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Abstract Book

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About this project

The purpose of the EDSA Lecture Competition is to stimulate research by dentistry students, to provide a venue to share innovative scientific data, to showcase unique research projects, and to encourage networking among dentistry students with similar interests. The authors of the top 10 abstracts are invited to give a presentation during EDSA meeting onsite for peer review. Best authors get prizes and certificates for participation. This project has been highly valued and attended by students in last meetings.

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Managing Peri-implant Disease: A Biological Complication of Dental Implants

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INTRODUCTION:

In 2017, the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP) met to deliver a new Classification of Periodontal and Peri-Implant Diseases and Conditions. In light of this landmark development and surrounding literature, we aim to provide an updated summary of the diagnostic classification, prevention, risk factors and treatment options of peri-implant disease, and highlight its relevance to dental students.

MATERIALS AND METHODS:

A literature search was done for the keywords "peri-implantitis", "peri-implant mucositis" and "peri-implant disease". Findings relating to periodontitis, previous iterations of peri-implant classifications and mechanical complications were excluded. The remaining eligible studies were reviewed for methodological quality, comparability of in vivo data, and selected for relevance to the topic. Key data was extracted, summarised and discussed.

RESULTS:

One of the most common reasons for biological implant complications is failure of osseointegration due to peri-implantitis. Based on current evidence, the Consensus Report of Workgroup 4 at the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions details 4 categories for peri-implant disease. They are peri-implant health, peri-implant mucositis, peri-implantitis and soft and hard tissue deficiencies, each with staging and grading criteria. Healthy peri-implant health is defined by absence of bleeding on probing, swelling, and suppuration, and may be present even in sites with bone loss. Meanwhile, peri-implant mucositis features bleeding on probing, with possible increased probing depths due to inflammation. Peri-implantitis is defined by the presence of inflammation and destruction of soft and hard tissues surrounding dental implants. The diagnostic criteria include bleeding on probing, suppuration, increased probing depths and radiographic bone loss, with grades and stages detailed below. Assessment technique include probing with a light pressure of 0.25 N at six points, confirmation that mobility is not related to the supra-structure, and differential diagnoses. Finally, keratinized mucosa may be advantageous towards peri-implant health. Prevention is critical to maintenance of peri-implant health. Failure to diagnose and manage peri-implant mucositis in a timely manner may lead to an increased risk of peri-implantitis. Therefore, it is important to be familiar with the risk factors and classification of peri-implant disease to facilitate an early diagnosis. In terms of post-operative peri-implant maintenance, regular recall appointments for professional debridement should be ensured, with the frequency dependent on patient risk profile, which include factors such as lack of keratinized mucosa, poor placement of implants, history of periodontal disease, insufficient plaque control and more than 5 implants per prosthesis. Optimal self-performed plaque control by the patient is an important factor in preventing development of peri-implantitis. Oral hygiene instruction should be carried out to improve patients' dexterity for manual or automatic toothbrushes, and interdental aids. Treatment protocols are as detailed below, from non-surgical and surgical alternatives.

CONCLUSIONS:

The 2017 Classification identifies categories of peri-implant health and provides clinical and radiographic parameters to facilitate diagnosis, prognosis and treatment. This improves on previous iterations of diagnostic guidance for peri-implant diseases, most notably inclusion of suppuration. However, more research is needed on the relevance of bacterial factors and trauma on peri-implant tissues, retrograde peri-implantitis as well as more comprehensive data on the implications of keratinized mucosa and submucosal cement on disease risk. Clinicians should be familiar with up-to-date diagnostic classification of peri-implantitis, non-surgical and surgical treatment steps. This enables effective management of implant complications due to peri-implantitis. Prevention strategies based on patient risk profile can be implemented to design a holistic maintenance regime for patients with dental implants.

