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Study of marginal bone level and soft-tissue parameters of biomimetic implant system

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Management of midfacial recession defects around adjacent maxillary implants using ‘screw tent-pole’ technique

Author: Bach Le, DDS, MD, FICD, FACD

Soft-tissue recession around dental implants often results in metal exposure and can present a major esthetic challenge. Unfortunately, soft-tissue recessions around implants have been frequently observed, with one study reporting midfacial recessions greater than 1 mm were present in 61 percent of the cases. Treatment and coverage of periimplant soft-tissue recessions can be challenging despite reports in the literature indicating that recessions up to 2 mm can be successfully grafted with a combination of coronally advanced flap and subepithelial connective tissue grafts. Long-term data on the success of these grafting techniques is limited.

Thoma, et al, conducted a systematic review and reported that the combination of an apically positioned flap/vestibuloplasty and soft-tissue augmentation using a free gingival graft, subepithelial connective tissue graft or collagen matrix resulted in a 1.4-3.3 mm increase in keratinized tissue. Overall, soft-tissue connective tissue augmentation resulted in the best gains in soft-tissue volume at implant and partially edentulous sites, and a combination of better papilla fill and higher marginal mucosal levels as compared to non-grafted sites around immediately placed dental implants. A recent systemic review did not find a single acceptable randomized clinical trial (RCT) in the world literature to recommend the best incision designs, suturing techniques or materials to correct or augment periimplant soft tissues.

One of the aims of soft-tissue augmentation procedures is to correct mucosal recession. To address bone loss and associated gingival recession around implants in the esthetic zone, a combination of guided bone regeneration (GBR) and soft-tissue augmentation are often performed. When multiple implants are placed in the esthetic zone, vertical and horizontal bone augmentation of more than 2 mm from the implant platform is often necessary to overcome the normal pattern of bone remodeling and soft-tissue recession.

The use of a particulate mineralized bone allograft covered with a collagen membrane (GBR) for the correction of gingival recession has been reported in the dental literature. This case report demonstrates an innovative surgical technique to restore hard tissue and increase mucosal width and keratinized gingival height around maxillary implants in the esthetic zone without the color discrepancy associated with soft-tissue grafts.

Figs. 1-2. Patient with gingival recession and discoloration due to exposure of the underlying dental implants (teeth No. 7, 8, 9) three years after implant placement. Note the lack of keratinized peri-implant mucosa.

(Photos/Provided by Dr. Bach Le)
Case report

The patient was a healthy 22-year-old male non-smoker with a history of traumatic fracture of the maxillary right lateral incisor and two central incisors. The teeth were extracted with immediate placement of three external hex dental implants (Biomet 3i Dental, Palm Beach Gardens, Fla.). Three years after definitive restoration, the patient presented with a chief complaint of, "I can see the metal portion of my implants." Examination at this time revealed long unesthetic maxillary crowns with visible abutment metal and a dark shadow along the gingival sulcus (Figs. 1-4). Clinical and radiographic evaluations were conducted to assess the patient’s soft-tissue health, position and emergence profile of the implant relative to the alveolar housing and adjacent teeth, gingival contour, amount of gingiva visibility when the patient smiled, and the shapes of the prosthetic and clinical crowns. There were no active signs of inflammation or infection around the peri-implant mucosa and all three implants appeared to be in good three-dimensional position. A two-stage surgical approach was planned. The first stage would involve augmentation of the missing labial bone using guided bone regeneration with tenting screws (“screw tent-pole” technique described by Le, et al), followed by a second stage surgery to remove the middle implant with additional bone augmentation to develop a pontic site. Following a healing period, provisional restorations would be used to sculpt the soft-tissue architecture prior to definitive restorations.

