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Editor: John L. Reyher, DDS, Danville, IL, concentrated his career in clinical practice and clinical research in the Department of Veterans Affairs

Current Overview

Persson G, Salvi G, Heitz-Mayfield L, Lang N. Antimicrobial therapy using a local drug delivery system (Arestin®) in the treatment of peri-implantitis. I: microbiological outcomes. Clin Oral Implants Res 17: 386-393, 2006.

The objective of this study was to test the effects of adjunctive administration of minocycline microspheres (Arestin) in cases of peri-implantitis.

This 12-month single center clinical case study evaluated 25 subjects, 12 females, with an average age of 60.3 years. The 25 subjects consisted of 4 smokers, 11 previous smokers, and 10 non-smokers. Inclusion criteria were at least 1 implant with 2 mm bone loss from time of placement, and a probing depth of ≥ 5 mm. Initial therapy consisted of oral hygiene instruction, mechanical debridement with carbon fiber curettes, prophylaxis, and topical application of .2% chlorhexidine gel. The study began thereafter with administration of 1 dose Arestin to each selected implant site. If necessary re-administration of the Arestin was done at day 180 and 270. Microbial sampling was conducted at baseline, day 10, 30, 60, 90, 180, 270, and 360 using sterile curettes. At day 10 there was a statistically significant reduction in 6/40 individual bacteria

Peri-implantitis

Clinical Practice Point

The use of Arestin antibiotic therapy for treating peri-implantitis was found to be not effective in this study.

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measured. At day 180 there was a significant decrease in total bacterial load compared to baseline. At day 270 there was no significant difference of total bacterial load compared to baseline, but there were lower levels for 12 of the 40 measured bacteria. At day 360 the only significant decrease was found for the *A. actinomycetemcomitans* load, but not for any other complex or individual bacteria for the total bacterial load.

Amount of baseline microflora proved not to be predictive of success or failure of the implant. The study demonstrated that the effects of the Arestin lasted until day 180. Approximately 20% of the peri-implantitis implants treated in this study with antibiotics failed, which was similar to other findings in previous studies. Total bacterial load was reduced with the study protocol, but failures in treatment could not be related to the presence of specific bacteria or total bacterial load.

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Peri-implantitis

Clinical Practice Point

The significance of carrier state of allele 2 of IL-1RN gene individual peri-implantitis is demonstrated along with confirmation of smoking as risk factors for implant treatment outcome.

Laine M, Leonhardt Å, Roos-Jansåker A-M, Peña A, van Winkelhoff A, Winkel E, Renvert S. IL-1RN gene polymorphism is associated with peri-implantitis. Clin Oral Implants Res 17:380-385, 2006.

The purpose of this study was to evaluate the association between the cytokine interleukin-I (IL-I) and peri-implantitis.

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Individuals (120) with a median of 6 implants placed were evaluated in this study. Smoking, age, and gender were also evaluated in the model to test for additional correlation. Smoking was defined as anyone who currently smoked or who had quit smoking. Non-smokers were those who had never smoked. DNA from each patient was isolated, using a mouthwash of .9% saline to obtain cells that were then centrifuged out. Analysis of the polymorphism of IL-I family was carried out on each patient. The genes evaluated for were: IL-IA gene at position -889 of the promoter region, IL-IB at positions +3954 and -511, as well as the penta-allelic variable number of the tandem repeat polymorphism of the IL-IRN gene. In addition, allele 2 and carrier of allele 2 frequencies and their combinations within patients were evaluated.

A total of 365 implants presented with peri-implantitis and 236 implants had no evidence of peri-implantitis. There were no significant correlations made between IL-IA allele 2 or IL-IB allele 2 genotypes. There was an association of IL-1RN genotypes, allele 2 frequency and allele 2 carriers with peri-implantitis. Smoking also was shown in this study to be a risk factor for peri-implantitis.

In summary, there was an association between the carrier state of allele 2 of the IL-1RN gene and peri-implantitis. In addition, this study confirmed that smoking is a risk factor for developing peri-implantitis.

