implants

the international C.E. magazine of oral implantology

2013

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Implant site preservation using a novel post and crown

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Thanks to rapidly advancing technology, the field of implant dentistry is always changing and evolving. Clinicians must be vigilant in their efforts to keep up with new techniques, new products and new technology that could affect treatment planning.

And that’s what makes the publication you are holding right now so valuable.

For this issue of implants, we’ve assembled a collection of articles from a variety of respected names and companies in dentistry. These expert clinicians are sharing their first-hand knowledge and expertise with you. In this issue, you can read about implant site preservation, and you can also learn about blade implants. We also have news on implant events and technology.

But there’s more.

Every issue of implants magazine also contains a C.E. component. By reading the set of three articles (beginning on Page 6) on “Implant site preservation using a novel post and crown” by Dr. Kalman, “Clinical and diagnostic advantages of PreXion 3-D imaging system” (page 10) by Dr. McEowen and “Blade implants in the treatment of thin ridges” (page 15) by Dr. Dal Carlo, and then taking short online quizzes on each article at www.DTStudyClub.com, you will gain one ADA CERP-certified C.E. credit.

Keep in mind that because implants is a quarterly magazine, you can actually chisel at least four C.E. credits per year out of your already busy life without any lost revenue and time away from your practice. To learn more about how you can take advantage of this C.E. opportunity, visit www.DTStudyClub.com. Annual subscribers to the magazine ($50) need only register at the Dental Tribune Study Club website to access these C.E. materials free of charge. Non-subscribers may take the C.E. quiz after registering on the DT Study Club website and paying a nominal fee.

Finally, if you are interested in becoming a published author, we are always looking for experienced clinicians to write C.E. articles and offer their expertise to our readers. Contact Managing Editor Sierra Rendon at s.rendon@dental-tribune.com for more information on submitting an article.

I hope you enjoy this issue and that you get the most out of it.

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Clinical dentistry by Timothy F. Kosinski, DDS, MAGD

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Implant site preservation using a novel post and crown

Abstract

Implant site preservation is an important component of diagnosis and treatment planning. Through CAD (computer-aided design), prosthesis can be designed with ideal characteristics. By utilizing CAM (computer aided manufacturing), the clinician has the ability to mill the designed prosthesis with great accuracy.

IPS e.max has been selected as the material for this investigation due to strength and esthetics. The combination of IPS e.max and in-office CAD/CAM technology allows the clinician the ability to create an esthetic and predictable moderate-term provisional to preserve a site for future implant placement.

Introduction

Implant placement in the esthetic zone is the ideal treatment option when diagnostic criteria are satisfied. Finances, however, can act as a barrier to treatment. A moderate-term, esthetic provisional would allow the patient the opportunity to overcome barriers. In-office CAD/CAM technology would allow for immediate prosthesis fabrication.

CAD/CAM stands for computer-aided design and computer-aided manufacturing, respectively. CAD allows the clinician to digitally capture an image of a preparation and then design an indirect (out of the mouth) restoration by using software. After the ideal restoration has been produced, the design is then fabricated out of a material by a milling machine. E4D is an in-office dental unit (D4D Technologies). IPS e.max is a metal-free, esthetic dental material used in indirect restorations. IPS e.max is composed of lithium disilicate, and it's ideal physical and esthetic properties allow it to be the first choice for CAD/CAM restorations. IPS e.max has the ability of detailed CAM production and has strength second only to gold.

Fig. 1. Preparation of tooth #11.

(Photos/Provided by Dr. Les Kalman)
Clinical case

Presentation

A 28-year-old male patient presented with a failed post and core and porcelain fused to metal (PFM) crown. His chief complaint was that the ‘fake tooth’ has become dislodged several times and he requested a long-term solution.

Medical history was non-contributory. Clinical and radiographic examination indicated an endodontically treated central incisor with no apical pathology and a failed post and core/crown restoration. The PFM crown was still cemented to the post and core and lacked a ferrule effect. The post and core/crown had been re-cemented several times in the past.

Diagnosis indicated: endodontic treatment, failed post and core and caries on tooth number #11. Treatment options to replace the missing tooth included: an implant supported crown, a bridge, a removable partial denture and no treatment.

The patient had interest in the implant option but requested that the old unit be re-cemented. He had several professional and personal obligations that required an esthetic provisional. Finances were a limiting factor. The existing post and core/crown and core and lacked a ferrule effect. The post and core/crown had been re-cemented several times in the past.