On the day of surgery, the patient was asked to rinse with 0.12 percent chlorhexidine gluconate (15 mL) prior to IV sedation. A crestal incision and distal, curvilinear, vertical incision that followed the gingival margin of the distal proximal tooth were made. A full-thickness, subperiosteal flap was elevated to expose two to three times the treatment area (Figs. 5-6). Significant labial bone loss was noted in the anterior maxilla with moderate thread exposure on two adjacent implants. Decontamination of the implant surfaces was not performed because the patient did not exhibit signs of mucositis, periimplantitis-related infection or purulence around the peri-implant gingival sulci. The soft tissue was generously released and advanced to ensure tension-free closure. Prior to graft placement, three roughened titanium tenting screws were placed 3-4 mm below the implant platforms to create a tenting effect over the graft site and help reduce tension over the graft (Fig. 6). Mineralized bone allograft was placed over the defect sites and over-contoured by approximately 20-30 percent to compensate for the anticipated

Figs. 3-4. Patient with gingival recession and discoloration due to exposure of the underlying dental implants (teeth No. 7, 8, 9) three years after implant placement. Note the lack of keratinized peri-implant mucosa.

Fig. 5. Flap elevation illustrating labial bone dehiscence and implant exposure.

At the AO

Dr. Bach Le will be one of the Academy of Osseointegration’s ‘Morning with the Masters’ presenters at AO’s upcoming annual meeting on Friday, March 2, at the Los Angeles Convention Center. His presentation is titled, ‘Strategies for Managing Severe Implant Failures in the Esthetic Zone.’
implants

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Prior to use, the allograft material was hydrated according to the manufacturer’s directions and mixed with the patient’s blood, which served as a coagulant. After graft placement, the material was covered with a pericardial membrane. The mucoperiosteal flap was approximated and sutured in place. The patient was provided with an interim prosthesis to be worn during four months of healing and was dismissed with postoperative instructions, antibiotics and analgesics until the follow-up visit seven to 10 days later.

After a four-month healing period, a second-stage surgery was performed to remove the middle implant in the maxillary right central incisor position to create a pontic site (Figs. 8-9). The “screw tent-pole” technique was again utilized with mineralized allograft and a collagen membrane for additional vertical augmentation of the pontic site (Figs. 10-11). A consolidation period of 12 months was allowed to ensure proper maturation of the bone and overlying soft tissue (Fig. 12). Screw-retained provisional restoration were utilized (Fig. 13) for six months to develop the soft-tissue architecture prior to the delivery of the definitive restoration (Fig. 14).

The final restoration with soft-tissue profile is shown at eight years (Figs. 15-16) and 13 years (Fig. 17) follow-up, along with CBCT and periapical views (Fig. 18-20). There were no complications or adverse events during surgery or postoperative healing. The preoperative crestal bone thickness for both implants increased to 1.8 mm and 2 mm, respectively, approximately one year after treatment. Significant increases in soft-tissue thickness, keratinized tissue width and gingival height were also unexpectedly achieved and maintained through 12 years of follow-up.

_Discussion_

This clinical case reports on unexpected improvements in peri-implant soft-tissue dimensions after GBR procedures to correct labial dehiscences around implants in the maxillary anterior jaw. Peri-implant bone loss can result in soft-tissue resorption followed by plaque attachment at or near the implant-abutment interface. This, in turn, can trigger soft-tissue inflammation with additional bone loss and gingival recession.16-20 It has been reported that gingival margin levels may be affected by the thickness of the gingival tissues and that a thin tissue biotype may favor apical displacement of the soft tissue margin.21 To maintain gingival health, maintaining an adequate width (~2 mm) of keratinized gingiva around dental implants has been suggested;16,19,21 however, this has been disputed.22 A correlation has been reported between the presence of keratinized tissue and plaque levels and the incidence of mucositis.23 It has been...
suggested that sites with minimal keratinized tissue might be prone to a lower incidence of periodontal pocket formation.\textsuperscript{20,23}

In the anterior maxilla, as labial bone thickness resorbs, there is a corresponding loss in labial soft-tissue thickness around the implant.\textsuperscript{24} Moderate recession can make thin, pink gingival tissues appear dark because of the presence of the underlying metal abutment and implant, and further bone loss can cause unsightly metal exposure above the gingival margin. In general, implants carry a higher risk of soft-tissue complications when placed in thin tissue bio-types or with labial inclinations when the labial plate thickness is $<2$ mm.\textsuperscript{24-26} Use of an opaque abutment, such as zirconia, has been reported to produce the least amount of gingival color change when gingival thickness was $<2$ mm, whereas any abutment material resulted in satisfactory esthetics when gingival tissue thickness was $>2$ mm.\textsuperscript{24,26}