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Noguerol B, Muñoz R, Mesa F, de Dios Luna J and O'Valle F. Early implant failure. Prognostic capacity of Periotest®: retrospective study of a large sample. Clin Oral Implants Res 17: 459-464, 2006.

This study evaluates the prognostic ability that the Periotest values would have on implant failure for first stage and second stage surgeries. Implants (1086) placed in 316 patients over a 10-year period were evaluated retrospectively. Data collected during this time was used to generate the study. Information gathered included: age, gender, smoking status, periodontal status, radiographs, and Periotest values. Bivariate analysis as well as multivariate logistic regression were used to relate early implant failure to the variables in question.

A sensitivity versus specificity curve revealed that at a value of -2 for the Periotest, the sensitivity was 84% and specificity was 39%. Bivariate analysis demonstrated a significant association between Periotest values and early implant loss. The multivariate logistic regression showed an association between the Periotest values of first

Early implant loss prognosis

Clinical Practice Point
Periotest measurement values associated with early implant loss prognosis is demonstrated vs. traditional radiographic analysis alone in this study.

stage surgery and early implant loss but not the second stage surgery. In conclusion, this study suggests that the Periostest may serve as a better prognostic tool than traditional radiographic analysis.

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Implant placement

Clinical Practice Point
Computer generated SurgiGuide use vs. intuitive placement of implants to improve treatment outcome is described.

Rosenfeld A, Mandelaris G, Tardieu P. Prosthetically directed implant placement using computer software to ensure precise placement and predictable prosthetic outcomes. Part 2: rapid-prototype medical modeling and stereolithographic drilling guides requiring bone exposure. *Int J Periodontics Restorative Dent* 26: 347-353, 2006.

The authors discuss the use of CT imaging in producing prosthetically driven surgical guides. Historically, implant placement has been intuitively guided and often led to compromised prosthetic outcomes. The goal of these advanced surgical guides is to ensure prosthetically-driven plans and provide predictable and repeatable results.

Rapid-prototyping is a technique used to develop a solid model of human anatomy from a 3D computer image. These models are produced in 3 ways: stereolithography, fused deposition modeling, and selective laser sintering. All are produced in layers from a computer-generated 3D image. These models benefit the patient by enhancing understanding of treatment, reducing time in surgery, and allowing for a better review of risks and benefits before surgery. These models are used to visualize anatomic features, aid in communication, practice surgical technique, and guide the design of future component prototypes. Stereolithography is the most common technique and the one reviewed in this article.

Stereolithographic models are accurate, reliable, and FDA approved for use in the patient during surgery. SurgiGuides are computer-generated osteotomy guides that use this technique. These guides have successive steel guide tubes for each osteotomy site, which measure .2 mm greater than the intended drill. With each new drill size, there is an associated tube which accommodates that size. These guides are bone supported, requiring flap reflection during surgery and at least a 30 mm mesial-distal bone surface.

These guides are intended to help the surgical and restorative teams plan implant therapy preoperatively and achieve consistent results. Being bone supported allows for surgical field visualization and stability of the guide.

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Chiapasco M, Lang N, Bosshardt D. Quality and quantity of bone following alveolar distraction osteogenesis in the human mandible. Clin Oral Implants Res 17:394-402, 2006.

This study characterized the quality and quantity of newly formed bone following distraction osteogenesis and determined clinical outcome following implant placement and subsequent loading. Seven carefully selected were entered into the study over a two year period.

The intraoral distractor was surgically placed and allowed to heal for 7 days. The device was activated twice daily at .5 mm for a total of 1 mm distraction per day until the amount needed was achieved. The desired position was maintained for 3 months without prosthesis use. The distraction device was then removed. At the time of implant placement nine bone biopsies were taken with trephine burs. Twenty 3.3 or 4.1 mm ITI solid screw SLA implants of 10 or 11 mm length were placed. After 3–4 months healing the abutments were connected and prostheses fabricated.

