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Implant dentistry; the way to prevent bone loss

Maryam Mahmood
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Bone loss is a consequence of loss of teeth and chronic periodontitis. Causes of bone loss include extension of inflammation, trauma from occlusion, and other systemic diseases. Furthermore, dentures can accelerate bone loss by wearing away at the ridges of bone they are placed on. Primary aim of dental implant therapy is the preservation and prevention of alveolar bone atrophy. Over the last two decades, several clinical studies have shown that alveolar bone resorption is permanently prevented if dental implants are placed immediately or soon after tooth loss. Extraction of teeth always leads towards the shrinkage of jawbone at the extraction site with a 40-60% bone loss in height and width over a period of 2-4 years and this phenomenon continues throughout life at a rate of 0.5-1% annually. Unaesthetic facial lines, increase in size of the maxillary sinus, poor retention of dentures, over closure, shifting of remaining teeth and general discomfort are among the problems that are generated by loss of bone causing functional, anatomical and cosmetic problems. Implant therapy not only provides possibility of the reconstruction of lost dental tissues but most significantly also enables the preservation of alveolar bone.

Biography

Maryam Mahmood is a final year Dental student currently studying at CMH Lahore Medical College and Institute of Dentistry.

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Prevalence of congenitally missing permanent teeth in Aseer region, Kingdom of Saudi Arabia

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Introduction: The most common developmental and congenital dental anomaly is tooth agenesis. Congenitally Missing Teeth (CMT) refers to teeth whose germ did not develop sufficiently to allow the differentiation of the dental tissues 1. It is defined as missing of one or more teeth 2. It can be seen sporadic or in hereditary syndromes. This anomaly occurs in three categories: 1. hypodontia; 2. oligodontia and; 3. anodontia.

Materials & Methods: A total of 1050 panoramic radiographs of patients attending College of Dentistry, King Khalid University in KSA, Aseer region were reviewed. 1050 panoramic radiographs (64.76% males, 35.23% females) were selected. The patients were 12-40 years old. Inclusion criteria: having no specific syndromes, age more than 12 years old. Exclusion criteria: history of tooth extraction or tooth loss due to trauma, caries, specific syndromes, cleft lip & palate, ectodermal dysplasia, periodontal disease or orthodontic extraction, not enough radiographic quality to accurately diagnose the CMT. A tooth was considered congenitally missing when the absence of crown mineralization was confirmed in the panoramic radiographs. Data were collected and entered into the SPSS software then analyzed using Paired t-test, Mann-Whitney test, independent t-test, Chi-square test and Fisher exact test (α=0.05).

Results: The patients were obtained from 12 to 40 years old patients OPG. Prevalence of CMT is 7.42%. A total of 78 teeth, (males=52, females=26) in 73 patients were congenitally missing, with an average of 0.71±0.34 teeth per patient. The most common congenitally missing teeth were mandibular second premolars 28.21%, maxillary second premolars 25.64%, maxillary lateral incisors 23.8% and maxillary first premolars 12.82%, respectively. In this study, bilateral missing tooth in maxilla (60%) was more than mandible (40%). Prevalence of CMT in mandible (28.8%) was less than maxilla (71.2%). The least common missing teeth were first and second molars of both jaws (with no missing case) followed by mandibular canine.

Conclusion: The prevalence of CMT in Aseer, KSA is more in comparison with many population groups; therefore, the importance of diagnosis and management of these teeth is most important. By early detection of missing teeth, alternative treatment modalities can be planned and minimize the complications of CMT. The most frequent missing teeth were mandibular second premolar fallowed by maxillary second premolar and maxillary lateral incisor.

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Stronger osteogenesis of induced pluripotent stem cell-derived MSCs as compared to dental follicle stem cells

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Bone loss is a common consequence of long lasting teeth loss. Fixation of dental implants requires a sufficient vertical and transversal bone level to guarantee long-term success. Autologous material cannot always be provided and xenogenic acellular material still fails to provide satisfactory durable results for the osseointegration of implants. A promising cell source is stem cells differentiated towards the osteogenic lineage. We could show that dental follicle-derived mesenchymal stem cells (DFCs) are already committed towards hard tissues and therefore a better source than mesenchymal stem cells. However, dental follicle cells are only available in the young or from allogenic donors. With the discovery of iPS cell generation in 2006, a new promising autologous cell source was established. iPS cells might be superior to DFCs due to their easy, non-invasive harvest, their infinite self-renewal, and their pluripotency. In this study the osteogenic differentiation potential of induced pluripotent stem cells was compared to that of dental follicle-derived mesenchymal stem cells. Both, DFCs and iPSC-derived iMSCs express the positive markers CD73, CD90, and CD105 recommended by the International Society for Cellular Therapy to define MSCs. IPS cells were shown to be pluripotent by immuno-fluorescent detection of pluripotency markers. Successful differentiation of these cells towards iMSCs was evaluated by RT-PCR with the respective markers. Both stem cell types were able to differentiate towards the osteogenic lineage as verified by Alizarin Red S staining. Several purinergic receptors were shown to be involved in osteogenesis, in particular the P2X7 subtype in DFCs. In both cell types P2X5 was down-regulated. Remarkably, another subtype, P2X3, is upregulated during the differentiation process towards osteoblasts in iPSCs and iMSCs. Interestingly, iMSCs exhibit an even stronger osteogenic capacity compared to DFCs. DFCs are derived from wisdom teeth and therefore, it is unlikely that they can be obtained from the respective patient. On the other hand, these cells have the advantage to be juvenile cells with a high proliferation capacity. However, iPS cells have an even higher proliferation capacity and can be reprogrammed from the patient's own cells. Here, we show for the first time that also their osteogenic capacity is better as that of other adult stem cells. This makes them an attractive cell source for bone replacement and dental implants in the future.

