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On behalf of the Organizing and Scientific Committee, We are pleased to welcome you all at the 5th International Scientific Conference in Dentistry 2020 Novi Sad.

The Scientific and Organization Committee have made every effort to plan a conference that is scientifically satisfactory and interesting, although it is held on-line due to pandemic situation caused by COVID -19.

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.

We really hope that next year these uncertain times will be behind us, and that you will have opportunity to experience the traditional hospitality of Novi Sad, to strengthen the existing friendships and create a lot of new ones.

President of the Organizing Committee

Prof. dr Tatjana Puskar

President of the Scientific Committee

Assist. Prof dr Milica Jeremic Knezevic

TABLE OF CONTENTS

INVITED LECTURES

DIAGNOSTIC AND THERAPY OF TEMPOROMANDIBULAR DISORDERS.....	2
MAXILLARY SINUS MEMBRANE PERFORATION - POTENTIAL RISK FACTORS IN LATERAL SINUS FLOOR ELEVATION.....	6
VITAMIN D AND PERIODONTAL HEALTH	7
IMMEDIATE VS DELAYED IMPLANT PLACEMENT IN THE UPPER MOLAR SITE	12
ANATOMY OF THE TEMPOROMANDIBULAR JOINT.....	18
STEM CELLS FOR TEMPOROMANDIBULAR JOINT REPAIR AND REGENERATION.....	19
TELESCOPIC SYSTEM AS A SOLUTION FOR SUBTOTAL EDENTULISM	20
ESTHETIC OF DENTAL RESTORATIONS	25
WHERE IS THE END OF SCIENCE? WHEN ART BEGIN?	25
EMERGENCY DENTAL CONDITION OF CHILDREN.....	26
DENTAL CLINIC : DIGITAL WORKFLOW WITH MEDIT I500	32
ROLE OF MRI IN TRIGEMINAL NEURALGIA	37
THE INCIDENCE OF DENTAL CARIES AND MOLAR INCISOR HYPOMINERALISATION AMONG THE CHILDREN OF SOS CHILDREN'S VILLAGE CROATIA	42
CERAMICS AND CEMENTS FOR MODERN PROSTHETIC RESTORATIONS: WHAT? WHEN? HOW?	45
PERIODONTOLOGY, ORTHODONTICS AND PROSTHETICS – AESTHETIC ASPECT	50
IMPORTANCE OF DETERMINING BIOCHEMICAL AND MOLECULAR MARKERS IN ORAL FLUIDS.....	53
CHALLENGES IN PREDICTABLE AESTHETIC DENTISTRY SOLUTIONS: #ANTERIOR & POSTERIOR	54
CONVENTIONAL IMPRESSIONS IN IMPLANT PROSTHETICS FROM THE ASPECT OF ACCURACY.....	58
CHRONIC ALCOHOLISM AS ETIOLOGICAL FACTOR OF DENTAL EROSION.....	64
IMMEDIATE IMPLANT PLACEMENT IN THE AESTHETIC ZONE.....	75
ANALYSIS OF SPECIFIC ORAL HEALTH PROGRAMS OF THE POPULATION OF THE AUTONOMOUS PROVINCE OF VOJVODINA.....	76
DENTAL CARIES AND DENTIN HYPERSENSITIVITY - ARE WE DIAGNOSING TOO LATE?.....	83
PAIN IN TEMPOROMANDIBULAR JOINT	87

FULL PAPERS

THE PURPOSE INSTRUMENTS OF AXIS II RDC-CMD PROTOCOLS IN DIAGNOSING OF TEMPOROMANDIBULAR DISORDERS.....	89
THE IMPERATIVE OF TEAM CARE FOR IMMOVABLE THIRD-AGE PATIENTS WITH TOTAL DENTURES	94

ORAL MUCOSA REACTION ON COMMON USE OF TOOTHPASTE WITH STANNOUS FLUORIDE	101
AESTHETIC SOLUTION OF AN EDENTULOUS REGION WITH FIBER-REINFORCED COMPOSITE BRIDGE - CASE STUDY	108
APPLICATION OF ELECTROSPINNING METHOD IN DENTAL MEDICINE.....	113
CHOICE OF ADHESIVE BOND STRENGTH TESTING METHOD FOR DENTAL COMPOSITE MATERIALS	117
MATERIALS FOR THE BASIS OF REMOVABLE DENTAL PROSTHESES	122

POSTER PRESENTATIONS

„ALL ON FOUR”- CONCEPT.....	127
APPLIANCE OF FACE-BOW TRANSFER IN DENTAL PROSTHODONTICS.....	128
CORONALLY DISPLACED FLAP WITH CONNECTIVE TISSUE GRAFT IN THE PRE-PROSTHETIC PERIODONTAL TREATMENT	129
PREVALENCE OF APICAL PERIODONTITIS ON ROOT-FILLED TEETH IN AN ADULT SERBIAN POPULATION.....	130
PERIAPICAL HEALTH RELATED TO THE TYPE OF CORONAL RESTORATION IN ENDODONTICALLY TREATED TEETH	131
THE IMPORTANCE OF INITIAL DENTAL AVULSION TREATMENT. CASE REPORT	132
BIOCOROSION OF NICKEL-TITANIUM DENTAL INSTRUMENTS UNDER THE INFLUENCE OF DIFFERENT SOLUTIONS	133
THE APPEARANCE OF INCREMENTAL LINES IN THE ENAMEL OF PRIMARY TEETH	134
APPLICABILITY OF NANOINDENTATION, SEM, PROFILOMETER AND MACRO PHOTOGRAPHY IN ANALYSING BITE MARKS ON ANCIENT POTTERY	135

INVITED LECTURES

DIAGNOSTIC AND THERAPY OF TEMPOROMANDIBULAR DISORDERS

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Abstract: *Temporomandibular disorders (TMD) represent a common and widespread health problem. TMD is a combination of both structural and functional problems that affect temporomandibular joint (TMJ), masticatory muscles, and surrounding structures. It is most observed in the age group 20-40 years of age, with an incidence of 18-35% in the general population.*

According to the latest recommendations, diagnostic protocols are used to diagnose TMD and ensure standardization of the procedure. In order to make adequate diagnosis, in addition to the clinical examination, TMJ should be examined by using one of the available imaging methods. Magnetic resonance imaging is the "gold standard" for detection of the discus articularis position and bone marrow signal.

TMD therapy can be reversible and irreversible, depending on the type of disorder. Reversible therapy includes splints, pharmacotherapy, physical therapy, and psychotherapy. Irreversible therapy includes dental restoration (crowns, bridges), orthodontic therapy, surgery, as well as dental fillings.

Key words: *temporomandibular joint; temporomandibular disorder; magnetic resonance imaging; therapy of TMD;*

Introduction

Temporomandibular disorder (TMD) represents significant health problem which is very often in general population and widespread. These disorders are present in contemporary society, but the first evidence of problems in TMJ was noticed in the fifth age before Christ, when Hippocrat described manual method of dislocation of mandible called fixation of mandible. Patients are often lost with their problems with TMJ because they do not know which specialist are in charge for their TMJ problems. So, for many of them, this is a long journey in getting the right diagnose and adequate treatment. The first choice is ORL specialist, then maxillofacial surger, and at the end dentists or specialist of Prosthodontics.

TMD represents several conditions characterized by signs and symptoms involving TMJ, masticatory muscles or both. In general population, peak in the age is between twenty and forty years. Females are predominantly affected. (1)

So many factors have influence on etiopathology of TMD. It is extremely hard to distinguish it because they have different roles in initiating individual symptoms. It could be divided into three groups: initiating

factors- they initiate first signs and symptoms, predisposing factors -they result in higher risks for developing TMD, and perpetuating factors, which is repeating factors, and treatment is complicated if these factors are present.

There are many Classifications for TMD, but very well known and useful are Classification according Dworkin and LeResche from 1992 (2). They divided all TMDs into three groups: I- Myofascial pain, II- Disc displacement and III- Arthralgia, Osteoarthritis and Osteoarthrosis.

Shiffman and Peck suggested Taxonomic Classification, and according to that Classification, there are four groups of disorders: Temporomandibular joint disorders, Masticatory muscles disorders, headache, and disorders of surrounding structures (3).

Diagnostic of TMD

Clinical examination comprises analysis of occlusal complex and function analysis of orofacial system. The most useful contemporary diagnostic protocols are RDC/TMD (Research Diagnostic Criteria for TMD) and DC/TMD (Diagnostic Criteria for TMD) (4).

These protocols have special algorithms which allowed quite easy making a diagnosis of TMD.

The author of DC/TMD protocol are Richard Orbach, and he represents Diagnostic Decision tree, which is helpful in making diagnosis of TMD.

There are many diagnostic tools in contemporary diagnosis of TMD, but MRI is the most useful imaging diagnostic method and gold standard in contemporary diagnosis of TMD for depiction of position of articular disc, retrodiscal tissue and bone marrow. Advantages of MRI are non-invasive and non-ionisation method. (5)

For dentists it is important to notice that dental fillings, dentures as well as orthodontic appliances are not contraindication for imaging TMJ by MRI, but they can reduce quality of an image.

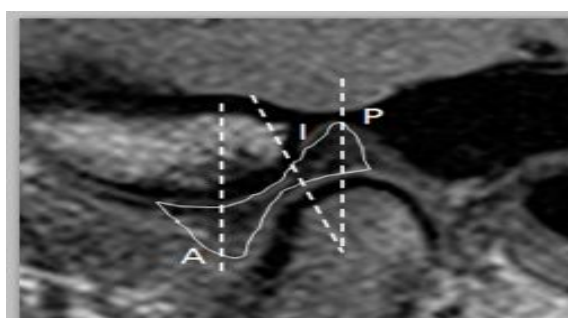


Image 1. Normal position of the articular disc on MRI in closed mouth position and maximum opening mouth position.

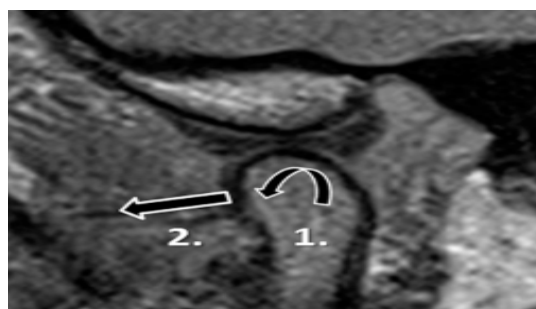


Image 2. This is sagittal view of TMJ. Some authors described shape of the articular disc as bow/tie configuration.

Therapy of TMD

Occlusal stabilisation or Michigan splint is the first initial step in therapy of TMD. It is reversible occlusal therapy, where therapist incising vertical dimension of occlusion, relaxing hipercontracted muscles and allowing guiding mandible by canines, which is characteriscics of pfysiological occlusion.

Therapists have two aims in curring TMD, how to treat daytime as weel as awaking TMD symptoms.

TMD self-management instructions

- to routinely encourage patients to rest their masticatory muscles by voluntarily limiting their use, i.e., avoiding hard or chewy foods and restraining from activities that overuse the masticatory muscles (e.g., oral habits, clenching teeth, holding tension in the masticatory muscles, chewing gum)
- to encourage awareness and elimination of parafunctional habits (e.g., changing teeth clenching habit to lightly resting the tongue on top of the mouth or wherever the tongue is most comfortable) and keeping the teeth apart and masticatory muscles relaxed

Conclusion

Only patient history which include questionnaires and a structured clinical examination with adequate imaging method lead to accurate diagnostic of TMD.

TMD is like musculoskeletal disorders in other parts of the body, and similar therapeutic approaches can generally be used. It is important for dentists to rule out disorders that mimic TMD, to identify non-TMD disorders that may negatively impact the patient's TMD symptoms, and to offer the patient therapies that will provide the most cost-effective long-term symptom relief.

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MAXILLARY SINUS MEMBRANE PERFORATION - POTENTIAL RISK FACTORS IN LATERAL SINUS FLOOR ELEVATION

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Abstract: *The maxillary sinus floorelevation procedure (SFE) is widely used to attain sufficient boneheight for implant placement in the posterior maxilla. Most common complication of (SFE) is sinus membrane perforation (SMP)with a prevalence ranging from 10.0% to 60.0% and numerous treatment options. In this lecture will be presented the results of the study about the correlation between SMP and potential risk factors and the evaluation SMP treatment outcomes with collagen membrane. Analysis of patients' records and CBCT focused on patient-related risk factors (sinus contours, thickness of membrane and lateral sinus wall, interfering septa, crossing vessels, former oroantral communication) and intervention-related risk factors (surgical approach, sides, number of tooth units, and sites).The outcome of SMP treatment was analyzed in the recalls.*

VITAMIN D AND PERIODONTAL HEALTH

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Abstract: *Periodontal disease is a chronic inflammatory condition of periodontium caused by microbial biofilms and host's immune response to bacterial products. If left untreated, periodontal disease can cause destruction of the tissues that support the teeth, resulting in teeth mobility and finally, teeth loss. Recent studies have shown strong association of periodontal disease with systemic diseases such as cardiovascular disease, type II diabetes mellitus, adverse pregnancy outcomes and osteoporosis. Vitamin D is fat soluble vitamin and it is obtained from exposure to sunlight, diet and nutritional supplements. Vitamin D plays an important role in calcium homeostasis regulation, bone mineralization and immune modulation. Vitamin D is in a tight relationship with periodontal health. Deficiency in vitamin D leads to reduced bone mineral density, osteoporosis and the progression of gingivitis and periodontal disease. Moreover, polymorphisms of the vitamin D receptor gene shown to be associated with periodontal disease and alveolar bone loss. The purpose of this study is to stress the clinical importance and evaluate vitamin D in the prevention and treatment of periodontal disease in order to reach an optimal therapy outcome.*

Vitamin D is fat soluble vitamin and it is obtained from exposure to sunlight (80%), diet and nutritional supplements (20%) [1]. Knowing climatic variations and limited exposure to sunlight, deficiency of vitamin D is very frequent health problem worldwide [2, 3]. Approximately one billion people worldwide and up to 40% of Europeans are likely suffering from vitamin D deficiency [3].

Vitamin D comes in two forms: vitamin D₂ (ergocalciferol) and vitamin D₃ (cholecalciferol). Its active form is 1,25 dihydroxy vitamin D (1,25(OH)₂D), which has a half-life of only about 4 hours. Vitamin D is converted in the liver to 25(OH)D, the major circulating metabolite in the blood with a half-life of 2-3 weeks, that serves as a patient's vitamin D status determinant. It normally fluctuates from 25 to 138 nmol/l. Although there is no consensus on optimal levels of 25(OH)D, most experts define < 50 nmol/l (20 ng/ml) as vitamin D insufficiency (deficiency, inadequacy) [4]. It is established that vitamin D deficiency (serum 25(OH)D concentrations < 25-30 nmol/L) leads to rickets in children, and osteoporosis in adults, as well as an increased probability of bone fracture and decrease in bone mineralization density, causing osteomalacia and muscle weakness, pointing to the need for prevention and treatment of such low serum 25(OH)D concentrations on an individual and population level [1, 5]. Recent evidence suggests that 25(OH)D levels may need to be as high as 75 nmol/l (30 ng/ml) to achieve optimal vitamin D status [4].

1,25(OH)₂D works through the vitamin D nuclear receptor (VDR) which functions as a transcription factor, interacting in the regulation of many biological processes, including calcium and bone homeostasis,

inflammation, cell mediated immunity, cell-cycle progression, and apoptosis [6]. The $1,25(\text{OH})_2\text{D}/\text{VDR}$ signaling pathway has the capacity to mediate antibacterial, antiviral, and anti-inflammatory activity [6]. $1,25(\text{OH})_2\text{D}/\text{VDR}$ pathways directly or indirectly can mediate differentiation and maturation of osteoblasts and osteoclasts, thus influencing bone remodeling. $1,25(\text{OH})_2\text{D}/\text{VDR}$ pathways in osteoblasts enhance the expression of osteogenic genes such as those encoding type I collagen, alkaline phosphatase, osteocalcin and osteopontin which drive bone formation and upregulate the expression by osteoblasts of RANKL which subsequently promotes differentiation and activity of osteoclasts [1, 4].

Periodontal disease/periodontitis is chronic inflammatory condition of the supporting tissues of teeth. It is caused by periopathogens from biofilm (mainly *Porphyromonas gingivalis*, *Aggregatibacter actinomycetemcomitans*, *Prevotella intermedia* and *Treponema denticola*), as well as the host's immune response to bacterial products. Periodontitis affects up to 50% of the adult population. If not timely treated, periodontitis will eventually lead to gingival detachment and progressive destruction of periodontal tissues, including alveolar bone, ultimately leading to tooth loss. Recent studies have shown strong association of periodontitis with systemic diseases such as cardiovascular disease, kidney disease, type II diabetes mellitus, adverse pregnancy outcomes and osteoporosis.

The golden standard in periodontal therapy focuses on reducing the periopathogens through: personal and professional mechanical debridement of the tooth surface, by the use of local or systemic antibacterial agents, or by downregulating the immunoinflammatory response with drugs in order to reduce the bacteria-induced inflammation and to arrest the progression of periodontal tissue damage. Since periodontitis is a major cause of tooth loss in adults worldwide, the accent should be given to the prevention rather than therapy of this disease.

Recently, it has been shown that vitamin D modulates periodontal diseases pathogenesis through increasing bone mineral density and reducing bone resorption [7-9]. The relation between vitamin D insufficiency (<20 ng/mL) and several infectious and inflammatory conditions, including onset and progression of periodontal disease, has been observed by many authors [7-17]. Dietrich et al. were one of the first to support an association between $25(\text{OH})\text{D}$ levels and periodontal disease reported an negative relation between $25(\text{OH})\text{D}$ levels and attachment loss in participants ≥ 50 years [10, 11]. Millen et al. also reported that vitamin D status was inversely associated with periodontal disease in a sample of 920 postmenopausal women [12]. Anbarcioglu et al. observed an increased prevalence of vitamin D deficiency in aggressive periodontitis subjects suggesting that decreased vitamin D level could be a risk factor and its screening is recommended in suspected individuals [13].

Alshouibi et al. investigated the periodontal health status in older men with moderate bone loss and a maintenance vitamin D dose of ≥ 800 I.U. [14]. They suggested that this daily dose could inhibit periodontal disease's progression [14]. Bashutski et al. observed that periodontal surgery had better treatment outcome in patients with adequate vitamin D than those with vitamin D deficiency [15]. Garcia et al. reported that calcium and vitamin D supplementation may reduce the severity of periodontal disease if used at doses higher than 800-1000 I.U. daily [16]. They also noted that vitamin D, in addition to its role in bone and calcium homeostasis, acts as an anti-inflammatory agent because it inhibits immune cell cytokine expression

and causes monocyte/macrophages to secrete molecules that have a strong antibiotic effect [16]. In study by Boggess et al, pregnant female with periodontitis was shown to have vitamin D insufficiency, moreover, the adjunctive use of vitamin D was shown to be able to improve maternal oral health [17]. Similarly, Miley et al. observed improved periodontal health status after vitamin D supplements [18]. However, Hidelbold recommended further controlled clinical trials to address the adjunctive role of calcium/vitamin D supplements for treating periodontal disease [19].

Vitamin D may be of benefit in the treatment of periodontitis, not only because of its direct effects on bone metabolism, but also because it may have antibiotic effects on periodontopathogens and inhibit inflammatory mediators that contribute to the periodontal destruction. Consequently, the risk of gingivitis and chronic periodontitis can be decreased by adequate consumption of vitamin D [10, 18, 20]. Vitamin D supplementation may be considered as a safe, effective and affordable therapeutic approach for periodontal therapy. Thus, maintaining an adequate vitamin D level (correcting vitamin D deficiency) seems to be beneficial in prevalence and treatment of periodontal disease. However, additional research are necessary in order to examine exact role by which vitamin D protects periodontal tissues from inflammatory breakdown, especially in infants, children, adolescents, premenopausal women and in diverse racial or ethnic groups.

Further, it is necessary to evaluate the required dose and effects of continuous vitamin D supplementation on periodontal health in prospective controlled clinical trials in order to achieve best therapy outcome, since it is well known that increased prolonged intake of mega dose of vitamin D supplements without medical consultation could lead to a risk of vitamin D toxicity (VDT) [21]. Exogenous VDT is diagnosed by 25(OH)D level above 125 nmol/l (50 ng/ml), and is associated with severe hypercalcemia and hypercalciuria and significantly decreased parathyroid hormone activity [21, 22].

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IMMEDIATE VS DELAYED IMPLANT PLACEMENT IN THE UPPER MOLAR SITE

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Abstract: *The purpose of this case report series is to highlight the advantages and limits of an immediate implant placement in the upper molar area. We focused on implantation protocol, various bone augmentation techniques, implant type and extraction site previsionalisation. Our conclusion is that the immediate implant placement has a lot of certain advantages, limited only by morphological obstacles, like the sinus cavity and surgical skills of the operator.*

Key words: *immediate implant placement, augmentation material, bone condensation technique, PRF, upper molar area.*

Introduction

After tooth extraction, clinicians often experience changes in the anatomy of the local area. In the aesthetic area and not only, but the successful management of the extraction socket is sometimes challenging. For the support of a prosthesis to remain stable, proper management is required to ensure the stability of the implant used. The need for a classification system for various types of extraction sockets is obvious. A noninvasive, simple approach to the grafting and the management of sockets when soft tissue exists but the buccal plate is affected following tooth extraction is also very important [1].

Case study

The study was performed in accordance with the principles of the Declaration of Helsinki and has the ethical approval from University’s research Ethic committee. Patient provided written consent before the study and dental implant procedures were undertaken.

A.F patient, 47 years, female, with a hopeless endo tooth (Fig. 1), with floor perforation and a socket defect Type 3 after Richard B. Smith and Denis P. Tarnow [1] (Fig. 2), relieved on 2D and 3D radiological images (Fig. 3,4) came to our clinic for treatment.



Fig. 1 Clinical aspects hopeless endo tooth

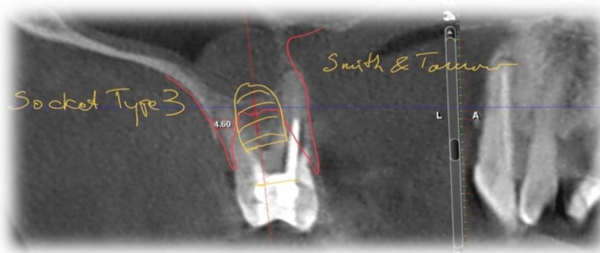


Fig. 2 The socket type 1 defect



Fig.3. Initial OPG of the patient

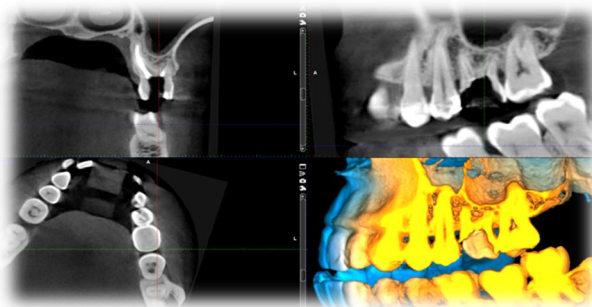


Fig. 4. CBCT aspect-floor perforation

We used a prior extracted 1.8. (wisdom tooth) as grafting material and a hybrid collagen membrane. The tooth was rigorously cleaned, grounded and sterilized (Fig.5,6,7) according to manufacture (Kometa Bio) protocols [2]. Being autologous hard tissues, the biocompatibility is clearly superior compares to other types of augmentation material. The removal of soft tissue debris is a very important step to obtain an autologous grafting material (Fig.8).



Fig. 5. Recovered, extracted root fragments

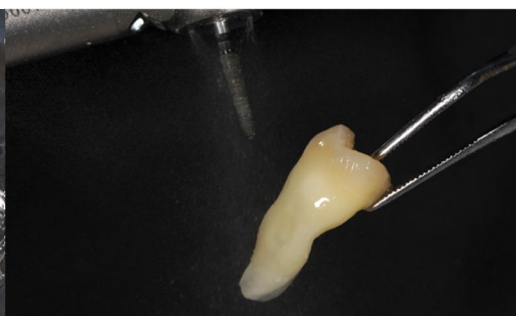


Fig.6. Tooth cleaning



Fig.7. Tooth placement in the grinder



Fig.8. Grounded and sterilized autologous dentin

After these steps follow socket degranulation (Fig.9), debridement cleaning and disinfection for the removal of elements present following tooth extraction such as soft tissue, root debris and bone fragments [3]. After that, the internal sinus elevation (Fig. 10) with first bur and reaching the floor 3-4 mm [4], [5], followed by bone expanding densification at same level with second 3mm bur (Fig.11), beyond the floor (1-1,5mm) (Fig.12) and 3-4 mm targeting over the sinus floor and bone expanding was a very important part of the treatment.



Fig.9. Socket degranulation with round bur



Fig.10. Pilot drill in the molar septum



Fig.11. Second 3mm bur, bone expanding densification Fig.12. 3mm bur beyond the floor (1,5mm)

After that, a 3,5 mm diameter bur it used for an 4mm diameter/ 8-10mm length implant (Fig.13). The implant placement was preceded by sinus membrane elevation(Fig.14) with the hybrid membrane and followed by implant placement (Fig.15) and dentine bone compactation (Fig.16). The entire complex was covered by an A-PRF membrane and a flowable composite adhesive bond to the teeth (Fig.17).



Fig.13. 3,5 mm diameter bur in action



Fig.14. Sinus membrane elevation



Fig.15. Implant placement



Fig.16. Dentine bone compactation



Fig.17. A-PRF membrane and a flowable composite



Fig.18. Papilla and tissue contour



Fig.19. Direct, screw retained, prosthetic restoration

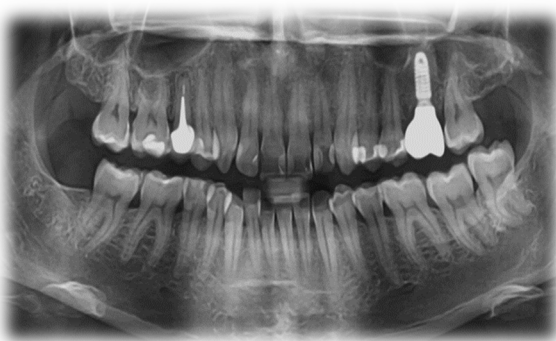


Fig.20. Rx final aspects

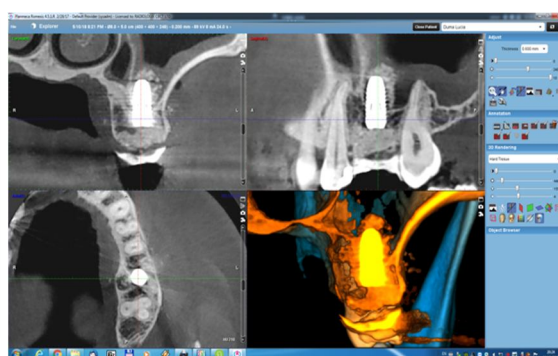


Fig.21. Post-op CT scan images

Post operator result is exceptional, concerning soft and hard tissue aspects. Papilla and tissue contour sustained by ground dentin particles (Fig.18). Final direct, screw retained, prosthetic restoration (Fig.19) with full contour zirconia and pre-mill abutment is great from aesthetic and functional point of view. 2D and 3D radiologic aspects reveal the undeniable success of the treatment (Fig.21) like the results with the other authors [6],[7].

Immediate dental implants are predictable and beneficial for patients, more than that, reduces such surgical visits [8], [9], [10]. The patient comfort concerning the absence of edentulous situation is maybe the principal advantage for immediate vs delayed implant placement in the upper molar site. Our results are similar with the literature data [11], [12].

