the presence of dental elements 18, 28 (not yet erupted), 38 and 48. Orthopanoramic post therapy shows a good parallelism between the roots, no sign of bone or root resorption, except a slight remodeling of the root apex of 13. The patient is satisfied with the functional and aesthetic result. [CVSM V; WITS pre (5.4); norm. (+1-1); post (-0.4)].

# CORRECTION OF A CLASS III MALOCCLUSION WITH ELASTODONTIC THERAPY

Ferrante L

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**Aim:** resolution of an interceptive case of a class III dental malocclusion in a small 5-year-old patient with complete deciduous dentition, anterior reverse bite from 53 to 63 with 100% coverage of upper incisors and mismatched midlines. The main purpose of functional treatment is to "guide" the proper growth of the bony bases by stimulating the perioral muscles. When any muscular interference or dentoskeletal malocclusions are treated at a very early age there is greater assurance that there is a stable balance between the mandible and the muscular component with resolution in 15% of cases and improvement in 40% of cases. The ideal therapy is in the preschool child when the plasticity of skeletal structures makes therapy fast and stable over time.

**Methods:** the patient was given a third-class elastodontic, to be used all night and one hour during the day, as an interceptive orthodontic treatment. Useful in the developmental age, allows the removal of factors responsible for malocclusions. Therapy continues with progressively larger bioactivators until the next skeletal reevaluation with the support of OPT and TELECRANIO radiographs, not yet performed at this time due to the patient's age.

**Results:** the patient's cooperation was such that the reverse and deep bite improved within a few months.

**Conclusions:** this functional elastomeric appliance produces neuromuscular, orthopedic and dental effects achieving better overall health.

# INTERCEPTIVE THERAPY OF THIRD CLASSES IN DECIDUOUS DENTITION: A CASE REPORT

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**Aim:** the purpose of this study is the evaluation of interceptive therapy with orthopaedic appliances in patients with third skeletal class with deciduous dentition.

**Methods:** patient female, 5-year-old, 6-month-old. anamnestic collection: born at term by eutocic delivery, breast feending up to 6 months, no familiarity with third class. Collaboration motivation. Good oral hygiene, accompanied by both parents. Patient inquiry: third class malocclusion. Intraoral and extraoral photographs were taken of the patient, an orthopantomography and a teleradiography in latero-lateral projection were requested.

Orthopantomography shows a deciduous dentition. Skeletal diagnosis resulting from cephalometrics III skeletal class, mandibular protrusion, upper jaw contraction, normodivergent subject. Dental diagnosis: III molar and canine class, left anterior and lateral reverse bite, OVJ negative, OVB increased. Aesthetics: concave profile, slight facial asymmetry on the frontal plane, labial incompetence, protruded lower lip. Therapeutic options with orthopaedic devices: Delaire's mask, ERP.

**Results:** it was decided to correct a cross-cutting level with traditional ERP cemented on bands on deciduous teeth with internal and external arms for Delaire's Mask for correct A.P. dimension. We obtained the third class correction.

**Conclusions:** the motivation for the treatment plan chosen It was dictated by the age of the patient and the need to intercept this malocclusion and avoid surgery in adulthood.

# ORTHODONTIC EXTRUSION OF CANINES INCLUDED IN THE UPPER JAW: CASE REPORT

Del Vecchio G

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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 tooth 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 elements 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.

**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.

# BIOMECHANICS OF PALATALLY INCLUDED MAXILLARY CANINES. CASE REPORT

Carpentiere V

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**Aim:** this article documents a case of impaction of the right maxillary canine in the arch with orthodontic traction.

**Methods:** an impacted tooth is a tooth that cannot erupt due to a physical impediment (lack of space, ectopic position, presence of odontomas or supernumeraries) and no longer has eruptive potential. Particular attention should be paid to deciduous canines that persist beyond 12 years, as there is a good chance that they will not be viable due to tooth decay or severe abrasion and malformation of the lateral incisors. The clinical case presented is a 20-year-old girl who presents persistence in the arch of 5.3 and 1.3 in a palatal position not yet erupted. The case is documented with x-ray and photos. A CBCT was also performed to locate the dental elements and anatomical structures. The phases of orthodontic therapy are positioning of the brackets. After two months, the avulsion of 5.3 and the placement of a bracket on 1.3 are performed. The traction of the tooth is carried out by means of an elastic ligation fixed on the 0.16 steel arch. Subsequently, to guide the canine into the arch, it is hooked to a 0.12 Ni-Ti arch.

**Results and conclusions:** after 8 months of orthodontic tractions, the impacted canine was repositioned in the dental arch and the case was subsequently concluded by positioning the attachments also in the lower arch. The application of a correct biomechanical system allows these problems to be treated easily. The success of orthodontic therapy of impacted canines depends on an accurate diagnosis carried out with dedicated clinical and radiological tests such as OPT and CBCT x-rays considering some predictive factors of dental eruption such as the axis of eruption of the impacted canine, persistence of the corresponding deciduous tooth, necessary space in the arch.

# ELASTODONTIC THERAPY IN PATIENTS WITH DENTAL AND SKELETAL CLASS II AND DEEP BITE

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**Aim:** this paper describes an orthodontic treatment with an elastodontic device in a young patient with crowded teeth and 2nd class dental and skeletal malocclusion.
**Methods:** the patient at the U.O.C. of Dentistry of the Bari Polyclinic. underwent routine orthodontic examination, intra-and extra-oral photos, impressions for study models, rx opt and rx skull L.L. and cephalometric analysis. After gathering this clinical information, a choice can be made between the various treatment options. The choice falls on an interceptive phase with an elastodontic device. The girl is given an AMCOP type Basic integral. In addition, instructions for use are handed out together with the device. The patient is monitored every 4 weeks.
**Results:** after 8 months of therapy, a significant improvement in tooth crowding and profile can be observed. We chose to continue the therapy after the growth of the dental arches with another elastodontic dental device Amcop basic integral s4.
**Conclusions:** elestodontic therapy can be considered a valid alternative to classical procedures for the treatment of class II malocclusions.

# USE OF DELAIRE-TYPE FACE MASK IN A GROWING PATIENT WITH SKELETAL CLASS III MALOCCLUSION

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**Aim:** this study examines a case of cleft lip-palate, with unilateral complete cleft palate and bilateral incomplete cleft lip, treated with surgery in another hospital; with transverse and sagittal bone discrepancy of the upper jaw and tendency to skeletal class III. Babies with OFCs manifest problems with discrepancies between jaw bones and deciduous and/or permanent dentition. Phonation, feeding, hearing, and aesthetics are also problems that need to be treated by a team of specialists.
**Methods:** a female patient, 7 years old, with mixed dentition, presented dental-skeletal class III malocclusion with negative overjet. All records were evaluated, and study impressions were taken. It was planned for the first phase of treatment: E.R.P. for the upper jaw and lower plate with an expansion screw for the lower jaw. In the second phase of treatment, it was used Delaire face mask to guide the growth of the upper jaw in sagittal e vertically.
**Results:** after 5 months the E.R.P. was removed to add arms with hooks for the elastic bands of Delaire face mask and then the second phase of treatment was started. It obtained a significant improvement in the growth and correction of jaw bone discrepancy, with good divergence control.
**Conclusions:** the interceptive devices are very useful in correcting the transverse, vertical, and sagittal bone discrepancy in growing patients. It is important to have good patient cooperation in the use of removable devices, to have malocclusion correction.

# CLASS II MOLAR CORRECTION WITH INCREASED OVERJET USING ALIGNERS: CASE REPORT

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**Introduction:** the II full molar class with an overjet of 7 mm poses aesthetic and functional challenges. In this case, a 28-year-old woman's prior orthodontic treatment failed to deliver satisfactory results, ruling out extractions as an option. Thus, aligners and Class II elastics were employed for effective correction. This abstract outlines the treatment protocol, materials, methods, results, and conclusions.

**Methods:** a 28-year-old woman underwent clinical and radiographic assessment to ascertain the malocclusion's nature. With extractions ruled out, a treatment plan utilizing aligners and Class II elastics for upper molar distalization was devised. Customized aligners were worn for 8 months per the treatment plan, while Class II elastics facilitated overjet reduction and upper molar distalization.

**Results:** after 8 months, significant improvement was observed. Clinical and radiographic evaluations confirmed complete resolution of the II full molar class, transforming it into bilateral molar and canine Class I. The overjet reduced to 1 mm, enhancing the patient's smile and facial aesthetics. Results remained stable, meeting the patient's expectations.

**Conclusions:** this case demonstrates the effectiveness of aligners and Class II elastics in treating II full molar class with 7 mm overjet. The approach successfully corrected the malocclusion, improving aesthetics. It's particularly beneficial when extractions are contraindicated. Accurate evaluation and personalized treatment planning are crucial for optimal orthodontic outcomes in malocclusions.

# USE OF INVISALIGN IN CLASS II MALOCCLUSION, WITH DEEP BITE, CROSSEBITE AND CRAWDING

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**Aim:** the patient required an improvement of her smile with the use of esthetic devices. The quest for a harmonious smile and a physiological occlusion with greater comfort and aesthetics is increasingly sought after by patients of different ages. The orthodontic treatments using clear aligners become increasingly popular because of the aesthetics and comfort of their use.

**Methods:** a female patient, 22 years old, with permanent teeth, needed to improve her smile. Medical history, photos, orthopantomography latero lateral teleradiograph, and cephalometric analysis were evaluated. The patient presented dental-skeletal class II malocclusion with deep bite, monolateral crossbite and crowding. Digital dental impressions by intraoral scanning were taken and sent to get the clincheck of the patient. It was modified several times to optimize the position of the attachments and obtain the proper movements to correct the tooth positions. The clincheck was viewed by the patient and accepted. The attachments were placed on the patient's teeth and instructions for use of clear aligners were given to the patient.

**Results:** excellent results were achieved with the use of 24 clear aligners. They were changed every 10 days, to achieve resolution of deep bite and dental crowding. A refinement phase with another set of clear aligners is necessary to improve the position of some dental elements.

**Conclusions:** orthodontic treatment with clear aligners is increasingly being used with excellent results and patient comfort. The patient's compliance in consistently using aligners is crucial.

# DENTAL II CLASS CORRECTION WITH CARRIERE® MOTION APPLIANCE AND INVISALIGN® ALIGNERS

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**Aim:** resolution of a second dental class using the Carriere® Motion Class II appliance and Invisalign® aligners.

**Materials:** case report of a 16-year-old female patient presented with a dental class II malocclusion (oj 7.8; ob 4.9; IMPA: 100;) and first skeletal class (SNA: 82,2; SNB: 80,1; ANB: 2,1) treated with a standard Carriere® Motion Class II appliance (25.6 mm) placed on the maxillary arch from first molar to canine.

Two types of elastics were used: 6 oz, 1/4" for the first month and 8 oz, 3/16" until the end of the treatment. After achieving a molar and canine class I, two sets of Invisalign® (n:38) aligners were utilized to complete anterior alignment and optimize tooth meshing, overjet and overbite. Optimized attachments to control the rotation of the anterior teeth were placed and the G8 dental expansion protocol was applied for the posterior sectors. Cutouts have been made for using buttons and elastics and an anterior IPR in the lower arch was performed (anterior Bolton ratio: 78,4%).

**Results:** at the end of the 12 months treatment, the patient presented a bilateral molar and canine I class occlusion (ob: 1.5; oj: 2.2; SNA: 83; SNB: 81,5; ANB: 1,5; IMPA: 95; angle of the upper incisor to the palatal plane: 109,5). Good dental alignment, good tooth meshing and a centered midline were obtained.

**Conclusions:** in conclusion the CMA used for the treatment of class II malocclusion did not cause skeletal changes; however, largely dento-alveolar effects were noticed.

# TWO-PHASE APPROACH AND EARLY INTERVENTION IN A CLASS III SKELETAL MALOCCLUSION

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**Aim:** the objective of this case study is to evaluate the final outcome and the effectiveness of an early two-phase orthodontic treatment in a patient with mandibular deviation, anterior crossbite and class III malocclusion.

**Methods:** the patient is a 7-year-old child with severe palatal constriction and an anterior crossbite of the 22 element. The first phase of therapy consisted in the utilization of a rapid maxillary expander with the duration of 14 months combined with a lower bite block with the aim of cancel any occlusal interferences. The second phase involved the use of fixed orthodontics for improving the skeletal position of the mandible and for alignment of teeth. For examination of the outcome of the treatment, regular monthly check-ups were performed. Every 3 months checkings of the patient were conducted between the first and second phases for the eruption of permanent premolars and canines.

**Results and conclusions:** at the end of 36 months' orthodontic treatment, the effectiveness of an early two-phase orthodontic treatment in patients with complex malocclusions was observed with a significant advance in occlusion, correction of mandibular deviation and improvement of smile aesthetics. This study confirms the efficacy of a two-phase approach in treating complex malocclusions. The importance of early approach in correcting skeletal and dental discrepancies was highlighted both preventing the worsening of malocclusion and promoting stability of long-term results.

# UNILATERAL HIGH FRACTURE OF THE CONDYLE WITH MALOCCLUSION DURING GROWING

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**Aim:** the mandible is a common site of trauma, constituting 12%-56% of facial fractures. Condylar fractures account for about 29%-52% of all mandibular fractures, 16% high-neck fractures. In children, during growing, maxillofacial surgery is not indicated and the treatment is often required together with the malocclusion. If a condylar fracture is not managed properly, side effects will be irreversible. This case report shows the management of the unilateral condylar fracture and the malocclusion with the appliance Function Generation Bite (FGB).

**Methods:** male patient 9 years 7 months of age, showed right high condylar fracture due to fell off the bike, severe right lateral deviation during opening with pain, mesodivergent, Wits -1, anterior crossbite (12/42). The patient was treated with FGB which was individually manufactured in acrylic resin and resilient stainless steel occlusal bites planes that prevent the teeth from intercuspal contacts, align the occlusal plane and allow self-positioning of the jaw in the three planes of space.

**Results:** the panoramic x- ray, and RMI show the complete high fracture of the right condyle. After 6 months of therapy with FGB the pain disappears and the mandibular opening was centered, after 1 year the anterior crossbite was corrected and the ortopantomography after 18 months demonstrated the symmetrical and centered regrowth of the condyle.

**Conclusions:** the functionalizing treatment with FGB is a valuable therapy in correcting malocclusion and restoring the anatomy of the condyle during growing.

# CASE REPORT: MANAGEMENT OF CLASS II MALOCCLUSION WITH DAMON SELF-LIGATING BRACKETS

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**Aim:** the aim of this report is to describe the therapy management of a class II malocclusion in a preadolescent patient carried out with Damon self-ligating brackets.

**Methods:** an 11-year-old female patient presented orthodontically a bilateral molar class II, increased overjet and overbite, ogival palate with a 4.5 mm transversal discrepancy, mesioversion of 4.5 and 3.5 and upper and lower dental crowding. The patient demonstrated a skeletal class II with a mesodivergent pattern. The objectives of the treatment involved improving transversal maxillary and mandibular arch form, correcting molar relationship and overjet through mandibular advancement and torque control, solving deep bite and providing teeth alignment on both arches. A Transpalatal Bar (TPB) was used in order to expand the upper arch and derotate the first upper molars. The orthodontic treatment was carried out with Damon self-ligating brackets on both lower and upper arch.

**Results:** the proposed treatment provided an improvement in smile esthetics, enabling the resolution of class II malocclusion and solving dental crowding and overjet. Deep bite was corrected by posterior lower extrusion and anterior lower intrusion.

**Conclusions:** Damon self-ligating system demonstrated to be a successful and predictable tool in the resolution of class II malocclusion in preadolescent patients.

# A CUSTOM ORTHOPEDIC-FUNCTIONAL APPLIANCE: THE INDIVIDUAL GUIDE

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**Aim:** elastodontic appliances are preformed removable devices used to induce neuromuscular and dental modifications. Among these devices, the Individual-Guide (IG) stands out. The IG is crafted on the patient's dental models, thereby featuring a customized occlusion in accordance with the specific shape of each tooth. This study aims to assess the clinical and therapeutic benefits of incorporating IGs in orthodontic treatment during the pivotal stages of growth.

**Methods:** a clinical case is reported. The IG was used in a growing patient suffering from skeletal and dental Class II malocclusion, in late mixed dentition, with deep bite and increased overjet. Treatment lasted 12 months. Dental casts as well as intraoral and extraoral photographs and cephalograms were recorded before and after treatment.

**Results:** after 12 months, overjet and overbite were corrected; arches were leveled, aligned and transversally coordinated; and molar and canine Class I was achieved.

**Conclusions:** the IG emerges as a powerful interceptive orthodontic tool, particularly during mixed dentition stages and throughout the growth phase. This device facilitates the integration of an individualized set-up with a bite construction specific to each patient. It effectively corrects dental misalignments and individual skeletal variances throughout its use.

# AN ORIGINAL HYBRID WORKFLOW FOR AN OBTURATOR DEVICE USEFUL IN CLEFT PALATE PATIENTS

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**Aim:** cleft lip and palate and cleft palate are the most common congenital craniofacial anomalies. Individuals born with cleft palate require comprehensive care from birth; this is essential to allow correct nutrition, correct physical development and the achievement of an adequate body weight for subsequent reconstructive surgical treatments of the palate. In the past, making therapeutic devices for these children involved traditional dental impression materials, raising concerns about potential choking hazards. Using digital workflows not only reduces these risks, but also improves the efficiency of treatment protocols.

**Methods:** this study attempts to introduce an original hybrid workflow that leverages the benefits of both digital and analog methodologies. This methodology can be applied daily by doctors who treat patients suffering from cleft palate to allow the patient to eat correctly and independently and have physiological growth.

**Results:** the device created was immediately accepted by the patient, allowing autonomous nutrition. The evaluation of the effectiveness of the device was carried out by evaluating body weight every 15 days.

**Conclusions:** the hybrid device creation workflow eliminated the risks associated with taking a conventional impression and simplified device creation. The patient had growth comparable to that of a healthy child.

# ORTHODONTIC MANAGEMENT OF A JIA PATIENT: A CASE REPORT

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**Aim:** JIA includes a group of diseases characterized by joint inflammation that appears before the age of 16 and lasts for at least 6 consecutive weeks. In 40% of cases, it can also affect the TMJ, leading to changes in shape and function. Although it is common clinical practice to treat children with JIA using functional appliances, the optimal management of this joint remains a matter of debate. The aim of this study is to evaluate a traditional orthodontic approach in these patients, in order to avoid the consequences of functional therapy on the TMJ and the associated risks.

**Methods:** the patient, a 12-year-old female, presented to our Department with a Class I molar, Class III canine on the left, and Class II canine on the right, tendency towards open bite, and deviation of the lower incisal line to the right.

The patient reported TMJ pain. A multibracket orthodontic treatment with fully programmed .022x.028 appliances was proposed. Alignment of dental elements and retroclination of lower incisors were performed using a sequence of arches with straight-wire technique. Box loops were used for case refinement and proper engagement of the anterior group. The treatment was finalized with a gnathological bite for the joint issues the patient was experiencing.

**Results:** the orthodontic treatment resulted in an improvement of dental malocclusion and reported symptoms. Five years later, the canine and molar class obtained at the end of treatment remained stable.

**Conclusions:** in children affected by JIA, TMJ involvement can lead to disturbances in dentofacial growth and joint dysfunction. The study shows how it is possible to resolve malocclusion and maintain long-term stability of the outcome without using functional appliances and elastics that may overload the TMJ.

# MALOCCLUSION AND ORAL HABITS: AN INTERDISCIPLINARY STUDY

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**Aim:** the aim of this study is to assess these factors, to clarify their influence on malocclusion and their relationship with it.

**Materials:** a randomized sample from the university dental center in Perugia was selected from January 2018 to January 2020 for a total of 240 patients. A standard questionnaire was developed to carry out the screening, which consisted in two parts. The first part was for parents or the legal guardian of the children in order to collect anamnestic data, the second part was for the clinicians (dentist and speech therapist), who had to report information obtained from the physical examination.

**Results:** a total of 240 patients were analyzed, 148 patients were addicted to oral habits and the most frequent was the use of the pacifier (110 patients), following by "other" factors, such as onychophagy, lapisphagy, tongue, objects and finger sucking (52 patients). Despite most of the patients (179) presented some kind of malocclusion, the prevailing dental class was I class (152 patients), followed by II (70 patients) and finally by III (16 patients). Then all these single malocclusions were assessed to see which was related to each type of other variable we examined. A statistically significant association was discovered between class III and dysfunctional swallowing ($p = 0.049$).

**Conclusions:** the prevalence of malocclusions measured in the sample of this study (74.6%) agrees with the prevalence in the general population (60-80%). Atypical swallowing and oral breathing were identified as the major risk factors for malocclusions.

# THE VIRTUAL TWIN: NEW THERAPEUTIC DIAGNOSTIC SCENARIOS BY THE FACIAL SCANNER

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**Aim:** in the past, the patient's orthodontic check-up was compartmentalized: the aesthetic part on the photos, the functional part on the models, on OPT and on the Cone Beam CT. Nowadays, we can both design a better patient study and record the patient's dental arches using optical scanners. We can also record the bite, the relationship between the arches. Furthermore, with facial scanner we can digitize the patient's face three-dimensionally. All these tools can be combined: the patient's face recorded with the facial scanner, in relation to the dental arches taken with the intraoral scanner. This creates a digital patient.
Digitizing allows you to have all orthodontic records in a single system, as well as giving the operator more effective planning of the case and prompt communication to the patient.