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HOXA11 pre-selected human mesenchymal stem cells from different body parts for enhanced osteoblastogenesis

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In dental surgery new bone reconstructive therapies are of great interest. Bone grafts are usually provided from autologous, allogenic, or xenogenic sources that are either not available in sufficient amounts or carry the risk of immunogenic reactions. A promising new approach is the use of human mesenchymal stem cells from the patient in combination with scaffolds. We showed recently, that stem cells from the head region are pre-committed towards hard tissues and address the question, if there are cells from other body parts, that are easier to obtain and similar pre-committed. *HOX* genes are a highly conserved family of 39 transcription factors defining the limp development along the cranio-caudal axis and thus are potential biomarkers for the osteogenic potential of stem cells isolated from different body parts. Collagen scaffolds were tested for their successful support of attachment and growth of freshly isolated primary cells. Mesenchymal stem cells from neck, thigh, and belly were isolated from liposuction material and differentiated towards the osteogenic lineage. The *HOX* gene pattern was investigated before and after differentiation via gene array analysis and RT-PCR. The osteogenic differentiation was confirmed via Alizarin Red S staining. Interestingly one member of this gene family, namely *HOX*A11, is up-regulated during in vitro osteogenesis. In addition, mesenchymal stem cells from the belly region showed the highest basal expression of *HOX*A11 and the strongest staining with Alizarin Red S. One hurdle for the use of mesenchymal stem cells in regenerative dentistry is their low differentiation efficiency. Since liposuction material can be obtained from various body regions defining the most pre-committed stem cells for osteogenesis might improve their future use in bone regeneration by reducing unwanted side effects. For this *HOX*A11 can be a suitable marker gene. Collagen scaffolds with their good biocompatibility might serve as an intermediate to bridge the gap until the defect jawbone is reconstructed. The combination of *HOX*A11 preselected stem cells and collagen scaffolds might therefore be a promising alternative to current strategies in regenerative dentistry.

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Dental neural crest-derived progenitor cells as a better source for jawbone repair

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The gold standard for cellular therapy in regenerative medicine is mesenchymal stem cells. However, for jawbone repair it would be beneficial to use stem cells pre-committed towards the osteogenic lineage. We have shown recently that adult stem cells derived from dental follicles are pre-committed towards the osteogenic lineage. However, the availability of these cells derived from wisdom teeth is restricted to the youth of the donors. Therefore, we investigated another cell type, dental neural crest-derived progenitor cells (dNC-PC), which might have a similar differentiation potential and can be found in adult teeth. Dental neural crest-derived progenitor cells from the apical pad which can be found beneath the papilla of maxillary third teeth were isolated and characterized for mesenchymal markers. Similar to dental follicle cells, dNC-PCs are pre-committed towards the osteogenic lineage since they are no longer able to differentiate towards adipocytes, endothelial cells and smooth muscle cells. In addition the dNC-PCs differentiate towards osteoblasts within two weeks which is faster and might even be stronger than the other mentioned cell types. All three tested cell types show the same pattern for mesenchymal stem cell marker, although they are of different embryonic origin: both, dNC-PCs and DFCs, are derived from the brachial arc whereas MSC are derived from somites during embryogenesis. Since dNC-PCs showed the strongest and fastest osteogenic differentiation of the tested cell types, they might be a suitable alternative for dental follicle cells in jawbone repair.

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Antioxidant and antimicrobial activity of lignin-based hydrogels for drug release applications in dental bone regeneration

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Lignins are intensively studied regarding their potential as bio-based sustainable drug release material. Thus, various drugs have been encapsulated and tested regarding their release kinetics including antimicrobial substances. Regarding their availability, lignins are byproducts of the paper and pulping industry. They are available in huge amounts in form of so called black liquor, mainly produced via Kraft-pulping. However, applications of technical lignins are still limited to low-quality products due to the chemical and structural inhomogeneity. Thus, the first goal is to develop an appropriate approach for lignin extraction and purification. The purified lignins are then studied with special focus on antioxidant and bioactivity properties depending on biomass source and pulping process. In collaboration with the cold chain management group at the University Bonn, lignin-based polymers are developed for biomedical applications such as drug release for dental tissue regeneration. The lignin is extracted from black liquor via acidic precipitation, monitored by thin layer chromatography (TLC). Purification of kraft lignin was carried out by selective extraction. Lignins are characterized by FTIR, UV-Vis, 31P NMR, SEC, XRD and microscopy (SEM). Antioxidant activity is studied using a DPPH assay. The phenol content of lignins is determined by the Folin–Ciocalteu Micro method. The results of both methods confirm the antioxidant ability of lignins reported in literature. In addition, it could be shown that the antioxidant activity of the lignin fractions strongly depends on the source of the raw material (black liquor). Here, differences in biomass feedstock used for the kraft pulping process could be the reason for this observation which still is under investigation. Bioactivity (antibacterial and antifungal) of extracted lignins is accomplished by disk diffusion method and solution shake method. The antimicrobial activity is tested by modifying the method ISO 22196 (2007), a quantitative method to determine the level of antimicrobial activity of polymer surfaces. Polymer composites based on lignin and hydroxypropyl methylcellulose (HPMC) were prepared and tested regarding their swelling behavior and mechanical stability.

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Preparation and structure analysis of agarose/hydroxyapatite composites to be used as scaffold and drug release material in dental bone regeneration

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The treatment of dental bone defects requires individually designed scaffolds, which should not only fill the bone void restoring at least partial stability but should preferably also induce new bone formation. Therefore, scaffolds could carry both stem cells with the capability to differentiate into osteoblasts and growth factors that induce and/or conduct osteogenic differentiation. Current approaches in scaffold engineering include composite materials consisting of both, polymers (e.g. collagen, polycaprolactone, chitosan or polysaccharides) and inorganic ceramic constituents (e.g. hydroxyapatite (HA), beta tricalcium phosphate (ß-TCP) or bio-glass). While polymers help forming light and porous biocompatible structures, ceramics improve mechanical stiffness and cell attachment. Most recent research activities include scaffolds promoting human mesenchymal stem cell (MSC) differentiation into osteoblasts incorporating various growth factors directly into the scaffolds. Additionally, purinergic receptors (P2X and P2Y) have been found to have a significant influence on the osteogenic linage commitment. Thus, osteogenic differentiation can be guided by addition of corresponding receptor ligands. The topic of this contribution is the facile scaffold preparation of natural polysaccharide agarose hydrogel and *in situ* precipitated hydroxyapatite. Agarose hydrogels are biodegradable, biocompatible and non-cytotoxic, have high water content and show high porosity. HA resembles original bone composition and provides both mechanical strength and osteo-conductivity to the agarose hydrogel. Fabricated scaffolds have been characterized via X-ray diffraction, FTIR spectroscopy and electron microscopy (SEM). Furthermore, porosity, drying and swelling behavior have been evaluated. Results of mechanical stability and first release experiments will be presented.