In all patients, the desired vertical gain was obtained with a range of 5–9 mm. There was a mean follow-up of 18 months, with all patients reporting acceptable function and no paresthesia, dyesthesia or pain. No implants were lost during follow-up, but 1 implant had levels of bone loss exceeding that recommended by Albrektsson. Survival rate was reported as 100%, with a success rate of 95%. The percent of mineralized bone was calculated for old versus new bone. The new bone ranged from 21.6%–57.8% and the old bone ranged from 48.9%–63.7%. When the percent of mineralized bone between old and new bone was compared, no correlation could be made. Qualitatively and quantitatively, the clinical findings are supported by the histological findings, i.e., there is sufficient volume and maturity of bone to support implant therapy.

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Helenius L, Tervahartiala P, Helenius I, Al-Sukhun J, Kivisaari L, Suuronen R, Kautiainen H, Hallikainen D, Lindqvist C and Leirisalo-Repo M. Clinical, radiographic and MRI findings of the temporomandibular joint in patients with different rheumatic diseases. Int J Oral Maxillofac Surg 35:983-989, 2006.

The objective of this study was to evaluate patients diagnosed with rheumatoid disease and evaluate their clinical, radiographic, and MRI findings.

Sixty-seven patients diagnosed with rheumatoid arthritis (RA) were included in this study and were subsequently divided into 4

Distraction osteogenesis

Clinical Practice Point
The quality and quantity of bone following distraction osteogenesis in the human mandible were found to be favorable for implant placement.

TMJ & rheumatoid disease

Clinical Practice Point
Temporomandibular joint (TMJ) diagnostic findings of patients with rheumatoid disease delineated.

groups: patients with RA, patients with mixed connective tissue disease (MCTD), patients with ankylosing spondylitis (AS), and patients with spondyloarthropathy (SPA). A clinical exam and interview with a patient questionnaire was carried out for each patient. The TMJ and teeth were evaluated using standard dental panoramic tomography. MRI was done for the majority of patients.

Decreased mouth opening was reported by 40% of patients with the majority being those with AS. The clinical exam found that 17% of AS patients had limited mouth opening, but was only found in 6% of RA, 0% of MCTD, and 11% of SPA patients. Panoramic radiographs revealed severe erosion in 13% of RA, 7% of MCTD, and 28% of both AS and SPA patients. MRI findings demonstrated condylar erosion, osteophytes and abnormal or flattened shape. Erosion was most common in RA (31%). Osteophytes were found in the majority (60%) of patients, especially the RA group. Perforation of the disc was found in 50% of RA, 33% MCTD, 44% of AS, and 35% of SPA patients. Abnormal position of the disc was most commonly found in the RA group. In general, there was a good correlation between panoramic radiographs and MRI. Pain, crepitation, and decreased movement of the TMJ were frequent findings in patients with rheumatoid disease.

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Erosive tooth wear

Lussi A, Hellwig E, Zero D and Jaeggi T. Erosive tooth wear: diagnosis, risk factors and prevention. Am J Dent 19:319-325, 2006.

Clinical Practice Point
The diagnostic challenge of erosive tooth wear is addressed in a clinically helpful manner with risk factors.

The objective of this study was to provide a review for the diagnosis, associated risk factors and prevention for erosive tooth wear.

Diagnosis is difficult to determine early and it may prove challenging to differentiate from abrasion and attrition. The diagnosis of erosive tooth wear is primarily the clinical presentation:

- Smooth silky-glazed appearance with no perikymata
- Intact enamel at the gingival margin
- Cupping and grooving noted on occlusal surfaces
- Flattening or developing a concavity in the enamel surface in advanced cases
 - o The concavity has a width that exceeds its depth

Risk factors for dental erosion are divided first into biological, behavioral and chemical factors. Additional factors such as habits, general health, knowledge, education, and socio-economic status play roles in the risk of developing erosive tooth wear:

- Biological
 - o Saliva flow and buffering capabilities
 - o Soft tissue movement
 - o Pellicle
 - o Tooth anatomy
- Behavioral
 - o Eating and drinking habits
 - o Oral hygiene practices
 - o Regurgitation or vomiting
 - o Occupation
 - o Drugs
- Chemical
 - o Ph
 - o Type of acid
 - o Adhesion
 - o Chelation
 - o Presence of Ca, P, F

These authors suggest the use of a checklist for etiologic factors to determine the source of acid, extrinsically or intrinsically. Based on the various sources indicated by the patient questionnaire, specific preventive recommendations can be made. Some recommendations may include the reduction of frequency of exposure to acidic foods, avoid brushing teeth immediately before or after the consumption of an acidic food or drink, the use of a topical fluoride, or the use of chewing gum throughout the day. Medical referral may be appropriate for intrinsic sources of acid.

