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On behalf of the Organizing and Scientific Committee, we are pleased to welcome you all at the International Scientific Conference in Dentistry 2024 Novi Sad.
You will be met with an exceptional program covering different topics, from basic research areas to areas within daily practice of Restorative Dentistry, Endodontics, Prosthodontics, Oral Surgery and Implantology, Periodontology, Pediatric and Preventive Dentistry.

President of the Organizing Committee
Prof. dr Tatjana Puskar

President of the Scientific Committee
Prof. dr Milica Jeremic Knezevic

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INVITED LECTURES

NATAL AND NEONATAL TEETH

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Abstract:
Natal teeth *refer to teeth present at birth, while* ***neonatal teeth*** *emerge within the first 30 days of life. These teeth most commonly represent the early eruption of normal primary deciduous dentition, but they may also be supernumerary teeth. Complications can include detachment of the tooth with the risk of aspiration or swallowing, discomfort during breastfeeding, laceration of the mother's breasts, sublingual ulceration with pain. A dental radiograph (roentgenogram) should be performed to differentiate between the premature eruption of a primary tooth and a supernumerary tooth. In cases where the tooth is supernumerary or excessively mobile, extraction is recommended.*
Key words: *Natal Teeth; Tooth, Deciduous; Tooth, Supernumerary; Radiography, Dental*

Introduction

Natal teeth are defined as teeth present at birth, while neonatal teeth are those emerging within the first 30 days of life [1, 2, 3]. It is well known that normal eruption of primary deciduous teeth typically begins with the eruption of mandibular incisors at about 6 months of age, with physiological range between 4 and 8 months [4, 5]. Prematurely erupted primary teeth are referred to teeth emerged before their expected schedule, and could be find in a literature under several terms, such as congenital teeth, fetal teeth, infancy teeth, predeciduous teeth, precotious dentition, dens conatalis, and dentitia praecox [6, 7]. The terms „natal teeth“ and „neonatal teeth“ were introduced by Massler and Savaral [8] to target these specific types of prematurely erupted primary teeth.
From Roman times onward, different eras and cultures, through superstitions and fairy tales, have offered various explanations for natal teeth. These ranged from favorable interpretations - that such children would have a fortunate fate - to beliefs that they were bearers of misfortune and doomed [1, 9]. The significance attributed to natal teeth is evident in the fact that many historical figures, including Hannibal, Richard III, Louis XIV, Cardinal Richelieu, and Napoleon, were documented to have had them [9].
Natal teeth are a rare occurrence, with an incidence ranging from 1 in 2,000 to 1 in 3,500 live births, varying across geographical areas and populations [1, 2]. They are slightly more common in females [10]. Neonatal teeth are even rarer, with an estimated incidence three times lower than that of natal teeth [1, 2, 3].

Etiology

The etiology of natal and neonatal teeth is not fully understood. It is considered to be multifactorial, with inheritance and genetics, endocrine, environmental and developmental factors involved. They are often isolated findings without any other abnormalities, but may be associated with underlying medical conditions or syndromes.

Inheritance and genetics
The enrollment of hereditary factors in the occurrence of natal and neonatal teeth is supported by the fact that these conditions might occur in a familial pattern. Positive family history has been reported in 8-62% of cases [7]. The inheritance of natal teeth is believed to follow an autosomal dominant pattern [1]. Natal teeth are associated with leech of cleft lip and palate: they are present in 2% of infants with unilateral cleft lip and palate and in 10% of infants with bilateral cleft lip and palate [11]. Furthermore, natal and neonatal teeth have been repeatedly reported to be associated with more than twenty genetic syndromes and abnormalities, such as Down’s syndrome, Ellis-van Creveld syndrome (chondroectodermal dysplasia), craniofacial dysostosis, Pierre Robin sequence, Sotos syndrome, pachyonychia congenita (Jackson-Lawler syndrome), ectodermal dysplasia, neonatal progeria, epidermolysis bullosa simplex, and others [3, 12, 13, 14, 15].

Endocrine factors
Endocrine disorders in the mother during pregnancy that stimulate the pituitary gland, thyroid gland, and gonads can influence premature tooth eruption in the newborn, possibly through excessive or accelerated resorption of the bone surrounding the tooth germ [16]. Several reports indicate an association between natal tooth eruption and congenital hypothyroidism [17, 18].

External and environmental factors
Exposure to certain unfavorable factors during intrauterine development, such as maternal infections and febrile conditions, malnutrition and hypovitaminosis during pregnancy, hormonal stimulation, and syphilis, may contribute to the formation of natal and neonatal teeth [3, 19]. Exposure of a pregnant mother to environmental toxins, predominantly polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs), and dibenzofurans (PCDFs), appears to contribute to the eruption of natal teeth, among other potential disorders and impairments that may be found in the newborn [19, 20, 21].
They are industrial compounds or byproducts that have been widely identified in the environment and in chemical waste dumpsites. PCBs are ubiquitous environmental contaminants due to their large-scale production until the late 1980s and continued use to this day. PCDD/Fs and PCBs can also be emitted from biomass and fossil fuel burning, as well as from stationary sources like waste incineration [22]. These compounds cross the placenta, and their concentrations in a newborn's adipose tissue correlate with those found in the mother's milk. In cases of intrauterine exposure to high concentrations of these compounds, the newborn may exhibit other manifestations in addition to natal or neonatal teeth, such as dystrophic fingernails and hyperpigmentation [23].

Developmental Factors
Abnormalities in the dental lamina during embryonic development can lead to the early formation of teeth. The dental lamina is responsible for the formation of the tooth germ, and disruptions in this process may cause teeth to erupt earlier than usual [16].

Clinical and histological characteristics

Most natal and neonatal teeth are considered early erupting teeth of the normal deciduous dentition. However, in up to 10% of cases, natal and neonatal teeth are supernumerary [3, 23]. Given that natal and neonatal teeth are usually prematurely erupted normal deciduous teeth, they most often occur in the area of the mandibular (lower) incisors, in over 85% of cases [3, 16]. Other locations are affected much less frequently, with the maxillary incisors occurring in 11% of cases, mandibular canines and molars in 3%, and maxillary canines and molars in 1% [7].
Natal and neonatal teeth can be solitary, but they often emerge in pairs. However, the eruption of more than two natal or neonatal teeth is a rare occurrence [16].
Natal and neonatal teeth may resemble normal primary dentition in size and shape; however, they are often smaller, conical, and yellowish. Additionally, they frequently exhibit abnormal mineralization of the enamel, resulting in hypoplastic or dysplastic enamel and irregular dentin. The incisal edge might lack enamel. Both Hertwig's sheath and cementum may be absent, often accompanied by incomplete or absent root formation [3].
Depending on the combination of developmental, external, and histological characteristics, several clinical categories of natal and neonatal teeth can be distinguished [14, 16, 19]:

- Shell-like crown structure loosely attached by gum tissue with no root.
- Solid crown loosely attached by gum tissue with little or no root.
- Eruption of the incisal margin of the crown through gingival tissue.
- Swelling of the gum tissue with an unerupted but palpable tooth.

Complications

As the descriptions of individual forms indicate, in a significant number of cases, natal and neonatal teeth have poorly developed or absent roots, making them very mobile and prone to falling out. Furthermore, their underdeveloped sharp margins can cause lacerations in the surrounding tissue. Logical complications of natal and neonatal teeth include [1-3, 14, 16, 19, 24, 25]:

- sublingual ulceration (Riga-Fede disease) with resultant feeding refusal
- discomfort during suckling (pain associated with teeth mobility)

- laceration of the mother's breasts
- aspiration or swallowing of the teeth

A lesion on any surface of the oral mucosa can result from trauma caused by primary teeth. The ventral region of the tongue is the most common site for such ulcers due to the tongue's forward and backward movements. This condition is known as Riga-Fede Disease (RFD) [24, 25]. The lesion initially presents as an ulcerated area with prominent raised edges. Repeated trauma can cause it to evolve into an enlarged fibrous mass resembling an ulcerative granuloma, potentially with superficial necrosis [24, 25]. This lesion is painful and causes discomfort for the infant, making it difficult to suck and feed. In some cases, it may lead to a refusal to feed, putting the infant at risk of dehydration and nutritional deficiencies. Additionally, there is a potential for infection at the site of the lesion.

Diagnosis

Careful inspection of the natal or neonatal tooth/teeth, along with an assessment of their mobility, is the first step in diagnosing this condition [1-3, 14, 16, 19]. To differentiate prematurely erupted primary deciduous teeth from supernumerary teeth, a dental roentgenogram should be performed as soon as possible. The only situation in which a dental X-ray is not performed on a newborn is if the parents oppose this type of diagnostic procedure [26].

Although natal and neonatal teeth are in majority of cases isolated occurrences, it is important not to overlook possible associated genetic and other syndromes and diseases. After a thorough and detailed medical history and careful examination of the infant, any further investigations should be directed accordingly.

Management

Management of natal and neonatal teeth can be expectant, conservative, or invasive (e.g., extraction) depending on several factors. If the tooth is clearly a prematurely erupted primary tooth, does not interfere with breastfeeding, and is otherwise asymptomatic, no treatment is necessary, just a regular checkup. However, if the tooth is supernumerary, exceptionally mobile, or poses a high risk of aspiration or swallowing, extraction should be performed [16, 26, 27]. In other cases, decisions should be made on a case-by-case basis.

If there is an increased risk of Riga-Fede Disease (RFD) or if RFD is already present, conservative management should always be considered as the first option, avoiding extractions when possible [28]. In some cases, further mucosal trauma can be prevented by modifying and flattening sharp edges of the teeth, or by covering sharp edges with adhesive restorations and mouthguards [25]. If conservative treatment options do not lead to a quick resolution of the injury, tooth extraction may be necessary.