The goal of the GBR procedures in the present case was to treat the facial bone defects as well as restore the esthetic gingival margin. The efficacy of allografts and GBR surgical protocols in repairing alveolar defects is documented in the dental literature.\textsuperscript{27-29} While some allogenic\textsuperscript{30-31} and xenogenic\textsuperscript{32} tissues have demonstrated efficacy in soft-tissue augmentation, the use of a collagen membranes with a mineralized allograft for soft-tissue augmentation is not well-documented. In the present case, use of a collagen membrane in combination with a mineralized bone allograft resulted in gain in keratinized tissue width and gingival height.

While the goal of the GBR procedure was to treat the bone defect in the present case, improvements were coincidentally observed not only in the soft-tissue dehiscence, but also in the keratinized tissue width and soft-tissue thickness. The use of mineralized allograft placed around 1.5 mm titanium screws ("screw tentpole") to tent out the soft-tissue matrix and periosteum has been previously reported for successful alveolar ridge reconstruction.\textsuperscript{33} Although there are no reports of a GBR procedure resulting in clinical increases in both of the latter soft-tissue dimensions, a limited number of retrospective studies\textsuperscript{34,35,36} have reported an increase in soft-tissue thickness around dental implants primarily in the
He has authored or co-authored more than 13 chapters in textbooks on bone regeneration and dental implants and has published extensively in peer-review journals. Le served as editor of the recognized Fonseca Oral & Maxillofacial Surgery textbook (third edition), released in 2017. His primary focus has been in hard- and soft-tissue regeneration improving esthetic outcomes. He has been a main podium speaker at numerous organizations, including the American Association of Oral and Maxillofacial Surgeons, the Academy of Osseointegration, the American Academy of Esthetic Dentistry, American Academy of Implant Dentistry, the American College of Prosthodontists, the Greater New York Academy of Prosthodontists and the International Congress of Oral Implantologists. Le was inducted as a diplomate of the American Board of Oral and Maxillofacial Surgeons, the American Dental Society of Anesthesiologists, the Academy of Osseointegration, the American Academy of Dental Implantologists and the International Congress of Oral Implantologists.

anterior maxilla after increasing the thickness of the facial bone through GBR.

Furthermore, the membrane placed over the particulate graft in the present clinical case was essentially a collagen matrix similar to a connective tissue graft, which adds to the thickness of the overlying tissue. Scoring of the periosteum and underlying bone tissue prior to grafting and foreign body reaction from placement of a graft and membrane may also result in scar tissue formation that augments the soft-tissue profile. The present technique is not ideal for restoring the gingival margins for poorly positioned implants or when there is significant thread exposure. For example, implants placed outside of the alveolar housing or with significant labial inclination associated with labial bone loss should be excluded.

Zucchelli et al. reported on a surgical-prosthetic treatment for implants with buccal soft-tissue dehiscence defects in the esthetic zone. The technique involved removing the crown, shortening the abutment and then treating the dehiscence defect with a coronally advanced flap and connective tissue graft. After one year, mean soft-tissue dehiscence coverage was 96.3 percent with complete coverage in 75 percent of the treatment sites. While patients were satisfied during short-term follow-up, the ability to camouflage a bony defect with or without exposed implant threads is highly limited without the support of the underlying bone, which is the main cause of soft-tissue recession.

In addition to soft-tissue recession, marginal bone loss has been associated with increased peri-implant stress concentrations in the crestal bone region. Over time, elevated stress concentrations can trigger additional bone loss and further soft-tissue recession. If left untreated, increased stresses can result in screw loosening, metal fatigue and component fracture over time. Implants placed in the anterior maxillary jaw with thin buccal plates are highly susceptible to the adverse effects of marginal bone loss.

