

2ND INTERNATIONAL
DENTAL STUDENTS' CONGRESS
RIJEKA, CROATIA
MARCH 31ST - APRIL 2ND 2017



Abstract book

SCHEDULE

FRIDAY, MARCH 31ST 2017

8:30 REGISTRATION

9:00 OFFICIAL CONGRESS OPENING

9:45 3D PRINTED BONE BLOCKS

PROF. TOMISLAV ČABOV, DMD, PHD

10:20 NOVEL ADDITIONS TO PERIO THERAPY

ASST. PROF. JELENA PRPIĆ, DMD, PHD

**10:40 MODERN MATERIALS FOR GINGIVAL RECESSION
TREATMENT**

ASST. PROF. DAVOR KUIŠ, DMD, PHD

11:00 COFFEE BREAK

11:20 PLASMA THERAPY

ROMANA PERŠIĆ-BUKMIR, DMD

11:40 AUTOTRANSPLANTATION

ASSOC. PROF. ALEN BRAUT, DMD, PHD

12:00 MONOLITHIC ESTHETIC RESTORATIONS

ASSOC. PROF. ZORAN KOVAČ, DMD, PHD

13:00 LUNCH

13:30 1ST POSTER SESSION

HALL 1

14:00 2ND POSTER SESSION

HALL 1

14:30 CBCT (FOR ALL CBCT WORKSHOP PARTICIPANTS)

HALL 2, 20'

15:00 WORKSHOPS

21:00 EVENING ACTIVITIES

SATURDAY, APRIL 1ST 2017

9:00 WORKSHOPS

13:30 LUNCH

14:10 1ST POSTER SESSION
HALL 1

14:50 2ND POSTER SESSION
HALL 1

**15:30 WHY SHOULD WE USE DENTAL LASERS?
PHOTOACOUSTIC STREAMING: A BREAKTHROUGH CONCEPT IN
ENDODONTICS**
DAMIR ŠNJARIĆ, DMD, PHD

17:00 COFFEE BREAK

17:20 INVISALIGN
ASST. PROF. BARBARA MADY-MARIČIĆ, DMD, PHD

**17:40 PROSTHETIC AND SURGICAL OPTIONS IN IMPLANTO-
PROSTHETIC REHABILITATION**
DAMIR JELUŠIĆ, DMD, PHD

18:40 OFFICIAL CONGRESS CLOSING

21:00 EVENING ACTIVITIES

Members of the scientific committee:

Assoc. prof. Miranda Muhvić-Urek, DMD, PhD (President)

Assoc. prof. Danko Bakarčić, DMD, PhD

Assoc. prof. Alen Braut, DMD, PhD

Luka Morelato, DMD

Assoc. prof. Stjepan Špalj, DMD, PhD

Prof. Ivone Uhač, DMD, PhD

Case report: internal resorptionEma Paljevic^{1*}, Jelena Vidas², Ivana Brekalo Prso²

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Introduction: Internal resorption (IR) is a pathological change in permanent teeth with usually asymptomatic progression. Etiology is often unknown. Some of the triggering factors are chronic pulpal inflammation, trauma, caries, orthodontic treatment and restorative procedures. IR is radiographically seen as uniform, round or oval translucent expansion in the canal. Histopathologically, dentinoclastic activity results in degradation of inorganic tissue and organic matrix. Two types of internal resorption are inflammatory, characterized by the progressive loss of hard tissue and replacement resorption, characterized by deposition of bone-like material into the defect. Complete removal of inflammatory tissue from the root canal (RC) and abundant irrigation with sodium hypochlorite are prerequisites for successful treatment. Between sessions, calcium hydroxide paste (Ca(OH)₂) should be placed into the RC. Alongside with the MTA, Obtura system is the method of choice for definitive seal of RC.

Objective: The aim of this study is to report the case of internal resorption along with the treatment protocol.

Case details: Patient, E.C. (22) was referred to the Department of Endodontics and Restorative Dentistry, School of Dental Medicine, University of Rijeka, after internal resorption of tooth 25 was accidentally spotted on x-ray.

During the first session, endodontic cavity access was prepared, working length was determined and the RC was treated mechanically. Irrigation was performed with NaOCl and EDTA. Ca(OH)₂ paste was placed intracanal and left for six weeks. Between two sessions, CBCT was taken. At the final session, the RC was filled using Obtura technique.

Conclusion: IR is often observed in practice (although less frequently than external resorption). With early detection, diagnosis, and management, the prognosis for rendered treatment may be favorable.

Keywords: Dentinoclastic activity; endodontic treatment; internalresorption

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Endodontic morphology of first maxillary molar: a case report

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Introduction: Although in practice the doctors are following all the steps for proper endodontic treatment, usually the failure of endodontic treatment of the first permanent upper molar is caused by failure to open the second canal in the mesiobuccal root, although the second mesiobuccal canal (MB2) in the mesiobuccal root is almost always present (Šutalo in 83% of cases).

Objective: In order to eliminate the possibility of incomplete therapies, during the trepanation of first upper molar is essential to expand the preparation to the mesial and buccal parts of the crown, to open the second mesiobuccal canal and enable smooth entry of the instrument into the canal. Trepanation opening is the shape of a triangle with the base to the buccal part and tip to the lingual.

Case details: In our dental practice comes the patient, E.G. (41) sent from the primary practice for the treatment of chronic periapical periodontitis of the tooth 26 with four canals. As the additional diagnostics, along with the standard RTG, we made CBCT of upper left alveolar region. We performed „step back“ procedure and obturation with AHA Plus cement and Guttapercha points.

Conclusion: In order to reduce the percentage of failed therapy to a minimum, it is necessary to work according to the rules, so we must consider MB2 canal in the teeth 16 and 26 the rule, not the exception, as seen in literature and cases in practice.

