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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

Lachmann S, Kimmerle-Müller E, Axmann D, Gomez-Roman G, Weber H, Haas R. Reliability of findings around healthy implants in association with oral hygiene measures: a clinical, microbiological, and immunological follow-up in edentulous patients. Clin Oral Implants Res 18:686–698, 2007.

The aim of this study was to assess important aspects of reliability of the most common clinical, microbiological, and immunological diagnostic procedures for diagnosis of peri-implant health. Furthermore, this study investigated the influence of common oral hygiene and maintenance measures on the stated diagnostic tests.

Twenty-one edentulous patients with the presence of a removable implant-retained full denture in at least 1 jaw that had been in function for 12 months or more were selected to be in this study. The patients were followed over 3 months, beginning 1 week before their annual recall visit. Hygiene scores, probing depth, bleeding on probing (BOP), implant stability, gingival crevicular fluid (GCF) volume, sulcular interleukin-1 β (IL-1 β) and prostaglandin E2 (PGE2) concentrations, and relative concentrations of 5 bacterial species (polymerase chain reaction) were investigated.

Diagnosis

Clinical Practice Point

Diagnostic procedures validated for peri-implant tissue assessment

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Measurement variation was assessed as a function of (a) intra- and (b) inter-examiner reliability, (c) inter-implant variation in each patient, (d) time, and (e) effect of hygiene measures by accuracy, repeatability, reproducibility, and visualization with the Bland and Altman Plot. The results were shown in measurement means and accuracy (in parentheses): GCF volume 1.5 microl (1.5), IL-1 β 8 ng/mL (26), PGE2 63 ng/mL (185), bacteria sum score 0.2 (0.7), plaque score 1 (1), BOP score 0 (1), Periotest value -4 (3), resonance frequency analysis ISQ 66 (11), and pocket probing depth 2.3 mm (0.7).

There was no statistically significant measurement variation as explained by accuracy, repeatability, or reproducibility. There was insufficient agreement for replicated BOP scored. A short post-treatment reduction in plaque and BOP scores was visually apparent. Clinical and biochemical appearance of the peri-implant tissues was not influenced by professional oral hygiene measures. The results of this study show that all findings except BOP showed statistically acceptable repeatability and moderate vulnerability to influences present “chairside” in clinical practice.

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Strietzel FP, Reichart PA, Graf H-L. Lateral alveolar ridge augmentation using a synthetic nano-crystalline hydroxyapatite bone substitution material (Ostim): preliminary clinical and histological results. Clin Oral Implants Res 18:743–751, Epub 2007 Sep 20.

Ridge augmentation

Clinical Practice Point
Prospective study demonstrates bone integrity in ridge augmentation using nano-crystalline hydroxyapatite (ncHA)

The purpose of this clinical prospective study was to investigate the tissue composition of augmented sites after the use of a nano-crystalline hydroxyapatite (ncHA) bone substitution material by clinical and histological examinations.

Fourteen patients requiring lateral ridge augmentation were included in this study. Ten of the 14 patients required ridge augmentation 6–7 months prior to implant placement, while the remaining 4 required augmentation at implant placement. The ncHA material was covered by a titanium mesh for space maintenance. Clinical and radiographic parameters were evaluated. In addition, bone biopsy cores that were obtained 6–7 months following augmentation were assessed histologically and histomorphometrically.

During the study, one patient showed swelling, redness and pain at the augmentation site that required removal of the titanium mesh 6 weeks after the surgical procedure. In 7 patients, a premature exposure of the titanium mesh without any inflammatory symptoms was examined. Six months following augmentation, the width of the fixed gingival and the alveolar ridge height did not change significantly ($P > 0.5$). However, a significant gain in alveolar ridge width ($P = 0.01$) was observed.