In summary, the use of a mineralized bone allograft and a collagen membrane effectively increased alveolar hard- and soft-tissue dimensions in the esthetic zone of the anterior maxilla. Restoring the missing buccal bone decreased the risk of developing peri-implantitis from bacterial biofilm attachment to the exposed implant-abutment crevice and roughened implant surface. Secondly, the soft-tissue thickness was increased, which made the restored tissues more resistant to future recession and mask the underlying titanium components. Thirdly, guided bone regeneration also unexpectedly increased the width of keratinized tissue, which has also been reported to help provide a peri-implant soft-tissue seal against bacterial invasion, in addition to providing resistance against recession.

While increases in soft-tissue thickness and keratinized tissue width have been reported after placement of connective tissue and free gingival grafts, this phenomenon has not been previously reported after guided bone regeneration procedures around dental implants. The author has reported the results of using this same technique in 11 patients who achieved similar outcomes after short-term follow-up.

The value of individual clinical case reports is that their anecdotal data can provide preliminary evidence for developing new hypotheses that lead to larger randomized clinical trials, which are needed to determine if the present approach will effectively serve as an alternative for soft-tissue augmentation in instances where tissue thickening is needed.

References available upon request from the publisher.
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A five-case representative cohort from an ongoing five-year study of marginal bone level and soft-tissue parameters of a novel pink biomimetic implant system

Authors: Mariano A. Polack, DDS, MS; E. Todd Scheyer, DDS, MS; Kevin G. Murphy, DDS, MS; Joseph M. Arzadon, MD, DDS; Alan L. Rosenfeld, DDS; and George A. Mandelaris, DDS, MS

Abstract

Color discrepancies between peri-implant soft tissues and materials used in implants, abutments, and restorations may influence overall esthetics at the implant–soft-tissue interface, particularly in the aesthetic zone. In an ongoing five-year multicenter prospective post-marketing surveillance study of 120 adult male and female participants at eight sites in the United States (total of 168 implants placed), the authors have been evaluating anterior and posterior single-tooth implants using a novel pink osteoconductive implant system (in clinical use since 2010) that features a variety of pink components, developed with the objective of improving peri-implant soft-tissue esthetics.

Clinical analyses of the 18-month interim survival rates, marginal bone and soft-tissue level changes, and esthetics have been completed, showing an overall success rate among all of the implanted sites of 95.8 percent. This case series aims to summarize data on implant survival, probing-derived and radiographically assessed marginal bone and soft-tissue level changes, and qualitative photographic evidence of post-restorative soft-tissue esthetic outcomes by presenting a snapshot of five representative cases (two anterior and three posterior), at 18 months from the start of this study.

Four of the five cases described here involve teeth visible in full smile and comprise three maxillary incisors and two maxillary premolars. The remaining case was a relatively straightforward mandibular first-molar replacement. Gingival inflammation, bleeding on probing and plaque were infrequently observed throughout the treatment period. Implant success and stability, alveolar bone-level stability, soft-tissue height and attached-gingiva width stability, and peri-implant soft-tissue esthetic outcomes were uniformly excellent at the 18-month follow-up visit. Data from the entire ongoing multicenter study population will be published both at three years and at study completion at five years. Those results will be necessary to assess any statistical differences in tissue changes and/or bone levels and apply meaningful interpretation to aggregate observed qualitative colorimetric soft-tissue parameters associated with this implant system.

Introduction

Despite the high predictability of tooth replacement with osseointegrated implants, management of tissue esthetics at the facial restoration margin can pose significant challenges for the prosthodontist, restorative dentist and periodontist, and is of particular concern in the esthetic zone. In general, the closer natural shades of hard and soft tissue can be mimicked, the better the esthetic result. Gingival esthetic challenges have been addressed specifically using externally placed pink porcelain on prosthetic components to simulate natural gingiva, with varying degrees of success. The current system (Genesis®, Keystone Dental, Inc, www.keystonedental.com) addresses a similar goal by modifying internal esthetics within the implant/abutment–free gingival interface.

The proximity of the facial implant–soft-tissue interface to that of a crown margin places an intense focus on harmonization of compatibilities among the inherent colorations of various metals, ceramics and gingiva in a variety of soft-tissue scenarios. The ideal treatment objective is to make this convergence visually indistinguishable.