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THE MOST RISKFUL WISDOMTEETH

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Abstract: *This lecture aims to give diagnostic tips to reliably find and filter most riskful wisdomteeth. PoloMint, PEIR, and JAR. Nice abbreviations but what are they meaning? Do they have diagnostic and therapeutic consequences? How can they modify our surgical decisions? Are there such cases, where even coronectomy can not be applied? How can drill sleeve support tooth section's precision? This lecture tries to give an insight in the above mentioned questions and concerns, including experimental and clinical research results.*

RELATIONSHIP BETWEEN PERIODONTAL DISEASE AND SYSTEMIC HEALTH

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Abstract: *The occurrence of periodontal disease is linked to several other health conditions, including heart disease, diabetes, certain cancers, arthritis, osteoporosis, and various gastrointestinal and respiratory issues. This study aimed to explore how periodontal disease relates to this diseases. Our findings indicate a significant two-way connection between periodontal inflammation and overall health. Hence, periodontal disease should be recognized as a potential contributor to the development of many diseases in human body. Moreover, treating periodontal disease can have a substantial impact on reducing the risk of mortality and illness associated with systemic conditions.*

CONSERVATIVE TREATMENT OF THE MASSETER MUSCLE HYPERTROPHY ASSOCIATED WITH TEMPOROMANDIBULAR JOINT DISORDER

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Abstract: *Masseter muscle hypertrophy occurs bilaterally with the squared lower third of the face. Etiology is unknown, related to gum chewing, bruxism, malocclusion, psychological disorders, and temporomandibular joint disorders. Patients complain of facial asymmetry; symptoms are pain, trismus, or bruxism. Several treatment options are presented: pharmacotherapy, occlusal splints, neuromodulator botulinum toxin, and surgical reduction. Patients were treated with a conservative approach the occlusal equilibration by splints and injecting botulinum toxin locally into the hypertrophied muscle. A significant reduction in muscle thickness and facial reduction was observed on a 6-month follow-up. Botulinum toxin injection is a safe, effective treatment for masseter hypertrophy.*
Key words: *masseter muscle, hypertrophy, TMJ, TMD*

Introduction

Masticatory muscle hypertrophy (MMH) is a functional, reactive hypertrophy affecting mainly the masseter muscles [1]. Hypertrophy occurs bilaterally/unilaterally, and patients have typically squared lower faces [2]. Etiology is multifactorial, due to modern life stress and anxiety many patients adopt bad habits like clenching and grinding teeth, biting nails, chewing pencils, and toothpicks. These triggers are not very strong, but over long periods can lead to overworking the chewing muscles, accompanied by pain, trismus, and hypertrophy [3]. Malocclusion and facial morphology are often considered an important etiological factor [4], [5]. MMH has no gender and ethnic predominance with a high incidence of occurrence in 20-40 years. Patients have type I when the enlargement is due to muscle hypertrophy or type II when the swelling presents a prominence of mandible angle and not much hypertrophy of masseter muscles [6]. Clinical examination involves extra, intraoral observation, palpation, radiography, ultrasonography, morphometric analysis, and electromyography measurement [7], [8]. Differential diagnoses include muscle, vascular, parotid, mandible tumors, and salivary gland diseases [9]. Treatment options range from pharmacotherapy, occlusal splints, relaxation techniques, and botulinum toxin to more invasive surgical bone reduction [10]. The paper aims to present conservative treatment of the masseter muscle hypertrophy associated with temporomandibular joint disorder as one of the possible therapeutic modalities with effective reduction in muscle volume and activity.

Material and methods

Patients with bruxism were treated with muscle relaxants, occlusal equilibration by splint, and local injection of botulinum toxin-A into the hypertrophied masseter muscle. Standardized photography and clinical parameters were used to assess facial contour and muscle thickness at the beginning of the therapy and successive follow-ups. Both patients had type I hypertrophy.

A 30-year-old female patient was treated for bruxism with a soft occlusal splint. Anamnestic data were positive for grinding and clenching teeth during sleeping, and pain in the peri-auricular and temporomandibular joints. Clinical examination showed bilateral hypertrophy of the masseter muscles on both sides, upper frontal teeth incisal chipping, occlusal abrasion, tongue indentations, and linea Alba - Figure 1. We did not detect local inflammation in the masseteric area, the consistency was normal, homogeneous, and painless. The TMD Disability Index Questionnaire showed 45% disability.

Fig. 1. Extraoral photographs of bruxism patient: a. squared lower face b.tounge indentations

The patient was advised to avoid chewing hard food and to perform jaw and tongue exercises for 15 minutes/day to strengthen the muscles that control the movements and improve flexibility. The stabilization occlusal splint was made of hard acrylic material in a neutral jaw position, and the patient was advised to wear it while sleeping and for several hours during the day – Figure 3. There was no significant reduction in muscle activities in 60 days, but occlusal equilibration decreased symptoms.

Fig. 3. Occlusal stabilisation splint

Botox was injected into the masseter muscles to prevent nerve signals that cause overuse and relieve discomfort by clenching and grinding. Dysport 500 IU was diluted with 2.5 mL normal saline, and 30 IU was injected into 3 equidistant bulging points on the masseters on both sides. Although the dosage of the toxin is not standardized, it is very important to inject it correctly - Figure 4. The patient clenched and held the teeth, the safe area was marked from the anterior to the posterior border of the muscle, under the line from the tragus to the corner of the mouth. Avoiding certain anatomical positions like the parotid gland and risorius muscle to prevent unwanted complications is very important.

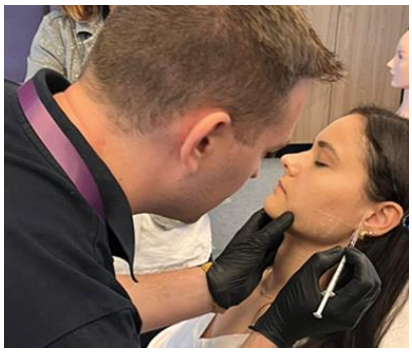

Fig. 4. Marking the "safe area" for toxin application

The female patient 43 years old reported bulging in the region of the right mandible angle, massive teeth erosions in both jaws, no pain and discomfort, but significant problems in chewing and esthetic appearance. The changes progressed slowly within several years. She was diagnosed with bruxism, teeth wear, and improper occlusion. There was a complete change in the position of the mandible, with a cross-bite on the right side- Figure 5.

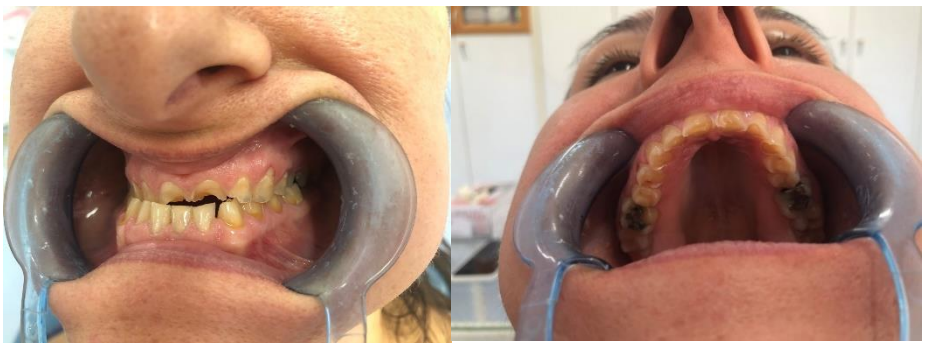

Fig. 5. Patient with severe bruxism: Intraoral view

The protocol started with a change in diet, endodontic treatment of upper incisors, and a repositioning occlusal splint in the lower jaw. We used Durasoft 3, 0 mm (sandwich foil 2,1mm hard/0,9mm soft) which is an abrasion-resistant, transparent material with a hard and soft side used for combined hard/soft splints in patients with bruxism.

Fig. 6. a. Durasoft splint b. PMMA provisional bridges

The patient received the first provisional bridges manufactured with the digital method from PMMA and Botox injections. Three months later, the final provisionals were cemented in new, rebalanced muscles and lower jaw position in TMJ. By injecting small doses of botulinum toxin directly into the right masseter, the muscle was weakened enough to stop involuntary grinding of the teeth and clenching of the jaw. This significantly relaxed the muscles and reduced further wear of the teeth.

Results

A significant reduction in the distance from the angle of the mandible to the most prominent point of the chin was observed between pre-treatment and 6-month follow-up. The thickness of the muscle on palpation was significantly reduced and extraoral photography confirmed the change in facial contour and reduction in prominence at the angle of the mandible - Figure 8. At the end of the treatment, we performed conservative restoration of the teeth with composite material.

Fig. 8. Extraoral view after treatment

Our second patient received a complete prosthodontic restoration one year after the first appointment with multilayered zirconia bridges. The protocol reprogrammed the muscles and TMJ, reduced hypertrophy,

bruxism grinding and clenching, and all accompanying symptoms. The new prosthodontic restoration was manufactured with increased vertical dimension in central occlusion - Figure 8.

Discussion

The biting force, chewing, diet, or para-functional habits like bruxism determine the volume of the masseter muscle. The masticatory forces generated during bruxism may be increased by six times the maximal biting force generated in normal chewing cycles [11], [12]. The treatment of the condition may be conservative, surgical, or a combination depending on the severity of the symptoms [13]. Botulinum toxin was presented as a less aggressive treatment option for lower face hypertrophy by Smith et al. Tan's study suggested that botox is a safe and effective treatment for people with severe bruxism, but should be considered for patients not responding to conventional therapy [14]. Botulinum toxin inhibits muscular contraction by blocking the release of acetylcholine from motor nerves. The toxin decreases motor activities which lead to muscle atrophy and symptom relief [15], [16].

Occlusal splints are removable, artificial occlusal surfaces used for diagnosis or therapy affecting the relationship between the mandible and maxillae [17]. They can provide a balanced and stable jaw relationship improving muscle activity and thus preventing dentition wear [18], [19]. The hard acrylic splints 3-6mm thick should be worn for at least 3-6 months regularly day/night to achieve significant pain decrease and symptom improvement for myofascial pain [20]. Hard stabilization occlusal splints with posterior contacts also are involved in relaxing the masticatory muscles bringing equilibration between temporal and masseter muscles [21]. Therefore, the splints are often a part of the conservative treatment of the TMD, especially in cases with increased muscle activities and bruxism. A combination of these conservative treatments should bring an effective reduction in muscle volume and activity, and be accompanied by relief of symptoms with a smooth, symmetrical, and balanced contouring of the lower face without inconvenient side effects [22].

Conclusion

Botulinum toxin injection is a non-invasive, safe, and effective treatment for MMH. The injection technique was found to be effective, and patient satisfactory, with a good outcome over the follow-up period and we recommend its use. The clinical method for evaluating muscle bulk is an economical alternative to radiographic techniques and is easy to use in our clinical practice.

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TREATMENT PLANNING AND LOADING PROTOCOLS IN IMPLANT PROSTHODONTICS

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Abstract:
Implant prosthodontics has evoleved over the past decades, providing our patients with reliable solutions for edentulism. Effective treatment planning and loading protocols are critical for the overal success of dental implants. Treatment planning involves a comprehensive assessment of the patient's medical and dental history, diagnostic imaging, and evaluation of bone quality and quantity. Loading protocols, which include immediate, early, and conventional loading, are part of the whole planning process and need to be determined prior to implant placement. Recent advancements in technology, such as digital planning and guided surgery, have enhanced precision in implant placement and reduced treatment times.
Key words: *dental implants, loading protocols, treatment planning*

Introduction

Treatment planning and loading protocols in implant prosthodontics are critical for the success and longevity of dental implants. Planning implant therapy involves a systematic approach to ensure the best treatment outcome. The process implies comprehensive patient assessment, diagnostic evaluation, and strategic planning to achieve high success rates. Patient assessment in implant prosthodontics is a complex process involving a thorough review of medical and dental history, clinical examination, diagnostic imaging, and treatment planning. By carefully evaluating these factors, clinicians can develop a personalized treatment plan that optimizes the chances of implant success and meets the patient's functional and esthetic needs.

