

## ORTHODONTIC TREATMENT IN A PATIENT WITH ANTISYNTHEASE SYNDROME: CASE REPORT

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**Aim:** to show possible risk of orthodontic treatment in a patient with antisynthetase syndrome (ASS). ASS is an immune-mediated, chronic pathology, which can affect multiple systems of the body. Common sign and symptoms of ASS are interstitial lung disease, inflammatory myopathy, and inflammatory polyarthritis.

**Methods:** the patient, a 33-years-old woman, presented a skeletal and dental Class I malocclusion with a crowding of 7 mm, OVJ 5 mm and a slight lateral open bite on sector 1. Patient suffered ASS, was followed by a rheumatologist and was under systemic therapy with monoclonal antibodies. The patient was treated with clear aligners and vertical elastics. One year after the treatment start, patient reported unjustified muscle fatigue and muscular and joint pain. The clinical examina-

tion following the diagnostic criteria for temporomandibular disorders allow a diagnosis of arthralgia, myofascial pain and headache attributed to TMD.

**Results:** therapy consists in counseling and physiotherapy with massage and stretching exercise to repeat five times per day and suspension of the vertical elastics. After two months of therapy patient reported no more fatigue or pain.

**Conclusions:** this case report highlights the importance of a comprehensive diagnosis. In patient with ASS particular attention should be paid to the presence of signs and symptoms of TMD given their possible predisposition to these symptoms. A stop and start protocol that provide the treatment of TMD symptoms before to continue orthodontic therapy could be suggested in these patients.

## PREVALENCE OF SLEEP BRUXISM: POLYSOMNOGRAPHIC DIAGNOSIS, TOOTH-WEAR AND OROFACIAL PAIN

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**Aim:** Sleep bruxism (SB) is a condition of great interest although is still complex to define. Polysomnography (PSG) recordings are currently the gold standard for diagnosis. The purpose of this controlled cohort study is to compare clinical tooth wear, head-neck muscles pressure pain thresholds (PPT), diagnosis of temporomandibular disorders (TMD) and the results of SB self-assessment questionnaires between SB patients diagnosed with PSG and non-SB patients.

**Methods:** adult and self-sufficient patients undergo an ambulatory PSG recording; bruxism episodes are recorded and analyzed through the signal of electrode positioned on masseter and audio-video recordings. The incisal/occlusal tooth-wear is clinically recorded using scale TWES2.0. PPT are measu-

red using Fisher algometer. A clinical examination is carried out to evaluate the presence of TMD and orofacial pain, according to the international diagnostic criteria. SB self-assessment questionnaires are administered.

**Results:** 7 SB patients and 23 non-SB subjects were included. The analysis of tooth wear does not show a significant difference between SB-patient and non-SBs, as well as PPT and SB's self-assessment questionnaires. There is no evidence of relation between TMD and SB.

**Conclusions:** results confirm that tooth-wear is not pathognomonic of active SB and that the SB self-assessment is not reliable. Furthermore, the absence of a relationship between TMD and SB confirm the poor relevance of effects of SB activity compared to a daytime clenching.

## RHABDOMYOSARCOMA OF THE TEMPOROMANDIBULAR JOINT SPACE: A PECULIAR CASE REPORT

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**Introduction:** Rhabdomyosarcoma (RMS) is an aggressive malignant tumor composed of neoplastic mesenchymal cells. RMS is the most common soft tissue sarcoma in children, and in 40% of the cases it occurs in the head and neck region where it often presents facial swelling, throat discomfort, or nasal airway obstruction, lacking specific signs and symptoms.

**Case report:** we report a rare case of RMS developed in the space of the right temporomandibular joint in a 12-year-old male patient. After 6 months of intractable pain around his right ear and mandible, an orofacial pain specialist was consulted. The patient reported a high intensity pain of short duration that occurred every 3/5 minutes. On a clinical examination, there was a severe limitation of mouth opening with a mandible deviation to the right side. Evaluated with Von Frey hairs, the patient re-

ported paresthesia in the right auricular area and hyperalgesia in the right side of the mandible. All these clinical aspects suggested requesting urgent magnetic resonance imaging that revealed the presence of the neoplastic mass. An incisional biopsy led to the diagnosis of poor prognosis *Embryonal RMS*.

**Discussion:** the difficulty in making a correct diagnosis is attributable to the intracranial growth of the tumor which led to an unusual presentation of the problem. Nevertheless, the accurate evaluation of the patient's history and of the characteristics of pain was crucial to improve the diagnostic process. Continuous and nonspecific signs and symptoms like limited mouth opening and persistent pain both during function and spontaneous should alert despite patients do not show any facial swelling.