Esthetic impact of implant–abutment interface design has been reported in a recently published case series by McGuire et al, specifically, adherence...
to a specific treatment protocol yielded good esthetics with the three different interface designs tested (conical, flat or platform-switched). One-year results from the larger five-year randomized clinical trial by Cooper et al\(^\text{10}\) represented by those cases demonstrated that difference in interface design had significant impact on marginal bone stability but not on gingival mucosal architecture or position (including the apical-most aspect of the facial gingival margin contour, i.e., zenith).\(^\text{10}\)

The case series presented here represents another ongoing five-year clinical study comprising 120 patients who required replacement of one or more anterior or posterior teeth, now in its third year of post-marketing surveillance to evaluate clinical implant efficacy and soft-tissue esthetics of this unique implant system developed with the objective of overcoming color discrepancy-driven challenges. Three additional representative case reports from this study have been published.\(^\text{11}\)

This system uses a biomimetic implant–bone interface produced by anodic spark deposition or discharge (ASD, also known as microarc oxidation or glow discharge deposition) to the threaded titanium implant surface (BioSpark\(^\text{13,14}\), Keystone Dental, Inc.)\(^\text{12,15}\) via electrochemical anodization to form a nanorough, osteoconductive titanium-oxide implant surface rich in calcium and phosphorus ions as a bone interface.\(^\text{13,15,16}\)

In global use since November 2010, this system also features a variety of prefabricated and customizable pink abutments and other restorative components, including implant collars and matching prefabricated customizable titanium abutments. Unless otherwise customized, the transmucosal portion of the abutment and/or the implant collar are uniformly pink throughout the system.

The pink color is produced on the implant surface by a proprietary electrochemical anodization process (AnaTite\(^\text{18}\), Keystone Dental, Inc.), which produces a layer of titanium oxide on the implant surface. The resulting pink coloration also helps mask the gray hue that could be observed with conventional implants under the gingiva of thin-biotype patients, thus offering the clinician an alternative to zirconia for creating, enhancing and refining gingival esthetics.

Published preclinical studies have evaluated this implant system’s surface in regard to bone-to-implant contact.\(^\text{13,17,18}\) In vitro studies on cell behavior\(^\text{13,14}\) and studies on the effects of pink on gingival esthetics have evaluated this system from clinical\(^\text{19,20}\) and animal-tissue perspectives.\(^\text{21}\)

Spectrophotometric analyses published by Park et al confirmed that there is a measurable difference between the colors of natural maxillary/labial gingiva and the surfaces of conventional titanium implants.\(^\text{19}\) More specifically, colorimetric data reported by Ishikawa-Nagai, et al, suggest that (in comparison to other colors) light pink coloration of the implant neck produces an optimal color that is clinically indistinguishable from that of natural gingiva.\(^\text{20}\) Patient-specific shading of the implant collar using a similar approach has also been described in a three-case series published by Sumi, et al, who reported such specificity to provide stable gingival esthetics at a 1.5-year follow-up, especially in patients with a thin gingival biotype.\(^\text{22}\)

A case report by Polack published in 2012 specifically evaluated the pink nanorough implant system presented in the current case series (Genesis). An excellent result was achieved in an esthetically demanding case that required multiple extractions and site development for the replacement of four maxillary incisors (using narrow-diameter, 3.8-mm x 13-mm fixtures to replace two laterals, creating a four-unit implant bridge) in a severely resorbed ridge.\(^\text{23}\)

Functional considerations of immediate implant placement

In the authors’ experience, the aggressive thread pitch of the implant fixture used in this case series also facilitates its efficacy in immediate placement and loading scenarios. Of note, all implants in this multicenter study population have surpassed three years of survival, function and success; the vast majority of them were immediate placements (78 percent; 22 percent were staged).