1. Treatment planning

Modern implantology necessitates a multidisciplinary approach in planning to minimize the occurrence of complications. Since the prosthodontic component is a crucial aspect of implant-prosthodontic therapy, complications related to mobile and fixed dental restorations are often more significant from a technical perspective than those related to the implant itself [1]. It's clear that therapy failure isn't always due to iatrogenic factors. Nevertheless, the complexity of treatment planning requires a thorough analysis of each individual case. In contemporary implantology, advanced digitization methods are now essential in the planning process, as they ensure exceptional precision and predictability of the treatment outcome [2].
In treatment planning we need to assess patients medical history**:** Evaluate systemic health, including conditions like diabetes, osteoporosis, or autoimmune diseases that may affect implant healing. Also, dental history is important and prior dental treatments, occlusion, and current oral hygiene must be reviewed. Patient's functional requirements needs to be assessed, including the need for esthetics, chewing efficiency, and speech. Diagnostic procedures include clinical examination, radiographic analysis, study models and digital planning.
Diagnostic procedures start with inspect of the oral cavity for anatomical considerations, soft tissue health, and existing dental conditions, following radiographic analysis by use of X-rays (periapical, panoramic) and 3D imaging (CBCT) to assess bone quantity and quality, anatomical structures, and implant placement sites. Study models and digital workflow must be included to create physical or digital models for implant placement planning and prosthetic design.
Treatment goals refer to: functional, esthetic goals and long-term outcomes. With functional goals is ensured that the implant restores proper function and occlusion, while esthetic goals achieve satisfactory esthetics, considering tooth shape, color, and alignment. Long-Term outcomes aim for longevity and health of the implant and surrounding tissues.
Implant selection is also very important, and implant type and size needs to be carefully considered- the choice between different implant systems (e.g., screw-type, cylinder-type) based on clinical needs and bone quality and selection of appropriate length and diameter. Also, surgical planning site augmentation if needed

(e.g., bone grafting) and the optimal position, angulation, and depth for implant placement needs to be determined.

2. Loading Protocols

Historically, implant placement and loading protocols have been examined independently. Nevertheless, the technique used for implant placement and its immediate surgical outcome are crucial factors in determining the appropriate loading protocol. For example, primary implant stability is a key determinant of success for both placement and loading protocols [3]. Therefore, selecting the optimal placement and loading option requires careful assessment of both the patient and the treatment site.

The various implant loading options, as outlined by the ITI Consensus Conferences in 2003, 2008, and 2013, have been implemented in clinical practice [4-7]. The definitions of loading protocols have evolved over time and are currently categorized as follows: (a) Immediate loading, which occurs within 1 week of implant placement, (b) Immediate restaoration, dental implants are connected to a prostheses held out of occlusion with the opposing arch within 1 week subsequent to implant placement (c) Early loading, which occurs between 1 week and 2 months after placement, and (d) Conventional loading, dental implants are allowed a healing period of more then 2 months after implant placement with no connection of the prostheses [6, 8].

When we talk about loading protocols we need to consider bone quality and quantity because it affects implant success. Poor bone quality may necessitate longer healing periods. Immediate and early loading protocols offer reduced overall treatment times and the possibility of avoiding removable provisional prostheses, making them appealing to both clinicians and patients. The surface modification of dental implants has expedited the bone response during the healing process ([4-7]. Each loading protocol has demonstrated high survival rates. However, bone turnover during healing may affect implant stability and limit the implant's ability to withstand significant lateral forces before proper osseointegration occurs [9,10]. Most studies on immediate or early implant loading emphasize the importance of adequate primary stability. The primary stability of the implant is commonly evaluated using insertion torque (IT), though specific thresholds can vary between studies. Another important factor in evaluating primary stability for immediate or early loading is resonance frequency analysis (RFA), often used in conjunction with IT. In the literaure, it is suggested a minimum of ≥35 Ncm IT for immediate loading protocol.

Resonance frequency analysis (RFA) combined with insertion torque is an important evaluation metric for determining the feasibility of immediate or early loading of dental implants. Various studies have proposed different thresholds for insertion torque (IT) and implant stability quotient (ISQ) to guide this decision. For instance, Margossian et al. (2012) and Ostman et al. (2008) suggested IT ≥30 Ncm with ISQ ≥60 [11,12]. Degidi et. al (2011) recommended IT ≥25 Ncm with ISQ ≥60, while Fung et al. (2011) proposed IT ≥20 Ncm with ISQ ≥60 [13,14].

2.1. Immediate Loading

Immediate implant loading can offer significant advantages, including reduced treatment times and enhanced patient satisfaction, by providing immediate functional and esthetic results. However, it requires careful planning, excellent primary stability, and strict adherence to post-operative care protocols to minimize risks and ensure long-term success. It is usually done when primary stability is adequate, and the patient has good oral hygiene and often used in single-tooth replacements or some full-arch restorations. The benefits of this tretment option include reduced overall treatment time and improvement of patient satisfaction. However, it has higher risk of implant failure especially if primary stability is insufficient or if the patient does not adhere to post-operative instructions.

2.2. Early implant loading

Early implant loading involves placing a functional restoration on a dental implant before the complete osseointegration process is finished, but after an initial healing period. This approach aims to balance between immediate loading and traditional delayed loading, offering benefits in terms of reduced treatment time while still allowing for adequate healing. Early loading refers to placing a temporary or permanent restoration on an implant typically 4 to 8 weeks after the implant has been placed. The objective is to restore function and esthetics sooner than traditional methods, while still allowing the implant sufficient time to integrate with the bone. Benefit of this type of loading protocol is osseointegration with a reduced waiting period compared to traditional protocols.

2.3. Delayed Loading

Delayed implant loading refers to a strategy in dental implantology where the dental prosthesis (such as a crown, bridge, or denture) is not attached to the implant immediately after its placement. Instead, there is a waiting period—typically after 3-6 months —before the prosthesis is attached allowing for complete osseointegration. It is ideal for situations where implant stability is a concern or where complex prosthetic solutions are planned. Benefits of this concept are lower risk of implant failure, especially in cases with compromised bone quality or in full-arch restorations.

Overall, the decision between immediate and delayed loading is typically based on individual patient factors, implant type, bone condition, and the specific clinical scenario. A dentist or oral surgeon will assess these factors to determine the most appropriate approach for each patient.

2.4. Protocol Considerations

Among the factors affecting loading protocols and implant success are: Bone quality and quantity (Poor bone quality may necessitate longer healing periods), Prosthetic design (single crown, bridge, or denture influences the loading protocol and timing) and Patient Compliance (Successful outcomes depend on the patient's ability to maintain oral hygiene and adhere to post-surgical care instructions)

3. Follow-Up and Maintenance

3.1. Regular Check-Ups:

- **Monitoring:** Regular clinical and radiographic evaluations to assess implant health and integration.
- **Prosthesis Maintenance:** Ensure that the prosthetic components are functioning properly and make adjustments as necessary.

3.2. Hygiene and Care:

- **Patient Education:** Instruct patients on proper oral hygiene practices to prevent peri-implant diseases.
- **Professional Cleaning:** Schedule professional cleanings and assessments to maintain implant health.

The reasons for opting for delayed loading include:

1. **Osseointegration**: This is the process where the bone grows around and integrates with the implant. Delayed loading allows for more time for the implant to fuse properly with the bone, potentially leading to better stability and longevity of the implant.
2. **Initial Stability**: In cases where the implant might not have achieved sufficient primary stability (initial mechanical stability) right after placement, delayed loading can help ensure that the implant remains secure while it integrates with the bone.
3. **Bone Quality and Quantity**: In situations where bone quality or quantity is compromised, allowing more time before loading the implant can help ensure a better integration process and reduce the risk of implant failure.
4. **Healing and Tissue Response**: Delayed loading allows for better management of the healing process, reducing the stress on the implant and surrounding tissues during the initial healing period.
5. **Minimizing Complications**: Immediate loading might sometimes lead to complications if the implant isn't sufficiently integrated or if there is undue stress on it. Delayed loading can mitigate some of these risks.

Conclusion

Implant placement and loading protocols are widely recognized as critical components in implant treatment planning. Effective treatment planning and appropriate loading protocols are essential for the success of implant prosthodontics. Thorough patient assessment, careful planning, and precise execution of loading strategies contribute to the durability and functionality of dental implants.

Regular follow-up and maintenance are key to ensuring long-term success**.**

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THE ORTHO-PERIO SYNERGY: CHALLENGES AND THERAPEUTIC SOLUTIONS

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Abstract: *The advancement of orthodontics has presented new challenges for jaw orthopedics and dentists. In the case of orthodontic patients, the periodontium must withstand the forces caused by orthodontic movement, especially in cases of periodontitis or a thin periodontal phenotype. In such patients, it's essential to provide adequate therapy for periodontium, prevent the occurrence of possible periodontal complications, and maintain health during treatment. Due to the lack of guidelines, clinicians often approach these patients based on their knowledge and experience. This paper aims to provide a comprehensive understanding of the orthodontic-periodontic relationship for optimizing therapeutic strategies and achieving the best treatment outcomes.*
Key words: *orthodontics, periodontal disease, complications, therapy modalities*

Introduction:

Nowadays, orthodontic therapy (OT) has increased in popularity not only among younger people but also among adults. Adult orthodontics has become a popular dental therapy, yet both patients and dental professionals are not fully aware of the potential risk for periodontal complications. A recent survey demonstrated that the majority of patients with moderate-to-severe periodontitis (68%) showed interest in orthodontic therapy because of esthetical and functional changes caused by pathologic tooth migration [1]. Another aspect that cannot be overlooked is the effect of orthodontic tooth movement in patients with a reduced periodontium, where the total surface of the periodontal ligament that receives the orthodontic forces is significantly less and the tooth center of resistance is apically displaced, resulting in the expression of greater moments of force. In these situations, the orthodontic treatment should be carefully planned and monitored in order to achieve bodily instead of tipping tooth movements. The presence of reduced periodontal support also implies different anchorage requirements.

Orthodontic therapy moves teeth from one position in the jaw, through bone and the surrounding soft tissues, to another position, and this movement of teeth is accompanied by tissue remodeling, which modifies the morphology of the periodontal tissues. The periodontal ligament, as a dynamic structure, makes this possible. The whole periodontium, including the alveolar bone, shows biological responses and changes, including a modification of the local vascularization. Even though there are many innovative mechanical devices for tooth movement, therapists are still not completely successful in preventing trauma to the periodontium, resulting in undesirable side effects. In general, most adverse effects are believed to be transient.

Side effects of orthodontic therapy on periodontal health

Plaque/biofilm

Orthodontic fixed appliances make maintenance of proper oral hygiene more difficult, resulting in increased accumulation of plaque and subsequent inflammation of the gingival tissues. Concerning facilitation of oral hygiene, recent study found no differences when comparing clear aligners, self-ligated brackets, and traditional fixed orthodontic appliances [2]. However, there was a significant change in biofilm composition after the placement of orthodontic appliances including an increase in the percentage of potentially pathogenic gram-negative bacteria. Such changes in microbial parameters were normalized 3 - 6 months following the removal of fixed orthodontic appliances [3].

Gingival inflammation and overgrowth

Orthodontic appliances can complicate oral hygiene, leading to gingivitis characterized by increased probing depth, bleeding, and crevicular fluid volume, though these issues are usually temporary after 3–6 months post-treatment [3]. Gingival overgrowth may occur, with its severity linked to the duration of OT. This overgrowth, seen in about 10% of patients, is believed to involve increased fibroblast activity [4,5]. Generally, hyperplastic gingivitis resolves with good oral hygiene and appliance removal. In some cases,

parameters may normalize more than 3 months after debonding, suggesting that gingivectomy or gingivoplasty might be unnecessary until after this period.