## FORENSIC DAMAGE ASSESSMENT OF TEMPOROMANDIBULAR JOINT: A REVIEW

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**Aim:** recent studies highlight the underestimation of traumatic orofacial lesions and related individual sequelae. Forensic assessment should not be limited to detecting dental fractures and traumas, and the persistence of painful symptomatology and functional and muscular limitation should be considered pathological. The purpose of this study is to determine whether there is a relationship between damage assessment and TMD.

**Methods:** the research for the keywords "damage assessment" and "TMD" joined by the boolean operator "AND", on the search engine PubMed, until February 2022, produced 69 results. There were 5 articles included that satisfied the question: 4 retrospectives, and 1 prospective study.

**Results:** all studies show direct proportionality between severity and type of trauma with soft tissue changes. Damage assessment should always be supported by diagnostic examination on both sides of the face, regardless of the characteristics of the impact: TMJ is often subject to involvement by indirect trauma, despite the *restitutio ad integrum*.

**Conclusions:** this review wants to expose the existing correlation between orofacial damage and the individual sequelae that in direct and indirect ways involve in good percentage the TMJ.

Future studies will clarify the real extent of a traumatic event, as well as its management and treatment.

## GNATHOLOGY IN SPORT: NEW TECHNOLOGIES IN A MULTIDISCIPLINARY ANALYSIS

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**Aim:** the aim of this work is to analyze oral, postural, podiatric and performance conditions of a group of athletes.

**Methods:** the study included 30 basketball players of three Italian clubs, aged between 18 and 27. After anamnesis, the dental team evaluated each athlete in oral, gnathological and postural condition. A surface electromyography (Teethan) was used to measure masticatory muscles parameters. A band accelerometer (Baiobit) was used to register posture, balance and functional mobility. Data were integrated with a baropodometric platform (Loran) analysis, made by a podiatrist. Performance jump tests were standardized and registered by clubs' athletic trainer, using infrared sensors (Optojump).

**Results:** 97% of examined athletes had at least one type of

gnathological asymmetry: dental, muscular, articular or functional. Electromyography confirmed these results reporting quantitative data on muscular parameters. Accelerometer tests detected postural asymmetries, the most relevant was pelvic rotation in axial jump movements ( $19.65^\circ \pm 0.70$ ). Baropodometric tests reported that 93% of participants had at least one type of asymmetry in plantar support in terms of pressure, surface, antero-posterior or latero-lateral.

**Conclusions:** the results highlight the importance of gnathological and multidisciplinary approach in athletes in order to design targeted therapies. Further studies will evaluate any possible correlations between selected parameters, integrating a multidisciplinary follow-up after gnathological treatment.

## EXTRACORPOREAL SHOCK WAVE THERAPY IN PAIN RELIEF FOR PATIENTS WITH TEMPOROMANDIBULAR DISORDERS

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**Aim:** Temporomandibular Disorders (TMD) are defined as a set of disorders affecting the masticatory muscles, TMJ, and/or associated structures. This study aimed at comparing the efficacy of physical therapy, with or without Radial Extracorporeal Shock Wave Therapy (rESWT), in TMD patients.

**Methods:** in this pilot randomized clinical trial, patients were recruited from University Hospital "Mater Domini", Catanzaro, Italy in a 6-month period (July-December 2021) and randomly assigned 1:1 to receive physical exercise combined with rESWT or sham rESWT for 4 weeks. Inclusion criteria were: diagnosis of myofascial pain (Group Ia, Ib - DC/TMD); VAS  $\geq 3$ ; pain lasting from at least three months on at least one masseter muscle. Primary outcome was pain intensity measured by VAS; secondary outcomes were muscle activity assessed by sEMG of anterior temporalis and masseter muscles.

**Results:** fifteenth patients were enrolled after providing informed consent and were randomized to rESWT therapy plus physical therapy (n = 8; mean age:  $28.50 \pm 8.85$  years) or physical therapy alone (n = 7; mean age:  $30.71 \pm 8.98$  years). A significant improvement in pain in the group A (Right side: p = 0.02; Left side: p = 0.02) at the end of treatment. Concerning the secondary outcome, Group A patients showed a statistically significant reduction in BAR (at T2: p = 0.04; at T3: p = 0.03). Moreover, rESWT group reported significant increase in total standardized muscle activity (IMP, IMPACT score) and a significant POC in masseter muscles at T1 (p = 0.04).