Conclusion

The immediate implant placement in the upper molar site has obvious more advantages than a delayed implant placement in the same site. The success of the treatment is due to the autologous bone augmentation material and the technique of obtaining it. The key to successful treatment is the clinician's ability to properly assess the initial clinical situation and find appropriate solutions.

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ANATOMY OF THE TEMPOROMANDIBULAR JOINT

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Abstract: *The temporomandibular joint is a synovial, bicondylar and ginglymoarthroidal joint that regulates mandibular movement. It is a compound joint which consists of three components: the head of the mandible, the mandibular condyle of the temporal bone and the articular disc. The articular disc, as a non ossified bone that permits complex movement of the joint, completely divides the articular cavity into the superior and inferior compartment.*

This presentation provided a detailed description of appearance of articular surfaces, articular capsule, as well as ligaments that reinforce the capsule and, on the other hand, restrict excessive movements in the joint. In addition to the described vascularization, innervation of the joint and the relationships that it makes with the surrounding structures, special attention is given to the description of complex movements that are performed simultaneously in both temporomandibular joints.

STEM CELLS FOR TEMPOROMANDIBULAR JOINT REPAIR AND REGENERATION

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Abstract: *Stem cells are capable of creating new copies of themselves indefinitely (self-renewal) while maintaining the ability to differentiate into specialized cell types. Lesions confined to isolated articular cartilage have little or no capacity for tissue regeneration, since they do not penetrate the subchondral bone, and therefore do not have access to bone marrow space and chondro-progenitor cells. During this process, the mesenchymal stem cells (MSCs) migrate to the lesion. In response to the presence of undifferentiated MSCs at the lesion site, they form a repair tissue that normally has an intermediate composition and structure somewhere between fibrocartilage and hyaline cartilage, which impairs biomechanical competence through reduced stiffness and increased permeability. Thus, the ability of chondrocytes to produce changes in the composition of the extracellular matrix and synthesize new molecules is the basis for the processes of tissue regeneration. Stem cell-based therapy has raised much attention as an alternative approach towards tissue repair and regeneration. MSCs derived from the bone marrow and synovium, play a role as seed cells for the cartilage regeneration of temporomandibular joint (TMJ) osteoarthritis. MSCs possess multilineage differentiation potential, including chondrogenic differentiation as well as osteogenic differentiation. In addition, the trophic modulations of MSCs exert anti-inflammatory and immunomodulatory effects under aberrant conditions. Furthermore, MSCs combined with appropriate scaffolds can form cartilaginous or even osseous compartments to repair damaged tissue and impaired function of TMJ.*

Key words: *Mesenchymal stem cells; Temporomandibular joint; Osteoarthritis; Lesion*

TELESCOPIC SYSTEM AS A SOLUTION FOR SUBTOTAL EDENTULISM

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Abstract: *Despite the visible progress in preventative dentistry, the loss of natural teeth is still affecting modern man. In the case of subtotal edentulousness, achieving optimal function, shape and aesthetics of the stomatognathic system is achieved by partial dentures retained with telescopic or cone crowns. In everyday practice, it has been noticed that general practitioner, doctors of dental medicine are still afraid from to work with them. Therefore, the aim of this article is to explain the indications and contraindications as well as the advantages, disadvantages and complications of prosthodontic rehabilitation with telescopic systems.*

Key words: *subtotal edentulousness, overdenture, telescopic systems*

Introduction

According to the literature, the number of elderly population is growing, due to better health care, but also better dental care. Consequently, the need for prosthodontic rehabilitation of patients who still have one or more teeth in their mouth is growing. Also, there are more and more patients whose tooth distribution (allocation) or their biological value does not allow the manufacturing a fixed prosthodontic replacement. Implants greatly help fixed prosthodontic rehabilitation, but they also have their limitations, which are, unfortunately, often of economic nature. So today, the manufacturing of periodontally supported dentures is still a great reality and need. Properly made partial removable denture establish and rehabilitate all impaired functions of the stomatognathic system caused by partial tooth loss. In addition to the functions, the aesthetic component has great significance which today is under the influence of the media, and in the most cases is the most important component.

Planning a partial denture is a great challenge for a dentist. Due to large number of possibilities on planning forms of the base denture and retention elements, we must first of all take into account the current situation in the oral cavity, the individual functional activities and create a structure that will prevent further local damage to the teeth and surrounding tissues. Also, we have to ensure good retention of partial dentures or its calmly lying despite the functional and parafunctional forces that seek to lift it from its bearing.

Retention of a partial denture is achieved mainly by mechanical elements, and all of them have their advantages and disadvantages. First there were clasps. They are still widely used in clinical practice, at least in clinics where patients who come often want only the type of partial dentures which they can get through health insurance for economical reasons. In recent decades many dentists have tried to find better solutions than clasps. In order to annul the harmful effects of the lever, rotation and twisting of the teeth, but also due

to caries prophylaxis and poor aesthetic effect. So today, in everyday practice attachments, bars, implants, and telescopic systems increasingly take place because of many good characteristics.

The name telescope is taken from technical terminology and denotes a system of two cylindrical tubes with parallel walls that are mutually adapted and in intimate contact. Friction is the base for achieving the retention effect of this system. In dentistry, we distinguish several types of crowns that we include in telescopic systems, which are structurally different, but also have some common properties.

These are systems of double crowns that are technically unique, but morphologically different. The first crown is cemented to the tooth, and the second is part of a partial denture or removable bridge. All crowns are retained by friction up to a maximum of 9 Newtons to prevent damage to the retention tooth. Both crowns are made for one retention tooth i.e. abutment tooth. Telescopic crowns as a retention elements stabilize the partial denture with its robustness by connecting the retention teeth into a block. Aesthetics are as good as oral hygiene. These prosthetic replacements are extremely long-lasting and can be easily repaired if necessary. In fact, it can be said that telescopic crowns are superior to other retention elements because they achieve excellent retention and stabilization and load the tooth axially, i.e. minimize the harmful effects of oblique and horizontal forces on the tooth. However, in everyday clinical practice, they are the least used retention elements because it requires extremely precise work of dentists and dental technicians, as well as the relatively high cost of manufacturing. Telescopic system is a system of double crowns. The primary or inner crown is cemented to the abutment tooth and protects it from caries and thermal stimuli. It also allows the acceptance of the mobile part of the prosthodontic replacement, i.e. the partial dentures or removable bridge, and ensures good retention of the external telescope. It does not have any morphological characteristics of the teeth. It is a thin metal cap. The secondary telescope, i.e. the outer crown, has the morphological and aesthetic characteristics of the tooth for which it is made, and is precisely adapted to the primary telescope. Secondary crown with primary make together a functional unit. Secondary crown is part of a removable bridge or, in the case of a small number of remaining teeth, as part of a partial denture. It may have additional retention elements on the outer walls to connect to the base of the partial denture.

With system of double crown there is no denture kinetics around the almost tangential axis of rotation. Also a denture base is maximally reduced.

Indications and contraindications of telescopic system

The first and probably most important indication is subtotal dentures with the remaining 1 to 3 teeth. In this case, it is almost impossible to use attachments because of the insufficient number of teeth, even if they are biologically valuable. The construction of the bar in these cases depends on tooth arrangement and free intermaxillary space. Clasps can be made, but in the case of such small number of teeth it is usually a linear load or a rotation point, so the retention of the denture is poor, not to mention its aesthetics. In such cases, telescopic systems are the best elements of retention. After tooth extraction, patients often have large resorptions and defects of the alveolar ridge bone, and even when dentists choose implant therapy, it cannot achieve satisfactory aesthetics with fixed prosthodontics work, so making a denture with telescopes is a better option.

So, if the teeth have poor arrangement or biological value, and if the clinical crowns are enlarged and need to be shortened a lot (then we often need pre-prosthetic endodontic treatment), the manufacturing of a denture retained with telescopic crowns is indicated. Contraindications would be, in addition to general (periodontal, endodontic and oral hygiene, which are actually contraindications for all retention elements), undermined alveolar ridge, and short teeth crowns that do not achieve satisfactory retention by friction.

Advantages and disadvantages of telescopic system

In clinical situation when patients have only a few teeth and it is made cover dentures, benefits are primarily good retention, stabilization and aesthetics, which ultimately meets all the needs of our patient. The tooth is properly loaded, and not-parallel teeth can be parallelized. The denture can be further reduced, so the patient gets used to it faster and easier, and to some extent it can be easier transition to the complete dentures. In case of lost of any of the retention teeth (abutment teeth), this kind of work could be simply repaired and again become functional with almost insignificant costs unlike the retention of a partial denture with attachments. The relative disadvantages include that it is extremely precise work and requires great knowledge of dentists and dental technicians, and a relatively high cost.

Types of crowns in telescopic systems

These are primarily cylinder telescopic crown that have parallel walls. Their disadvantage are too large, non aesthetic crowns or the need for extensive grinding of teeth. Also, the force required to separate the secondary crown from the primary is often too large and can damage the periodontium of tooth and even can cause tooth loss. These deficiencies have been tried to be removed using conical crowns. The abutment teeth are grinded at an angle of 2-6 degrees. Separation forces are less, the aesthetics is better and this kind of work (conical crown) is considered the optimum of closed systems. Conical crown, i.e. their aesthetics, are especially suitable for frontal teeth. There are also combined crowns when cervical part of teeth is grinding cylindrical, and towards to occlusal plane at an angle.

Resilient telescopes crowns are made when one tooth remains in the mouth and a higher mucosal load is indicated, or when the remaining teeth have poor periodontal apparatus. Open telescopic crowns are made in a case of a reduced intermaxillary space, so the outer telescope is made in the shape of a ring. And the last type of crowns of telescopic systems is the partial telescopic crown. In this case, the primary telescope is veneered, the outer, secondary crown is made at the oral part of abutment teeth and ends at the proximal groove.

Retention power of telescopic systems

Retention power depends on the size of the contact surface (larger area-higher retention), the angle of inclination (inversely proportional) and the size of the space between the primary and secondary crown (also inversely proportional). Then the static aspect of friction depends on the number of telescopic crown and the wear of the material. In the case of base alloys, the wear is higher proportionally with larger particles and higher hardness of the alloy. If the roughness is higher, the friction is higher, but so it is the wear of the

material, and retention force decreases faster over time. The power also depends on the sliding speed, and if it is closer to zero the friction is higher. It is a dynamic aspect of friction.

Friction should be well defined, so that the forces are not too strong and do not damage the abutment teeth, but not too weak that the retention still remains good. Therefore, it is necessary to adjust the strength individually to each patient. It depends on the number of telescopic crowns, the condition of the periodontium, and the skill of the patient. Often the forces of separation are too strong for patients who are, because of their age, less manually skilled. Sometimes, dental technicians make grooves on the dentures on which they rest their fingers to make it easier for them to remove the dentures. But if they still fail, it is necessary to give up the retention force. Contact varnish or spray marks the places of the strongest pressure and the retention force is reduced.

Material for fabricating telescopic systems

Platinum gold alloys used to be “golden standard” due to incomparably better properties compared to non-precious alloys. Non-precious alloys are less precise, have a higher modulus of elasticity and higher hardness, so the secondary crown is more difficult to adapt to the primary, and the wear of the material is greater due to the formation of oxides. But since the price of gold has risen tremendously, telescopic crowns have also been made more and more from base alloys (chromium cobalt) because patients cannot afford the first option. So, when a patient has a few teeth and we know that it would be poorly retained with a partial denture with clasp, it would be better to make telescopic crown even on base alloys. For the aesthetic part of double crowns it used to be synthetic resin such as isosite, chromasite. With the increasing use of ceramics, neither dentists nor patients were satisfied with the aesthetics of resin, and veneers also has been often cracked. Then some dentists started making telescopic crowns coated with ceramics. But it is well known that ceramics are brittle, and that by removing and putting denture, they often crack. It can be said that ceramics is an absolute contraindication for making veneers. So, the optimal solution then would be modern composite materials that satisfy both aesthetically and functionally.

Disadvantages and mistakes of telescopic systems

Usually the main disadvantages are poor retention and poor aesthetics. Poor retention can occur in many stages of taking impression and fabrication of final work because more technical processes you have, possibility of error is larger. It can arise from modeling, casting, processing, and not human factor can not be neglected either. Poor aesthetics is caused by insufficiently grinded teeth, so crowns are oversized. Also aesthetic problems can arise due to poor modeling and cracking of the veneer. These errors can be mitigated by repairing the veneer with composites, and as far as retention is concerned, there are so-called telescopic coatings which strengthen the retention at least for a while. We can repeat the procedure after a few months.

Conclusion

Cover denture retained with telescopic system greatly improves the quality of life of the patient. Such denture, like any other removable denture, is a foreign prosthodontic replacement in the oral cavity to which

the body must adapt. Adequately made dentures fit well on the remaining teeth and soft tissue of the oral cavity. By using a telescopic system in a subtotal edentulousness and cover denture, we get significantly better retention at the desired position in the mouth, and reduce the impact of surrounding structures of moving dentures from its base. The telescopic system is also one of the aesthetic elements of retention, which contributes to the final appearance of the completed prosthodontic work and greater patient satisfaction.

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ESTHETIC OF DENTAL RESTORATIONS WHERE IS THE END OF SCIENCE? WHEN ART BEGIN?

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Abstract: *The development of science and new technologies in the field of prosthodontics has improved the quality of dental restorations, simplified and accelerated the manufacturing process. However, at the same time, put high tasks to therapists whit regard to aesthetic characteristics of dental restorations. The lecture should answer some of the questions, but also try to find solutions to the dilemmas that we ask ourselves in daily clinical work: How to choose the best therapeutic solution? When to apply digital or analogwork approach? What are the guidelines in selecting the right dental material? How to satisfy the wishes of patients and therapists who lead to a common goal - complete functional and aesthetic rehabilitation? Where in the whole therapeutic protocol does science end and art begins, and is it possible to draw a clear line between them?*

EMERGENCY DENTAL CONDITION OF CHILDREN

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Abstract: *Traumatic dental injuries, dental caries and periodontal disease become the major threat to young people's dental health. Orofacial injuries cause pain, as well as aesthetic, psychological, behavioral and functional problems among children with traumatized primary and permanent dentition. Although oral area makes only 1% of human body, oral tissue injuries are the sixth most common body injuries. Studies have shown that 35%-50% of children have sustained traumatic injuries of primary and permanent dentition. Dental caries still represents a significant public health problem. It is the most common childhood chronic disease which leads to pain, masticatory and pronunciation difficulties, systemic diseases and lower quality of life. The onset of prevention and dental health care in early childhood helps maintain dental health for the rest of adult life, and also timely and adequate adjustment to dental treatment reduces the likelihood of dental anxiety and fear in the future. By motivating and educating parents and children about oral hygiene and proper nutrition, and recognizing inappropriate oral habits, can significantly contribute to prevention of caries and other dental pathologies in the pediatric population.*

Orofacial injuries cause pain, as well as aesthetic, psychological, behavioral and functional problems among children with traumatized primary and permanent dentition. Traumatic dental injuries (TDI) are surpassing dental caries and periodontal disease to become the major threat to young people's dental health. Although oral area makes only 1% of human body, oral tissue injuries are the sixth most common body injuries. Studies have shown that 35%-50% of children have sustained traumatic injuries of primary and permanent dentition. The reviewed literature shows that males aged 10-12 years experience dental trauma most often, and the majority of trauma (71%-92%) occur before the age of 19. Maxillary central incisors usually are the teeth that are most affected in both types of dentition. Recent studies have shown a reduction in gender difference due to the characteristics of Western society. Generally, TDI in children and adolescents is associated with damage to the oral soft tissue (lips, tongue and gingiva). Oral soft tissue injuries connected to TDI are present in nearly half of all dental trauma patients. A rational examination procedure is essential in order to establish a complete and correct diagnosis of all soft and hard tissue injuries.

Take a short medical and dental history: The medical history should include the patient's general health, allergies and. that may influence treatment. Be alert to other injuries and symptoms which can indicate more serious injury. It is also of value to ask what has been done before the patient reached the clinic, such as any treatment carried out elsewhere and how avulsed teeth have been stored. The dental history should indicate

previous dental traumas, information which may explain radiographic findings such as pulp canal obliteration or apical pathology. Questions relating to the injury: (Where did the injury occur?, How did the injury occur?, When did the injury occur?, Was there a period of unconsciousness, Is there any disturbance in the bite?, Is there any reaction in the teeth to cold and/or heat exposure?).

Clinical examination: A systematic approach is recommended. The general principle with oral injuries to “examine from outside to inside and treat from inside to outside” is helpful for a systematic approach. Hence suturing of lip lacerations should be carried out after intraoral injuries of urgent character have been treated. Otherwise it may be difficult to enter the oral cavity once edema has started to develop.

- Clean the face and the oral cavity with water or saline
If there are soft tissue wounds, a mild detergent should be used. This cleaning will make the patient feel more comfortable and facilitate extraoral and oral examination.
- Examine the face, lips and oral muscles for soft tissue lesions.
- Palpate the facial skeleton for signs of fractures.
- Inspect the dental trauma region for fractures, abnormal tooth position, tooth mobility and abnormal response to percussion. Furthermore, registration of direction of displacement in case of luxation injuries. In case of fractures their extent and involvement of dentin, pulp and the relation to the gingival sulcus area is noted.
- Pulp testing (usually electrometric) completes the clinical examination.
- Percussion testing of teeth may reveal a high pitch bony sound indicating intrusion of the tooth.
- The possibility of inhaled or swallowed teeth, parts of teeth or prosthetic appliances at the time of injury should always be considered. Foreign body in the airways usually give symptoms such as coughing but may go undetected, which is especially important when treating unconscious patients.
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Radiographic examination: The completed clinical examination has now identified the trauma region and this site should now be examined with relevant radiographic techniques. A minimum series of radiographs for a typical dental trauma to the anterior region of the maxilla is: 3 films with parallel technique supplemented with one film with steep occlusal exposure. In case of lip laceration a radiograph with the film placed inside the lip and reduced exposure time should be added. Cone beam CT may be a valuable tool and can be considered if the obtained information will influence the choice of treatment. .

Photographic registration: Finally, photographic registration of the trauma is recommended as it offers an exact documentation of the extent of injury and can be used later in treatment planning, legal claims or clinical research.

Diagnosis: The information obtained from clinical and radiographic examination will lead to the correct diagnosis including both fractures and luxation injuries (combination injuries).

Special considerations for trauma to primary teeth

A young child is often difficult to examine and treat due to lack of cooperation and because of fear. The situation is distressing for both the child and the parents. It is important to keep in mind that there is a close relationship between the apex of the root of the injured primary tooth, and the underlying permanent tooth germ. Tooth malformation, impacted teeth, and eruption disturbances in the developing permanent dentition are some of the consequences that can occur following severe injuries to primary teeth and/or alveolar bone. A child's maturity and ability to cope with the emergency situation, the time for shedding of the injured tooth and the occlusion, are all important factors that influence treatment. Repeated trauma episodes are frequent in children.

Immature versus Mature Permanent Teeth

Every effort should be made to preserve pulpal vitality in the immature permanent tooth to ensure continuous root development. The vast majority of TDIs occur in children and teenagers where loss of a tooth has lifetime consequences. The immature permanent tooth has considerable capacity for healing after traumatic pulp exposure, luxation injury and root fractures.

Fractures and luxations of permanent teeth:

INFRACTION: An incomplete fracture (crack) of the enamel without loss of tooth structure. Not tender. If tenderness is observed evaluate the tooth for a possible luxation injury or a root fracture.

ENAMEL FRACTURE: A complete fracture of the enamel. Loss of enamel. No visible sign of exposed dentin. Not tender. If tenderness is observed evaluate the tooth for a possible luxation or root fracture injury. Normal mobility. Sensibility pulp test usually positive.

ENAMEL-DENTINFRACTURE: A fracture confined to enamel and dentin with loss of tooth structure, but not exposing the pulp. Percussion test: not tender. If tenderness is observed, evaluate the tooth for possible luxation or root fracture injury. Normal mobility. Sensibility pulp test usually positive.

ENAMEL-DENTIN-PULP FRACTURE: A fracture involving enamel and dentin with loss of tooth structure and exposure of the pulp. Normal mobility. Percussion test: not tender. If tenderness is observed, evaluate for possible luxation or root fracture injury. Exposed pulp sensitive to stimuli.

CROWN-ROOT FRACTURE WITHOUT PULP EXPOSURE: A fracture involving enamel, dentin and cementum with loss of tooth structure, but not exposing the pulp. Crown fracture extending below gingival margin. Percussion test: Tender. Coronal fragment mobile. Sensibility pulp test usually positive for apical fragment.

CROWN-ROOT FRACTURE WITH PULP EXPOSURE: A fracture involving enamel, dentin, and cementum and exposing the pulp. Percussion test: tender. Coronal fragment mobile.

ROOT FRACTURE: The coronal segment may be mobile and may be displaced. The tooth may be tender to percussion. Bleeding from the gingival sulcus may be noted. Sensibility testing may give negative results initially, indicating transient or permanent neural damage. Monitoring the status of the pulp is recommended. Transient crown discoloration (red or grey) may occur.

ALVEOLAR FRACTURE: The fracture involves the alveolar bone and may extend to adjacent bone. Segment mobility and dislocation with several teeth moving together are common findings. An occlusal change due to misalignment of the fractured alveolar segment is often noted. Sensibility testing may or may not be positive.

CONCUSSION: The tooth is tender to touch or tapping; it has not been displaced and does not have increased mobility. Sensibility tests are likely to give positive results.

SUBLUXATION: The tooth is tender to touch or tapping and has increased mobility; it has not been displaced. Bleeding from gingival crevice may be noted. Sensibility testing may be negative initially indicating transient pulpal damage. Monitor pulpal response until a definitive pulpal diagnosis can be made.

EXTRUSIVE LUXATION: The tooth appears elongated and is excessively mobile. Sensibility tests will likely give negative results.

LATERAL LUXATION: The tooth is displaced, usually in a palatal/lingual or labial direction. It will be immobile and percussion usually gives a high, metallic (ankylosed) sound. Fracture of the alveolar process present. Sensibility tests will likely give negative results.

INTRUSIVE LUXATION: The tooth is displaced axially into the alveolar bone. It is immobile and percussion may give a high, metallic (ankylosed) sound. Sensibility tests will likely give negative results.

AVULSION: Is seen in 0.5-3% of all dental injuries. Numerous studies show that this injury is one of the most serious dental injuries and the prognosis is very much dependent on the actions taken at the place of accident and promptly after the avulsion. Replantation is in most situations the treatment of choice, but cannot always be carried out immediately. An appropriate emergency management and treatment plan are important for a good prognosis. There are also individual situations when replantation is not indicated (severe caries or periodontal disease, noncooperating patient, severe medical conditions (immunosuppression and severe cardiac conditions) which must be dealt with individually. Replantation may successfully save the tooth, but it is important to realize that some of the replanted teeth have lower chances

of long term survival and may even be lost or extracted at a later stage. The tooth has been kept in storage medium (e.g. tissue culture medium, HBSS, saline, milk or saliva). First aid for avulsed teeth at the place of accident: Immediate replantation is the best treatment at the place of accident. If for some reasons this cannot be carried out, there are alternatives such as using various storage media. If a tooth is avulsed, make sure it is a permanent tooth (primary teeth should not be replanted). Choice of treatment is related to the maturity of the root (open or closed apex) and the condition of the periodontal ligament cells. After a dry time of 60 minutes or more all PDL cells are non-viable. For this reason, the dry time of the tooth, before it was placed replanted or placed in a storage medium, is very important to assess from the patient's history. From a clinical point of view it is important: maturity of the root (open or closed apex) and the condition of the cells PDL by classifying the avulsed tooth into one of the following three groups before starting treatment:

1. The PDL cells are most likely viable (very short time at the place of accident). The PDL cells may be viable but compromised. The tooth has been kept in storage medium (e.g. tissue culture medium, HBSS, saline, milk or saliva and the total dry time has been less than 60 min). The PDL cells are non-viable. (total extra-oral dry time has been more than 60 min).

Treatment guidelines for avulsed permanent teeth: Clean the root surface and apical foramen with a stream of saline and soak the tooth in saline thereby removing contamination and dead cells from the root surface. Administer local anesthesia. Irrigate the socket with saline. Examine the alveolar socket. If there is a fracture of the socket wall, reposition it with a suitable instrument. Replant the tooth slowly with slight digital pressure. Do not use force. Suture gingival lacerations, if present. Verify normal position of the replanted tooth both clinically and radiographically. Apply a flexible splint for up to 2 weeks, keep away from the gingiva. Administer systemic antibiotics (tetracycline is for patients under 12 years of age. A penicillin in an appropriate dose for age and weight the first week, can be given as alternative to tetracycline.). Check tetanus protection. Give patient instructions. Avoid participation in contact sports. Soft diet for up to 2 weeks. Thereafter normal function as soon as possible. Brush teeth with a soft toothbrush after each meal. Use a chlorhexidine (0.1%) mouth rinse twice a day for 1 week.). Initiate root canal treatment 7–10 days after replantation and before splint removal.

Dental injuries are a common presentation multi trauma patients. Special attention should be given to the trauma principles of clearing and maintaining a patent airway, stabilising the cervical spine, oxygenation and controlling haemorrhage. The goal of treatment is life, function, and then cosmetic repair. The ultimate goal of any dental emergency treatment is to re-establish normal tooth position together with normal function. In the absence of specialised dental personnel, appropriate first aid as described in this chapter is important and decreases dental costs, complications and pain.

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DENTAL CLINIC : DIGITAL WORKFLOW WITH MEDIT I500

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Abstract: *In the current presentation we analyze all the analog and digital workflow that should be performed in order to produce dental restorations. Also all the benefits of digital workflow are analyzed compared with analog workflow and prove the efficiency of using a digital workflow in the dental clinic.*

Key words: *Dental Clinic, Dental Lab, Digital Workflow*

Introduction

Dentistry has been working from the very old ages utilizing analogue workflow until recent modern years. All these years the workflow has been optimized either from aspect of dental materials or from aspect of dental equipment. From the beginning of 2000 decade, there has been a massive development in the digital dental workflow initially from aspect of equipment and additionally from aspect of protocols , materials and production protocols. Beginning from simple tooth cases initially and now restoration of complex and multiple cases , has become mainstream while providing the clinicians the necessary tools to ensure efficiency, long term results and maximum patient comfort.

Medit intraoral scanner remains a tool which provides the dental clinicians , all necessary features and applications to be able to restore all kinds of cases. Medit i500 covers not only prosthodontic cases but also orthodontic cases, veterinary dentistry cases, maxillofacial cases and also excessing cleft palatal cases. Apart from that, our system provides also the capability to clinicians to be able to adjust and create 3D printable models , which can be sent directly either in-house or to be outsourced so they can be printed .

Dental Lab Analogue Workflow

Analogue production workflow has been applied for several years in the dental labs. Its origin start from many years ago and has been optimized from aspect of equipment and materials. It requires a high level of technical knowledge and experience to ensure stable and consistent production results.

Also the production workflow is time consuming from the first step until the final delivery of restoration. This analogue protocol includes many production steps in order to achieve the final result as we see in the diagram below – Figure 1.