Periodontal parameters

A systemic review reported minimal changes in clinical attachment levels and probing pocket depth in periodontal healthy patients undergoing OT [6]. Jäger et al. in their study reported a significant decrease in periodontal bone height and cortical bone thickness after OT [7].

Root resorption

Orthodontic therapy can cause root resorption, ranging from mild to severe, with potential loss of root length or dentin. The exact biological mechanisms are not fully known. Prevalence of severe root resorption varies from 2.9% to 14.8%, while mild resorption ranges from 46% to 98.1% [8,9]. Apical external root resorption is a common complication and is linked to risk factors like extractions, prolonged treatment, heavy continuous treatment forces, and large distance tooth movements, especially in maxillary incisors. CBCT is a reliable tool for detecting this condition.

Gingival recession

Orthodontic treatment can affect mucogingival conditions, with gingival recession affecting 20% to 25% of patients two to five years post-treatment [10].

What are the risk factors for the development of mucogingival anomalies, especially gingival recession as a very common complication of orthodontic therapy? Among anatomical variables, subjects with thin tissue and absence of attached gingiva (thin gingival phenotype) tend to have a higher incidence of gingival recession. Further risk factors are the shape of a tooth, the presence of dehiscence/fenestration, an aberrant tooth eruption, or thickness of the alveolar bone due to tooth position in the alveolar process. The new term “periodontal phenotype” was adopted to describe the combination of gingival phenotype and bone morphotype.

Prevention and treatment modalities

Considering that there are two major problems concerning periodontium in patients who is seeking for orthodontic treatment, it is of great importance prevention of complications and knowledge of therapeutic modalities if complications still occur.

Before undergoing orthodontic treatment, periodontitis patients should follow these steps per European Federation of Periodontology guidelines:

Step 1: Clinical Evaluation: Assess periodontal health and phenotype.

Step 2: Nonsurgical Therapy: Perform scaling, root planning, and ensure good oral hygiene.

Step 3: Surgical Therapy: Proceed if necessary.

Step 4: Orthodontic Therapy: After a period of periodontal maintenance.

Periodontal maintenance appointments should be scheduled every 1-3 months based on patient needs to maintain stability.

Treatment modalities for orthodontic patients with mucogingival anomalies and thin periodontal phenotype involve two procedures: soft tissue augmentation or soft and hard tissue augmentation, commonly known as periodontal phenotype modification therapy (PhMT).

The most commonly applied therapeutic procedures for soft tissue augmentation are free gingival grafting (FGG) and subepithelial connective tissue graft (SCTG). FGG increase width of keratinized tissue, protect the anterior area during orthodontic treatment and allow correct oral hygiene. SCTG with coronally advanced flap is used for treatment of gingival recession, which resulting with new keratinized gingiva that should protect the anterior area during orthodontic therapy. For soft and hard tissue augmentation, the commonly used procedure is regenerative therapy, guided bone regeneration therapy (GBR) with deproteinized bovine bone mineral used to enhance the bony architecture, and a membrane was placed to enhance the soft tissue volume.

Corticotomy-assisted orthodontic treatment (COAT) is an option primarily for adults. It involves selective alveolar decortication around teeth to be moved, inducing increased tissue turnover and transient osteopenia. This leads to faster tooth movement and shorter treatment times. COAT can also help maintain or increase facial bone thickness and potentially expand the range of tooth movement, especially for mandibular incisors.

The American Academy of Periodontology (AAP) found that modifying periodontal phenotype with tissue augmentation can benefit orthodontic treatment. However, studies did not specify the optimal timing for augmentation - before, during, or after orthodontics. It would be reasonable to suggest augmentation before labial tooth movement, especially with a thin phenotype or less than 2 mm of keratinized tissue [11].

Although it is expected that any OT should initiate after the complete healing of previously inflamed periodontal tissues, the literature remains unclear on the best moment to start tooth movement after

periodontal therapy. It has been known that periodontal tissue stability after therapy may vary according to the different treatment approaches. Pini Prato and Chambrone, proposed a periodontal-orthodontic treatment algorithm concerning the healing dynamics of the periodontium as follows: the expected period for periodontal tissue healing is 3-6 months after non-surgical periodontal therapy, 6-9 months after open flap debridement and 1 year after GBR [12]. A recent study by Jepsen et al. compares the outcomes after early (4 weeks post-surgery) or late (6 months post-surgery) orthodontic therapy following regenerative surgery of intra-bony defects in patients with periodontitis stage IV. They conclude that there is no statistically significant difference in outcomes, and OT can be initiated 4 weeks after regenerative surgery, which reduces the overall treatment time [13].

And what about periodontal follow-up care during OT? There is consensus that patients with periodontitis, even when treated successfully, always remain at risk of recurrent periodontitis and therefore should be enrolled in a supportive periodontal care program. A group of autors proposed guidelines for periodontal follow-up care during OT in patients susceptible to periodontitis (Table 1.) [12,14].

	Before orthodontic treatment	**During orthodontic treatment**	**Following orthodontic treatment**
Plaque control	+	+	+
Periodontal probing	+	+ Every 6 months	+ Once a year
Bitewings/parallel periapical radiographs	+	+ Once a year unless there is a pathological finding	+ Once a year unless there is a pathological finding
Referral to a periodontist	1. In the event of pathologic periodontal pockets or radiographic bone loss 2. In the event of doubt regarding the periodontal condition		

Table 1. Proposed guidelines for periodontal follow-up care during orthodontic therapy in patients susceptible to periodontitis

Conclusion:

Several areas of concern are identified and should be addressed accordingly in patients with periodontal problems who are seeking orthodontic therapy. Two major problems are the thin periodontal phenotype and existing periodontitis. What should clinicians do to prevent risk factors during orthodontic tooth movement? Periodontal inflammation must be resolved and proper periodontal maintenance according to patients' needs encouraged/implemented before, during, and after OT. Hard and/or soft tissue augmentation in patients with thin periodontal phenotype can be performed when needed, before orthodontic therapy.

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PREVALENCE OF THE ANTERIOR DISC DISPLACEMENT WITH REDUCTION IN DENTAL STUDENTS AT THE UNIVERSITY OF OSIJEK

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Abstract: *This study was aimed to research the prevalence of anterior disc displacement with reduction in dental students at the University of Osijek, Croatia. A total of 133 students, 62 male (47%) and 71 female (53%) participated in this research. The results of this study showed that 53% of dental students at the University of Osijek, have anterior disc displacement with reduction (ADDR).*
This research showed high prevalence of the ADDR in dental students at the University of Osijek. These data can be used for comparison with other similar studies.
Key words: *anterior disc displacement with reduction, dental students, temporomandibular joint*

Introduction

Temporomandibular joint (TMJ) is a complex structure in charge of several important functions such as mastication, speech or breathing. In humans masticatory system is composed of bones, teeth, muscles and TMJ [1]. This complex system is coordinated by nerves and central nerves system (CNS) which enables that all parts of the masticatory system runs synergistically and in cooperation [2]. In the case of certain pathological processes of the TMJ or adjacent structures in order to make right diognosis and treatment plan systematic knowledge of anatomy, biomechanics, occlusion and dental medicine as a whole is needed. The World Health Organisation (WHO) reports that temporomandibular disorders (TMD) are third most common pathological process in dental medicine after caries and periodontal disease. Most common etiological factors of the TMD are emotional stress, macro and micro trauma and genetics. Pain is the most common symptom of the TMD, and it can be acute or chronic[3,4]. There are different types of orofacial pain, most common is tooth ache. In the region of the head and neck other types of pain can occur such as headaches, neuralgia or TMJ pain or pain of adjacent structures such as muscles tendons ect. It is not uncommon that pain of the TMJ can be misdiagnosed and treated wrongly [3]. To achieve right diagnosis proper anamnesis and clinical examination are necessary as well as other diagnostical methods such as radiographs. Most commonly are used panoramic radiographs and Cone Beam Computed Tomography (CBCT). Other diagnostic methods which are used in diagnosis of the TMD are Multislice Computed Tomography (MSCT) and Magnetic Resonance Imaging(MRI) [5].

Material and methods

This study was aimed to research the prevalence of anterior disc displacement with reduction in dental students at the University of Osijek, Croatia. It was conducted in the form of a cross-sectional study. Statistical analysis was done with IBM SPSS Statistics 25 (SPSS Inc., Chicago, Il, USA) software using descriptive statistics and a chi-square test and Mann-Whitney U test. The results were expressed as rates ratio (RR) with 95% confidence intervals (CI), $p<0.05$ was considered as statistically significant.

Results

A total of 133 students [mean age = 24 years, range = 19–45 years], 62 male (47%), and 71 female (53%) participated in this research. The study was conducted in April and May 2022. Diagnosis of anteriror disc displacement was based on detailed anamnestic history and careful clinical examination. Information about ADDR from students were collected in anamnestic sheets. Results showed high frequency 44% of

parafunctions were noted. Emotional stress was also frequent in students population, 65% of students felt stressed. 51 % of students used frequently chewing gums (Table 1.)

Symptom	Yes	No	Total	%
Jaw locking?	6	127	133	5
Jaw locking in the morning?	6	127	133	5
Jaw locking in the evening?	2	131	133	2
Teeth grinding or clenching during the day	47	86	133	35
Teeth grinding or clenching while sleeping	29	104	133	22
TMJ pain in the morning?	13	120	133	10
TMJ pain in the evening?	7	126	133	5
Muscle pain while chewing	12	121	133	9
TMJ while resting pain?	1	132	133	1
Parafunctions?	58	75	133	44
Are you under stress?	86	47	133	65
Do you use chewing gums?	68	65	133	51
Jaw trauma	1	132	133	1

Table 1. Distribution and frequency of the symptoms in analyzed students

The results of this study showed that 53% of dental students at the Osijek University, have anterior disc displacement with reduction (ADDR) (Figure 1.).

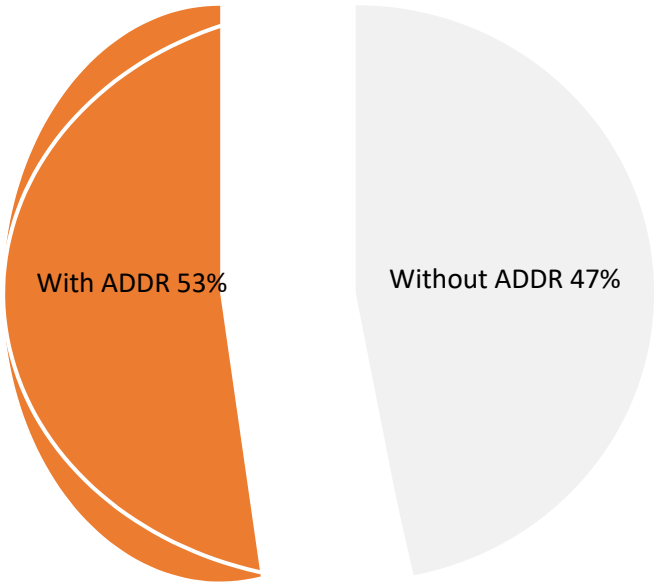

Figure 1. Distribution of the results in students with ADDR and without ADDR (n = 133)

In comparison between male and female dental students the results showed that there was a statistically significant difference of the ADDR between male and female dental students. The female dental students had higher prevalence of the ADDR (P=0,049) than male dental students. The analysis also showed that there was no statistically significant difference between ADDR in dental students in relation to the year of the study (P=0,0393), also statistics showed that there were no significant difference concerning the age. Subjects were divided in to two groups. The first group consisted of students aged between 19 and 25 years, and the second group consisted of students aged between 26 and 45 years. The statistical analysis showed no statistical significance between the two groups (Table 2.).