After a median period of prosthetic loading of 24 months, no implant was considered to be a failure. After at least 6 months, histology revealed no histological symptoms of inflammation in ncHA remnants in peripheral and central parts of biopsy cores obtained from 7 patients. Histomorphometry of bone cores revealed no significant differences of the mean percentage area of ncHA in peripheral (23.4%) and central (15.1%) parts of biopsy cores ($P = 0.262$). The mean percentage area of bone colonizing the defect was 52.3%.

The results of this study showed that small amounts of ncHA were found after at least 6 months in bone biopsies. The former defect space was filled with bone. The alveolar ridge width gain was found to be significant after lateral augmentation utilizing ncHA. The increase in alveolar ridge width will provide a sufficient site for primary stable implant placement.

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Crestal bone and implants

Clinical Practice Point

Crown-to-implant ratio the significant factor for success of posterior implants in study

Blanes RJ, Bernard JP, Blanes ZM, Belser UC. A 10-year prospective study of ITI dental implants placed in the posterior region. II: Influence of the crown-to-implant ratio and different prosthetic treatment modalities on crestal bone loss. Clin Oral Implants Res 18:707–714, Epub 2007 Aug 13.

This study had 2 objectives: (1) to evaluate the influence of the crown to implant (C/I) ratio on the long-term fixture survival rate and crestal bone loss around ITI dental implants placed in the posterior region, and (2) to evaluate the influence of different prosthetic treatment modalities on crestal bone loss around ITI dental implants.

In 83 partially edentulous patients, 192 ITI dental implants were consecutively placed in premolars and molars. Restoration of implants included ceramic-to-metal fused fixed partial dentures or a single crown. Implant designs included: standard hollow cylinder, standard hollow screw, standard solid screw and narrow solid screw.

All the patients were followed as part of a prospective longitudinal study focusing on implant success. Surgical, radiographic and clinical variables were collected at the 1-year recall after implant placement and at the most recent clinical evaluation. Periapical radiographs were taken with a standardized long-cone paralleling technique. Based on their respective clinical C/I ratios, implant restorations were divided into 3 groups: (1) 0–0.99, (2) 1–1.99, and (3) ≥ 2 .

The mean clinical C/I ratio was 1.77 ± 0.56 mm. Fifty-one implants (26.5%) showed a clinical C/I ratio equal to or greater than 2. In this group, 3 implants failed, giving a cumulative survival rate of 94.1%. Crestal bone loss was -0.34 ± 0.27 mm in group 1, -0.03 ± 0.15 mm in group 2, and -0.02 ± 0.26 mm in group 3. Differences among groups were statistically significant ($P = 0.009$). Crestal bone loss around ITI dental implants was not affected by mode of retention, splinting or presence of cantilever extensions. The results of this study suggest that implant restorations with C/I ratios between 2 and 3 may be successfully used in the posterior areas of the jaw.

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Surgery for foreign body complication

Clinical Practice Point

Endoscopically driven surgical procedure for removal of implant from sphenoid sinus reduces post-operative morbidity

Felisati G, Lozza P, Chiapasco M, Borloni R. Endoscopic removal of an unusual foreign body in the sphenoid sinus: an oral implant. Clin Oral Implants Res 18:776–780, Epub 2007 Sep 14.

Despite high success rates of implants placed in the maxilla, some complications have been reported in the literature. While displacement of implants in the maxillary and ethmoid sinuses has been reported,

there are no clinical reports related to migration of implants in the sphenoid sinus. This article presents a clinical case focused on the possibility of treating such a rare complication by means of endoscopic treatment through the nasal cavity.

The patient was a 45 year old woman who was systemically healthy. The patient had undergone an implant placement procedure for the substitution of the upper first molar with a screw-type oral implant. Due to the absence of primary stability, the implant and fixture mount penetrated into the left maxillary sinus.

Two weeks after the surgical placement, the implant migrated into the spheno-ethmoidal recess. Ten days after the primary surgery, the fixture mount spontaneously detached from the implant and the patient expelled a fixture mount from the mouth. Although the patient presented no symptoms, it was decided to remove the implant to prevent potential obstruction or infectious complications of the sphenoid sinus. Under general anesthesia, the patient underwent endoscopic removal of the displaced implant via a trans-nasal approach.