Workflow

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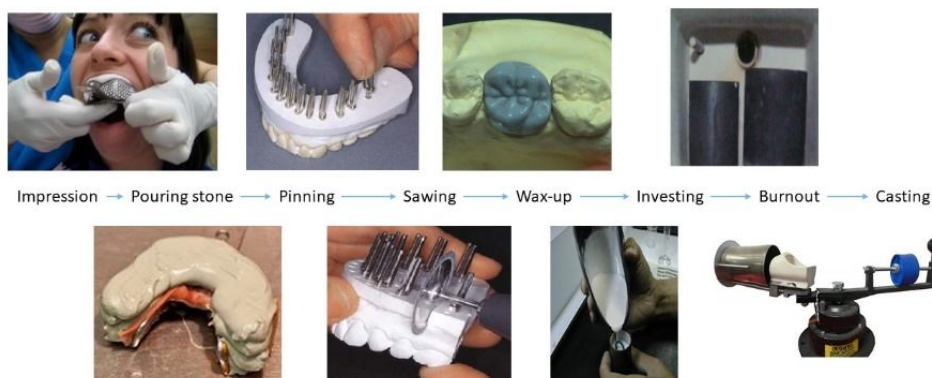


Fig. 1. Analogue Workflow

Dental Lab Digital Workflow

Dental Labs were the first that applied digital workflow in their production. The digital workflow provided them the ability to minimize errors/mistakes, eliminate many production steps and to reduce production time. Another advantage is that digital workflow allows them to track down any potential failures, correct them and proceed to production directly without the need to start everything from scratch as used to happen in the past with analogue production workflow. For the dental labs, since they receive the silicone impression from the dentist, they can pour gypsum models and then proceed to production as below – Figure 2.

Workflow

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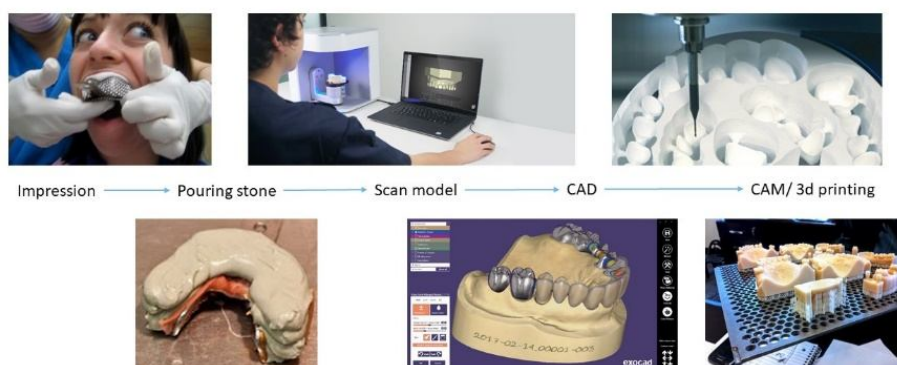


Fig. 2. Dental Lab Digital Workflow

Dental Clinic Digital Workflow

Dental Clinics nowadays have changed rapidly their workflows compared with the past. Today the majority of dentists switch from the analogue to complete digital workflow starting from an intraoral scanner. After the intraoral scanner is established in the clinic, the clinician can decide if he wants to produce in-house or to

outsource all his dental restorations to digital dental lab. No matter what will be his decision , the workflow that will be applied will be the following in the picture below – Figure 3.



Fig. 3. Dental Clinic Digital Workflow

Digital Dentistry for Maxillofacial Cases

Maxillofacial cases have been challenging for the clinician all these years due to their nature. Patients that were diagnosed with cancer or suffered due to an accident , are the most common type of maxillofacial cases that Digital Dentistry has to handle. Most of them require to combine many different informations together in order to perform an accurate and minimal invasive case planning, which will result in functional, aesthetical and long term results for the patients. Now with Digital Dentistry , the clinicians can combine data from CBCT scans, intraoral scans, pictures, Xray and fuse them all in softwares, which will enable to achieve a very precise , efficient and fully functional maxillofacial restorations. Below we can see a maxillofacial case from a patient who was diagnosed with mouth cancer. – Figure 4.

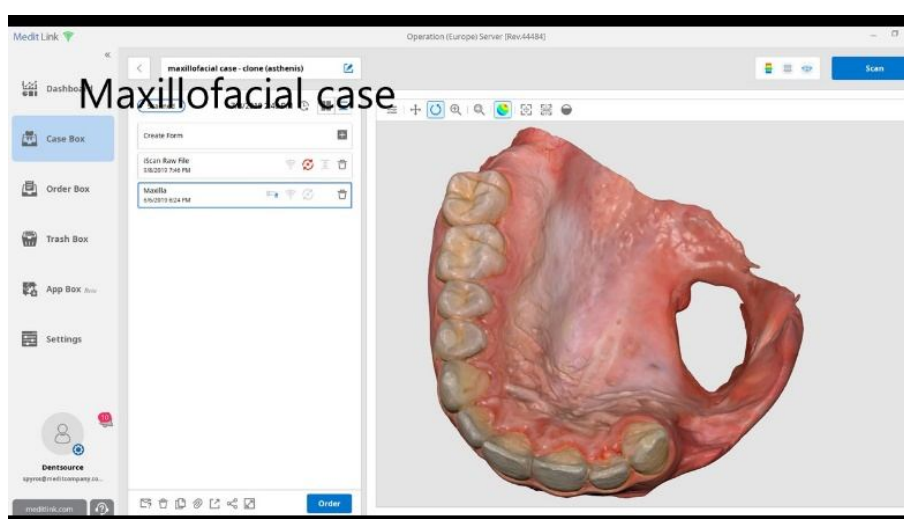


Fig. 4. Maxillofacial Case

Digital Dentistry for Cleft Palatal Cases

Apart from maxillofacial cases, cleft palatal cases are also very challenging cases to restore. These cases are usually found in babes and kids in very young age. Cleft Palatal cases require a significant amount of time to

be restored because they are changing together with the body which is under development in babes and toddlers. Many clinicial specialties are involved in the restoration of cleft palatal cases and all these years , it wasn't easy to restore these cases because it was difficult to predict their evolution but also to design precisely appliances that would help in their restoration. Now with the fusion of many different technologies including intraoral scanning , now cases like the one below can be restored in a more predictable and comfortable way for the patient. – Figure 5

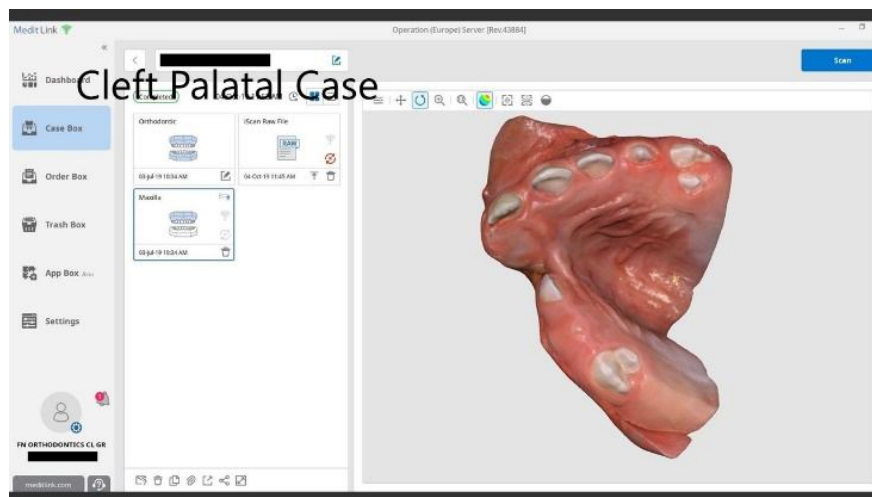


Fig. 5. Cleft Palatal Case

Digital Veterinary Dentistry

Veterinary is a field which includes also dental care for all pets and animals ,which might need it. All these years , veterinary dentistry remains a section which developed in parallel with dentistry. Although the dental materials which will be used to create dental restorations for pets are the exact same with the ones used for humans, all the other peripheral equipment needed was always custom to each animal. Now with Digital Veterinary Dentistry , there is no need to use any special equipment for pets and animals. Only by using an intraoral scanner, utilized in digital dentistry for humans, is more than enough to create accurate, functional and esthetic dental therapy for all pets and animals, which might need it. – Figure 6.

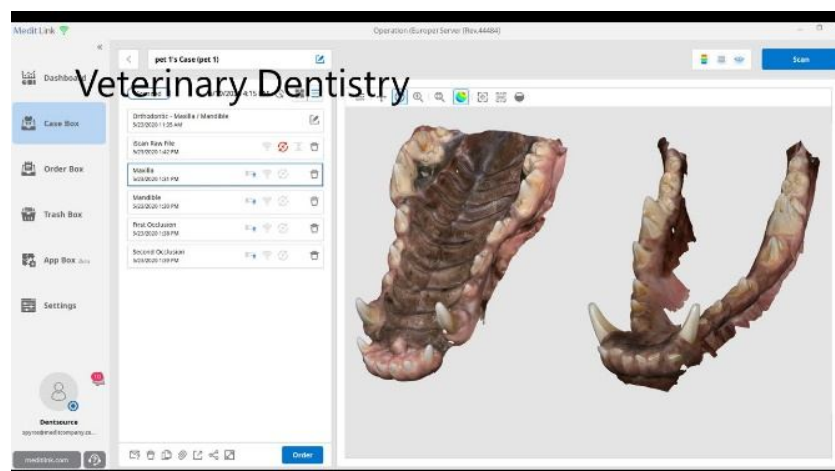


Fig. 6. Intraoral Scan of German Shepherd

Digital Models 3D Printing

One of the most significant part of digital workflow is the production of digital 3D models. Now using digital workflow , all 3D models are produced with the technology of 3D Printing. By utilizing 3D Printing technology in the daily production workflow, provides the ability to create models according our needs and specifications in the most efficient and accurate way possible . – Figure 7

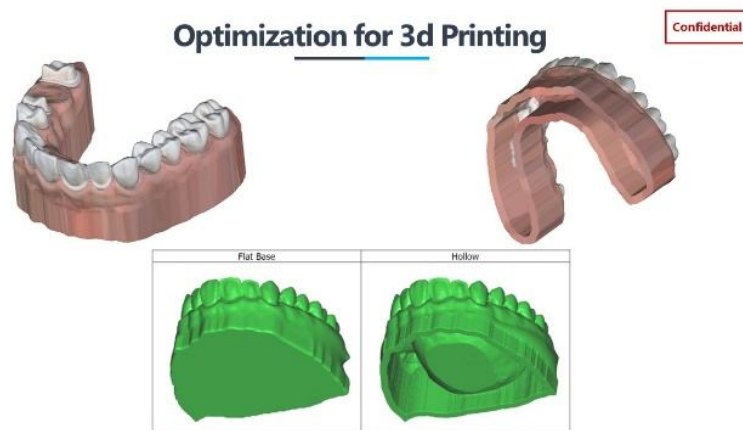


Fig. 7. 3D Printable Model Creation

Conclusion

As we realize from the presentation, digital technology is certainly the future of dental industry. It will affect both dental laboratories and dental clinics in their daily workflow and production. Also it will optimize the communication between them and it will increase the number of successful cases . Apart from that, it will minimize almost to zero mistakes due to production errors and communication errors by increasing the overall patient satisfaction with the final result.

ROLE OF MRI IN TRIGEMINAL NEURALGIA

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Abstract: *Routine magnetic resonance imaging (MRI) detects structural causes of trigeminal neuralgia (TN) in 15% cases. The most often cause of TN is neurovascular conflict (NVC) - in 80-90% cases and uncommon causes are multiple sclerosis, tumor infiltration or ischemic changes. Trigeminal nerve can be compressed also in cases of meningioma, vestibular schwannoma or epidermoid cyst. The portion of the nerve along which the peripheral myelin (derived from Schwann cells) transitions to central myelin (derived from oligodendrocytes) may be referred to as the transition zone (TZ) and it is located where the nerve enters the pons. This segment is 2-4mm long and it is particularly vulnerable to mechanical stress due to thin central myelin. TZ is a region of high interest in MRI because studies revealed that majority of symptomatic nerve compression are located exactly in that region. For grading of NVC severity the following scale has been proposed: 0 –no contact (visible cerebro-spinal fluid (CSF) signal between artery and nerve), 1- simple contact, (no visible CSF signal between artery and nerve), 2 –significant contact with dislocation/distortion and/or nerve atrophy. During the MRI study, evaluation of the contralateral nerve is needed. Simple contact is common in asymptomatic patients as well as on asymptomatic side and could not be used as diagnostic sign without appropriate clinical context. Arterial vessels (superior cerebellar artery>>anterior inferior cerebellar artery>>elongated vertebral artery) are more often offending vessels due to higher intraarterial pressure and their pulsatility than veins (transverse veins of pons most often). Longstanding NVC results in demyelination of the sensory fibers of the proximal segment of trigeminal nerve and later leads to nerve atrophy. MRI provides crucial information for the treatment planning and it encompasses following information: presence of NVC on the symptomatic side; presence of NVC at the TZ; grade of NVC, offending vessel identification. The most important two sequences in the dedicated MR protocol are high resolution T2-weighted sequence using thin slices (0.6mm) and MR angiography. MR examination on 3 Tesla system is recommended. High spatial resolution and thin slices have increased sensitivity and specificity in patients with NVC.*

Introduction

Neurovascular compression (NVC) represent disorder where vascular structure, most often artery is causing compression of a cranial nerve. One of the most frequent NVC is trigeminal neuralgia, a chronic pain condition that affects the trigeminal nerve.

Pathology

The transition zone between the central and peripheral myelin is considered the most vulnerable region for symptomatic neurovascular compression syndromes (Peker S. Neurosurg 2006). Root entry zone of the cranial nerve includes transition zone, central myelin of the cranial nerve and adjacent surface of brainstem.

The most often offending artery is superior cerebellar artery (SCA) (88% of all cases), anterior inferior cerebellar artery (AICA) (25%), combination of SCA and AICA, posterior inferior cerebellar artery, veins of pons (12-16%), c arteries and veins together (12-16%). Compression of the trigeminal nerve causes focal demyelination on compression site (Love S. Brain 2001; Peker S. Neurosurgery 2006).

Clinical presentation

Trigeminal neuralgia consist of sudden severe paroxysms of excruciating pain on one side of the face which usually lasts a few seconds to a few minutes, involving one or more branches of the trigeminal nerve. Vascular compression is the most prevalent cause. Not all cases of neurovascular contact are clinically symptomatic. Incidence of trigeminal neuralgia is 4–20/100,000 with symptomatic neurovascular compression typically proximal.

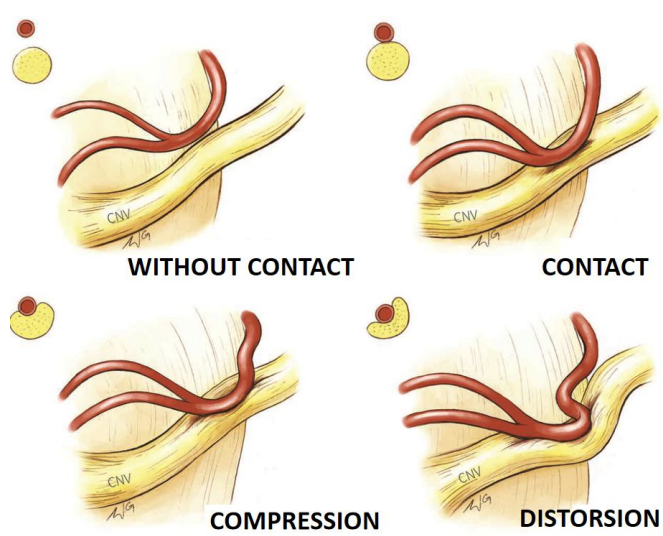


Figure 1. Spectrum of relationships between artery and trigeminal nerve.

Structural Magnetic resonance imaging in patients with trigeminal neuralgia

MRI is a gold standard diagnostic tool in patients with TN that should answer the following questions: 1) does presence of NVC explain symptomatology? 2) Does NVC represent the solely cause of the TN?

Dedicated MRI protocol consists of high resolution T2 weighted sequences with very thin slices from 0.4-0.6mm in combination with MR angiography.

If the compression site is on the medial part of the trigeminal nerve, symptomatology is often in distribution of the mandibular nerve. Compression on the lateral part of the nerve causes symptoms in the maxillary nerve distribution (Yoshino. Radiology 2003.)

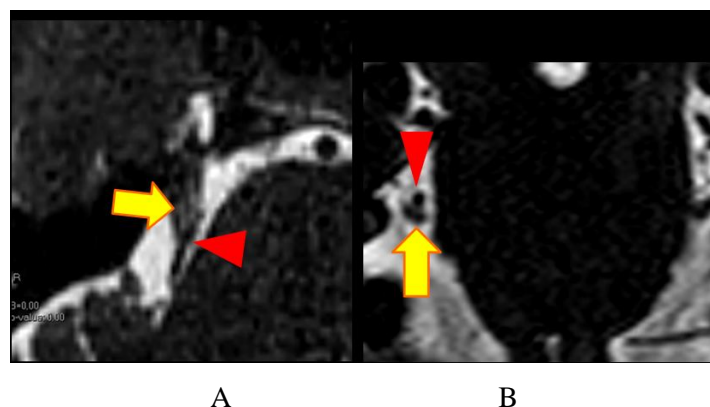


Figure 2. T2-weighted sequence in transverse plane (A) showing trigeminal nerve (arrow) and SCA (arrowhead) causing neurovascular contact. T2-weighted sequence in coronal plane (B) showing trigeminal nerve (arrow) and SCA (arrowhead) .

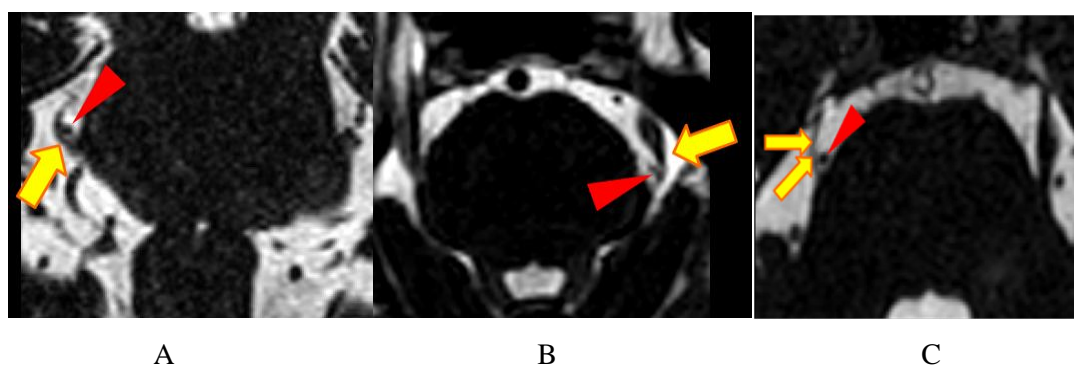


Figure 3. T2-weighted image in coronal (A) and transverse plane. SCA (arrowhead) causes distortion of the nerve at the root entry zone. T2-weighted image in transverse plane (C) showing significant atrophy of the trigeminal nerve (arrows) and SCA (arrowhead)-

	Symptomatic side	Asymptomatic side
NVC Maarberjg S. Brain 2015	89% assoc with pain	78% 75% bilat
Dislocation/ atrophy Antonini G. Pain 2014	52%	9%
Trigem.nerve diameter Surface area Erbay SH. Radiology 2006	2.1 mm \pm 0.4 4.5 mm ² \pm 1.7	2.6 mm \pm 0.5 6.2 mm ² \pm 2.2
Artery offender Maarberjg S. Brain 2015	74%	56%
Distance of NVC from pons Suzuki M. OSOMOPOR 2015	0.9 \pm 1.2mm	3.8 \pm 2.6mm

Table 1. NVC is more present on the patients symptomatic side as well as dislocation or atrophy. Trigeminal nerve diameter and surface area are smaller on symptomatic side. Distance of NVC from the pons is shorter on the asymptomatic side.

Asymptomatic individuals

NVC is common neuroanatomical variant and can be found in MRI control group in 39-88% of examined individuals (Miller 2009; Peker 2009). NVC is present in 14-52% of individuals without TN on autopsy studies (Ramesh VG. J Clin Neurosci 2009). Dislocation/atrophy are rare in healthy individuals, 0-1% Ueda F. BRJ 1999 and in cadaveric studies, in individuals without TN NVC can be found in 0-11% (Ramesh VG. 2009).

Other causes of trigeminal neuralgia diagnosed with MRI at the cisternal level are multiple sclerosis (1-4%) (Hooge JP. Neurology. 1995), tumors (5%), AVM/aneurysm (1%) (Nomura T. NeurosurgRev. 1994) and perineural tumors spread.

Recurrent trigeminal neuralgia after microvascular decompression

Microvascular decompression (MVD) of the trigeminal nerve is successful in 64% of patients, without improvement in 4%, unsatisfactorily in less than 2% of patients after 5 years of follow up and <1% of patients after 10 years (Barker FG NEJM 1996). Complication of the MVD are inappropriate decompression, teflon dislocation and the presence of teflon-granuloma (1-7%) Hans-Holger C. JHP 2010

Advanced research in patient with trigeminal neuralgia

Special advance MRI-technique called MR voxel-based morphometry of the gray matter between patients with TN and healthy individuals controls showed that changes in thickness of brain cortex in regions that are responsible for sensory-discriminative and cognitive/affective dimensions of pain and pain modulations (DeSouza DD. PLoS One 2013).

On the other hand, the research with MR voxel-based morphometry of white matter in patients with TN and controls detected changes in white matter tracts that connect regions involved in pain experience, attention and compensatory motor pattern. White and gray matter changes suggest the important role of central nervous system in development and maintenance of TN symptomatology (DeSouza DD. Front. Neuroanat 2016. Rodriguez-Raecke, R. PLoS One 2013).

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THE INCIDENCE OF DENTAL CARIES AND MOLAR INCISOR HYPOMINERALISATION AMONG THE CHILDREN OF SOS CHILDREN'S VILLAGE CROATIA

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Abstract: *Oral health is an integral part of general health and an important factor in overall quality of life. Despite great efforts to preserve oral health, diseases of the oral cavity are on the rise. The family has an important role in the development of every child and thus in the formation of children's attitudes related to health, because the health behavior of parents certainly affects the behavior of children. The occurrence of caries is influenced by many factors: gender, age, socioeconomic status, cultural and religious factors, environmental factors, diet and oral hygiene habits. Dental caries is the most common chronic disease among the pediatric population. Molar incisal hypomineralization (MIH) is a global problem and a challenge in modern dentistry. Good knowledge of the clinical picture of MIH due to the sensitivity of the affected teeth and the rapid progression of carious lesions is therefore of particular importance to dentists. SOS Children's Village is a leading global organization in the field of alternative child care. Such an organized community cares for orphans and parental care regardless of their racial, national and religious affiliation, providing them with love and security in a family environment. The results of the research show the connection between oral health, oral hygiene habits and the socioeconomic status of children living in specific living conditions.*

Introduction

Oral health is an integral part of general health and an important factor in overall quality of life. Oral cavity diseases are on the rise. The possibility of objective diagnosis, epidemiological monitoring and the control of risk factors for their occurrence make them a group of preventable diseases. Measures and methods for achieving good oral health in children have significantly advanced in the last 20-30 years in the world, while in today's population of Croatia there is a substantial lack of action in children's and preventive dental medical care. In accordance with the recommendations of the World Health Organization, the condition of oral health in children is assessed by the discovery of caries. Caries is the most common oral cavity disease, also the most widespread disease in the world in general (80% of the total population is affected by caries). It is a chronic infectious disease affecting all age groups. Appears in the process of chemical dissolution of tooth surface as a result of metabolic processes occurring in the biofilm. Today's prevention is based on early diagnosis of caries – caries at the level of cavitation is considered a too advanced finding late to ensure proper and effective prevention of the disease and to use all the possibilities of modern preventive actions. Caries a result of interaction of biological, cultural and social factors as well as eating habits. The main cause of orofacial pain, premature tooth loss and greatly affects psycho-social quality of life. Research conducted

on the topic of caries have shown that caries can be prevented and controlled. In order to achieve satisfying results - the most accurate epidemiological data on its distribution in the target population as well as on geographical location are needed. In Croatia and in the world there is no data on the research and the measurements of caries or on the health status of oral cavity in children of SOS Children's Villages. MIH (molar-incisor hypomineralization) is systemic hypomineralization involving one or all of the first permanent molars, often including permanent incisors. Term MIH suggested in 2001 (Weerheijm et al.). Numerous studies have not confirmed any individual cause of MIH, but many factors involved in the appearance of the disease have been suggested that are associated with systemic conditions during the first three years of a child's life.

Respondents

The research included primary school children: from SOS Children's Village (Ladimirevci and Lekenik) - 109 children, children from biological families in rural areas (Ladimirevci and Lekenik) - 112 children and children from biological families of the cities of Osijek and Sisak - 89 children. Inclusive criteria was all primary school children from the SOS Village and randomly included children from rural (Lekenik and Ladimirevci) and urban areas (Osijek and Sisak). Exclusive criterion was: children younger than 7 years (preschool age) and children older than 14 years and children undergoing fixed orthodontic treatment.

Methods

The children were examined in the dental practice of the Valpovo Health Center and the Lekenik Health Center and in the dental practice in Osijek and Sisak according to standardized WHO conditions, in conditions of controlled hygiene and with appropriate lighting in the practice. Clinical examination included visual-tactile examination of the oral cavity with the help of a probe and a mirror and examination with a Diagnodent pen device. Questionnaire on knowledge of oral health, socioeconomic status, eating habits and oral hygiene was completed by mothers/carers. Based on the obtained oral statuses of the examined children, the following indices were calculated: dmft/DMFT, dmfs/DMFS, SiC. BMI was calculated for each child after measuring body weight and height.

Research aims was Identify the most important factors that affect the oral health of the studied populations and determine the following: children from the SOS Children's Village have a higher/lower DMFT index than children living in biological families, SOS mothers have a better/worse assessment of their children's oral health than the assessment of biological mothers in rural areas and to determine the frequency of individual stages of MIH in the examined groups of children.

Conclusion

The population of primary school children living in SOS Children's Village has lower values of dft/DMFT index and dfs/DMFS compared to children from biological families in rural as well as urban areas. SiC index for the population of primary school children living in SOS Children's Village shows a lower value compared to children from biological families in rural and urban areas. The population of children from rural

areas has lower values of the dft/DMFT index compared to children from urban areas. The frequency of molar-incisive hypomineralization in children from SOS Children's Village is 7.34%, in children from rural areas 1.79%, while in children from urban areas it was not recorded. The most important factor influencing oral health in the group of primary school children from the SOS Children's Village is oral hygiene, and the least significant is the socio-economic status. The assessment of oral health by SOS mothers does not differ from the assessment of biological mothers of children from rural and urban areas.

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CERAMICS AND CEMENTS FOR MODERN PROSTHETIC RESTORATIONS: WHAT? WHEN? HOW?

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Abstract: Contemporary prosthodontics is overwhelmed by the multitude of ceramic materials and cements available on the market, which makes the process of material selection difficult for the clinician. Achieving successful clinical outcomes involves several important factors: (1) the correct knowledge of the material characteristics and indications, (2) the clinician efficient communication with the patient and the dental laboratory, and 3) the ability of the practitioner to follow state of the art the specific clinical protocol. This article will discuss about ceramics, cements and recommended protocols for different clinical scenarios, highlighting the factors involved in the longevity of prosthetic restorations.

I. All ceramic materials

All-ceramic materials are biocompatible, have a long-term clinically acceptable resistance and are aesthetically superior, and can be used successfully for all types of prosthetic restorations (crowns, inlays, onlays and veneers [1,2]. Technical performances have led to the development of new biocompatible ceramic materials, with excellent aesthetics and much improved optical properties, but also with superior mechanical properties and low plaque retention [3,4].

Dental ceramics can be classified into two broad categories:

- 1. silicon-based ceramics - feldspar ceramics, leucite-reinforced ceramics, lithium disilicate ceramics,
- 2. Oxide-based ceramics - zirconium oxide(Y-TZP) and aluminum oxide [2,3].

Another more up-to-date classification of all-ceramic materials was developed by Edward Mc Laren in 2015[5]. According to this classification there are 4 major classes of ceramic materials:

-Class I (Powder / Liquid or feldspar ceramic, created from materials containing silicon dioxide, a glass matrix and varying amounts of crystalline phase inside that glass matrix.