	Group	Subjects	Number	Percentage	U value	Z value	P1)
1.	Gender	Male	62	60,90			
		Female	71	72,33	1822	-1,920	0,049*
2.	Age	19-25	100	68,20			
		26-45	33	63,36	1530	-0,666	0,505
3.	Year of study	Preclinical study	39	62,85			
		Clinical study	94	68,72	1671	-0,854	0,393

Note: 1) * statistical significance $p<0.05$

Table 2. ADDR results in tested groups, Mann-Whitney U test (n = 133)

Discussion

Our interest was to investigate what is ADDR status in our student population since these types of research were not conducted at the University of Osijek, Croatia. This research showed high frequency of 53% of the ADDR in dental students at the University of Osijek. These findings are correspondent to similar studies conducted, also our findings showed that the frequency of ADDR in students was also higher than in general population, which is connected with expected stressful student life [6]. Research performed by Roch et al. Showed similar results with 58,9% of ADDR, Azvezedo et al. showed the result of 42.1% of ADDR [7,8]. In the gender comparison our research showed higher frequency of the ADDR in females than in males which is also in concordance to the other studies which rate from 3 to 9 times higher incidence of the ADDR in females then in males [9,10]. Impact of the stress and parafunctions as a etiological factor of TMD and ADDR are well documented [11,12]. Our results also showed high incidence of stress 65% and parafunctions 44%. Student population is under pressure of achieving results while studying complex and extended faculty program. Occurrence of the stress in student population is typical. Muscular pain is usual part of the TMD, especially because muscles are soft tissue formations which are one of the most vulnerable parts of masticatory system. Prolonged clicking and popping of the TMJ at one point when compensatory mechanisms are exhausted will result with the muscular or TMJ pain. In this study 9% of the students which are younger part of population reported muscle pain, which is somehow in accordance with the general population in which values of muscle pain are around 12-14% [13, 14]

Conclusion

The results of this research showed high rate of the ADDR in dental students at the University of Osijek. These findings are correspondent to other studies, also it was confirmed that in our population females are also more commonlly affected by the TMD and ADDR than males. It would be interesting to compare these results with other Universities in Croatia, or with comparable neighboring countries. These results also can be used and compared with other similar studies concerning TMD and ADDR.

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INNOVATIVE ADHESIVE TESTING IN DENTISTRY

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Abstract: *Special attention is devoted to researching of adhesion and to the determination of the mechanical parameters characterizing the tooth-dental material bond. It is essential to ensure a permanent and reliable adhesive bond between the indirect restoration and the tooth structure, as this is the key to the success of aesthetic restorations. In order to assess the clinical performance of different adhesive materials, the bond strength is usually verified. The significant number of specimen preparation phases that need to be performed prior to testing, render the push-out approach highly technically demanding method for evaluating dental material bond strength. Current different bond strength testing methods face significant challenges which should be overcome in accordance to simplifying of testing procedures and providing reliable results. The microbond test method has not been previously applied as a method of choice in the bond strength testing of dental resin-based materials. In the microbond test, the interfacial shear strength is calculated by determining the force required to debond the cement droplet from the contact area between the droplet and the fiber. Compared to the standard push-out test, the proposed microbond test is highly simplified, as it requires fewer specimen preparation as well as test execution steps, thus reducing the potential for specimen damage, while limiting failure and error rates. Specifically, the proposed microbond test dispenses with the need for human material preparation and storage, thus not only simplifying the testing process, but also requiring fewer tools. Most importantly, the testing apparatus and procedure can be standardized, allowing the obtained results to be compared across materials or studies.*

EXPERIMENTAL AND CLINICAL PERSPECTIVES OF RESIN-BASED COMPOSITE AND CERAMIC RESTORATIONS

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Abstract: *A number of novel resin-based composite (RBC) materials are now available, which can be employed to enhance certain properties or reduce the chair-time. The most popular of these materials are bulk-fill RBCs, which are either pre-heated or rapid 3s-curing. In addition to direct RBCs, ceramic restorations represent a high-quality dental treatment option. What are the factors that strongly influence the outcome of a direct or indirect restoration from a mechanical or biological perspective? The presentation of experimental and clinical investigations can serve to highlight the crucial points, which are considered to be critical factors in the survival of a restoration.*

PERI-IMPLANTITIS: DIAGNOSIS AND TREATMENT

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Abstract: *Peri-implantitis is the most common biological complication in implant dentistry. Early and accurate diagnosis is crucial for effective management and involves clinical examination, radiographic assessment, and the evaluation of peri-implant probing depths, bleeding and/or suppuration on probing. Risk factors such as poor oral hygiene, smoking, and systemic conditions must be considered in the diagnostic process. Treatment of peri-implantitis aims to halt the progression of the disease and restore peri-implant health. Non-surgical and surgical protocols will be discussed, as well as their success rates and limitations.*

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TMJ DYSFUNCTION MANAGEMENT USING OCCLUSAL SPLINT THERAPY

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Abstract: *Dysfunction of temporomandibular joint (TMJ) represent a condition affecting the temporomandibular joints and surrounding muscles and ligaments. Occlusal splints represent the first line in the strategy of orthodontic treatment of these patients. The aim of our case report is to show the effectiveness of directive, non-permissive splint use as an intermediate treatment, before starting fixed orthodontic therapy in TMD patients. A careful and comprehensive approach with a combination of treatment procedures is needed for successfully reducing the symptoms of TMJ dysfunction before applying fixed orthodontic therapy in order to bring the teeth in ideal position according to all gnathological principles.*
Key words: *TMJ dysfunction, occlusal splint, fixed orthodontic treatment.*

Introduction

Dysfunction of temporomandibular joint (TMJ) represent a condition affecting the temporomandibular joints and surrounding muscles and ligaments. These conditions can cause jaw pain, headaches and difficulty in mandibular movements, restrictive opening of the mouth, crepitations, myofunctional pain, hypermobility of the joint, etc. These conditions may affect any age group of patients and a thorough diagnosis is required to differentiate it from other cranial and facial pain conditions, such as tension type headaches and migraines. There are various therapeutic procedures for managing these patients. Occlusal splints represent the first line in the strategy of orthodontic treatment of these patients. Once the cause of occlusal-related disorders is identified, a careful medical/dental history along with a comprehensive examination of each part of the system, such as joints, muscles, periodontium is necessary. Occlusal disturbances, such as persisting slide between Centric Relation (CR) and Maximum Intercuspidation (MIP), balancing, working side and posterior protrusive interferences lead to orthopaedic instability of TMJ and hyperactivity of the muscles of mastication which eventually lead into dysfunction of TMJ, due to the strong correlation between occlusal static and dynamic parameters and dysfunction of TMJ [1-4]. To establish diagnoses of occlusal pathology, however, it is essential to have objective knowledge of the patient's mandibular dynamics and develop a method that enables the dentist to analyze the functional aspects of occlusion [5-8]. Digital analysis provides additional information on occlusal contact pattern, including the quantification of force, sequence of contact and occlusal–disocclusal timing [9-11]. Occlusal splints as a common treatment modality to manage jaw dysfunction have been used for more than a hundred years. There is general agreement that splints protect against tooth wear and damage caused by involuntary clenching or grinding, relieving the strain and stress on masticatory muscles and temporomandibular joint, protecting the temporomandibular joint discs from dysfunctional stresses that can result in perforations or permanent displacements. Occlusal splints prevent patients from achieving maximum intercuspation. Therefore, the patient must position his jaw properly with stops of equal intensity on all teeth, which facilitates the seating of the condyle in centric relation. Treatment of occlusal-related disorders is often a challenge for both the dentist and the patient. These disorders are often difficult to diagnose, as the presenting symptoms can be variable. Occlusal splint design and function can be considered an example of art and science of dentistry.

Aim

To assess the need and use of occlusal splint in patients with dysfunction of TMJ, by repositioning the mandible to a centric occlusion, before starting the orthodontic therapy with fixed aplliance.

Material and method

This case report describes an adult patient with clicking sound and crepitus of TMJ on jaw movements with chief complain of facial asymmetry, history of headache, discomfort and pain in the joint itself that radiates into the mandible, ear and neck. The patient was diagnosed with distoocclusion, anterior deep bite, occlusal cant and laterotrusion of the mandible (Fig 1).

Fig. 1. Intraoral view of the occlusion.

Treatment plan and progress

After analysis, we ordered the occlusal splint therapy with non-permissive splint for 9 months and fixed appliances with self-ligating technique for period of 2 years. *A non-permissive splint locked the teeth and mandible in a forward position.* This splint had indentations that limited the movement of the mandible and was made from a processed acrylic resin and fitted over the occlusal and incisal surfaces of the maxillary and mandibular teeth. This precise custom removable dental appliance not only protected the teeth from harmful habits, but it supported the TMJ and the masticatory muscles from overuse, wear and damage and facilitates a mutually protected occlusion (Fig. 2).

Fig. 2. Intraoral view of the non-permissive splint.

Ideally, occlusal adjustments should not be done until after a period of successful splint treatment. This patient has worn the splint for 9 months and all the symptoms were resolved. The signs and symptoms that were result of the hyperactivated lateral pterygoid and the displacement of the disk which was pulled anteromedially toward the origin of the muscle disappeared. The normal physiological position of the condyle/disc that occurred wearing the properly balanced occlusal splint resulted in an occlusion associated with relaxed positioning elevator muscles (Fig. 3).

Fig. 3. Intraoral view of the occlusion after the use of non-permissive splint, neuromuscular harmony.

Than we prosecuted the therapy with self-ligating braces in both dental arches with desarticulation using stops on the palatal surface of the maxillary central incisors. For mandibular assymetry we used intermaxilary elastics Class II on the right side and Class III on the left side. In order to correct the maxillary midline shift we used mini-implant as a temporary anchorage devise to tract the maxillary dental arch on the right side and open coil spring to open the extraction space for the missing maxillary left molar (Fig. 4).

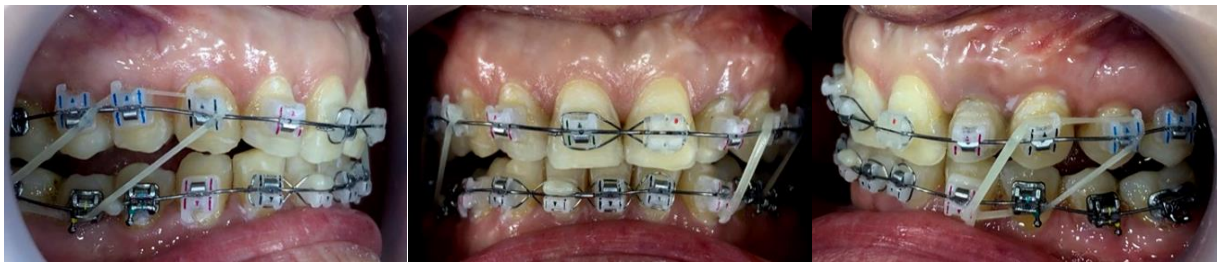

Fig. 4. Intraoral view of the therapy with self-ligating braces in both dental arches.