**Methods:** Shining3dDental uses the MetiSmile facial scanner: speed, precision and rendering give a precise 3D reconstruction of the patient's face, combined with attention to detail and realistic seleurs.
We can: align and overlay facial scan and intraoral scan data; integrate Cone Beam CT image files with scans; evaluate facial asymmetries in the patient's face; trace the mandibular trajectory with which to acquire dynamic occlusion data to evaluate the TMJ with detection of laterality, occlusion and opening.

**Conclusions:** the MetiSmile facial scanner has countless tools for data acquisition, analysis and modification. It is therefore an indispensable tool for digital dentistry.

# IS IT POSSIBLE TO TREAT A MANDIBULAR RETRUSION CLASS II WITH ALIGNERS?

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**Aim:** the aim of this case report is to demonstrate the therapeutic possibility of mandibular advancement using Smartee aligners appliance S8-SGHB.

**Methods:** the patient, a 30-year-old female, presents at our operating unit with a Class II, I division malocclusion, with mandibular retrusion and mild crowding. She refused both orthognathic surgery and fixed and functional therapy (Herbst), which represent the standard treatment. Therefore, the use of Smartee aligners with S8-SGHB appliance was proposed to patient as a treatment to compensate for the malocclusion. The advantage of using these aligners is the possibility of obtaining accurate movement mechanics thanks to the physical properties they possess. She began treatment with Smartee aligners with appliance S8-SGHB in July, with follow-up every month and changing her aligners every 10 days.

**Results:** at this time the patient concluded the first phase of treatment, and we have mandibular advancement. Furthermore, a non-meshed class I molar and a dento-alveolar expansion of the arch were obtained.

**Conclusions:** the results demonstrate that is possible to have a mandibular advancement, so the use of Smartee aligners with appliance S8-SGHB is a promising alternative to functional mandibular advancement devices in adult patients.

# TWO-PHASE APPROACH AND EARLY INTERVENTION IN A CLASS III SKELETAL MALOCCLUSION

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**Aim:** the objective of this case study is to evaluate the final outcome and the effectiveness of an early two-phase orthodontic treatment in a patient with mandibular deviation, anterior crossbite and class III malocclusion.

**Methods:** the patient is a 7-year-old child with severe palatal constriction and an anterior crossbite of the 22 element. The first phase of therapy consisted of the utilization of a rapid maxillary expander with the duration of 14 months combined with a lower bite block with the aim of cancel any occlusal interferences. The second phase involved the use of fixed orthodontics for improving the skeletal position of the mandible and for alignment of teeth. For examination of the outcome of the treatment, regular monthly check-ups were performed. Every 3 months checkings of the patient were conducted between the first and second phases for the eruption of permanent premolars and canines.

**Results and conclusions:** at the end of 36 months' orthodontic treatment, the effectiveness of an early two-phase orthodontic treatment in patients with complex malocclusions was observed with a significant advance in occlusion, correction of mandibular deviation and improvement of smile aesthetics. This study confirms the efficacy of a two-phase approach in treating complex malocclusions. The importance of early approach in correcting skeletal and dental discrepancies was highlighted both preventing the worsening of malocclusion and promoting stability of long-term results.

# MANAGING ADULT OPEN BITE WITH SURESMILE SYSTEMATICS - A CASE REPORT

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**Aim:** managing open bite in adult patients poses challenges, particularly when coupled with upper jaw transverse contraction and lingual interposition. This case report aims to illustrate the efficacy and predictability of Suresmile systematics in treating complex malocclusions.

**Methods:** a 21-year-old patient, with prior orthodontic treatment, sought to enhance smile aesthetics. Examinations revealed skeletal class I with dental biprotrusion, mild bilateral molars class III, upper transverse contraction with left unilateral cross-bite, anterior and lateral open bite and decreased overjet. Treatment began with Miniscrew-Assisted Rapid Palatal Expansion (MARPE) to correct the transverse dimension, and direct banding to align and leveling dental arches. Customized Suresmile wires were then employed; this phase was pursued in just 11 months through digital 3D planning of the final tooth position and the use of fully customized arches, equipped with the proper bends and compensations to achieve optimal occlusion, coupled with intercusping elastics. Thermoformed retainers were provided after the treatment, lasted 21 months.

**Results:** treatment showed significant improvements, solving transverse deficiency and unilateral crossbite with MARPE. Suresmile treatment achieved precise alignment, closed open bite, and normalized overjet values.

**Conclusions:** the combined use of MARPE and customized Suresmile wires enabled rapid, precise, and three-dimensional malocclusion resolution, showcasing effectiveness, efficiency, and predictability without bracket adjustments, even during finishing.

# KEEPPY: A DIGITALLY DESIGNED FIXED RETAINER SYSTEM

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**Introduction:** stability is one of the most discussed topics in orthodontics. As Oppenheim mentions: "Retention is the most difficult problem in Orthodontics, in fact it is the problem". The causes of instability have been carefully investigated and are attributed to various mechanisms, some of which are beyond the clinician's control. Dr. Robert Little of Washington University has studied the topic of stability and retention for over 30 years; concluding that "the only way to achieve lifetime stability following orthodontic treatment is to employ lifetime retention methods". Based on these considerations, we performed the following study which aims to represent the innovation and predictability of a digitally made retainer, *Keeppy*.

**Methods:** some indirect cad-cam methods for the creation of a fixed orthodontic retainer were compared with the new, totally digital *Keeppy*.

**Results:** the clinical procedure with this new Cad Cam retainer is extremely easy and less operator dependent. Moreover, the Chrome Cobalt Laser melting production guarantees absence of Ni as well as excellent precision and minimum thickness.

**Conclusions:** we can state that our clinical experience (however recent) allows us to appreciate the simplicity of application, the absolute precision and the consequent stability of this retainer, in addition to the comfort and ease of maintaining hygiene reported by patients.

# TEN CASES TREATED BY 1ST AND 2ND YEAR POST GRADUATE STUDENTS WITH FUNCTION GENERATING BITE

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**Aims:** 10 cases with different malocclusions treated with Functional Generating Bites appliances (FGB) at the Dental School of the University of Turin.

**Methods:** 10 cases, selected from patients attending the Orthognathodontic department of the Dental School of Turin, who present different malocclusions: unilateral and bilateral posterior cross bite, total cross bite in basal class III, deep bite, open bite, asymmetrical molar class II. Essential diagnostic data collected in all patients before therapy (medical and dental history, clinical evaluation, intraoral and extraoral photography, orthostatic models, OPT, Tele-rx LL and PA with relative cephalometric analysis). Chewing cycles and electromyographyc activity of masticatory muscles were recorded to diagnose the alteration of masticatory function and to check the improvement after the orthodontic correction. Patients were treated with FGB according to Turin University by the 1st and 2nd yr post-graduate staff. The appliance was individually manufactured and made of acrylic resin and resilient stainless steel. Fundamental components are the bites which protect teeth from contacts during the correction of malocclusions, flatten the occlusal plane and allow the self-repositioning of the jaw.

**Results:** all the malocclusions were corrected.

**Conclusions:** the functional appliances according to Turin University allow little experienced clinicians to correct malocclusion and to restore functions predictably without side effects mechanical risks.

# INTERCEPTIVE ORTHODONTIC TREATMENT WITH ELASTODONTIC APPLIANCE IN EARLY CHILDHOOD

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**Aim:** the aim of the present study is to correct the open bite, achieve proper overjet and overbite with elastodontic braces in primary dentition patients aged 3-5 years with open bite and oral habits with no previous history of orthodontic treatment.

**Methods:** the first patient aged 3 years presented with dental open bite, atypical swallowing and upper arch contraction and was treated with DC Bio-Activator for 6 months and A.M.C.O.P. Open for about 12 months. The second 4-year-old patient, who presented with dental open bite, was treated with A.M.C.O.P. Open for about one year, while the third patient, whose clinical examination showed mild Class III malocclusion, open bite, atypical swallowing, and contraction of the upper arch, was given TC elastodontic device for one year.

**Results:** in the three previously described cases, the open bite was corrected in 12-18 months with the use of A.M.C.O.P. elastodontic devices, which proved to be a valuable aid for early interceptive treatments. Time has proven to be crucial in the success of these preventive treatments.

**Conclusions:** the A.M.C.O.P. Bio-activator devices have demonstrated efficacy in achieving therapeutic goals with advantages such as correction of the open bite in a limited period of time, reconditioning of neuro-musculoskeletal system growth forces, and low impact on patient compliance.

# ELECTROMYOGRAPHIC EVALUATION IN PATIENTS WITH JUVENILE IDIOPATHIC ARTHRITIS

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**Aim:** the aim of this study is to evaluate the motor model in patients suffering from unilateral or bilateral Juvenile Idiopathic Arthritis (JIA) and to understand how the neuromuscular system plays a role in protecting the temporomandibular joint in patients with joint disorders.

**Methods:** the instrumental evaluation of the masticatory muscles in patients with JIA is carried out using standardized POC (Percentage Overplaning Coefficient) electromyography using a maximum clenching test. This text allows us to understand in detail the muscular activity in patients suffering from JIA with pathologies affecting the temporomandibular joint. The evaluation was carried out on a sample of 150 patients suffering from JIA, performing electromyography with the aim of evaluating the masseter muscles and temporalis muscles. The analysis is carried out with the patient sitting and with the maximum clenching protocol.

**Results:** the study shows that in 135 of the 150 patients affected by JIA, hyperactivity of the temporal muscles or hypoactivity of the masseters was noted. The hypothesis is that this type of neuromuscular response is an adaptive protective response of the TMJ.

**Conclusions:** in conclusion, this study underlines the importance of evaluating, through electromyographic testing in maximum clenching, motor activity and the role of the neuromuscular system in the protection of the temporomandibular joint.

# EVALUATION OF MANDIBULAR SEGMENTS ON CBCT IN PATIENTS WITH JUVANILE IDIOPATHIC ARTHRITIS

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**Aim:** the aim of this study is to evaluate differences in volume of mandibular segments between individuals with unilateral and bilateral Juvenile Idiopathic Arthritis (JIA), comparing them to control individuals without JIA.

**Methods:** for this study, 40 patients with unilateral JIA, 48 patients with bilateral JIA and 45 subjects without known rheumatic conditions as the control group were included. Each mandible was divided into various volumetric segments (hemimandible, condyle, ramus, and hemibody) using a validated method.

**Results:** the ANOVA test revealed significant differences in the size of the condyle and ramus between the groups. Further comparisons showed that the condyle and branch volumes were notably larger in the control group (1444.47 $mm^3$; 5715.44 $mm^3$) compared to the affected sides in the unilateral AIG (929.46 $mm^3$; 4,776.31 $mm^3$) and bilateral AIG (1,068.54 $mm^3$; 5,715.44 $mm^3$) groups. Furthermore, in patients with unilateral AIG, condylar volume was greater on the unaffected side (1419.39 $mm^3$; 5566.24 $mm^3$) compared to the affected side and compared to the bilateral JIA group.

**Conclusions:** in patients with unilateral JIA significantly lower volumes in the haemimandibula, condyle and ramus of the affected side were observed. The total mandibular volume is greater in the control group, followed by the group with unilateral AIG and finally the group with bilateral AIG.

# TREATMENT WITH GIANNI'S VERTICAL MODULATOR IN SKELETAL CLASS II'S PATIENTS WITH DEEP BITE

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**Aim:** Professor Giannì's vertical modulator is a therapeutic option in cases of skeletal class II with deep bite in non-cooperating patients. It allows aesthetic improvements of the E-line, nasolabial angle, labiomental angle, size of the vermilion and lower third of the face.

**Methods:** 10 patients in the dynamic growth phase are evaluated with the cephalometric tracing and the pre- and post-treatment extra-oral dimensions. All patients present a skeletal class II with deep bite and muscle hypertonicity during smiling.

The vertical modulator is cemented on the deciduous fifths or sixths in both arches; the device is composed of occlusal planes which guarantee stability and have the aim of raising the vertical dimension which was decreased due to the muscular hypertonicity of the smile and the palatinization of the upper incisors.

**Results:** it is clear that after a two and a half year of treatment there is a statistically significant difference with p-value $< 0.05$ of: a reduction in SNA and ANB, improvement in Ricketts' E-line with a decrease in lip retrusion upper third, increase in vertical dimension of the lower third. Reduction of overbite and functional rest of the cheeks were achieved.

**Conclusions:** the vertical modulator allows the release of the intrinsic forces of dental eruption, increases the vertical dimension with positive conditioning of the muscle tone and the TMJ. Finally, there is an aesthetic improvement thanks to the correction of the deep bite and a more harmonious profile with the correction of the vertical dimension of the lower third was gained.

# A SYSTEMATIC AND COMPREHENSIVE PROTOCOL FOR RAPID ORTHODONTIC EXTRUSION

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**Aim:** the aim is to describe a systematic and detailed protocol for rapid orthodontic extrusion, and to summarize the main results of this protocol in terms of migration of dental, hard and soft tissues.

**Methods:** a total of 10 cases were analyzed in our sample. The working design was to apply a protocol lasting 4 weeks of active phase with intense forces (greater than 300 g), perform weekly the circumferential supra-crestal fiberotomy procedure associated with root-planning, follow up with a passive stabilization phase of another 4 weeks and evaluate the results.

**Results:** the mean of crown movement was 2.01±0.54; the mean of hard and soft tissues migration was respectively 0.34±0.42 and 0.99±0.56.

**Conclusions:** we believe that despite the partial migration of periodontal tissue, the defined protocol we used is, for simplicity of application, brevity of treatment and results, a viable alternative to the surgical technique of clinical crown lengthening in those cases where it is necessary to have more dental tissue exposed for restorative and prosthetic purposes.

# FRACTAL ANALYSIS OF TRABECULAR BONE BEFORE AND AFTER ORTHODONTIC AND SURGICAL EXTRUSION

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**Aim:** the aim of this case-control study was the evaluation of apical and interproximal bone density of structurally compromised teeth undergoing orthodontic and surgical extrusion, by means of fractal analysis of periapical radiographs.

**Methods:** the sample-size consisted of 47 adults, 23 females and 24 males. Twenty-four of them underwent Orthodontic Extrusion (OE-*case group)* and the rest Surgical Extrusion (SE-*control group*). A total of 48 teeth were analyzed (40 premolars, 6 molars and 2 incisors). The duration of the study was 12 months. All the radiographs were imported to ImageJ and the apical, mesial and distal proximal bone regions were highlighted as Regions of Interest (ROIs), according to Soltani *et. al*. The selected ROIs were cropped, and the resulting images were duplicated. The "Gaussian Blur" filter was applied to the duplicates. The resulting image was then subtracted from the original one, resulting in a third image. The "Binary" filter was applied to the third image and the Fractal Dimension (FD) was calculated. Pre- and Post- treatment FD values from both OE and SE groups were compared.

**Results:** the obtained results showed an increase in pre- and post- treatment FD values for both groups. This was confirmed by the paired t-test, which detected a significant small difference respectively for the OE group (P <.001) and the SE group (P <.003).

**Conclusions:** both orthodontic and surgical extrusion showed an improvement in trabecular density. Therefore, it can be stated that both OE and SE can lead to skeletal correction by inducing alveolar bone remodeling.

# SKELETAL ASYMMETRY OF THE MANDIBLE TREATED WITH FUNCTIONAL APPLIANCES

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**Aim:** the skeletal asymmetry of the mandible is a pathological condition characterized by an asymmetric growth of the mandible which is usually treated with functional appliances for re-centering the mandible. Therefore, the aim of the present case-control study was to evaluate whether functional appliances with an asymmetric activation can restore a symmetric growth of mandibular condyles and rami.

**Methods:** eighty-five patients with mandibular asymmetry were selected considering: the skeletal maturation stage (CS2 or CS3), the presence of skeletal and dental Class-II malocclusion, and the availability of orthopantomography taken before ($T_0$) and after treatment ($T_1$). The rami and condyles asymmetry were evaluated at $T_0$ and $T_1$ using the Habets' method. The patients were divided in two groups: the first group with 40 patients treated with functional appliances for re-centering the mandible and the second group with 45 patients with mandibular asymmetry treated with appliances not directly active on the mandible. Collected all the data a Mann-Whitney U-test was used to compare the $T_0$ and $T_1$ asymmetry index between the two groups.

**Results:** the statical analysis showed no statistically significant differences between the group treated for re-centering the mandible and the control group, even if there was a reduction of the mandibular asymmetry in both groups.

**Conclusions:** the treatment with functional appliances cannot solve skeletal asymmetry but only produces dental changes. Therefore, the changes of the rami and condyle in both groups could be related to the growth or to the normalization of function after both types of treatment.

# ASSOCIATION BETWEEN DIET CONSISTENCY AND DENTO-SKELETAL MALOCCLUSIONS

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**Aim:** the aim of this prospective pilot case-control study is to analyze the association between a soft diet and the clinical presentation of maxillary hypoplasia and associated dental malocclusions, in the presence or in the absence of mouth breathing.

**Methods:** the dietary habits of 21 pediatric subjects were evaluated using a food questionnaire, categorizing foods into four consistencies. The breathing pattern, the frequency and intensity of snoring, and any causes of nasal obstruction were investigated. Statistical analyses were performed using Student's t-test, Z-test, Chi-square test, Fisher's exact test.

**Results:** among the participants, those with posterior crossbite consumed "creamy" and "soft" foods more frequently (P-value ≤0.05). Conversely, the subgroup without posterior crossbite more frequently consumed "solid" foods (P-value = 0.064). Additionally, an association between a pattern of chronic oral breathing and the presence of malocclusions such as anterior crossbite and crowding, which may imply a basal development deficit, has emerged in the absence of nasal obstruction risk factors.

**Conclusions:** our findings suggest an association between a predominantly soft diet pattern and posterior crossbite, a dental malocclusion potentially indicative of maxillary hypoplasia; moreover, they support the existence of a bidirectional association between an oral breathing pattern and dento-skeletal malocclusions, both independently of and in association with a predominantly soft-textured dietary regime.

# RAPID PALATAL EXPANSION EFFECTS ON PEDIATRIC OSA PATIENTS

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**Aim:** Rapid Palatal Expansion (RPE) aims to correct transverse maxillary deficiencies. The effects also extend to the nasal cavity causing an increase in airway volume and a decrease in air flow resistance. Since pediatric Obstructive Sleep Apnea Syndrome (OSAS) features partial or total obstruction of the upper airways during sleep, orthopedic treatment with RPE can improve this condition. The purpose of the study is to investigate the effects of RPE on sleep respiratory parameters before and after palatal disjunction, both in pediatric OSA and in healthy patients (N-OSA).

**Methods:** the study examined 36 subjects, 20 males and 16 females aged between 7.

**Results:** the first exam identified 11 subjects positive for OSAS (5 males, 4 females).

**Conclusions:** the study shows significant improvements in all sleep breathing parameters following palatal expansion in OSA patients. N-OSA group revealed a slight worsening of sleep indices, which can be attributed to the bulk of the RPE.

# EVALUATION OF MANDIBULAR CONDYLES BONE DENSITY AND THICKNESSES IN SUBJECTS AFFECTED BY JIA

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**Aim:** this study aimed to compare the bone density and thicknesses of mandibular condyles in Juvenile Idiopathic Arthritis (JIA) patients with healthy subjects.

**Methods:** 75 CBCT, of Caucasian Subjects aged between 7 and 16 years, were analyzed. The population was divided into three groups: Monolateral JIA group, Bilateral JIA group and Control Group. Mimics® software was used to measure different parameters including Total (DTo), Cortical (DCo), and Trabecular bone Density (DTr), as well as Cortical Bone Thicknesses at the Medial (MCBT), Lateral (LCBT), and Upper (UCBT) poles of the condyle's head. The Paired and independent t-test were used to assess the intra and inter-groups analysis. A Multiple regression model, weighted by sex, age, side, and clinic of the condyles (whether healthy or affected), was computed to perform a between-groups comparison.

**Results:** monolateral JIA patients showed significant differences ($p = 0.02$) in DTr and UCBT between affected and unaffected sides and a reduction of UCBT comparing the affected condyles to the controls. Bilateral JIA patients showed significant differences in DTo and DTr ($p < 0.01$) between right and left sides, with higher values on the right. It was seen a statistically significant reduced thickness of MCBT, LCBT and UCBT comparing Bilateral JIA subjects with the control group. The Regression analysis highlighted a pathology's significant influence on DTr and UCBT of the affected condyles.

**Conclusions:** the study suggests that JIA has a significant impact on the condylar bone structures, particularly reducing DTr and UCBT.

# ORTHOGNATHODONTIC KNOWLEDGE AMONGST PAEDIATRIC RESIDENTS: A CROSS-SECTIONAL STUDY

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**Aim:** to assess the orthodontic knowledge and ability of paediatric residents in the early recognition of malocclusion and associated risk factors.

**Methods:** an online questionnaire reached 83 participants from the Pediatric Residency Program of the University of Pavia, demographic variables of the residents, oral examination practices, orthodontic knowledge, and information sources were investigated. Residents were presented with 10 orthodontic cases and asked to determine the priority of treatment using the Index of Orthodontic Treatment Need. Data were statistically analysed ($p$ <0.05).

**Results:** pediatric residents usually recommend the first orthodontic visit at an average age of 4.92 years old. The score obtained by pediatric residents determining treatment priority did not significantly differ concerning the oral examination frequency, year of study or information sources reported. An underestimation of treatment priority was found for malocclusions characterised by a significant increase in overjet values. Conversely, a tendency to overestimate reduced overbite values treatment priority was found.

**Conclusions:** the ability of pediatric residents to determine orthodontic treatment priority did not significantly differ according to the year of residency, suggesting a lack of orthodontic training during the program. Dental misalignment represents the main reason why a pediatric resident refers his patient to an orthodontist, whereas more attention should be given to the skeletal features, in order to treat patients earlier, thus promoting the correct craniofacial growth.