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Comparison of sealer penetration by using different irrigation techniques – an *in vitro* study

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Introduction: The main goal of root canal treatment is to eliminate the microorganisms particularly in the apical third area and to prevent re-infection. To achieve these goals, the instrumentation must be combined with adequate irrigation.

Aim: To compare sealer penetration by using different irrigation techniques i.e., apical negative pressure irrigation, Passive Ultrasonic Irrigation (PUI) and combination of apical negative pressure irrigation and PUI.

Materials & Methods: A total of 48 single rooted maxillary central incisors were taken. Access cavity was prepared and biomechanical preparation was done. The samples were randomly assigned into three experimental groups based on the final irrigation technique used. Group I: Apical negative pressure (Endovac), Group II: PUI, Group III: Combination of apical negative pressure and PUI. All the samples were obturated using AH plus sealer and the sections were observed under confocal laser scanning microscope to evaluate the percentage and maximum depth of sealer penetration at 1mm, 3mm and 5mm levels. Statistical analysis was done by using two-way ANOVA and Tukey's post-hoc test to compare the percentage and maximum depth of sealer penetration.

Results: Combination group resulted in better sealer penetration at 1mm and 3mm from the working length than the Endovac and PUI group. However, the Endovac group showed significantly better sealer penetration at 1mm from the working length when compared with PUI. There was no significant difference in sealer penetration at 5mm level between PUI and combination group.

Conclusion: Combination group was the only group to achieve better sealer penetration at 1mm and 3mm levels from the working length

Biography

Prabu Mahin Syed Ismail currently works as an Assistant Professor at Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia from 2014. He worked as a Senior Lecturer at Priyadarshini Dental College and Hospital, Pandur, India from 2010 to 2014. He taught undergraduate classes in Conservative Dentistry and Endodontics as a part of the PG (MDS) programme at the Faculty of Dental Sciences of Sri Ramachandra University.

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The effect of resin infiltration application on early proximal caries lesions (in vitro study)

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Background: Resin infiltration material (ICON), used in treating early proximal caries lesions, as it depends on a micro-invasive infiltration technology.

Aim: To evaluate the effectiveness of resin infiltration, fluoride varnish and combination of fluoride and resin infiltration after induction of caries like lesion on extracted human young premolar teeth in vitro.

Material & Methods: Thirty extracted human premolar teeth for orthodontic treatment were sectioned in a buccolingual direction into two halves using isomet low speed saw, thereby creating 60 specimens in total. Each specimen was immersed for 2 weeks in demineralizing solution to induce caries-like lesion. Only teeth with International Caries Detection and Assessment System (ICDAS) codes 1 and 2 were selected. The specimens were divided into three equal groups. Group A (n=20) (ICON), group B (n=20) (ICON+ Fluoride) and group C (n=20) (Fluoride) served as control group. Then, thermo-cycled in artificial saliva and examined with Scanning Electronic Microscope and Energy-Dispersive X-ray analysis. The collected data were submitted to statistical analysis using Kruskal Wallis and Mann Whitney with level of significance among the groups at (p values<0.05).

Result: The demineralized enamel surface showed an irregular pitted rough surface with the presence of widely distributed craters of variable depths. In group A, there was a partial blockage of the enamel rods with resin infiltration, while in group B the surface was highly smooth and homogeneous with the presence of a hyper-mineralized layer and complete obliteration of the craters and enamel rod ends. In group C, the enamel rods were partially blocked with fluorapatite crystals with rough irregular surface. EDX analysis showed high Ca and P levels in group A in comparison to the other groups, there is no statistical significant difference, while group B and C had higher level of Fluoride.

Conclusion: Combination of resin infiltration and fluoride were seen to be an efficacious method for the treatment of interproximal lesions by improving the surface texture and remineralization of the tooth surface. Application of resin infiltration and fluoride will reduce caries progression.

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Anti-plaque efficacy of herbal mouthwashes as compared to synthetic mouthwashes in orthodontic patients: a randomized controlled trial

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Aim: The present study compares the antiplaque effects of two herbal mouthwashes (*Salvadora persica* and *Azadirachta indica*) with two synthetic types (*Chlorhexidine* and *Cetylpyridinium*).

Design: In this double-blind, randomized controlled trial, 100 patients undergoing orthodontic treatment was first scaled and polished for baseline zero plaque score. In the first phase, they were given oral hygiene education and provided a standard tooth paste to be used twice daily for a period of three weeks. In the second phase, following scaling and polishing, they were randomly allocated to use one of the four types of mouthwashes (A=Chlorhexidine, B=Cetylpyridinium, C=Extracts of *Salvadora persica* miswak and D=Extracts of *Azadirachta indica* miswak) along with previously instructed tooth brushing protocols for a further period of three weeks. Plaque accumulation was scored according to modified bonded bracket plaque index at the start, after tooth brush-paste trial and at the end of mouthwash trial. Paired t-test was used for comparison of pre- and post-plaque index in all groups. Comparison analysis of mean difference of post-plaque index between and within groups was performed by multivariate analysis of variance MANOVA and Post hoc Tukey test.

Results: A total of 80 participants completed the study; among them, 17 were male and 63 were female. There was significant reduction in mean plaque scores after using mouthwashes in all the 4 groups at follow-up when compared to first plaque score (p=0.009). A statistically significant (p=0.016) reduction of plaque score was found in Group C (*Salvadora persica*) when compared with the CHX group. Group D (*Azadirachta indica*) also had higher reduction when compared with CHX and CPC but it was not statistically significant (p=0.092 and p=0.292). However, no significant difference was seen between CHX group and CPC group with respect to mean reduction in plaque scores (p=0.934).

Conclusion: Both types of miswak derived mouthwashes can be a good substitute for synthetic types and can be recommended, especially for patients on orthodontic treatment, as safer, cost effective and well tolerated mouthwashes.

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Assessment of transverse dental arch relationship and occlusion in surgically repaired unilateral cleft lip and palate children

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Objective: The purpose of this study was to assess and compare the transverse dental arch relationship and occlusion in surgically repaired unilateral cleft lip and palate children by Oslo protocol with those of healthy comparable non-cleft children in Egypt.

Study design: Comparative cross-sectional study design was used. Thirty-one non-syndromic children with repaired unilateral cleft lip and palate with mean age of 7.35±1.52 years together with thirty-one healthy, comparable, non-cleft children were recruited from Faculty of dentistry, Alexandria University. For each subject, sagittal molar and cuspid occlusion was measured from the dental study casts. The buccolingual dental arch relationships were determined through the modified Huddart-Bodenham scoring system.