Results

At the end we corrected canine and molar relationship in Angle Class I, we achieved satisfying static and dynamic occlusion, achieving good muscular balance (Fig. 5).

Fig. 5. Intraoral view of the patient at the end of the therapy.

Discussion

Dentists and orthodontists at one time or another have been exposed to the gnathological concept of occlusion. Establish a gnathologic finish, including canine protected occlusion, protects patients from temporomandibular dysfunction and orthodontic tooth relapse [12-14]. There are several anecdotal and correlational reports of relationships between TMJ dysfunction signs or symptoms and Angle malocclusions in general. This case report shows that distoocclusion, deep bite with loss of molar as a key of occlusion is cause of signs and symptoms of this dysfunction and is in concordance with several authors that confirm this relationship [15-18]. Since occlusal treatments are typically irreversible and the evidence of their therapeutic or preventive effects on TMJ dysfunction is insufficient, it is recommended that reversible treatment such as self-care, well-designed splints should always be used initially to manage signs and symptoms of this dysfunction. Irreversible occlusal adjustments should never be undertaken in the presence of acute muscle pain or other symptoms of TMJ dysfunction. If a well-balanced stabilization splint is worn and the patient's symptoms resolve, only to return when the splint is 'weaned off', then there might be a logical reason to address the occlusion of the natural teeth, but not without further and detailed occlusal analysis, and only after meticulous planning with articulated plaster casts and with informed and valid consent. This would indicate whether provision of an 'improved' occlusion would benefit the patient's symptoms [19].

Conclusion

An occlusal splint is custom-made using detailed study models on an instrument called an articulator that simulates the movement of the jaws and it designed to guide the jaw as it moves side-to-side and front-to-back. This again helps to reduce strain on the muscles and prevents the jaw joints from being overloaded, creating increased vertical height, which helps to put the jaw in a more neutral or resting position. Occlusal splints promote muscle relaxation by providing a platform for the teeth that allows equal distribution of tooth contacts, immediate posterior tooth disclusion in all movements (with anterior guidance), and reduced stress on the joint.

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ORAL MANIFESTATIONS OF NEUROLOGICAL DISEASES

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Abstract: *The central nervous system and the oral cavity are anatomically close to each other. Diseases of the central nervous system are studied in detail in various fields of biomedical science such as otology, ophthalmology, neurology, neurosurgery and dentistry. Neurological diseases affect the orofacial structures and the oral cavity. The prevention and dental care of patients with neurological diseases requires a specific approach, i.e. a particular type of preventive and rehabilitative treatment.*
These people have difficulties in performing everyday activities, including oral hygiene. Due to motor, intellectual, perceptual or psychological disabilities, inadequate oral hygiene often leads to an increased incidence of caries and the prevalence of periodontal disease.
Key words: *nervous system, oral cavity, prevention*

Introduction

The central nervous system and the oral cavity are in a close anatomical relationship. Neurological diseases affect orofacial structures and the oral cavity. Prevention and dental care of patients with neurological diseases require a special approach, i.e. special types of preventive and rehabilitative treatments. These people have difficulties in performing everyday activities, including oral hygiene (OH). Due to motor, intellectual, perceptual or psychological disabilities, inadequate oral hygiene often leads to dental caries and a higher prevalence of periodontal disease [1].

The most common neurological disorders include: Cerebrovascular disorders, Multiple sclerosis, Parkinson's disease, Huntington's disease, Bell's palsy, Myasthenia gravis, Cerebral palsy and Epilepsy [1].

Cerebrovascular disorder

A cerebrovascular disorder is a focal disorder caused by the destruction of brain tissue as a result of hemorrhage, thrombosis, embolism or vascular insufficiency. The factors influencing the occurrence of cerebrovascular accident result from a sudden interruption in the central area leading to death or a focal neurological deficit. Causes of stroke can include high blood pressure, trauma, substance abuse or rupture of an aneurysm. Clinical symptoms are sensory and motor deficits, paralysis of eye movements, visual disturbances, headaches, dizziness, nausea and seizures [2].

Symptoms in the oral cavity occur in patients who are receiving anticoagulant therapy and are prone to prolonged bleeding, so a coagulation profile must be drawn up. Xerostomia due to medication is a symptom that increases the risk of tooth decay and inability to wear removable dentures. Frequent OH, regular dental visits, saliva substitutes and the use of fluoride are essential. Patients with orofacial muscle weakness may have poor salivary control, impaired swallowing reflex, dysphagia and changes in chewing ability, resulting in poor food intake [2].

It is necessary to reduce stress during the visit, which can be achieved by preoperative inhalation of nitrous oxide or oral anxiolytics. For stroke patients, local anesthesia containing epinephrine can be used. Overall, the dental treatment of stroke patients should not pose a major problem. Taking a careful medical history, monitoring blood pressure before treatment and avoiding prolonged procedures are important factors in ensuring safe dental treatment for stroke patients [3].

Multiple sclerosis

Multiple sclerosis (MS) is autoimmune disease which affects the nervous system. It is characterized by chronic demyelination of the brain and spinal cord. It affects the white matter in the CNS. It can be triggered secondarily by trauma. Although the exact cause of MS is not known, a genetic susceptibility is evident. It is mainly an autoimmune reaction. The age at which MS occurs is usually between 20 and 45 years. Optic neuritis without other CNS signs or symptoms may be the first symptom of multiple sclerosis.Diplopia, blurred vision, nystagmus are also very well known symptoms. Weakness of the limbs is also a common symptom. Ataxia can also affect the head and neck in patients with multiple sclerosis. These patients often show sensory impairments, including paresthesias and hyperesthesias [4].

Symptoms in the oral cavity include trigeminal neuralgia (TN). Neuropathy of the upper and lower branches of the trigeminal nerve can lead to burning, tingling or reduced sensation. Facial weakness, paralysis and dysarthria may occur in these patients as speech disorders [4].

During acute exacerbations of multiple sclerosis, elective dental treatment should be avoided. These patients may require dental treatment under general anesthesia. With advanced disease, assistance with transfers to and from the dental chair is required and patients may have difficulty maintaining OH. Short dental procedures should be performed in the morning as the disease often worsens in the afternoon due to fatigue [3].

Parkinson's disease

Parkinson's disease is a disorder characterized by rigidity, tremors, bradykinesia and impaired postural reflexes. Parkinson's-like symptoms can also be triggered by drugs that lower dopamine levels in the brain. Although the exact etiology is not clear, it is most likely that the disease results from a combination of aging, genetics and exposure to toxins [5].

People over the age of 50 are most commonly affected. The main motor signs of Parkinsonism are: resting tremor, rigidity or stiffness, bradykinesia, and postural instability. The mask-like face is also well known. Half of the patients develop dementia, depression, anxiety, apathy and irritability [5].

Symptoms in the oral cavity include increased salivation, which makes it difficult to maintain a dry area during some dental procedures. The use of anticholinergics causes xerostomia, which leads to difficulty in holding removable dentures, mucosal ulcers and bacterial and fungal infections [5].

These patients require a periodontal examination twice a year. Saliva substitutes and local application of fluoride are essential for patients with xerostomia. During the procedure, the chair should be positioned at a 45-degree angle. The procedures should be short and performed, if it’s possible, with nitrous oxide sedation [3].

Huntington's disease

Huntington's disease is a degenerative disease of the CNS characterized by involuntary movements and dementia. The first signs of this disease include depression and irritability as well as a slowing of cognitive abilities. There are changes in coordinated and small movements, which are particularly noticeable in the face. In advanced cases, there are difficulties with speech and swallowing [6].

Symptoms in the oral cavity include dysphagia and involuntary movements of the face and tongue, which make dental treatment considerably more difficult [6].

Treatmnt protocol includes sedation with diazepam. Removable prosthetic restorations should be avoided in these patients due to the risk of fracture or accidental swallowing [3].

Bell's palsy

Bell's palsy is also known as facial paralysis or paralysis of the VII cranial nerve. The exact etiology is unknown, but a viral infection such as herpes simplex that affects the facial nerve causes inflammation. Other causes such as trauma during tooth extraction, surgical procedures such as parotidectomy, skull base tumors etc [7].

It begins with pain around one ear, followed by sudden paralysis of the muscles. The eye on the affected side remains open and the corner of the mouth droops. The face becomes expressionless and the forehead wrinkles flatten. Corneal ulcers can occur as a result of the impaired blinking [7].

The patient has a drooping corner of the mouth, which leads to increased salivation. There may be problems maintaining OH as food is retained in the upper and lower cheek and lip folds. The patient has difficulty speaking and chewing. Taste perception in the front two-thirds of the tongue is impaired [7].

For these patients, more frequent visits and instructions to maintain OH are required [3].

Myasthenia gravis

Myasthenia gravis is a chronic neuromuscular disease caused by autoimmune destruction of the neuromuscular junction, resulting in impaired neurotransmission and muscle weakness. The most common antibody is the anti-acetylcholine receptor antibody [8].

The clinical picture is characterized by weakness and easy fatigability of the voluntary muscles. The weakness increases with activity and improves after a period of rest. The most commonly affected muscles include the eye, facial and swallowing muscles. Symptoms often begin with weakness of the eyes (ptosis or diplopia). Weakness of the facial muscles causes a mask-like face [8].

Symptoms in the oral cavity include a change in voice and difficulty chewing and swallowing. Characteristic nasal speech due to weakness of the pharyngeal muscles. Dysphagia with risk of aspiration is also easily recognizable. Weakness of the facial muscles leading to a "myasthenic growl" when smiling [8].

These patients have a higher risk of developing aspiration pneumonia. OH should be properly maintained by the patient. Dental treatments should be scheduled for the morning and kept short as fatigue worsens during the day. The use of a mouth guard is recommended. Dentists should be familiar with and prepared for a possible myasthenic crisis. During a myasthenic crisis, dental treatment should be postponed and the patient should be referred to a physician [3].

Cerebral palsy

Cerebral palsy is a condition that results in permanent disability due to non-progressive damage to the developing brain. The manifestations depend on which area of the brain is affected. The pathophysiology includes damage to the motor cortex leading to spastic movements, damage to the basal ganglia causing dyskinetic movements, and damage to the cerebellum leading to ataxic movements [9].

The clinical picture includes muscle weakness and loss of coordination, muscle tension, spasticity and other involuntary movements. Difficulty controlling muscles, resulting in abnormal posture, movement and gait. Patients may have learning difficulties and sensory impairments [9].

Oral findings vary widely depending on the severity and type of CP. Common problems include misaligned teeth, increased incidence of tooth decay and periodontal disease due to difficulty maintaining OH, dental trauma from falls and seizures, bruxism, drooling, speech and swallowing difficulties and increased risk of aspiration [9].