**Conclusions:** taken together, findings of the present study showed that the synergistic approach between rESWT and physical therapy reported a significantly lower pain and a higher POC index on the masseter muscles compared to the control group.

## A CASE OF SEVERE TMJ DEGENERATIVE DISEASE WITH LEFT CHONDROMATOSIS

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**Aim:** to present a case of extensive unilateral TMJ chondromatosis. Synovial Chondromatosis (SC), a benign proliferation of cartilaginous tissue in synovial joints, is relatively rare in TMJ, especially when cartilaginous calcified bodies are particularly voluminous. Relationship of calcified bodies with bone components of the joint or disk and articular spaces are depicted in CT and MRI respectively and help in clarifying pathogenesis and guiding surgery. Secondary SC may be associated with degenerative changes of the joint components and with previous trauma. Differential diagnosis concerns osteo-cartilaginous neoplasms.

**Methods:** a 61-years-old female patient referred to Gnathology Dep, Dental School, Turin University, complained of left TMJ pain, with articular crunch, restriction on opening the

mouth and sporadic dizziness. A fall down from a high chair at 2 years old has been reported. Clinical examination: crackling, muscle and joint pain were evident on masseter palpation on both sides at the pressure of 1 kg, bilateral joint pain and crackling, reduction of active and passive opening, 27 mm and 38 mm respectively. TMJ CT was prescribed.

**Results:** CT findings: unilateral severe degenerative changes with osteophytes, pseudocysts, cortex sclerosis and erosion, flattening of the condyle head and multiple calcified bodies in the left TMJ with no calcified bodies or degenerative changes in right TMJ. No direct signs of condylar fractures.

**Conclusions:** CT unilateral pathological findings and anamnestic datum of trauma orient the diagnosis toward a post traumatic SC.

## TEMPOROMANDIBULAR JOINT DISORDER IN SJOEGREN SYNDROME: A SYSTEMATIC REVIEW

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**Aim:** Sjogren Syndrome (SS) is a chronic systemic autoimmune disease characterized by progressive lymphocytic infiltration of the exocrine glands and sicca syndrome. Oral functions impairment due to low salivary flow includes difficulty in chewing, swallowing and talking, dysgeusia, tooth decay, mucosal atrophy. Muscular and nervous domains are frequently involved in SS but their clinical relevance in the oro-facial district have rarely been investigated. The aim of this systematic review is to evaluate the possible association of temporomandibular joint disorders (TMJD) with SS.

**Methods:** PubMed, Embase, Web of Science and Scopus databases were electronically searched for observational studies reporting TMJD or TMJ involvement in patients with a diagnosis of SS according to the 2002 American-European Consensus Group (AECG) classification criteria.

Only articles in English were included.

**Results:** from 42 articles 7 relevant articles have been selected and read in full. SS patients presenting symptoms and signs of TMJ involvement ranged between 29% - 91% and prevalence of TMJD ranged between 29% and 54%. All controlled studies agreed on reporting a significant higher prevalence of TMJD in the SS group. Two studies reported a significant decrease in masticatory muscle activity and tongue strength compared to age-and-sex-matched controls.

**Conclusions:** when investigated, symptoms and signs of TMJD are reported in most of SS patients, who show a much higher prevalence of TMJD compared to the general population (31% among adults, 11% in adolescents). More data are needed to assess the possible association between SS and TMJD and its causes.

## NEW PERSPECTIVES FOR SOFTWARE-ASSISTED REHABILITATION IN PATIENTS WITH SYSTEMIC DISEASES

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**Aim:** the aim of this case report is to include a patient in a computerized workflow, that can follow him in every phase of the treatment and track the mandibular position and movements as closely as possible to reality, in order to create customized devices.

**Methods:** the objective test of the vulnerable patient that was selected, revealed mobility and extrusion of the periodontally involved elements 3.2 and 4.2, severe impairment of masticatory function and an altered mandibular position, due to the deviant precontact offered by 3.2 and 3.3 elements. The lateral incisors, above mentioned, were extracted and, in order to rehabilitate edentulism through fixed prostheses on osseointegrated implants, a software which combines the full-arch digital impressions, the 3D CBCT data of the jaws and the JMT data, was used.

**Results:** the software shows on the screen a 3D image of the patient's specific mandibular movement. The spaces and volumes available can be measured with maximum precision, in order to select the most suitable areas for implant placement. In this case a four-element bridge was chosen. The most correct implants angulation and sinking were established, in order to prepare the site and to offer a prosthetically guided axis for the abutment. Then a CAD-CAM surgical guide was ordered.