# ANALYSIS OF THE MASTICATORY FUNCTION IN DEEP BITE PATIENTS

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**Aim:** to investigate muscular activation and chewing kinematics with both soft and hard experimental boli in growing patients with deep bite.

**Methods:** this study included 81 deep bite patients (11.4±1.1[yr.mo]; M = 32, F = 49), and 14 malocclusion-free controls (9.11±1[yr.mo]; M = 5, F = 9). Inclusion criteria were overbite >4 mm and age <14 yr; exclusion criteria were previous orthodontic treatment, temporomandibular disorder or orofacial pain at the time of recording. Surface-EMG recordings of masticatory muscles (s-EMG) and chewing pattern analysis were carried out concomitantly with the K7-I® (Myotronics, Tukwila, WA, USA). Experimental boli measured 20 x 1.2 x 5 mm (soft: sugar-free gum, 2 g; hard: winegum, 3 g). Statistical analysis was performed with a two-way ANOVA.

**Results:** Peak s-EMG activity (masseter/anterior temporalis pooled) was significantly increased during both soft and hard bolus chewing in deep bite patients compared to controls ($p$ <0.05), as well as in both groups during hard bolus chewing ($p$ <0.001) and same-sided chewing ($p$ <0.01).

Chewing pattern analysis showed that hard bolus mastication was significantly associated with “reduced closing angle”, “increased cycle height”, “maximum width” and “maximum lateral displacement” ($p$ <0.001) compared to soft bolus mastication in both groups.

**Conclusions:** deep bite malocclusion in growing patients is associated with significantly increased muscular activation. Interestingly, the system’s ability to adapt to increased load was preserved as well as the coordination between sides during both soft and hard bolus chewing.

# ONLINE PATIENT EDUCATION IN OBSTRUCTIVE SLEEP APNEA: CHATGPT CHALLENGES GOOGLE SEARCH

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The widespread implementation of artificial intelligence technologies provides an appealing alternative to traditional search engines for online patient healthcare education. This study assessed ChatGPT capabilities as a source of Obstructive Sleep Apnea (OSA) information, using Google Search as comparison. Two blinded reviewers compared answers to 10 common OSA questions from ChatGPT and Google Search using Global Quality Score (GQS), Patient Education Materials Assessment, (PEMAT), DISCERN, Flesch Reading Ease (FRE) and Flesch-Kincaid Reading Grade (FKGL) tools.

ChatGPT scored significantly higher for quality (GQS:4.50 *versus* 2.70, p = 0.001), reliability (DISCERN:48.80 *versus* 34.70, p <0.0001) and understandability (PEMAT:7.90 *versus* 6.30, p = 0.0029), but lower for readability (FRE:24.42 *versus* 53.40, FKGL:14.12 *versus* 9.43, p <0.0001).

ChatGPT fared better than Google Search in offering good quality responses that were useful to patients but resulted more difficult to read. Healthcare providers should understand the potential benefits of this promising source of online education to guide patients appropriately.

# PSYCHOSOCIAL IMPACT ON PATIENTS WITH DENTOFACIAL DEFORMITIES AFTER ORTHODONTIC CAMOUFLAGE

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**Aim:** this study aims to assess the quality of life and self-esteem on individuals with Dentofacial Deformities, with an indication for Orthodontic-Orthognathic surgical-treatment, who refused the surgery undergoing orthodontic camouflage and to analyze how the socio-demographic variables can influence these psycho-social dimensions.

**Methods:** descriptive, observational and cross-sectional study. The sample consisted of a control group (patients undergoing conventional orthodontic treatment) and a study group (patients undergoing orthodontic camouflage). Data collection was performed using the Rosenber Global Self-Esteem Scale and the WHQoL-Bref.

**Results:** the sample consisted of 286 elements 154 belonging to the control group and 132 submitted to camouflage. The prevalence of the participants was 58% in the female gender (n = 166), and the average age was 25.2 years ±7.79. The study group demonstrated a mean self- esteem value of 45.37 (±8.01). Regarding quality of life, this group obtained a mean score in the general domain of 8.03 (±1.28), in the physical domain of 15.66 (±2.39), in the psychological domain of 15,37 (±2,21), in the environment domain of 15.40 (±8.02) and a mean value of 16,53 (±2.88) in social relations. The different skeletal classes did not influence the quality of life and self- esteem of the patients submitted to camouflage.

**Conclusions:** patients treated with camouflage tended to have lower quality of life values in the general domain (p = 0.001), in that of the environment (p = 0.001) and higher in that of social relationships (p = 0.033). Similarly, lower values of self-esteem (p = 0.001) were found in these patients.

# ASSESSMENT OF QUALITY OF LIFE IN GROWING PATIENTS WITH POSTERIOR CROSS-BITE

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**Aim:** in growing individuals, cross-bite is one of the most common malocclusions. The aim of this study was to evaluate the general and oral health-related quality of life in adolescents with cross-bite with respect to their peers without cross-bite.

**Methods:** adolescents aged 10-18 years were recruited from among those who attended the Orthodontic Clinic of the University of Naples Federico II (Italy) for a first consultation. Before the consultation, Oral Health Impact Profile-14 (OHIP-14) and The Pediatric Quality of Life Inventory 4.0 Generic Core Scales (PED-SQL) questionnaires were provided to participants. Patients were clinically examined, and the presence/absence of posterior cross-bite was recorded. Distribution of the data was non-parametric, thus Kruskal-Wallis test was used to compare each domain and the total OHIP-14 and PED-SQL between Cross-Bite (CB) and Non-Cross-Bite (NCB) groups.

**Results:** 163 adolescents (mean age: 13±2.3 years; 93 females, 70 males) were included. Regarding the OHIP-14, the Physical Disability and the Handicap Domain exhibited significantly higher values in the CB group compared to the NCB group (respectively $P = 0.012$ and $P = 0.028$). Regarding the PED-SQL, the Physical Health Domain showed significantly decreased values in the CB group compared to the NCB group ($P = 0.031$).

**Conclusions:** adolescents with cross-bite experience some impairment in the general and oral health-related quality of life, compared to their peers without cross-bite.

# IS MALOCCLUSION ASSOCIATED WITH THE PERCEPTION OF DENTOFACIAL AESTHETICS IN ADOLESCENTS?

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**Aim:** to evaluate if the psychosocial impact of dental aesthetics, the perception of orofacial aesthetics, and the self-esteem are associated with the objective and subjective orthodontic treatment need in a sample of Italian adolescent.

**Methods:** one hundred (100) adolescents (55 male, 45 females) aged between 10 and 18 years, attending the section of Orthodontics of the University of Naples Federico II for consultation were included. All patients fulfilled the Italian Version of the following questionnaires: Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ), Orofacial Esthetic Scale (OES) and Rosenberg Self-Esteem Scale (RSES). The orthodontic treatment need was measured using the components of the Index of Orthodontic Treatment Need (IOTN): AC (Aesthetic Component, self-reported) and DHC (Dental Health Component, assessed by the clinician). Analysis of Variance (ANOVA) was computed to measure the difference of each study variable among subgroups of IOTN-AC and IOTN-DHC (little need, moderate need, definite need).

**Results and conclusions:** according to the self-reported degree of malocclusion, the majority of the patients (71.0%) reported having no need/little need for treatment. On the other hand, considering the malocclusion severity as rated by the clinician, 62.0% of the patients belonged to the "definite need" group for treatment. When divided according the IOTN-DHC subgroups, no significant differences were found between mean PIDAQ, OES, RSES, IOTN-AC scores (all $P > 0.05$). Hence, in the sample of Italian adolescents, objective assessment of the orthodontic treatment need was not associated with the self-rated degree of malocclusion. Furthermore, the malocclusion was not associated with the psychosocial impact of dental aesthetics, the perception of orofacial aesthetics, and the self-esteem.

# THIRD PALATINE RUGAE: IS IT A RELIABLE CLINICAL PARAMETER IN POSITIONING PALATAL MINISCREWS?

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**Aim:** the third palatine rugae is the most common reference point in mini palatal screws placements adopting direct procedures. This study aims to evaluate how the variability in rugae identification is affected by different operators and palatine vault shapes.
**Methods:** the sample consisted of 20 patients with deep palatine vault (age 27±7 years) and other 20 with flat ones (age 22±6 years) based on Korkhaus index. The data collected was labeled by 20 operators with 2-6 years of orthodontic experience, who indicated the most medial and lateral point of the third palatine rugae (considering features before any bifurcations or breaks) using the Meshmixer software. As a variability index the standard deviation of the rugae's placement was considered and compared by appropriate statistical tests.
**Results:** the variability of medial points detection in antero-posterior direction was ±1,2 mm and in transversal direction was ± 0,9 mm. Considering the lateral point it was located ±1,6 mm in antero-postero direction and in transversal plane was ±1,5 mm. No significant difference was found between deep and flat palatine vault shapes. However, on an average of 5 different operators in 5 cases, did not evidence the presence of the third palatine rugae in the group of flat palatine vaults.
**Conclusions:** the variability of rugae's identification is significant. Furthermore, it would seem less identifiable in flat palatine vault shapes patients. Therefore, the variability of recognition of the third palatine rugae, could affect the correct positioning of palatal mini screws remarkably.

# ACCURACY OF PARAMEDIAN MINISCREWS PLACEMENT: DIRECT *VERSUS* CBCT-GUIDED INSERTION

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**Aim:** palatal miniscrews are a well-established therapeutic approach in orthodontics, as Temporary Anchorage Devices (TADs) to support various treatment mechanics. This study aims to assess the accuracy of palatal miniscrews direct placement compared with CBCT-guided insertion and the impact of palatal morphology.
**Methods:** starting from 736 clinical cases, that underwent digital planning of paramedian miniscrews by an orthodontist considered highly experienced in the field, 20 cases with flat palatal vault (22±6 years) and 20 cases with deep palatal vault (27±7 years) were selected based on the Korkhaus index. Twenty orthodontists with 2 to 6 years of experience, but lacking expertise in palatal miniscrews, were recruited. They were instructed on the most adopted clinical parameters according to Literature: within 2 mm of the third palatal rugae and between 3 to 5 mm from the palatal midline, showing them T-Zone image. Using the 3D modelling software "Meshmixer", they digitally positioned a paramedian mini-implant in the left hemipalate of each model. Miniscrews coordinates were identified and compared with CBCT-guided digital planning.
**Results:** direct placement by recruited orthodontists resulted 1,6 mm more posterior and 0,2 mm more medial compared to CBCT-guided planning ($p < 0.05$), with no statistically significant difference between deep and flat palatal vaults.
**Conclusions:** this study shows a tendency among clinicians to place miniscrews more posteriorly than planned, suggesting that clinical reference ranges may need to be reconsidered after these findings.

# DIGITAL ANALYSIS OF KINEMATICS AND EMG DURING THE MASTICATORY CYCLE

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**Aim:** this study wants to describe the interaction between mandibular kinematics and surface electromyographic activity within a group of healthy subjects.
**Methods:** 22 dental students aged 25±2.88 years, including 11 females and 11 males, attending Vita-Salute San Raffaele University in Milan, Italy, were enrolled in the study. The masticatory cycle was analyzed using the sEMG BTS TMJOINT device to detect the electrical activity, activation sequence, and coordination of the masticatory muscles and the ModJaw® to record the mandibular movements. The protrusion and lateral movements were also recorded in order to calculate condylar slopes and Bennet angles. Using descriptive and inferential statistics, the obtained parameters were then analyzed.
**Results:** a positive correlation has been observed between the vertical amplitude of the opening path and the work produced by the masseter muscle, both on the right and left sides. The person correlation coefficient (-0,42) obtained in this study indicates a moderate negative correlation between the values of the masticatory symmetry index (SMI%) from sEMG and the percentage value of AngR/AngLx100 calculated from the jaw motion trajectory angles during unilateral chewing.
**Conclusions:** perhaps, thanks to the combination of electromyography and kinematic data resulting in a complete view of the patient's muscle-motor connections, clinicians are given the possibility to offer personalized treatment plans while deepening their knowledge on temporomandibular disorders.

# BULLYING AND SELF-ESTEEM AND RELATIONSHIP WITH PERCEIVED ORAL HEALTH IN ADOLESCENTS

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**Aim:** to assess the prevalence of bullying victims in middle schools and to investigate the potential correlation between self-reported bullying, perceived oral health, self-esteem, and psychological distress.
**Methods:** a self-administered questionnaire was distributed to students at lower secondary schools in Tuscany, aged between 10 and 15 years. The anonymous questionnaire comprised assessment of bullying victimization (Florence Bullying and Cyberbullying Scale); self-esteem evaluation (Rosenberg scale-RSE); perception of oral and occlusal health (CPQ11-14 16 ISF) and a scale for psychological distress (Strengths and Difficulties Questionnaire- SDQ). Relationships between variables were further analyzed using Fisher Exact Test, logistic regression, ANOVA test, linear regression, and multivariate linear regression.
**Results:** the study included 437 participants. 53% reported having suffered bullying and 39% claimed to have taken part in bullying episodes. The CPQ 11-14 in the "Social Well-being" (SW) component was significant both for "low self-esteem" (RSE) and for the "high total difficulty" (SDQ). The CPQ 11-14, in the "Oral Symptoms" (OS) and "Emotional Well-being" (EW) component, was significant for the "victimization", while only EW was significant for the "bullying"; the SW component was significant for the "cybervictimization", while the SW component for the "cyberbullying". The four most implicated dentofacial characteristics were tooth color or shape, orthodontic appliance wear, protruding incisors, and spacings or missing teeth.
**Conclusions:** significant correlations between perceived oral health and low self-esteem, and between psychological distress and bullying/cyberbullying were found. Additionally, a considerable number of students face bullying because of their dentofacial characteristics.

# CLEAR ALIGNER TREATMENT FROM A PATIENT'S PERSPECTIVE: AN INSTAGRAM CONTENT ANALYSIS

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**Aim:** improving treatment satisfaction requires an accurate understanding of the patient's issues and viewpoints. To better understand the patient's experience, the present study aimed to qualitatively report the content of Instagram posts linked to Clear Aligner Therapy (CAT).

**Methods:** Awario™, a custom social media monitoring technology, accessible posts on Instagram were prospectively collected over four weeks. Three investigators selected 1800 posts based on the inclusion/exclusion criteria and categorized them based on content and timing.

**Results:** the majority of pre-treatment posts were encouraging and highlighted the goals of the patients. The results of this analysis indicate that the use of CAT, particularly during the pre-treatment period, is associated with high expectations for patients.

**Conclusions:** understanding the patients' perspectives can assist orthodontists treating patients with CAT in effectively anticipating and communicating issues that may arise during treatment *i.e.*, pain, compliance, speech adaptation, and understanding of appliance limitations. This communication before and during treatment may potentially enhance patient satisfaction.

# SOUTHERN ITALY: ORTHODONTICS & SLEEP-DISORDERED BREATHING RISK

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**Aim:** prolonged upper airway blockage during sleep is a characteristic of Sleep-Related Breathing Disorders (SRBD). The current study set out to determine the frequency of SRBD in the pediatric orthodontic cohort that was representative of the community in Southern Italy. It also sought to determine the type of malocclusion that was most common in subjects who were at risk of developing SRBD.

**Methods:** 364 children between the ages of 7 and 14 who were referred to the University of Catania's Department of Orthodontics and Pediatric Dentistry for orthodontic treatment made up the study sample. A translated and validated Pediatric Sleep Questionnaire was given to parents to fill out. Data defining the sagittal and vertical skeletal growth pattern were acquired, and they were statistically examined together with the cephalometric parameters.

**Results:** 9,89% of the children in the sample as a whole were at high risk for SRBD. The probability of getting SRBD was higher in younger children (7-11 years old) compared to older children (11-14 years old) (13,74% *vs* 7,76%). Compared to girls, boys had a notably increased risk of SRBD, especially when they were younger. There were no distinguishing questions for a child deemed to be at high risk of SRBD.

**Conclusions:** according to the current research, it is critical to screen young orthodontic patients for SRBD and to refer high-risk individuals for further evaluation and therapy from their healthcare professionals.

# MASTICATORY MUSCLES RESPONSE TO ORTHODONTIC TREATMENT: A PROSPECTIVE CONTROLLED STUDY

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**Aim:** Temporomandibular Disorders (TMD) are a multifactorial biopsychosocial condition affecting 5 to 12% of individuals worldwide. Due to the lack of well conducted studies in modern literature, the influence of Orthodontic Treatment (OT) on TMD and on the masticatory muscles activity is still unclear. The purpose of this study is to evaluate the effects of OT on the surface Electromyography (sEMG) and Pressure Pain Thresholds (PPT) of masticatory muscles and on the prevalence of TMD.

**Methods:** the study recruited 7 patients seeking OT and 7 paired control subjects. Patients were evaluated before the start of multibracket OT ($T_0$), after two weeks ($T_1$) and after 1 month ($T_2$). The study involved the following evaluations at each time point: the assessment of TMD through the DC/TMD protocol (Axis I and Axis II); the measurement of PPT of head and neck muscles using a Fisher Algometer; a 24-hours analysis of the activity of the left masseter muscle through a portable sEMG device (dia-BRUXO, BiotechNovations S.r.l).

**Results:** no significant differences emerged between the groups at each time point and among time points in each group concerning TMD prevalence, PPT measurements, the sEMG values and the Oral Behaviour Checklist (OBC) questionnaire. The test group showed higher Jaw Functional Limitation Scale (JFLS-20) at $T_2$ than controls (P = 0,025), but not in other time points. No differences in JFLS-20 score were found among time points in each group.

**Conclusions:** according to the present data, the influence of OT on TMD, PPT and sEMG of the masticatory muscles is negligible.

# USE OF TADS IN INTRUSIVE MECHANICS

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**Aim:** this study aims to compare the advantages of intrusive mechanics using mini-screws *versus* traditional methods.

**Methods:** fifty patients, from 12 to 54 years old, requiring intrusion of lower or upper incisors by 3 to 7 mm, were examined. They were randomly divided into two groups: 25 treated with a utility arch, 25 treated with a continuous arch connected to a TAD for intrusion. All mini-screws were of 8 mm length and belonged to a single type. The mini-screw was positioned 4-5 mm below the gingival margin between central incisors. The head of the TAD served as a reference point to assess intrusion speed over the 4-month examination period.

**Results:** utility arch treatment yielded an average intrusion speed of 0.9 mm/month. In 8/25 cases the intrusion objective was not achieved, molar dislocation with distal tipping was observed in all cases. Mini-screw treatment resulted in an average intrusion speed of 1.3 mm/month, all patients achieving the intrusive objective. Two cases experienced mini-screw loss and 7 patients exhibited inflammatory reaction around the mini-screw head.

**Discussion:** the use of TADs offers advantages over traditional methods, reducing treatment duration and number of visits. Even in cases of TAD loss, intrusion speed was unaffected. Patients well tolerated mini-screws.

**Conclusions:** intrusion using mini-screw technique was proved faster and more reliable, mitigating common side effects. TADs provide reliable anchorage in various clinical scenarios, offering a reproducible procedure.

# STUDY ON THE EFFICACY OF CANNABIDIOL *VERSUS* STANDARD OF CARE IN MYOFASCIAL PAIN DISORDERS

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**Aim:** this is an observational, prospective, monocentric study lasting 16 months, to evaluate the effectiveness and safety of CBD Oil compared to standard of care for dysfunctional temporomandibular joint pain syndromes with myofascial component.

**Methods:** many systematic reviews confirm how the use of THC and CBD can be valid therapeutic aids for conditions including neuropathic pain. Temporomandibular joint disorders, such as myofascial syndromes, are often associated with psychological issues. Excessive stress leads to parafunctional activation of the masticatory muscles, resulting in painful phenomena. For the study, patients diagnosed with temporomandibular joint pain-dysfunction syndrome with myofascial component will be recruited and randomized into 2 study arms in a 1:1 ratio. The first arm will undergo Standard of Care treatment, and the second will undergo treatment with CBD Oil. Clinical follow-up is scheduled at 1, 2, and 3 months with active therapy or standard of care and an additional check at 6 months, after interrupting therapy for 3 months. At each visit, a general and gnathological objective examination will be performed, and pain progression will be evaluated using questionnaires.

**Conclusions:** test scores, including VAS scale, will be evaluated to assess pain over time, and patients will undergo a clinical visit to evaluate any limitations of mandibular functionality. Additionally, the onset of any adverse reactions to CBD oil will be analyzed.

# DENTOSKELETAL EFFECTS PRODUCED BY A CLASS II PROTOCOL WITH CLEAR ALIGNERS

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**Aim:** to evaluate the dentoskeletal changes produced by a clear aligner protocol in adolescent patients with Class II malocclusion.

**Methods:** the treated group comprised 31 consecutively treated adolescent patients (mean age 13.0±1.1 years), 18 females and 13 males. The patients in the treated group were compared with a control group of 24 subjects with untreated Class II malocclusion. The control group was selected from the AAOF Craniofacial Growth Legacy Collection. Cephalometric analysis was performed on cephalograms taken at T1 (pre-treatment) and T2 (post-treatment). ANalysis of COVAriance (ANCOVA) was performed to compare the T2-T1 changes between the two groups.

**Results:** a statistically significant reduction in the ANB° angle in the treated group (-1.3°; p= <0.001) was recorded while no statistically significant differences were found for the vertical skeletal variables. Regarding other variables using Pancherz's analysis, in the treated group overjet was significantly reduced (-3.0 mm; p = <0.001) and molar relationship improved significantly (+4.2 mm; p = <0.001). There was no statistically significant difference in the sagittal position of the lower incisors, while upper incisors showed more distalization in the treated group (-1.8 mm, p = <0.001). Lower first molars showed a significantly greater mesialization in the treated group (+1.9 mm, p = <0.001). No statistically significant differences were found in the sagittal position of the upper first molar.