Keywords: Mesiobuccal root; root canal

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Aesthetic reconstruction of uncomplicated trauma of maxillary central incisor- case report

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Introduction: Dental trauma is a common consequence of accidents in children. In the permanent dentition the most common trauma is a fracture of the tooth, and due to the anatomical accommodation in the jaw, in 80% of the cases, it is the upper incisors. Trauma can be followed by numerous complications

Objective: Objective of this case report is to show different and minimal invasive treatment to some late complications of dental trauma, such as calcific metamorphosis of the pulp (obliteration of the pulp chamber) which was diagnosed.

Case details: 22 years old patient suffered trauma at the age of 8. Clinical examination confirmed an uncomplicated fracture of the tooth 21. Shade of tooth 21 was A4 and the rest of incisors was A1. Clinical, radiological and anamnestic tests leads to diagnosis of calcific metamorphosis of the pulp chamber of tooth 21. Therapy plan included: supraginival scaling and plaque removal, vital tooth whitening of tooth 21 and composite restoration of tooth 21 using silicone key. After 3 treatment of whitening, shade of tooth 21 was A2, and decision was to make composite veneer on vestibular surface to cover still preset discoloration along with incisal reconstruction of fracture edge.

Conclusion: The correct diagnosis, timely intervention, rehabilitation of dental trauma and monitoring of the patient are important for a successful outcome of treatment of dental trauma. Respecting the protocol of anamnesis and evaluation of all relevant factors can bring about the correct diagnosis and treatment plan.

Clinical, radiological and anamnestic tests should be carried out thoroughly and the results should be interpreted correctly with a goal to make a proper treatment plan and future follow-up of the patient.

Keywords: Calcific metamorphosis of pulp chamber; composite veneers; silicone key; tooth whitening; uncomplicated tooth fracture

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Root Canal Treatment of a Three - Rooted Mandibular First Molar: A Case Report

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Introduction: Treatment of endodontic pathology depends on a chemo-mechanical cleansing and shaping of the root canals before root canal filling with a hermetic seal. In most cases first mandibular molar is two-rooted with two mesial and one distal canal. The prevalence of additional root located distolingually is 4.2%. An awareness and understanding of the presence of unusual root canal morphology is essential as it determines the successful outcome of the endodontic treatment.

Objective: The main objective of this case report was to present a treatment of mandibular first molar with an additional distolingual root.

Case details: A patient (29) reported to the Department of Conservative Dentistry and Endodontics in Clinical Hospital Centre Rijeka and gave a history of intermittent pain localized in the tooth 46 for several weeks. The tooth was not previously root treated, but the crown was destroyed with a carious lesion. A pretreatment periapical radiograph showed a dark area in the bone around the mesial and distal root and it was also evident an extradistolingual root. The access opening was modified to the trapezoidal shape, working lengths were determined and canal roots were instrumented mechanically. The endodontic system was flushed with sodium hypochlorite and calcium hydroxide was placed as an intracanal medicament for 7 days. The patient was asymptomatic at the next appointment. Chemo-mechanical instrumentation was finished and root canal obturation with cold lateral condensed gutta-perchawas performed. The patient was asked to follow up after a year. At the clinical examination the tooth was asymptomatic and the radiographic examination revealed a resolution of periapical radiolucencies.

Conclusion: Understanding of the presence of unusual root-canal morphology can contribute to the successful outcome of root canal treatment. Root canals are often left untreated because the operator fails to recognize their presence and it can lead to high rate of molar extraction.

Keywords: Anatomical variants; mandibular first permanent molar; radix entomolaris; root canal therapy; supernumerary root

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The incisive foramen versus apical periodontitis: two case report

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Introduction: The incisive foramen (IF) is positioned at the midline of anterior portion of the hard palate, behind the maxillary central incisors. On periapical radiographs the IF typically appears as radiolucency between the roots of maxillary central incisors; however, when it is projected over the apical thirds of their roots, it may mimic the appearance of apical periodontitis (AP). Due to considerable variations in its radiographic presentation it can be falsely interpreted as AP.

Objective: Our aim is to present two clinical cases which will demonstrate how to differentiate between radiolucencies caused by AP and the IF.

Case details:

Case 1

A 56-year-old male was referred to the Department of Operative Dentistry and Endodontics for endodontic management of the asymptomatic right maxillary first incisor with well-defined oval periapical radiolucency. However, in the absence of caries and deep restorations there was no obvious explanation for the appearance of AP. Moreover, pulp vitality tests gave positive results. Additional angled radiographs confirmed our diagnosis of IF mimicking the radiographic appearance of AP. Endodontic management of the tooth was therefore not indicated.

Case 2

A 61-year-old female was referred to the Department of Operative Dentistry and Endodontics for retreatment of the asymptomatic right maxillary central incisor with oval radiolucent lesion on the mesial side of the root. Based solely on the initial radiograph, the lesion could be interpreted as the IF or AP. Following retreatment with proper root canal filling, the lesion has reduced in size and a lateral canal communicating with the lesion became visible.

Conclusion: By using angled periapical radiographs, the root of the maxillary central incisor may be projected free from the IF. The radiographic findings must always be evaluated together with patient's history and findings of the clinical examination.

Keywords: Apical periodontitis; dental radiography; incisive foramen; maxillary central incisor

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Susceptibility examination of bacteria methicillin-resistant *Staphylococcus aureus* by effects of non-thermal atmospheric pressure plasma

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Introduction: Non-thermal atmospheric pressure plasmas represent an interesting novel technique that can be applied for decontamination of bacteria-colonized surfaces and for antimicrobial therapy in biomedicine.

Objective: In this study, *in vitro* susceptibility of methicillin-resistant *Staphylococcus aureus* (MRSA) to non-thermal atmospheric pressure plasma, created by plasma needle and plasma jet, was investigated.