During endoscopic exploration, only a slight inflammatory reaction was found, but with no mucopurulent secretion from the sinus. It was also observed that the natural ostium of the maxillary sinus on the involved side was larger than usual and may partly explain the causes of implant migration. Post-operative recovery was uneventful. Antibiotic prophylaxis was started at the time of anesthesia induction, and then continued for 6 days post-operatively.

This case represents the first report concerning migration of an oral implant into the sphenoid sinus. It also demonstrates the reliability and safety of an endoscopically driven surgical removal of the foreign body, thus preventing potential complications, with extremely low post-operative morbidity.

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He J-D, Chou T-M, Chang H-P, Chen J-H, Yang Y-H, Moore DJ. Predictable reproduction of the buccal shelf area in mandibular dentures. Int J Prosthodont 20:535–537, 2007.

In order to reduce fit, retention, and stability problems for dentures, developing the proper border extensions is a key step. The purpose of this study was to assess whether a periodontal probe measurement could be used to obtain a predictable reproduction of the buccal shelf areas in mandibular dentures.

Complete dentures

Clinical Practice Point
Perio probe measurement technique and integrity of buccal shelf flange fit of mandibular denture

In this study, 100 patients and their complete dentures were clinically examined. Using a periodontal probe, all patients were measured at the anterior (buccal frenum area), posterior (anterior edge of the retromolar pad), and middle (center of anteroposterior width of buccal shelf) widths of the buccal shelf. The widths of the buccal shelf were measured from the crest of the residual alveolar ridge to the external oblique ridge. These measurements were then compared to the corresponding portions of the existing dentures.

Comparison of corresponding portions showed statistically significant differences in the width of the buccal shelf. The periodontal probe can be used to measure the width of the buccal shelf to obtain a predictable reproduction of the buccal shelf areas in mandibular dentures.

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Retention and stability of mandibular denture

Clinical Practice Point

Patient instruction technique to enhance mandibular denture functional accommodation in challenging complete denture case

Bohnenkamp DM and Garcia LT. Phonetics and tongue position to improve mandibular denture retention: a clinical report. J Prosthet Dent 98:344–347, 2007.

A challenge that clinicians face is explaining to patients the lack of retention for a new mandibular complete denture. The position, size, and activity of the tongue are important factors in denture success or failure. This article is a case report describing the use of phonetics and tongue position during fabrication and at insertion to improve the retention and stability of a newly fabricated mandibular complete denture.

The patient was a 52 year old woman who complained of ill-fitting and non-retentive complete dentures. The patient was in overall good health, had been edentulous for 18 years, and was currently wearing her third set of dentures. Examination of the current set of dentures revealed fair masticating efficiency, esthetics, and phonetics, decreased occlusal vertical dimension, and poor retention and stability of the mandibular denture.

Clinical and radiographic examination of the patient revealed good neuromuscular skills, normal mandibular movements, a highly resorbed mandibular residual ridge, and normal tongue size with a square tongue form and retruded tongue position. The patient did not want implant retained dentures when the option was offered to her.

A new set of complete dentures were made for the patient, with special emphasis on retention and stability of the mandibular denture. During border molding and making of the final impression, the patient was asked to pronounce the sound “e” as in the word “knee” to aid in positioning the tongue and buccinator muscles to develop a peripheral

seal of the mandibular denture borders. The important role that tongue position and facial muscles have in improving retention and stability was reinforced with the patient.

The patient was instructed to pronounce the sound “e” to help train and coordinate the positions of the tongue and buccinator muscles. Although the patient was initially skeptical, she soon acknowledged that through the use of phonetics, she was able to improve the retention and stability of her new mandibular denture. This case study suggests that a phonetic training technique, to demonstrate to the patient how to retain and stabilize the mandibular denture, may be needed for some denture patients.