ACKNOWLEDGEMENTS:

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KEY WORDS:

peri-implant, peri-implantitis, 2017 Classification of Periodontal and Peri-Implant Diseases and Conditions, peri-implant mucositis, dental implants

Maxillar Soft Tissue Changes After Le Fort I Osteotomy In Angle III Malocclusion Patients

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INTRODUCTION:

Visual appearance is largely determined by the surrounding soft tissue. Most studies focus on bone changes after orthognathic surgery, but not on soft tissues. For surgons and orthodontists soft tissue response may be really difficult to determine before surgery. For patients with severe dentofacial deformations, to whom orthognathic surgery is planned, soft tissue changes are expected after surgery. Important is to predict possible changes.

The soft tissue of the middle part of the face is difficult to predict due to the back-pulling forces of the muscles.

Aim is to identify and predict maxillar soft tissue changes in patients with Angle Class III malocclusion after Le Fort I osteotomy.

MATERIALS AND METHODS:

Soft tissue measurements were made on 3dMd Vultus scans obtained from a database of orthognathic surgery Le Fort I Angle III malocclusion patients. Soft tissue points were placed, measurements were performed on scans taken before orthognathic surgery (T0), 6 or 9 months (T1) after orthognathic surgery for 22 subjects, age 20 - 43. Paired t-test were used to determine changes between pre-surgery and post-surgery soft tissue position.

RESULTS:

Distance between both lips increased by 0,928mm ($p < 0,01$). Mouth width did not change. Distance between nasal alare increased by 1,554mm ($p < 0,01$). Biggest changes were between points sn (subnasale) and li (lower lip), where distance increased by an average of 2,03mm ($p < 0,01$), and also between points sn (subnasale) and chL (chelion left) on average by 1,77mm ($p < 0,01$). Changes also occurred in the soft tissue of the lower lip.

CONCLUSIONS:

Major changes were in the triangle area of nose alares and upper lip. This area moved forward and increased in width.

KEY WORDS:

Soft tissue, maxilla, Le Fort I, orthognathic surgery, 3dMd.

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Surgery First Approach – a promising new protocol for orthognathic treatment?

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INTRODUCTION:

Orthognathic treatment combines orthodontics and maxillofacial surgery. Treatment can take years and is very demanding to the patient. Studying new treatment protocols such as Surgery First Approach (SFA) could bring major benefits for the patients and for the healthcare system.

MATERIALS AND METHODS:

A systematic review of literature on SFA was performed in the PubMED database. Patient selection criteria, treatment duration, patient satisfaction and postoperative stability were compared. The search results were filtered using a PRISMA -chart. In the end 31 articles were included in the study. A case study was also included in the study.

RESULTS:

Careful patient selection is vital. With SFA treatment takes 6-12 months in total which leads to improved patient satisfaction when compared to the conventional method. There were no differences in postoperative stability between the conventional method and SFA.

CONCLUSIONS:

SFA is an effective protocol to be used for carefully selected patients alongside the conventional method. Suitable patients to be treated with SFA are those with even dental arches with no dental crowding, typically patients with Obstructive Sleep Apnea. Patient satisfaction and treatment have been very positive with similar postoperative stability than with the conventional method when patient selection is done carefully. SFA seems to be a promising method, although more studies are needed to confirm the results.

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KEY WORDS:

Orthognathic treatment, surgery first approach, regional acceleratory phenomenon, malocclusion, orthodontic surgery

Dental Stem Cells in Pulp Regeneration

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INTRODUCTION:

Stem cells are capable of becoming, depending on the environment, in cellular tissue of different organs. One stem cell gives many active, functional lineages. Stem cells in the oral cavity can be found in the dental pulp (DPSCs), gingiva, apical papilla, periodontal fiber (PDLSCs), alveolar bone. However, highest proliferation potential have stem cells from exfoliated deciduous teeth (SHED). They have become an attractive source for dental tissue engineering. These stem cells can be isolated from patients noninvasively. If they are stored in suitable conditions after extraction – they can treat diseases and even regrow whole tooth structures. The concept of using stem cells for dental tissue engineering was explored by Sharpe. He proved that it is possible to engineer murine teeth, using stem cells of nondental or dental origin.