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Smiler D and Soltan M. The bone-grafting decision tree: a systematic methodology for achieving new bone. Implant Dent 15:122-128, 2006.

The authors present a methodology for selecting bone grafting materials and techniques. The goal of bone grafting procedures is to achieve bone regeneration, rather than bone repair, the latter being an inadequate replacement for what existed prior to the defect being formed. To accomplish the goal of new bone regeneration, 4 conditions must be met: first, bone forming cells must be present; second, an adequate blood supply must exist; third, the graft must remain stable and immobilized; and fourth, the mucoperiosteal flap must be free of tension where the incision was made.

Bone forming cells or osteoblasts must exist at the graft site, be incorporated into the graft, or be created by mesenchymal cells during bone regeneration. The presence of osteoblasts at the graft site can best be determined by the amount of cancellous bone

Bone grafting

Clinical Practice Point
A methodology for achieving bone regeneration vs. bone repair is presented.

remaining. This quality of bone can be determined using CT technology. The ratio of cortical to cancellous bone is used and will help in determining the grafting material of choice. Blood supply must be insured to the area to allow for full regeneration. It is suggested to remove the dental lamina for socket preservation, as well as to pack the graft loosely to promote angiogenesis.

Once the graft material has been chosen, the amount needed can be determined. The amount of bone at the graft site will determine the surgical technique used, either onlay or interpositional.

With the graft in place, it must be stabilized; in a 5-wall defect, no additional retention is needed. However, other situations may require the use of GBR membranes, titanium-reinforced GBR membranes, titanium mesh, bone screws, or bone tacks.

Flow charts are provided in the article to assist in decision-making regarding graft material, based on existing bone quality, surgical technique based on bone quantity, interpositional and block graft options, as well as fixation choices.

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Bone tissue engineering

Clinical Practice Point
Bone tissue engineering with scaffolding procedures for load-bearing applications in place of autogenesis grafting is described.

Chim H, Hutmacher D, Chou A, Oliveira A, Reis R, Lim T, Schantz J. A comparative analysis of scaffold material modifications for load-bearing applications in bone tissue engineering. Int J Oral Maxillofac Surg 35:928-934, 2006.

Bone tissue engineering is a potential alternative to autogenous techniques to aid in the repair or replacement of bony defects. Three-dimensional biodegradable polymeric matrices are seeded with cells to generate bone-grafting scaffolds. The 2 major classes of scaffolds resemble foam-like structures or scaffolds with a more reproducible internal architecture. The aim of this study was to evaluate the effect of incorporated hydroxyapatite and simulated body fluid on a poly-e-caprolactone (PCL) scaffold.

PCL scaffolds were fabricated using a fused deposition modeling described in the article. A group of samples was left as a control. One group was infiltrated with hydroxyapatite crystals. The second group was impregnated with a sodium silicate gel, then immersed and stored in simulated body fluid (SBF). All of the samples were then seeded with human calvarial osteoblasts. Cell growth and differentiation were compared between samples. The cell-scaffold constructs were then surgically implanted into the back of Balb C nude mice and removed at 6 and 14 weeks. These samples were then grossly evaluated, imaged radiographically and tested mechanically for stiffness and creep.

All 3 samples demonstrated a successful seeding and proliferation of osteoblasts. The PCL and HA-PCL scaffolds demonstrated a constant rate of cell proliferation. Cell growth on the SBF-treated samples did not support cell growth as readily. Alkaline phosphatase activity peaked in all 3 samples soon after seeding, but was consistently higher in the HA-PCL and control scaffolds. In addition, osteocalcin expression peaked after 10 days in the HA-PCL and control groups but not in the SBF-treated group. In the implanted samples, vascular ingrowth was particularly pronounced in the HA and control scaffolds. Radiographic imaging demonstrated more mineralization in the HA and control groups than the SBF-treated group. Stiffness was similar in all groups, but the SBF group decreased in stiffness over time.