- Class -II (glass ceramics) have a similar composition to class I, but they differ in their crystal phase ratios and crystal types. There are two subdivisions of this class. Materials in *class II subdivision a* have a low-moderate leucite content (less than 50%). Such materials contain less than 50% crystals and behave more like a glass. These dense materials containing glass and leucite are indicated for veneers, crowns in the front area, inlays and onlays, but only when long-term adhesion can be ensured. *Class II subdivision b* is represented by lithium disilicate, with a higher leucite content.

-Class III (high strength crystalline ceramics) is represented by alumina and zirconia. Both materials have shown greater strength, but they are much more opaque, due to the crystalline content, which diminishes the aesthetics.[5]

More translucent versions of polycrystalline ceramics are currently used in the anterior and posterior region, for full-contour or monolithic zirconia restorations. Zirconium oxide-based ceramics that are super-translucent or ultra-translucent have a lower strength, about 600-800 MPa, which changes the area of indications and also the cementation procedures.[6].

Ceramic blocks for CAD/CAM technology

The ceramic blocks for chairside CAD / CAM technologies are homogeneous, dense, without imperfections, with improved biomechanical and optical characteristics. (Fig.1). Currently, manufacturers offer more than 20 types of milling blocks for chairside CAD/CAM technology. Milling blocks are available in different sizes, shades and translucencies and may require a post-milling treatment, which is different, depending on the material. (7).



Fig.1.Different ceramic CAD/CAM blocks

CAD/CAM ceramic materials can be classified in four generations. The first generation of CAD/CAM materials are feldspar ceramics (eg Vita Mark II, Vita), and leucite glass ceramics, with low, medium leucite content (eg Empress CAD, Ivoclar). The recently introduced Vita blocks Trilux Forte are indicated for veneers and crowns in the frontal region, where the esthetics is mandatory. The second generation is represented by lithium disilicate, the most representative being e.max. CAD (Ivoclar/Vivadent), which consists of approximately 40% crystals of lithium disilicate (0.2-1 micron) and has a much better shear and fracture resistance compared to feldspar ceramic materials. The third generation of CAD/CAM blocks are hybrid materials, so-called nanoceramic resins and hybrid ceramic materials, which have the advantage of

easy handling, similar to composites, along with the strength and final luster of ceramics. These materials can be easily milled and have a much lower abrasive effect on antagonist teeth. They are indicated for single restorations, especially for minimally invasive preparations (Fig.2).

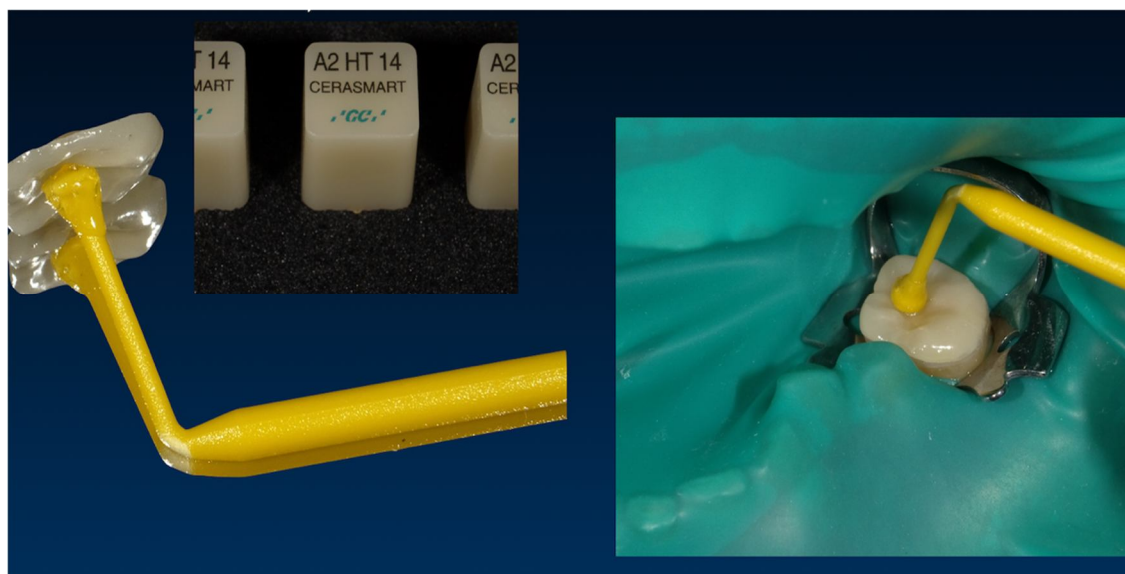


Fig.2. a) Table-top milled from resin-nanoceramic CAD/CAM block (Cerasmart, GC);
b) isolation for adhesive cementation.

The fourth generation of CAD / CAM materials refers to zirconia monolithic or FCZ (full contour zirconia), that can be used for a wide range of prosthetic restorations: crowns, fixed dental prostheses, implant abutments, etc. Zirconium oxide (YTZP) is milled in the pre-sintered phase, then at sintering it reduces its volume by about 20%. [7,8]. For chairside CAD/CAM technology there are available also fully -sintered zirconia blocks.

II. Cements and cementation protocols for all ceramic materials

As new ceramics are introduced, the cementation process continues to adapt and evolve. There are a number of new resin cements on the market, some of which combine existing materials for convenience and simplified procedures, and some that have entirely new chemistry. Decision about the resins cement and the bonding protocol should be done after analysing the properties and characteristics of those materials. An ideal bonding material should meet many requirements, including good sealing, long-lasting adhesion to the tooth and restoration, sufficient mechanical strength, low viscosity, resistance to disintegration, tissue compatibility and ease of handling [9].

The main objective of cementing prosthetic restorations is to achieve the tightest possible connection between the surface of the preparation and the restoration. Together with the objective the retention of the fixed dental prostheses, maintaining the tooth vitality and integrity, and also the health of periodontal tissues, are mandatory. [9].

Cements used in dentistry are classified according to several criteria: the adhesion mechanism, the adhesion system, respectively the polymerization mechanism. [10-12].

The adhesive scheme can be a) total-etch (total-demineralizing, b) self-etch (self-demineralizing) and c) self-adhesive. Self-adhesive resin cements are easy to use and provide low to medium bond strengths (4-16 MPa) to tooth structure.

Dentists should decide which cement to use in every restorative indirect case, based upon the preparation geometry and the selected ceramic material.

For retentive preparations, ceramic materials with low resistance should be bonded, and for high strength ceramics is indicated the conventional cementation protocol.

For non-retentive preparations, resin cement should be used in conjunction with a specific treatment protocol. The internal surface of the restoration must be treated differently depending on the type of material (glass ceramic, zirconium oxide). Normally the glass ceramic is pre-treated with hydrofluoric acid gel before applying the silane. Attention must be paid for saliva decontamination after try-in of the restoration. Zirconia is a non-glass ceramic, so it cannot be etched by traditional methods. The retention of zirconia-based ceramics depends on the mechanical abrasion (sandblasting) of the surface and the chemical bond is obtained with a special primer containing 10 MDP [12-14].

The ability to obtain a good isolation, the absence of contamination due to the presence of blood and other oral fluids is absolutely essential for the successful use of resin cements and adhesive protocols. [15, 16].

Conclusion

Due to its different composition and characteristics, the selection of cement and cementation technique should be adequate for every class of ceramic materials. Clinicians should be aware that incorrect bonding protocols might affect the long-term clinical success of all-ceramic restorations.

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PERIODONTOLOGY, ORTHODONTICS AND PROSTHETICS – AESTHETIC ASPECT

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***Abstract:** Lecture has two parts.*

First part is about orthodontic therapy in adults diagnosed with periodontitis. Different possibilities and limits of such therapy will be discussed together with presentation of different clinical cases.

Second part of the lecture is about the crown lengthening procedure as an important step before prosthodontic rehabilitation, especially when aesthetic is considered. The procedure will be explained in theory and multiple clinical cases.

Periodontology and Orthodontics

The number of adults that are seeking for orthodontic treatment has increased in the recent years. Most of these patients are more concerned in improving dental esthetics rather than in health and functional reasons (1). But objectives of adult orthodontics are the same as objectives of orthodontics in general – (1) optimum occlusal function; (2) improve the aesthetics of the face and teeth; (3) longevity of the stomatognathic system (2).

Adult patients (in their 40's or 50's) already have other dental problems, so adjunctive and comprehensive treatment involving multidisciplinary treatment approach is needed. This approach often includes, beside orthodontist, periodontist, restorative dentist, prosthodontist, endodontist, TMJ specialist, oral & maxillofacial surgeon, implantologist etc. in order to achieve adequate esthetic and functional results (1,3).

Periodontal status must be evaluated and any periodontal disease must be treated before orthodontic treatment in adult patients. They should also be able to maintain optimal plaque control because the orthodontic tooth movement could cause further periodontal destruction if periodontitis is not treated or if plaque control is not optimal (1).

Adult orthodontics is basically the same as adolescent orthodontics for tissue changes associated with tooth movement, stages of treatment and goal of treatment. But there are certain differences and several treatment limitations in adult patients, such as the limited scope for growth modification and functional appliances, a longer time to adapt to the appliances, age changes in bone (denser cortical bone, reduced spongy bone and the loss of marginal bone), reduction in the periodontal ligament vascularity, more vulnerable to root resorption, and vulnerability to temporomandibular disorders (1,3).

Benefits from orthodontic treatment for patients with treated periodontitis are numerous:

- 1) better oral hygiene in well shaped dental arches; without dental crowding and/or malocclusion (that facilitate periodontal disease);
- 2) vertical occlusal impact parallels to the long axes of the teeth (muscle force uniformly distributed all over the dental arch);
- 3) a normal vertical dimension (in combination with restorative procedures);
- 4) the achievement of adequate dental crown-root relationship with induced orthodontic extrusion;
- 5) facilitates the correction or improvement of vertical bone defects;
- 6) improves the positioning of prosthetic pillars for fixed prostheses and of the next teeth of osteointegrated implants;
- 7) decreases or eliminates effects of bruxism (pain or muscle spasms) (2).

Periodontology and Prosthetics

Crown lengthening procedure is one of the most common surgical procedures in periodontal practice (4). The indications for the procedure are subgingival caries, crown and/or root fractures, altered passive eruption, cervical root resorption and short clinical abutment , but also crown lengthening performed for esthetic reasons in anterior areas that is often part of a multidisciplinary orthodontic and restorative treatment plan (5).

The most important thing in crown lengthening procedure is to reestablish the biologic width (or supracrestal tissue attachment, according to the Classification of periodontal and peri-implant diseases and conditions from 2017.) in a more apical position. Biologic width (or supracrestal tissue attachment) represents the distance between the base of the gingival sulcus (or periodontal pocket) and the height of the alveolar bone (5). That distance is approximately 2mm and is made of the epithelial junction (or attachment) and connective tissue attachment (6). If only gingivectomy is performed, and the biological width is not reestablished (or is violated), it may result in bone resorption and gingival recession or gingival inflammation and hypertrophy)(5).

Usual steps of the procedure are: gingivectomy, flap design, ostectomy, osteoplasty, flap suturing and positioning.

Prosthetic procedures (tooth preparation) may be performed intraoperatively, early tooth preparation (three weeks after crown lengthening procedure) or delayed tooth preparation (after the complete healing and maturation of soft and hard periodontal tissues) (5).

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IMPORTANCE OF DETERMINING BIOCHEMICAL AND MOLECULAR MARKERS IN ORAL FLUIDS

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Abstract: *Over the last 20 years, biochemistry and molecular biology have revolutionized our understanding of the oral cavity. From the biochemical point of view, we are well aware of the biochemistry of teeth, dental caries and saliva, however, the molecular aspect of the mentioned is a subject of interest in molecular genetic research and their application in diagnostic or clinical procedures.*

What about a genetics or molecular biology in order to relate with dentistry hereditary diseases. Genetics contributes to all diseases, including dental disease. It's well known that genetic disorders are caused by gene mutations or chromosome disorders that cause a change in the number or structure of chromosomes.

Molecular diagnostics plays a major role in discovery of biomarkers for the diagnosis of oral and systemic diseases. Oral samples that are useful for the diagnosis of systemic diseases include saliva, gingival crevicular fluid (GCF), oral swabs, dental plaque. There are molecules that have been accurately detected in saliva, steroid hormones (cortisol, androgens, estriol, estrogen, progesterone, aldosterone, dehydroepiandrosterone), antibodies (IgG, IgA, sIgA, IgM), growth factors (EGF, NGF, VEGF, IGF), cytokines and chemokines (IL-1, IL-8, IL-6, MCP-1, CX3CL1, GRO-1 alpha, troponin I, TNF alpha), nucleic acids (human DNA, microbial DNA, mRNA, siRNA, micro RNA: miR-125a and miR-200a), proteins (100's-1,000s) and drugs (drugs of abuse -NIDA 5, ethanol, therapeutic drugs, anticonvulsants, antipyretic/analgesics, anti-neoplastic agents, anti-bacterial agents, bronchodilators).

Recent advances in the diagnosis of oral liquid biomarkers have been driven by new molecular approaches that are reflected in the segment of proteomics, transcriptomics and genomics in order to link them to systemic and oral diseases.

CHALLENGES IN PREDICTABLE AESTHETIC DENTISTRY SOLUTIONS: #ANTERIOR & POSTERIOR

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Abstract: *AESTHETIC DENTISTRY is not a specialization, it is everyday dentistry, it is well done dentistry. Aesthetics is not the end of the treatment, It is the result of respect for biology and the application of healthy functional and biomechanics principles. Since restorative materials such as composite resins and ceramics can have the same color as the tooth, the result should also be "aesthetic"*

Planning a new smile reach different objective connected with the clinical aspects. Record data: history, physical examination, intraoral Scanning, 3d-xray, Additive manufacturing (3D printing) simulation of the person seeking medical care DIAGNOSIS interactive programs designed to assist health professionals with decision-making tasks. The clinician interacts with the software utilizing both the clinician's knowledge and the software to make a better analysis of the patients data than either human or software could make on their own. Typically the system makes suggestions for the clinician to look through and the clinician picks useful information and removes erroneous suggestions.

Key words: *3-5 Key Esthetic, additive method, 3D-printing, chairside, chairside*

Introduction

AESTHETIC DENTISTRY is not a specialization, it is everyday dentistry, it is well done dentistry. Aesthetics is not the end of the treatment, It is the result of respect for biology and the application of healthy functional and biomechanics principles. Since restorative materials such as composite resins and ceramics can have the same color as the tooth, the result should also be "aesthetic".

Planning a new smile reach different objective connected with the clinical aspects. Record data: history, physical examination, intraoral Scanning, 3d-xray, Additive manufacturing (3D printing) simulation of the person seeking medical care DIAGNOSIS interactive programs designed to assist health professionals with decision-making tasks. The clinician interacts with the software utilizing both the clinician's knowledge and the software to make a better analysis of the patients data than either human or software could make on their own. Typically the system makes suggestions for the clinician to look through and the clinician picks useful information and removes erroneous suggestions.

The simulation of the final result directly on the patient's mouth is fundamental, because thanks to the mock-up it is possible to evaluate the impact of our project not only on the frontal teeth but in to the whole patient's face, evaluating, also the incisal guide the canine guides and eventually the vertical dimension changes. The program always will take in consideration the need of the patient that we will treat ANALYSIS and clinica

decision making. TREATMENT often follow formal or informal algorithmic guidelines thank to data analysis that give clinical decision making possibilities definitive treatment plan together considering all the aspect that could condition the final results not only from a clinical point of view but also from a psychological point of view. Intraoral Scanning, models Digitalization, Addictive Manufacturing give to the Dental Team simplify protocols Key of clinical success.

Thanks to the introduction on the market for the validation of the clinical method of intraoral scanning today the dentist is able with a few simple steps to perform a complete intraoral scan the effect of such a technology allows the opening to advanced methods in the realization of direct restorative prosthesis and aesthetic planning the stl file generated by intraoral scanners can be easily processed within a software dedicated to the realization of a partial or complete restoration the Modern methods of realization of Restorations today are more than consolidated ap. The landscape has paved the way for restoration and prosthetics with materials that have very high mechanical and technological properties compared to the conventional production method. Feldspathic ceramics zirconia, hybrid composites are just a few types of materials available to the clinician and dental technician.

Additive technologies such as 3D printing have further amplified the technological possibilities due to the fact that there is no longer a limit due to the size of the tool in the production of the tool material has become a laser beam that strikes a material triggering a process of polymerization of the structure. Another advantage of additive methods is the possibility of being able to layer different types of material depending on the layer I different color gradients within the same restoration. 3D printing in odontostomatology has recently undergone a further revolution Thanks to the introduction in the market of ultrafast printers that work with different materials within the same printing process the gradient of mechanical properties and color gradient further amplify the quality of restorations. DFAB of DWS is a technology that thanks to a patent called Photo Shade allows the layering of the restoration within the 3D printing process. In the following we will present a clinical case where this type of technology has been applied in the direct restorative

Figure 1 intraoral scanning allow a dentist to generate a STL model of a preparation site



Fig. 3 .Color Saturation setting thanks to the additive method we can set different saturation into the same color. From letterature we know that Value and Saturation are the key factor for optimal esthetic results with morphology and texture design



Fig. 4 .Color Saturation setting thanks to the additive method we can set different saturation into the same color. From literature we know that Value and Saturation are the key factor for optimal esthetic results with morphology and texture design the DWS Photo Shade Method

Fig. 5 DFAB ultra speed 3d Printing Machine can print multiple restoration (until 5 elements) in 20 min using ibrids Ceramic, Composite, Zirkonia



Fig. 6 Saturation anValue the Photo-shade Power of the additive method

Fig. 7 intraoral scanning and 3d printed Master Model with analogue



Fig. 8 Custom made abutment & crown



Fig. 9 Finalization



Conclusion

Aesthetics and function are the basis for the success of a restorative prosthetic objective in implantology and on the natural tooth the limitations of subtractive methods are the application of the tool to the blocks or discs to be milled.

Aesthetic finalization is one of the cornerstones of successful therapy. Subtractive methods only allow the use of blocks or discs layered with precise lines, the size of the tool and the management of the insertion axis is a further complexity. I put additives overcome the limitations described above the tool in the additive method is the laser light the possible incremental layering of different saturations and materials offers the clinician and the dental technician superior advantages over conventional methods even within the dental office direct methods of 3D printing allow the realization in a few minutes of definitive restorations using hybrid ceramics zirconia or composite materials

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CONVENTIONAL IMPRESSIONS IN IMPLANT PROSTHETICS FROM THE ASPECT OF ACCURACY

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Abstract: *The most common problem faced by prosthodontics who perform therapy for restoring missing teeth by implant-supported restorations is rigid bond between implants and surrounding bone and lack of periodontal ligaments which allow natural teeth physiological mobility. Because of that the accurate fitting is priority in those cases. The aim of this study was to examine the influence of the impression method and impression material on the accuracy of the definitive working cast for production of implant-supported restorations. This in vitro experiment was conducted using three different impression techniques and two types of elastic impression materials. Replica casts underwent optical 3D (three-dimensional) digitalization using two laboratory scanners, for the analysis of implant positioning deviations.*

Key words: *implant-supported restorations, implant impressions, impression materials, accuracy*

Introduction

In modern dental practice, during the planning of treatment of toothless and edentulous patients, the indication of implant-supported and worn dental restorations is one of the most common approach in the rehabilitation of the stomatognathic system. Those restorations are made in dental laboratory, indirectly, on a cast that should faithfully, accurate and precise, reproduce the morphology, positions and relations between remaining teeth, implants, residual alveolar ridges and surrounding soft tissues as they exist in the patient's mouth. Therefore, the accuracy of definitive casts using for producing implant restorations is priority for good therapeutic results. It usually depends mostly of impression procedure and with that goal conventional impression techniques undergone through several modifications [1].

Dental implants, due to their direct and rigid connection with surrounding bone tissue, opposite to the natural teeth which can perform a minimum physiological mobility thanks to the presence of periodontal ligaments are limited with their ability to absorb pressure and to adjust distortion moments that can occur between implant-supported restoration and the abutment [1, 2].

The capability of an implant system to withstand occlusal loads without an excessive stress and production of extensive forces in the peri-implant bone region or at the junction of abutment and restoration is in the direct connection with the success and longevity of rehabilitation. Although that absolute passive fit within restoration and abutment is impossible to provide, and that the discrepancy degree which won't cause biological or technical complications is yet not defined, performing as much as possible accurate fitting is the most important to think about when using this form of rehabilitation [1, 2, 3].

There are many factors that can affect the accuracy of working model for producing implant restorations, as: implant depth [9], degree of implant angulation [2,3,4], type, shape and design of the abutment [5], experience of the clinician, etc., but the most influenced factors are still impression methods [6,7,8] and choice of impression materials [1,6].

Conventional impression methods and impression materials in implant prosthetics

Two basic conventional impression methods for taking impression of dental implants are direct so-called "open tray technique" and indirect so-called "closed tray technique" or method. The open, direct method is also called "pick-up" method, because it implies application of transfer caps or copings that stay in the impression after the binding of the impression material is completed and being lift or pick up with impression and remain in it. This method uses the so-called "open" tray (stock or custom) which is perforated in the part of alveolar arch where implants are located in order to release copings before removal impression from the patient's mouth. After impression taking on each coping is fixed an analog of implant body (replica) with the same screw and the same strength as it was fixed in the mouth [2]. Copings for this technique have special morphology in order to stay in the impression, they are squared and have undercuts for retention of impression material during the procedure.

Closed tray, indirect method, the so-called "transfer" uses transfer caps or copings which are fixed to the implants and remain in the patient's mouth after the impression is taken. After taking impression out of patient's mouth, the copings are being unscrewed or removed from implants and link to implant analogues, so they can be putted in their formed holes in impression before outpouring of the definitive working cast. Copings for this technique have also special morphology in order to make easier removal from the impression when it is carried out from the mouth, they are tapered or conical and have smooth surfaces.

With the desire to improve the accuracy of making implant-supported restorations both basic conventional methods of impression have undergone through modifications [5, 6].

Modification technique of direct method is the so-called "splint" technique in which all copings are connected with dental floss and then the mixture of auto polymerizing acrylate is applied over the floss thus, forming a solid acrylic block that increases the stability of the copings in the impression. The function of the dental floss is to reduce the contraction of polymerization of acrylate resin to a minimum and prevent micromovements at copings level during the procedure [5, 6, 9].

The "click" or "snap on" impression technique is modified closed tray or indirect method that uses plastic transfer caps or copings which are applied to the edge of the shoulder of implant and using vertical and horizontal movements fixes on implant body with the appearance of a characteristic "click" sound, as a sign of their proper positioning. This technique aims to improve the accuracy of impression by more precise positioning of implant analogs, since the copings remain in the tray [6, 9].

Materials used for taking definitive impressions in modern implant prosthetics are addition silicones and polyethers. Both materials have similar good mechanical properties such as elastic recovery, strain in compression, tear energy, and tensile strength, large degree of accuracy and precision, dimensional stability, minor contraction during polymerization etc., which brought them to the top of the list of modern impression

materials. [1, 10]. Polyether, as a material which is, in the bound state, characterized by a huge rigidity, could be the material of choice for direct method, since it is more resistant to torque expected when taking this impression technique. On the other hand, for the purposes of the closed tray technique preference is usually given to addition silicones, because they are, after bonding, showing less durable deformation and better elastic properties, which ensure more accurate repositioning of copings into the impression [10].

Materials and method

Master (reference) model was planned to simulate a common clinical case of the upper jaw partial edentulism (Kennedy 1st class), which included the two angulated implants on one side, and two parallel implants on the other, in the region of first upper premolars and molars on both sides. Implants were posted in soft tissue level (*Soft tissue level, STL, Standard Plus Implant Endosteal diameter 4.1 mm Regular Neck 10 mm SLA®, Straumann, Switzerland*). The prepared master model was digitized using two laboratory scanners, which resulted in two virtual reference models. Two commercial laboratory 3D scanners routinely used in dental practice were used in the study: *3Shape's D900L* and *Medit's Identica Blue*.

There were performed three impression techniques: direct "open tray" basic technique, modified direct technique (splint) and modified indirect "closed tray" (click) technique. Basic indirect "closed tray" technique wasn't included into the research, because the modified "click" technique proved more accurate in previous studies [1, 3, 11]. Two types of elastic impression materials were used: addition silicone, polyvinylsiloxane (PVS) (*Elite HD + Light Body Fast Set, Zhermack, Italy*) and polyether (PE) (*Soft Monophase Impregum Penta, 3M ESPE, USA*). Impressions were taken on the implant level, 30 (10 times with three different techniques) times with both materials, and replica models were purred in dental stone type 4 (*GC Fujirock®, Japan*).

Obtaining data of the spatial orientation of implants and subsequent analysis of deviations were enabled by using specially constructed abutments for scanning the so-called *Straumann Intraoral Scan bodies* from the original set of manufacturers corresponding to the implant type (*Straumann® CARES® Mono Scanbody, Soft Tissue Level, Regular neck*).

Comparative geometric analysis of replica models with a reference model was performed by CAD (*Computer-Aided Design*) inspection in specialized software program intended for that purpose (*GOM Inspect 2016*). In order to determine the exact position of the implant body and enable exact comparison and deviation analysis on 3D replica models, 3D implant model was imported from the Straumann library and its positioning on the master model by the method of ideal overlap or *best-fit*. The prepared master model was digitized using two laboratory scanners, which resulted in two virtual master models. These models played the role of reference models, for each scanner, and all other definite casts after scanning became replica virtual models – Figures 1. and 2.

The analysis of the deviation of the center of the implant body of the experimental 3D model was performed in relation to the coordinate origin of the corresponding local coordinate system of the master model. In order to avoid the influence of implant angulation degree on the accuracy of the definitive working model, the deviation analysis of only parallel implants was performed and only affection of impression technique

and impression material was investigated. By analysis deviations was included the shortest distance between the center of the base and the local coordinate origin (x y z)- Figure 3.

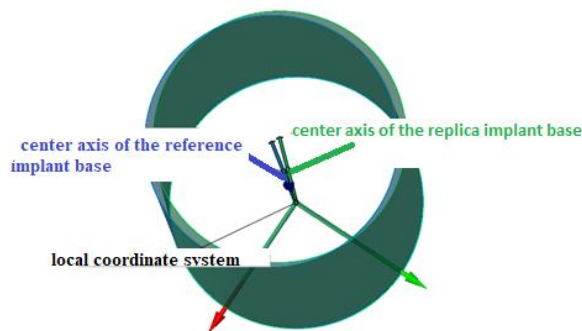


Fig.1. Reference model

Fig.2. Replica model

Fig.3. Local coordinate system for the analysis

Results and discussion

Since the data were collected on two different scanners, the first step in the result analysis was to examine the differences in scanner readings. Applying multivariate analysis of variance, it was found that there were no statistically significant differences in the results of deviations from the center on both scanners which has statistically justified the exclusion of the scanner as a grouping variable and the aggregation of data from both scanners for further analysis.

The statistics of the multivariate analysis of variance test indicated that there were statistically significant differences in the average measurements of the results from the center deviation according to different materials and techniques. Splint technique showed as the most accurate impression technique compared to other two types of technique, and PVS was little more accurate relative to PE material- Table 1. and 2. Techniques were marked as Open (basic open tray); Closed (modified closed tray „click “) and Splint (modified open tray) techniques, and materials were spotted as PVS (polyvinylsiloxane) and PE (polyether).

Closed (click) technique displayed more accurate in combination with PE than PVS, open technique had more deviations also in combination with PVS, while splint technique had the least discrepancies in combination with both types of materials, but less in combination with PVS. Basic open technique has shown the most deviation and less accuracy in both material groups especially in combination with PVS.