Results of a meta-analysis published by Kinaia, et al, in 2014 comprising 16 controlled studies suggests that immediate implant placement preserves crestal bone significantly more effectively than implant placement in healed bone after at least 12 months of functional loading.\(^\text{24}\) Furthermore, this meta-analysis also identified a significant advantage for the use of platform switching in such immediate placement scenarios.\(^\text{24}\)

Preliminary results from an ongoing randomized clinical study by Huynh-Ba, et al, showed no short-term differences in esthetic outcomes in immediate vs. early implant placements.\(^\text{25}\) Cosyn, et al, also reported minimal midfacial recession (in two of 25 patients after three-years’ follow-up) following an immediate implant placement protocol in the anterior maxilla in patients with thick gingival biotypes.\(^\text{26}\)

A recent systematic review by Slagter, et al, that also encompassed immediate provisionalization reported similar findings.\(^\text{27}\) Another systematic review by Cosyn, et al, found conflicting evidence regarding contributory factors to midfacial recession after immediate implant placement but suggested this risk is lowest in patients who have a thick biotype and an intact buccal bone wall and receive immediate

implants

‘... All implants in this multicenter study population have surpassed three years of survival, function and success; the vast majority of them were immediate placements.’
Recent systematic reviews consistently confirm that implants with platform-switched abutments are associated with better crestal bone preservation than implants with platform-matched abutments.

Platform switching has become a standard feature in implant component design and has expanded the clinician’s control over crestal bone preservation. Numerous studies29-33 and systematic reviews34-37 have reported reduced alveolar crestal bone resorption for platform-switched implants compared with platform-matched implants.

Considerable clinical evidence suggests platform switching has a bone-protective effect. Cappiello, et al, reported a significant preservation effect (vertical bone loss was 0.72 mm less with platform-switched healing abutments versus controls) in a controlled clinical trial of 131 implants (all placed at the crest) in 45 patients.32 Clinical studies by Prosper, et al,38 and Canullo et al39 have also demonstrated advantages of platform-switched implants over regular implants with respect to crestal bone stability, with a minimum of 24 months follow-up. Recent systematic reviews consistently confirm that implants with platform-switched abutments are associated with better crestal bone preservation than implants with platform-matched abutments.35-37

While platform-switched implant configurations also appear to preserve soft tissue and provide increased control over gingival esthetics according to some reports,40,41 several recent studies tend toward reporting similar tissue-esthetics preservation with platform-switched and other abutment-implant interface designs,3,42 which suggests that platform switching favors stable tissue dynamics. However, a study by Zuiderveld, et al, found platform switching to have no effect on midbuccal mucosal (MBM) measurements one year after crown placement; rather, the buccopalatal positioning of the implant itself (i.e., more toward the buccal) resulted in a more apically positioned MBM.43

Findings of a systematic review by Prasad, et al, emphasize the importance of considering a synthesis of factors comprising implant design, occlusal forces and bone and soft-tissue volumes in optimally preserving crestal bone.44 As a further caveat, even the authors of some recent systematic reviews raise notes of caution about remaining unknowns as to functional specifics of platform switching and stress the need for further and more specific data from clinical studies to evaluate them.34,35

Taken together, these findings offer evidence that the functionality of this implant system in various placement protocols may complement bone-and soft-tissue-preserving effects, with immediate placement in combination with platform switching.

Five-year prospective clinical study

An ongoing five-year study continues to evaluate the use of this implant system (168 implants placed in 120 partially edentulous patients). Its objectives include assessment of the five-year survival rate of this implant system, implant success, incidence of excessive bone loss, peri-implant infection and other complications, incidence of adverse device effects, change in marginal bone level, visual soft-tissue esthetic outcomes, and the number and nature of prosthetic revisions.

Alignment, orientation and magnification of the periapical radiographic images of all subjects’ implants and alveolar bone levels were standardized by rotating and translating each image such that all were uniformly aligned, oriented and scaled using a semi-automated program (MATLAB®, MathWorks, www.mathworks.com/products/matlab). For angles, imaging differences in both elevation (above or below correct plane) and azimuth (mesial–distal) between images in the same series were computed. All of the images in this data set have a percentage error of less than 3.5 percent. Clinical analyses of the investigator-reported 18-month interim survival rates, marginal bone and soft-tissue level changes, and esthetics estimate an overall success rate among all sites of 95.8 percent.