Results: Mesial step terminal plane and class III cuspid relation were significantly higher in UCLP children in the age group 4 to <6 years. Class III permanent molar and cuspid relations were significantly higher in UCLP children in both age groups 6 to <8 and 8 to <10 years. Modified Huddart-Bodenham showed significantly more negative total arch constriction score in 6-9-year old UCLP children than in non-cleft children.

Conclusions: There was a predilection for most of UCLP children in all age groups to have mesial step terminal plane in primary dentition, class III permanent molar relation in mixed dentition and Class III cuspid relations. Modified Huddart-Bodenham scores revealed that UCLP children suffered from constricted maxillary arch in all age groups especially in the canine region.

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Calcium hydroxide and iodoform compared to zinc oxide and eugenol containing materials pulpectomy in primary teeth: a systematic review and meta-analysis

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Aim: This systematic review and meta-analysis aimed to evaluate whether primary teeth calcium hydroxide and iodoform pulpectomy is more successful clinically and radiographically compared to ZOE containing materials.

Methods: A systematic search was performed through electronic databases to find relevant studies. The titles of all studies were reviewed by two authors independently. Duplicate articles were excluded. After titles selection, the abstracts then full text was reviewed. Finally, a meta-analysis was performed.

Results: The searches yielded 3,492 potentially related titles, 25 were selected and reviewed in full text. The 15 studies included in the presented systematic review have included 1,649 primary teeth (337 anterior teeth and 1332 posterior teeth) from children aged between 3-13 years were pulpectomized and have follow-up period ranged from 2–30 months. The included studies reported different inclusion, exclusion criteria and different interventions in their methodology. A total number of 10 studies were included in the meta-analysis showed no statistical significant difference in the overall clinical and radiographic success rate in primary teeth pulpectomy when using calcium hydroxide and iodoform compared to zinc oxide and eugenol containing materials. However, the high-quality studies reported statistical significant difference in the radiographic success rate in zinc oxide and eugenol containing materials group compared to calcium hydroxide and iodoform.

Conclusion: This study represents no statistical significant differences between the overall clinical and radiographic success rate of calcium hydroxide and iodoform compared to zinc oxide and eugenol containing materials used in primary teeth pulpectomy. However, the high- quality studies reported statistical significant difference in the radiographic success rate in zinc oxide and eugenol containing materials group compared to calcium hydroxide and iodoform. The results of this study recommended more high quality randomized clinical trials with long follow up period to determine the clinical and radiographic success rate of zinc oxide and eugenol containing material groups compared to calcium hydroxide and iodoform.

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Isolation of mesenchymal stem cells from the tooth pulp and cell characteristics

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Background: In recent years, a sufficient amount of data has been obtained on the possibility of isolating stem cells from the teeth pulp, both children and adults. The main population of cells that can be isolated from the tooth pulp is mesenchymal stem cells. As a possible source of MSC for tooth regeneration, several types of cells are considered today: tooth MSC, MSC from non-dental intraoral sources, primarily the mucous membrane of the cheek, gums, periosteum, and MSCs from other sources such as bone marrow, adipose tissue and umbilical cord.

Objective: To develop a protocol for MSC isolation from the pulp of third molars removed by orthodontic indications and characteristics of isolated MSC.

Material & Methods: Third molars without visible carious lesions and signs of inflammation (n=20) of patients of both sexes aged 16-35 years were removed by orthodontic indications. All patients signed informed consent form allowing the use of isolated MSC for research purposes. Cells were isolated enzymatically. The tooth was placed in 2 ml of a 0.5% collagenase II type for 1 hour at 37°C, followed by addition of 3 ml working medium (1:1 DMEM/F12) to stop the fermentation and subsequent centrifugation of cell suspension (5 min, 1000 rpm, room temperature). The supernatant was carefully selected. The cell pellet was re-suspended in 1 ml of the complete culture medium (1:1 DMEM/F12, 10% FBS, 100 μM L-ascorbic acid, 2 mM L-glutamine, 100 U/ml penicillin, 100 mg/ml streptomycin and 0.25 mg/ml amphotericin B). The resulting suspension of dental pulp cells was placed on 25 cm2 culture plates with the complete culture medium and subsequently incubated at 37°C and 5% CO2. The culture medium was replaced every 2-3 days until confluence reached 80%. Isolated passages were performed according to standard protocol (1:3 ratio, every 7-8 days). Further analysis included cells on 2-3 passages. Analysis of the cell population characteristics was conducted by the following MSC criteria: morphologic criteria, expression of typical cell surface markers, ability to differentiate into specific cell types. Evaluation of the cell shape was performed by light microscopy. Analysis of MSC markers expression (presence of CD73, CD90, CD105, absence of CD14, CD20, CD34, CD45) was performed by flow cytometry (Beckman Coulter, FC500 assay kit, MSC phenotyping kit: human #130-095-198, Miltenyi Biotec) according to the manufacturer's instructions. We analyzed the ability of cells to differentiate into osteo-and chondrogenic cell lines, and the ability to differentiate into specific tooth cells, odontoblasts. Osteo- and chondrogenic differentiation was carried out by the addition of standard differentiating media (StemPro, Chondrogenesis Differentiation Kit, # A1007101, Gibco StemPro, Osteogenesis Differentiation Kit, # A1007201, Gibco) for 30 days with the following histologic staining. Odontoblastic differentiation was assessed by expression of characteristic markers - dental sialofosfoproteina (DSPP) (primary antibody anti-DSPP, Abcam, ab216892; secondary antibody - goat anti-IgG, IgA, IgM rabbit FITC (f-GAR Iss), Imtek) with immunocytochemistry standard protocol.

Results: The MSC isolation protocol is prepared inclusive of modern data on the base of own experience for human tooth. All procedures for cells isolation (n=20) from the removed teeth were successful. Dynamic observation of cell cultures after 24h of culturing showed the formation of cell colonies and most of the cells acquired the typical fibroblast-like form of MSC already. After culture medium replacement, all cells obtained characteristic fibroblast-like shape. The level of CD90 and CD105 expression was 98.5±3.8% and 96.8±2.9%, respectively, and CD14, CD20, CD34, CD45 markers were absent. The success of osteo- and chondrogenic differentiation was confirmed by the histochemical staining. Analysis of odontoblastic differentiation showed that use of standard differentiating osteogenic medium can lead to specific tooth cell differentiation.