**Conclusions:** treatment of Class II malocclusion with clear aligners and intermaxillary elastics improved sagittal skeletal discrepancies and molar relationship in adolescent patients. Clear aligners produced a good control of both lower incisors and vertical skeletal relationships.

# DOES MINISCREW-ASSISTED RAPID PALATAL EXPANSION INFLUENCE UPPER AIRWAY IN ADULT PATIENTS?

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**Objective:** this scoping review evaluates the effects of Miniscrew-Assisted Rapid Palatal Expansion (MARPE) on different regions of the upper airway in adult patients and investigates various methods of measurement.

**Methods:** the Search encompassed PubMed, Cochrane Library, Scopus and Web of Science. The review was conducted following the PRISMA_ScR guidelines and the inclusion criteria for examined studies were chosen in accordance with the PICOS framework.

**Results:** seven studies were included in this review, comprising four retrospective studies, one prospective and two case reports. All studies involved the use of Cone Beam Computed Tomografy (CBCT) for measurements of the areas of interest. The percentage of increase in the volume of the nasal cavity varied between 31% to 9.9%, depending on the study. Volumetric variations of in the nasopharynx were reported as increase between $T_0$ (before expansion) and $T_1$ (immediately after expansion) of 6.4%, 20.7% and 14.1%. All studies considered $T_0$ before expansion and $T_1$ immediately after expansion. Only one study evaluated remote follow-up to assess if the results were maintained after one year.

**Conclusions:** MARPE appears to lead to a statistically significant increase in upper airway, especially in nasal cavity and nasopharynx immediate after expansion. However, higher prospective and retrospective trails with long term controls are required to verify the effects of MARPE on upper airway.

# RATIONALIZATION OF RADIOGRAPHIC EXAMINATION IN ORTHODONTICS

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**Aim:** this study aims to quantify the effective dose of radiation a patient undergoes during an orthodontic treatment, from the simplest to the most complex, and identify potential standardized flow charts that improve treatments, while minimizing the patient's radiation dose.

**Methods:** a literature search was conducted, and an analysis of the data obtained from 120 articles of the scientific literature review was executed. A hypothetical clinical protocol was constructed in a flowchart format; for each one was estimated the effective range of radiogenic dose that an individual patient undergoes during orthodontic treatment and then the indications were provided regarding which radiological exams could be omitted and when.

**Results:** in the most common clinical practice, despite the low radiogenic dose of the exams, there is extensive usage of radiographs that could be avoided because not strictly necessary for the treatment. Especially in young patients, the most frequently treated subjects, it is essential to reduce exposure because they are 15 times more sensitive than adults. The most susceptible organs are the salivary glands, currently not protectable, the thyroid and the crystalline lens; the dose absorbed is respectively of 3044,3±1808,1 μGy, 94.7±29,2 μGy and 87,4±3,3 μGy.

**Conclusions:** more than 35% of x-rays prescribed for orthodontic purposes were found avoidable in order to reduce risks of stochastic lesions: Orthopantomography at the end of expansion, Lateral Teleradiography at the end of the treatment and CBCTs in the cases not strictly necessary.

# BIOACTIVE BIOMATERIALS ON ORTHODONTIC TOOTH MOVEMENT: A LITERATURE REVIEW

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**Aim:** the aims of this review were to observe if human Bioactive Biomaterials (BB) can accelerate Orthodontic Tooth Movement (OTM) and highlight possible adverse effects in patients after administration.

**Methods:** the research was conducted by using the PubMed database. Keywords used are: "tooth movement" AND "Prostaglandins" OR "Relaxin" OR "Vitamin D" OR "Vitamin C" OR "PRF". This systematic review followed the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) checklist.

**Results:** the research strategy resulted in 270 studies. All studies highlight the effect of BB on OTM acceleration. Vitamin C and prostaglandin E1 improve the quality and result of orthodontic treatment. According to Yussif, Vitamin C deficiency can reduce OTM and stop osteogenesis. The effects of Vitamin D on the OTM are variable. Dreizen et al. claim that Vitamin D modulates bone metabolism, so the effects on the OTM depend on the concentration administered. According to Yamasaki, Relaxin has no significant effect on the OTM. Local management of plasma derivatives has also been confirmed to accelerate the OTM. According to Erdur, PRF in injectable form showed positive effects.

**Conclusions:** BB in addition to fixed therapy may have positive effects on the speed of OTM have not found adverse effects but on the contrary an improvement in bone regeneration or a maintenance of the integrity of the tooth and tissues adjacent to the BB application site.

# GLOBAL TRENDS IN DENTAL AGENESIS OVER THE LAST 20 YEARS: A BIBLIOMETRIC ANALYSIS

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**Aim:** dental agenesis has a great clinical significance due to its frequency during daily practice and the therapeutic problems that can arise from it. The aim of this study was to perform a bibliometric and visualized analysis to identify the research trend on dental agenesis over the last 20 years.

**Methods:** articles on dental agenesis published in the period 2004-2024 were acquired from Scopus (Elsevier) database. The VOSviewer application was applied to perform a network analysis of keywords. Excel was applied to perform analysis of institutions and countries.

**Results:** the search identified a total of 356 articles. The scientific literature on dental agenesis has seen a significant increase over the last ten years. Globally, Brazil (62) produced the most articles on dental agenesis, followed by Italy (47) and the United States (29). University of São Paulo was the institution with the highest number of products (16 articles), followed by Padova University (9 articles). A total of 1795 keywords were gathered from the article list, keywords reflect the trend of the studies and could be grouped into statistical incidence, etiology, clinical characteristics, malocclusion and treatment.

**Conclusions:** the general status and trends of the literature on dental agenesis from a bibliometric point of view can offer a guide for researchers and clinicians on the topic.

# ARE MINISCREWS USEFUL? A LITERATURE REVIEW OF THEIR CLINICAL IMPLICATION AND SIDE EFFECTS

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**Aim:** the increased performance of skeletal anchorage has led to an increased use of TADs. The aim of this review was to evaluate benefits and risk of the mini-screw (MIs) in orthodontic treatments.

**Methods:** a survey of articles published up to February 2024 investigating the use of TADs in orthodontic treatment and their complications was performed, using 2 electronic databases. Systematic review, Narrative Review and RCT associated with the use of orthodontic MIs were included.

**Results:** the results showed a success rate of 93.87% in treatment of transverse maxillary deficiency with MARPE and a significantly skeletal expansion at the level of the nasal cavity when compared to RME. The use of direct anchorage by MIs to move the PICs (Palatally Included Canines) away from the adjacent teeth roots lead to a reduction in root resorption and shorter treatment time. TADs are also successfully used in intrusion with a range from 2.1 to 4.5 mm in the posterior teeth and 0.62 mm in the anterior teeth, using respectively a force between 100-500 g, and 30-250 g. No statistically significant effect in gummy smile correction and in class II treatment when used in BMSAD (Bi-Maxillary Skeletal Anchorange Device). However biological or mechanical complications are reported: root injury that can lead to vitality loss; lesion of mucosa around the MIs; perforation of nasal or sinus membrane and MIs fracture.

**Conclusions:** MIs showed a wild field of application with a good clinical performance; however, side effects are reported in literature thus trained clinicians are required to avoid complications.

# AESTHETIC ANALYSIS OF SOFT AND SKELETAL TISSUES IN DIFFERENT GENRES USING CEPHALOMETRY

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**Aim:** the aim of this study is to evaluate the characteristics of soft and skeletal tissues in female and male subjects with different skeletal malocclusions, using the analysis of data in literature.

**Methods:** the research has been conducted on the following databases: PubMed, Cochrane and Google Scholar. Keywords used were: facial soft tissue, cephalometry, malocclusion. The research produced 42 studies. Studies involving patients with history of trauma, craniofacial anomalies and previous orthodontic or orthognathic surgical treatment were excluded. Only 4 articles met the inclusion criteria.

**Results:** different results have been obtained in relation to malocclusions and genres. Male patients with a class I dentoskeletal relationship showed a thicker FSTT; the most significant thickness was observed in the areas of the upper/lower lip. Female patients in Class II Division 1 were characterized by thicker facial soft tissues of the mentolabial sulcus and chin. The studies show different conclusions on facial soft tissue thickness for Class II Division 2 patients. Men and women with a Class III maxillary skeletal relationship showed no significant differences in their FSTT.

**Conclusions:** these observations of significant changes in facial structures between males and females
should be of great help for the evaluation of orthodontic cases. However, given the discordant results obtained, it is necessary to carry out more studies to obtain more homogeneous clinical results.

# OSAS: REASONED FLOW CHART FOR AN EFFICIENT PATIENT PATHWAY IN THE PUBLIC HEALTHCARE SYSTEM

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**Aim:** the present study aims to propose an integrated and predictable model to improve early diagnosis and multidisciplinary approach management of OSA. Flowcharts have been defined to protocol the diagnostic process, the role and timing of each specialist and the choice of the appropriate treatment plan.

**Methods:** the management methods of OSA available in literature were analyzed, focusing on the identification of patient needs and actual treatment protocols weaknesses. A diagnostic and therapeutical workflow was defined considering hospital resources and efficient management.

**Results:** the multidisciplinary team of specialists at the first office visit included ENT, orthodontist, pneumologist and maxillofacial surgeon. As needed, patients were secondarily sent to cardiologist, nutritionist, psychologist, bariatric surgeon or neurologist. Pediatric OSA patients are more likely to be identified by the pediatrician, dentist or ENT. The pathway included identification of high risk patients, in-depth diagnosis, planning of the most appropriate treatment for each specific case and long-term follow up. A total of two accesses per patient at the OSA office is necessary to define the treatment plan.

**Conclusions:** the synergy among specialists and the timely approach significantly improves early diagnosis, rationalizing patient access to care and the choice of the therapy strategy. Developing a diagnostic and therapeutic path allows to timely and more accurately define the treatment plan for the OSA patient, with consequent benefits in terms of patient life quality and healthcare resource efficiency.

# CLEAR ALIGNERS: A NETWORK AND BIBLIOMETRIC ANALYSIS OF THE 50 PIVOTAL

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**Aim:** to list the top 50 papers on Clear Aligner (CA), evaluate them critically, and apply bibliometric analysis to investigate the achievements and prospects of this field of study.

**Methods:** a computerized database search (Scopus) was conducted on September 24, 2023, to find publications about CA published in the scientific literature between 2013 and 2023. The top 50 cited manuscripts were chosen. Author-based characteristics were obtained from the Scopus database. The data set from Clarivate Analytics' Incites Journal Citation Reports was used to determine parameters based on journals and articles. To improve the visual analysis, the keywords were collected systematically from the chosen articles.

**Results:** the database search produced a directory of the 50 most cited articles out of a total of 1,405 papers. Of the 50 most frequently cited works on CA, 35 (70.0%) were original research studies and 15 (30.0%) were reviews. The biggest node was determined to be the removable orthodontic appliance, as the keyword-network analysis indicated.

**Conclusions:** this bibliometric study's results indicated that CAT-related papers were receiving increasing numbers of citations. The goal of this study is to determine the most influential articles by highlighting the authors, journals, and issues treated.

# AESTHETIC PERCEPTION BETWEEN ASIAN AND CAUCASIAN ETHNICITY

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**Aim:** the purpose of this review is to highlight the comparison between Asian and Caucasian ethnicity. The mass media try to focus our attention to Asian aesthetic trends even though Caucasian are still linked their own model. Nowadays, the trend undoubtedly leans towards Asian model, reflecting a global appreciation for their beauty standards.

**Methods:** the search was carried out on the main electronic databases (such as PubMed, Scopus, and Medline), selecting the articles from 2022 to today. The keywords used were:"korean and caucasian beauty standards" and "facial proportion canons" and "aesthetic preference". A total of 3 articles have been selected for this review.

**Results:** the data showed a growing appreciation of Asian facial beauty standards in Western societies: professionals claim that both Caucasian and Asian patients, between the age 18-40 years, consider in their own concept of beauty many common features such as face shape, nose morphology,"v-shaped" jawline,full but not prominent lips.

**Conclusions:** this review shows how there is no doubt that various genetic differences exist between Caucasian and East Asian populations.

While Asian have a small, delicate, and less robust appearance face, Caucasian women are born with angulated mandible and protruding cheeks.

However, aesthetic preferences is changing due to mass media influence. In fact, the media itself shows how the Asian model plays the main role in the concept of beauty, to which Caucasian tend to aspire more and more in our future.

# EFFECTIVENESS OF DIFFERENT MANDIBULAR ADVANCEMENTS IN OSA PATIENTS: A SYSTEMATIC REVIEW

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**Aim:** Mandibular Advancement Devices (MADs) are a valuable therapeutic approach for Obstructive Sleep Apnea (OSA). There is no evidence regarding the most effective mandibular advancement; therefore, the aim of this systematic review with meta-regression analysis was to investigate the effectiveness of different mandibular protrusion amounts in reducing Apnea-Hypopnea Index (AHI) in OSA patients.

**Methods:** an electronic search was conducted across MEDLINE, Cochrane Database, Scopus and LILACS to select Randomized Controlled Trials (RCTs) and cohort studies investigating the efficacy of MADs in reducing AHI in adult OSA patients. The risk of bias was evaluated using the Cochrane Collaboration's tool for assessing risk of bias in randomized trial (RoB 2.0) and the Risk of Bias In Non-randomized Studies of Intervention tool (ROBINS-I). The quality of evidence was evaluated using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology. The success rate of each study was computed: [(mean AHI at baseline-mean AHI after treatment)/mean AHI at baseline].

**Results:** 15 RCTs and 10 cohort studies were included. Meta-regression analysis revealed that higher protrusion amounts do not significantly affect the success rate (for mild-moderate OSA Q = 2.125, p = 0.144; for severe OSA Q = 0.001 p = 0.968). The quality of evidence was rated as low to very low.

**Conclusions:** the results suggest that the success of MAD may not be determined only by the amount of mandibular protrusion but by a combination of variables that need to be further investigated.

# CONDYLAR HYPERPLASIA: SYSTEMATIC REVIEW OF THE LITERATURE ON TREATMENT OPTIONS AND TIMING

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**Aim:** there is some controversy as to the ideal treatment option and time to treat Condylar Hyperplasia (CH). The present review article describes the various surgical protocols proposed to date in literature and their timing.

**Methods:** the search was conducted following the Prisma statement on PubMed, Cochrane and Scopus with "Condylar Hyperplasia AND treatment AND timing" as keywords without time restrictions. Of 12 articles, 4 were duplicates, 1 was eliminated because it did not concern CH, and the others were included in the review.

**Results:** the strategy depends on growth activity (assessed by a SPECT scan and the patient's age. High partial condilectomy is the elective treatment of active condylar hyperplasia in adults and it is even more advisable in immature patients. In younger patients, the aims are to prevent progression of deformities and to restore facial symmetry and occlusion spontaneously, if performed early. It is not recommended to wait for the end of growth because compensatory changes can compromise surgical optimal outcomes. In adults, conventional orthognathic surgery alone is not adequate in active condylar hyperplasia. Condylectomy and simultaneous orthognathic surgery have predictable and stable results in terms of facial symmetry and unimpaired joint. If necessary, post-surgical orthodontic treatment is indicated however it is vital to confirm that growth has halted before it begins.

**Conclusions:** the timing and type of operative correction is aided using scintigraphy and CBCT. However, additional research is needed to establish a more standardized approach and longer follow up studies most be completed to determine the most successful treatment options.

# A SYSTEMATIC REVIEW ON THE PREDICTABILITY OF DENTAL DISTALIZATION USING ALIGNERS

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**Aim:** this review's objective is to assess the scientific data on how well Clear Aligner therapy (CA) works to regulate orthodontic movement during tooth distalization.

**Methods:** using the Boolean operator "AND," the search phrases "orthodontia aligners" and "distalization" were entered into the Scopus, Web of Science, and PubMed databases. Out of the 146 investigations that have been conducted over the past 10 years of research, 19 papers were chosen for this review. Distalization is an orthodontic treatment strategy that moves the posterior teeth in the upper or lower dental arch in a distal direction. In the second dental or skeletal classes with increased overjet, this movement is required as part of the treatment plan to prevent extractions in the upper arch; in the third classes, it is necessary to address orthodontic issues such crowding and misalignment of molars in the lower arch.

**Results:** when invisible masks are worn exclusively, distalization movement is conceivable, but there is a high chance of losing anchoring in the anterior sectors. The employment of skeletal Anchoring Devices (TAD) and Interproximal enamel Reduction (IPR), which enable compensation to lessen the initial overjet, can assure the stability of the results and reduce undesired effects. With orthodontics, this hybrid method has shown the highest degree of success.

**Conclusions:** using Clear Aligners (CA), that represents a young orthodontic technique a rapidly developing method, this systematic review offers a critical evidence-based assessment of the predictability of distalization.

# CLEAR ALIGNERS IN THE GROWING PATIENT: A SYSTEMATIC REVIEW

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**Introduction:** mixed dentition represents a crucial developmental stage in pediatric oral health, characterized by the coexistence of primary and permanent teeth. This article proposes a comprehensive systematic review to evaluate the utilization of aligners as an innovative approach in managing mixed dentition. The primary objective is to investigate the efficacy, safety, and acceptability of aligner therapy in this evolving age group.

**Methods:** the systematic review will focus on randomized controlled trials, cohorts, and observational studies examining the use of aligners in patients with mixed dentition. Clinical, radiographic, and psychosocial parameters will be analyzed to assess the overall impact of aligner therapy during this critical phase of dental development. Data will be meticulously extracted and synthesized to provide a comprehensive overview of the potential of aligners in pediatric orthodontics.

**Results:** expected outcomes aim to delineate practical guidelines and targeted therapeutic strategies for orthodontists involved in managing mixed dentition. Through an in-depth analysis of available data, this review seeks to identify gaps in current research and propose future directions for investigating the efficacy of transparent aligners in patients with mixed dentition.

**Conclusions:** in conclusion, this systematic review aims to contribute to the ongoing evolution of evidence-based orthodontic practices by providing valuable insights into the application of aligners in the management of mixed dentition. By synthesizing existing evidence and identifying areas for further research, this review seeks to enhance our understanding of the potential benefits and limitations of aligner therapy in pediatric orthodontics.

# BILATERAL CORONOID PROCESS HYPERPLASIA IN PEDIATRIC PATIENTS: A REVIEW OF ITS MANAGEMENT

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**Aim:** this bibliographic review of literature aims to investigate the etiology, the diagnosis and the management of pediatric patients with hyperplasia of coronoid process.

**Methods:** the following databases were scouted: PubMed, Scopus, Cochrane, Library. The research was carried out using the following terms: ("bilateral coronoid hyperplasia" OR "coronoid process") AND ("temporomandibular joint ankylosis") AND ("treatment for coronoid hyperplasia").

**Results:** literature proved the multifactorial nature of coronoid process hyperplasia; particularly this problem can be ascribed to: an excessive activity of the temporalis muscle, disorders of endocrine system, temporomandibular alterations, physical injuries, persistence of an active growth center of the coronoid region and, in a small number of patients, a genetic predisposition. Symptoms reported by patients are: a restricted mobility of the jaw, specifically limited protrusion or lateral movements, and muscle dystonia. Additional X-rays, together with panoramic and teleradiography, can be prescribed, like CT (Computer Tomography) scans and MRI (Magnetic Resonance Imaging), in order to obtain a more detailed diagnosis.

**Conclusions:** coronoid process hyperplasia interferes with pediatric patients' growth and development.

Therefore, via an early diagnosis and treatment the multifunctional oral and jaw capabilities can be restored.

# TREATMENT OF EXTRUSIVE AND LATERAL LUXATIONS ON YOUNG ADOLESCENTS: A LITERATURE REVIEW

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**Aim:** tooth luxation comprising the 18-33% of all trauma in permanent dentition, often leads to severe damage to pulp and supporting tissues; defined as the displacement of the tooth from its position in the socket as a result of acute trauma, can occur in three directions: intrusive, extrusive and lateral.Aim of the present review is to evaluate protocols of orthodontic repositioning as treatment for luxated teeth and to assess most common complications following extrusive or lateral luxation trauma.

**Methods:** the research was conducted from November 2023 to March 2024, by two independent reviewers with a K-Cohen of 0.70, based on PRISMA and PICO protocols. The screening was performed using various databases such as PubMed, Medline, Scopus and Web of Science, using proper keywords and criteria.

**Results:** the first screening of literature led to 716 relevant articles; 22 were assessed for eligibility after the application of inclusion and exclusion criteria; leading to a total of 9 final articles for the purpose of the review. Manual and surgical reposition represent the gold standard as acute treatment, whereas orthodontic repositioning could be used as an alternative choice for subacute or delayed treatment. Luxation trauma could lead to various pulp responses in OA a CA, such as PN, PCO and physiological healing.

**Conclusions:** orthodontic repositioning could be considered a viable alternative to manual and surgical repositioning; Among pulpar responses: PN was the most frequent outcome in closed apex teeth in both traumas type, meanwhile PCO was common in open apex teeth.

# EVALUATION OF SIDE EFFECTS OF RME TECHNIQUES IN ADULTS: MARPE *VS* SARPE. A SCOPING REVIEW

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**Aim:** the aim of the study is to investigate the side effects of rapid maxillary expansion techniques (MARPE or SARPE) in adult patients in order to guide the choice of the best cost-effective clinical treatment plan.

**Methods:** this protocol was drafted using the Preferred Reporting Items for Systematic Reviews and Meta-analysis Protocols (PRISMA). The eligibility criteria were determined according to the study goals. The research team developed a PICO question to find relevant studies in bibliography. Three databases were investigated: PubMed, Scopus and Cochrane Library. The studies were divided into two groups according to the expansion technique performed.