Consistent with other implant designs, most osseointegration failures in the study occurred during the healing period following placement or shortly after prosthetic loading. However, unlike other designs, the location (mandible versus maxilla)45-48 and length of the implant46-48 had no apparent effect on the survival rate. After loading, this implant system has demonstrated a survival rate of more than 99 percent, based on available data from this ongoing study.

This is primarily a clinical implant survival and efficacy study with hard- and soft-tissue metric endpoints. The study protocol defines implant success as peri-implant bone loss ≤3 mm. Its descriptive endpoints require radiographic and photographic documentation only, and the esthetic results are presented as clinical photographs.

Note: Please see Implants C.E. magazine’s next edition, 02/2018, for Part 2 of this article.

References available upon request from the publisher.
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The Academy of Osseointegration's (AO) 2018 Annual Meeting has all the ingredients to be the premier dental meeting of the year, and one of the highlights is expected to be the 2018 President's Reception. This acclaimed event, complimentary to registered attendees, promises to be one of the most festive social gatherings ever assembled by AO. To be held just a "stone's throw" from the main hotel, this "don't miss" extravaganza will provide many surprises.

“My President’s Reception will be in Microsoft Square and is a fantastic venue much like a mini-Times Square, or where I come from in London, a Piccadilly Circus. What’s more, AO’s 2018 Annual Meeting will commence during Oscars weekend, so Los Angeles will be awash with celebrities and the atmosphere will be buzzing!” said AO president Dr. Michael Norton.

Britishmania, one of the leading Beatles tribute bands in the world, will be providing the soundtrack for this fantastic event with their perfected theatrical and expert performance that will keep the spirit of the Beatles alive and take you back in time.

“Throughout its history, AO’s spectacular social events have made for memorable annual meetings — and this is one extravaganza you will not want to miss! We look forward to seeing you in Los Angeles!” Norton said.

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Continuing education in dental implantology has traditionally focused on theoretical aspects. Trinon Collegium Practicum (TCP) challenges this training approach by offering practice-orientated dental implantology courses. The Q-Implant Marathon offers an engaging curriculum specializing in hands-on training, Trinon asserts.

Conventionally, entering the field of implantology has proven difficult for many dentists. Typically, it is not a subject of university education, with many universities and courses focusing largely on theoretical orientation. Because of this, establishing oneself within this particular area of dental medicine can prove to be a time-consuming endeavor. Further complicating the matter is the issue that educational and training programs rarely present an opportunity for practitioners to practice directly on patients.

Since 2003, the Q-Implant Marathon has offered hands-on training that incorporates a live patient model. Participants spend five days assisting and leading surgeries under the supervision of TCP’s experienced surgical team. The Academy of General Dentistry accredits the Q-Implant Marathon, and all participants are eligible to receive 60 continuing-education credit hours.

The Q-Implant Marathon offers three levels of training on the basis of practitioner experience:

- **Level 1:** Participants lead the placement of 30 implants, while assisting on dozens more.
- **Level 2:** Participants perform five sinus lifts and learn foundational bone-splitting techniques.
- **Level 3:** Participants learn advanced grafting techniques, such as ramus and chin block grafts and titanium mesh reconstruction.

Visit booth No. 2339 at the Chicago Midwinter Meeting for more information.

“Prior to coming to this course, I had only theoretical/didactic knowledge in implantology. You gain immense knowledge in placement, treatment planning and surgical skills. As a beginner, I would highly recommend taking this course to advance your career.”

- Q-Implant Course participant (Level 1)

“I found the hands-on level 2 course invaluable. The learning environment was supportive and the training and feedback with total hands-on instruction was the one thing my previous training lacked.”

- Q-Implant Course participant (Level 2)

For more information on Trinon Collegium Practicum courses, please call (877) 705-1002, e-mail register@implantologycourses.com or visit online at www.implantologycourses.com.
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Novadontics, LLC, validates the meaning of its brand name with the launch of a new category for implant dentistry, DTO (Digital Treatment Optimization). In response to the DSO model decimating the autonomy and profitability potential of independent dentists, and the overabundance of social media complaints from patients against various faceless conglomerate organizations, Novadontics has created a business model to help implant clinicians remain competitive with even more corporate benefits than a DSO, yet without selling their soul or risking patient well-being.