Materials and Methods: Clinical strains of MRSA, isolated from surgical wounds, were used in this study. To investigate susceptibility of MRSA to non-thermal atmospheric pressure plasma, inhibitory zones were determined, and viability of bacteria in biofilm was evaluated by *MTT* assay. For purpose of inhibitory zones measurement, bacterial suspensions were prepared, corresponding to 0.5 *McFarland*, that were equally seeded on the *Müller-Hinton* agar. The samples were treated by plasma under different plasma treatment conditions. Inhibitory zones were determined after 24 h incubation at 37°C. For viability testing of bacteria on biofilms, inoculum of 10⁴ CFU was made. In 48-well microtiter plates, 450 µl brain-heart infusion (*Sigma-Aldrich, USA*) was added in each well, and inoculated with 50 µl of previously prepared bacterial suspension. The inoculated plates had firstly been incubated for 24h at 37°C, and then exposed to plasma, after which the viability of bacteria was evaluated by *MTT* assay.

Results: The results of inhibitory zones measurements showed that non-thermal atmospheric pressure plasma inhibited MRSA growth, and the size of the zones depended on the plasma parameters, but also on the plasma source. Besides, it was shown that there was significant decrease of bacterial viability after plasma treatment, since the values of *MTT* assay of the treated samples were notably lower when compared to untreated control samples.

Conclusion: Results of this investigation show that non-thermal atmospheric pressure plasma has inhibitory effect on MRSA growth, and that it can decrease their viability on biofilm, wherefore it could represent a possible choice for eradication of these bacteria.

Keywords: MRSA; *MTT* assay; non-thermal atmospheric pressure plasma; plasma jet; plasma needle

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Effect of root canal irrigants on the push-out bond strength of mineral trioxide aggregate to radicular dentin

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Introduction: Mineral trioxide aggregate (MTA) is, according to indications, used before the endodontic treatment is accomplished. Since the MTA is a slow setting material, root canal irrigants may affect its properties, especially in the early setting phase.

Objective: The aim of this study was to evaluate the effects of different root canal irrigants on the push-out bond strength of MTA to radicular dentin.

Materials and Methods: Forty 1-mm-thick dentin discs were prepared from 20 single root human teeth. Root canal cavities were prepared with a diamond bur and filled with MTA (*MTA Angelus, Londrina, Brazil*). After initial setting (10 minutes), specimens were randomly divided into four groups (n=8) for treatment with one of four root canal irrigants: 2.5% Sodium hypochlorite (NaOCl), 17% EDTA (*Calcinase, LegeArtis, Pharma GmbH, Germany*), 2% chlorhexidinegluconate (CHX) (*Gluco-chex 2%, Cerkamed, Poland*) and 10% citric acid. Specimens were immersed in irrigants for 30 minutes, rinsed with distilled water and allowed to set for 48h. In the control group (n=8), specimens were not treated with irrigants. Push-out bond strength was measurement using a universal testing machine (PCE-200, Great Britain) at a crosshead speed of 1mm/min. Data were statistically analyzed using ANOVA and Turkey post-hoc test ($\alpha=0.05$).

Results: The highest values of push-out bond strength were recorded for specimens treated with NaOCl. Those specimens presented significantly higher values of push-out bond strength than specimens treated with other irrigants and control specimens ($p<0.05$). The lowest values were recorded for specimens treated with CHX.

Conclusion: The findings of this study indicate that root canal irrigants might affect push-out bond strength of MTA to root canal dentin if used in the early phase of material setting.

Keywords: Bond strength; mineral trioxide aggregate; root canal irrigants; push out

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***In vitro* comparison of various techniques to avoid gap formation in Class II restorations**

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Introduction: Glass-ionomer materials (GIC) have become popular in dentistry thanks to their bioactivity and excellent physical properties. Placing GIC lining between the composite and the dentin can reduce the formation of a marginal gap. When the dentin is covered with GIC lining and the liner is completely covered with the composite restorative material on the surface, it is called Closed Sandwich Technique (CST). In the open sandwich technique (OST), gingival part of the GIC is left exposed.

Objective: The aim was to compare the appearances of the gingival marginal gap with different restoration techniques.

Materials and Methods: 16 teeth were prepared for restoration margin under the cemento-enamel junction. Eight teeth were restored with OST and eight with CST. The composite restoration on the opposite tooth side was restored on the enamel level. On two teeth the preparation was restored only with adhesive system and composite material (ACR), without GIC and would serve as a positive control. Teeth were submerged in artificial saliva and underwent thermo-cycling during one week between room temperature and 37° C. On the last day a methilmetacrylate dye was added into the solution. The appearance and depth of marginal gap was estimated measuring dye penetration depth under the microscope compared to the measuring scale.

Results: The restorations with OST showed less gap formation than the CST at the root level, but at the gingival margins in enamel the CST was superior to OST. On the teeth reconstructed with ACR the gap formation was lower when placed in portions then reconstructed with bulk technique.

Conclusion: It is recommended that the open sandwich technique be the restoration of choice when proximal gingival margins extend beyond the cemento-enamel junction, but when restoration finishes in enamel to use the CST.

Keywords: Class II and III restoration; GIC; marginal gap; sandwich technique

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Minimally invasive preparation

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Introduction: Minimally Invasive Dentistry (MID) emphasizes conservative caries therapy methods with main goal-less destruction of tooth structure. These management is a deviation of the traditional GV Black's restorative principles. The focus of this approach is on the prevention, remineralization and maximal conservation of tooth structure.

Objective: The aim of this review is to present minimally invasive preparations as a method of choice especially in young teeth.

Review of the topics: Early detection of caries activity and caries lesion (RVG, Diagnodent) is crucial for tooth structure preservation. Minimally invasive techniques variates from mechanical, chemo mechanical, laser or ozone therapy. Preparation is based on the selective opening of the carious grooves and execution of small rounded cavities. Cavity shape is dictated solely by the extension of the carious process. Infected hard tissue, incapable for regeneration has to be removed. Demineralized dentine may remain on the pulpal wall of the prepared tooth only if the complete excavation of caries would compromise the tooth vitality. Dental adhesives, glass-ionomer cements, resin-based composites are materials of choice for this kind of therapy considering their capability of preservation of the tooth structure (micro mechanic retention, fluoridation etc.) and do not require traditional GV Black's restorative principles.