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Implants was deemed poor and could not be used. Based on the situation, an alternative option was presented to the patient: an indirect IPS e.max CAD/CAM post and core/crown moderate-term provisional that would be fabricated using an in-office E4D unit. Treatment-specific informed consent was given, and the patient agreed. It was decided to generate an indirect CAD/CAM prosthesis due to the investigative nature of the clinical case.

**Preparation**

Tooth #11: the canal space was cleaned of cement and the remaining tooth structure was prepared as per full porcelain coverage specifications (Fig. 1). A paper clip was inserted into the canal space (Fig. 2). A final PVS impression (Ivoclar) was taken, utilizing a Q-Trays (Research Driven) segmental tray (Figs. 3–5). A bite registration was taken for the CAD/CAM scan (Fig. 6). The patient was dismissed to the waiting room while the prosthesis was fabricated.

**Indirect CAD/CAM component**

The impression was poured with stone and then digitized by taking several scans of the area with the E4D scanner (Fig. 7). Utilizing CAD technology, the prosthesis was delineated. The CAD software then presented a rudimentary prosthesis based on the parameters selected. Material thickness was then evaluated.

The prosthetic design was further manipulated using the provided software tools until an acceptable result was achieved (Fig. 8).

The CAD design was executed on an IPS e.max block (Fig. 9) utilizing CAM technology (Fig. 10). The prosthesis was removed from the block and assessed for morphology and fit on the cast. The prosthesis was then stained and glazed (Fig. 11) and fired in the furnace. After firing, the color of IPS e.max changes from purple to tooth colored (Figs. 12 and 13).

The patient returned for prosthetic delivery. The post and crown prosthesis underwent intraoral assessment (Fig. 14). The patient approved the esthetics. The prosthesis was cemented with Multilink (Ivoclar); occlusion was refined and the restoration was cleaned and polished (Fig. 15).
Discussion

This report represented a clinical investigation; as IPS e.max blocks supplied for in-office CAD/CAM dentistry have not been recommended for posts or post and core/crown combinations. This was due to the fact that block application for posts has been unexplored and that the strength of IPS e.max for posts had yet to be determined.

The CAD software was quite limited and did not have the capability to generate an intra-canal projection. The optical scanner also had limitations, as the angle of acquisition had to be manipulated to acquire digitized data. Finally, the CAM unit’s ability to generate a complex crown unit with a canal projection (post) had yet to be determined.

Several factors were evident that allowed for the completion of this case. The patient requested a “temporary,” highly esthetic procedure until financials permitted the ideal treatment. The inability to use his existing restoration opened up the opportunity for this investigative trial.

The patient’s occlusion exhibited mild overlap and overjet; therefore, occlusal forces would be minimized. The patient was committed to wearing his occlusal appliance. That the adjacent teeth had no other restorations present reinforced the necessity for minimally invasive dentistry.

Conclusions

CAD/CAM technology has been harnessed utilizing IPS e.max to provide for an investigative moderate-term, predictable and esthetic anterior provisional. Further studies are required to: quantify the strength of IPS e.max, assess its role as an intra-canal projection (post) and develop the technology for CAD/CAM procedures.

The potential seems to exist for IPS e.max to act as a predictable, moderate-term and esthetic canal-retained prosthesis. This novel approach will enable site preservation and optimize clinical condition for future implant placement.

Disclosure: Dr. Les Kalman is the co-owner of Research Driven and the developer of the Q-Tray.

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about the author

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Fig. 14. Prosthesis try-in.
Fig. 15. After: final cemented prosthesis.
C.E. article application of 3-D imaging

Clinical and diagnostic advantages of PreXion 3-D imaging system

Author Dan McEwen, DDS

For nearly 100 years, dentists have relied on 2-D radiographic imaging for diagnosis and treatment planning. With the 1999 introduction of cone-beam computed tomography (CBCT), all dentists now have tools available for more accurate diagnosis and treatment.1 The ability to look at a tooth in any direction and orientation, as well as in 3-D, eliminates much of the guesswork commonly experienced with 2-D radiographs.

We have been limited in most cases to only a buccal-lingual view provided by periapicals, bitewings and panoramic radiographs with the occasional axial view of an occlusal film. Medical CT scans and images began in the early 1970s and were sometimes used by dentists, offering our first multiplaner views.2

The adoption of 3-D cone-beam imaging is appropriate and has important advantages for all modalities of dentistry. From every specialist to the general dentist, the increased amount of radiographic information as well as increased accuracy will aid in the most sound diagnosis possible.