**Results:** the computer-assisted search identified 270 articles from PubMed (n = 117), Scopus (n = 112) and Cochrane (n = 41) databases. At least, 19 studies fully met the inclusion criteria and were included in the scoping review. Among the included studies, 8 were retrospective studies, 7 were prospective studies, 2 were randomize clinical trial and 2 were case series. SARPE was evaluated in 13 studies, MARPE in 5 studies and both techniques in 1 study. The side effects reported in the studies were synthesized and divided in 4 categories: dentoalveolar, surgical, asymmetric expansion and appliance-related issues.

**Conclusions:** according to the obtained results, both techniques are not risk free. SARPE is mainly related to surgical complications, while MARPE to dentoalveolar ones. For this reason, careful patient selection and treatment planning is essential to minimize the side effects of maxillary expansion in adult patients.

# CLEAR ALIGNERS IN DENTOALVEOLAR EXPANSION: A SYSTEMATIC REVIEW

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**Aim:** clear aligners are currently considered an innovative alternative to traditional fixed multibrackets. As a treatment method based on a production model, it is important to evaluate the predictability and effectiveness of movements made through this type of therapy, in fact this is the aim of this literature review.

**Methods:** an electronic search was conducted on the PubMed database using keywords such as "clear aligners", "expansion", and "Invisalign". 130 articles were identified and following the use of specific inclusion and exclusion criteria, 6 of these were considered suitable for the following analysis. Then, a qualitative analysis was performed by assigning a score to each based on various parameters, and the quality level of the studies was found to be moderate to low.

**Results:** the articles examined consider pre-treatment, planned treatment, and post-treatment. Regarding effectiveness, most studies have shown an increase in all measured interdental distances, with maximum expansion at the premolar level and minimum in the anterior and posterior regions. In terms of predictability, significant differences were found between post-treatment models and Clinchecks, making it generally weak, although in some studies there is an exception regarding the upper molars.

When planning arch expansion with Clear aligners it may be necessary to consider overcorrection of the programming, because the Clincheck software tends to overestimate dental movement compared to the actual clinical result.

**Conclusions:** in conclusion, even though the low predictability, following overcorrection, treatment of these patients appears to have good therapeutic efficacy.

# EVALUATION OF CHANGES IN SALIVARY FLOW AND PH DURING FIXED ORTHODONTIC THERAPY

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**Objective:** fixed orthodontic treatment plays a pivotal role in restoring occlusal function and enhancing smile aesthetics. However, the placement of fixed appliances within the oral cavity can introduce changes in the oral environment. One aspect involves alterations in salivary composition, particularly in terms of pH and flow rates. Saliva is crucial in maintaining oral health by contributing to enamel remineralization and defense against oral pathogens. This review aims to assess qualitative and quantitative alterations in saliva during fixed orthodontic treatment.

**Methods:** a literature search was conducted on PubMed using predefined MeSH keywords: "fixed orthodontic treatment" OR "dental brackets" OR "fixed orthodontics" AND "saliva" OR "salivation" OR "salivary pH".

**Results:** nine clinical studies were selected, which revealed conflicting results. These results were observed at various intervals from the start of fixed orthodontic therapy.

**Conclusions:** in summary, changes in pH and salivary production during fixed orthodontic treatment have been suggested, predominantly showing decrease or no modification in pH values and an increase in salivary flow. However, further studies are required to fully comprehend the extent of these alterations, particularly regarding the timing of saliva sampling.

# USE OF ARTIFICIAL INTELLIGENCE AS DIAGNOSTIC SUPPORT IN OSAS PATIENTS: SCOOPING REVIEW

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**Aim:** Obstructive Sleep Apnea Syndrome (OSAS) is a common disorder with a prevalence of 5 to 14 percent among adults aged 30 to 70 years. The gold standard for the diagnosis of OSAS is polysomnography. The use of Artificial Intelligence (AI) in the diagnosis of OSAS has shown promising developments. The purpose is to evaluate the accuracy of current AI models used in the diagnosis and management of OSAS by reviewing the scientific literature to identify the models used.

**Methods:** this work was conducted according to the SR method that refers to the framework developed by Arksey and O'Malley consisting of six steps: identification of the research question and relevant studies, selection of studies, data analysis, report collection of results, and the optional consultation exercise. A survey of articles published up to January 2024 about the use of AI models used in the diagnosis of OSAS posing as an alternative to Polysomnography was conducted. The databases used in the research are: PubMed, Ovid, Web of Science, and Google Scholar. 1,100 potentially relevant articles were identified based on the keywords: Osas, Apnea Syndrome, Sleep Respiratory Disorder, AI, Artificial Intelligence, Machine Learning, Deep Learning, Neuronal Networks. A total of 97 studies were selected based on title and abstract, and then the full text was analyzed. Finally, data were collected from 83 articles.

**Results and conclusions:** this scooping review is the first in the literature to provide a description of AI models for OSAS diagnosis by reporting the degree of accuracy of each model used. It aims to be an accessible multidisciplinary guide for medical and bioengineering researchers who desire new AI models.

# INFLUENCE OF MALOCCLUSION ON ATHLETIC PERFORMANCE

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**Aim:** the aim of this review is to assess the impact of malocclusion on the physical and physiological capabilities of patients participating in athletic competitions. Malocclusion affects posture, the spatial position of the spinal column, body balance, and the eccentric strength of postural muscles.

**Methods:** the research was conducted on the main electronic databases (PubMed, Scopus, Medline). The keywords used were "occlusion and posture", "sport and malocclusions", "orthodontics and sports performance". For this review, 20 articles from 2021 were selected.

**Results:** studies have shown that proper occlusion increases muscle strength even in areas distant from the oral cavity and that wearing a rigid stabilization splint (HSS) can improve postural balance, thereby preventing injuries and improving performance, leading to very satisfactory results. It has been demonstrated that heart rate, useful for controlling training load, monitoring recovery kinetics, and assessing athletes' training conditions, tends to increase in subjects with malocclusion.

**Conclusions:** this review highlights the importance of greater awareness of athletes' oral health, ensuring, through orthodontic treatment, better results during competitions, injury prevention, and improvement in muscle strength. In conclusion, a healthy mouth is important for sporting success.

# ETIOLOGY AND MANAGEMENT OF A RARE CHALLENGING CONDITION: PRIMARY FAILURE OF ERUPTION

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**Aim:** Primary Failure of Eruption (PFE) is a poorly understood condition associated with tooth eruption failure. Although the genetic involvement and some recurrent clinical features, this condition is idiopathic. Therefore, the aim of this literature review is to better evaluate the etiology and summarize current treatment options of PFE.

**Methods:** online searches were conducted on PubMed, Web of Science and Scopus using keywords “primary failure of eruption” and “primary failure of tooth eruption”. Case reports, case series, observational studies, retrospective studies, and review articles published until 2023 and regarding tooth failure of eruption were included. The 492 initially identified articles were screened according to PRISMA protocol. At the end of the process, 37 articles were included and analyzed.

**Results:** diagnosis requires excluding systemic and local conditions. Mutations in PTH1R genes are common, but the exact mechanism of PFE remains unclear.

Most of the following pathognomonic characteristics are reported: posterior teeth are more commonly involved than anterior ones; teeth tend to erupt into initial occlusion and then they block, or they fail to erupt entirely; both primary and permanent molars could be affected; involvement may be unilateral or bilateral and family members are often involved even if the condition can also be isolated.

**Conclusions:** treatment varies depending on clinical condition and age, including prosthetic restoration and surgical interventions. Genetic testing for PTH1R variants is advised to guide orthodontic interventions effectively.

# ORAL HYGIENE IN CLEAR ALIGNERS *VERSUS* FIXED APPLIANCES: A SCOPING REVIEW

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**Aim:** to assess oral hygiene indicators in individuals undergoing orthodontic therapy with Clear Aligners (CA) compared to those with Fixed Appliances (FA).

**Methods:** a scoping review was performed, following the PRISMA- ScR guidelines, in PubMed, Embase, and the Cochrane Library databases from 2004 to 2024. Studies focusing on oral hygiene during treatment with FA or CA were included. Data extraction and quality assessment were independently conducted by two examiners.

**Results:** 54 records were screened, with 9 meeting the inclusion criteria. 2 studies were manually added. Adults undergoing CA presented plaque scores lower than those treated with FA within the first 6 to 12 weeks, while no difference was recorded for inflammation indices. Microbiological parameters (presence of *S. Mutans* and *Lactobacilli*) were pronounced in FA patients but only for the first 3 to 6 months. No evidence of significant difference in oral hygiene levels between CA and FA after long-term active orthodontic treatment were revealed. However, in the short term, the CA group’s oral hygiene parameters scores were better than those in the FA groups.

**Conclusions:** our study finds out no discernible distinctions in oral hygiene levels between CA and FA over the long term. Individuals undergoing CA without supplementary attachments or adjuncts may exhibit marginally improved oral health: it’s essential to note that the certainty of this observation is notably limited, ranging from low to very low. These underscores demand further research to corroborate such findings and elucidate the underlying mechanisms.

# EFFICACY OF ELASTODONTIC DEVICES IN THE CORRECTION OF MALOCCLUSIONS: A SCOPING REVIEW

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**Aim:** this scoping review evaluates the effects of elastodontic devices in the correction of class II and III sagittal malocclusions with altered OVJ in mixed dentition patients.

**Methods:** a web of Science, PubMed/Medline and Scopus search was conducted. This review was conducted following the prisma guidelines and the inclusion criteria for the reviewed studies were chosen in accordance with the pico framework.

**Results:** six studies were included including 4 retrospective studies, 1 retrospective cohort and 1 prospective study with a total of 126 subjects with a mean age of 8.8 years treated with elastomers with a $T_0$-$T_1$ ranging from 12 to 36 months. The clinical protocol involves wearing the devices at night and for two hours during the day. SNB records an increase from 1.3° to 2.7°. ANB records changes from 1.3° to 2.6°. OVJ decreases from 2.1 mm to 3.1 mm.

**Conclusions:** elastodontic devices can treat mild to moderate dentoskeletal malocclusions and dentoalveolar abnormalities in the sagittal, vertical and transverse planes in children and usefully prevent bad habits.

They can successfully alleviate early signs of malocclusion in class II subjects. Further long-term clinical.

# EFFECTS OF LEAF EXPANDER AND RAPID PALATAL EXPANDER ON THE PALATAL SURFACE. COMPARATIVE RCT

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**Aim:** to evaluate palatal surface effects induced by LE and RPE, alongside spontaneous changes in an untreated group.

**Methods:** this randomized clinical trial compared digital models pre- and post-treatment over 12 months in patients receiving tooth-borne Leaf Expander® (LE) and tooth-borne Hyrax-type maxillary expander (RPE) treatments, alongside untreated patients. Analysis included 24 LE patients, 22 RPE patients, and 17 untreated subjects. Digital models were obtained using an intraoral scanner. The palatal surface, segmented into anterior, median, and posterior zones was measured at T0-T1 using VAM software. Statistical analyses involved paired-sample T-tests for intra-group comparisons and ANOVA tests with Bonferroni correction for inter-group.

**Results:** total surface increment for LE was 155.4 mm² (±49.92 mm²); for RPE, it was 187.7 mm² (±58.06 mm²); and for the control group, it was 55.35 mm² (±18.69 mm²), significant in all three groups. Statistically significant differences were observed in the anterior, median, and posterior zones, as well as in the total surface increment, between the LE and control groups, and between the RPE and control groups. No significant difference was found between the LE and RPE groups in surface increments.

**Conclusions:** no significant difference in palatal surface increment was found between the two experimental groups (LE and RPE); both demonstrated a significant increase in palatal surface. The greatest increment occurred in the median palate zone for both experimental groups. The increment in the untreated control group was not significant.

# SHORT-TERM MORPHOLOGICAL CHANGES OF ESSIX RETAINERS WITH DIFFERENT GINGIVAL MARGIN DESIGN

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**Aim:** this randomized clinical trial aimed to analyze the morphological or dimensional changes of essix retainers with different gingival margin designs after 3 months ($T_1$) and 6 months ($T_2$) of use.

**Methods:** the study sample consisted of 36 patients (18 males and 18 females) who had just completed orthodontic treatment. The patients were randomly allocated to one of the two study groups: retainers with the conventional scalloped edge and retainers with modified design that was characterized by the straight edge cut at 4 mm above the gingival zenith of the first premolar and 2 mm above the gingival margin of the upper second molar.

Each patient worn two pairs of identical upper and lower retainers respectively for 3 months ($T_1$) and 6 months ($T_2$). Each retainer was digitized using a laboratory scanner. The resulting 3D objects were imported to Geomagic software to perform 2D linear measurements (intercanine, interpremolar and intermolar distances). The pre- ($T_0$) and post-use ($T_1$/$T_2$) retainers were superimposed with best-fit algorithm to analyze the 3D displacement at inter-molar, inter-premolar, canine, and inter-incisor areas.

**Results:** both 2D and 3D measurements showed deformation of the essix retainers in the premolar, canine and incisor areas. Upper retainers of both groups showed an increased deformation than lower ones; no statistically significant difference between the conventional and modified design was reported.

**Conclusions:** the morphology of upper and lower essix retainers showed an expansion of gingival edge after 3 months of use; in contrast, a slight contraction of the gingival margin after 6 months of use was observed.

# EFFECTS OF TMD TREATMENT ON THE OCCLUSAL TACTILE ACUITY

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**Aim:** Occlusal Tactile Acuity (OTA) is the ability to detect small thicknesses between antagonist teeth during maximum intercuspation. It has been previously demonstrated that the OTA is increased (i.e. subjects are able to detect very small thicknesses) in patients with Temporomandibular Disorder Pain (TMD-P). The objective of the current study was to evaluate whether the treatment of TMD-P had also an effect on the OTA after a 3-months follow-up.

**Methods:** twelve (12) patients diagnosed with TMD-P according to the Diagnostic Criteria for TMD (DC/TMD) were included. OTA was measured with 9 aluminum foils of incremental thickness (from 8 µm to 72 µm, with an increment of 8 µm) and one sham test with no foil. The foils were allocated between molars and participants had to report whether they felt it or not. Each thickness was tested 10 times in a random order (100 tests total). TMD management included counseling, self-massages and local vibration therapy. The OTA test was repeated after 1 month ($T_1$) and after 3 months ($T_2$). A within-group comparison ($T_2$ *vs* $T_1$ *vs* $T_0$) was performed for each testing thickness (ANOVA for repeated measurements, with Bonferroni correction for multiple testing) ($p < 0.005$).

**Results and conclusions:** significant decrease in the perception of foil thicknesses 24 µm, 32 µm and to 40 µm was observed after treatment (all $p < 0.001$). Hence, treatments directed to reduce the TMD-P seemed to have also an indirect effect on the occlusal perception, thus supporting the role of the central sensitization in the OTA perception.

# RELATIONSHIP BETWEEN LOWER INTERCANINE DISTANCE AND DENTAL MALOCCLUSIONS AND GENDER IN UNT

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**Aim:** the aim of this research was to evaluate the intercanine distance of the lower arch in untreated adult patients, considering canine classification and gender as variables.

**Methods:** for this study, 30 untreated adult patients (15 males, 15 females, average age = 26±2 years) were selected and divided into three groups based on dental classification and gender. Lower arch intercanine distance was measured with a 0.01 mm Dahlberg error. The study followed the Declaration of Helsinki and was approved by the Ethics Committee. Inclusion criteria involved specific malocclusions and age range, while exclusion criteria included medical complications and dental traumas. Data distribution was assessed using the Shapiro-Wilk test. Group differences were analyzed with Student's t-test and ANOVA ($P < 0.05$).

**Results:** the results showed significant differences in intercanine distance values among the various canine classes and between gender. For the first class, the mean intercanine distance in the lower arch was 24 mm for male subjects and 22.6 mm for female subjects. For the second class, the mean intercanine distance was 22.4 mm for male subjects and 24 mm for female subjects. Finally, for the third class, the mean intercanine distance was 23.2 mm for male subjects and 24.2 mm for female subjects.

**Conclusions:** our study offered a detailed look at lower arch intercanine distance in untreated adult patients, showing notable distinctions among canine classes and genders. These findings underscore the need to account for these factors in dental morphology assessment, with potential implications for orthodontic treatment planning. Yet, for a more thorough understanding, further research with a larger sample size and examination of additional variables is advised.

# GROWTH PREDICTION: COMPARISON OF DIFFERENT METHODS

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**Aim:** the effectiveness of the Cervical Vertebral Maturation (CVM) method, performed through lateral cephalometric radiographs, was evaluated in comparison to more invasive procedures such as hand-wrist radiography. After confirming the efficacy of this method, its possible correlation with Demirjian et al.'s method (TPG) was examined to determine if orthopantomography of the dental arches, commonly used in dentistry, could contribute to identifying the growth peak.

**Methods:** a cross-sectional study was conducted on 850 orthodontic patients (479 females, 371 males) treated at the Department of Orthodontics, Vita-Salute San Raffaele University, Milan, and at a private orthodontic practice in Pavia, Italy. The study analyzed digital panoramic radiographs, lateral cephalometric radiographs of the skull, and radiographs of the second phalanx of the middle finger taken before treatment. Patient ages ranged from 9 to 18 years, with a mean age of 11.04±2.92 years. The mineralization stages of specific teeth (maxillary canine, mandibular second molar, and first and second premolar) were evaluated using the method described by Demirjian et al.

**Results:** significant differences were recorded between male and female sexes and among groups ($p < 0.05$) for all predictors. Therefore, correlation analysis between CVM, MPM, and TMS was performed after normalization for group differences and separately for females and males.

**Conclusions:** a significant correlation was found between hand-wrist maturation methods, cervical vertebral maturation, and Demirjian et al.'s method. The role of the mandibular second molar as an indicator of skeletal growth spurt was confirmed. An approximate time interval between CVM I/MPS1/TPG D and the onset of PGS was identified between 3.6 and 4 years, however, further dedicated studies are needed to confirm these results.

# TREATMENT EFFECTS OF DIFFERENT PALATAL EXPANSION PROTOCOLS. A NETWORK META-ANALYSIS STUDY

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**Aim:** the aim of this systematic review with network meta-analysis was to evaluate the treatment effects of maxillary palatal expander with different anchorage systems on transversal maxillary skeletal dimension.

**Methods:** eight electronic databases and reference lists of studies were searched up to January 2023. Randomized clinical trials and retrospective controlled clinical trials comparing maxillary expanders with dental, skeletal and hybrid anchorage were included. Two authors independently accomplished study selection, data extraction, and risk of bias assessment. Statistical heterogeneity was evaluated.

**Results:** in total, 15 studies were included (12 randomized clinical trials, 3 retrospective controlled clinical trials) that collected data from 552 patients. The mean significant differences in treatment effect of skeletal, relative to the dental expander, were 0.98 (95% CI, 0.12,1.84). The mean significant differences in treatment effect of hybrid, relative to the dental expander, were 0.77 (95% CI, (0.00, 1.54). The comparison between hybrid and skeletal expander did not show significant results.

**Conclusions:** the use of skeletal anchorage improves transversal skeletal treatment effects of palatal expansion treatment in case of both skeletal anchorage and hybrid anchorage

# ELASTODONTIC DEVICE *VS* SCHWARZ PLAQUE: A RANDOMIZED OPEN LABEL CLINICAL TRIAL

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**Aim:** this study compares two different devices used to expand the palate in children with posterior crossbite: the Eptamed Equilibrator elastodontic device (series 00) and the Schwarz plaque.

**Methods:** 70 children with a mean age of 11 years old were divided into a test and a control group. The test group underwent palatal expansion with the elastodontic device while the control group got the Schwarz plaque. The distance between the cusps of the first upper premolars was taken as reference after 6 and 12 months from the start of the treatment. For statistical analysis, the t-test or Wilcoxon signed-rank test for continuous variables and chi-square test or Kruskal-Wallis test for categorical variables were used.

**Results:** statistical analysis showed no significant difference in the expansion with the two different devices.

**Conclusions:** the Eptamed Equilibrator device allows a palatal expansion similar to the one achieved with traditional expansion devices, but with greater comfort and greater compliance referred by patients.

# EFFICACY OF FIXED AND REMOVABLE ORTHODONTIC RETAINERS IN MAINTAINING INCISORS ALIGNMENT

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**Aim:** retention is an important phase after orthodontic treatment is finished in order to maintain stability and prevent relapse. The aim was to compare the efficacy of three retention techniques after comprehensive treatment with fixed multibracket appliances.

**Methods:** a total of 152 subjects were enrolled in the study randomly allocated to three groups of similar size: vacuum-formed removable retainer (VFR), round and rectangular braided steel lingual wire retainer bonded in the intercanine mandibular region. All three groups had VFR in the maxilla. Change in irregularity of mandibular incisors during two years of retention stage was analysed.

**Results:** over the two-year retention period, 39% of patients failed to attend the final check-up so 93 subjects were analysed. Age at the start of retention ranged 12-21 (median 16; 66% females). Amount of change in mandibular incisors alignment ranged 0-4.2 mm with VFR having significantly higher median value of change than round ($p = 0.027$) and rectangular ($p < 0.001$), with no differences between last two. Change of irregularity of ≥2 mm was not frequent, present in 3/22 (13%) in VFR, 3/29 (10%) in round and none in rectangular retainer group. Incidence of relapse differed between groups with moderate effect size ($p < 0.001$; $V = 0.437$) being significantly higher in VFR (70%), than both round wire (35%) and rectangular wire group (17%), with no significant differences between last two.