Conclusion: The goal of MID is maximal preservation of tooth structure. However, if there is a cavity, it should be repaired conservatively as soon as possible. The future promises further development of dentistry according to the preventive approach with new technologies, diagnostics, prevention and treatment, but first of all, patients will have to comprehend the importance of healthy teeth and gums.

Keywords: Dental adhesives; minimal intervention; remineralization

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Case report: internal resorption

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Introduction: Dentin hypersensitivity (DH) can be defined as pain derived from exposed dentin in response to chemical, thermal, tactile or osmotic stimuli which cannot be explained as arising from any other dental defect or disease. Dentin is a hard mineralized tissue that is covered and protected by enamel or cementum. It is a vital tissue which is naturally sensitive because of extensions of odontoblasts and the formation of dentin-pulp complex. The odontoblastic processes are surrounded by dentinal fluid inside the tubules. The fluid is responsible for communication between the pulp and the dentin. There are three theories that explain the mechanisms of dentin sensitivity: direct innervation, odontoblast receptor and hydrodynamic theory.

Objective: The aim of this review is to give a short review of dentin hypersensitivity and to provide a brief overview of the diagnosis, epidemiology, clinical picture and the clinical management of DH.

Review of the topics: Dentin hypersensitivity affects younger patients, most commonly the age group between twenty and forty years. The main cause of exposed dentin is enamel loss or periodontal tissue loss. These conditions cause exposing and opening of dentinal tubules which leads to the main symptom – short sharp pain mostly caused after a warm or cold sensation. Pain is the only symptom of the disease, therefore it is necessary to take a detailed anamnesis and clinical examination in order to differentially diagnose and adequately conduct therapy. By choosing adequate desensitizing agents, which act in a way of closing dentinal tubules or blocking the nerve activity, optimal results in the treatment of dentin hypersensitivity are achieved.

Conclusion: Dentin hypersensitivity is an often encountered condition (in average 27%) in everyday practice. Clinicians knowledge of etiology and clinical manifestations is necessary for successful treatment of mentioned condition.

Keywords: Dentin hypersensitivity; dentinal tubules; odontoblasts

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Longevity evaluation of G.V. Black Class I restoration

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Introduction: One of the significant problems of modern dentistry is pit-and-fissure caries, being one of the most widespread forms of destructive affection of the tooth hard tissues. High frequency of fissure caries relating to anatomy of the occlusal surfaces of the posterior teeth, which inhibits protection from saliva and instead, favors plaque accumulation. Conventionally, treatment of caries lesions is to remove carious hard tissues and restore the resulting cavity. Throughout the history of dentistry one of the main objectives was establishing the most long-lasting restoration. In that regard, longevity of restoration is the main criterion in material selection.

Objective: The aim of this study was to compare and evaluate the longevity of Class I amalgam and direct composite restoration in posterior teeth.

Materials and Methods: To provide following information, number of published scientific literature are studied. Restorations evaluated at baseline of 10 years according to modified USPHS criteria (Ryge G., 1980). In restorations, the following clinical characteristics were examined: Anatomy, Roughness, Marginal Adaptation with Marginal Discoloration, Secondary Caries. All criteria in this study were rated as Alfa (A), Bravo (B) and Charlie (C).

Results: All restorations, regardless of the material selected, right after the filling were evaluated as highest grade Alfa. Based on published scientific literature at baseline of 10 years: 82% of the amalgam restorations got an A and B mark. 18% got mark C (clinically unacceptable). As for composite restoration, 27% got the mark C.

Conclusion: Marginal defects were the main reason for failure in both materials. As opposite to composite restoration, amalgam restoration is complicated by secondary caries much later.

Keywords: Amalgam; composite; longevity; restorative dentistry

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Quality of life of patients with temporomandibular disorders

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Introduction: Temporomandibular disorders (TMD) are significant public-health problem which affects 5-12% of World population. They are the second most common musculoskeletal condition which results in pain and limited function. They can influence everyday activities, psychosocial functioning and overall quality of life.

Objective: The aim of our study was to examine influence of temporomandibular disorders on quality of life.

Materials and Methods: In the period between November 2016 and March 2017, 27 patients came to Clinic of Prosthodontics of Faculty of Dental Medicine of University in Belgrade with some of the symptoms of dysfunction of mandibular joint. For the confirmation of the diagnosis Dual axis RDC-TMD questionnaire is used. It contains well defined, clinically relevant criteria for assessment of temporomandibular dysfunction. Besides that, patients were completing the questionnaire OHIP14 (The Oral Health Impact Profile) for assessment of influence of oral health condition on quality of life.

Results: The results of the study show that TMD are more frequent within the female population (77.78%) and that they manifest with more severe symptoms if there is a combination of muscular dysfunction and dislocation of discus, than when each of these disorders are presented isolated. The statistically significant relation was obtained between degree of chronic pain and limitation of mandibular functions. With an increase of degree of chronic pain, a limitation becomes higher. Higher degree of pain also causes significant increase of mean values of OHIP14 questionnaire and same correlation can be seen between limitation of mandibular functions and the results of OHIP14 questionnaire (Spearman coefficient of correlation $r=0.648$ $p<0.001$).

Conclusion: The results of our research show that the presence of temporomandibular dysfunctions has significant influence on reduction in quality of life of patients. Still, the limitation of this study is a lack of big sample, so further, more extensive researches are needed.

Keywords: Quality of life; temporomandibular dysfunction

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Evaluation of efficacy of oral appliances (OA) in the treatment of patients with sleep apnea syndrome

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Introduction: Sleep is a physiological, reversible condition, where human spend 30% of life. The biological functions of sleep aren't fully clarified, but it's known that it's very important for the normal organism functioning. Sleeping as physiological condition has its disorders, whose division is complex and the most significant group is breathing disorders during sleep. Clinically the most common disorder is *Obstructive Sleep Apnea (OSA)*, manifested as abnormal ventilation during sleep and blockade of breathing, due to obstruction of upper airways.