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Misch C, Goodacre C, Finley J, Misch C, Marinbach M, Dabrowsky T, English C, Kois J, Cronin R Jr. Consensus conference panel report: crown-height space guidelines for implant dentistry—part 2. *Implant Dent* 15:113-121, 2006.

The issue of crown height space (CHS) is considered with guidelines to help plan treatment for implant restorations with available space that presents. CHS is divided into excessive, adequate and insufficient and is measured from the crest of bone to the occlusal plane.

Excessive CHS is space greater than 15 mm. Orthodontics or surgery should be considered for reducing this space. Prosthodontics is the most common treatment for excessive CHS but should, in fact, be the last resort. There is a distinct advantage of removable prosthetics over fixed metal ceramic restorations in CHS cases. The support from implants for removable prostheses in excess CHS cases should be as great as that for fixed when using a rigidly attached over denture. With a non-rigid over denture there must be adequate soft tissue areas for support.

In cases of reduced CHS of less than 8 mm, the restorative choices become more limited. The 8 mm CHS must be divided into 2 mm of occlusal material, 4 mm for the abutment and 2 mm for the biologic width. Orthodontics and surgery should be considered in partially edentulous patients to gain CHS.

Complications from lack of room for restorative materials such as metal substructure which is thinned includes screw loosening/fracturing, porcelain fracture and excessive stresses on the implant/bone interface. If abutment height is less than 3 mm screw retention is recommended and using screw or non retrievable cement for 3–4 mm

Crown-height space guidelines

Clinical Practice Point
Recommendations for available crown-height space (CHS) guidelines for implant placement discussed to avoid treatment complications.

height. Reduced height prevents use of removable prosthetics in many cases with minimum requirements determined by the implant and implant attachments selected. The occlusal vertical dimension may be modified by treatment considerations discussed.

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Posterior mandible implants

Clinical Practice Point
Achievability of immediate loading of implants in posterior mandible demonstrated in this study but with reservations.

Romanos G and Nentwig G. Immediate versus delayed functional loading of implants in the posterior mandible: a 2-year prospective clinical study of 12 consecutive cases. *Int J Periodontics Restorative Dent* 26:459-469, 2006.

Immediate loading of implants in the posterior mandible poses a potentially risky clinical situation because of the amount of micromotion that may be present. Several studies have reported higher failure rate in the posterior mandible after immediate loading. The purpose of this study was to follow 12 consecutive cases of immediate versus conventionally loaded implants.

The study was comprised of 7 male and 5 female patients who were bilaterally edentulous distal to the canines or premolars. Eight of these patients had natural teeth in the maxilla and 4 had removable prostheses. Patients were in good health, compliant, and had a minimum 11 mm of bone and 6 mm of bone width. Three Dentsply Friadent CeraMed Ankylosis implants were placed on each side. One side was immediately loaded and the other was allowed to heal 3 months before loading with provisionals. The immediately loaded implants were placed at the time the control implants were uncovered and loaded. After 2 weeks, the provisionals were removed and a final impression was made. Four weeks later the final prosthesis was placed. All provisional and final crowns were made without interferences in lateral excursions and allowed for anterior guidance with posterior disclusion.

Healing was uneventful and all implants achieved osseointegration. No implant mobility was detected after surgery or during loading. During the loading period, radiographic bone height was 2 mm or less in the test group. In the control group, 1 site had bone loss of 3 mm at the end of 2 years.

Further studies with a larger sample size and longer follow-up, along with more compromised situations, are needed to provide more clinical data. However, within this study, successful osseointegration with immediate loading in the posterior mandible was achievable.

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Yamada Y, Ueda M, Hibi H, Baba S. A novel approach to periodontal tissue regeneration with mesenchymal stem cells and platelet-rich plasma using tissue engineering technology: A clinical case report. Int J Periodontics Restorative Dent 26: 363-369, 2006.