Tailored dental care is essential. Frequent visits for dental care and preventive treatments are also necessary. Use of mouth supports and other aids to assist the patient during dental procedures. Close collaboration with other healthcare professionals is important to ensure comprehensive care [3].

Epilepsy

Epilepsy is a disorder characterized by seizures caused by abnormal electrical activity. Abnormal neuronal activity in the brain causes sudden, uncontrolled electrical discharges that lead to seizures. Seizures can be focal or generalized. Seizure types include tonic-clonic seizures, absence seizures, myoclonic seizures and atonic seizures [10].

Patients with epilepsy may suffer oral trauma due to seizures. Patients should be educated about the importance of wearing a mouth guard during activities that can trigger seizures. Dentists should be prepared to treat a seizure in the dental office, including interrupting treatment, removing instruments and protecting the patient from injury. Medications for epilepsy, such as phenytoin, can cause gum growths. Regular visits to the dentist to monitor and check the health of the gums are necessary [3,10].

Conclusion

In any oral cavity procedure, we must take into account possible interactions between the local anesthetic and the medications the patient is taking (analgesics, antibiotics, daily therapy) to avoid undesirable consequences, especially in high-risk patients.

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MULTIDISCIPLINARY APPROACH IN AESTHETIC REHABILITATION – CASE REPORT

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Abstract: *Aesthetic dentistry often involves a multidisciplinary approach to achieve the best possible results. This approach usually includes knowledge and skills from different dentistry fields such as orthodontics, restorative dentistry, endodontics, oral surgery, periodontics, and prosthodontics. The development of technology and new construction materials made it possible to achieve the desired results in a predictable and simple way.*
Key words: *aesthetic, multidisciplinary approach, orthodontics, prosthodontics*

Introduction

A multidisciplinary approach to aesthetic dentistry involves the integration of multiple dental specialties to achieve optimal aesthetic and functional results for patients. This collaborative strategy ensures comprehensive treatment planning and delivery, taking into account various aspects of dental health and appearance [1, 2].
The main components of this approach are:
Prosthodontics, which focuses on the design and fitting of dental prostheses such as crowns, bridges, veneers and dentures. It ensures the restoration of teeth with a natural appearance and function.
Orthodontics, which involves the alignment and straightening of teeth using braces or clear aligners. Properly aligned teeth contribute to a better appearance and a healthy bite.
Periodontics, which deals with the health of the gums and the supporting structures of the teeth. Healthy gums are crucial for an attractive smile and the longevity of dentures.
Endodontics, which deals with the health of the dental pulp and root canals. Endodontic treatments save teeth from extraction and maintain the integrity of the dental arch.
Oral and maxillofacial surgery, which offers surgical procedures for complex cases in the jaw area, such as the insertion of implants, bone grafts and corrective jaw surgery [1, 3, 4].

Multidisciplinary approach brings advantages

Advantages [5, 6, 7, 8]:
Comprehensive treatment planning: a multidisciplinary team can develop a well-rounded treatment plan that addresses all aspects of dental health and ensures that no problems are overlooked.
Tailored treatment: Customized treatment plans can be tailored to each patient's specific needs and goals, resulting in individualized and effective treatment.
Better results: Collaboration between dentists can lead to better quality results, as each expert brings their unique skills and knowledge to the treatment process.
Efficiency and coordination: Optimized communication and coordination between the different specialists can lead to a more efficient treatment schedule and a shorter overall treatment time.
Improved esthetics: Combining the expertise of different dental specialists ensures that both functional and esthetic aspects are optimized, resulting in a more beautiful and natural-looking smile.
Patient satisfaction: A holistic approach often leads to higher patient satisfaction, as comprehensive care not only addresses the immediate dental problem, but also contributes to overall oral health and appearance.

Case report

A female patient, 30 years old, came to the clinic. The patient did not like her smile. Intraoral examination revealed compression of maxillary central incisors, microdontia of tooth 22 (endodontically

treated tooth), ectopic tooth 34 in lateral bite with 24, Angle class I at right, Angle class II at left side– Figure 1.

Figure 1. Initial situation

The treatment plan initially included scaling, then teeth reparing, hybrid orthodontics, teeth whitening, zirconium oxide crown on tooth 22 and aditive treatment of teeth 12, 21 and 11 with composite injection technique. The orthodontic treatment was started with aligners in the upper and lower jaw. It was continued with a combination of aligners in the upper jaw and fixed orthodontics in the lower jaw. After the orthodontic treatment, the patient started bleaching the teeth with 16% carbamide proxide and an intracanal whitening with 35% hydrogen peroxide was performed on tooth 22. The tooth shade was determined before the tooth was ground and prepared for the crown. Due to the dark color of the endodontically treated tooth, the preparation is slightly subgingival – Figure 2.

Figure 2. Preparation of a tooth 22 for zirconium oxide crown

The injection technique was performed on both the central and the other lateral incisor. A digital impression was taken to facilitate communication with the laboratory. The finished zirconia crown was cemented with an adhesive cement. Adhesive cementation can provide additional retention for crowns on teeth that have undergone root canal treatment, especially when the remaining tooth structure is minimal. And for anterior teeth or other areas with high esthetic requirements, adhesive cementation provides a more seamless integration with the natural tooth structure and a better marginal fit.

The predictability of the orthodontic pre-prosthetic preparation created the conditions for a minimally invasive procedure and satisfactory esthetics while preserving the tooth structure – Figure 3.

Figure 3. Final situation

Conclusion

With a multidisciplinary approach that included orthodontic, restorative and prosthetic therapy, the conditions were created for the esthetic rehabilitation of the anterior segment of the maxilla with minimal reduction of the tooth structure.

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POSTER PRESENTATIONS

TEMPOROMANDIBULAR JOINT ANKYLOSIS CLASSIFICATION

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Abstract:

INTRODUCTION: The orofacial system comprises the following: the temporomandibular joint (TMJ), the bony structures of the viscerocranium, orofacial muscles, teeth and their supporting tissues, oral mucosa, and the vascular and nervous systems. Since the symptoms of these disorders are not specific exclusively to the TMJ, the American Academy of Orofacial
Pain (AAOP) has proposed the term craniomandibular dysfunction (CMD). CMD
represents an overarching term for a range of structural and functional disorders of various etiologies that affect the state of the orofacial muscles and/or the TMJ. TMJ ankylosis, in addition to trismus and disk displacement without reduction, is classified as a condition of hypomobility of the temporomandibular joint. It involves the fusion of joint structures, specifically the formation of adhesions between the joint components or their fusion. It most commonly occurs in children aged 1 to 10 years.

MATERIAL: TMJ ankylosis can be categorized into fibrous and bony types. The most common cause is trauma, followed by infections, degenerative diseases, or surgical interventions. Fibrous ankylosis primarily results from trauma, which leads to minor disk damage due to increased friction or surface defects on the condyle. Intracapsular bleeding causes the formation of fibrous adhesions, which later develop into dense connective tissue.
True bony ankylosis typically arises from trauma or infection within the joint, particularly during periods of growth and development and can be categorized into two types, true and false. True bony ankylosis involves pathological changes within the joint itself, typically due to trauma and infection. False ankylosis can be subdivided into four categories: myogenic causes, resulting postoperative movement restriction due to pain; neurogenic causes, most commonly associated with central nerve system lesions; psychogenic factors, where hysterical trismus is the primary trigger and bony obstructions, such as extracapsular malformations (for example coronoid process exostosis or zygomatic bone thickening).

CONCLUSION: TMJ ankylosis is an acquired condition in most cases. The primary causative factor is trauma at birth or during childhood. Enhancing awareness among parents and healthcare professionals about this condition would be beneficial, as it could lead to both primary and secondary prevention, as well as successful definitive treatment.

IN VITRO EVALUATION OF CYTOTOXIC EFFECT ON DENTAL CULTURES IN DENTAL RESEARCH

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Abstract:

Cell culture is a laboratory method which enables growth of cells in vitro, in controlled environment and optimized conditions required for specific research. Regarding dental research, cell culture models are mainly used to study differentiation, proliferation and other complex processes of oral tissue development in vitro, in aim to form an analogue of the naturally grown oral tissue, commonly referred as tissue engineering, for clinical purposes such as regenerative dentistry.
The tooth is a key model for understanding organogenesis at the molecular level, being a highly mineralized organ that develops through interactions between epithelium and mesenchyme, originating from the oral ectoderm. Cells for creating teeth and bones can be sourced from primary cultures or derived from tumor cells for uniform research purposes, and provided as immature intact matrix-organ cultures. The culture of epithelial cells, especially from the oral mucosa, has gained prominence in dental research due to its in vitro applications. However, the scarcity and maintenance challenges of epithelial stem cells limit research into tooth development. Nonetheless, human embryonic stem cells (hESCs) and induced pluripotent stem cells (hiPSCs) offer promising alternatives for exploring their functional roles in the tissue engineering of teeth.
Cell cultures are a valuable, ethically non-concerning method, widely used in the field of translational medicine. In dentistry, cell cultures provide an efficient method for teeth development research, synthetic and biomaterials toxicity testing, and recently, stem cell-based regenerative dentistry. Numerous studies have identified sources of stem cells and their potential in treatment of periodontitis, bone repair, regeneration of the pulp and new teeth development. However, these approaches are novel, stem cell biology still requires elucidation and further in vitro and in vivo studies are essential for stem cells to progress into precise and reliable method for modern regenerative medicine.

Key words: *cell culture, stem cells, regenerative dentistry*

CONTEMPORARY METHODS OF THE IMPROVEMENT OF RESIN-DENTIN BONDS

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Abstract:

Introduction. Despite the diversity and advancement of materials for permanent restorations, there is still no material that completely matches the physical, chemical, and biological properties of dental tissues. Contemporary research in the field of adhesive dentistry is focused on achieving an adequate and predictable bond between restorative materials and dental substrates. The aim of this paper is to present recent advancements in dental technology focused on enhancing the still controversial bond between restorative materials and dentin. Currently, there are several main strategies for addressing this issue including the use of collagen cross-linkers, antioxidants, inhibitors of endogenous proteinases, reinforcement with inorganic fillers and remineralization agents, modification of bonding techniques, and substrate treatment with lasers.

Conclusion. Based on current knowledge and experimental research, it is concluded that the use of modern methods for modifying dentin substrate achieves an adequate initial adhesive bond. However, the degradation of the interfacial contact surface still represents a common problem that compromises the longevity of restorations.