Objective: The aim of this study was to determine the efficacy of oral appliance (OA) in the treatment of patients with mild or moderate form of the *Obstructive Sleep Apnea* syndrome.

Materials and Methods: The study lasted four months and included 15 patients, who were diagnosed OSA, during polysomnographic examination. After dental examination OA was made for all of them individually. The success of the therapy was monitored at the end of I, II and IV month by filling out a standardized questionnaire by patients and their partners, to determine daytime sleepiness index. Also after IV month patients were once again directed to polysomnography examination.

Results: On the first follow-up patients reported substantial reduction in symptoms- 80% of them snored less, 73% slept better. On the end of II month all patients reported substainal reduction in symptoms. At the end of the study, a complete therapy success was recorded in 7 (47%) patients, partial success in 7 (47%) patients. Treatment failure was recorded in 1 (6%) patient, but with noticeable subjective improvements. All of patients reported regression if not elimination of symptoms.

Conclusion: Results of this study showed that OA are very successful in the treatment of mild and moderate OSA, and because of their characteristics should be recommended to patients as a non-invasive way to resolve their problems.

Keywords: Oral appliances; sleep apnea, obstructive; treatment

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Denture stomatitis treated with photodynamic therapy

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Introduction: Denture Stomatitis is a fungal infection which affects partial or total denture wearers. Photodynamic therapy (PDT) is a non-invasive therapy used for different oral infections. Photodynamic therapy is an oxygen-dependent photochemical reaction that occurs by action of low energy single frequency light and activation of the photochemical material without side effects on surrounding tissue.

Objective: The aim of the study was to assay whether applying photodynamic therapy can eradicate fungal infection compared to conventional antifungal therapy and if using this method could decrease therapy time.

Materials and Methods: Ten subjects with partial or total dentures were included into the study, all patients were diagnosed with denture stomatitis based on clinical examination, symptoms and microbiological analysis. Patients were divided into two groups: experimental (PDT group) and control group (C-group). The experimental group was treated with photodynamic therapy (HELBO photodynamic therapy). The control group was treated with conventional antimicrobial therapy for 14 days. Samples were taken before therapy immediately after the procedure and 30 days after therapy.

Results: The results of this study showed that immediately after using PDT significant reduction and resolution of *Candida Spp.* happens. One month after *Candida Spp.* was not isolated in PDT which was not the same in the control group where antifungal drugs were used, *Candida Spp.* was lowered.

Conclusion: PDT is an efficient therapeutic aid in the treatment of denture stomatitis and it can be used to shorten the therapeutic process and prevent relapse.

Keywords: *Candida Spp.*; denture stomatitis; photodynamic therapy

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Herpes zoster of the trigeminal nerve - a case report

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Introduction: Herpes Zoster (HZ) occurs via reactivation of a latent Varicella-zoster virus infection located in the sensory ganglia. HZ of the trigeminal nerve occurs in 13% of Herpes zoster cases. The ophthalmic branch(nerve) of the trigeminal nerve is most likely to be affected followed by the maxillary branch and the mandibular branch.

Objective: The aim of this case report is to present the HZ infection that affected the maxillary and mandibular branches of the trigeminal nerve.

Case details: A 79-year-old male patient came to the Department of Oral Medicine at the School of Dental Medicine Rijeka due to pain and lesions on the right side of the face and in the oral cavity. A detailed anamnesis was taken. Furthermore, detailed extraoral and intraoral clinical examinations were performed. Extraoral examination determined unilateral vesicles and erythema on the right side of face. Intraoral examination revealed unilateral erosive lesions of the hard palate, tongue and lower lip. Diagnosis of the herpes zoster infection of the trigeminal nerve affecting the maxillary and mandibular branches was confirmed. The patient was treated with systemic acyclovir (5x800mg) and tramadol/paracetamol analgesic. Topical therapy consisted of an oral antiseptic (hexidine), local anesthetic (lidocaine) and low level laser therapy (LLLTT). The patient has later developed a postherpetic neuralgia that was treated by LLLTT and systemic pregabalin. After two months, the patient has made a full recovery and no longer has lesions or pain in the oral cavity and face.

Conclusion: Herpes zoster of the trigeminal nerve is a rare type of HZ affecting the orofacial region. Sometimes, neurological complications such as postherpetic neuralgia can be developed among elderly patients. Dentists must be familiar with the complications as well as, signs and symptoms of HZ to provide successful treatment.

Keywords: Herpes zoster; shingles; trigeminal nerve; trigeminal second branch; trigeminal third branch; varicella-zoster virus

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Salivary level of IL-2 in patents with denture stomatitis before and after low-level laser therapy

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Introduction: The denture stomatitis (DS) is a common oral mucosal lesion that occurs in denture wearers. A low-level laser treatment (LLLTT) is a potential noninvasive treatment for DS due to its anti-inflammatory and biostimulation effects.

Objective: The objective of this study was to monitor therapeutic response to LLLTT by measuring the salivary level of proinflammatory cytokine interleukin-2 (IL-2) in patients with DS.

Materials and Methods: The study included 20 subjects with DS (Newton type II DS) and 20 healthy volunteers. The clinical examination was performed according to the standard clinical criteria. DS patients were placed on therapy with LLLTT for four consecutive weeks. A whole unstimulated saliva were collected before and after LLLTT. For determination of salivary level of IL-2 ELISA (Sigma Immunochemicals, St Louis MO, USA) test was performed.

Results: In the experimental group, levels of IL-2 measured before LLLTT were significantly greater (0.459 ± 0.127) than IL-2 levels following therapy (0.246 ± 0.058) ($p < 0.001$). In the control group, no significant difference was found in the levels of IL-2 before (0.203 ± 0.090) and after (0.201 ± 0.067) the application of LLLTT (all p values > 0.05).