Technique	Average value	Standard deviation
Open	0,091404	0,0775969
Closed	0,093911	0,0663591
Splint	0,072479	0,0376010

Table 1. Distance from the center of the implant base for the group of techniques (mm)

Material	Average value	Standard deviation
PVS	0,074590	0,0613667
PE	0,097098	0,0630389

Table 2. Distance from the center of the implant base for the group of materials (mm)

The average deviations from the center of the reference implant base for the combination Splint / PVS were statistically significantly smaller compared to Splint / PE, Closed / PE, Open / PE, Closed / PVS and Open / PVS – Chart 1.

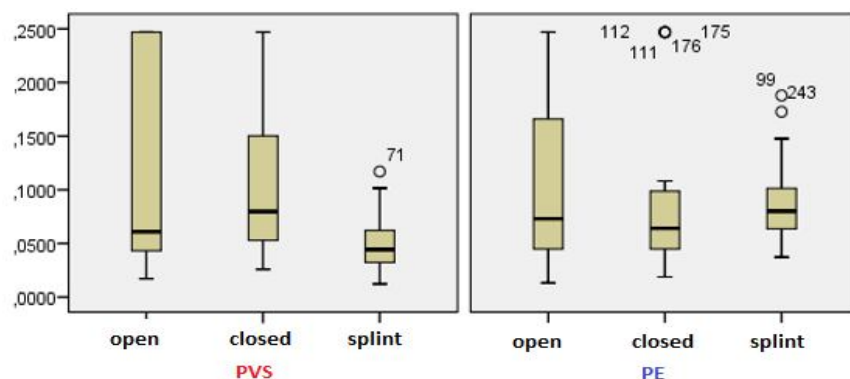


Chart 1. Distribution of discrepancy from the center of the reference implant base for all combinations of techniques and materials (mm)

Conclusion

For implants that are posted parallel to one another in the region of upper first premolar and first molar splint technique as modification of open tray impression method, compared to basic open tray technique and click technique (modification of closed tray method), gives the most accurate definitive working casts. Also, related to impression materials, this study proved that polyvinylsiloxane is more accurate material than polyether. In the combinations of impression techniques and materials splint technique used with addition silicone material is demonstrated as the most accurate combination for this concrete clinical case. Due to the fact that there are many factors that can affect the accuracy of the definitive working model, further research is needed on this topic in order to find the most accurate conventional technique and impression material for use in implant prosthetics.

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CHRONIC ALCOHOLISM AS ETIOLOGICAL FACTOR OF DENTAL EROSION

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Abstract: *Consumption of alcohol is an integral part of everyday life. Low pH value of alcoholic beverages (e.g. the pH value of Heineken beer is 4, white wine 3.2-3.5 and red wine 3.5-4.0) has a direct impact on the demineralization of hard dental tissue. The resulting dental erosions are deepened under the influence of gastric hydrochloric acid which reaches the oral cavity through vomiting and regurgitation in cases of alcohol intoxication, also causing the loss of protective function of saliva due to xerostomia which appears as a side effect of this type of addiction. Each presence of generalized erosive changes in which the case history has not detected an etiologic factor must create suspicion of chronic alcoholism and thus, this type of defect could be considered a symptom and, as such, it could be used in the diagnosis of this addiction. Dental erosions are also followed by certain complications such as: tooth fractures, pulpitis, periodontitis, lowering of the vertical dimension of the bite, damaging of temporomandibular joint. Twenty-first century is the century of preventive dentistry, only in this case the preventive measures taken only by dentists are not sufficient; the prevention should be multidisciplinary and must include dentists, nutritionists, gastroenterologists and psychiatrists*

Alcoholism is the most common addiction and after depression, it is a mental disorder that in most cases contributes to global disability⁽¹⁾. Prolonged intake of large amounts of alcohol in the body leads to the adaptation of organism to alcohol and functional, later even organic, changes in the central nervous system (CNS) which are phenomenologically manifested as an addiction syndrome or alcoholism⁽²⁾.

Alcohol is a legalized psychoactive substance (LPS) and its transport and trade are regulated by the law. Drinking of alcohol is a sociably acceptable activity and, in some cultures, such as ours, it has been even favored to the level of obligatory ritual in many different situations ⁽¹⁾. One-third of adults in Serbia (31.6%), according to the data from 2006, used to consume alcohol two to three times during the period of a 30-day research. Everyday consumption of alcoholic drinks in Serbia was registered in 3.4 % of population, whereas an average consumption of alcoholic drinks per person amounted to 7.4ml. The largest percent of people who drink alcohol is between 20 and 34 years of age. Drinking amongst the young has a competitive pattern, i.e. they compete in who can drink more. Lately, combining various types of alcoholic drinks has become increasingly popular. A high-risk group for the development of long-term diseases and conditions resulting from the abuse of alcohol included a significantly larger percent of men (5.7%), whereas women were less affected (0.4%)⁽¹⁾. Excessive intake of alcohol represents one of the leading risk factors for human health in the world, due to the fact that the etiological factor causes more than 60 diseases and damages and it can also lead to death outcome in approximately 2.5 million people every year⁽³⁾.

Alcohol addiction has serious consequences on human health as it leads to the diseases of gastrointestinal tract⁽⁴⁾, central nervous system⁽⁵⁾, cardiovascular system⁽⁶⁾, skin⁽⁷⁾, respiratory⁽⁸⁾ and reproductive system⁽⁹⁾. Alcohol addiction damages the health of the whole organism and thus, all constituents of oral cavity. Salivary glands, especially parotid gland, could be enlarged in cases of chronic alcoholism, which is the consequence of peripheral neuropathy caused by ethanol⁽¹⁰⁾. Reduction of the salivary secretion leads to the reduction of saliva buffer capacity which, in combination with poor oral hygiene, causes changes of hard dental tissues as well as periodontal tissues. Alcohol addicts have a high risk of dental caries ⁽¹¹⁾, high incidence of caries, filled and extracted teeth ^(12,13), gingival-periodontal disease^(13,14), tongue inflammation, oropharyngeal cancer⁽¹⁵⁾ (especially if combined with the consumption of cigarettes). Except for carious changes, dental erosions ⁽¹⁶⁾ may also occur on hard dental tissues.

Chronic alcoholism is associated with high prevalence of dental erosions which is the consequence of *direct* acid effect of beverages (having a pH value of: Heineken beer 4.1; white wine 3.2-3.5; red wine 3.5-4.0)^(17,18), taking into consideration that the acidity of alcoholic beverages (pH value) is lower than the critical value for the demineralization of hard dental tissues (pH 5.5)⁽¹⁹⁾ or *indirect*, as a result of the appearance of gastric hydrochloric acid in the oral cavity due to chronic gastric regurgitation and vomiting provoked by alcoholic intoxication with the loss of protective functions of saliva due to the occurrence of xerostomia which is typical of this kind of addiction^(20,21,22).

Dental erosions

Dental erosion is defined as an irreversible loss of hard dental tissue caused by a chemical decomposition due to acids that are not of bacterial origin ^(23,16). In 1989 Smith BG. and Robb ND registered the existence of erosive changes in 92% of the examined teeth of alcoholics. The changes are more common in those who frequently consume alcoholic beverages compared to those who consume them occasionally ⁽²⁴⁾. Many *in vivo* as well as *in vitro* studies emphasize the relationship between the acidic drinks and dental erosions ^(25,26). Acids commonly present in beverages are as follows: citric, malic, tartaric, phosphoric and coal ⁽²⁷⁾.

There are two important factors that can affect the erosive potential of a solution: a low degree of saturation in relation to hydroxyapatite (fluorapatite) and the presence of acid or citrate, a substance capable of chelating the calcium of the teeth. There are several factors that are involved in the development of dental erosion: *intrinsic factors*, such as salivary flow rate, buffering capacity and salivary composition, pellicle formation, tooth composition; *extrinsic factors*, such as chemical (pH, titratable acidity, calcium and phosphate concentration, fluoride content of the material in contact with the tooth) and *behavioral factors* (eating and drinking habits, lifestyle, excessive consumption of acids)^(16,27-29). Ethanol ingestion affects the hypothalamo-neurohypophyseal system resulting in increased diuresis, dehydration and hyperosmolality⁽³⁰⁾. Alcohol acts as a diuretic, which can lead to drying of the mouth. Some habits associated with drinking expand their deleterious effect on the enamel and can increase tooth erosion because they cause xerostomia. Such habits include smoking, drug abuse etc ⁽³¹⁾.

Low pH and the contact time between the acidic beverage and dental surface, play a crucial role in determining tooth wear. The pH of most alcoholic beverages is acidic, with values around pH 4.0 (lower than

the critical dissolution enamel pH 5.5) and the concentration of organic and inorganic acids is high. It is important that the pH of incomplete fermented drinks, such as beer and wine, is acidic because it helps prevent contamination by other microorganisms, while nowadays, the erosive potential is increased due to the combination of primary alcoholic beverages and soft drinks or fruit juices^(28,32,33). The potential of wines to cause erosion results from their fruit acid content, of which tartaric acid is the most abundant one. Different wines have different combinations and concentrations of acid types and other inhibiting factors present and thus, the erosive potential varies. For tooth crowns, there appeared to be little difference in depths of erosion resulting from the exposure to white wine or champagne-style wine, both at room temperature and at 37°C. The erosion resulting from red wine contact was substantially less than the one from both white wines. Riesling-style wine is more erosive than champagne-style wine and both are more erosive than claret⁽³⁴⁾. Amongst primary drinks, white wines are more erosive than red wines because of their higher concentration of titratable acids⁽³⁵⁾, while beer⁽³⁶⁾ and ciders⁽³⁷⁾ have a moderate erosive potential. Nogueira et al.(2000) evaluated the effect of different beer brands in relation to titratable acidity, calcium and phosphate concentrations and pH measurements, and observed that beer may have a potential dental effect, indicating calcium loss from the enamel over time⁽³⁸⁾. During fermentation in brewing, yeast is placed in the mixture and free amino acids are absorbed. Also, during fermentation, yeast is responsible for changing the buffer ability of beer, consumption of bases and acids excretion, increasing the amount of free hydrogen ions in the mixture responsible for pH reduction⁽³⁹⁾.

The astringency of alcoholic beverages is likely to be another factor promoting tooth wear- dental erosions. The taste typical of some alcoholic beverages is due to the presence of high levels of polyphenols, mostly tannins, which bind salivary proteins, such as proteins and mucopolysaccharides, causing their precipitation, with consequent sensation of astringency, losses of lubrication of the oral mucosa and teeth and simultaneous decrease in protection of teeth from acids⁽⁴⁰⁾.

Patophysiology and Pathohystology of dental erosion

Alcoholic patients are a risk group for dental erosion injuries, because alcohol consumption has the potential for degradation rate mechanisms. The mineral in our teeth is composed of calcium-deficient carbonated hydroxyapatite. These substitutions in mineral crystal lattice, especially carbonate, render tooth mineral more acid-soluble than hydroxyapatite. During the erosion caused by acids and/or chelators, these agents interact with surfaces of mineral crystals, but only after they diffuse through the plaque, the pellicle, and the protein/lipid coating of the individual crystals themselves. The effect of direct attack by the hydrogen ion is to combine with the carbonate and/or phosphate releasing all of the ions from the region of the crystal surface leading to direct surface etching⁽⁴¹⁾.

First, the prism sheath area and then the prism core on the enamel surface get dissolved, leaving a honeycomb appearance. Figure 1. Then, fresh and unionized acids diffuse into the interprismatic areas of enamel and further dissolve the mineral content underneath the surface. This acid attack leads to an outflow of ions and an increase in the pH in the surrounding environment⁽⁴²⁾. Loss of enamel leads to the opening of dentine tubules and a consecutive phenomenon of dentine hypersensitivity as one of the symptoms⁽⁴³⁾. The

pain is manifested as a shooting sensation to physical, chemical, thermal and evaporative triggers⁽²⁹⁾. The effects of acids on dentin have been largely investigated, as the length of time that teeth remain in the mouth is increasing, with dentinal coronal and root exposures that are gradually becoming common because of tooth wear and gingival recession, respectively⁽⁴⁴⁾. However, due to the high organic content of dentine, diffusion of demineralizing agents and mineral ions are partially stopped by the organic matrix, which acts as a barrier to acid diffusion and mineral release. Figure 2. This difference in erosive processes between enamel and dentine does not mean that the erosive process in dentine is slower, on the contrary, the dentine substrate is more susceptible to acid dissolution because its hydroxyapatite crystals are smaller than that of enamel^(45,46).



Figure 1. Scanning electron micrography of longitudinal cross-section of enamel 15 minutes after the exposure to filtrate of gastric juice



Figure 2. Scanning electron micrography of dentin roof of the pulp chamber after 15 minutes of exposure to filtrate gastric juice

Distribution and morphology of dental erosion in alcoholic

High consumption of alcoholic beverages and the problems associated with it: as a result of this, some dental surfaces are more affected by erosion in alcoholic patients. Alcohol –dependent patients undergoing an addiction rehabilitation therapy presented high experience and low severity of dental erosion lesions. Palatine surfaces of maxillary teeth, followed by occlusal surfaces of posterior teeth and incisal edges of anterior teeth, in average, were the more severe dental surfaces affected by erosion wear. Image 3. In these patients, the mandibular teeth and maxillary teeth buccal surfaces were the less affected by erosion wear ⁽⁴⁷⁾. The primary signs of dental erosion are diminishing enamel luster, absence of macroscopic plaque and dental surfaces that have become rounded and polished because of the loss of micro anatomy. After the initial dental erosion, some features can be observed, such as smoothing out of developmental pits and grooves, dentin exposure, prominent restorations that are elevated above the surrounding tooth structure and well defined concavities of dentin on the occlusal and incisal surface, especially on the cusp tips of the posterior teeth. In more advanced cases, extensive mineral loss can lead to tooth shortening, which can promote functional and aesthetic problems. Convex teeth areas as proximal ridges gradually become flat and even concave. Image 4. In severe cases, dental morphology can be totally lost ⁽⁴⁸⁾. Several epidemiological studies report a time-dependent association between chronic alcoholism and dental erosion, independently of socioeconomic status ⁽²⁸⁾.

Image 3. Erosive changes on the oral surfaces of upper anterior teeth in a patient with gastroesophageal reflux disease



Image 4. Erosive changes in the teeth of the lower jaw in a patient with gastroesophageal reflux disease

Repeated or prolonged exposure of teeth to acid leads to selective dissolution of specific components of the tooth surface, with eventual loss of tooth substance, hypersensitivity, functional impairment, and even tooth fracture⁽⁴⁹⁾ and when excessive wear occurs possible complications are pain, pulpal inflammation, necrosis and periapical pathology⁽¹⁶⁾

From the dentists point of view a prerequisite for preventive measures is to diagnose erosive tooth wear and to evaluate the different etiological factors in order to identify persons at risk. No diagnostic device is available for the assessment of erosive defects. They can only be detected clinically. Initial evaluation begins with a thorough medical history review, with detection of repeated presence of gastric juice in the mouth (recurrent vomiting disorders or reflux or regurgitation) including a listing of all prescription and non-prescription medications and supplements and alcohol abuse. Items that are relevant to the problem of erosion include medications that may cause salivary hypo function and those used to treat GERD. Acidic medications or supplements such as Vitamin C and the method of ingestion should be noted. Through the process of risk assessment, the diet and the dietary factors predisposing the patient to the risk of dental erosion will be identified ⁽¹⁶⁾Dental professionals are urged to be aware of each patient's substance use history. It is therefore suggested that general dental practitioners should bear in mind the possibility of chronic alcoholism in cases of unexplained dental erosion. During the dental appointment, the health questionnaire and subsequent verbal interview should pose the relevant questions, allowing a patient to indicate a previous or existing alcohol abusing problem. Routine screening of patients for alcohol use and abuse, would allow dentists to detect patients most at risk and plan treatment and patient counseling accordingly.

A modern preventive strategy needs training of dentists in early detection and monitoring of the process because dental professionals are responsible for identifying early signs of dental erosion and implementing appropriate management strategies, including education and counseling. Also, a dentist has to provide a way of discussing alcohol with the patient and supporting behavior change through a health behavior change approach (change behaviors such as smoking, alcohol consumption, diet and physical activity)⁽⁵⁰⁾. Often patients themselves do not seek treatment until the condition is at an advanced stage or when the teeth become hypersensitive or when the aesthetics are affected.

Individually tailored advice for patients.

Alcohol abuse treatment should not only be focused on the medical and psychological management of the patient, but it also needs to include oral and dental treatment that may be necessary. Patients should be given advice on simple, practical ways to reduce the risk of erosive tooth wear such as dietary advice, modifying habits, remineralisation of dental defects, maintaining proper oral hygiene, professional application of fluoride and the application of occlusal guard.

Dietary advice: refers to the limited intake of acidic foods and beverages that are entered only during meals. We recommend the use of natural water in large quantities (8-10 glasses per day) and tea from calendula and

linden. The meal should be finished with milk or milk products containing 1.5% of fat. Other nutrition advice should be provided by nutritionists. In order for the reduction of reflux symptoms to occur, the following must be respected:

Modifying lifestyle: (to be emphasized to people with reflux symptoms)

- Dinner should be eaten 3 hours before going to bed;
- Avoid a horizontal position in bed, immediately after a meal;
- Sleep on an elevated headboard;
- Straighten your body when sitting or walking;
- Avoid voluminous meals;
- Avoid fatty foods, chocolate, coffee, peppermint, spicy foods, citrus ,tomato;
- Avoid alcohol and smoking;
- Regulate body weight;
- Eliminate excessive intake of analgesics, aspirin, ibuprofen, drugs against osteoporosis;
- Carbonated soft drinks consumed using a straw;
- Acidic drinks, alcoholic and non-alcoholic should be drunk at once, without sipping;
- Rinse your mouth with water after intake of carbonated beverages, wine and beer;
- Drink cold rather than warm beverages (if acidic)⁽⁵¹⁻⁵⁴⁾.

Remineralization of dental defects (individual recommendations)

- After vomiting or regurgitation rinse mouth with plain water⁽⁵⁵⁾ or
- Rinse with sodium bicarbonate (1ts in 250 ml water)⁽⁵⁶⁾;
- Once a day rinse your mouth with green tea⁽⁵⁷⁾;
- Between the acid attack rinse mouth with chlorhexidyne⁽⁵⁶⁾;
- Strengthen salivation with sugarless chewing gum with xylitol⁽⁵⁸⁾;
- Wash your mouth with fluoride 200-300pp once a day or
- Use fluoride tablets or lozenges⁽⁵⁴⁾.

Oral hygiene advice:

- Brush your teeth twice a day for two minutes⁽⁵⁹⁾;
- Use toothpaste with fluoride or with CPP-ACP (casein phosphor peptide - amorphous calcium phosphate) with low abrasiveness;
- Apply a soft or medium toothbrush;
- A toothbrush should be changed every three months;
- After vomiting brush your tongue;
- Check up every six months⁽⁵⁴⁾.

Professional application of fluoride :

- Periodically, in moderate high or high risk;
- The 2% solution of sodium fluoride (2-4 applications per year at high risk and 1-2 for moderate risk)
- 8-10% stannous fluoride (solution or jelly)

Application of protective appliance

- Application of occlusal guard during sleep, swim in the pool or provoke vomiting;
- Alkaline substances placed into the guard (Magnesium milk or neutral fluoride gels -5 min./24 hours with 1.1% neutral fluoride gel)^(54,55).

The twenty-first century is proclaimed a century of preventive dentistry. World Dental Association, World Health Organization and International Association for Research in Dentistry have brought the general and specific objectives for the provision of oral health to be achieved by 2020. Some of the general objectives are: to reduce the impact of general (systemic) disease on oral health, use already manifested symptoms (oral or craniofacial) for early prevention, focus on diagnosis and the effective treatment of systemic diseases. Serbia needs to improve preventive strategy through health promotion and good primary prevention. It is fundamental to note that without a valid multidisciplinary prevention there is no normal functioning of the stomatognathic system and protection of hard dental tissue in patients diagnosed with chronic disease⁽⁵⁴⁾.

As a healthcare practitioner, a dentist can play an important role in empowering individuals and communities to recognize how the alcoholic can improve their own health and well-being by informing patients of their health risk factors, and supporting them towards healthier options.

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IMMEDIATE IMPLANT PLACEMENT IN THE AESTHETIC ZONE

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Abstract: *Immediate implant placement procedure reduces the number of surgical interventions and the time required to perform the entire treatment of edentulous patients. Ideal three-dimensional implant positioning, alveolar bone preservation, and optimal soft tissue aesthetics can be achieved with this procedure. High aesthetic results can be expected.*

The technique of tooth extraction must be especially careful and minimally traumatic. The use of some of the regenerative procedures is common in these cases, and it is extremely important to choose the appropriate one for each case.

Previously, the main concern of oral implantology was the survival of the implant and the health of the tissues surrounding it. It is now considered that the aesthetic effect is equally important for the success of the implant. Implant and prosthetic implantation are related and especially challenging in the aesthetic zone. Guidelines for ideal implant positioning such as diagnosis, treatment plan, anatomical parameters, three-dimensional positioning, implant time as well as implant design will be discussed in this lecture.

Immediate implant placement can be negatively affected by the presence of infection, lack of soft tissues as well as a thin biotype of the gingiva. When the indications for this procedure are set correctly, it represents a predictable treatment modality with a success rate comparable to the success rate of implants placed in cases of delayed implant placement.

Complications of immediate implant placement are numerous and are primarily conditioned by inadequate case selection. Aesthetic implant failures in frontal regions represent one of the most difficult complications in modern implantology. The reasons for the occurrence of these complications are the most common: traumatic tooth extraction, incorrect implant positioning, inadequate use of regenerative techniques for bone and soft tissue replacement, as well as the production of inappropriate prosthetic restorations.

ANALYSIS OF SPECIFIC ORAL HEALTH PROGRAMS OF THE POPULATION OF THE AUTONOMOUS PROVINCE OF VOJVODINA

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Summary

The basic starting point for defining specific oral health programs is to analyze the oral health of the population of Vojvodina, especially vulnerable and socially vulnerable population groups. On the basis of the evaluation of the obtained results, special programs in the field of public health for the territory of A.P. Vojvodina were started, because there are no appropriate programs at the National level of the Republic of Serbia. These programs include oral health behaviors that need to be corrected to increase population response to the systematic preventive check - ups, as significant measures to detect the risk factors for oral diseases of the all population categories (children, women, working population, elder). These programs are also needed for intensifying the preventive work of the selected physicians, than for population education (family, educators, teachers, etc.), including media, especially the local and whole community. These activities and health service resources based on monitoring and analyzing the health status of the population of Vojvodina, served decision makers to propose the specific health care programs in the territory of the A.P. of Vojvodina according to legislative regulations.

Main text

Priority areas for preserving and improving the health of the population are those related to the prevention and control of chronic non infectious diseases that today's society is most burdened with, as well as the protection and improvement of the environment and factors that may have an impact on health programs, related to these priority areas. As a starting point for defining these programs, the condition of oral health of pregnant women, preschool children and other socially vulnerable population groups like (Roma) in Vojvodina, was analyzed. Based on the evaluation of the obtained results, special programs in the field of public health for the territory of A.P. Vojvodina, which are not covered by appropriate programs at the level of the Republic of Serbia was started. The analysis of the obtained results showed that bad habits, attitudes and behaviors that affect health are responsible for the occurrence of two thirds of oral diseases (oral hygiene, improper diet, absence of fluoride prophylaxis, etc.). Surveys show that more than 44% of children and youth in Vojvodina brush their teeth irregularly. Also, the nutrition of children and youth is improper. Every fifth child does not eat qualitative food the intake of milk and dairy products, fish, fresh fruits and vegetables is insufficient, while sweets, snacks and sweet soft drinks are very often on the children's menu. Regarding preventive dental examinations of the population in Vojvodina, the coverage of pregnant women

and new-born children is relatively satisfactory (92%), while in infants (77%), young and preschool children (83%), primary school students (78%), as well as high schools (70%) and university students (50%) was less than required. The priority areas of preservation and improvement of oral health regarding special programs in the field of public health for the territory of A.P. Vojvodina include oral health behavior that need to be corrected. These activities served the decision makers to propose special health care programs on the territory of A.P. Vojvodina in accordance with legal regulations. So far, special programs in the field of public health have not been adopted in A.P. Vojvodina, even legal regulations for their adoption exist.

Review and analysis of the existing situation

The analysis of the health condition of the population is the starting point for the objective identification of priority problems, setting the goals of health policy, strategies and technologies in health care. Retrospective analyses of the health condition of the population on the territory of A.P. Vojvodina point out to problems related to the specific needs of vulnerable categories of the population and the spread of oral diseases that are of great socio - medical and economic importance. In this regard, there is a need to provide basic information about the health of the population, especially vulnerable categories of the population (infants, young children, pregnant women) and socially vulnerable groups. Priority areas for preserving and improving health relate to the prevention and control of chronic non-contagious diseases, especially oral diseases, which are the most burdened for society today. The objectives of the special programs include the identification of the most significant health problems and risk factors. The analysis of health status was performed at the Institute of Public Health of Vojvodina, and included: analysis of vital-demographic situation, socio-economic indicators, identification of risk factors for oral diseases in pregnant women, particularly vulnerable populations of different ethnicities and religions and promotion health and health education. Output indicators are: program establishment of a public electronic service for recording oral diseases and early childhood caries (ECC), epidemiological examination, planning of measures and definition of health policy, for socially vulnerable groups (like Roma people). The second task of the proposed programs was to implement an action plan for preserving the health of pregnant women, children and socially vulnerable categories of the population. In this regard, the following two current problems stand out: improving the prevention of ECC and improving the oral health of Roma children in Vojvodina. In the realization of these projects, funds from the Provincial Budget were used through the line Secretariats for Health and the Secretariat for Science and Technological Development. The special program in the field of public health entitled: "Prevention and control of early childhood caries" included parents of children aged 0 to 3 years in A.P. Vojvodina, with special emphasis on parents of premature infants and those who had a minor body weight of 2,500 gr at birth. Based on data obtained from parents (evaluation of socio-economic data, habits, attitudes, behavior and health information), the risk factors for caries were identified. This was a condition for defining special prevention programs in A.P. Vojvodina for the period 2016- 2020.

Specific objectives of the program:

- Informing parents of infants about measures for prevention and control of ECC.

- Education of dentists of all health centres in A.P. Vojvodina, for early implementation of preventive and therapeutic interventions before the occurrence of irreversible changes in the teeth,
- Evaluation of risk factors for the occurrence of ECC through a survey of parents of new-borns in A.P. Vojvodina, with special emphasis on parents of premature babies and new-borns weighing less than 2500 gr. at birth.
- Development of the Program of preventive dental protection of families with infants who had a body weight of less than 2500 gr. at birth.

The program of special interest for the social community entitled: "Research on the state of oral health of Roma preschool children in Vojvodina", funded by the Secretariat for Science and Technological Development was aimed at the following goals:

- diagnose of the carious lesions in children of 1-3 years old
- assessment of periodontal status (PMA Löe-Silness index)
- assessment of knowledge, habits, attitudes and behaviors related to the oral health of the parents of examined children using a specially designed anonymous survey questionnaire
- defining a model for caries prevention based on identified risk factors
- development of the Dental Health Care Program for Roma children
- education of health and non-health workers as well as other participants (promoters, mediators) for the implementation of the Program and the promotion of oral health.

In this regard, it is important to emphasize that research in the world and in our country shows that Roma children have a very low level of oral hygiene, more untreated caries, especially ECC and very common periodontal diseases, together with orthodontic irregularities that may cause loss of many teeth at the earliest age. The complex etiology of ECC includes early implementation of cariogenic bacteria, immature immune system influence of social, ethnic, cultural and behavioral factors. Unequal access to health information and dental service as well as the lack of social and health insurance causes the most common teeth extraction, and deterioration of general health and quality of life of the Roma population. Difficult registration of the Roma population due to complicated legal regulations increases the risk of developing oral diseases that can be successfully prevented today. Animation by local authorities was also very important for the prevention, improvement of oral health, early diagnosis and rehabilitation of oral diseases in Roma children. Within the Program, the introduction of mediators in the health care system was initiated with the aim of improving communication between the Roma population and dentists, providing assistance to Roma to use the right to health care.