**Conclusions:** using the modern computerized approach, it is possible to obtain static and dynamic information, which will be useful in the realization of the prosthesis, relying on the real movements of the patient and considerably reducing the chair time and the patient discomfort.

## RELATIONSHIP BETWEEN PERIODONTITIS AND OSA IN ADULTS: A SYSTEMATIC REVIEW

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**Aim:** the purpose of this systematic review was to evaluate whether there is scientific evidence regarding the association between periodontitis and OSA in adults.

**Methods:** the study was conducted according to the PRISMA statement. An electronic search was performed on Medline/PubMed including prospective and retrospective longitudinal studies, cohort studies and case-control studies conducted in human adults affected by both OSA and periodontitis, published between 2000 and 2021. Two reviewers extracted the data using a custom Excel spreadsheet. A methodological assessment of the quality of the studies was performed using the Newcastle-Ottawa scale.

**Results:** fourteen studies were included. All studies evaluated the association between periodontitis and OSA. None of the

studies evaluated the cause-effect relationship. Eleven studies found a significant positive relationship between periodontitis and OSA, while three found no statistically significant association. The evidence for a dose-response relationship was conflicting. Several study limitations were observed, such as lack of standardization of study groups, diagnosis of periodontitis and OSA and differences in study design.

**Conclusions:** evidence of a plausible association between periodontitis and OSA was found. The possible relationship could be explained by systemic inflammation, oral breathing, and the comorbid relationship attributable to common risk factors. Observational and randomized controlled studies are needed to clarify the mechanism of interaction between the two conditions.

## ASSESSMENT OF ORAL BEHAVIOURS IN INDIVIDUALS WITH HEADACHE

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**Aim:** oral behaviors are predisposing factors for the development of temporomandibular disorder (TMD). There are no information regarding the contribution of these oral activities in the onset of headache disorders. The aim of the current study was to assess the frequency of oral behaviors in patients different type of headache.

**Methods:** participants were retrospectively recruited from the Section of Orthodontics and Temporomandibular Disorders of the University of Naples Federico II. Adult patients with a diagnosis of headache attributed to TMD, or migraine, or both, were included. The oral behaviors were measured with the Oral Behavior Checklist (OBC). OBC total score, sum of non-functional activities (NFA) and functional activities (FA) were computed. Between groups differences were calculated

by means of a one-way Analysis of Variance (ANOVA), with Bonferroni post-hoc. Statistically significant level was set at  $P < 0.05$ .

**Results:** one-hundred fourteen (114) patients were selected, of which: 19 with migraine (4 M, 15 F, mean age  $40.7 \pm 14.7$  years), 74 with headache attributed to TMD (12 M, 62 F, mean age:  $40 \pm 17.9$  years), and 21 with mixed headache (3 M, 18 F, mean age  $37.5 \pm 12.7$  years). Considering all the study variables, the oral behaviors in the migraine group were lower, as compared to both headaches attributed to TMD and mixed headache patients. However, these results did not reach statistically significance.

**Conclusions:** oral behaviors seem to play a limited role in the development of headache disorders.

## PRELIMINARY STUDY WITH FMRI ON PATIENTS WITH TMD DISORDERS

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**Aim:** this study aims to evaluate by fMRI the efficacy of gnathological therapy on patients with teeth clenching and myofascial pain and study the variations and effects on the CNS. Correct clinical treatment can modify the functional activation of cerebral networks associated with pain and unconscious teeth clenching, specifically the pain network (PN) and default mode network (DMN).

**Methods:** a case series on 10 pts (5 intra-articular-5 extra-articular). Each pt was treated with passive aligners and biofeedback exercises (only one pt has not been assigned a biofeedback exercise). All pts are examined monthly with VAS and muscle palpation. MRI of the TMJ and fMRI of the brain are performed on each pt before and after treatment.

**Results:** this study showed the reduction of symptoms in 10/10 pts, both in referred pain and trigger points detected during muscle palpation and VAS. The fMRI of the brain showed that 9/10 pts have a homogeneous functional modification of PN and DMN. In only one patient, the values of the networks are opposite because he did not perform the exercise.

**Conclusions:** the gnathological therapy with passive aligners and biofeedback exercises improved clinically myofascial pain in all patients. This type of therapy may be an effective treatment option for patients with TMD. These results are decisive because they allow associating an external and completely subjective datum (pain) to an objectively repeatable activity at the level of precise cerebral networks.