Following treatment with LLLTT for 4 weeks the levels IL-2 decreased significantly and the levels of this pro-inflammatory cytokine was significantly different from controls.

Conclusion: This study showed that LLLTT may be an efficacious choice for DS therapy.

Keywords: Denture stomatitis; interleukin-2; low-level laser therapy

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Clinical crown lengthening in two different cases

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Introduction: Clinical crown lengthening (CCL) is a procedure during which the gingival and/or bone tissue are reduced for the purpose of increasing the supragingival tooth structure.

The indications for the procedure are: inadequate height of the clinical crown for restorative and prosthetic treatment (caries, abrasion, etc.), access to the subgingivally located cavity or fracture, esthetics – gummy smile, and uneven gingival contour. There are three main techniques used for CCL: gingivectomy and/or gingivoplasty, apically repositioned flap without the vertical incisions, and forced orthodontic eruption (orthodontic extrusion) with or without fiberotomy. Treatment choice depends on the indication.

Success of CCL depends on a sufficient amount of biological width before CCL and it has to remain unviolated thereafter.

Objective: Two cases – different clinical situations - are presented depicting different techniques for CCL.

Case details:

Case 1

Patient had reduced height of the clinical crowns due to bruxism, so CCL needed to be performed before the prosthetic treatment. Treatment option for the procedure was gingivectomy. Excess gingiva was removed conventionally (with a blade) in local anesthesia. Sutures were placed and removed after 10 days. Patient wore temporary bridges before and after CCL. After one month, the prosthetic treatment commenced.

Case 2

Patient had uneven and excessively displayed gingiva (gummy smile) with long, rotated teeth. Therefore, treatment option for CCL was apically repositioned flap without the vertical incisions. The procedure began with gingivectomy, followed by flap elevation to expose the bone for osteotomy. The flap was repositioned and fixed with sutures which were removed after 7 days. After one month, the prosthetic treatment was initiated.

Conclusion: CCL enables good results in prosthetic treatment of patients with bruxism and gummy smile, and it should be considered as a surgical component of therapy.

Keywords: Bruxism; clinical crown lengthening; gummy smile

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Introduction: Platelet Rich Fibrin (PRF) is a blood concentrate containing platelets, growth factors and cytokines. PRF is generated from centrifuged blood and is strictly autologous. Areas of PRF application in dental medicine include guided bone regeneration, guided tissue regeneration, healing of the soft tissue in mucogingival surgery, revitalization of tooth with necrotic pulp and open apex, healing of post-extraction wounds and sinus-lift procedures. PRF may also be combined with other regenerative techniques.

Objective: Application of PRF membrane in surgical treatment of combined three and two - walled periodontal intrabony defect.

Case details: The present case report is about a 31-year old man who came to Department of Oral Medicine and Periodontology, School of Dental Medicine, Rijeka. Upon examination, the patient was systemically healthy and had not taken any long term anti-inflammatory medications or antibiotics. On periodontal examination and radiographic evaluation, the patient presented with combined three and two-walled periodontal bone defect. Blood sample was taken on the day of surgery according to the PRF protocol with a Process PC02 centrifuge and collection kits. After 8 minutes of centrifuge, a fibrin clot was formed in 2 test tubes, where the upper part contained acellular plasma and the bottom part contained red blood cells. The fibrin clot was separated from the lower part of centrifuged blood and pressed between the two metal plates of provided PRF-box to obtain a membrane.

Conclusion: PRF membrane may be used in surgical regenerative treatment of intrabony defects alone or in combination with xenogenic bone-graft materials. PRF represents a new revolutionary step in periodontal regenerative treatments with several advantages. It is a simple, fast and cost-effective procedure with no side-effects, using autogenous material with powerful regenerative effect.

Keywords: Periodontics; platelet rich fibrin; tissue regeneration

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Clinical crown lengthening procedure prior to prosthetic restoration – a case report

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Introduction: Clinical crown lengthening procedure (CCLP) is a common procedure in periodontal surgery. Two crucial factors have to be considered preoperatively. One is the width of the attached gingiva that should not be smaller than 2 millimeters after the procedure. The other factor is preservation of the dentogingival complex (DGC). DGC represents the soft tissue coronal to alveolar bone margin and consists of connective tissue attachment, epithelial attachment and gingival sulcus. In average, the value of DGC is 3 mm (from the alveolar bone margin to the gingival margin). Violation of DGC may result in inflammation and formation of the periodontal pockets or in attachment and bone loss that could lead to gingival recession. In order to maintain the value of DGC (3mm), gingivectomy and additional osteotomy is performed in CCLP.

Objective: The objective of this case report is to describe the surgical sequences of CCLP to achieve the appropriate aesthetics of the gingival margin prior to prosthetic restoration.

Case details: Patient S.C., 67 years old, came to dental practice because she was not satisfied with her current fixed denture. She was relatively healthy except suffering from high blood pressure and problems with the thyroid gland, however these conditions were treated with drugs. After the clinical examination, the plan was to perform CCLP for teeth 11 and 12 to achieve the desirable aesthetics of the gingival margin. The new fixed denture was planned after the healing period.

Conclusion: CCLP could be the solution for many smile aesthetic problems. It is important to try to fulfill patients needs and desires but also respect the rules of the profession. The right indication, correct planning and the right surgical procedure, as well as patient's good oral hygiene and regular check-ups are steps to achieve long-term success.

Keywords: Crown lengthening; gingivectomy; osteotomy; prosthodontics

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Longitudinal changes of dental arch shape during adolescence and occurrence of late mandibular incisor crowding

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Introduction: Occurrence of late crowding in the mandibular incisor region is a common request for orthodontic treatment. Various theories about its aetiology have been proposed throughout the years. Dental arch width and length change during lifetime, due to facial growth and development of dentition and could be one of the factors contributing to late mandibular crowding.