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Froum SJ, Cho S-C, Cho YS, Elian N, Tarnow D. Narrow-diameter implants: a restorative option for limited interdental space. Int J Period Rest Dent 27:449–455, 2007.

A high degree of success has been reported for dental implant restorations for completely and partially edentulous patients. Implant manufacturers have introduced small-diameter implants in an attempt to solve space issues. These implants require a minimum mesiodistal space of 6.0–6.5 mm to allow adequate implant to tooth distance. Initially, narrow-diameter implants (NDI) with a diameter of 1.8 mm were used as transitional implants.

Five years ago, Dentatus introduced a new narrow-diameter titanium alloy implant allowing screw retained restorations, which have shown success over extended periods of function. These implants are currently available in diameters of 1.8, 2.2, and 2.4 mm and in lengths of 7, 10, and 14 mm. The purpose of this study was to examine the use of a screw-retained NDI system as an option for implant placement in areas of limited bone volume.

This retrospective report followed 48 NDIs in 27 patients for 1–5 years postloading. No implant failures were reported, yielding a 100% survival rate. Due to possible porcelain fracture, chipping, or a desire to change color, the screw-retained attribute of this system allows retrievability of the restorations.

The 3 diameters available allowed for flexibility for a variety of narrow edentulous spaces. These NDIs present a cost-effective alternative for restoring limited spaces with implant restorations, without the bone augmentation or orthodontic procedures required for conventional fixed restorations. The NDI system has been approved by the U.S. Food and Drug Administration for long-term use.

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Narrow diameter implants

Clinical Practice Point
Narrow-diameter system effective in variety of narrow edentulous space treatment situations

Tissue conditioners

Clinical Practice Point
Cytocompatibility of tissue conditioners examined as a measure of cytotoxicity of the plasticizers

Hashimoto Y, Tanaka J, Suzuki K, Nakamura M. Cytocompatibility of a tissue conditioner containing vinyl ester as a plasticizer. Dent Mater J 26:785–791, 2007.

The purpose of this study was to examine the cytocompatibility of 8 vinyl esters as candidate plasticizers producing phthalate- and ethanol-free tissue conditioners.

The following 8 vinyl esters were examined: vinyl octanoate, vinyl pivalate, vinyl cyclohexane carboxylate, vinyl benzoate, vinyl cinnamate, 4-(vinylxy)butyl benzoate, vinyl 4-methyl benzoate, and divinyl adipate. Using an E-Screen assay, the estrogenic activity of the experimental compounds was assessed.

This assay employs MCF-7 breast tumor cells to compare the ability of chemicals to mimic growth stimulation by estradiol. The cytotoxicity of the tissue conditioners was assessed in a collagen gel culture system using the MTS assay. In addition, the cytotoxicity of 3 prototype materials and commercially available tissue conditioners were examined on human fibroblasts grown in collagen gels. Finally, the effects of these materials on the expression of cytokines in 3-dimensional cultures by reverse transcriptase-polymerase chain reaction and enzyme-linked immunosorbent assays were measured.

The results showed that none of the tested vinyl esters had estrogenic activity. Out of the 8 tested vinyl esters, vinyl octanoate and vinyl pivalate were the least cytotoxic. A prototype tissue conditioner containing vinyl octanoate had equivalent or weaker cytotoxicity and induction of cytokine expression than conventional materials. These results suggest that VO might be useful as a plasticizer in new tissue conditioners.

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Composite resin restoratives

Clinical Practice Point
Biofilm tied to secondary caries in indirect composite restorations is related to surface characteristics

Ikeda M, Matin K, Nikaido T, Foxton RM, Tagami J. Effect of surface characteristics on adherence of S. mutans biofilms to indirect resin composites. Dent Mater J 26:915–923, 2007.