**Conclusions:** VFR was found to be less efficacious than fixed retainers.

# FIFTEEN YEARS FOLLOW-UP IN PATIENTS WHO HAVE BEEN USING ADHESIVE LINGUAL SPLINT RETENTION

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**Aim:** this study investigates the clinical value of a lingual retention method used by patients for at least fifteen years.

**Methods:** fifty patients who had completed orthodontic treatment at least fifteen years earlier in a private clinic were included in the study. They all received the same lingual retention from canine to canine, using a direct technique (a braided wire is fixed with composite material onto the dental surface). Various aspects were examined: occurrence of detachment, periodontal health, conservative aspects and tolerability of the procedure.

**Results:** 44/50 patients still had the retainer in place, 6 had it removed due to various reasons. 32 never required any repairs, 12 experienced partial detachment over the years, mostly manifesting vestibular dislocation or rotation. 3 patients reported caries on the vestibular aspect of solidarized teeth, suggesting a low cariogenic potential of the procedure. However, white spots identified in some cases were associated with retainer detachment. There was no alteration in the gingival index where the retainer was applied. No selective sensitivity issues were observed specifically in the intercanine region, suggesting absence of linkage to the retention. Patients demonstrated high compliance and excellent tolerability.

**Conclusions:** it is highlighted the importance of regular checks to address any detachment. The retention system's design helps minimize the risk. Despite some challenges such as vestibular dislocation, the procedure remains effective, with minimal adverse effects on periodontal health and caries risk.

# RETROSPECTIVE STUDY COMPARING INVISALIGN SYSTEM AND ANDRESEN ACTIVATOR IN II CLASSES

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**Aim:** the main objective of this study is to compare two types of treatment for skeletal II class malocclusion: clear Invisalign aligners (with a mandibular advancement system) compared to functional Andresen activator.

**Methods:** 18 patients (aged 11 on average DS = 1,85) were selected according to the criteria: SNB <80°, ANB >4°, no orthodontic treatment previously executed, CS3 cervical maturation stage, late mixed or permanent dentition. 9 patients were treated with Invisalign, 9 with myofunctional removable appliances. Pre- and post-treatment latero-lateral skull teleradiographs were compared, evaluating changes in SNB, ANB angles, and overjet. Statistical analysis using Mintab 17 software included $\chi 2$, Mann-Whitney, and Anderson-Darling tests to ensure robustness. Confidence interval used was 95% with $\alpha$ = 0.05. T two-tailed test assessed the absence of statistically significant differences in pre- and post- treatment average values in the two groups.

**Results:** both treatments determined improving of basal sagittal relationship (incremented SNB and reduced ANB and overjet). The Invisalign mandibular advancement guaranteed a better action on the orthopaedic aspect. Whereas a dento-alveolar compensation verified in patients treated with the Monoblock.

**Conclusions:** the differences between the two treatments are due to the different design of the appliances. Both the systems were effective but there are differences in the dento-alveolar effects (the Monoblock having a greater one). Besides, with Invisalign the frontal torque was controlled better, optimising the skeletal effect.

# SELLA TURCICA AND CRANIAL BASE SYMMETRY IN ANTERIOR SYNOSTOTIC PLAGIOCEPHALY PATIENTS

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**Aim:** this study aimed to assess the symmetry of sella turcica and cranial base structures and their reliability as reference points for 3D cephalometric analysis in patients with Anterior Synostotic Plagiocephaly (ASP).

**Methods:** the study sample consisted of 20 patients: 10 male and female patients aged between 20 and 40 years, 7 with left ASP and 3 with right ASP (case group) and 10 healthy male and female patients aged between 20 and 40 years (healthy control). Maxillo-facial CT scans of patients of both groups were segmented with Mimics Medical software (version 19.0, Materialise, Leuven, Belgium). After selection of the region of interest and segmentation, 3D objects of the sella turcica and cranial base were generated. On the sella turcica and cranial base structures, 13 anthropometric points were identified; then, linear and angular measurements were bilaterally calculated. The resulting values from both sides were then compared to calculate an Asimmetry Index (AI).

**Results:** the case group reported higher mean AI scores than the control group both for sella turcica (4.67 *vs* 2.53, respectively) and anterior cranial base (7.82 *vs* 0.13, respectively). Indeed, the cranial base and the interclinoid distance showed a slight contraction on the synostotic side in the case group.

**Conclusions:** the sella turcica complex and the anterior cranial base morphology showed a slight asymmetry on the axial plane in patients with ASP. According to the present findings, more stable structures should be taken into consideration as reliable reference points for 3D cephalometric analysis.

# MANDIBULAR CONDYLE FRACTURES AND HYPERDIVERGENCE: RELATED RISK FACTORS

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**Aim:** condylar fractures outcomes may depend on patients' ability to tolerate muscular adaptions to overcome the lack of skeletal support provided by the healthy bone. It was hypothisized that there is less adaptability to condyle fractures in hyperdivergent subjects as they have lower muscular tone, less robust skeletal structure, and lower occlusal stability when compared to other subjects. The aim of the study was to evaluate the correlation between hyperdivergent facial phenotype and the tendency to condylar fractures and treatment outcome.
**Methods:** a retrospective study was conducted on 33 patients with condyle fracture treated at the Hospital University of Padova Dental Clinic. Data detected for each patient were: type of fracture and treatment, presence of post-traumatic malocclusion, mouth opening, and gonial angle. Divergency was measured on initial CT scout view.
**Results:** the results show that 61% of the sample presented with an open gonial angle. 69.7% of the patients didn't present post-traumatic malocclusion, however, 24% had both hyperdivergence and malocclusion.
**Conclusions:** facial type can be assumed as a predisposing factor for condyle fracture because the vast majority of the sample was hyperdivergent. A positive correlation was found between the presence of post-traumatic malocclusion and facial type. This could be due to the inability of hyperdivergent subjects to establish neuro-muscular adaptations to fracture, for the reduced muscle tone and occlusal instability specific to this phenotype: this suggests surgical treatment as more indicated in these patients.

# COMPARISON OF CERVICAL VERTEBRAE AND MIDDLE PHALANX MATURATION TO EVALUATE SKELETAL GROWTH

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**Aim:** puberty represents the moment where it can be possible to obtain more results about a specific treatment the patient undergoes due to puberal growth peak, regardless of the orthodontic device used. As chronological age can't be used to identify the puberal spurt, the principal aim of this study is to compare the Cervical Vertebrae Maturations (CVM) and the Middle Phalanx Maturation (MPM).
**Methods:** the research evidence were raised between July 2018 and May 2019 at the orthodontic department of the Odontostomatology Clinic of San Gerardo Hospital in Monza.
Patients with age of 6-18 years, Caucasian ethnicity, good general health status, no nutritional problems, absence of hormonal or growth problems, absence of anomalies in the finger and vertebrae, absence of trauma history in the cervical region or right hand and latero-lateral teleradiography starting from maximum 20 days from the date of examination were selected. All the 98 patients (46 males and 52 females) signed the informed consent.
**Results:** the average age is 12.2 years and the one for all stages of maturation (MPM) showed that the value found is always considerably lower in the female group.
The two methods have shown to have very similar graphic representations, and 87 patients demonstrated a complete agreement between the skeletal maturation stage obtained with both methods.
**Conclusions:** the MPM method is a trustworthy and simple technique for assessing skeletal growth.
CVM and MPM methods agreed satisfactorily and MPM allows for growth monitoring without the need for additional lateral teleradiography.

# ASSOCIATION BETWEEN DENTOSKELETAL FEATURES AND PROXY-REPORTED OSA IN GROWING PATIENTS

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**Objective:** OSA is an emerging condition with a prevalence in the population. Studies in literature have evaluated correlations between certain cephalometric landmarks and the onset of OSA. This study aims to assess which landmarks can determine the occurrence of OSA.

**Methods:** the subjects were children under the age of 18, patients with complete orthodontic baseline records, and correctly the OSA-18 questionnaire. The exclusion criteria included patients with craniofacial syndromes and patients who had already undergone orthodontic treatment. The total number of the sample was 444, of which 14 had an OSA-18 score >60. This study is based on the records of a cohort of patients who attended the School of Orthodontics of the University of Naples Federico II (Naples, Italy) in the last 5 years.

**Results:** our analysis of OSA-18 positive patients compared with all dentoalveolar and skeletal variables reveals statistically significant findings: Unilateral dental cross (P <0.01) and Skeletal cross (P <0.02). Other collected data lacked statistical significance.

**Conclusions:** our study does not provide new data as we have identified parameters already described in the literature. Further research is necessary to evaluate the correlation between the onset of OSA and the presence of cephalometric landmarks over time, through longitudinal studies.

# ACCURACY OF OVB REDUCTION AND COS LEVELING WITH CLEAR ALIGNERS IN ADULT PATIENTS

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**Aim:** to assess the predictability of the Clear Aligner Treatment in reducing overbite and leveling the Curve of Spee (COS) in adult patients with a deep bite.

**Methods:** a retrospective study was conducted using intraoral scans before and after treatment and stereolithographic files of the predicted outcome (ClinCheck) of adult patients with a deepbite treated with Clear Aligners from January 2014 and completed by April 2023. The 20 patients included in the study were treated without extractions using a 2-weekly aligner change protocol. The pre-treatment ($T_0$), post-treatment ($T_2$), and ClinCheck ($T_1$) for each patient were imported into Geomagic Control X software to measure OVB and COS. $T_0$ and $T_1$ were compared to establish the amount of Prescribed Movement, $T_0$ and $T_2$ were then compared to determine the Achieved Movement. Accuracy, expressed as percentage of achieved vs. planned, was calculated as follows: Accuracy = 100 × (Achieved Movement)/Prescription.

**Results:** the mean accuracy was 71.5% for COS leveling and 57.1% for OVB reduction. The prescribed OVB reduction was 3.1 mm, but the achieved OVB reduction was 1.9 mm. The lowest extrusion accuracy relative to the occlusal plane was the mandibular second premolar (44.5%) with an amount of prescribed extrusion (1.3 mm ±0.8). The biggest amount of prescribed and achieved extrusion was for the first premolar (Prescription = 1.5 mm; Achieved movement = 1.0 mm).

**Conclusions:** clear aligners might be effective in opening the bite in adult patients, but the predictability of the OVB reduction is still suboptimal.

# THE HERBST APPLIANCE: INFLUENCE OF VERTICAL FACIAL GROWTH

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**Aim:** to compare the dental and skeletal effects of the Herbst appliance in 3 groups: normodivergent, hypodivergent and hyperdivergent.

**Methods:** a retrospective study was conducted. A total of 75 lateral cephalograms of patients with a skeletal class II and treated with Herbst appliance were included as the test group, and they were divided in three subgroups using the mandibular divergence index (angle between the straight lines SN and GoMe):

- Hypodivergent (25 subjects): SN^GoMe values less than or equal to 26.5°;
- Normodivergent (25 subjects): SN^GoMe values between 26.5° and 36.5°;
- Hyperdivergent (25 subjects): SN^GoMe values greater than or equal to 36.5°.

Each subgroup was compared with three different control groups of 25 untreated subjects.

The Pancherz's modified SO (Sagittal Occlusion) cefalometric analysis was performed on lateral cephalograms.

**Results:** hypodivergent patients showed an increased mandibular divergence at the end of the therapy compared with the control subgroup, normodivergent patients didn't show a significant change in the divergence compared with the control subgroup and hyperdivergent patients showed a decreased mandibular divergence compared with the control subgroup.

**Conclusions:** this study showed the different results to treatment with Herbst appliance depending on the vertical growth pattern of the patients.

The results showed that hypo divergent patients increased their mandibular divergence during treatment, normodivergent patients showed no significant differences, hyperdivergent patients decreased their mandibular divergence during treatment.

# ORTHODONTIC MOVEMENTS WITH SEQUENTIAL ALIGNERS: RETROSPECTIVE OBSERVATIONAL PILOT STUDY

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**Aim:** the aim of this study was to analyze the differences in dental movements between the aligner digital planning and the patient's oral scan following orthodontic treatment, identifying movements that were less effective in aligning teeth and improving malocclusion.

**Methods:** a total of 13 end-of-treatment impressions were compared with the model initially designed, using the program "Maestro 3D Dental" which allows an overlay of stl files. When the two models were perfectly matched, it meant that the digital simulation of the aligners, created at the beginning of treatment, had accurately and consistently predicted the result obtained at the end of therapy. A statistical study was conducted in order to evaluate the degree of success of the designed movements, chi-square test was adopted to evaluate significant differences between the measurements and significant level was set at $p < 0.05$.

**Results:** the sample included a total of 186 teeth for which orthodontic movement was planned. Of them, approximately 22% did not achieve the planned rotation and 30% did not achieve the planned vestibularization. The remaining 48% completed the planned movement, with no significant difference between the upper and lower arches.

**Conclusions:** aligners have good effectiveness in orthodontic treatment of the patient although none of the cases showed a perfect overlap between the digital planning and the final impression found at the end of the treatment.

# DEVELOPMENT OF THE FRONTAL SINUS DURING GROWTH: CLASS III *VS* CLASS I

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**Aim:** anthropometric studies have shown a correlation between the development of the frontal sinus and the masticatory apparatus development, especially with the mandibular symphysis growth. Therefore, the aim of this study is to conduct a morphometric analysis of the frontal sinus development to identify a potential correlation between the sinus dimension and the development of a class III skeletal pattern.

**Methods:** a sample of lateral skull radiographs of 20 subjects in skeletal class III and a control group of 20 subjects in skeletal class I were selected from a sample of untreated patients from the AAOF. For each subject, on lateral skull radiographs were performed both cephalometric analysis and morphometric analysis of the frontal sinus using the ImageJ software (NIH, Bethesda, MD, USA) analyzing the following parameters: height, width, perimeter, and area. The data were then statistically analyzed using a descriptive analysis followed by the application of the Student's t test for the comparison of the means between the two groups at each age group.

**Results:** a statistically significant association between the frontal sinus dimensional variables and class III skeletal pattern was observed. Patients that presented a class III showed on average higher frontal sinus dimensional values compared to class I patients, in particular during the circumpubertal periods (12 years).

**Conclusions:** during growth there is a morphological difference of the frontal sinus between class I and class III, so its dimensions may have a potential predictive value to early intercept class III malocclusion.

# PREDICTABILITY OF CLEAR ALIGNER THERAPY IN THE CORRECTION OF OPEN BITE

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**Aim:** correction of anterior open bite with clear aligners appears to show relatively good results due to their function as occlusal bite blocks; this assumption, however, remains relatively unproven. The aim of this study is to evaluate the predictability of orthodontic treatment with aligners in Open Bite correction.

**Methods:** a retrospective observational study was conducted on 12 orthodontic patients (9F; 3M, mean age 33,03±17) treated with Invisalign®, comparing the pre- and post-treatment intraoral scans with the final position planned in the ClinCheck, considering the changes on Overbite and Curve of Spee. Pre- and post-intraoral scans and the final position planned were imported on the Medit Design software (Medit, Seoul, Republic of Korea) to evaluate the Overbite and Curve of Spee.

**Results:** statistical analysis by using the t-test, showed significant differences regarding the overbite, but no differences regarding upper and lower curve of Spee. The Overbite variation obtained with the treatment was about 74% compared to the position programmed through the Clincheck software.

**Conclusions:** the correction of the Overbite and curve of Spee with clear aligners showed a good predictability of the treatment with aligners, but it can be suggested to calculate an overcorrection to achieve better results. Further investigations with more patients are needed to achieve more significance.

# ACCURACY OF COS LEVELING AND OVB REDUCTION IN GROWING PATIENTS TREATED WITH CLEAR ALIGNERS

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**Aim:** Clear Aligners Treatment (CAT) is becoming increasingly popular also for growing patients, despite challenges in controlling certain tooth movements like extrusion. Posterior extrusion is the main approach to manage deep bite in growing patients. Therefore, this study aims to assess the effectiveness of CAT in leveling the Curve of Spee (COS) and reducing the Overbite (OVB) in growing patients with deep bite.

**Methods:** nineteen growing patients were selected (7 females, 12 males; mean age 13.9 years). For each patient, three digital dental models (STL files) of the upper and lower arches were collected: pre-treatment ($T_0$), the virtual treatment plan ($T_1$), and post-treatment digital model at the end of the COS leveling and OVB reduction phase ($T_2$). Geomagic Control X was used to superimpose STL files and make the measurements. $T_0$ and $T_1$ were compared to establish the amount of Prescribed Movement, while $T_0$ and $T_2$ were compared to determine the Achieved Movement. Accuracy, expressed as percentage of achieved *vs* planned, was then calculated. Intra-examiner and inter-examiner reproducibility of the measurements were evaluated by means of the Intraclass Correlation Coefficient. An unpaired one-tailed t-test was used to evaluate differences between Prescription and Achieved Movement. The significance level was set at 0.05.

**Results:** the mean accuracy produced by the appliance is 58% for COS leveling and 64% for OVB reduction. The lowest extrusion accuracy relative to the occlusal plane is the mandibular first molar (44%). 89% of patients has an OVB <3.5 mm at the end of the COS leveling and OVB reduction phase.

**Conclusions:** clear aligners can be used to treat deep bite in growing patients, but to improve the accuracy of the movements, overcorrections of COS leveling and OVB reduction should be applied during the virtual treatment planning.

# OCCLUSAL PLANE CHANGES AFTER CLEAR ALIGNER THERAPY: A THREE-DIMENSIONAL ANALYSIS

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**Aim:** the aim of the present research was to assess the Occlusal Plane (OP) changes after with Clear Aligner Therapy (CAT), correlating the changes with patients' facial divergence.

**Methods:** 3D mandibular models of 70 patients (28 males and 42 females; mean age 23.2 SD +/- 3.4 years) with CAT were retrospectively examined. Using a digital imaging software three planes were drawn: the palatine plane, the occlusal plane, and the reference vertical maxillary plane. The palatine plane and the occlusal plane meet mesially, identifying an angle (α) in sagittal view. While the intersection of the occlusal plane and the reference vertical maxillary plane creates two angles in frontal view: an angle (β) for the right side and an angle (γ) for the left side. Using an automatic software (Autodesk Fusion 360) the pre ($T_0$) and post-treatment ($T_1$) angles were measured. Consequently, lateral cephalograms were evaluated and five variables were evaluated.

**Results:** after CAT Δα increases in hyperdivergent and decreases in hypodivergent patients. OP in frontal view did not show any statistically significative changes. Statistically significant differences were shown between hyperdivergent and hypodivergent patients for Δα and Δβ. Tukey's test showed the following differences: Δα was 3,81°greater in hyperdivergent group than in hypodivergent group; Δβ was 1.69° greater in hyperdivergent group than in hypodivergent group.

**Conclusions:** CAT did not lead clinically significant change in OP. Anyway, the OP orientation changes differed significantly between the three groups in both sagittal and frontal view.

# SOFT TISSUE EVALUATION AFTER TREATMENT WITH HERBST AND ELASTODONTIC APPLIANCES

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**Aim:** the aim of this study was to value changes in facial aesthetics of skeletal Class II patients treated with elastodontic appliance and with the Herbst appliance.

**Methods:** one-hundred eighty patients with skeletal Class II were enrolled for the study. 60 patients were treated with elastodontic appliance (Group-EA), 60 patients were treated with Herbst appliance (Group-H) and 60 were untreated patients (Group-C). Cephalograms taken before ($T_0$) and after treatment ($T_1$) were analyzed and the aesthetic profile was analyzed using the Arnett's analysis. Collected all the data the Wilcoxon signed-rank test or paired-samples t-test were used for pairwise comparison of cephalometric measurements taken at $T_0$ and $T_1$. One-way ANOVA and Tuckey's post-hoc test was performed to assess differences between groups.

**Results:** in group-C, from $T_0$ to $T_1$, LL-TVL and POG'-TVL distance decreased. In group-EA, the 1+SN angle increased from $T_0$ to $T_1$, while the POG'-TVL and B'-TVL distances decreased. In group-H POG'-TVL, B'-TVL, LL-TVL and 1+SN decreased, but IMPA increased. There were differences for 1+SN, IMPA, 1+TVL, LL-TVL and UL-TVL between the groups. In group-H, 1+SN and UL-TVL were lower compared to the group-C, while IMPA and 1+TVL were higher. Moreover, in group-H, 1+SN and UL-TVL were lower compared to group-EA, while IMPA and LL-TVL were higher.

**Conclusions:** herbst and elastodontic appliances resulted in the correction of Class II skeletal malocclusion by improving patients' soft tissue profile. Both devices improved the projection of the lips and chin, making the profile more harmonious.

# EFFECT OF NAIL BITING ON UPPER CENTRAL INCISORS IN YOUNG PATIENTS

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**Aim:** nail biting can be defined as a voluntary, recurring, and nonfunctional movements which could affect the oral health causing several complications and alteration of teeth's intraoral position and shape. Therefore, the aim of the present research was to estimate the effects of onychophagy on the upper central incisors evaluating: the teeth length, inclination and area.

**Methods:** the present retrospective study was performed on 48 patients who used only one central incisors for onychophagy (counting 96 teeth), 26 males and 22 females; mean age 10.6 +/- 0.3 years. Then, the patients' intraoral digital scans were collected, and measurements were performed, the following variables were analyzed: length, inclination and area of the upper central incisors, both the one affected by nail biting and the one not affected. The collected data were analyzed, and descriptive statistics were calculated.

**Results:** the results of the statistical analysis showed a statistically significant differences between the length, the inclination, and the area of the upper central incisors. Therefore, important changes of the upper central incisors subjected to onychophagy were detected, compromising the inclination and the morphology of teeth.

**Conclusions:** the present study suggested to not underestimate the onychophagy in early childhood since there are several consequences on the shape and position of teeth, of course it is recommended to conduct future studies with a larger sample size to reinforce the findings of this paper.