Conclusion: The pool of cells from third molars of adult patients isolated according to the developed technique is characterized by the basic features of mesenchymal stem cells isolated from other sources and described according to the passports of the cell lines - the ability to self-renew and multilinear differentiation, has an osteo-odontogenic and chondrogenic potential.

Biography

Svetlana Lyamina has completed her Cand. of Med. Sci. (equal to PhD) at the age of 25 years from Saratov State Medical University, Saratov, Russia, and Doct. of Med. Sci. at the age of 31 from Moscow State University of Medicine and Dentistry, performing postdoctoral studies from Moscow State University of Medicine and Dentistry. She is the professor of pathophysiology department of Moscow State University of Medicine and Dentistry. She has published more than 48 papers in reputed journals and she is the author of 2 invention patents

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Prevalence of congenitally missing permanent teeth in Asir region, Kingdom of Saudi Arabia

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Introduction: The most common developmental and congenital dental anomaly is tooth agenesis. Congenitally missing teeth refers to teeth whose germ did not develop sufficiently to allow the differentiation of the dental tissues. It is defined as missing of one or more teeth, it can be seen sporadic or in hereditary syndromes. This anomaly occurs in three categories: hypodontia; oligodontia and; anodontia.

Materials & Methods: A total of 1050 panoramic radiographs of patients attending College of Dentistry, King Khalid University in KSA, Asir region were reviewed. 1050 panoramic radiographs (64.76% males, 35.23% females) were selected. The patients were 12-40 years old. Inclusion criteria: Having no specific syndromes, age more than 12 years old. Exclusion criteria: History of tooth extraction or tooth loss due to trauma, caries, specific syndromes, cleft lip & palate, ectodermal dysplasia, periodontal disease or orthodontic extraction, not enough radiographic quality to accurately diagnose the CMT. A tooth was considered congenitally missing when the absence of crown mineralization was confirmed in the panoramic radiographs. Data were collected and entered in the SPSS software then analyzed using Paired t-test, Mann-Whitney test, independent t-test, Chi-square test and Fisher exact test. (α=0.05).

Results: The samples were obtained from 12 to 40 years old patients OPG. Prevalence of CMT is 7.42%. A total of 78 teeth, (males=52, females=26) in 73patients were congenitally missing, with an average of 0.71±0.34 teeth per patient. The most common congenitally missing teeth were mandibular second premolars 28.21%, maxillary second premolars 25.64%, maxillary lateral incisors 23.8% and maxillary first premolars 12.82%, respectively. In this study, bilateral missing tooth in maxilla (60%) was more than mandible (40%). Prevalence of CMT in mandible (28.8%) was less than maxilla (71.2%). The least common missing teeth were first and second molars of both jaws (with no missing case) followed by mandibular canine.

Conclusion: The prevalence of CMT in Aseer, KSA is more in comparison with many population groups, therefore the importance of diagnosis and management of these teeth is most important. By early detection of missing teeth, alternative treatment modalities can be planned and minimize the complications of CMT. The most frequent missing teeth was mandibular second premolar followed by maxillary second premolar and maxillary lateral incisor.

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Expression of VEGF and M-CSF levels in bone remodeling during tooth movement with laser therapy histological and Immunohistochemical Study

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Background: Vascular endothelial growth factor (VEGF) induces proliferation of endothelial cells, stimulates angiogenesis, and increases vascular permeability, but information about its role in bone remodeling therapy is limited. The aim of this study is to determine Evaluation of the expression of macrophage colony-stimulating factor (M-CSF) to assessment for dental tissue response includes (periodontal ligament, cementum, alveolar bone) to application of LLLT and VEGF in orthodontic treatment in experimental rabbits.

Materials & Methods: A total sixty healthy male New Zealand - white rabbits of 22-24 weeks of age were used. Divided randomly into four groups: control group, experimental group with VEGF, experimental group LLLT and experimental combination group (VEGF + LLLT). These four groups received orthodontic appliance include only the mandibular central incisors (MCIs), and these teeth were moved distally for 21 days by using pushing coil spring that will be delivered a total constant amount of light continuous orthodontic force about100gm (50gm for each tooth). Application day for treatment will be at (0, 7th, 14th, 18th) of total experimental period. Each five rabbits for each study groups were sacrificed at the end of each periods (1st week, 2nd week, 3rd week) with inhalation anesthesia. Radiographical assessment method was performed first, then, histopathological examination for bone formation and resorption was performed at the pressure and tension sides of the coronal level with immunohistochemical based assessment for macrophage colony-stimulating factor (M-CSF)

Results: It shows on the bases of clinical findings that there is significant difference in the percentage of tooth separation between the control and the experimental groups, and the combination group records the highest value.

The Radiographic, histological and immunohistochemical findings support this, as the radiographic findings show the same result of clinical finding. Histological reports for numbers of osteoblast, osteoclast and blood vessels revealed a high record for combination group followed by laser and then VEGF group.

Conclusion: The exogenous application of VEGF and LLL therapy can increase the rate and percentage of orthodontic tooth movement by stimulating PDL remodeling and increasing alveolar bone formation.

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Salivary amylase and pain levels estimation & co-relation in myofascial pain syndrome

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Objectives: The present study evaluated the level of salivary α-amylase (sAA) in healthy individuals and Myofascial pain syndrome (MPS) patients and evaluated the reliability of salivary α amylase as a biomarker for pain.

Methods: Following ethical approval, the salivary sample for estimation of amylase was taken using Navazesh method of clinically diagnosed MPS patients (criteria by RDC) (Group I) and age & sex matched control group (Group II). Visual Analog scale (VAS) score for everyone was recorded co-related with salivary amylase. Statistical analysis was done using SPSS software 16.0.

Results: The sAA was significantly higher amongst Group I (149.92±21.1) compared to Group II (91.18±5.4). There was significant difference in VAS among different age groups and sex. The salivary α amylase levels progressively reduced in patients as the age increased. Group I. However, mild negative correlation was found between VAS and sAA in Group II.

Conclusion: The study highlights the sensitivity of sAA as an effective marker in assessment of pain severity in MPS patients based on VAS scale. The level of salivaryα-amylase was significantly correlated with the pain severity assessed by VAS.

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Minimally invasive endodontics: is it a new fashion or a reliable option?