In this literature review we will focus on tissue engineering of dental pulp with SHED cells. As suffered pulp is usually treated with endodontic approaches leading to devitalization and weakened tooth, we firmly believe pulp tissue engineering will gain more and more popularity in 21 century dentistry.

The experiment is done in vivo and consists of a tooth slice with 1mm thicklness from third molar. Its residual soft tissue is removed with a scalpel and the dental surface is wiped down with 70% ethanol. Biodegradable scaffold is prepared within the root canal and then seeded with dental pulp stem cells or dental pulp stem cells mixed with endothelial cells. The tooth slice is implanted in the subcutaneous tissue of immunodeficient mice, observing the predentine formation.

MATERIALS AND METHODS:

Key role plays the choice of scaffold and cells, which show potentiality to differentiate into cells of the pulp like dentin-secreting odontoblasts and vascular cells (providing vitality to the tissue). Polymers, such as polyglycolic acid (PGA) are suitable matrices for seeding of dental pulp fibroblasts, allowing their proliferation and development of a tissue with similar cellularity to normal pulp. Other scaffolds like a spongeous collagen, a porous ceramic, and a fibrous titanium mesh can support the attachment, growth, and differentiation of dental pulp stem cells in vitro, and when such constructs are implanted in vivo, the cells organize into a well-vascularized tissue that expresse dentin sialophosphoprotein.

The day before the implantations, the tooth slice/scaffolds are hydrophilized with incubations (5 minutes) in ethanol (100%, 90%, 80%, and 70%) and washed with sterile 1× PBS overnight at 4°C. The tooth slice/scaffolds containing cells are incubated for 30 minutes at 37°C to allow for the setting of the Matrigel.

After 14–28 days, the implants are retrieved, put in 10% buffered formalin at 4°C for 24 hours, demineralized with 10% formic acid at 4°C until the dentin offer no resistance to cutting with a blade (5–8 days) and then process for histology. Histologic sections (5-μm-thick) are stained with hematoxylin-eosin or kept unstained for immunohistochemistry.

RESULTS:

A dental pulp-like tissue with characteristics that resemble those of a normal dental pulp is observed. Predentin is formed. Besides SHED alone, endothelial cells are also implanted in the tooth slice/scaffold devices. To begin morphologic characterization of the engineered dental pulps, the number of cells lining the predentin is counted. SHED and endothelial cells show a higher number compared to SHED only. These findings suggest that co-implantation of endothelial cells provides for the quick organization of a microvascular network and influx of oxygen and nutrients to the SHED, improving their survival after transplantation and enhancing tissue cellularity.
Also almost all of the blood vessels found in the pulps engineered with SHED contain blood cells in their lumen, which demonstrates that the transplanted dental pulp stem cells are capable of differentiating into blood vessels that anastomose with the host vasculature.

Transmission electron microscopy reveals the ultrastructure of the cells adjacent to the predentin in engineered dental pulps. These cells show morphologic characteristics that resembled those of odontoblast cells, including the eccentric polarized position of the nucleus at the basal part of the cell body, developed rough endoplasmic reticula, Golgi's complex, and numerous vesicles.

CONCLUSIONS:

This method offers exciting opportunities for regeneration of dental pulps, one of the most commonly diseased tissues of the body, with consequent potential for impact on healthcare. Importantly, these cells form a functional vasculature as well as connective tissue secreting cells of the soft and hard tissues of the tooth. In the SHED cell–seeded tissue constructs, the cells at the periphery of the tissue show characteristics of active dentin-secreting odontoblasts - DPS-factors, typical for dentine are expressed. When SHED cells are co-implanted with human endothelial cells, the resulting pulp tissue constructs has even better organization and greater cellularity than when SHED cells alone are implanted.
This work suggests that exfoliated deciduous teeth constitute a viable source of stem cells for dental pulp tissue engineering.

KEY WORDS:

stem cells, proliferation, pulp, dentistry