One of the most frequently occurring reasons for replacement of indirect resin composite restorations is secondary caries. This is due to bacterial adhesion and biofilm formation on indirect resin composites. There is little information on the bacterial community formed on indirect composites. In order to study this, an artificial mouth system (AMS) was used in this study to grow *Streptococcus mutans* (*S. mutans*). The aim of this study was to evaluate the effect of surface characteristics on bacterial adhesion and biofilm formation on indirect resin composites using an AMS.

Two indirect resin composites, Estenia C&B (ES) and Gradia (GR), were used. ES is a urethane monomer-based and light and heat-polymerizable resin composite, while GR is a UDMA-based and light-polymerizable resin composite. Slabs were prepared from the materials, and then either ground with 800-grit silicon carbide paper or polished with diamond pastes up to 1 micron. The AMS was equipped with 2 chambers, each containing a warm water jacket to maintain a constant interior temperature and a gas delivery unit for N₂ (80%), H₂ (10%), and CO₂ (10%) to grow biofilms under anaerobic conditions.

Using the AMS, artificial biofilms of *S. mutans* were grown on the composite slabs for 20 hours. The amounts of retained biofilm on the surfaces were measured after sonication. The following surface characteristics of the resins were examined: surface roughness, amount of residual monomers, and distribution of filler particles.

The results showed that the amount of retained biofilm varied ($p < 0.05$) according to the composition and surface roughness of the material. Biofilm adherence was lowest on ES slabs when polished with diamond pastes up to 1 micron. The data in this study show that the surface roughness and composition of a resin composite influenced biofilm adherence.

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Schnitman PA. Computer-guided implant dentistry. *J Mass Dent Soc* 56:22–24, 2007.

A new revolutionary way to practice implant dentistry involves computer-guided minimally invasive implant treatment. Currently, both medical scanners and cone beam scanners are used for implant treatment planning. While both are useful for viewing available bone in a 3-dimensional (3-D) format, only a radiographic guide coupled with either scan allows for full visualization of the bone relative to the planned replacement tooth or teeth.

The guided software technology actually transforms the scan of the now virtual radiographic guide into the actual surgical template. The surgical template can then be placed on the mounted cast that the radiographic guide was produced on, and this cast is then effectively retrofitted with implant replicas in the planned positions. This provides a tremendous advantage in restorative predictability and confidence in both routine and advanced cases.

Dental implant surgery

Clinical Practice Point
Computer-guided implantation reduces complications and surgery time

An essential element of the procedure is the production by rapid prototyping from a 3-D computed tomogram of a stereolithographic template containing precision drilling sleeves. The implant placement procedure generally takes 30–60 minutes, depending on the number of implants. The surgical template is secured to the patient with a surgical index and anchor pins. Then, using a series of specially designed burs and drilling guides, which precisely fit into the sleeve or sleeves of the surgical template, the implant site is prepared flapless through the soft tissue and the implant is placed in the position as planned in the 3-D software.

Since there is no incision, there is minimal post-operative discomfort or swelling and no sutures. Because the implant sites are so precisely prepared, the prostheses can be placed immediately at implant insertion. The ideal patient for this procedure is one who has adequate bone and attached soft tissue in the edentulous area and who may not be able to tolerate an extended surgical procedure. The patient must also be able to open wide enough to accommodate the length of current drills, which are 10 mm longer than standard drills. Any disadvantages may be offset by improved surgical planning, good coordination with the referring dentist, and optimization of esthetics. In addition, the patient will experience significantly reduced surgical time and discomfort, and a speedy recovery.

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Endo post systems

Piovesan EM, Demarco FF, Cenci MS, Pereira-Cenci T. Survival rates of endodontically treated teeth restored with fiber-reinforced custom posts and cores: a 97-month study. Int J Prosthodont 20:633–639, 2007.

Fiber-reinforced post systems have become popular within the past few years because enlargement of the root canal space is not required and the risk of root perforation is eliminated. Furthermore, they have biomechanical properties that are similar to dentin, making them the only systems with this characteristic. The purpose of this study was to assess the long-term survival rates of polyethylene fiber-reinforced posts and cores used in endodontically treated teeth over a 97-month period.