The authors report on the use of a true periodontal regeneration technique to replace GTR. This technique uses mesenchymal stem cells (MSC) in a platelet-rich plasma gel to re-establish attachment levels, reducing pocket depths and bony defects.

A 54-year old patient was used as a case report for this new technique. This patient received initial periodontal therapy of scaling and root planing. After initial therapy, the patient still presented with bleeding on probing, with a probing depth of 5 mm on the mesial and lingual, and an interproximal bony defect on the mandibular right second premolar.

Periodontal regeneration began first by harvesting MSC from the patient's iliac crest marrow 1 month before surgery. One day prior to surgery, the platelet-rich plasma gel was prepared and combined with the MSC. Immediately before surgery, the patient rinsed with .2% chlorhexidine solution for 90 seconds. Buccal and lingual full thickness flaps were reflected and de-epithelialized. Any remaining granulation tissue was removed and the root was scaled and planed. No bony recontouring was done. The MSC gel was placed on the root surface and bony defect. Sutures were removed after 2 weeks and the patient rinsed 2–3 times per day with chlorhexidine. Prophylaxis and exams were done every 2 months for the 1-year follow-up.

In 1 year the probing depths were reduced to less than 1 mm on the mesial and lingual. The probing attachment level had improved by 4 mm at the mesial. No bleeding on probing was observed, and the mesial interdental papilla regenerated. The bony defect was reduced in depth radiographically. Within the limitations of this case report, the use of MSC and platelet-rich plasma may be clinically useful in the regeneration of periodontal defects.

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Bader C and Krejci I. Marginal quality in enamel and dentin after preparation and finishing with an Er:YAG laser. Am J Dent 19: 337-342, 2006.

It has been proposed that the surface left after cavity preparation using a laser system may potentially compromise adhesion, which may increase microleakage of composite restorations. The purpose of this study was to evaluate the laser prepared surface of dentin and enamel as well as the margin before and after thermo-mechanical loading, and then to establish a set of parameters for cavity preparation.

Periodontal tissue regeneration

Clinical Practice Point

The use of a true periodontal regeneration to replace guided tissue regeneration (GTR) is demonstrated in a case report.

ER:YAG laser preparation

Clinical Practice Point

ER:YAG laser preparation defects are linked to magnitude of energy pulse settings for cavity preparation and finishing procedures.

Twenty-four intact caries-free extracted molars were embedded in custom holders with tubing containing PBS-diluted horse serum inserted in the middle third of the roots to simulate dentinal fluid. Saucer-shaped preparations on the buccal and lingual of each tooth were prepared with the Er:YAG laser using different preparation and finishing energy and frequency settings. After the initial preparation was completed, a PVS impression was made which was compared to a similar impression made after thermal and mechanical loading of each tooth. Scanning electron micrographs were evaluated for: continuous margin, marginal gap, marginal enamel fracture, marginal dentin fracture, marginal restoration fracture, overhang, and unfilled margins. The marginal dentinal fracture, marginal restoration fracture, overhangs, and underfilled margins were not reported because of low incidence.

All groups except for one demonstrated a significant decrease in continuous margin after loading. A trend was noted for better continuous margin in dentin throughout all the groups. All the groups demonstrated marginal enamel fracture with a higher incidence in some of the groups. None of the groups tested showed a 100% marginal adaptation. The best group was prepared under 500 mJ/pulse and used a 100 mJ/pulse setting to finish the preparation. The observation was made that most of the marginal imperfections were related to enamel fractures. The magnitude of the enamel fractures seemed to escalate with increased energy. Bevelling of the enamel did not improve the adaptation to the margin.

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Implant-supported fixed partial dentures

Nickenig H-J, Schäfer C, Spiekermann H. Survival and complication rates of combined tooth-implant-supported fixed partial dentures. Clin Oral Implants Res 17:506-11, 2006.

Clinical Practice Point

Rigid vs. non-rigid connections in tooth-implant supported fixed partial dentures considered with reservations.

The purpose of this study was to review complication rates in 83 patients treated with tooth to implant supported FPD's.