The conducted research confirmed high oral morbidity, irregular visits and difficult communication of Roma children with the dentist. This indicates the necessity of health promotion, early and continuous application of preventive measures, the need to raise the health knowledge, culture and awareness of parents and then their children. It is planned to reduce the prevalence of caries and periodontal diseases, as well as reduce the number of extracted teeth and increase the number of treated teeth, and significantly improve oral hygiene.

In this way, the society would reduce the expenses for expensive treatment of oral diseases among Roma children as the most endangered population group on the territory of A.P. Vojvodina.

The following was defined by a special project:

- raising the level of the oral health of Roma children
- increasing access to hard-to-reach environments through health promoters or Roma mediators,
- Engagement of all communication technologies and MAS media with language-adapted health education programs in the process of raising the level of knowledge about oral health
- Development of the Program of primary and secondary prevention of oral diseases in Roma children,

This Program has increased the participation of non-medical staff (health promoters) as well as parents in the prevention of oral diseases. In order to better achieve the set goals, it is necessary to speed up the flow of information through the electronic service for reporting infectious diseases. Providing information on the epidemiological characteristics of oral diseases, and risk factors in order to plan intervention measures allows a more precise definition of health policy in socially vulnerable population groups in A.P. Vojvodina.

The Government of the Republic of Serbia should provide an organizational structure, at the highest level, which will be the basis for the implementation of the Strategy for improving health care and the position of Roma until 2020 through budget funds.

Public authorities should provide:

- Removing barriers to Roma access to health care
- Organizing public campaigns for the prevention of oral diseases
- Involvement of Roma health mediators in all areas inhabited by Roma

Tasks of local self-government:

- Implementation of oral health promotion policy through visits to the Roma community
- Continuous work on educating health workers about the problems and needs of the Roma community, with a special focus on women and children.
- Involvement of Roma civil society organizations in the work of local health councils.

The activity of civil society organizations should be focused on:

- Work on improving civil society organizations in the field of health care and patients' rights.
- Advocating for the rights of minorities, while respecting gender equality,
- Establishing cooperation with local institutions, planning joint activities and ensuring regular communication with Roma on health problems.

The implementation of special programs is an important condition for the later improvement of oral health in schools. A large number of oral diseases can be brought under control by intensifying promotional and preventive measures with task-setting through multidisciplinary cooperation and activation of the non-governmental sector. Activities need to be implemented in cooperation with the Ministry of Education. These activities should be carried out throughout the year, with the support of school dental clinics, and not only during "The week of healthy teeth." In order to preserve and improve the health of the population, develop a healthy environment and promote healthy lifestyles, continuous activities are needed to promote health and health education, especially for vulnerable population groups and the vulnerable population of Vojvodina. The legal basis for the adoption of special programs in the field of public health for the territory of A.P. Vojvodina are:

- Law on public health ("Official Gazette of RS", No. 72/2009), Article 6,
- Law on determining the jurisdiction of the Autonomous Province of Vojvodina ("Official Gazette of RS", No. 99/2009 and 67/2012 - US Decision) Article 47,
- Law on health care ("Official Gazette of RS", No. 107/05 and 72/09) Article 13,
- Provincial assembly decision on provincial administration ("Official Gazette of APV", No. 40/2012), Article 48.

In addition, the adoption of a special program is based on strategies and national programs adopted by the Government, in particular:

- Health policy of Serbia (2002),
- Poverty reduction strategy in Serbia (2003),
- National millennium development goals in RS (2006),
- Strategies for the development of youth health in RS (2006),
- National strategies on aging 2006 - 2015 (2006),
- National strategies for sustainable development (2008),
- Strategies for prevention and control of chronic non-communicable diseases (2009),
- Strategies for improving the position of Roma (2009),
- RS Public health strategies (2009),
- Amended National integration program re audience of Serbia to the European Union (2009), etc.

The proposed special program is based on the basic principles and values contained in international documents adopted under the auspices of the WHO, and in particular in:

- The Alma-Ata Declaration (1978);
- Ottawa Charter on Health Promotion (1986);
- The Jakarta Declaration on the Introduction of Health Promotion in the 21st Century (1997);
- Policy Framework for the European region "Health for All" (2005);
- European strategy for the health and development of children and youth "From resolution to action 2005-2008" (2005);

- Declaration on health in all policies (2007);
- Tallinn charter "Health systems for health and welfare" (2008) and other internationally recognized documents.

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DENTAL CARIES AND DENTIN HYPERSENSITIVITY - ARE WE DIAGNOSING TOO LATE?

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Dental caries is a global public health problem that affects the quality of life and can negatively affect the general state of health. Unfortunately, despite modern technologies and technological development of modern dentistry, research has been ineffective in the fight against oral diseases like caries and dentin hypersensitivity.

Dental caries is more than just cavities. Numerous studies have identified the stages that precede the formation of a cavity. In particular, when fluoride is available it takes several years before a sound surface is cavitated. During this period both patient and dentist should be made aware of surfaces in the dentition that appear to be at particular risk. The study of the pathogenesis of dental caries has demonstrated that the early stages of caries are characterized by a preferential dissolution of tooth mineral from weak spots in the tissue, at both the microscopic and macroscopic level.

The question is, are we diagnosing too late?

Dentine hypersensitivity (DH) is one of the most commonly encountered clinical problems in dentistry. It is characterized by short, sharp pain arising from exposed dentine in response to external stimuli, which cannot be ascribed to any other form of dental defect or disease. Researches showed that over half of the world's population suffers from dentin hypersensitivity. Dentine hypersensitivity can affect the patient of any age, but most affected patients are in the age group of 20–50 years, with a peak between 30 and 40 years of age, mostly women. Regarding the type of teeth involved, canines and premolars of both the arches are the most affected teeth. Buccal aspect of cervical area is the commonly affected site.

Dentine is covered and protected by hard tissues such as enamel or cementum. Dentin itself is a vital tissue, consisting of dentinal tubules, and is naturally sensitive because of extensions of odontoblasts and formation of dentine–pulp complex. DH develops in two phases: lesion localization and lesion initiation. Lesion localization occurs by loss of protective covering over the dentin, thereby exposing it to external environment. It includes loss of enamel via attrition, abrasion, erosion, abfraction, structural anomalies or bleaching of the teeth. Another cause for lesion localization is gingival recession which can be due to toothbrush abrasion, pocket reduction surgery, tooth preparation for crown, excessive flossing or secondary to periodontal diseases.

Dental pain develops due to hydrodynamic mechanism, i.e., fluid force. Scanning electron microscopic (SEM) analysis of “hypersensitive” dentin shows the presence of widely open dentinal tubules. The presence of wide tubules in hypersensitive dentin is consistent with the hydrodynamic theory. This theory is based on the presence and movement of fluid inside the dentinal tubules. This centrifugal fluid movement, in turn, activates the nerve endings at the end of dentinal tubules or at the pulp–dentine complex.

As like any other clinical condition, an accurate diagnosis is important before starting the management of DH. DH has features which are similar to other conditions like caries, fractured or chipped enamel/dentine, pain due to reversible pulpitis, and post dental bleaching sensitivity. Diagnosis of DH starts with a thorough clinical history and examination.

The question arises again, are we diagnosing too late?

For the past 40 years, prevention of dental caries has centered around fluoride, in various forms of application. Numerous studies were completed to quantify the effects of various preventive products. These studies focused on the type of fluoride in a paste or rinse, the fluoride level, and the effects of other additives. Fluorides are a standard ingredient in toothpaste to increase remineralization of dental hard tissues like enamel, to inhibit demineralization, to increase the resistance of the apatite structure to acid attack and to have anti bacterial properties. Various fluoride compounds are used in the different dentifrices, of which the most common in Europe are sodium fluoride (NaF) and amine fluoride (AmF). The caries preventive effect of fluoride depends on the fluoride bioavailability.

Among fluoride formulations, the combination of amine fluoride and fluoride showed good efficacy in prevention of dental caries. It adsorbs to the enamel surface, performs surface activity, is bacteriostatic and decreases enamel solubility. In clinical studies, enhanced plaque and caries inhibition, a reduced acid production in plaque, gingivitis prevention, and long-term plaque and gingivitis inhibition.

Amine Fluoride (Olaflur) is active ingredient in Elmex® toothpastes and mouth rinses. Amine Fluoride (Olaflur) has been developed by GABA scientists exclusively for our company. Final reaction step carried out at our own Therwil (Switzerland) plant. More than 400 scientific studies confirmed efficacy of this ingredient. Amine fluoride forms a long-lasting protective layer around sensitive teeth and exposed teeth necks to prevent pain sensitivity and tooth damaging tooth decay. Amine Fluoride has many different effects in our mouth. It is surface-active, reduces the surface tension of saliva and ensures targeted transport of fluoride ions to the tooth surface. Olaflur is forming a film on all oral surfaces, which stays longer and protects areas which are particularly susceptible to caries. It has an increased antibacterial activity, which provides best caries protection.

Amine Fluoride (Olaflur) promotes formation of CaF_2 layer on teeth. Amine Fluoride (Olaflur) containing elmex® products are formulated slightly acidic around pH 4.5 Calcium Fluoride layer on teeth surface acts as a depot which facilitates incorporation of fluoride into the enamel, for protection against cariogenic acids.

Elmex Toothpaste and Elmex Junior Toothpaste contain Olaflur (amine fluoride) in concentration of 1400 ppm, which supports the refilling in minerals of the demineralized enamel. It makes the first permanent teeth (from the age of 7) more resistant to the acid attack of bacteria of the dental plaque. Amine fluoride has an effect on remineralization of the initial decays of the enamel, like white spot lesions and molar incisor hypomineralisation (MIH).

The therapy for management of dentine hypersensitivity is primarily aimed at occluding the dentinal tubules or making coagulates inside the tubules. Patients are often prescribed over-the-counter desensitizing agents. These “at home” desensitizing agents include toothpastes, mouthwashes and chewing gums. Majority of the toothpastes contain potassium salts (potassium nitrate, potassium chloride or potassium citrate), sodium

fluoride, strontium chloride, dibasic sodium citrate, formaldehyde, sodium monofluorophosphate and stannous fluoride. Potassium salts act by diffusion along the dentinal tubules and decreasing the excitability of the intradental nerve fibers by blocking the axonic action.

Traditionally, fluorides have been used as a caries preventive material which can help in remineralization of enamel/dentin. Also, various clinical trials have shown that application of fluoride solution can decrease dentine hypersensitivity. Fluorides decrease the dentinal permeability by precipitation of calcium fluoride crystals inside the dentinal tubules. These crystals are partially insoluble in saliva. SEM revealed granular precipitates in the peritubular dentin after application of fluorides. Various fluoride formulations are used to treat DH. These include sodium fluoride, stannous fluoride, sodium monofluorophosphate, fluorosilicates and fluoride combined with iontophoresis.

The high effectiveness of amino fluoride in treatment of dentine hypersensitivity has been proven in numerous clinical studies. Tooth pastes containing Olaflur (Amine fluoride) forms a long-lasting protective layer of calcium fluoride, which occludes opened dentine tubuli, to treat pain sensitivity.

For the treatment of severe forms of dentine hypersensitivity, tooth pastes and powders containing arginine are proved to be effective through several clinical studies. Arginine is a natural amino acid, naturally found in saliva and compatible with fluoride. Arginine promotes precipitation of calcium and phosphate ions to form a calcium-rich layer that plugs and seals the opening of dentine tubules. Tooth pastes contain 8% arginine, calcium carbonate, and 1450 ppm fluoride and by establishing an alkaline environment, lead to the precipitation of more salivary calcium and phosphate on the surface and within the dentinal tubules. Furthermore, calcium carbonate, through attracting arginine, forms a molecule which is positively charged. The plug shields dentine fluid from exposure to external stimuli. A single fingertip topical self-application of a new 8.0% arginine-calcium carbonate toothpaste directly onto the hypersensitive surface of teeth provides significant immediate improvement in dentin hypersensitivity. Significant improvements in dentin hypersensitivity were also demonstrated after three days of brushing with the 8.0% arginine-calcium carbonate toothpaste, subsequent to the single topical self-application of the product. The improvement demonstrated by the 8.0% arginine toothpaste after direct application was maintained after three days of twice-daily brushing, reductions in dentin hypersensitivity on both tactile and air blast hypersensitivity scores immediately after direct application.

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PAIN IN TEMPOROMANDIBULAR JOINT

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Abstract: *Temporomandibular disorders-TMD are a common type of musculoskeletal disorder in the orofacial region involving the masticatory muscles, temporomandibular joint (TMJ) and associated structures. The typical features are pain in TMJ, restriction of mandibular movement, TMJ sound, and facial deformities. The prevalence of pain in temporomandibular joint in general population lies in the range of about 5-12%.*

Persistent pain in the masticatory muscles is usually unilateral condition, may be exacerbated by normal oral function such as chewing, talking, or yawning. Limited mouth opening-less than 30-35mm and deviation to the affected side are present. Both tenderness and trigger points in muscles are also characteristics of these pain.

Therapy of TMD are reversible and irreversible.

Specialized physical therapy options such as ultrasound, iontophoresis, electrotherapy, or low-level laser therapy have been used in the management of TMD.

If the patient has a restricted opening- stretching the mouth wider. This is usually performed by placing the index finger over the incisal edges of the mandibular incisors and the thumb over the incisal edges of the maxillary incisors and pressing the teeth apart by moving the fingers in a scissor-type motion.

NSAIDs are first-line agents typically used for 10 to 14 days for initial treatment of acute pain. Patients with suspected early disk displacement, synovitis, and arthritis benefit from early treatment with NSAIDs. Despite the multiple choices of NSAIDs available, only naproxen (Naprosyn) has proven benefit in reduction of pain. Muscle relaxants can be prescribed with NSAIDs if there is evidence of a muscular component to TMD.

Opioids are not recommended and, if prescribed, should be used for a short period in the setting of severe pain for patients in whom nonopiate therapies have been ineffective. Even with these parameters, opioids should be used cautiously because of the potential for dependence.

FULL PAPERS

THE PURPOSE INSTRUMENTS OF AXIS II RDC-CMD PROTOCOLS IN DIAGNOSING OF TEMPOROMANDIBULAR DISORDERS

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Abstract: *Carefully interpreted results of the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) protocols are clinically relevant and reliable instruments for the identification of patients with a TMD, high level of disturbances, pain and dysfunctionality. The aims of this study were to investigate the role and significance of Axis II (psychological factors) in the RDC/TMD in diagnosing of TMD.*

In addition to the physical diagnosis (Axis I) the RDC-TMD system assesses psychological, behavioural and psychosocial factors (Axis II). Three main sets of instruments for the assesment of psychosocial impairment have been introduced in the diagnostic pathway of the TMD patients: Graded Chronic Pain Scale (GCPS), the depression and somatization scales of the SCL-90-R and a Jaw Disability Checklist.

The relationship between TMD pain and psychological variables appears to be very complex. Depression and somatization are generally recognized as important variables in the diagnosis and treatment of orofacial pain.

Key words: *diagnostics, RDC/TMD protocol, TMD, depression, somatisation*

Complex anatomy, physiology and neurobiology of the head and neck region demand a specific approach and a combination of different complex procedures in diagnostics of painful chronic myofascial syndromes. Temporomandibular disorders (TMD) are a group of biopsychosocial illnesses characterized by chronic painful conditions and dysfunction in the masticator and the temporomandibular joint (1). Pain is leading and often the only symptom. Studies have indicated that patients with TMD demonstrate increased somatization, stress, anxiety, and depression compared to healthy individuals, and a consistent relationship. Carefully interpreted results of the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) protocols are clinically relevant and reliable instruments for the identification of patients with a TMD, high level of disturbances, pain and dysfunctionality. The aim of using a standardized protocol of the diagnostic criteria (RDC/TMD) is to determine the prevalence of clinical diagnoses of the TMD, the prevalence of psychological stress (depression and nonspecific physical symptoms), as well as the prevalence of psycho-social dysfunction (3). The RDC/TMD criteria for both Axes I and II have been used in numerous clinical research studies to characterize physical and psychological factors associated with TMD, as well as the relationship among these factors (4-6).

The aims of this study were to investigate the role and significance of Axis II (psychological factors) in the RDC/TMD in diagnosing of TMD.

MATERIAL AND METHODS:

Assessment instruments: Diagnosing TMD was conducted using the detailed anamnesis, with a particular emphasis on the pain anamnesis, as well as with the clinical examination, performed by standardized procedures of the RDC/TMD protocol (7). The RDC-TMD system has been extensively tested and translated into various languages so that it has wide universal acceptance. In addition to the physical diagnosis (Axis I) the RDC-TMD system assesses psychological, behavioural and psychosocial factors (Axis II) (8).

Three main sets of instruments for the assesment of psychosocial impairment have been introduced in the diagnostic pathway of the TMD patients: Graded Chronic Pain Scale (GCPS), the depression and somatization scales of the SCL-90-R and a Jaw Disability Checklist.

The GCPS comprises seven assessed on 10-point scale. The scoring criteria are simple to use and allow the categorization of pain patients into 5 levels of pain-related impairment (0-no disability; 1-low disability and low intensity; 2-low disability and high intensity; 3-high disability and moderately limiting; 4-high disability and severely limiting) and its result is the value that is called the Characteristic Pain Intensity (CPI) (9,10).

SCL-90R: a total of 31 items were included in the Axis II. The mean scale score is calculated by simply adding the scores of the single items together. This makes it possible to rate patients as having normal, moderate or several levels of impairment regarding depression and nonspecific physical symptoms (scores below 0,535 were considered normal; 0,535-1,105 moderate depression and scores above 1,105 depressive disorder)(11).

Jaw Disability Checklist is a psychometrically validated tool and the clinical significance of limitations in mandibular function.

DISCUSSION:

TMD are a group of musculoskeletal disorders affecting the temporomandibular joints (TMJs), the jaw muscles, and associated structures. In addition, the standardized RDC/TMD protocol for TMD encompasses a psychosocial evaluation (12). Nonetheless, the core features of the original Axis II, used for more than 20 years, are still useful tools for sharing epidemiologic data among the different research groups, as well as for characterizing behavioral features in clinical settings. Despite the wide diffusion of the RDC/TMD in the research setting, little information is available on the correlation between physical diagnoses drawn from Axis I and psychosocial findings based on Axis II. Such an evaluation could be helpful to identify clinical predictors of high pain-related disability (13).

Many authors analyzed the reliability, validity, and clinical utility of the depression, non-specific physical symptoms, and graded chronic pain scales comprising the RDC/TMD Axis II and concluded that the major RDC/TMD Axis II measures demonstrate psychometric properties suitable for comprehensive assessment and management of TMD patients (5,14-16).

There are those who favor the view that the psychological factors have a role in the cause or maintenance of TMD, or may predispose the condition to chronicity. On the other hand, it has been stated that psychological disturbances may be a direct consequence of pain-related life events in TMD patients (17). Depression has been shown to negatively impact a patient's perceptions of pain, and the portion of the day in which a patient usually feels depressed is an indicator as to the impact that depression may have on the patient's TMD symptoms. Based on clinical experience, when a patient relates the depression is primarily due to TMD pain, the depression generally resolves when the TMD pain resolves (1).

The advantages of GSCP are that it has clearly defined criteria, it is simple and quick, easy to calculate and distinguish between specific orofacial pain conditions. Thus, results confirm the claim that the GSCP values can be a parameter for distinguishing between different chronic orofacial pain conditions. It should also be stressed that the values of this scale need to be carefully interpreted in everyday practical work. The creators of this scale attempted to quantify the degree of psychosocial functions related to chronic pain as precisely as possible. They created a scale to estimate pain using a combination of several scales for self assessment and continuous measurement of dysfunctions (10). The ease of use was one of the most important criteria for including this instrument in RDC/TMD Axis II (3). It has been found to be a valid and reliable instrument for use as a self-completion questionnaire and used in earlier pain studies.

The comprehensive assessment of psychosocial factors could facilitate the selection of an appropriate treatment via the identification of proper outcome predictors. The comprehensive assessment of psychosocial factors could facilitate the selection of an appropriate treatment via the identification of proper outcome predictors (18).

CONCLUSION:

In this respect, future research should be aimed at completing and developing uniform, generally accepted diagnostic protocols for these orofacial region disturbances. Yet, over the past few decades there has been a continuous scientific development in the field which can bring about progress and improve the clinical research protocols and instruments for chronic myofascial pain assessment. It is therefore essential that psychological factors, if present, be identified early in the initial management of TMD because failure to do so may result in treatment non-success and deterioration of the patient's condition.

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THE IMPERATIVE OF TEAM CARE FOR IMMOVABLE THIRD-AGE PATIENTS WITH TOTAL DENTURES

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Abstract:

Introduction. Republic of Serbia, with approximately 16% of its population over the age of 65, is demographically ranked among the countries with the oldest population in the world. This imposes a demand on all of us to comprehensively observe a population that is increasingly numerous and to be more accessible to all types of health care and therefore dental health care.

Objectives. The main goal of this study was to determine the stomatognathic system in patients of the third age immovable with dentures.

Methodology. In this paper, the applied research was done according to the principle of selection of patients (third-life), with their consent to participate in this study. The therapeutic protocol was the same for all patients stratified by age.

Results. All the results obtained during this study are presented, although in the professional public it is a well-established practice to present only successful and positive results of individual research. We can rarely read about those less successful results – unwanted for publication. All results will be presented in tables and graphs in the lecture, and in extenso in the paper.

Conclusion. This study raises a very important question when it comes to patients of the third age. When we take into account all the above data, indications, contraindications, desires and possibilities for geriatric prosthodontic rehabilitation with total dentures, we can freely say, that the results are alarming, since almost 50-65% of patients - examinees were completely edentulous and gerontoprosthetically untreated.

Key words : Prosthodontics, Stomato-prosthetic remediation, Geriatric dentistry

INTRODUCTION:

Republic of Serbia, with approximately 16% of its population over 65 years of age, is demographically ranked among the countries with the oldest population in the world. This imposes on us a demand to comprehensively observe a population that is increasingly numerous and to be more accessible to all types of health care, including dental health care. As in all living beings, human body physiology undergoes the stage of aging, which is a unique process in every individual, and cannot be uniformly observed in any aspect, except that an age limit has been set, and that is 65 years of age. Numerous factors determine the rate of the aging process. The changes affect soft tissues, but also the hard tissues in the oral cavity. The changes may be the result of various factors, from food types to oral hygiene, the presence or absence of natural teeth and their condition, as well as whether the patients used removable dental prostheses at an earlier age or are using

them now. Geriatric dentistry is a team work that includes a medical doctor specializing in a specific field, a dentist and medical/dentistry nurses¹⁾. In elderly patients, there is a frequent presence of comorbidity, i.e. of several diseases and conditions that require comprehensive diagnostics and treatments. It is therefore necessary to take in consideration the patient's general condition, impaired sight, neurological diseases, the loss of arm coordination, psychological condition and reduced saliva secretion, either due to aging or to the usage of medications in the therapy of certain diseases. The latter may result in poor oral hygiene, xerostomia, ulceration, fungal diseases, increased dental plaque, tooth decay, especially deep decay, abrasion in the remaining teeth, dental substance fractures, bleeding, with the outcome of paradontopathy and tooth loss or extraction²⁾. Ultimately, the lack of teeth and weakened muscular activity may make the patient avoid food or swallow it without chewing, which leads to the changes in the upper parts of the gastrointestinal system (increased secretion of H receptors, gastrin and gastrointestinal hormones). The ultimate outcome is malnutrition, i.e. conspicuous decrease in body weight¹⁰⁾.

OBJECTIVE: The main goal of this study was to determine the state of the oral cavity in third age patients before and after prosthodontic remediation; whether the patients had earlier history of stomatognathic system problems and whether they replaced their lost teeth in due time by removable prosthodontic devices.

Based on the anamnestic data obtained from the patients or their caregivers, on the clinical examination of the patients' oral cavities and additional diagnostics, the therapeutic plan was made for the remediation of the patients (semi-mobile and mobile persons). These procedures were conducted with the goal of successful prosthodontic remediation and general improvement of health in elderly patients.

RESEARCH METHODOLOGY: The research was conducted by selecting third age patients-participants, with their consent to participate in the study⁴⁾. Remediation protocol was the same in all patients, who were stratified into three age groups. The protocol involved gathering anamnesis, obtained from the patients or their caregivers. The patients then underwent clinical examination (extraoral and intraoral examination). After that, plans of treatments were designed prior to geriatric prosthodontic remediation.

The first group was aged 65 to 75, the second 75 to 85, and the third group, which was the smallest, over 85. Patients with chronic diseases (cardiological, neurological, endocrinological, gastroenterological, hematologic and other) had to provide written consent from their long-term medical specialist in order to be included in the remediation procedure⁵⁾.



Photo 1



Photo 2



Photo 3

Photo 4

Geriatric prosthodontic remediation was performed by removable complete dentures, complete. The remediation procedure included the total of 148 patients, 48 of whom were male, and 100 female.

During the clinical examination, it was found that the total of only 21% participants of both genders had been previously stomatologically remediated, while the rest of the participants were in need of any type of remediation.

80% of the patients had the following problems:

- inability to be treated in their place of residence;
- distance and additional cost of transportation;
- having been declined by their stomatologist in charge to provide examination and aid, and proceed with prosthodontic procedures;
- having been sent to larger centres for treatment, with a referral that had to be re-validated, in the place of residence.

A lesser part of the target group, mostly immobile and bed confined patients, required a longer period of time⁶⁾. Approximately 25% of the 148 patients examined did not receive appropriate basic dental care (close to their place of residence). Such a discriminatory attitude of certain stomatologists deprives patients of appropriate geriatric prosthodontic care close to their place of residence and increases the cost of medical care.

The latter case can be interpreted in several ways, either as inadequate motivation of the stomatologists or their insufficient knowledge and skill of communication with patients of this age group.

RESULTS OF THE STUDY: In the subsequent section we present all the results obtained in the study, despite the common practice to publicize only successful and positive results in the expert community. We can rarely read about those less successful results – unfavourable for publication. In reality, unfavourable results are equally worthy of publication, since they motivate us to do our best and compare our results with those of other authors-researchers, in the country and abroad, and lead us to advance our practice and scientific research and promote human health care⁷⁾.

As was stated in the research methodology section, our study included 148 patients, aged from 65 to over 85. It included both genders, 48 female and 100 male patients.

Before the prosthodontic procedure, the participants of both genders complained about the following:

- tooth pain – 148
- patients
- pain in the temporomandibular joints – female patients 39
- loose teeth – 148 patients
- inadequate dentures (unstable or loose) – 48 female, 67 male patients
- difficult and impaired speech – 56 patients of both genders
- difficulty taking food and chewing – 148 patients of both genders
- missing control appointments/corrections – 39 female and 70 male patients
- pain in the stomach after taking a meal (food insufficiently chewed) – 53 patients of both genders
- psychological anxiety (withdrawing from society) – 42 female and 28 male patients.

Before the remediation, partially or completely edentulous patients had used removable dentures from 8 to 17 years, but there were also patients who had used dentures over 20 years. Those with fixed prosthodontic devices had used from 5 to 10 years, and a lesser group had them between 10 and 15 years, or even longer.

After the treatment of soft and hard remaining tissues in the oral cavity, 48% of the patients of both genders were treated with complete dentures in both jaws.

25% of the patients of both genders were treated with one complete and one partial denture.

23% of the patients of both genders were treated with partial dentures in both jaws.

After the treatment of soft and hard remaining tissues in the oral cavity, the patients were treated in the following way:

Table 1

With complete dentures in both jaws	With one complete and one partial denture	With partial dentures in both jaws
53%	25%	22%

Special care should be taken with semi-mobile and immobile patients, regardless of whether they are institutionalized or not.