Sixty-nine patients were selected based on the following criteria: (1) complete dentition and normal occlusion, verified by clinical and radiographic evaluations in continuous clinical follow-up visits (at least 1 annual recall) and (2) at least 1 endodontically treated tooth restored with a fiber-reinforced post and core between 1994 and 2000, using a resin composite core buildup (Z-250, 3M ESPE) and either direct restoration with compact-filled ultrafine resin composite (Z-250 or P60,

Clinical Practice Point
Fiber-reinforced post systems facilitate conservative root canal therapy and survival rates

3M ESPE) or ceramic-fused-to-metal or all-ceramic crowns as the final restorations.

One operator restored all teeth with the same high-molecular-weight polyethylene fiber (Ribbond, Ribbond Inc) and resin composite cement (Enforce, Dentsply) post-and-core system. The patient's teeth were then prepared and restored with complete cast crowns or direct resin composite. Survival functions of restorations were analyzed with Kaplan-Meier and log-rank tests ($\alpha = .05$) and displayed according to the variable tooth location and material of the definitive restoration.

When evaluated, 4 posts fractured among the 36 anterior restorations and 2 posts fractured among the 73 posterior restorations. The mean overall survival estimate was 90.2 (± 3.7) months (95% CI: 82.8–97.5). There was no significant difference between survival functions regarding tooth location or type of restorative material as variables.

The results of this study suggest that polyethylene fiber-reinforced posts with composite cores may be recommended for clinical use. In this study, restorations evaluated after the 97-month follow-up period presented with high survival rates.

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Brink J, Meraw SJ, Sarment DP. Influence of implant diameter on surrounding bone. Clin Oral Implants Res 18:563–568, 2007.

Stress distribution between the implant and surrounding bone is important for implant healing and survival, and implant diameter is an important factor in stress distribution. It has been suggested that for areas of poor bone density, a wider implant of the same length has a greater total surface area, subsequently increases the bone/implant contact (BIC) and may be able to compensate for the lack of height or bone density.

It is not known whether or not the influence of diameter on BIC translates into a clinical advantage. The present study was designed to determine the influence of implant diameter on BIC and the surrounding bone density.

This prospective randomized experimental study used 5 adult male mongrel dogs. A total of 20 standard diameter (3.75×5.0 mm) and 20 wide (5×5 mm) implants were placed. Three surgeries were performed prior to bone harvest. First, atraumatic extraction of all second, third, and fourth premolar and first molar teeth was done. After 2 months of healing, implants were placed using standard techniques.

Implant width

Clinical Practice Point
Increased adjacent bone density correlated with wide implants

Two months after implant placement, implants were surgically exposed and healing abutments were placed. A hygiene regimen was instituted, and the implant sites were followed for an additional 3 months. Histomorphometry was done to determine initial bone density, bone to implant contact and adjacent bone density.

There were no statistically significant differences in adjacent bone density or bone to implant density between standard and wide implants. Increased adjacent bone density was the only parameter that was correlated with wide implants. The placement of wide implants in this system influenced the adjacent bone density. This may be due to changes in force dissipation or other factors not yet investigated.

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Zirconia implants

Clinical Practice Point
Implant bone apposition enhanced by surface texture

Gahlert M, Gudehus T, Eichhorn S, Steinhauser E, Kniha H, Erhardt W. Biomechanical and histomorphometric comparison between zirconia implants with varying surface textures and a titanium implant in the maxilla of miniature pigs. Clin Oral Implants Res 18:662–668, 2007.

This study was designed to compare the influence of surface modification on the osseointegration of zirconia ceramics using 2 different zirconia surface topographies and looking at biomechanical and histological measures. The well-documented titanium sandblasted acid-etched (SLA) surface was used as a reference material.