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Ninja, sumo, keyhole, moushole preparation, non-prep endo, guided endo, truss access, selective retreatment etc. Strange expressions and treatment protocols became popular in recent days in endodontics. What is the rationality behind it? Is it worth to be minimal invasive during endodontic treatments, breaking sometimes the traditional rules? In my presentation focusing on the patient-centric approach, I will give answers to these actual questions. Benefits for the audience: 1. To have a definition about minimally invasive endodontics 2. To get a short review of the current literature, regarding to the this topic 3. To take possession of useful trics and tips to plan less invasive endodontic treatments, demonstrated with detailed cases, showing high quality pictures and videos.

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Sub-gingival simvastatin / chitosan gel in the treatment of chronic periodontitis in smokers.

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Aim of the work: The present study was designed to evaluate clinically & radiographically the effect of sub-gingival delivered simvastatin with / without chitosan gel in the treatment of chronic periodontitis among smokers.

Methods: Twenty smoker patients with moderate to severe chronic periodontitis (40 sites) selected and divided into 4 treatment groups (split mouth study)10 sites in each group as: group A, sites received scaling & root planning (SRP) + SMV gel. group B, sites received SRP + chitosan gel. group C, 10sites received SRP + (SMV+ chitosan) gel and group D, sites received SRP alone and served as a control. The clinical parameters were recorded, at baseline (before SRP), after 1, 3 and 6 months they included: plaque index (PI), bleeding on probing (BOP), gingival Index (GI), probing pocket depth (PPD) and clinical attachment level (CAL). At baseline and after 6 months, radiologic assessment of intrabony defect (IBD) fill was done using computer-aided software.

Results: All subjects tolerated the drug, without any post application inflammation. All therapies resulted in significant improvements. group C showed most significant improvement in all clinical parameters including: PI, GI, BOP, PD and CAL followed by group A and B, while group D showed the least improvement. Regarding radiologic assessment, group C also showed the most significant (IBD) fill followed by group B, A and D respectively.

Conclusions: The results showed that, the use of SMV with Chitosan gel in addition to conventional periodontal therapy in treatment of chronic periodontitis in smokers reduced the GI and PI score more than SRP alone, as it produced more decrease in PPD, more gain in CAL, less BOP and increase IBD fill.

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Achievement optimal esthetic results in anterior implant restorations

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To provide optimum esthetic results in anterior region is very difficult cases which not provide optimum implant placement criteria. There are several factors to consider when restoring failing dentition in the anterior region. The dental team must evaluate various criteria to define the optimal treatment plan. To achieve optimal esthetics especially anterior region, various patient and tooth related factors have to be taken into consideration. In esthetic implant restoration is one that resembles a natural tooth in all respects. Dental and gingival esthetics act together to provide a harmonious smile. The Dental should be aware of the parameters related to gingival architecture icluded morphology, form, dimension, characterization, surface texture and color. The predictability of an esthetic outcome for an implant restoration is dependent on many variables factors. The various factors and the procedures related to enhancement of peri-implant esthetics will be discussed in this lecture.

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The Psychological Effect of Smile Line on the Personality Behavior

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Cosmetic dentistry is considered one of the priorities of people need all around the world in a high percentage. According to that, cosmetic dentistry is considered the subject of today. Based on this fact the term cosmetic dentistry has become vernacular across the globe. Most of the patients nowadays are looking for cosmetic corrections .They may ask to rehabilitate their smile so that they can get the most beautiful smile according to their convenience .The reason behind this patient demand may have great effect on the psychological behavior of the patient .The variation of this demand depends on the severity of the appearing beauty of the smile line of the patient .Many of these patients may become shy ,others may become aggressive with psychological trauma. Also, some of these patients may isolate themselves from the community so may not share any social activities and the result is inferior complexity. So, the clinician here is playing the role of a dentist and a psychiatrist at the same time. Hence, the dentist or the specialist who is working in the field of cosmetic dentistry may change the whole life of the patient. In other words, you are rehabilitating the life of your patient. The difficulties in cosmetic correction may vary from one case to another depending on many factors. The most important target of all these cases is bad looking smile line which affected the personality behavior. These factors may include: 1. The severity in complicated cases like sever crowding which may need huge space availability. 2. Difficulties to treat cases like gum smile profile patient. 3. Difficulties to treat patients lacking the required inter occlusal space relationship. 4. Difficulties to treat patients having big diastema spaces. 5. Difficulties to treat canine cases out of occlusion which might be situated labially. 6. Difficulties to treat patients with severe bone loss in the anterior region. 7. Difficulties to treat patients with inconvenience in the level of gingival margin. 8.Difficulties to treat patients with shifted midline that is clearly visualized and diagnosed. 9. Difficulties to treat patients having traumatic accidents that require immediate solution to improve the aesthetic profile immediately. This article discus these difficulties by displaying some clinical cases report of many patients suffering from bad smile line. Most of these patients have psychological trauma and they were looking for immediate solution. Meanwhile, they were looking for a dentist with a deep emotion that has a spiritual behavior towards them. This is considered part of the keys for successful end results. The conclusion of this article is how to make your patients live happy and practice their life normally keeping in the mind that money is not everything in our faded life.

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Early childhood caries in Albania

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Introduction: Dental caries is a common childhood illness and important health problem worldwide. The purpose of the study is to evaluate the morpho-biologic correlation in primary teeth caries.

Material and Methods: This was a cross-sectional study conducted in 2012-2014. The study involved children who attended the Dental Clinic in Yrshek. The truck included 217 children of both sexes. Caries status of each child is recorded using DMFT index according to WHO criteria.

Results: The study included 102 (47%) boys and 115 (53%) girls. Only a small proportion of children (14.7%) use of vitamin D supplements and Fluor (9.7%). The prevalence of caries in the study resulted in 49.3% (95% CI 42.71-55.90). Caries prevalence among boys is 61.8%, while the prevalence in females is lower, 38.3%. Boys are 2.6 times more likely to develop caries than girls (p<0:01). The prevalence of caries in 0- 2 years of age is 18.3%, while the prevalence in the age of 3-6 years is higher. Also, children aged 3-6 years are more likely to develop caries compared with 0-2 years age group. Association of caries with maternal factors: Caries occurs most often in children who have mothers with low education, low economic status, primipare mothers, mothers with the disease, mothers with under nutrition and nutrition-health and who have not received vitamin D. Foods & soft drinks are consumed more often by children with caries or (86%) of them, and also children with caries consume less soup or (14%) of them, compared with (9%) of controls that consuming foods & drinks and sweet (91%) who frequently consume soup (p<0:01).