Also, much more attention should be taken to provide appropriate training to dentistry doctors for work with third age patients, in order to prevent them from declining their expert service.



Photo 5



Photo 6

DISCUSSION: The results can be interpreted from many angles through the impact of the above stated facts, as a result of the aging process, but also from the sociological and economic angle, that the third age population is dependent on the care of other persons. Those can be their closest or distant family members, but also experts if the patients are institutionalized in old people's home. Various systematic diseases will, to an extent, affect the condition of the stomatognathic system of the patient. Unfortunately, however, we have to state the truth about geriatric patients as they get older. Infrequently, if the geriatric patient is under the care of a younger person, or is immobile, confined to bed, the questions asked in communication with the medical aide, or the caregiver of an immobile person are always similar, or the same.

Geriatric prosthodontic remediation, as part of stomatological care, today involves an increasing number of third age patients.

CONCLUSION: This study raised a very important question, when it comes to the third age patients. Taking in consideration all the data presented, indications, contraindications, desires and possibilities of geriatric prosthodontic remediation, we have obtained a highly alarming fact that almost 50-65% of the

patients were either partially edentulous with the remaining teeth untreated, or completely edentulous – geronto-prosthetically untreated.

Third age patients have to be treated with care from the reception and the first visit – by good communication, positive reception, appreciation of their own sense of suffering, interest in potential systematic diseases, and explanations of the procedures to be undertaken for solving their geriatric stomatological problems, obtaining the information on their prescribed medications, since it determines the type of anaesthetics used. This is all important for earning their trust and achieving ease of remediation procedure for the pathologies for which they sought medical help, either on their own, or through their caregivers. It is important to show concern about their health and their suffering. The most frequent problems are pain in a remaining tooth, which is either fractured or abraded, soft tissue abscess, or the most severe conditions (malignant diseases), found after thorough diagnostic procedures.

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ORAL MUCOSA REACTION ON COMMON USE OF TOOTHPASTE WITH STANNOUS FLUORIDE

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Abstract: *It is known that toothpaste can cause damage to the oral mucosa. The objective was to identify predisposed hypersensitive persons and type of oral mucosa reaction during the use of the toothpaste with stannous fluoride. The sample was consisted of 77 participants. The subjective and objective reaction of the oral mucosa to the stannous fluoride paste (Sensodyne Rapid relief®) was examined. 19 (24.7%) participants showed some symptoms, and in addition to subjective 10 (13.0%) had oral lesions. The most common subjective symptom was burning sensation (57.9%), and the oral lesions was enanthem (42.1%) and mucosa desquamation (21.1%).*

Key words: *toothpaste; stannous fluoride; oral mucosa reaction; mucosa desquamation*

1. INTRODUCTION

Toothpaste is one of the essentials of the oral hygiene [1]. Its role is to protect, clean, and polish teeth, to make oral hygiene more efficient as well as to freshen the breath. In order to preserve oral health, it is necessary to brush your teeth with toothpaste at least twice a day. The toothpaste contains the following substances: agents that reduce soft and hard deposits, antibacterial substances, fluorides, breath fresheners and agents for reducing tooth sensitivity, abrasives and teeth whitening substances. In addition to the above mentioned positive characteristics, toothpaste can cause damage to the oral mucosa in the form of chemical irritation or allergic reactions [2].

A chemical or mixture of chemicals associated with external factors, such as mechanical irritation, can cause irritation or an allergic reaction on the oral mucosa. Chemical irritation is a non-immune, local, inflammatory reaction after the first or repeated contact of the chemical with the oral mucosa. A group of authors defines irritation of the oral mucosa caused by mechanical or chemical factors as irritant contact stomatitis. The allergic reaction is mediated by the cells of the immune system and most often manifests itself after repeated contact of the allergen with the oral mucosa and is defined as allergic stomatitis. Each of these reactions has certain signs and symptoms. Symptoms such as pain and burning sensation appear in both types of reactions, but they are more intense with irritation and occur first. Itching is a symptom characteristic only for allergies. Erythema, vesicles, pustules and ulcers can be signs of irritation and allergic reactions, while desquamation is only a sign of irritation. Hyperkeratosis and erosions usually accompany irritation but can sometimes

occur within an allergy. Mechanical effects (friction, pressure, impact) can increase chemical irritation and allergic reaction [3].

In the case report of Baelena A. [4], in addition to cheilitis, the occurrence of extraoral changes in the form of dermatitis was observed, which are associated with hypersensitivity to toothpaste. The presence of amine fluoride, which is presumed to be the cause of hypersensitivity, was determined in the paste. Groote de A. [5] has reported association between the occurrence of angular cheilitis, papules, plaques, vesicles and the use of amine fluoride gel, and toothpaste in a case study. Enamandram M. [6] has shown that the amalgam fillings and toothpaste are source of tin, and after the replacement of amalgam fillings chronic idiopathic urticaria and cheilitis have not receded. Based on anamnestic data and patch testing, it was determined that the appearance of chronic urticaria with swollen lips episodes, angular cheilitis and aphthous ulcers is caused by stannous fluoride from toothpaste. Perianal itching and dermatitis of the extremities have been described extraorally [7].

Sodium lauryl sulfate is a toothpaste ingredient that has detergent properties and is considered as a substance that can lead to side-effects on the oral mucosa. Herlofson BB. and Barkvoll P. [8] conducted a study proving that sodium lauryl sulfate leads to irritation of the oral mucosa in the form of desquamation. Apart from being an irritant, sodium lauryl sulfate is also mentioned as a cause of hypersensitivity that leads to a systemic allergic reaction [1]. Another study reported histological changes in the desquamated oral mucosa that occurred in eleven subjects using the same toothpaste [9]. In these publications, the evidence of an allergic reaction was confirmed by a patch [6] or prick test [1], while the irritant reaction was confirmed by the cap splint method [8].

The clinician's experience has indicated that certain patients have a reaction of the oral mucosa when using toothpaste with stannous fluoride (Sensodyne rapid relief®, GlaxoSmithKline Consumer Healthcare, UK). A review of the available literature has shown no data regarding any side-effect of this toothpaste on the oral mucosa.

2. OBJECTIVE

To identify predisposing hypersensitive persons and the type of reaction of the oral mucosa during the use of toothpaste with stannous fluoride; and to examine the influence of socio-demographic factors, allergological anamnesis, oral hygiene and dental restorations in persons with a positive reaction of the oral mucosa on the use of toothpaste with tin stannous fluorid.

3. MATERIAL AND METHODS

The study was conducted as a prospective, epidemiological, cross-sectional study. All adults older than 18 years, regardless of gender, were included in this study. The sample was consisted of 77 subjects (39 men and 38 women) among who were patients visiting the Clinic of Dentistry of Vojvodina in Novi Sad for regular check-ups and therapy, and also participants who were randomly selected from the municipalities of Novi Sad, Temerin and Apatin. The research has lasted for 3 months, from November 2019 to January 2020. This was the first part of a pilot study in which predisposing hypersensitive people will be identified when

using stannous fluoride toothpaste. After the data being obtained, the subjects will be divided into two groups: the group with the reaction of the oral mucosa and the group without the reaction of the oral mucosa. The study was approved by the Ethics Committee of the Clinic for Dentistry of Vojvodina in Novi Sad under number 01-33 / 12-2019. All subjects were provided with necessary written information for participants, before joining the study. After reading it carefully they were asked to sign the consent for participating in this study, on a voluntary basis.

Each subject received a 15ml sample of Sensodyne Rapid relief® (GlaxoSmithKline Consumer Healthcare, UK). The ingredients of this paste are glycerin, PEG-8, silicon dioxide, sodium triphosphate, flavorings, sodium lauryl sulfate, titanium dioxide, polyacrylic acid, stannous fluoride, cocamidopropyl betaine, saccharin, sodium fluoride and limonene. Stannous fluoride is present in a concentration of 0.454% w / w, and sodium fluoride at 0.0721 w / w (1450 ppm fluoride).

In addition to the paste, the subjects also received printed instructions on how to use it while performing regular oral hygiene, ie brushing their teeth. It was necessary to brush your teeth two times a day (morning and evening), for 7 days. The instructions for brushing the teeth were as follows: after the paste is applied to the toothbrush, it is necessary to apply rotational movements so that the bristles of the brush are at an angle of 45° in relation to the tooth axis. The brushing starts from the incisors and then moves to the premolars and finally to the molars. You should evenly brush each surface of the tooth and then spit it out and rinse your mouth with water. Brushing teeth should take a minimum of 30 seconds, not longer than 2 minutes.

After completing or quitting the use of toothpaste, each subject has filled in the attached questionnaire in printed or electronic form. Unlike the printed questionnaire in which they were able to circle the offered answer or to complete it, the electronic questionnaire provided the option of selecting the certain answer by clicking or simply writing it. The electronic questionnaire was published within Google Forms and each answer was forwarded to the email address of the examiner. The questionnaire was consisted of 23 questions which were divided into 4 groups: general data (name and surname, gender, age, occupation), allergological anamnesis (family and personal, types of allergens, ways of expressing allergies and possible therapy), oral hygiene and dental restorations (how many times a day teeth are brushed, oral hygiene products, amalgam fillings, prosthetic restorations) and data on the reaction of the oral mucosa when using toothpaste. Those subjects who, after some time, developed a reaction of the oral mucosa, which may be subjective in the form of burning, itching, tightening, pain, heat or roughness of the mucosa of the tongue, gums, lips, cheeks or floor of the mouth, and oral lesion with enanthem, swelling, whitish scales or desquamation of the oral mucosa, were asked to mark it in the questionnaire. In addition to the above reactions, it was necessary to indicate on which day (from 1 to 7) the reactions of the oral mucosa occurred. The questionnaire also recorded on which day the usage of the paste was quitted if it happened before the expiration of the seventh day. The last question refers to the assessment of the intensity of the difficulties on the VAS (Visual Analog Scale) scale from 0 to 10, 0 means that the symptoms are not present, while 10 indicates the most intense symptoms. All subjects were able to circle or click to select an integer on the scale that corresponds to the severity of their symptoms.

If there have been symptoms after each use of toothpaste, its usage should be stopped and the research team or dentist should be contacted. If there have been visible changes on the mucosa, the participants were asked to take pictures of them with their cell-phones using the flash on, and to send the pictures to the students who have been performing the examination as well as to visit them for examination of oral mucosa.

The commercial statistical program "SPSS 21 for Windows" was used for statistical data processing. For categorical features, the data were presented in the form of absolute and relative numbers, and for numerical ones through mean values and measures of variability. Descriptive statistics were used to describe the sample, χ^2 - test (Yates correction) for attribute characteristics and Student's *t* - test to calculate a statistically significant difference between the observed numerical variables. The *p* value <0.05 was statistically significant. The results are shown using tables with appropriate textual answers.

4. RESULTS

The sample consisted of 77 subjects (39 men and 38 women) with the average age 35.4 ± 14.4 (range 18 to 82 years). A positive reaction of the oral mucosa during the use of toothpaste was reported by 19 (24.7%) subjects. All 19 respondents felt subjective symptoms, and in addition to subjective 10 (13.0%) they also had lesions of the oral mucosa. Gender and age did not have a significant effect on the occurrence of the reaction of the oral mucosa in the examined sample, $p > 0.05$.

Table 1 shows the frequencies of subjective symptoms and oral mucosa lesions.

subjective symptoms and oral lesions	frequencies (N19) yes/no (100%)
Pain	4 (21.1%)
Itching	0 (0%)
burning sensations	11 (57.9%)
tightening and roughness	9 (47.4%)
feeling of heat	6 (31.6%)
Enanthem	8 (42.1%)
lip and mucosa swelling	1 (5.3%)
whitish scales and mucosa desquamation	4 (21.1%)

The symptoms appear at the earliest on the first and at the latest on the fifth day from the beginning of using the paste. On average, the symptoms appear in the middle of the second day. Five subjects stopped using the paste before the expiration of the seventh day, at the earliest on the first, and at the latest on the sixth, while on average they stopped on the fourth day. Respondents who had problems marked them on a scale from 1 to 10. The minimum severity of reported problems was 1, and the maximum was 10. The average value of the intensity of symptoms caused by the use of toothpaste based on VAS is 4.6.

In the group with the reaction of the oral mucosa, 42.1% also stated the presence of allergies within the family, while in the group without an oral mucosal reaction, only 17.2% of them state the existence of allergies in their families. There is a statistically significant influence of a positive family allergological

anamnesis on the occurrence of the reaction of the oral mucosa, $p = 0.056$. Also in the group with the reaction of the oral mucosa, 11 (57.9%) reported a positive personal allergy history. In the group without the reaction of the oral mucosa 9 (15.5%) have a positive personal allergy history. Based on these data, a statistically significant difference between the groups $p = 0.001$ is observed.

The frequency of teeth brushing and the use of additional means of performing oral hygiene (mouthwash, dental floss, interdental brushes, toothpicks, waterpik) do not affect the occurrence of the reaction of the oral mucosa, $p > 0.05$. The average number of amalgam fillings in the group with the reaction of the oral mucosa is 3.4, and 3.1 in the group without the reaction, but neither the presence nor the number of amalgam fillings are important for the appearance of symptoms and lesions on the oral mucosa $p = 0.729$. The presence of prosthetic restorations (crowns, bridges, skeletal prostheses) is also not statistically significant for the occurrence of any reaction of the oral mucosa, $p = 0.155$.

5. DISCUSSION

Toothpaste containing stannous fluoride is very effective in reducing tooth sensitivity but there are a number of people who cannot use it due to some side-effects on the oral mucosa.

In relation to all subjective symptoms in participants who had reactions of the oral mucosa, the pain did not occur frequently. The feeling of pain when using toothpaste can be attributed to the effect of capsaicin, which causes a painful reaction of the oral mucosa at the first contact. However, capsaicin has been shown to reduce or even eliminate the sensation of pain caused by other etiological factors with repeated use [10]. The extraoral presence of pruritus as a consequence of using stannous fluoride toothpaste (Sensodyne Complete Protection®) was reported in a study by Nadine T. [7] and in a case report of Baelena AV. [4] when using a paste containing amine fluoride (Elmex Erosion Protection®). Itching, which is typical for an allergic reaction, is not mentioned by any of the subjects in this study because it is a symptom that mainly refers to the reaction of the skin, while the mucosa does not itch. Allison A. A. [11] has described the occurrence of burning sensations when using toothpaste with menthol as well as Baelen AV. [4] when using an amine fluoride paste. The feeling of burning sensations are actually the symptoms that our subjects most often mentioned with an lesions in the form of enanthem. The effect of sodium lauryl sulfate and cocamidopropylbetaine from toothpaste on the oral mucosa was investigated by Herlofson BB and Barkvoll P. The cap splint method proved that these substances cause irritation of the oral mucosa in the form of desquamation. As part of this method, the subjects applied toothpaste to the upper jaw teeth twice a day with the help of an individually made splint [8]. Whitish epithelial patches in the form of mucosal desquamation, caused by stannous fluoride-containing toothpaste (AZ Pro-Expert®), have also been described in the case study of Burton F [9]. We observed that changes in the form of whitish scales or flakes (21.1%) were mostly accompanied by a feeling of tightness and roughness (47.4%). Another symptom reported by patients is a feeling of heat or warming of the gums and teeth below prosthetic restorations, but this symptom as such has not been reported in the available literature. In subjects with the reaction of the oral mucosa, a moderately strong average intensity of subjective discomfort was recorded, which is in the middle of the VAS. Regarding all subjective symptoms and objective changes that we have reported, a pain and BMS are more

common with irritation, according to Chowdury BR et al., whitish scales or desquamation only indicate irritation of the oral mucosa, enanther may be a sign of irritation or allergic reaction on the oral mucosa, and itching is associated only with allergies.

The results of this study indicate a significant influence of family and personal allergy history in the group with a positive reaction of the oral mucosa. In their case studies, some authors examined the cause of this reaction after the reaction of the oral mucosa to the toothpaste was determined, the patch test proved hypersensitivity to tin, its compounds and amine fluoride, and the prick test to sodium lauryl sulfate [1,4,5,6,7].

The presence and number of amalgam fillings do not show a mutual association with the occurrence of the reaction of the oral mucosa, which corresponds to the case report of Emandram M. [6]. With evidence of hypersensitivity to tin, the patient was exposed to tin through toothpaste (Crest Pro-Health®) and amalgam fillings. Subjective symptoms and objective changes did not subside after the replacement of amalgam fillings with composite ones, but with the subsequent quitting in the usage of toothpaste, the symptoms have disappeared.

Figure 1 and 2 showed the cases of oral mucosa desquamations in the form of whitish scales or flakes



Figure 1



Figure 2

6. CONCLUSION

A quarter of the examined sample showed subjective symptoms when using toothpaste with stannous fluoride (Sensodyne Rapid relief®), of which the most common symptom was burning sensations (57.9%). In addition to the subjective symptoms, 13.0% also had objective changes with the most common enanther (42.1%) and mucosa desquamation. Socio-demographic factors, oral hygiene and dental restorations do not affect the occurrence of the reactions of oral mucosa. People with a positive family or personal allergy history are more likely to develop some reactions of oral mucosa when using stannous fluoride toothpaste. In the case of a reaction of the oral mucosa, its etiology should be determined, ie whether it is an allergic reaction or irritation.

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AESTHETIC SOLUTION OF AN EDENTULOUS REGION WITH FIBER-REINFORCED COMPOSITE BRIDGE - CASE STUDY

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Abstract: *Aesthetic dentistry nowadays represents a challenge for every dental practitioner. Conventional methods for replacing the missing tooth can range from implant placement to simpler or complicated dental restorations. The use of modern adhesive technology and composite materials enables the design of restorations without invasive tooth preparation. Fiber-Reinforced Composite (FRC) bridge, which is made with the direct method, is used as a temporary or permanent solution in the anterior or posterior region. Modern dentistry, using different work techniques, offers economical, minimally - invasive and aesthetic solutions.*

Key words: *aesthetic dentistry, fiber-reinforced composite bridge, composite resins*

Introduction

Today, aesthetics and minimally invasive techniques are the two leading topics in dentistry. Modern dentistry, using adhesive technology and modern composite materials, enables the design of aesthetic restorations with non-invasive or minimally invasive tooth preparations. In that way, alternative solutions can be found for simpler and more complex cases. Respecting aesthetic and biomimetic principles, one should not limit oneself only to the aesthetics of an individual tooth or a certain restoration, but also integrate into the whole smile with an individualized approach. (1) In the care of minimal edentulousness, there are several ways to compensate for the edentulous space, such as implant placement, application of metal-ceramic, ceramic, as well as adhesive bridges. Materials of choice for adhesive bridges can be composite, metal-ceramic, and nonmetallic systems. Due to the remarkable advancement of adhesive technology, it is possible to establish a strong bond between tooth enamel and composite restoration and to ensure the stability of dental restoration. (2,3) However, composite materials have limited mechanical properties and need to be improved. This is achieved by using fiberglass fibers. Fibers were first used in dentistry in 1960 but the strengthening of polymethyl methacrylate. (4) Restorative materials are a simple and high-quality solution for everyday work and enable adequate reconstruction of the external shape and color, reconstruction of the internal structure of the tooth, and imitate the optical properties of a natural tooth. (3) The clinical procedure consists of analysis and planning of replacement design, selection of adequate shade of material, proper preparation and preparation of teeth that will accept adhesive bridge, anatomical and layered application of composite material, finishing, articulation, finishing, and polishing. This paper aims to present, through a case report, the anterior reconstruction of the edentulous field using an adhesive bridge reinforced with fiberglass fibers.

Case report

Patient T.Š. (47 years old) came to the office intending to improve the appearance of her smile, because the appearance was disturbed by the toothless space between the first and second lower incisors on the right side. After the anamnesis, clinical examination, and analysis of the OPT image, it was established that the tooth space was caused by tooth migration - Figure 1,2,3. An orthodontic problem was also noticed, which is why the patient was referred to an orthopedic specialist. All teeth were conservatively repaired and it was decided to make an adhesive bridge reinforced with fiberglass fibers until the beginning of orthodontic therapy, which was postponed.



Figure 1. Smile analysis



Figure 2. Clinical examination



Figure 3. OPT image

The analysis of the edentulous space and the surrounding tissue showed a narrow and small space, which increased after the removal of the old composite fillings - Figure 4. The choice of color of the composite material was determined in daylight (shade A2 and A3). The enamel was conditioned with 37% orthophosphoric acids for 20 seconds - Figure 5. After rinsing with water for 30 seconds, it was dried and a relatively dry working field was made (Teflon tape was placed at the place where the intermediate member will come). The selected adhesive (Kerr Optibond) was coated and lightened for 40 seconds. Fiberglass tape (Polydentia) 20 mm long was applied to the teeth of the restoration brackets and fixed with special clamps - Figure 6.7. Before applying the composite resins (Kerr Herculite), the fiberglass tape was fixed on the

lingual side, coated with adhesive, and lightened. The layered technique of the crown part of the restoration was modeled by combining enamel and dentin-colored composites, and the strip was covered with enamel composite - Figure 8.9. The final appearance of the restoration was obtained after articulation, roughing, and polishing - Figure 10.11.



Figure 4. Removal of the composite fillings



Figure 5. The enamel conditioning



Figure 6. Fiberglass tape application



Figure 7. Fixing fiberglass tape



Figure 8. Layered application of composites



Figure 9. Final modeling of the superstructure



Figure 10,11. The final appearance of the restoration

Discussion

Before making an aesthetic restoration, it is necessary to define the indication and determine the diagnostic goal (5). Indications for making adhesive bridges are small edentulous spaces, patients who have phobias from interventions or needles, before or after orthodontic therapy, and in patients with periodontal disease, where periodontal splints are made. It is not always necessary to decide on expensive and complicated compensation, but it is necessary to choose a good solution for each case. The adhesive bridge reinforced with fiberglass fibers was an ideal choice, due to the reduced operating time, simplicity of manufacturing, and repair techniques. Disadvantages can be reflected in the longevity of this work, the possibility of proper maintenance of oral hygiene, and resistance to masticatory forces. (5,6)

Conclusion

In this paper, the emphasis is on improving the aesthetic appearance in the anterior region of the patient, who sought an aesthetic solution that is acceptable and minimally invasive. By making an adhesive bridge that is reinforced with fiberglass fibers, we easily and efficiently obtained an optimal dental restoration in one visit, which will be able to be removed without damaging the dental substance before the start of orthodontic therapy. With this paper, we have presented another option in the production of dental restorations, which combines functionality, economy, and aesthetics.

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APPLICATION OF ELECTROSPINNING METHOD IN DENTAL MEDICINE

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Abstract: *In recent years, the electrospinning method, as a dynamic process for structuring and manufacturing functional materials, has become increasingly popular in various biomedical fields. This innovative technology allows fine nanofibers and new structural materials of exceptional properties to be obtained from a polymer solution by subjecting it to a high-intensity electric field.*

In dental medicine, functional materials can be used to shape and regenerate the soft and hard tissues of the oral cavity, improve the mechanical properties of restorative composite materials, modify the implant surface, and as drug applicators.

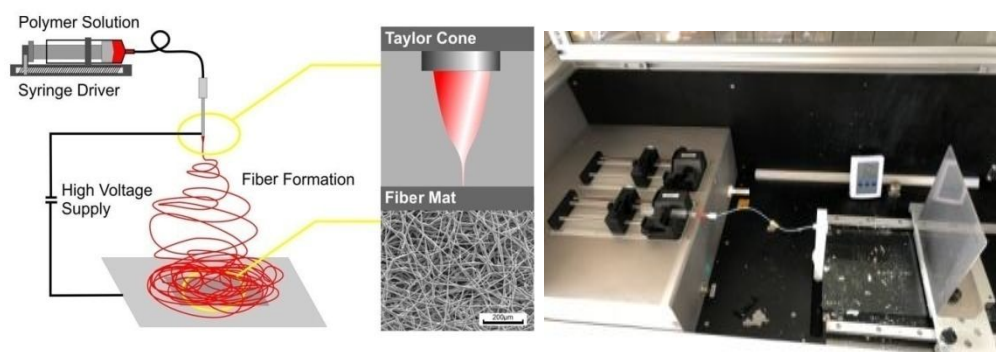
Key words: *Electrospinning; Nanofibres; Functional materials;*

Introduction

Electrospinning method, as a universal approach that relies on electrostatic forces to create fine fibers, is becoming increasingly known in various biomedical fields. Its application yields functional materials characterized by a large receptive surface and volume (high surface-to-volume ratio), improved cellular bonds and interactions, and enhanced protein absorption, which facilitates binding to cellular receptors [1]. When the electrospinning method is applied, high-potential electric field transforms a liquid or polymer solution into small-diameter fibers [2].

Electrospinning device

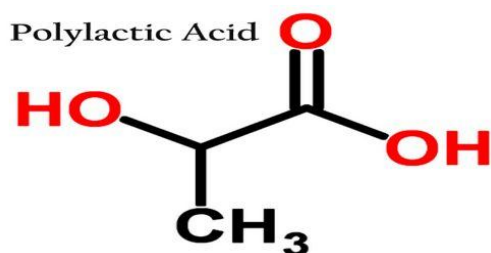
The electrospinning apparatus is of simple design and consists of a high voltage electric source, a pump with capillaries or tubes, and an aluminum conductor in the shape of a plate or a rotating drum (Picture 1) [3]. The polymer solution or melt is pressed through a syringe pump until it forms a polymer droplet. High voltage potential is applied to the polymer solution in the syringe via an immersed electrode, which induces electric current within the polymer solution. As the resulting ions move towards the electrode of opposite polarity, tensile forces are transferred towards the polymer liquid. When the applied potential reaches critical value (the value required to exceed the surface tension of the liquid), a jet of liquid is ejected from the top of the receptacle [3-5]. As the jet moves through the created atmosphere, the solvent evaporates, leaving dry nanofibers on the collection device [3].



Picture 1. Electrospinning device. Faculty of Technology University of Novi Sad.

Polymers

Numerous natural and synthetic polymers, and their hybrid mixtures, are used in the electrospinning process, producing fibers of different characteristics. Synthetic polymers exhibit remarkable flexibility in binding to other materials and their modification; however, polymers of this type lack cellular affinity due to low hydrophilicity and lack of space for cell recognition and binding. Natural polymers are characterized by superior biocompatibility, and some even exhibit antimicrobial properties and better clinical functionality. Most commonly used natural polymers are polysaccharides (cellulose, chitin, dextrose), protein (collagen, gelatin, silk), DNA, as well as hyaluronic acid, starch, and heparin. Among the synthetic polymers in prevalent use are polylactic acid (PLA) (Picture 2), polycaprolactone (PCL), polyethylene oxide and their copolymers poly-L-lactidecaprolactone (PCLA) and poly(lactic-co-glycolic acid) (PLGA), as well as amides in their polymer form [5]. Polyamides are suitable candidates for a wide range of applications due to their exceptional properties, such as heat resistance, rigidity, abrasion resistance, fine shaping capability, and reduced liquid absorption [1, 6].

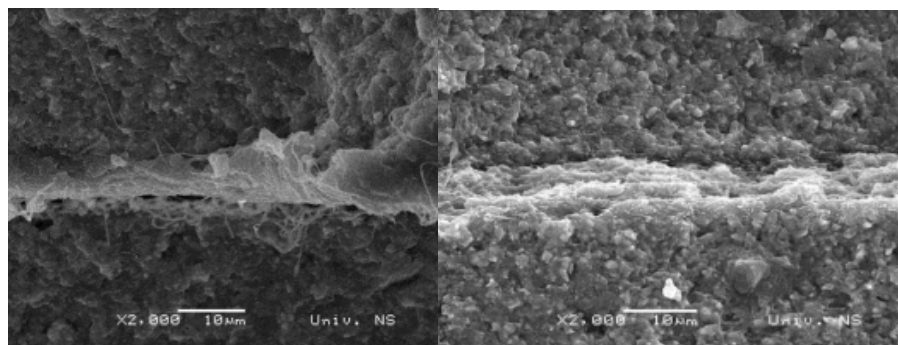


Picture 2. Polyactic acid structure.