CBCT description

CBCT is a single or partial rotation of an X-ray source around the head, capturing X-rays on various flat panel arrays and sensors. The information is converted to a series of axial slices by computed tomography and stored as virtual anatomy in the computer.

With the use of sophisticated software, the dentist is able to view information in several different views, including axial slices (head-to-toe orientation), coronal slices (front-to-back orientation) and sagittal slices (side-to-side orientation), all known as multiplaner reconstructions (MPR). The thickness of each slice can be varied to include more or less information.

Because the voxels (volumetric pixels 3-D) are isotropic, other MPR images can be generated by slices drawn at any angle, curve or thickness through the scan to view areas critical to the final diagnosis.3,4 The final view offered by CBCT is a 3-D view that can be rotated and viewed in any direction.

Once again through software manipulation, 3-D images can be viewed as conventional radiographs, maximum intensity projections (MIP), soft-tissue projections and a variety other views.

This nearly endless ability to manipulate the data aids in the diagnosis and identification of:

- disease,
- nerve canals,
- sinus morphology,
- dental caries,
- bone density,
- fractures,
- endodontic pathology,
- implant placement criteria,
- periodontal defects,
- bone pathology,
- fractured teeth,
- iatrogenic trauma,
- TMJ morphology and disease,
- third-molar position
- and many more healthy or diseased conditions.

Early CBCT adoption with implants

The first and primary use of CBCT for early adopters was implant placement. As the scope and the value of the information became better known, dentists of all branches began to see the value of MPRs and 3-D renderings including periodontics, endodontics, oral surgery, treatment of TMJ, orthodontics, implantology and general dentistry.1,4,5

_c.e. credit part II

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Clinical periapical and panoramic radiographs for the placement of implants can be misleading with elongation, foreshortening, superimposition and geometrically incorrect data. A look at the implant in the periapical shows no obvious disease to an existing integrated implant.

Clinically, a buccal fistula was present with exudate and slight pain. The CBCT scan (Fig. 1) reveals a more accurate view showing a buccal defect on a sagittal MPR. A surgical flap revealed a dehiscence of the coating of the implant. Removal of the foreign body resulted in an asymptomatic and healthy patient.

The evaluation of the available bone for the initial implant placement can be crucial for the long-term success of the case. If there is inadequate bone available, grafting may be a necessity. CBCT studies render the most accurate information available at a low radiation dose. The periapical shows an obvious lack of bone height, but does not show the buccal-lingual dimensions or an accurate view of the sinus morphology (Fig. 2).

The MPR view of the CBCT shows all necessary measurements to perform the sinus lift and grafting with the immediate placement of the implant fixture (Fig. 3). Three-dimensional views show the floor of the sinus and any soft-tissue pathology (Fig. 4). Having accurate measurements in all dimensions is an advantage of CBCT scanning.

**CBCT and endodontics**

Endodontics is a field that is rapidly adopting the use of CBCT and for good reason. The inherent geometric deficiencies of 2-D radiographs make the CBCT scan a valuable adjunct to investigate the root morphology in both 3-D and MPR.

The typical periapical will show superimposed canals in the anterior, bicuspid and molars as well as unwanted bone densities both buccal and lingual to the affected tooth making the image quality poor.

The ability to view MPR slices in cross-section, long axis and oblique directions gives the ability to follow all canals in any direction and show their relationship and measurements from other known structures. This virtual tour of the root morphology is a great benefit to the final treatment outcome (Fig. 5).

Post-root-canal infection can be difficult to diagnose with the standard periapical. The endodontic fills may appear to be normal even though other clinical findings and symptoms are abnormal. The patient presents several months post root-canal treatment with pain on palpation and pressure and avoids this side of the mouth.

A periapical radiograph shows minimal pathology (Fig. 6). The roots appear to be filled, and a small puff of sealer extends through the apex of the mesial roots. The distal root structure and fill appear normal. There is little indication of periapical radiolucency, only a widening of the periodontal ligaments of the mesial roots.

A CBCT scan reveals a completely different picture. The coronal MPR reveals a short fill near the apex of the mesial lingual root and a large radiolucency (Figs. 7, 8) not visible on the periapical radiograph (Fig. 6).

Missed canals are difficult to see in a buccal-lingual projection of the periapical radiograph as one canal is superimposed on the other (Fig. 9). Often, as viewed in this radiograph, we see periapical pathology with an apparent normally filled canal.