Two examiners treatment documentations for 83 patients were evaluated with survival curves and frequency counts. A total of 84 prostheses were evaluated with a follow-up time of 4.73 years (median). 37.1% of the tooth abutments were mandibular first premolars. The majority of the implants used were Branemark or ITI with 45.3% of those being screw retained. 33% were cement-retained prostheses and 26% used some sort of telescopic system. Overall 33% of all the FPD's were classified as non-rigid connections.

Three out of the 56 rigid FPD's were associated with technical (service of renewal, reintegration or repair) complications. Eight of

the 28 non-rigid FPD's were associated with technical complications. In addition, 8 of the 47 screw retained prostheses had complications whereas 3 out of the 26 cemented restorations had complications. No association with system and complications could be made. No implants were lost but 3 of the 132 abutment teeth were lost to periodontal inflammation and/or abscess. They reported 8% of all abutments needed some adjunctive periodontal therapy, 3% needed restorations or endodontic therapy because of secondary caries. Screw loosening was noted in 7 out of 72 screw retained abutments and loss of cementation on 4 out of 35 cement retained abutments. They did not report if any natural tooth intrusion had been seen.

The authors conclude that utilizing rigid connections between teeth and implants will yield more favorable outcomes.

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Kotschy P, Laky M. Reconstruction of supracrestal alveolar bone lost as a result of severe chronic periodontitis. Five-year outcome: case report. Int J Periodontics Restorative Dent 26:425-431, 2006.

Enamel matrix proteins are thought to play an important role in the development of periodontal tissues like cementum, ligaments, and alveolar bone. Bovine porous bone mineral has been used successfully in bone grafting procedures such as sinus augmentation, around dental implants, and periodontal defects. This paper presents a case report where enamel matrix proteins (EMPs) are combined with bovine porous bone mineral to regenerate suprabony as well as infrabony defects.

A 46 year old female patient diagnosed with generalized severe chronic periodontitis first received initial scaling and root planing with antibiotic therapy followed by surgical scaling and root planing 5 days later. Surgery was first done posteriorly and then anteriorly after the posterior healed for 6 weeks. Mucoperiosteal flaps were reflected and designed to preserve the papilla. Root surfaces were treated with Emdogain. The bone was reconstructed with BioOss supracrestally and subcrestally. The anterior section was flapped and then ethylenediaminetetraacetic acid and EMPs were applied. Bony defects were reconstructed with BioOss and covered with a resorbable membrane. The mucoperiosteal flap was coronally positioned and sutured. Post-op care consisted of 4 weeks of 2x/day chlorhexidine rinse, and liquid diet. Twice a week for 2 months supragingival polishing was done without any subgingival instrumentation.

Periodontal tissue repair

Clinical Practice Point
Periodontal tissue repair demonstrated with enamel matrix proteins.

At baseline probing depths averaged 4.43 mm and 2.55 at 5 years. Clinical attachment levels averaged 5.48 mm at baseline and gained an average of 2.28 mm after 5 years for an average of 3.20 mm. Within the limitations of this case report it is likely that bone grafting with bovine porous bone mineral in combination with EMPs can improve attachment levels.

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Surgical guide fabrication

Clinical Practice Point
Cone beam technology simplifies surgical guide fabrication.

Jabero M and Sarment D. Advanced surgical guidance technology: a review. *Implant Dent* 15:135-142, 2006.

The objective of this article is to review the advancing technology in regard to cone-beam CT imaging and its application to surgical guide fabrication. Standard radiographs are limited in the fabrication of implant surgical guides because of their restricted 2D view.

CT imaging traditionally used a radiographic source with circular movements along with computer reformatting and provided a series of axial images. This technology is expensive and the equipment size limited their use to hospitals. Cone-beam technology, however, allows for shorter scanning times, less radiation, smaller equipment, and precise axial images of .2–.4 mm. The software available to use with this technology allows the dentist to plan for implant placement on a computer and have that information transferred electronically to a surgical guide.