This study was conducted on 13 miniature pigs. Prior to the study, maxillary incisors 2 and 3 were removed bilaterally, and tissue was left to heal for 6 months. The zirconia implants were prepared with either a machined or sandblasted surface, and both had the same cylindrical shape with a standard ITI thread configuration that matched the reference SLA titanium implants used in the study. A randomized scheme was used to assign the placement of 78 total implants in the pigs.

At various healing times up to 12 weeks post-placement, most implants were challenged with removal torque tests (RTQ value). Several implants were resected on bloc, embedded and examined under a light microscope to analyze direct bone apposition. When the surfaces of the implants were compared prior to placement, the Ti SLA implant had the highest surface roughness, followed by the sandblasted ZrO_2 implant and then the machined ZrO_2 implant. The machined ZrO_2 implants had significantly lower RTQ values after 8 and 12 weeks. The Ti SLA implant had significantly higher RTQ values than the sandblasted ZrO_2 implant at 8 weeks.

This study suggests that sandblasted ZrO_2 implants can achieve a higher stability in bone than can their machined counterparts. Surface roughening the turned ZrO_2 implants enhances bone apposition and has an added beneficial effect of interfacial shear strength.

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Ishikawa-Nagai S, Da Silva JD, Weber HP, Park SE. Optical phenomenon of peri-implant soft tissue. Part II. Preferred implant neck color to improve soft tissue esthetics. Clin Oral Implants Res 18:575–580, 2007.

Soft tissue implant esthetics

Clinical Practice Point
Objective quantifiable method devised for implant soft tissue esthetics

This study was designed to investigate an optical solution to eliminate the undesirable shine-through effect of implants on peri-implant mucosa by selecting an optimized implant neck color based on an objective and quantifiable method.

Fourteen subjects with a total of 15 maxillary anterior dental implants (Straumann) were enrolled in the study. The implants had all been placed during the past 5 years. The optical effect of color strips was assessed after determination of implant site health. Eight different color strips were used: white, black, light pink, pink, light orange, orange, gold, and violet.

The color differences between the peri-implant mucosa with each of the 8 color strips inserted and the gingiva of an adjacent or contra lateral tooth with no color strip inserted were assessed. The measurement for each site was taken before and after color strip insertion with a spectrophotometer to compare the color difference (ΔE) and the associated color coordinates (ΔL^* , Δa^* , Δb^* and ΔC^*).

A significantly smaller color difference (ΔE) was found when the color strips were inserted for light pink, pink, light orange, and orange. Light pink strips tested with the lowest mean color difference (ΔE) of 2.6, which is a clinically indistinguishable color change. The results suggest that the most esthetic color for the neck of an implant is light pink. It may be possible to further improve the esthetics of anterior abutments by masking the neck of the implant with color matching.

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Implant bone resorption

Clinical Practice Point
Platform switching understood to confer biomechanical advantage for preservation with a narrow-diameter abutment

Maeda Y, Miura J, Taki I, Sogo M. Biomechanical analysis on platform switching: is there any biomechanical rationale? Clin Oral Implants Res 18:581–584, 2007.

It is common during initial loading of osseointegrated dental implants to see some bone resorption close to the first thread of the implant. The mechanism behind this has been explained as either by the formation of the biologic width, as in natural periodontal tissues, or by the mechanical stress to the bone-implant interface. Studies have shown that bone resorption at the implant neck is not an inevitable process.

Bone preservation is possible when a narrower diameter abutment is connected to the implant. This is called platform switching. The purpose of the current study was to examine the biomechanical advantages of the platform switching configuration with regard to stress distribution in and around the implant.

The study was conducted using 3-dimensional finite element models. Bone and implant material properties were assigned with values that have been validated and used in previous studies. A simple cylindrical implant (external hex implant) of 4 × 15 mm without a surface screw structure was used in this study for ease of calculation. The implant was surrounded by bone, and a prepost processor was used to construct the osseointegrated implant. One model contained a 4.0 mm abutment connection (normal) and the other had a narrower 3.25 mm abutment (platform-switching configuration).