Application of electrospinning in the field of dental medicine

Nanofibers obtained via the electrospinning method have unique chemical and physical properties that cannot be attained by some other method. One of their most beneficial advantages is their ability to mimic the extracellular matrix [7]. They also exhibit superior mechanical properties, such as 60% increased tensile strength [7]. In the field of dental medicine, functional materials obtained through the electrospinning method are most commonly used for shaping and regeneration of soft and hard tissues of the oral cavity and teeth. They are also used as implant surface modifiers to improve the mechanical properties of restorative

composite materials (Picture 3) and as drug applicators [8,9]. Application of functional materials yields positive results even when used in the splints applied in parafunction therapy, as they reduce material wear and tear when loaded with high-intensity forces [10, 11].



Picture 3. SEM micrography of reinforced dental composite material.

Polyvinyl alcohol (PVA), a synthetic polymer, is becoming increasingly popular as a base or substrate because it provides mechanical support, stability, and flexibility to pre-existing polymer-based restorations [9]. When applied with the aim of tissue repair and regeneration, fiber biodegradation rate should be consistent with the tissue regeneration rate [4].

Conclusion

Based on extensive empirical evidence, it can be concluded that electrospinning is an innovative method in the production of functional materials based on polymers and other beneficial components. One of the main advantages of the presented method is the ability to structure materials that incorporate thermosensitive components, as all processes are performed at room temperature. In this regard, it can be said that the electrospinning method successfully replaces conventional functional material production techniques.

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CHOICE OF ADHESIVE BOND STRENGTH TESTING METHOD FOR DENTAL COMPOSITE MATERIALS

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Abstract: *Dental material bond strength is defined as the force per unit area required to cause the adhesive joint to crack at or near the adhesive/adherent interface. The bond strength test may involve tensile and shear resistance measurements. Guidelines for selecting the appropriate dental composite material for a given clinical context are often informed by the results of laboratory tests and/or in vitro simulations. This typically requires performance of microtensile, pull-off and/or push-out tests.*

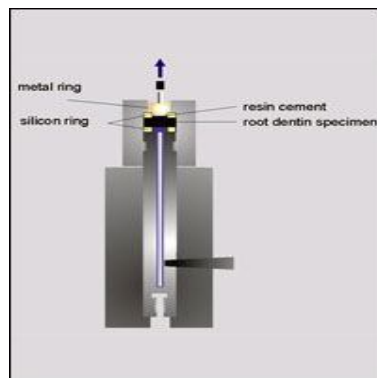
Results of numerous studies suggest that the push-out test is still the preferred method for determining the adhesive bonding strength due to its reliability, more accurate simulation of clinical conditions, and fewer premature failures.

Key words: *Bond strength; microtensile test; push-out test; pull-out test;*

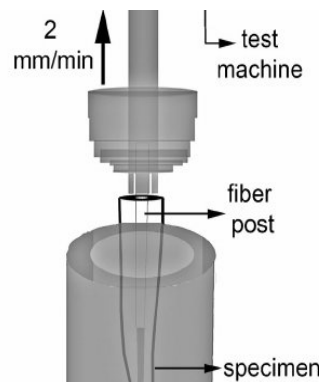
Introduction

Bond strength is clearly defined as the force per unit area required to break the adhesive joint at or near the adhesive/adherent interface. Adhesion implies firm attachment between the surfaces of two different elements that are in very close contact with each other. The substance that connects these surfaces is known as an adhesive, while the adherent is the material on the surface of which the adhesive is applied [1]. If two contact surfaces establish a connection by micromechanical means, this is known as mechanical adhesion, whereas specific adhesion implies chemical or intermolecular connection of the surfaces of two different entities [2].

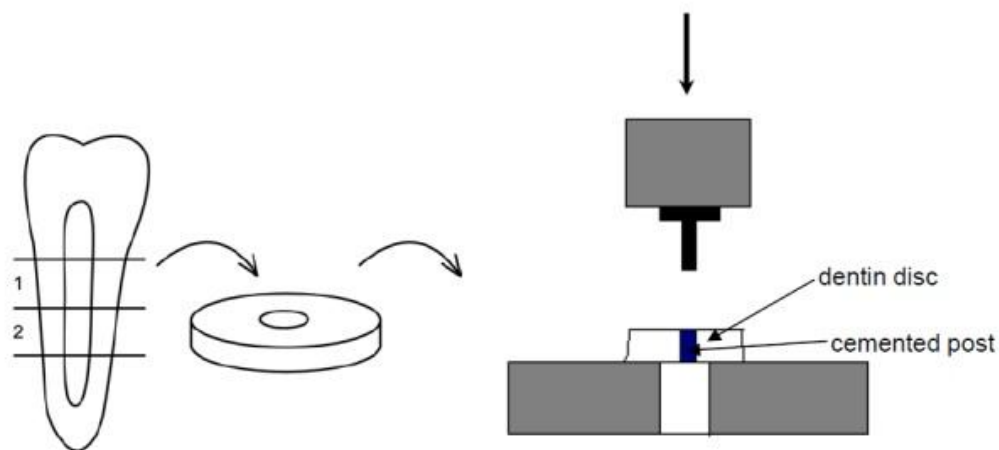
In academic research, adhesive bond strength tests may take the form of tensile and shear tests that simulate clinical conditions to some degree [3,4]. In tensile tests, the force is applied perpendicular to the sample surface, whereby the tooth or material sample is subjected to tensile forces. In shear tests, the force is directed parallel to the sample surface, thus producing shear forces within the specimen [5]. In that sense, microtensile test (Picture 1) [6], pull-out (Picture 2) [7], and push-out test (Picture 3) are most commonly used test types. In extant studies focusing on bond strength, raw data obtained experimentally pertain to the force applied (in N) and need to be converted to force per unit area (N/mm² i.e., MPa).



Picture 1. Microtensile test.



Picture 2. Pull-out test.



Picture 3. Push-out test.

Bond strength (Mpa)

$$F / 2 r \pi h$$

F the force applied to the material in N

r the post radius in mm

π is 3.14

h the thickness of the resin cement segment in mm

The push-out test was first introduced into research by Roydhouse by measuring the shear strength of cross-sectional specimens [8]. In the current studies examining the strength of dental materials, the push-out test remains the first choice [9] because it is considered to be more reliable than the microtensile test, as it results in fewer premature failures and less data variability [10]. Moreover, the push-out test simulates clinical conditions more closely than any other method. Using the Finite Element Analysis method, the push-out test has been shown to be the most suitable methodology for evaluating dental fiber post retention [11].

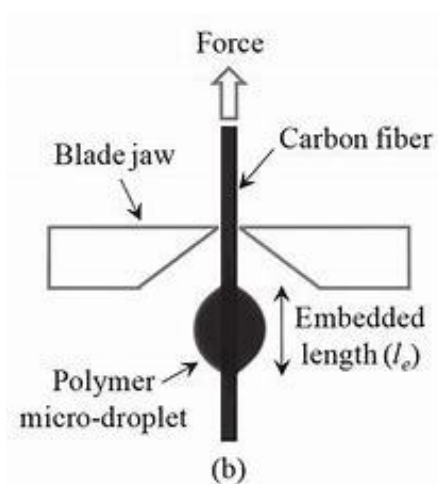
However, the push-out test is an extremely technically demanding (Picture 4) and sensitive method for determining the adhesive bond strength in the field of dental materials. Namely, numerous issues may occur

during sample preparation and the test itself, including challenges related to the collection of human material, possible damage to human material during storage and its consequent deterioration, the complexity of tooth preparation needed for the cutting procedure, damage to human material samples and possible loss of specimens during the cutting process, delicate and difficult positioning of tooth specimens in the tool for testing the adhesive bond strength, and damage to the tooth specimens and cementitious material during positioning and fixation in the testing apparatus. The afore mentioned difficulties highlight the need for designing and implementing a method that significantly simplifies the assessment of the adhesive bond strength while providing equally accurate and reliable results that are applicable in the daily work of dentists.



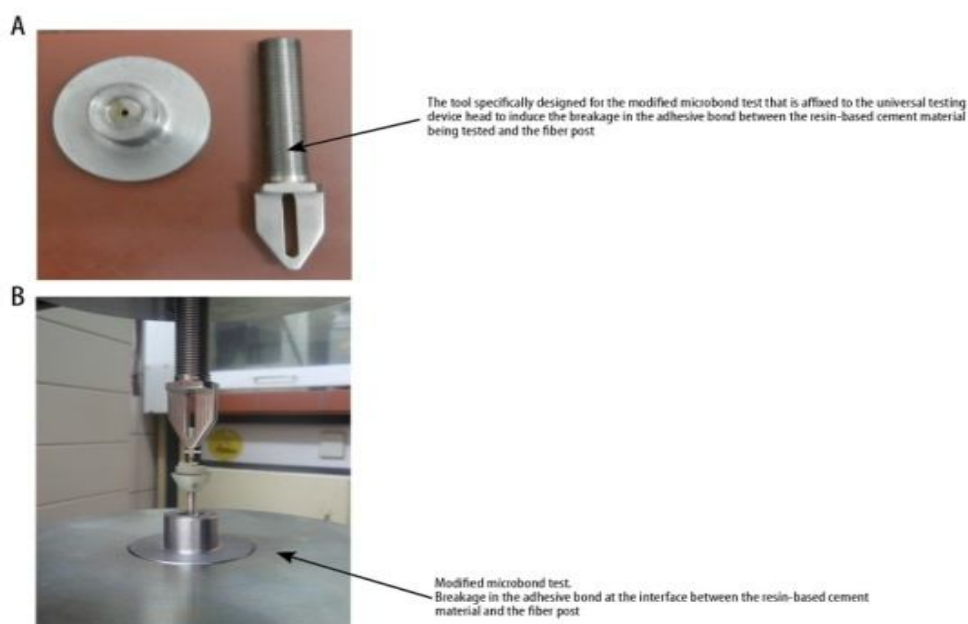
Picture 4. Tooth slice on steel holder. Testing device.

In academic studies examining the properties of polymeric materials or resin-based materials, the microbond test, also known as the droplet debonding test, is commonly and successfully applied to evaluate the adhesion strength involving different polymeric materials (Picture 5) [12]. However, there is a paucity of studies in which researchers have applied the microbond test to dental materials, primarily due to the lack of adequate tools for executing the procedure. Still, it is noteworthy that, compared to the push-out test, the microbond test involves a significantly smaller number of phases and, as the experiment itself is significantly simplified, potential for error and failure is markedly reduced.



Picture 5. Microbond test.

When performing the microbond test, (1) it is not necessary to collect and store human material, which eliminates any deterioration issues as well as facilitates further performance of the experiment, (2) samples do not need to be cut and, most importantly, (3) the tool design can be fully standardized. To ensure that the test results are valid and comparable with those yielded by the push-out test, the test specimen must correspond to the tooth root segment in both size and shape. Moreover, the tool designed for the microbond test must be shaped in such a way as to enable termination of the adhesive bond exactly at the joint of two different dental materials (Picture 6) [13].



Picture 6. Modification of microbond test.

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MATERIALS FOR THE BASIS OF REMOVABLE DENTAL PROSTHESES

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Abstract: *Today, in the dental practice of making removable dental prostheses, numerous materials are used, which differ from each other according to the type of their purposes and properties, which vary from hard to pronounced soft and flexible, ie. from solid to easily breakable. In practice, all applied materials can be for permanent or temporary use in the mouth, with the unique task of isolating various influences coming from the external environment, such as changes in temperature, acidity, humidity, pressure, etc.*

The aim of this paper is a brief chronological presentation of the origin, selection, and characteristics of materials throughout history in dental prosthetics (materials of rubber, synthetic polymers, Kallodent, Vertex ThermoSen) and presentation of the characteristics of Polyether ether ketones (PEEK). PEEK is a highly biocompatible and solid thermoplastic material, with good mechanical properties, which can be applied in CAD / CAM technology during the production of practical prostheses, and is characterized by properties of resistance to high temperatures and hydrolysis.

Keywords: *dental prosthesis, Vertex, PEEK*

Introduction

Today, a large number of plastic materials are used in dentistry, such as acrylates and acrylate polymers, which are among the most common materials in dental prosthetics. They are thought to make up about 95% of the polymers used daily in dental prosthetics.

Removable dentures are still used in oral rehabilitation (therapy). The most common material used to make the base of the prosthesis is poly (methyl methacrylate), the so-called PMMA. Although PMMA is most often used today for making denture bases, it is important to emphasize that this material has a lot of bad properties.

People have been trying for a long time to find the ideal material for making dentures. With the discovery of rubber in 1839 (Goodyear, 1839), the first material for making dental prostheses was obtained. In a very short time, the material proved to be unhygienic and aesthetically unacceptable and did not last long in use. Constant research and search for the ideal material continued, and since 1935, new materials have been developed, and synthetic polymers have dominated. One of the innovative materials (1935) was certainly a material made of methacrylic resin, called Kallodent.

Materials

Since 1940, polymethyl methacrylate has become the dominant material used to make the bases removable dentures. Acrylate is a material that has appropriate properties, such as quality aesthetic properties, low price,

and affordable manufacturing technology, the possibility of repair, etc. Figure 1. [1], while the disadvantages are low strength, brittleness, and polymerization shrinkage.

Also, at the local level, inflammation of the mucous membrane may occur upon contact with acrylate, due to the release of monomers, while higher concentrations can directly lead to respiratory disorders, and thus have a potentially toxic effect [2].

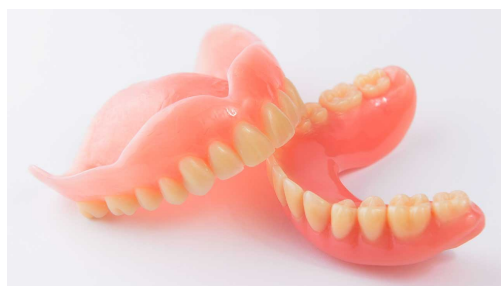


Figure 1. Acrylic total dentures

In everyday practice, nylons, thermoplastic materials that represent the Polyamide family, were discovered a little later. The factory name of these materials is Vertex ThermoSens. Its base is made of a complex mixture of polyamide and pigments. It belongs to the group of thermoplastic materials. An injection technique is used for its use. One of the most important characteristics of this material is the fact that it does not contain residual monomer, and is indicated in people allergic to the monomer.

Vertex ThermoSens is intended for the production of removable dentures, splints, telescopic structures as well as for temporary crowns and bridges. It is important to point out that if this material is used to make a denture base, it is necessary to make two preparations, one on the mesial or distal side of the tooth, and the other on the underside of the factory tooth. The preparation should be in the shape of a hole, 0.9-1.3 mm in diameter, because it is not possible to achieve a chemical bond between the factory teeth (acrylic, composite) with Vertex ThermoSens material. Prostheses made of this material are light, flexible, and have satisfactory aesthetic properties - Figure 2.



Figure 2. Vertex prosthesis

The main disadvantage that is imposed during the application of these materials is the lack of support during chewing, which leads to damage to the gingival sulcus if this part is not placed correctly. This is the crucial reason why, in practice, prostheses of this material are most often seen as temporary works [3].

A new material, found in 1980, that is still used today is polyether ether ketones (PEEK). PEEK is a solid thermoplastic material, which comes from the family of poly aryl ether ketones (PAEK), and can be used in CAD / CAM technology during the production of practical prostheses - Figure 3.

This material has good mechanical properties such as resistance to high temperatures and hydrolysis. PEEK material is a highly biocompatible material, with a low modulus of elasticity, close to the modulus of bone [4].

This material is also known as BioHPP, and it is characterized by the fact that it does not cause allergies (it is non-allergenic), with high polishing properties, low absorption, low plaque affinity and wear resistance [4].

The main bond of PEEK material is micromechanical, which is realized after appropriate mechanical preparation or acid etching. This material is used for both fixed and mobile prosthetic restorations, then in fixed prosthetic works on implants, occlusal splints, intraradicular posts, implant abutments, healing abutments, and temporary resuscitation [5].



Figure 3. Partial prosthesis made of PEEK material

Conclusion

Due to the development of technologies, materials in dentistry are also being developed. We are still looking for the ideal material that will meet all the appropriate characteristics and standards. Today, new, diverse material options are in use. Both new and previously discovered materials are equally important because, with the right indication, they can be the material of choice in prosthetic rehabilitation.

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POSTER PRESENTATIONS

„ALL ON FOUR”- CONCEPT

Kuzmanović M., Mirković S.

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Abstract: *All on four ”concept is a concept where four dental implants reconstruct the entire dental arch in the upper and/or lower jaw, providing immediate function of mastication, swallowing, phonation as well as satisfactory aesthetics. The surgical protocol for implant placement in the edentulous alveolar ridge of the upper jaw begins with the installation of two posterior implants, using first 2.4/2.8 mm bidders to make a bearing. After that, the implant is 4.3x13.0mm in size at an angle of 30-45 degrees. It is imperative that the implant insertion be careful to avoid implant fracture and bone tissue necrosis. Two anterior implants are mounted relative to the axial plane following the vertical lines of the guide. The implant placement protocol in the alveolar ridge of the lower jaw is very similar to that in the upper jaw, taking into account the 30 degree angulation of posterior implants. The implant is screwed in until the polished part reaches the level of the alveolar ridge. The complete fixed work is mounted on four implants that can withstand a higher load i.e. more crowns. This concept enables immediate function (immediate load) and adaptation of temporary fixed reimbursement immediately, within the same day after implantation, to adapt permanent reimbursement over a period of 6 months. This concept allows patients to avoid all the discomforts and disadvantages of mobile dentures by making life more comfortable and easier. The „all on four” concept of rehabilitation is a less invasive and permanent solution without the application of augmentation procedures and additional surgical interventions. In this way, it is possible to preserve vital structures as well as to easily maintain oral hygiene using conventional means. The natural appearance of the teeth, a sense of unity and a significantly lower cost than conventional implant treatments made this protocol unique.*

Key words: *"All on four" concept, oral implantology, materials in dentistry.*

APPLIANCE OF FACE-BOW TRANSFER IN DENTAL PROSTHODONTICS

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Abstract: *Transfer face-bow is dental instrument which is used to establish spacial relation between upper jaw (upper occlusal complex) and axis of rotation of the lower jaw (center of rotation), also for cast orientation of upper jaw in that relation according to axilar rotation of articulator.*

In order for the movements in the articulation to be as close as possible to those of the patient, it is necessary to apply the cheek arch and to find the center of rotation of the mandible in the patient as precisely as possible.

Transferring the jaw model to the articulator is a significant gnatological procedure, which significantly affects the success occlusal therapies.

In order for the articulator to simulate certain segments of the jaw movements, the jaw models must have the same position in relation to the articulated elements and the shaft of the articulator which occupies the jaw complex in relation to temporomandibular joints and the axis of rotation of the lower jaw.

All modern adjustable articulators and some medium-value articulators accept the cheek arch, and have the ability to accurately reproduce the hinge movement of the lower jaw.

Regardless of the design, all portable transfer face-bows have the following parts:

- 1. U-shaped frame
- 2. Condylar rods
- 3. Bite fork
- 4. Front reference point indicator
- 5. Joint system

Using the transfer face-bow, the models in the articulator should be oriented in the same relation to the axis of the rotation of the articulator as the upper jaw has towards the axis of rotation of the mandible.

Not applying the face-bow can lead to errors in the occlusion of artificial teeth and irregular intercuspitation, which occurs due to the mismatch of the position of the center of rotation of the patient's mandible and the center articulator condyle rotation.

The accuracy of occlusion reconstruction depends on the accuracy of finding or rotating the mandible.

CORONALLY DISPLACED FLAP WITH CONNECTIVE TISSUE GRAFT IN THE PRE-PROSTHETIC PERIODONTAL TREATMENT

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² Clinic for Dentistry, Novi Sad

Abstract:

Introduction: Exposed maxillary anterior area may present aesthetic issues in patients with a high lipline, due to gingival margin recession, presence of excess gingival tissue and/or loss of the interdental papilla.

Aim: The aim of this paper was to present coronally displaced flap with connective tissue graft as one of the pre-prosthetic periodontal treatment

Case report: A 40-year-old female patient presented to the Clinic for Dentistry of Vojvodina for a replacement of an old porcelain fused to metal bridge. Intraoral examination revealed high lipline, irregular gingival margin in the upper anterior teeth on the left side and gingival recession (Müller class I – 21,22; class III – 23). After making a temporary bridge with the crown edges extending to the correct position of the gingival margin, a coronally displaced flap (21–23) with connective tissue graft in the region of the tooth 23 was performed. After a 2-month healing period, preparations for a new permanent bridge will commence.

Conclusion: At 2-weeks follow-up, the wound was healing correctly, suggesting that the procedure has yielded the desired results. In the region of tooth 23, an open interproximal embrasure of 1 mm remains, which is to be expected, given that this surgical procedure in Müller class III recession does not lead to papilla reconstruction.

PREVALENCE OF APICAL PERIODONTITIS ON ROOT-FILLED TEETH IN AN ADULT SERBIAN POPULATION

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Abstract:

Introduction: The aim of this study is to report the frequency and distribution of root-filled teeth and the prevalence of apical periodontitis (AP) in an adult population in Serbia.

Material and method: Digital panoramic radiographs of 350 patients who were examined at the Dental Clinic of Vojvodina, Novi Sad were evaluated. Patients under the age of 18 and patients that had less than 7 teeth in both jaws were excluded. The frequency of root canal treatment and periapical status of all teeth present was assessed by two examiners, using the periapical index (PAI) score. Interexaminer correlation test was performed.

Results: Among a total of 8849 examined teeth, 502 teeth were root-filled (5.67%). The number of root-filled teeth with AP present was 293 (58.37% prevalence). The distribution of root-filled teeth was the highest among premolars (190 or 37.85%) and maxillary anterior teeth (152 or 30.28%). However, the prevalence of AP in connection with root-filled teeth was in total higher on molar teeth (112 or 22.31%) and on premolar teeth (104 or 20.72%).

Conclusion: Treatment outcomes of root-filled teeth depend on many factors that should be considered, but also they can vary in different populations as well. The frequency of endodontically treated teeth in this study were higher than in comparable populations in other countries and the prevalence of apical periodontitis were similar compared to other population studies.

Key words: Apical periodontitis, root-filled teeth, endodontic therapy, population

PERIAPICAL HEALTH RELATED TO THE TYPE OF CORONAL RESTORATION IN ENDODONTICALLY TREATED TEETH

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Abstract:

Aim: To evaluate the periapical health of endodontically treated teeth in accordance with the type of their coronal restoration.

Methods and Materials: The retrospective study included an analysis of the random sample of 350 panoramic radiographs from the electronic database of the Clinic for Dentistry of Vojvodina. The age of patients ranged from 18 to 75 years. A total of 502 endodontically treated teeth were recorded in 204 patients and their type of coronal restoration and periapical status were assessed.

Results: Endodontically treated teeth were most commonly conservatively restored (58,76%), while prosthodontic restorations (crowns with or without a post&core) were present in 33,27% of cases. The remaining 7,97% of cases didn't have any of the coronal restorations. From the overall number of endodontically treated teeth, periapical lesions were detected in 32% of cases. Periapical lesion was detected in 32,88% of cases with conservative restoration, whereas these lesions were radiographically visible in 26,95% of cases with prosthetic restoration. In more than half of cases (52,5%) without any restoration, an existing periapical lesion was recorded.

Conclusion: Panoramic radiographs represent a useful tool in epidemiological studies for the assessment of the status of the periapical health. The results of this study indicate that a good quality of the coronal seal, as well as a good apical seal are important predictors for the long-term success of the endodontic treatment. Prevention of microleakage from the both-apical and coronal directions is important for achieving or maintaining the periapical health.

THE IMPORTANCE OF INITIAL DENTAL AVULSION TREATMENT. CASE REPORT

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Abstract:

Introduction: Tooth injuries in children are an emergency in the dental office. Dental avulsion is a severe injury to the supporting tissue of the tooth, characterized by complete rupture of the periodontal fibers and the neurovascular bundle, as well as complete dislocation from the alveolar cup.

Case report: A seven-year-old patient was brought to the Dentistry Clinic of Vojvodina due to a dental trauma that happened an hour before. Anamnestic data indicated that an accidental impact at school caused the avulsion of tooth 21. Tooth was brought in a tissue. The patient didn't lose consciousness nor vomit.

Clinical examination: Avulsion of tooth 21 was diagnosed with incomplete growth of tooth root and laceration of the upper lip.

Initial treatment: Rinsing of the tooth root surface with saline was started immediately. Local anesthesia was administered. Then the blood clot was removed from the alveolus with saline without curettage. Affected teeth were prepared for a flexible splint. A replantation of the avulsed tooth in the alveolus was performed and a flexible splint was placed. Radiological control of the replanted tooth was performed. Systemic use of antibiotics as well as anti-tetanus protection are indicated. Due to the present laceration of the upper lip, an oral surgeon was consulted.

Conclusion: A significant factor in the success of dental avulsion therapy is the time elapsed from avulsion to initial treatment.

BIOCOROSION OF NICKEL-TITANIUM DENTAL INSTRUMENTS UNDER THE INFLUENCE OF DIFFERENT SOLUTIONS

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Abstract:

The objectives of this study were to determine the surface properties of nickel-titanium dental instruments after 3 weeks immersion in artificial saliva, acidic solution pH 5.5, and 0.05% fluoride.. Elasticity and hardness modulus were determined using the nanoindentation, the morphological and quantitative characteristics were analyzed by SEM/EDX. The observed values of E were 100GPa and H=8.3MPa before the experiment, and Ni/Ti ratio was even. All solutions lead to changes in the instruments, the presence of pits and debris was detected. The interrelation between nickel and titanium changed significantly, with the largest discrepancies observed in the fluoride solution.

Key words: biocorrosion; biomaterials; nanoindentation; SEM; EDX.

THE APPEARANCE OF INCREMENTAL LINES IN THE ENAMEL OF PRIMARY TEETH

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Abstract: *The formation of the enamel of the tooth takes place rhythmically, producing records about the effect of stress factors on the organism in the process of amelogenesis. This study included 40 primary teeth buds, found in archaeological site Lepenski Vir. They were extracted from children who died just after birth. The morphological features of the enamel, striae of Retzius and the neonatal line were observed under a light microscope (magnification 10x, 20x, 40x). Particular attention was paid to the appearance, visibility and continuity of the neonatal line. In only 11 samples the neonatal line was continuous and restricted. On the other 10 samples, the neonatal line was discontinuous. In 19 specimens, the neonatal line was not visible at all and it was impossible to determine the boundary between prenatal and postnatal enamel. It is necessary to examine the influence of microscopy techniques and sample preparation on the appearance of incremental lines.*

Key words: *primary teeth, neonatal line, incremental lines.*

APPLICABILITY OF NANOINDENTATION, SEM, PROFILOMETER AND MACRO PHOTOGRAPHY IN ANALYSING BITE MARKS ON ANCIENT POTTERY

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Abstract: *We analyzed experimentally produced surface marks on prehistoric pottery sherds which can give us information about object usage. Elastic modulus and hardness were examined using nanoindentation, samples were analysed using SEM with 20–50x magnification, DSLR camera, and profilometer. We analyzed 483 bite marks. The presence of shallow linear marks has been identified as distinctive features related to primary teeth mastication. Primary teeth are capable of leaving bite marks in the range of forces of occlusal strengths in children. SEM imaging offers the best opportunity for bite marks dimensions detection, record, and dimensions measurement, while profilometry allows detection of mark depth.*

Key words: *bite marks, nanoindentation, SEM*