Surgical guides can be fabricated in several ways using the CT software technology. CAD/CAM technology has allowed for the fabrication of surgical guides that follow the plan designed from the CT images. Stereolithography uses a laser-cure resin model. Essentially, liquid polymer is cured in layers by a laser that is guided from a computer-generated 3D image of the surgical guide. The I-Guide system is similar to the laser except that a projected powder is cured and layered following the computer-generated image. Another system, CADImplant, uses a conventionally-generated surgical guide. This surgical guide is related to the CT image by a registration cube, and the drill sites are prepared in the guide following the CT planning software.

The advances in cone-beam CT technology allows for better planning and preparation prior to implant placement. This preparation and planning help to reduce surgery time and allows for better predictability and reliability.

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Lee C. Immediate load protocol for anterior maxilla with cortical bone from mandibular ramus. *Implant Dent* 15:153-159, 2006.

This article proposes a protocol for anterior maxillary single implants placed in areas grafted with autogenic block grafts following a prospective study.

Nineteen patients received 19 implants in this study. All implants were defined as nonfunctional immediately restored and were subject to early occlusal loading with the final prosthesis. Inclusion criteria for this study were: bony atrophy in the labiolingual direction, autogenous block grafting indicated for the bony defect, and an implant replacing either a maxillary canine, lateral, or central incisor. Exclusion criteria: parafunctional habits, pregnancy, tobacco use, radiation therapy to the maxilla, or medical contraindications to surgery.

Autogenous bone grafting was done for each of the 19 patients and was allowed to heal for 12 weeks. After 12 weeks, Zimmer dental implants were placed following standard protocol techniques. An insertion torque of 30Ncm determined primary stability. Implant position was indexed by the surgeon. The provisional restoration was then fabricated and sent back to the surgeon for cementation between 48 and 72 hours after implant placement. Twelve weeks later final impressions were made and the final crowns fabricated and delivered. A 100% survival rate was reported for this study, with 1 soft tissue defect reported and repaired among the 19 patients. All implants were followed for 1 year.

These clinical results suggest that nonocclusal immediate loading of maxillary implants in the anterior, placed in block grafts, could provide a good alternative treatment to conventional techniques.

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de Vicente J, Recio O, Martin-Villa L, Junquera L and Lopez-Arranz J. Histomorphometric evaluation of guided bone regeneration around implants with SLA surface: an experimental study in beagle dogs. *Int J Oral Maxillofac Surg* 35:1047-1053, 2006.

The goal of this study was to evaluate the effectiveness of collagen membranes alone or in combination with natural bovine bone or human demineralized freeze-dried bone in defects surrounding SLA surface ITI implants.

Beagle dogs were used in this study and were prepared by having all 4 mandibular premolars extracted. After a 4-week healing

Anterior maxillary implants

Clinical Practice Point
Immediate loading of anterior maxillary implants facilitated with block grafts.

SLA surface ITI implants

Clinical Practice Point
Best osseointegration results combine collagen membrane, Bio-Oss and SLA surface coated implant.

period, ITI implants with a SLA surface were placed following standard protocol, achieving primary stability. On one side of the jaw, 3 implants with the associated bony defect were covered with a porcine-derived membrane. The bony defects were randomly filled with Bio-Oss, DFDBA, or no filling material. On this same side, a fourth implant was placed, filled with nothing and covered only with the mucoperiosteal flap. The other side had 3 implants placed, and again the bony defects were randomly filled with the same 3 options as the other side. No membrane was used on this side. After 36 weeks, the dogs were sacrificed and histological analysis was done.

The results of the study demonstrated that the control sites of no membrane and no graft showed negligible amounts of new bone formation. The mean percentage of the nonmembrane group was lower than that of the membrane group, except for one instance where the nonmembrane DFDBA group had more original defect bone fill than the membrane group. The use of Bio-Oss with a membrane yielded a more complete bone fill and bone to implant contact. It was also shown that the use of DFDBA might not be any more useful than a membrane alone. Bone fill with the membrane alone was on average 57%, with DFDBA 55% and with Bio-Oss 80%.

This study seems to demonstrate that the use of a collagen membrane, especially in combination with Bio-Oss, may produce a satisfactory osseointegration with an SLA surface-coated implant.

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