There were differences in the stress distribution patterns among the abutment, implant and bone. The platform-switching configuration greatly reduced stress in the cervical bone area of the implant compared with the normal implant configuration. The shearing stress that was reduced has been implicated in the disintegration process. However, this platform-switching system also increased stress in the abutment or the abutment screw. Potentially, this increased stress could cause abutment screw deformation over the elastic limit. Within the limits of this study, platform-switching afforded a biomechanical advantage and shifted the stress-concentration area away from the cervical bone-implant interface.

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Mazzocchi A, Passi L, Moretti R. Retrospective analysis of 736 implants inserted without antibiotic therapy. *J Oral Maxillofac Surg* 65:2321–2323, 2007.

For healthy patients, there is little documentation in the literature about prophylactic antibiotics prior to implant surgery with regard to any correlation with failure and success rates. The placement of endosseous implants is a Class II surgery, involving complex oral surgical procedures; however, it has less than a 5% infection rate and rarely carries with it any adverse consequences. The current retrospective report was designed to show and value the outcomes of dental implant treatment without antibiotic prophylaxis.

Cases of 437 consecutively treated patients, with a total of 736, 2-stage implants placed, were included in this study. None of the patients received prophylactic antibiotics, but all received anti-inflammatory therapy for 3 days post-operatively as either nimesulide 100 mg twice daily or *Arnica montana* 5C 3 times a day.

Healing was assessed at the implant uncovering surgery 4–6 months after implant placement. Failure was defined as removal of the implant due to non-osseointegration or signs of infection. A post-operative infection was defined as the presence of purulent drainage (either spontaneous or by incision) or fistula in the operated area, along with pain or tenderness, localized swelling, redness, and heat (or fever). Early infection was defined as infection occurring within 1 week post-operatively; late infection, as infection occurring from 1 week to the time of abutment connection.

In this sample, the implant survival rate was 96.2%. This value is not lower than success rates reported in the literature after use of assorted antibiotic regimens. Thus, this retrospective study suggests that antibiotics may not be as beneficial as once thought in the placement of routine oral implants.

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Scully C, Hobkirk J, Dios PD. Dental endosseous implants in the medically compromised patient. *J Oral Rehabil* 34:590–599, 2007.

This report is a literature review of the risks associated with endosseous implants in a range of systemic disorders. Prospective clinical trials are needed to actually produce concrete information that can be used by clinicians for the treatment of these patient populations with dental implants when appropriate. It appears that the degree of disease control, in most cases, is more important than the nature of the disease or disorder itself.

Antibiotic therapy

Clinical Practice Point
Routine prophylactic antibiotic therapy for implant surgery challenged

Compromised implant patients

Clinical Practice Point
Individual case consideration of contraindicating systemic disorders necessary for assessment of risk associated with endosseous implants

The treatment of these patients must be accompanied by an individualized assessment that includes the medical condition, quality of life currently and the life expectancy of the patient. For many of these patients, the benefits of dental implants may outweigh any potential risks, and this information summary can aid the patient in giving informed consent.

Suggested relative contraindications for dental implants in the literature include: children and adolescents, epileptic patients, severe bleeding tendency, endocarditis risk, osteoradionecrosis risk, and myocardial infarction risk. Little evidence is available to support these recommendations.

In the past 20 years, more than one study has highlighted the following disease categories as possible contraindications: alcoholism, bleeding disorders, bone or cardiac disease, corticosteroids, Crohn's disease, diabetes, immunocompromised, mucosal disease, neuro-psychiatric disorders, radiotherapy and chemotherapy, and Sjögren's syndrome. Information in the literature and case reports suggest that, as mentioned above, none of these situations is an absolute contraindication to dental implant therapy and patients with these diseases should be carefully handled on a case-by-case basis.

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