Objective: To assess the relation between late mandibular crowding and changes in dental arch shape during adolescence.

Materials and Methods: The sample included 71 (48% female) orthodontically untreated subjects, recalled for check-up every three years, from the Nittedal growth study, Norway. Patients' plaster casts at the age of 12, 15, 18 and 21 were analysed. Measurements included anterior arch length, anterior width, posterior width and the Little index, which was used to measure the amount of crowding. The ratio between anterior arch length and anterior width was measured to evaluate the dental arch shape.

Results: The increase of crowding ($p < 0.001$) and change in dental arch shape ($p < 0.001$) was observed during development in adolescence. The dental arch became more squared-shaped with age. Changes were mostly due to the significant decrease in anterior arch length ($p < 0.001$). The anterior arch width did not demonstrate significant changes over time. No differences in gender were observed. The amount of mandibular incisor crowding did not show a linear relation with changes in dental arch shape.

Conclusion: Mandibular incisor crowding increases and changes in dental arch shape do occur during adolescence, however, no linear relation is observed among these two phenomena.

Keywords: Adolescence; arch shape; crowding

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Generating an average three-dimensional shape of Croatian male and female face – a pilot study

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Introduction: Three-dimensional stereo photographic images serve for creation of average male and female facial shells for the Croatian population, which could be used as orthodontic/surgical diagnostic tools in growth monitoring, orthodontic and surgical treatment planning, phenotype–genotype correlations, and also in the behavioral studies.

Objective: Determine the look of an average three-dimensional shape of Croatian face, and also analyse which are the characteristics of male and female face.

Materials and Methods: Sample consisted of 73 Caucasian Croatian young adults (average age 23; 52% females). Facial scans of the subjects were taken using non-invasive stereo photogrammetry apparatus (3dMDface system, 3dMD Inc., Atlanta, USA) using a standardized acquisition technique (subjects sitting in an upright position, keeping their head in natural position, with neutral face expression). Processing, normalizing, and landmarking of facial images were performed using Rapidform 2006 (Reverse Engineering software; INUS Technology Inc., Seoul, South Korea). For every subject, 21 facial landmarks were identified and used for the creation of the average face for each sex.

Results: The visible differences were noted in size and shape between average Croatian male and female faces. Average Croatian female face was smaller in size, and had more prominent eyes and cheeks; contrary, average Croatian male face had more prominent forehead and chin.

Conclusion: There were noted differences between average Croatian male and female faces. Broader age range sample is needed to create average Croatian male and female face, which will give reference about growth pattern and development throughout the life of Croatian population.

Keywords: Average face; facial landmarks; facial shell; stereo photogrammetry

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Facial growth and mandibular incisor crowding during adolescence

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Introduction: Mandibular incisor crowding can occur during and at the end of adolescence when it is referred to as late crowding. The aetiology is still unclear, although several theories are proposed. Growth and development of facial bones continue throughout adolescence and some growth patterns may be associated with the occurrence of late crowding.

Objective: To assess the relation between late mandibular crowding and facial growth.

Materials and Methods: The sample consisted of 62 orthodontically untreated subjects (50% female), recalled for check-up every three years, from the Nittedal growth study, Norway. The Little index, a measure of amount of crowding, was assessed on subjects' plaster casts at the age of 12 and 21. Intermaxillary angle and length of the mandibular base were measured on latero-lateral cephalograms at the age of 12 and 21.

Results: A significant decrease in the intermaxillary angle was observed ($p < 0.001$). Although the decrease was significant in both genders, higher was observed in males (28.9 vs. 25.9) than in females (28.7 vs 27.0). The base of the mandible grew in length significantly during adolescence ($p < 0.001$). Incisor crowding increased significantly at the age of 21 ($p < 0.001$). No linear correlation was found between the amount of increase in crowding and amount of decrease in the intermaxillary angle nor increase in mandibular length.

Conclusion: Decrease of divergence between maxilla and mandible, lengthening of the mandibular base and late mandibular incisor crowding do occur during adolescence, however, great individual variability is present so the relationship cannot be characterized as linear.

Keywords: Adolescence; crowding; facial growth

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Testing of working properties of orthodontic archwires by three-point bend test and changes induced by corrosion

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Introduction: The three point bend test is used to assess the load-deflection characteristics of the material. The information from stress-strain curve allow insight into working properties of superelastic nickel-titanium archwires i.e. unloading forces that move teeth during orthodontic treatment. Hyaluronic acid has anti-inflammatory action and bacteriostatic effect and is therefore used as mouthwash. However, it can induce corrosion of orthodontic appliances and alter their working properties.

Objective: The aim was to analyse the working properties of orthodontic archwires before and after the corrosion induced by saliva and mouth was containing hyaluronic acid.

Materials and Methods: One group of nickel-titanium archwires (N=6) were exposed to solution that simulated human saliva (1.5 g/L KCl, 1.5 g/L NaHCO₃, 0.565 g/L NaH₂PO₄, and 0.5 g/L KSCN) with addition of 0.9 g/L lactic acid buffer to adjust for pH of 4.8 usually measured in one- and two-day-old dental plaque. Other group (N=6) was exposed to hyaluronic acid-containing mouthwash (0.025 %). Archwires were stored in saliva for 28 days and incubated at 37°C. Mouthwash group was immersed in hyaluronic acid once a week for 5 minutes and then restored in saliva and further incubated. The three point bend test was performed in a group of as-received, unexposed archwires and in both exposed groups.

Results: Saliva and hyaluronic acid have similar influence on working properties of nickel-titanium orthodontic archwires, both reducing elastic properties in the unload phase compared to as-received wires (p<0.05). Hyaluronic acid had a higher effect than saliva, but the difference was not significant.