## CLINICAL EFFECTS OF ABDOMINAL ACUPUNCTURE TREATMENT IN NON-RESPONDING TMD PATIENTS

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**Aim:** Temporomandibular Disorders (TMD)-related pain is often characterized by little or no response to conventional treatments. *Abdominal acupuncture* (AA) is successfully used for treating pain and neurological disorders, but evidence of its effectiveness in orofacial pain field is lacking. This retrospective study aimed to analyze the effects of AA on pain and pain interference in quality of life of TMD patients non-responding to previous therapies.

**Methods:** 28 patients, 24 females and 4 males (average age = 49.36 years) visiting our Clinical Gnathology Unit, between January 2019 and February 2021, with subacute and chronic treatment resistant TMD-related pain were fully treated and analyzed. All patients underwent to 8 AA sessions, twice a week, each lasting 30 min. At the start (T0) and end (T1) of AA

treatment the maximum mouth opening (MMO) and craniofacial pain intensity (VNS) were measured. At T0 and T1, all patients also completed the Oral Behaviour Checklist (OBC). The Wilcoxon signed-rank test was used to compare the VNS, MMO, and OBC results at T0 and T1 (statistical significance for  $P < 0.05$ ).

**Results:** the difference in MMO and the improvement in oral functioning (OBC) and pain perception, according to VNS, at T0 and T1, resulted statistically significant for all the considered variables (all  $P < 0.05$ ).

**Conclusions:** AA effectively improved subacute/chronic TMD-related pain and symptoms. Further studies with larger samples and appropriate design are needed to elucidate AA efficacy non-responding TMD patients.

## THE ROLE OF NUTRACEUTICALS IN THE MANAGEMENT OF TEMPOROMANDIBULAR DISORDERS

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**Aim:** to evaluate the efficacy of short-term treatments with nutraceuticals a) isolated or b) combined with splint therapy in subjects with temporomandibular disorders. Nutraceutical used was composed by Boswellia Serrata Casperome, Magnesium, Tryptophan and vitamins B2 and D with a posology of 1 tablet per day before sleep for 40 days.

**Methods:** as for the purpose a), 140 subjects with neuro-muscular disorders were eligible for the study and randomly divided into 2 groups (treatment group and control group). As for b), 140 subjects in therapy with occlusal splint were randomly divided into groups (treatment group and control group). Presence of muscle pain, headache, neck pain and sleep/emotional disorders were assessed at T0 and at T1, after 40 days. ANOVA was performed to compare treatments with nutraceutu-

tics and their respective controls, as for the variables related to painful symptomatology.  $c^2$  test was performed to assess differences in sleep/emotional disorders between groups. The level of statistical significance was  $p < 0.05$ .

**Results:** as for all the parameters under consideration in the ANOVA test, a significative effect of Therapy, Time and their interaction was found with  $p < 0.05$ . In all groups using nutraceuticals, subjects reported a significant improvement over controls.  $c^2$  analysis showed a reduction of sleep and emotional disorders in subjects taking nutraceuticals compared with controls.

**Conclusions:** the use of nutraceuticals seems to be a valuable support for TMD therapy in the short term either alone or when combined with occlusal splint therapy.

## THE ROLE OF COGNITIVE INHIBITION IN RESPONSE TO PAIN INDUCTION IN TEMPOROMANDIBULAR DISORDERS

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**Aim:** temporomandibular disorders (TMDs) are a group of pathological entities involving temporomandibular joints and related structures, with a multifactorial etiology. Chronic pain is one of the most frequent issues and its management often represents a challenge for the clinician. As emerged from fMRI, this type of pain is characterized by brain structural and functional alterations and weakening of central and peripheral mechanism of pain modulation, which leads to a lowering of pain threshold and tolerance. Cognitive impairment may also be present in subjects with chronic pain. To address the research purpose, the authors investigated the association between cognitive inhibition and pain in TMD.

**Methods:** a population of 15 healthy adults and 15 patients diagnosed with chronic TMD, recruited at the Department of

Oral and Maxillo-facial Sciences, Sapienza University of Rome, completed the experimental procedure. The Stroop Color Test was administered to assess cognitive inhibition in a randomized order; the Cold Pressure Arm Wrap was adopted to induce cold pain.

**Results:** a positive correlation between pain measures (thresholds and tolerance) and cognitive inhibition in TMD ( $r = 0.63$ ;  $p = 0.01$ ), in particular performance (i.e. reaction time) in the Stroop Task predicted pain threshold.

**Conclusions:** these findings suggest that TMD subjects with higher cognitive inhibition are more likely to manage pain successfully. Further studies, including a growing number of participants and other methods of pain induction, could be conducted to improve the significance level of the study.