Corporate dentistry touts three advantages: economies of scale derived from cookie-cutter process replication all under one roof, conglomerate-size purchasing power and limitless advertising spending inundating the market across all media fronts. Consumers feel they have ever-more limited choice as their dentists are unable to compete, hence the rise of corporate dentistry at the expense of independence, specialization and the friendly patient care of your local neighborhood provider. Novadontics provides a solution to this for both dentists and patients.

For renowned implantology expert, teacher and international author Dr. Louie Al-Faraje, the time has come to help independent dentists across America compete against the ever-growing corporate-controlled brands. Novadontics does this through its cutting-edge app-based Smartchecklist™ software featuring its flagship 150 Checks to Perfection™ protocol, together with a refer-in network of integrated solutions ranging from VoIP consultations to in-practice support, plus industry-leading continuing education and training.

“Healing the same benefits as a DSO, such as national brand marketing and unmatched purchasing discounts, then adding cutting-edge technology to drive both performance and predictability, we give the Novadontics network autonomy, empowerment and profitability through DTO and license to use our patented cloud-based software,” Al-Faraje said.

When it comes to patient capture for expensive implant treatments, offering free consultations and CT-scans is not enough. It is imperative to put the patient first by having bullet-proof treatment planning and using the highest quality products available on the market, thus mitigating procedure uncertainty for the patient and practice risk for the doctor, according to Novadontics.

With 32 already Novadontics Smile Providers located throughout the country since the company’s launch in January, Novadontics is positioned to disrupt the dental industry and give many more people — dentists and patients alike — significant reason to smile.

Novadontics is a software company doing it differently in the dental industry with creation of an exciting new category: DTO — Digital Treatment Optimization™. Through this “new dentistry” concept, Novadontics says that it is breaking ground in provider autonomy, practice empowerment and protocol standardization while ensuring patient awareness, choice and positive procedural outcome are an absolute given. By using the latest technologies and the best Swiss-engineered, U.S.-produced implant products available on the market, Novadontics can offer patients the most comprehensive “gratification guarantee™ available today.

“We have ways of making you smile™ with our premier product: the Novadontics Smile™, a next-generation data and technology-driven method of full-mouth rehabilitation using dental implants. Our exclusive clinician collaboration community of Novadontics Smile Providers follows an app-based smart checklist™ procedure designed in accordance with The Louie Al-Faraje Method, a proven protocol comprised of 150 Checks to Perfection™ Al-Faraje stated.

Novadontics doctors are trained to the highest level in implant education through the California Implant Institute and have demonstrated industry-leading competency by performing a requisite number of successful implant surgeries before joining Novadontics, the company asserts.
ICOI Symposia Around the World

2018
Marrakech, MOROCCO
ICOI/ICOI Europe/SENAMIE Symposium
March 1-3, 2018
Melaka, MALAYSIA
ICOI ASEAN Congress
April 5-7, 2018
Las Vegas, NEVADA
ICOI World Congress XXXVI
September 27-29, 2018

2019
Phoenix, ARIZONA
ICOI Winter Implant Symposium
February 14-16, 2019
San José, COSTA RICA
ICOI Central America Symposium
February 28-March 2, 2019
Baden Baden, GERMANY
ICOI Europe
May 23-25, 2019
New York, NEW YORK
ICOI World Congress XXXVII
August 15-17, 2019

2020
Houston, TEXAS
ICOI Winter Implant Symposium
February 27-29, 2020
Sydney, AUSTRALIA
ICOI World Congress XXXVIII
October 8-10, 2020

2021
Boston, MASSACHUSETTS
ICOI Winter Implant Symposium
February 18-20, 2021

For current meeting information, visit www.icoi.org
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must be combined into one Microsoft Word document. Please do not submit multiple files for each of these items. In addition, images (tables, charts, photographs, etc.) must not be embedded in the text document.

All images must be submitted separately, and details about how to do this appear below.

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Insert figure references in your article wherever they are appropriate, whether that is in the middle or end of a sentence, but before the period rather than after. Our preference is to have figure references noted in the appropriate place within the text as it helps the readers to orient themselves when moving through the article. In addition, please note:

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