Conclusion: Hyaluronic acid can be used as an anti-plaque and anti-gingivitis agent during orthodontic treatment without concern as working properties of fixed orthodontic appliances during levelling and alignment should not be affected.

Keywords: Corrosion; mechanics; orthodontic treatment

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Postoperative complications due to different incision types for apicoectomy in aesthetic region (a pilot study)

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Introduction: Surgical treatment of periapical lesions in the aesthetic region is a great challenge. In addition to the complete removal of the lesion, a lot of patience and attention should be given to the election of the right incision in order to avoid postoperative complications and consequences and to ensure proper healing.

Objective: The aim of this research was to determine the most suitable incision, comparing modified vertical (Eskici) and gingival angular (Reinmuller) incision.

Materials and Methods: Four patients with bilateral periapical lesions in maxillary front region were included. Concerning indications for each incision, on one side we used modified Eskici vertical incision, and on contra lateral side gingival angular – Reinmuller incision. All procedures were performed by the same surgeon. Patients were followed up to 30 days after intervention.

Results: The healing process was evaluated clinically, after 1, 2, 7 and 30 days post operatively. Parameters for evaluation were pain, swelling, aesthetic aspect, suture dehiscence and bleeding. In all cases, pain was negligible, and there was no bleeding recorded. Vertical incision showed slightly smaller swelling (~0.355) comparing to gingival angular incision (~0.479), although statistical analysis showed no significant difference. Concerning aesthetic acceptance, patients evaluated vertical incision as more acceptable (average grade : 8.05) than the gingival angular (4.74). In one case Reinmuller flap was indicated for revision of the intervention, due to the dehiscence of sutures. All other patients had no complications during the healing process.

Conclusion: Due to the short period of time and complex inclusion criteria, this was just a pilot study. Vertical incision presented better results, no complications, smaller oedema and more proper healing, without any scar formation. Hence, vertical incision should be used in aesthetic zone. Study will be expanded further, in the future.

Keywords: Apicoectomy; incision type; oral surgery

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The effect of local anaesthetic solution with adrenaline in various concentrations on cardiovascular parameters

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Introduction: There is no place for pain in modern dentistry. It is possible to achieve this by using local anesthesia. All local anesthetic solutions contain: local anesthetic agent, vasoconstrictor, stabilizer, antiseptic agent, buffer and solvent. Adrenaline is often used as a vasoconstrictor in an anesthetic solution and it affects cardiovascular parameters.

Objective: The Aim of this study is to determine changes in cardiovascular parameters when local anesthetic solutions with different concentrations of adrenaline are used.

Materials and methods: The study included 30 patients, ASA I classification, average age of 34 years. Half of the patients (group A) were administered with anesthetic solution of 1.8 ml of 2% lidocaine with adrenaline dilution 1:100000 and the other half (group B) with local anesthetic solution of 1.8 ml of 2% articaine with adrenaline dilution 1:200000, by method of local infiltration anesthesia. Heart rate, systolic and diastolic blood pressure were measured in all patients 5 minutes before the application, during the application and 5 minutes after the application of anesthetic solutions. Average values of the tested parameters were processed by Student's t-test.

Results: Cardiovascular parameters in both groups 5 minutes before application of the anesthetic solutions were approximate (heart rate 75.2 bpm; systolic pressure 111 mmHg; diastolic pressure 69,5 mmHg). Five minutes after application of anesthetic solutions Group A showed a statistically significant higher increase ($p < 0.05$) in systolic blood pressure and heart rate (systolic pressure 124 mmHg; heart rate 85 bpm) compared to group B (systolic pressure 118 mmHg; heart rate 79 bpm).

Conclusion: Changes in cardiovascular parameters values are minor when local anesthetic solution with adrenaline dilution 1:200000 is applied, compared to local anesthetic solution with adrenaline dilution 1:100000. The use of anesthetic solution with adrenaline dilution 1:200000 is safer, which is especially important for patients at cardiovascular risk.

Keywords: Adrenaline; blood pressure; heart rate

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Odontogenic necrotizing fasciitis and mediastinitis after tooth extraction

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Introduction: Necrotizing fasciitis of neck (NFN) is rare but extremely hazardous complication of dental extraction. It's characterized with fulminant infection, necrosis of subcutaneous tissues, frequently spread into mediastinum. This condition has high rate of complications and mortality.

Objective: This paper presents a case of 26 years-old male patient with NFN and upper mediastinitis after extraction of mandibular left second molar with periapical process.

Case details: The patient assigned to dentist because of the tooth pain and left sided perimandibular edema. Taken orthopantomograph displayed a cause at tooth 37. Patient primary treated with amoxicillin/clavulanate tablets within three days. Fourth day symptoms gradually worsened, body temperature increased, perimandibular edema descend sublingually with difficulty in mouth opening and developed dysphagia, but still without breathing problems. Dentist made left side sublingual intraoral incision and send him to Dental ambulatory department, University Hospital Dubrava, Zagreb. After clinical examination, tooth extraction is indicated and performed in combined local and general inhaled anesthesia. Few minutes after extraction, patient became cyanotic and dyspnoic with inspiratory stridor. Shortly after signs development, patient was successfully intubated and transferred in the operating room to emergency surgical tracheotomy. During operation, surgeon additionally made vertical incisions of skin and subcutaneous parts of both sides of neck because of obvious infection descending. Patient received triple antibiotic therapy (crystallin, gentamicin, and metronidazole). Control thoracic multi slice computer tomography has shown descendent mediastinitis. Second day, thoracotomy has been performed with complete mediastinotomy and drainage. Fourteen days later, patient discharged from intensive care.

Conclusion: Despite that this condition is very rare, early diagnosis and treatment of the patients with periapical process must be established with very great concern to prevent life-threatening complications. Antibiotics alone are not enough to prevent this condition, local basic treatment of infection such as trepanation of a tooth, incision, drainage or extraction are necessary.

Keywords: Complication; extraction; fasciitis; infection; mediastinitis; perimandibular edema

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