Conclusion: It is necessary to educate the population through promotional campaigns (in the press, TV, radio and brochures) and the staff at preschools for children's oral health.

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Bacteremia induced by acrylic and clear removable orthodontic retainers

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Introduction: Wearing orthodontic retainers after comprehensive orthodontic treatment is a regular practice. This makes an opportunity for the bacteria to enter the blood stream during the procedure. The fact behind the bacteremia is that the wires of acrylic removable retainer causes trauma to the buccal mucosa, gingival or even the alveolar mucosa and may introduce bacteria and subsequently bacteremia may occur. Other explanation is that when inserting removable retainer, bacterial deposits on the tooth surface may be pushed into the gingival sulcus by the pushing effect of the retentive clasps of removable retainer.

Aim of study: This study is aimed to investigate the incidence of bacteremia in orthodontic patients after inserting clear and acrylic removable retainers and to compare the colony forming units between both types of retainers.

Materials & methods: Forty-one subjects with an age range between 8-18 years from both genders were included in this study. Only 34 subjects were suited to this research. Eighteen subjects received acrylic retainer and the other sixteen received clear orthodontic retainer. For each subject blood sample were taken before and immediately (within one minute) after the insertion of the retainer. Blood Broth cultures were done on the samples to assess the presence of bacteremia. Post-insertion bacteremia was found in regarding the acrylic retainer, 12 cases (66.67%) acrylic retainers, whereas only 2 cases (12.5%) was found in clear retainer. There was highly significant difference (P-value=0.001) in the colony forming unit per ml of blood between both groups, being higher in acrylic one.

Conclusion: Removable retainer used in orthodontic retention presents a significant cause of bacteremia.

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The Bone Renaissance

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Introduction: In a relentless pursuance of perfection and a definitive solution for long term stability of tissues around dental implants, the author will present an exceptional concept - the 'Bone Renaissance'- a unique philosophy encompassing the sequential and codified reversal of the bone back to its original 3-D Engineered Divine Osseo-architecture (com'era, dov'era); by incorporating the five in one modus operandi: 'SABIRIN' (Stable Alveolar Bone Implant Reconstructive Integration Naturally), a major paradigm shift in re-establishing the natural spiritual union of the form and function.

Analysis: Loss of teeth always leads to the shrinkage of jaw bone at the extraction site with a 50-70% bone loss in height and width over a period of 2-4 years resulting in unaesthetic facial lines, increase in size of maxillary sinus, over closure, prognathic appearance, reduced horizontal labial angle of lip, loss of tone in muscles of facial expression causing functional, anatomical and cosmetic problems. A typical patient, with existing edentulous areas and desiring implant treatment doesn't have adequate bone to permit implants to be placed into normal root locations. This atrophy is a dynamic functional loss as the bone heals and changes from stress bearing to non-stress bearing bone for implant placement.

Methods: SABIRIN components: Bone Renaissance Implant placement with especial Osteotomes, Soft Tissue manipulation, Vascularized Osteotomies, Sinus & Onlay Grafts, Autologous Growth Factors & Stem Cells.

Results: The refurbishment of patients to innate curve, contour, aesthetics and function is achieved by using SABIRIN components which resurrect the lost contours of hard and soft tissues with a long-term, aesthetic predictability.

Discussion: Based on the 25 years of experience, the presenter thoroughly discusses the rationale, gives practical guidelines and presents surgical maneuvers to rectify hard & soft tissue deficiencies complemented by CGF to enhance facial aesthetics.

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Modern Orthodontic with laser and electromagnetic waves

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Evolution used laser at the beginning of this century, particularly in dentistry, we have begun to develop a plan for scientific research in the use of laser in orthodontics. The increase of deformation and jaw disorders at children nowadays leads to the need of new complete developed ways of orthodontic treatment. The increase of deformity and up normality of jaws at children happens with accordance of diseases of gingival tissues and caries; consequently, it leads to hardships of orthodontic treatment. Problems seen during orthodontic treatment are: 1. The environmental situations which cause effects upon immune system with disorder of accommodation in orthodontic treatment. 2. Hygiene, quality and types of materials used during treatment. Thus, orthodontic treatment leads to: 1. Bad immunological state in body system and reformation of bon tissues around moved teeth. 2. Destruction of bone tissues and difference in the blood circulation in gingival tissues. 3. Up normality of reaction of oral cavity. It is necessary to invent new multi-system ways which improve orthodontic treatment, in addition to decreasing of teeth caries and gingival tissues inflammation with correction of reactions in oral cavity. Those issues mentioned are some of important problems that have not been followed carefully in traditional orthodontics. Advantages of laser orthodontics for patients: With no doubt, we have a big advantage towards the conventional treatment. It is commonly believed to think of orthodontists as the people who activate brackets. By using laser nowadays, you have technical possibilities to adjust the laser settings in a way that you can treat a patient in an integrated way without teeth caries or gingival tissues inflammation in addition to the correction of reactions in oral cavity, and Shortening of the period of treatment, help in fixing teeth after orthodontic treatment, activating osteo and gingival cells though, you are still very effective. So, this is a very big advantage. And in addition to the known benefits of the laser effect. we well notice a correction of reaction resulted during orthodontic treatment with laser and electro-magnetic waves in the oral cavity, we will see: 1. The change of activity of Non-Oxidizing Enzymes of Saliva. Also, we will see decreasing of protein, katabsen –D and lactase concentration, high concentration of calcium and phosphor. This is confirmed in the case of improving functional reactions in the organism, the low level of inflammation in the oral cavity, Active construction and demolition operations in the bone tissue, change of the activity of enzymes increases: the activity of alkaline and acid-phosphates, there are many factors that have changed such as activity PH and other things affecting the mouth and physiological status that we will talk about later. The main goal obtained here is to get a new model of the use of combined application of lasers and electromagnetic waves (EMW), low density. It is a partnership between the laser and (EMW) in the use of combined therapy at various stages of orthodontic treatment; in which the red laser and infrared are absorbed by protein molecules cells.

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Office bleaching of vital teeth with laser (review of literatures)

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Introduction: The use of laser irradiation for teeth bleaching have been accepted recently. The procedure can be completed in one appointment and clinician allows to focus on one tooth or selected parts of tooth. The aim of this study is to summarize and discuss the available information concerning the efficacy, effects and side effects of activated bleaching procedures.