Key words: *dentin, adhesive, collagen, hybrid layer, matrix metalloproteinases*

HOW OFTEN IS EXTRACTION OF IMPACTED MAXILLARY CANINES NECESSARY AND WHAT ARE PREDICTIVE FACTORS

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Abstract:

Impacted maxillary canines are the second most frequently impacted teeth, right after third molars. Treatment options include surgical exposure with orthodontic traction, surgical removal, autotransplantation, or no intervention. The severity of canine impaction is most commonly predicted by factors such as the tooth's location (sector), its angulation relative to the sagittal medial plane (alpha angle), and its distance from the occlusal plane (vertical position). There is limited evidence in the literature regarding the frequency and specific circumstances that necessitate the surgical removal of impacted maxillary canines. 76 patients with 91 impacted maxillary canines with CBCT before start of treatment were included in our study. We assesed gender, side of impaction, localization, treatment option (orthodontic extrusion or extraction), alpha angle and vertical position of impacted teeth. Our results demonstrated that 17 out of 91 canines were indicated for extraction. Extractions were more commonly in females and unilaterally. 19% of palatally impacted and 23% buccaly positioned impacted teeth were extracted. Alpha angle was similar between extracted teeth (41.06 ±16.99°) and orthodontically extruded (40.31±12.71°, p=0.867). Vertical position of extracted teeth was significantly higher (8.88±2.41mm) compared to orthodontically extruded teeth (6.88±2.89, p=0.038). In almost 20% of impacted maxillary canines extraction is treatment option. Vertical distance to occlusal plane can be predictor for the need for extraction as when impaction of maxillary canine is diagnosed.

Key words: *maxillary canines, impaction, CBCT, extraction*

AI IN DENTAL MEDICINE: ASSESSING CHATGPT'S POTENTIAL IMPACT

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Abstract:

Introduction: Artificial intelligence (AI) and its derived programs are increasingly prevalent in everyday life, spanning diverse fields such as economics, programming, electrical engineering, management, marketing. Apparently it begins to influence various spheres of medical sciences, as well. However, the utilization of AI is accompanied by numerous challenges and limitations that can adversely impact its applications across these domains.

The Aim: This paper investigates the potential impact of large language models generated by artificial intelligence on everyday dental practice.

Material and Methods: For research purposes, ChatGPT 3.5 was used, tested for the capability to set a diagnosis and to list differential diagnoses of certain diseases of the dental pulp. The model's capacity to recognize typical clinical presentations of endodontic diseases and accurately identify symptoms in relation to disease names was evaluated, before and after training attempts, through prompt generation.

Results: The results of Fisher's test ($p>0.05$) showed that there is no statistically significant ability of the model to diagnose endodontic diseases based on the described clinical cases, both before and after informing the model.

Conclusion: According to the results of this research, it is concluded that the current language model – ChatGPT 3.5 does not currently have the ability to establish a diagnosis based on the presented clinical set of symptoms of endodontic diseases. The current use of this model is reflected in the possibility of easier and faster obtaining of basic information about different conditions, which should also be approached critically because they can be unreliable.

Key words: *artificial intelligence; large language models; ChatGPT; differential diagnosis; dental medicine*

TECHNOLOGICAL ADVANCES IN GUIDED ENDODONTIC TECHNIQUES: STATIC VS. DYNAMIC APPROACHES

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Abstract:

Guided endodontics represents an advancement in the precision of dental procedures, leveraging digital technologies to improve outcomes. This work explores the two main approaches in guided endodontics: static and dynamic navigation. Static navigation employs 3D- templates to guide instruments during treatment, offering high accuracy with minimal tissue removal. In contrast, dynamic navigation uses real-time tracking systems akin to GPS technology, enabling continuous adjustments during the procedure. Both approaches are applicable in treatments such as calcified canal management, periradicular surgeries, and autotransplantation. The advantages of each technique are evaluated, highlighting static navigation's simplicity and efficiency, and dynamic navigation's flexibility and precision.

Key words: *Guided Endodontics, Static Navigation, Dynamic Navigation, Digital Dentistry, 3D Navigation Systems*

RISK FACTORS FOR THE OCCURRENCE OF TEETH AND JAW IRREGULARITIES

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Abstract:

Introduction: Irregularities of the teeth and jaws are a significant socioeconomic issue, alongside caries and periodontal disease, and are increasingly common among children and adolescents. Assessing the risk factors for orthodontic irregularities is crucial as they may vary globally.

Aim: To identify the risk factors leading to orthodontic irregularities of the jaws and teeth.

Material and Methods: This retrospective study was conducted at the Clinic of Dentistry, Vojvodina, analyzing data from the Department of Orthodontics between 2007 and 2024. The average age of the patients was 11.46 years. Risk factors were assessed using a survey method, where the total score categorized risk levels as low (0-6 points), medium (7-12 points), or high (13-18 points).

Results: The analysis revealed that the number of observed risk factors per patient ranged from 0 to 7, with 3 factors being the most common. Fewer patients had 0 or 7 risk factors. The prevalence of 4 and 5 factors was also notable. Acquired factors accounted for 62% of the total, while hereditary factors comprised 38%.

Conclusion: The survey indicates that acquired risk factors are the predominant cause of orthodontic irregularities in the studied population. However, the presence of a significant number of children with hereditary predispositions supports the understanding that orthodontic irregularities result from a multifactorial interplay.

Key words: *Risk factors, malocclusion, teeth, jaws.*

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THE STRUCTURE OF TEETH AND JAWS IRREGULARITIES AT THE DENTISTRY CLINIC OF VOJVODINA

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Abstract:

Introduction: Malocclusion refers to the misalignment of the maxillary and mandibular teeth, which can vary in type across different regions and countries.

Aim: This study aimed to determine the frequency and severity of orthodontic irregularities in patients at the Clinic of Dentistry, Vojvodina.

Material and Methods: The research was conducted at the Clinic of Dentistry, Vojvodina, where data were collected from patients at the Department of Orthodontics between 2007 and 2024. Orthodontic irregularities were categorized into morphological and functional types. Patients were classified into three groups: Class I, II, or III.

Results: Among the patients, 67 (41.4%) were classified as Class I, 72 (44.97%) as Class II, and 21 (13.63%) as Class III. Morphological irregularities most commonly included crowded teeth (22.1%), a family history of similar anomalies (14.84%), and congenital variations in the number of teeth (5.84%). For functional irregularities, harmful habits and parafunctions accounted for 29% of the cases, while irregular functions were responsible for 71%.

Conclusion: The most prevalent malocclusion among patients at the Clinic of Dentistry, Vojvodina, is Class II, with a notable incidence of crowded teeth.

Key words: *Class II, Class III, malocclusion, crowded teeth.*

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OPTICAL IMPRESSION PRECISION OF THE EDENTULOUS UPPER JAW WITH IMPLANTS

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Abstract:

Introduction: The use of intraoral scanners has become an important part of digital dentistry and modern clinical practice. The optical impression of edentulous jaws with implants is a challenge due to the lack of anatomical reference points and mobile mucosa, so the right choice of scanning technique is of crucial importance for the accuracy of the digital impression.

Materials and methods: A digital model of an edentulous upper jaw with four implants installed was scanned with a reference laboratory scanner Ineos (DENTSPLY, Sirona, Germany). Four intraoral scanners were used: Aoralscan 3 (Shining 3D, China), TRIOS 3 (3Shape, Denmark), i700 (Medit, South Korea), and VirtuoVivo (Straumann, Switzerland). Different scanning protocols of BOP (buccal-occlusal-palatal), POB (palatal-occlusal-buccal) and SS (Latin letter "S" movements) were carried out on each scanner, and each path was repeated 10 times. The resulting files are saved in Standard Tessellation Language (STL) format. Then, in a 3D analysis software program (ZEISS Inspect, Zeiss, Germany), each STL file within all scanning techniques was compared with a control image obtained by a reference laboratory scanner in order to determine their trueness. After those measurements the most accurate scans within each group are then used as reference for measurement in the same program to determine precision of all scanners and techniques.

Results: Based on ANOVA statistical analysis considering precision, Virtuo Vivo (Straumann, Switzerland) showed the least precise results among other scanners and protocols ($p<0.05$). In terms of different scanning protocols BOP (buccal-occlusal-palatal) is most precise for i700 (Medit, South Korea), POB (palatal-occlusal-buccal) for TRIOS 3 (3Shape, Denmark) and SS (Latin letter "S" movements) for Aoralscan 3 (Shining 3D, China) ($p<0.05$).

Conclusion: The results of the study could indicate the need to use the appropriate technique for each intraoral scanner separately, it is most convenient to use the scanning protocol recommended by the manufacturer.

Key words: *Intraoral scanner, Scanning techniques, Implants, Edentulous jaw*

DENTAL PATIENT WITH CARDIOVACULAR DISEASE

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Abstract:

Basic knowledge about cardiovascular diseases, symptoms and complications that can occur during dental procedures in a patient suffering from cardiovascular diseases, are necessary for every dentist. The goal of the paper is to present the contemporary guidelines for preparing a patient suffering from cardiovascular disease for dental intervention. Dental patients who do not have adequate treatment of the underlying disease, have a significantly higher probability of general health complications during the dental intervention. Dental treatment of patients with cardiovascular diseases requires special attention, because any stressful situation can increase blood pressure and sometimes lead to unwanted events such as myocardial infarction or cerebrovascular insult. Adequate control of pain and anxiety is very important. Patients with arterial hypertension have a high risk of adverse cardiovascular events due to endogenous catecholamines that are secreted more during pain and stress. It is also recommended to add anxiolytics to their regular cardiology therapy before dental intervention. Intravascular application of anesthetic with a vasoconstrictor should be avoided. During the intervention, rapid changes in the patient's body position should also be avoided, in order to avoid orthostatic hypotension. The most common cardiovascular diseases that should be paid attention to in preparation for dental intervention are: arterial hypertension, ischemic heart disease, cerebrovascular diseases, heart rhythm disorders and heart failure. Special attention should be paid to patients on anticoagulation and/or antiplatelet therapy, as well as to patients that need prevention of bacterial endocarditis.

Key words: *dental patient, cardiovascular disease, risk*

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STATIC FRICTION COEFFICIENT OF CO-CR-MO ALLOY FOR REMOVABLE PARTIAL DETURE FRAMEWORK

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Abstract:

The paper presents the results of measuring of the static coefficient of friction of contact pairs made of dental ceramics and Co-Cr-Mo alloy in the presence of saliva. Samples of Co-Cr-Mo alloy were made by milling and aditive technology (SLS process). The Co-Cr-Mo alloy samples were subsequently polished, resulting in a combination of four contact pairs of dental ceramics and Co-Cr-Mo alloy. For tribomechanical characteristics of experimental samples tribometer was used. It works on the principle of an inclined plane. The measurements were performed in the presence of arteficial saliva. The lowest mean value of the static coefficient of friction was obtained for the contact pair of ceramics and Co-Cr-Mo alloy obtained by the SLS process after preparation and polishing (0.259). The highest mean value of the static coefficient of friction was obtained for the contact pair of ceramics and Co-Cr-Mo alloy obtained by the SLS process before preparation and polishing of the sample (0.369). The results indicate that values of the mean static coefficient of friction for the contact pair of ceramics and Co-Cr-Mo alloy obtained by the milling process and for the contact pair of ceramics and Co-Cr-Mo alloy obtained by the SLS process and then polished were similar. Higher values of the static coefficient of friction for the contact pair of ceramics and Co-Cr-Mo obtained by the milling process are obtained for lower surface roughness, while the opposite is the case for the contact pair of ceramics and Co-Cr-Mo obtained by the SLS process, i.e. a higher value of the static coefficient of friction was obtained for a higher surface roughness. With finishing and polishing procedure the shortcomings of AM manufactured object can be overcomed.

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