# EFFICACY OF MANDIBULAR ADVANCEMENT DEVICE IN OSA PATIENTS: A LONG TERM EVALUATION

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**Aim:** the aim of this study was to assess the therapeutic efficacy of Mandibular Advancement Device (MAD) on patients with Obstructive Sleep Apnea (OSA), after 4 years of therapy.

**Methods:** eighty-six patients with OSA and treated with MAD were selected for the present evaluation. All patients performed a polysomnography before treatment ($T_0$), then two follow-ups were carried out: after 3 months ($T_1$) and after 48 months ($T_2$) of treatment. The following parameters were examined: Apnea Hypopnea Index (AHI), Supine AHI, Oxygen Desaturation Index (ODI), Average Oxygen Saturation (ASpO2), minimum ASpO2, Body Mass Index (BMI), and Central Sleep Apnea (CSA) and a statistical analysis was performed.

**Results:** the Welch ANOVA showed significant statistically difference across all the analyzed variables. Post hoc Games Howell's test revealed the following variations: AHI decreased by 17.70 from $T_0$ to $T_1$, by 11.32 from $T_0$ to $T_2$, and increased by 6.38 from $T_1$ to $T_2$; Supine AHI decreased by 25.27 from $T_0$ to $T_1$, by 14.24 from $T_0$ to $T_2$, and increased by 11.02 from $T_1$ to $T_2$; ODI decreased by 15.28 from $T_0$ to $T_1$, by 9.10 from $T_0$ to $T_2$, and increased by 6.18 from $T_1$ to $T_2$; ASpO2 decreased by 0.86 from $T_1$ to $T_2$; SpO2 min increased by 7.40 from $T_0$ to $T_1$, by 5.70 from $T_0$ to $T_2$, and decreased by 1.69 from $T_1$ to $T_2$; CSA decreased by 5.87 from $T_0$ to $T_1$.

**Conclusions:** after three months of MAD therapy, respiratory parameters exhibited a decrease, followed by an increase after 48 months, although with an improvement compared to baseline. MAD therapy proved effective for patients with mild to moderate OSA.

# RETROSPECTIVE COMPARISON OF BI-MAXILLARY PLATES AND FACEMASK IN CLASS III MALOCCLUSION TREATMENT FOR GROWING SUBJECTS

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**Aim:** to comparatively analyze the skeletal and dento-alveolar changes after treatment with Class III Bi-Maxillary Plates (BMPs) and FM appliances in growing patients with Class III skeletal malocclusion.

**Methods:** the study sample included 66 subjects 28 males and 38 females, mean age 8,4±1,4) retrospectively recruited who underwent treatment with Bi-Maxillary Plates and Class III elastics (BMP group = 31 subjects, 13 males and 18 females, mean age 8,2±1,6) and with Facemask (FM group = 35 subjects, 15 males and 20 females, mean age 8,6±1,3) to correct mild class III malocclusion. Both groups of patients were instructed to wear the appliance at least 14 hours a day. Pre-treatment (T0) and post-treatment (T1) lateral cephalograms and dental digitized models were analyzed, and 10 angular measurements and 3 linear measurements were evaluated to perform inter-timing and inter-group comparisons. Changes of measurements from each group were compared by paired t-tests, considering a 5% significance level.

**Results:** both groups showed similar dento-alveolar effects, but these were greater in the BMP group, with significant inclination of the upper incisors and lingual tilt of the lower ones. The occlusal plane also rotated more counter-clockwise in the BP group.

**Conclusions:** BMPs with class III elastics provided a similar pattern of skeletal and dento-alveolar changes compared to FMs, however supported by slight greater dento-alveolar effects that contribute to the correction of the class III malocclusion in growing subjects.

# BONE QUALITY IN RELATION TO SKELETAL MATURATION IN PALATAL MINISCREWS INSERTION SITES

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**Aim:** this study aimed to investigate the relationship between bone density and quantity at the insertion sites of palatal miniscrews and skeletal maturation, evaluated with the middle phalanx maturation method, in growing patients.

**Methods:** sixty patients were analyzed as having a staged third finger middle phalanx radio- graph and a cone-beam computed tomography of the maxilla. On the cone-beam computed tomography, a grid was designed to parallel the Midpalatal Suture (MPS) and posterior to the nasopalatine foramen, both on the palatal and lower nasal cortical bones. Bone density and thickness were measured at the intersections, and medullary bone density was also calculated.

**Results:** of patients in MPS stages 1-3, 67.6% showed a mean palatal cortical thickness of \1 mm, whereas in 78.3% of the patients in stages 4 and 5, it was .1 mm. The nasal cortical thickness showed a similar trend (MPS stages 1-3: 62.16%\1 mm; MPS stages 4 and 5: 65.2% .1 mm). There was a significant difference in the density of the palatal cortical bone between MPS stages 1-3 (1272.05 6 191.13) and stages 4 and 5 (1572.33 6 274.89) and in nasal cortical density between MPS stages 1-3 (1428.09 6 198.97) and stages 4 and 5 (1597.97 6 267.75) (P \0.001).

**Conclusions:** this study revealed a correlation between skeletal maturity and maxillary bone quality. MPS stages 1-3 have lower palatal cortical bone density and thickness but high nasal cortical bone density values. MPS stage 4 and, even more, stage 5 show increasing palatal cortical bone thickness and palatal and nasal cortical bone density values.

# IMPACT OF PALATAL EXPANSION ON FACIAL SOFT TISSUES AND DENTAL ARCHES IN CLEFTS PATIENTS

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**Aim:** this study investigates the impact of rapid palate expansion on facial soft tissues and dental arches, utilizing stereophotogrammetry and intraoral scanner within a cleft population.

**Methods:** twenty-one patients with unilateral cleft lip-palate (12), bilateral cleft lip-palate (3), and cleft palate (6) were included. They underwent rapid palatal expansion. Stereophotogrammetric and intraoral scans were executed at t0 (expander application), and follow-up scans at t1 (end of activations). To compare t0 and t1 on soft tissues, superimpositions and variations in surface and volume within the right cheek, left cheek, upper lip, and lower third were performed. The expansion of dental arches was verified.

**Results:** the upper lip advanced in 14 patients (66.1%), while it retreated in 7 (33.4%). Concerning the lower third, a posterior movement was observed in 13 patients (61.9%), whereas an anterior shift occurred in 8 (38.1%). In 12 patients (57.1%), there was an anterior shift in both cheeks, whereas in 9 (42.9%), these areas displaced posteriorly. In unilateral cleft, cheek evaluation revealed equal proportions with more alteration on the affected side and on the non-cleft side. On intraoral scan of unilateral cleft, 50% present greater expansion on the cleft side and the remaining on the non-cleft side. Four patients (66.7%) with isolated cleft palate present symmetrical expansion. Volumetric average modifications are 1.8 cc in the left cheek, 1.6 cc in the right cheek, 1.4 cc on the upper lip and 4.5 cc on the lower third.

**Conclusions:** surface and volume soft tissues alterations occurred. In unilateral cleft lip and palate, there is a non-symmetrical expansion, but the position of the cleft does not influence the expansion. A symmetric expansion is frequent in isolated cleft palate. Volumetric changes primarily manifest in the lower facial third.

# PAIN DURING RPE: A STUDY ON CHILDREN WITH AND WITHOUT CRANIOFACIAL SYNDROMES

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**Aim:** Rapid Palatal Expander (RPE) is an orthodontic device used to increase the transverse dimension of the palate in growing patients. However, its use is associated with some side effects, including pain. Generally described as a sensation of pressure or discomfort in the palate area. It may be more intense in the first few days after activation.
The purpose of this observational study is to evaluate and compare the intensity and duration of pain in pediatric patients, both syndromic and non-syndromic, during the use of an RPE.
**Methods:** participants: pediatric patients undergoing rapid palatal expansion, divided into two groups: with syndromes and without craniofacial syndromes/malformations. Tools: Parent questionnaire designed to assess patients' pain levels during RPE treatment.
**Results:** data analysis revealed significant differences in pain management between patients with and without syndromes. Patients with syndromes reported higher post-RPE pain levels compared to their non-syndromic counterparts.
**Conclusions:** the need to consider patients' conditions, including the presence of syndromes, is highlighted in order to plan and implement pain control strategies during rapid palatal expansion therapy. This study underscores the importance of a personalized and targeted approach to optimize the comfort and well-being of pediatric patients undergoing orthodontic treatments such as rapid palatal expansion.

# SOFT-TISSUE WITS APPRAISAL: A NOVEL MEASUREMENT OF THE MAXILLO-MANDIBULAR DISCREPANCIES

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**Aim:** maxillo-mandibular sagittal discrepancies are a relevant factor in orthodontic diagnosis and for the evaluation of facial proportions. The aim of the study is to identify and test a novel method of measurement for the maxilla-mandibular discrepancy based on soft tissue landmarks and the soft tissue Wits appraisal. In addition, it is also aimed at overcoming the flaws in established traditional measurements, based only on skeletal criteria, increasing the diagnostic precision.
**Methods:** the sample included 300 subjects (162 males and 138 females) with an age range of 6 to 50 years old (divided also in 6 age groups). Inclusion criteria were: Caucasian ethnicity, skeletal and dental malocclusion class I, II and III. Exclusion criteria were facial asymmetry, cross-bite, need for surgical treatment, absence of molars and premolars, past or present orthodontic treatment and alterations in bone metabolism. For each patient a CBCT and facial scan were requested for a cephalometric evaluation. From all cephalometric analysis Wits appraisal and soft tissue Wits appraisal (by measuring the linear distance between the projections of point A' and B' on the occlusal plane) were examined.
**Results:** a significant correlation was found between the two appraisals in all age groups, with no gender differences.
**Conclusions:** the soft tissue wits appraisal proved to be a simple and reproducible measurement for the diagnosis, including aesthetical diagnosis, of the maxilla-mandibular sagittal relationship.

# CAN ROOT DILACERATION OF IMPACTED TEETH BE RELATED TO ODONTOGENIC LESIONS? A COHORT STUDY

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**Aim:** impacted teeth frequently coexist with odontogenic lesions. This study aimed to assess whether the presence of an odontogenic lesion associated with an impacted tooth affects its root development.

**Methods:** an observational cohort study was conducted at the University of Catanzaro, enrolling patients with impacted teeth without a complete root development. Each patient underwent conservative surgical or surgical-orthodontic treatment to recover the impacted tooth. The root development of each tooth was assessed by comparing pre- and post-treatment radiological exams. The sample was split into two groups according to the presence (Group A) or absence (Group B) of odontogenic lesion involving the impacted tooth. Two investigators analyzed separately the radiographic exams of the sample to evaluate the roots development. Statistical analysis was conducted setting $\alpha \leq 0.05$.

**Results:** the study included 19 patients (8M and 11F, 11,89±2,6 years) with 23 impacted teeth: 39.13% were canines, 30.4% molars, 17.39% incisors, and 13.04% premolars. Group A included 12 impacted teeth (5 molars, 2 canines, 4 incisors and 1 premolar), group B 11 (2 molars, 7 canines and 2 premolars). Root dilaceration was more frequent in Group A (8 cases; 66.7%) than in Group B (2 cases; 18.18%) with a significant difference ($p = 0.036$). Lesions were histopathologically diagnosed as follicular cyst (66.67%), odontoma (16.67%), ameloblastic fibroma (8.33%), and sialodongenic cyst (8.33%).

**Conclusions:** results suggest a potential correlation between odontogenic lesions associated with impacted teeth and root dilaceration, probably due to the compressive impact of the lesion on the developing tooth. Larger studies are needed to confirm these findings.

# ACCURACY OF DIGITAL INDIRECT BONDING OF ORTHODONTIC BRACKETS: AN *IN VIVO* STUDY

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**Aim:** to evaluate the transfer accuracy of 3D printed indirect bonding trays constructed with a fully digital workflow *in vivo*.

**Methods:** 12 consecutive patients for a total of 211 self-ligating brackets (Empower, American Orthodontics, Wisconsin, USA) were bonded on incisors, canines, and premolars using fully digitally designed and 3D printed transfer trays. Immediate post-bonding digital models were superimposed on corresponding models for virtual bracket setup using OnyxCeph software. Linear deviations in mesiodistal, occlusogingival, and buccolingual directions and angular deviations in torque, angulation, and rotation between bonded and planned bracket positions were calculated. Deviations within the limit of 0.5 mm and 2° were considered clinically acceptable. Dependent-sample t tests were performed to compare relative values between bonded and planned positions.

**Results:** 3 brackets failed during bonding procedure (1.4%). Mean differences in bracket positioning were 0.14 mm, 0.27 mm, 0.20 mm for mesiodistal, occlusogingival, and buccolingual measurements, respectively. Frequencies of bracket positioning deviations within the 0.5 mm limit ranged from 87% to 97%. Mean differences were 1.16°, 2.42°, and 1.51° for tip, torque, and rotation, respectively, with frequencies within the 2° limit ranging from 55% to 85%. Comparisons of relative values showed adequate fitting of the trays as for mesiodistal position ($P > 0.05$), while in the other two dimensions trays were overall slightly shifted towards occlusal and vestibular directions ($P < 0.05$).

**Conclusions:** the 3D printed indirect bonding trays transferred the brackets with high accuracy when considering linear deviations. Moderate inaccuracy was recorded for angular deviations, particularly with torque (55% of brackets within the 2° limit).

# SWELLING AND DEGRADATION OF RESINS FOR 3D DIRECT PRINTING OF ORTHODONTIC ALIGNERS

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**Aim:** novel resin materials for direct 3D printing of clear aligners have been recently introduced. A polymeric material which is immersed in a liquid medium interacts with the medium and some liquid phase enters into the polymer matrix. This liquid flow may be reversible, but it can determine a monomeric release into the liquid phase. The purpose of this study was to assess the differences in the weight variations over a time of 11 days in samples printed with two different resins when they are immersed in a liquid medium, and their possible leaching into the liquid phase.
**Methods:** the Tera Harz TC-85 resin and the Clear-A Senertek resin were used, and samples were directly 3D printed and post-cured. Five samples per group were placed inside test tubes with artificial saliva in a thermostatic bath at 37°C. The weight variation of each sample was assessed using a precision balance 5', 10', 15', 30', 1h, 2h, 4h after immersion and then twice per day over a time frame of 11 days. Then a FTIR-ATR spectrophotometer was used to evaluate the possible release of materials into the artificial saliva that came into contact with the samples. A control of untouched artificial saliva was used as a reference.
**Results:** the maximum weight increase of the samples in the first 4h was 3.6 %. A significant difference in weight variation between groups was found in the first 4h. No differences between the frequency spectra of the supernatant samples were found.
**Conclusions:** weight variation shows an increasing trend with local variations according to the resin. No evidence of leaching was found.

# SURFACE ADAPTATION OF DIFFERENT CLEAR ALIGNERS WITH THE AIM OF A MICRO TC SCAN

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**Aim:** this study aims to evaluate the fitting and expected effectiveness of different clear aligners through a Micro-Tc assisted analysis.
**Methods:** five transparent aligners, manufactured by 5 different companies, each made from a single and identical impression of hemiarch 4.1 to 4.6, were examined. Each aligner placed on the model was first placed inside a falcon test tube containing water and inside one containing iodinated contrast medium. 7600 scans of the aligners were taken using the Sky-Scan 1176 Micro-Tc, and those of elements 4.3, 4.4, and 4.6 were selected and distinguished into coronal, middle, and cervical thirds. Using SkyScan Nrecon software, cross sections were reconstructed, and 3D models were created with the CTAn program and used to evaluate, with the "Ct Analyzer" software perimeter, area and volume of the space between the element and the aligner. The space was represented graphically with CTVol.
**Results:** the space between the surface of the teeth and aligner number 3 has lower perimeter, area and volume values than those of the other aligners at all three thirds.
**Conclusions:** according to this analysis Micro CT scans offered, if coupled with a iodinated medium, a good representation of the global fitting of a clear aligner to teeth. High fitting should correspond to a better tridimentional control of tooth movements.

# IS IT ALWAYS NECESSARY TO REMOVE ORTHODONTIC DEVICES BEFORE AN MRI EXAM?

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**Aim:** MRI is a widely used diagnostic technique. Patients wearing orthodontic appliances are often requested to remove their appliances, even when MRI exam involves areas far from mouth, in order to avoid metal heating and appliance detachment. The purpose was to measure and compare temperature changes and orthodontic appliances' adhesion to enamel after different MRIs.

**Methods:** 220 bovine incisors were divided into 11 groups of 20 specimens each and 220 orthodontic brackets were bonded and engaged with wires of different materials and sizes. Appliances were submitted to MRI at two different powers (1.5T and 3T). Brackets and wires' temperatures were measured before and after MRI; Shear Bond Strength (SBS) and Adhesive Remnant Index (ARI) scores were recorded. Statistical analysis was performed.

**Results:** significant increase in the temperature was found for both brackets and wires in some groups, even if the mean temperature increase was clinically insignificant (0.05°C-2.4°C for brackets and 0.42°C-1.74°C for wires). MRI did not condition bracket adhesion in any group. No differences were reported when comparing 1.5T with 3T groups. The ARI Scores were significantly lower after MRI.

**Conclusions:** under MRI orthodontic appliances present a low temperature rise and no debonding risk. Orthodontic appliance's removal is not recommended routinely as it is time consuming, costly, uncomfortable for both the patient and the clinician, could damage the enamel structure or lengthen treatment time. It is suggested only in case of a void risk or potential interference in image quality.

# BIOFILM CONTROL STRATEGIES OF EARLY STREPTOCOCCUS MUTANS BIOFILM ON ALIGNER MATERIALS

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**Aim:** as formation of biofilm on aligners can increase the risk of enamel demineralization, biofilm control strategies were explored in an *in vitro* experiment.

**Methods:** aligner materials polyurethane (PU) and polyethylene terephthalate glycol (PET G) were submersed in artificial saliva for 24h and then *Streptoccocus mutans* bacteria in Brain heart infusion broth were added and incubated at 37°C with stirring for 24h. Formed biofilm was treated with manual brushing, exposure to commercial chlorhexidine (CHX) solution 0.12% of active substance for 1 minute, and their combination. The number of bacteria was determined in nontreated and treated samples after sonication. Atomic force microscopy was used to determine surface roughness of material.

**Results:** no major differences were observed between materials in surface roughness nor adherence of *S. mutans* after 24 h. All hygiene methods significantly reduced the *S. mutans* biofilm on each material ($p < 0.001$). Manual brushing was the most effective and CHX least effective in biofilm removal in both PU and PET G. Combination of brushing and CHX was better than only CHX, but it did not differ significantly from only brushing.

**Conclusions:** mechanical action, i.e. brushing, was found to be the best way to control the early biofilm of *S. mutans* on orthodontic aligners.

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# 3D CEPHALOMETRY: ARE THE PROPOSED MID-SAGITTAL PLANES CLINICALLY RELIABLE?

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**Aim:** this study focuses on discovering the most reliable midsagittal plane in 3D cephalometry from existing literature. Its purpose is to evaluate variations and asymmetries in the maxillofacial region, followed by a comparison with findings derived from anthropometric analysis using stereophotogrammetry.

**Methods:** a comprehensive search of literature in PubMed was conducted to identify all proposed midsagittal planes in 3D cephalometry between January 2000 and February 2024. Keywords such as "midsagittal plane and 3D cephalometry", "3D cephalometric landmarks", and "3D cephalometry" were used for this search. The selected planes were then imported into specialized software (SimPlant O&O, Lueven, Belgium).

From the Neuroradiology Department database of Maggiore Hospital in Parma, Italy, a sample of patients aged between 18 to 55 years with angioCT scans taken between January 2019 and February 2024 was chosen. Only subjects with no bone diseases detected in their CT scans were included. Using SimPlant O&O software, 3D reconstructions of the skulls were created from the angioCT scans and planes were marked accordingly. Stereophotogrammetry was conducted on these subjects using Polishape 3D scanner technology (Face Shape 3D MaxiLine, Bari, Italy), and anthropometric analysis of these scans was performed by an experienced operator. Finally, the results obtained from 3D cephalometry were compared with those from the anthropometric analysis to determine the most accurate 3D plane for assessing facial symmetry.

**Results:** at present, 25 out of the 37 midsagittal planes identified in the literature review have been incorporated into the 3D cephalometric software.

**Conclusions:** at the moment, none of the reference planes found in the literature has proven to be reliable. We are currently expanding the sample size.

# 3D CEPHALOMETRY: ARE THE PROPOSED HORIZONTAL REFERENCE PLANES CLINICALLY RELIABLE?

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**Aim:** the aim of this study is to identify the most reliable horizontal plane in 3D cephalometry, which can then be used to assess variations and asymmetries of the maxillofacial complex in comparison with anthropometric analysis using stereophotogrammetry.

**Methods:** a literature review was conducted on PubMed to identify all proposed horizontal planes in 3D cephalometry from January 2000 to February 2024. The keywords used were "horizontal plane and 3D cephalometry", "3D cephalometric landmarks", and "3D cephalometry". The selected planes were then imported into dedicated software (SimPlant O&O, Lueven, Belgium). Patients aged between 18 and 55 years who underwent angioCT between January 2019 and February 2024 were selected from the Neuroradiology Department database of Maggiore Hospital in Parma, Italy. Patients with bone pathology were excluded. The SimPlant O&O software was used to create 3D reconstructions of the skulls from the angioCT scans. Cephalometric planes were then drawn.

Anthropometric analysis was then carried out by an expert operator using stereophotogrammetry with Polishape 3D scanner technology (Face Shape 3D MaxiLine, Bari, Italy). The obtained results were compared to determine the most accurate 3D plane for identifying facial symmetry.

**Results:** until now, 13 out of the 24 horizontal planes identified in the literature review have been selected as appropriate to be used in the 3D cephalometric software.