Experimental Methods: Information from all original full articles listed in PubMed or ISI web of science with key words: bleaching teeth with laser, light activated bleaching, papers published between years 2010 to 2017 was entered to this study.

Results & Discussion: Data collected from these papers showed that bleaching teeth with activation may have some side effects on pulp. It may increase pulp temperature to a critical value.

Conclusion: Application of activated bleaching procedures is effective but it may have some side effects. So, clinician must consider physical, physiological and patho-physiological implications.

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Treating the untreatable

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Course Objectives: This course is designed to teach practitioners to adequately treat the most commonly encountered atrophied edentulous bone through bone manipulation & grafting procedures so that they can predictably recreate the adequate bone volumes in order to place implants into the most optimal locations. After taking the course participants will be confident to place and restore implants in their own practices and may even be able to undertake the advanced procedures such as bone grafting and sinus augmentation.

Course Highlights: Simple implantation to extensive bone grafting, manipulation & augmentation; tunnel grafting, onlay bone grafting techniques; sinus graft/lift procedures; soft tissue manipulation & esthetic enhancement techniques, plastic surgery principles, tissue graft; autologous growth factors for tissue regeneration & augmentation; fundamental steps which will avoid the causes of most problems related to implantology. The course details: Didactic sessions including video surgeries. Treating The Untreatable: In reality, most of the patients seeking implant treatment with existing edentulous areas either do not have adequate bone to permit implants to be placed or to have them placed into normal root locations. This may lead to no treatment at all, limited number of implants, complicated prosthesis, inadequate occlusion, unnecessary over treatment, excessive costs and/or poor esthetics / oral hygiene. This atrophy is a dynamic, functional loss as the bone heals and changes from stress bearing to non-stress bearing bone. For successful implant placement the goal should be to recreate bone in the same positions. In pursuance of perfection and a comprehensive solution the Course Conductor will present a unique philosophy, emphasizing on treating the untreatable cases; and will present to you the simplest ways to achieve these goals.

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The prevalence of inflammatory and developmental odontogenic cysts in a Libyan population

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Aim: The aim of this study was to determine the prevalence of odontogenic jaw cysts in a Libyan population and to compare the data with previously published reports from other countries

Materials & Methods: We retrieved and analyzed 2190 case notes and biopsy records of the Department of Oral and Maxillofacial Surgery and the Department of Oral Pathology and Microbiology, Al Arab Medical Sciences University, Benghazi, Libya, dating from January 1990 to December 2005. There were 326 cases (14.8%) of diagnosed odontogenic cysts among the 2190 biopsies performed during this period. The cases were analyzed for age and sex distribution, site of presentation, association with impacted teeth, and the method of treatment.

Results- The male to female ratio of patients was 1.3:1 Radicular cysts accounted for 222 cases (68.1%), followed by dentigerous cysts (n=49, 15%) and odontogenic keratocysts (n=43, 14.1%). Mean ages of the patients were, respectively, 31.7, 22.7 and 36.1 years. . The maxilla was more commonly involved than the mandible (1.3:1). The anterior maxilla was the commonest site (n=132, 37.4%) followed by the posterior mandible (n=96, 29.4%). Fifty three cases were associated with impacted teeth, and the highest frequency was for dentigerous cysts (n=37). Enucleation and curettage was performed on 300 patients, marsupialization on 14, and marginal/ segmental resection on 12.

Conclusion: To our knowledge, this is the first such study on a Libyan population. Our results are comparable to studies from other countries. Knowledge of the relative frequencies and sites of presentation of odontogenic cysts in different ethno-geographic backgrounds is essential for the early diagnosis and management of these benign yet potentially destructive lesions.

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MRI-based determination of occlusal splint thickness for temporomandibular joint disc derangement: a randomized controlled clinical trial

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Objective: The current prospective study aimed to describe a method using magnetic resonance image to assess the appropriate effective occlusal splint vertical thickness.

Study Design: the patients were diagnosed as having internal disc displacement of the TMJ was divided into two groups. Group I (Disc Displacement with Reduction-DDR): This group was randomly subdivided into two subgroups. Subgroup IA (control group): patients treated using 3-mm-thick splints. Subgroup IB (study group): patients treated using MRI-based splint thickness. Group II (Disc Displacement without Reduction-DDNR): This group was subdivided randomly into 2 subgroups. Subgroup IIA (control group): patients treated using 3-mm-thick splints. Subgroup IIB (study group): patients treated using MRI-based splint thickness. The primary outcome variables were maximum voluntary mouth opening (MVMO) and visual analogue scale (VAS). The secondary outcome variable was joint sounds. The final sample was composed of 162 subjects (Group I=90 and Group II = 72).

Results: Statistical analysis showed significant improvement of the clinical outcome in subgroups IB and IIB as compared to that in subgroups IA and IIA.

Conclusion: On the basis of MRI measurements and clinical outcome, the current study recommended 4 mm and 6 mm vertical splint thickness for DDR and DDNR respectively for 1 year.

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Treatment of severe idiopathic gingival fibromatosis in mixed dentition

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Gingival fibromatosis may occur as an isolated finding or in combination with additional clinical problems associated with some syndromes. It may result in difficulties with proper dental hygiene keeping, chewing and occlusion. This work aims to describe a case of a child that was submitted a periodontal surgery for tissue removal caused by severe idiopathic gingival fibromatosis. A 10 years old male patient reported that presented a very large gingiva and he related about difficulty of tooth brushing. As treatment for resolution of the case it was opted for the gingivectomy surgery. This procedure was performed using the internal bevel technique with blade 15c at 45º with the alveolar bone crest, surrounding all the vestibular teeth's faces and the palatine faces of the molars, removing about 4 mm of gingival tissue. A small part of this material was sent for histopathological analysis. During surgery, teeth 64, 65 and 84 were extracted due they presented great mobility. Histological sections, stained with hematoxylin and eosin, revealed the presence of an epithelial lining showing marked acanthosis and, additionally, connective tissue hyperplasia was observed, such findings compatible with fibroepithelial hyperplasia So, based on medical history, clinical examination and histopathological study of gingival tissue biopsies the patient was diagnosed with generalized idiopathic gingival fibromatosis. After 6 months of follow-up, the patient was very satisfied with the aesthetic and functional results because the crowns were much more exposed in the oral cavity, facilitating mastication and hygiene.

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