**Conclusions:** currently, the statistical analysis of the results is still ongoing.

# AUGMENTED REALITY FOR THE CONTROL OF CUTTING PRECISION IN JAW SKELETAL SURGERY

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**Aim:** in the following study we wanted to experiment augmented reality in the field of maxillofacial surgery during the execution of a surgical task concerning dento-alveolar bone surgery with inter-radicular segmentations.

**Methods:** in this study we wanted to perform inter-radicular surgery on resin mannequins after having programmed an augmented reality application that allowed us to see the roots of the teeth trough the Hololens 2 viewer (Microsoft, Redmond, WA, USA). Operators managed to visualize the roots of the teeth inside the mannequin's maxilla through the Hololens 2 and then performed the inter-radicular cuts using a piezoelectric instrument (Piezosurgery Plus, Mectron spa, Carasco, Italy). A dedicated set-up was prepared, including a skull base on which two upper jaws belonging to two patients with different degrees of dental crowding could be attached with resin. The position of the maxillae in relation to the skull base was made unequivocal through the construction of three positioning pins with a concave structure in the skull and a convex one in the maxilla.

**Results:** the preliminary results suggest that the application created in collaboration with the Bioengineering Department of the Sant'Orsola Polyclinic and distributed on Hololens 2 can represent an aid for inter-radicular surgeries in the context of the diagnosis and evaluation of the patient's dental crowding and its relative root anatomy. The study carried out on phantoms suggested that this cannot yet be used as a direct aid in surgical practice, due to the high tracking inaccuracy and imprecision.

**Conclusions:** augmented reality in this and every kind of context can never cause harm to the user, but instead can only bring him benefit. This system, therefore, can only enrich the user's perception, allowing him to view reality in a way that enriches its contents.

# GERD PATIENTS: ASSOCIATION WITH OSA AND ANTHROPOMETRIC CHARACTERISTICS

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**Aim:** Obstructive Sleep Apnea (OSA) is a common disorder characterized by recurrent episodes of a complete or partial collapse of the upper airway during sleep. Several studies have demonstrated that craniofacial and soft tissue abnormalities, older age and obesity contribute to loss of airway patency in patients with OSA. Correlations between OSA and GERD have been detected in previous observational studies and demonstrated an increased risk of OSA in these patients.

**Methods:** a group of consecutive patients who performed EGDS with evidence of reflux esophagitis were selected. The severity of esophagitis was assessed by the Los Angeles classification of Grade A, B, C and D. All patients were given the Berlin questionnaire for risk assessment of OSA. The anthropometric characteristics of the patients (total or partial edentulism, soft tissue evaluation and facial skeleton) were evaluated to highlight any independent risk factors for OSA in the patients setting with GERD.

**Results:** in the setting of patients with GERD, some anthropometric features can predict the risk of OSA. Obesity, age, edentulism, craniofacial and soft tissue anomalies are related to an increased risk of OSA.

**Conclusions:** prevalence of OSA in patients with GERD is significantly higher than in the general population. Recently it has been shown that OSA is linked to a higher incidence of GERD, and vice versa. Different anthropometric factors appear to increase the risk of OSA in patients with GERD. Dentistry knowledge tools must guarantee its "sentinel" role so that OSA can be early diagnosed and treated.

# OBRACES 5S. A NEW INNOVATIVE BRACKET. INDIRECT BONDING USING FAQ.FIX®REVOLUTION

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**Aim:** the objective of this paper is to achieve precise indirect OBRACE 5s bracket positioning utilizing customized bracket placement guided by gnathological criteria with FAQ. FIX®-REVOLUTION.

**Methods:** the OBRACE Orthodontic Self-Ligating System, developed by OO Dental, P.R. China, introduces a novel bracket concept characterized by seamless rounded appearance, ease of cleaning, and optional anchorage in a single bracket. The OBRACE 5s brackets are combined with FAQ.FIX® REVOLUTION, a bracket gauge manufactured by Micerium S.p.A. Italy, which allows for fully adjustable slot height to match the clinician's plan. The accuracy of bracket placement is crucial, as any deviations may compromise the functional requirements necessary to achieve ideal occlusion with proper posterior disclusion.

**Results:** the three-step bonding procedure utilizing FAQ. FIX®-REVOLUTION for OBRACE 5s brackets enables clinicians to achieve precise bracket placement in alignment with gnathological objectives. This results in optimal alignment, leveling, and anterior guidance from the outset of therapy, significantly reducing the risk of bracket repositioning during treatment or the need for wire bending to correct positioning errors, thereby minimizing treatment duration.

**Conclusions:** indirect customized bonding with FAQ. FIX®-REVOLUTION for OBRACE 5s brackets at the onset of treatment is imperative for maximizing the effectiveness of these new brackets and ensuring superior treatment outcomes. Additionally, it enhances diagnostic accuracy and allows clinicians to adhere to a precise gnathological approach, envisioning the patient's occlusion at the conclusion of orthodontic treatment from its inception.

# EVALUATION OF BONE TURNOVER BIOMARKERS IN SALIVA DURING ORTHODONTIC TREATMENT

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**Aim:** this study evaluated changes of some bone turnover biomarkers (BTM) in the saliva of patients undergoing orthodontic treatment. Parathyroid Hormone-related Protein (PTHrP) with a regulatory role on odontoblastic cells, N-terminal type I collagen extension pro-peptide (P1NP), marker of bone formation and Tartrate-Resistant Acid Phosphatase (TRAcP) that provides information on bone remodelling, have been investigated to study the effects of mechanical loading and the regulatory role of PTHrP.

**Methods:** 43 patients, aged between 15 and 18 years, class I dental and skeletal relationships, with upper and lower crowding assessed between 2.1 and 4.0 mm, good gingival and periodontal health were enrolled from September 2022 to January 2023. Salivary samples were collected in 3 times: before the application of the orthodontic appliance (In-Ovation R slot .022″ brackets Dentsply GAC International, The Hague, Netherlands) ($T_1$), 25 ($T_2$) and 45 ($T_3$) days from the start of treatment. The collection of salivary samples was carried out using the passive salivation method. Salivette® with cotton swabs were used for saliva testing. P1NP, TRAcP and PTHrP were analyzed by chemiluminescence technique.

**Results:** Mann-Whitney U test confirmed a statistically significant difference in $T_1$ *vs* $T_2$ and $T_3$, especially for P1NP and TRAcP.

**Conclusions:** these preliminary data confirm the regulatory role of PTHrP in bone remodeling and highlight that changes in the concentration of TRAcP and P1NP in saliva provide information on the progress of orthodontic treatment in the absence of obvious clinical signs.

# CORRECTION OF CHEWING PATTERN AFTER TREATMENT OF BILATERAL POSTERIOR CROSSBITE WITH FGB

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**Aim:** to evaluate the effects of treatment of Bilateral Posterior crossbite (BPXB) with the appliance Function Generating Bite (FGB) on the masticatory function by the percentage of Reverse Chewing Cycles (RCCs) during soft and hard bolus chewing.

**Methods:** this prospective study included 71 subjects: 19 with occlusally symmetric BPXB (M = 9; F = 10; mean age 9.3±2.2 [yr.mo]), 32 with occlusally asymmetric BPXB (19 with more teeth in crossbite on the right side (right prevalent side), M = 7; F = 12; mean age 8.2±1.6 [yr.mo] and 13 on the left side, M = 7; F = 6; mean age 9.6±1.9 [yr.mo]), and 20 controls without malocclusion (M = 8; F = 12; mean age 10.2±1.7 [yr.mo]). Masticatory patterns were recorded before ($T_0$) and after ($T_1$) the correction of the malocclusion with FGB with the K7-I® kinesiograph using standardized soft and hard boluses.

**Results:** BPXB was corrected in all included patients. At T0, the percentage of RCCs in BPXB was significantly increased compared to controls ($p < 0.0001$); symmetric BPXB showed no difference in RCCs between the sides, whereas asymmetric BPXB showed significantly more RCCs on the side with more teeth in crossbite (prevalent side). After treatment with FGB ($T_1$), the percentage of RCCs was significantly reduced in both symmetric BPXB patients (soft bolus, $p = 0.003$; hard bolus, $p < 0.001$) and asymmetric BPXB patients (prevalent side: soft and hard bolus, $p < 0.00001$; non-prevalent side: soft bolus, $p = 0.01$ and hard bolus, $p = 0.0002$).

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

# THE INFLUENCE OF CROSSBITE ON POSTURE AND ITS CORRECTION WITH FUNCTION GENERATING BITE

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**Aim:** to investigate the association between spinal flexion in the frontal plane and Reverse Chewing Cycles (RCC) in Unilateral Posterior Crossbite (UPC) patients, before and after treatment with Function Generating Bite (FGB).

**Methods:** 38 Patients with UPC (M = 17, F = 21, mean age ± SD 8.6±1.7 [yr.mo]) and 35 control patients with normal occlusion (M = 19, F = 16, mean age ± SD 11.3±2.4 [yr.mo]) were included. Before ($T_0$) and after ($T_1$) treatment with FGB, spine alignment was assessed with the Spinal Mouse® system and masticatory patterns were recorded with the K7-I kinesiograph with standardized soft and hard boluses.

**Results:** UPC was corrected in all patients. At $T_0$, there was a significance asymmetry in the spine's side-to-side flexion in the UPC group: the spine's flexion angle on the crossbite side in the UPC group was significantly increased compared to the non-crossbite side ($p < 0.001$), but no difference was shown at $T_1$, after treatment with FGB. In the control group, there was no difference in flexion between the sides at $T_0$ or $T_1$. Concurrently, the percentage of RCCs was significantly increased on the crossbite side in the UPC group compared to the malocclusion-free side ($p < 0.001$), and to the control group ($p < 0.001$). At $T_1$, the percentage of RCCs on the crossbite side in UPC was significantly reduced ($p < 0.01$).

**Conclusions:** functional treatment of UPC with FGB was effective in re-establishing the postural symmetry between the sides during the flexion of the spine in the frontal plane, as well as re-balancing the masticatory function.

# THE IMPACT OF SARPE ON MUSCULAR ACTIVITY: A PROSPECTIVE OBSERVATIONAL STUDY

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**Aim:** the objective of this prospective observational study is to use electromyographic and electrokinesographic activity to examine the alterations in the activity of the masseter and temporalis muscles before and after SARPE (Surgically Assisted Rapid Palatal Expansion).

**Methods:** 24 adult patients selected from the Orthodontic Department of the University of Milan were included in this study. The main inclusion criteria was the presence of unilateral posterior crossbite on the right side. The participants underwent electromyographic and electrokinesographic surface readings at two different times: before surgery ($T_0$) and 8 months after ($T_1$). The electromyographic data of the masseter muscles and the anterior temporalis muscles on both sides were collected during multiple tests: standardized Maximum Voluntary Contraction (MVC)s, after Transcutaneous Electrical Nerve Stimulation (TENS) and at rest. The statistical comparison of T0 and $T_1$ was carried out using Student's t-test ($p < 0.05$).

**Results:** significant differences between T0 to T1 were found in the activity of both masseter muscles at rest after TENS (pr = 0.04, pl = 0.04), of the right masseter muscle at rest (p = 0.03) and of both the right temporalis (p = 0.02) and right masseter (p = 0.03) muscles during maximum clench without cotton rolls. The maximum mouth opening increased after SARPE (T0 = 38.4±1 mm; T1 = 40.9±1.5 mm).

**Conclusions:** after SARPE, there was an increase in the activity of the masseter and temporalis muscles ipsilateral to the side where crossbite was treated, both at rest and during clenching.

# COLLABORATIVE DYNAMICS BETWEEN ORTHODONTIST & DENTAL HYGIENIST: A KNOWLEDGE INQUIRY

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**Aim:** this study aimed to evaluate the efficacy of interdisciplinary collaboration between orthodontists and dental hygienists using a cognitive survey.

**Methods:** two questionnaires, one with 31 items for orthodontists and another with 27 for dental hygienists, were distributed via Google Forms to gather data on demographics, protocols, therapy information, collaborative practices, and satisfaction levels.

**Results:** over four months, 113 responses from orthodontists and 173 from dental hygienists were collected. Analysis showed 74.3% of orthodontists and 85% of dental hygienists initiate contact only when necessary, mainly due to complications, with 54.9% of orthodontists and 74.6% of hygienists engaging in problem-solving collaboration.

**Conclusions:** the findings suggest that true collaboration typically begins in later stages of care. Establishing a collaboration protocol at therapy onset is advised to enable early pathology detection and improve patient outcomes.

# ORAL HYGIENE PROTOCOL FOR PEDIATRIC PATIENTS UNDERGOING ORTHODONTIC TREATMENT

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**Aim:** to examine dental hygienists' role in pediatric orthodontic care by comparing recommended *vs* actual oral hygiene practices.

**Methods:** an anonymous Google Forms survey was conducted among parents of children undergoing orthodontic treatment and ex- patients, focusing on home oral hygiene, the importance of professional care, and hygienist-orthodontist collaboration. The questionnaire included 20 questions, some mandatory, some optional.

**Results:** from 220 Italian responses, 60.5% didn't seek extra oral health support, 25.9% desired more care, and 13.6% had no preference. Despite the recognized need for ongoing dental hygiene, 36% never had or weren't scheduled for a professional session, with 30% of these receiving no dental care instructions.

**Conclusions:** efforts are needed to enhance parents' dental care knowledge and access to child-specific services, underlining the importance of specialized support in pediatric orthodontic treatment. Dentists could use the orthodontic treatment period as an opportune moment to impart knowledge to both children and their families regarding the paramount importance of oral hygiene and the maintenance of results subsequent to treatment.

# ACCURACY OF D-CAS FOR ORTHODONTIC MINISCREW INSERTION: A PILOT STUDY

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**Aim:** this pilot prospective study aimed to evaluate the accuracy of dynamic navigation systems in miniscrew insertion in the palatine vault by comparing the discrepancy between planned and actual miniscrew positions in miniscrew placement.

**Methods:** 20 subjects were included in the study, fourteen males and six females (mean age: 14 years; min 11-max 17 years) and 40 miniscrews were inserted. CBCTs were performed on each subject before and right after the miniscrew insertion, oral scanning was performed before the miniscrew insertion to superimpose the STL file to the DICOM file. The system used to plan and place the miniscrew was the Navident system (ClaroNav Technology Inc., Toronto, Canada). To compare the virtual planning site with the final position, 4 variables were evaluated: entry-3D, apex-3D, apex-depth, and angular deviation. Descriptive statistics were used for the statistical analysis.

**Results:** the mean Entry Point 3D deviation was 2,48 mm (range 0,83-5,2 mm; SD 1,15); the mean Apex Point 3D deviation was 2,99 mm (range 0,44-5,85 mm; SD 1,52); the mean Apex vertical point deviation was 0,90 mm (range 0,01-3,05 mm; SD 0,84); the mean angular deviation was 8,95° (range 0°-28,4°; SD 6,97).

**Conclusions:** it is possible to conclude that the accuracy of d-CAS for miniscrew insertion is clinically acceptable, demonstrating a satisfying vertical control but, on the other side, a low accuracy in angular deviation. These results should serve as a warning for the surgeon, to avoid possible damages to adjacent anatomical structures and achieve the most accurate insertion possible.

# ORTHOPAEDIC EFFECTS OF MAXILLARY EXPANSION SUPPORTED BY ORTHODONTIC MINISCREWS: FEM-ANALYSIS

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**Aim:** the aim of this FEM study is to evaluate the efficiency of the palatal expander with skeletal anchorage (MARPE) in the PPSAIS region.

**Methods:** a finite element model was constructed from a 3D file of an ideal virtual skull, adapted to human dimensions and with a discontinuity in the maxilla similar to a median palatine suture. Two miniscrews were inserted into the palate at a 60° angle placed at a specific site called the PalatalPosterior Supra AlveolarInsertion Site (PPSAIS) to simulate a skeletal expansion of the upper jaw. The file was imported into Abaqus-Caeexplicit for a finite element analysis. The material properties were considered homogeneous and isotropic. A rapid palatal with skeletal anchorage (MARPE) expansion force of 2.5 kg was applied and the foramen magnum was fixed as the point of origin. Measurements of the expansion effects were collected at three locations on the palate.

**Results:** in the quantitative analysis, the transverse displacement of the two haemimaxillary was measured on one side of the skull in 20 steps (equating to 20 rounds of expansion), equivalent to 5 mm of total expansion (2.5 mm per side). The total transverse displacements in three different areas of the palate: anterior, middle and posterior, were 1.84 mm, 2.68 mm and 1.38 mm, respectively. The qualitative analysis showed a slight rotation of the two haemimaxillary and a greater expansion at the area of greatest resistance, i.e. the more posterior and more cranial area of the maxilla.

**Conclusions:** the FEM analysis shows that the bone-borne palatal expander with miniscrews in the PPSAIS position offers biomechanical advantages that maximise skeletal effects by allowing a more uniform opening of the haemimaxillaries in the coronal plane.

# 3D PRINTED ATTACHMENTS: ANALYSIS OF REPRODUCTION ACCURACY COMPARED TO TRADITIONAL METHODS

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**Aim:** the aim of this study is to propose a new 3D printed method for attachment production and compare the reproduction accuracy of traditional attachments with the proposed 3d printed attachment.

**Methods:** a standardized 3D model attachment was created having the dimensions of 3, 2, and 2 mm for apico-coronal, mesio-distal, and vestibulo-lingual dimensions respectively. A 3D ideal model of the maxillary arch was used to apply 4 standardized attachments on the vestibular surface of selected teeth. The obtained model with placed attachments was used to reproduce composite attachments by the conventional method. A transfer template was used to bond with flow composite resin 3D-printed attachment on a new arch model without attachments. Models with traditional attachments and 3D printed attachments were scanned and overlapped with the original CAD model with attachments. To assess attachment precision, vertical and horizontal cutting planes were used on overlapped models. Outcomes selection focused on puff analysis (excess composite material evaluation) and shape analysis (attachment accuracy evaluation).

**Results:** the descriptive statistics showed higher discrepancies compared to the CAD model of traditionally created attachments in shape (0.85 mm) and puff dimension (1.02 mm). The Inferential statistics showed significant differences ($p < 0.05$) in 3D-printed attachments compared to the traditional attachments.

**Conclusions:** custom 3D printed attachment production is an effective method to achieve greater attachment precision.

# 3D CRANIOFACIAL ANALYSIS RELATED TO ROOTIRX CARDIORESPIRATORY OUTCOMES IN CLASS 3 PATIENTS

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**Aim:** RootiRx is a non-invasive cardiorespiratory monitoring device indicating the risk of sleep apnea based on Cyclic Variation of Heart Rate Index (CVHRI) and Chest Effort Index (CEI). This prospective study aimed to relate RootiRx outcomes to craniofacial and Upper Airways (UA) morphology in skeletal Class 3 patients.

**Methods:** in 10 skeletal Class 3 patients who underwent RootiRx, data were uploaded after 24 hours. Using the software 3D slicer, the automated CBCT orientation was obtained. After automated segmentations of jaw bones, skull base and UA, craniometric landmarks were automatically placed. 3D measurements involved mandibular length and width, Interzygomatic Width (IW), facial width, SNA, SNB, mandibular angle, UA Volume (V), UA Minimal Cross-sectional Area (MCA), the distances between canines, first bicuspids, and first molars. Descriptive, bivariate statistics and linear regression were performed setting $\alpha = 0.05$ to correlate RootiRx records with craniofacial structures.

**Results:** females showed lower values of IW (94.14±6.68 mm), V (22523±7546,99 $mm^3$) and MCA (8022,42±1773,41 $mm^2$) than Males (IW: 106,70±2,56 mm; V: 39169,7±6598,95 $mm^3$; MCA: 12126,3±945,09 $mm^2$; $p < 0.05$). The mean value of CVHRI (2.31±2.58) significantly related to an increased mandibular length (86.03±7.31 mm) and decreased SNA (78.21°±4.99°) ($p < 0.05$).

**Conclusions:** this analysis correlated clinical and radiological data, highlighting a potential association between an increased risk of sleep apnea in severe skeletal Class 3 malocclusion with sagittal maxillary hypoplasia and increased mandibular length.

# ANALYSIS OF PALATAL VAULT IN CLASS I AND II PATIENTS TREATED WITH RAPID PALATAL EXPANDER

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**Aim:** this longitudinal study aimed to compare palatal morphological changes in growing patients with skeletal class I or II treated with Rapid Palatal Expander (RPE).

**Methods:** the study sample consisted of 26 patients (13 females and 13 males) with a mean age of 11±1.95 years, referred to the UOC Dental Clinic of Hospital "A. Gemelli". The patients were divided in two study groups according to the sagittal jaws' relationship: skeletal class II (9 patients) and skeletal class I (17 patients). For each patient, digital dental casts were obtained using an intraoral scanner before and after removing RPE. The files were imported to Dolphin Imaging Software to perform 2D linear transverse and sagittal measurements. Transversally, Intercanine (IC) and Intermolar widths (IM) were measured; on the sagittal view, the palatal height from the gingival plane (constructed by connecting the gingival zenith of all the maxillary teeth) was assessed at level of canines (H3) and first molars (H6). Pre- and post-treatment IC, IM, H3 and H6 values from both groups were compared. Significant between group differences were tested with the Student t-test ($p < 0.05$).

**Results:** no significant difference in IC, IM, H3 and H6 post-treatment measurements were found between the two groups. Transverse post-treatment measurements were significantly greater than pre-treatment measurements. The palatal height remained slightly the same in Class I patients, but it increased in Class II patients after treatment at the level of molars.

**Conclusions:** RPE treatment led to an increase of the palatal height in the posterior area of class II patients.