CBCT scans allow dentists to look for pathology in MPR planes to identify the actual problem before invasive procedures are performed on the patient. The axial view shows a lingual canal exists and is

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**Fig. 1.** Sagittal CBCT MPR showing bone defect at point of dehiscence of the implant coating.

**Fig. 2.** Periapical does not show the sinus anatomy or the width of the bone.

**Fig. 3.** MPR showing post-op of sinus graft and implant placement.
I.C.E. article

application of 3-D imaging

I untreated. The coronal view confirms the diagnosis and treatment can be completed (Fig. 10).

Today’s endodontists, as well as general dentists, are benefiting from the diagnostic capabilities of the high-resolution CBCT scanners available over conventional 2-D periapical.5,6

Oral surgery

Oral surgery, with its inherent invasive nature, can be better served using CBCT with MPR as well as 3-D images. The ability to perform virtual surgery is a benefit to both the doctor and the patient.

Clinicians have the advantage of seeing morphology and landmarks in real time and space with accurate measurements, and patients will gain a better understanding of the problems and the solutions their doctors are offering them.

Third-molar extractions can be risky based on 2-D and panoramic radiographs. These radiographs can often superimpose nerves and sinuses over root structures. Dentists using 2-D radiographs must often rely on experience to assess the risks of iatrogenic trauma.

The use of CBCT with MPRs and 3-D images reduces any guessing as well as the chance for any permanent damage to the patient. With the adoption of CBCT, the judgment is based on solid evidence and the risk will decrease.

A panorex of the superimposed third molars gave no solid evidence the canal lies between the roots. It is only with the use of CBCT and the MPRs that the nerve can accurately be seen traversing between the mesial buccal and mesial lingual root (Fig. 11).4,5

Other surgical advantages include the identification and the position of supernumerary or impacted teeth. The images show accurate positions and show definitive morphology that will aid in removal of the proper teeth (Fig. 12).

Knowing the exact position of many of these teeth is a benefit to both the doctor and patient. It will lead to the most precise surgical path and the least invasive procedure.

Periodontics

The explanation of periodontal problems are often misunderstood by the patient. As doctors we talk about pockets, point to X-rays and propose treatment only to have patients refuse treatment because they do not understand what we are clinically describing. Using the 3-D portion of the CBCT scan can improve the understanding and acceptance of treatment plans.

The images are a picture of the problem that is owned by that patient and much easier to understand by the layperson. Illustrating periodontal defects and pockets allows the patient to better participate in the process (Fig. 13).

The MPRs and the 3-D projections aid in surgical planning for periodontists, allowing for accurate measurements and bone analysis prior to osseous surgery that doctors cannot get using the periapicals or panoramics.

Studies have shown that CBCT images are more accurate than panoramic radiographs. For the periodontist placing implants, the ability to measure bone density and avoid important anatomy is important.4,5
Orthodontists are beginning to adopt large field-of-view CBCT. Recent studies show that linear measurements of bony structures are more accurate using CBCT and have less distortion than currently used methods of measurement: lateral cephalometric, posteroanterior (PA) and submentovertex (SMVT).

Accurate measurements of tooth volume and tooth position can aid in accelerated treatment times and more precise treatment.

Along with tooth position, density of bone and size of arches, the orthodontist also has an accurate evaluation of the temporomandibular joint and position of the condyles. Impacted teeth are easily identified and position either buccal or lingual can be confirmed prior to movement or removal. Both MPRs and 3-D projections give the clinician a complete picture of the problems and the treatment course.

With a single CBCT scan, orthodontists can produce all of the information they need: panoramic, cephalometric, PA, SMVT, tooth size and volume, crowding evaluation in any plane, TMJ evaluation and airway analysis, all with both soft-tissue and skeletal information.

**Conclusion**

We treat our patients in 3-D, and now, with cone-beam computed tomography, we are changing the way we diagnose from 2-D to 3-D. The addition of this technology will increase your diagnostic skills with better and more complete information at your disposal. As with any type of invasive diagnostic tool, clinicians should weigh the risk to benefit in using CBCT scans.

Judicious use of CBCT and knowledge of patient’s lifetime doses should always be a consideration as well as the availability of other diagnostic tests appropriate for the problems of the patient. When...
adoption of new technology, training is paramount. Along with training comes the responsibility of the doctor to read and diagnose information from CBCT scans. Do not avoid CBCT from lack of knowledge; instead, take this opportunity to become a better diagnostician and radiologist. As you review radiology and pathology, your use of CBCT will aid in making the most accurate diagnosis and the most complete treatment plans.

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2. No specific author listed. For the Patient (history of x-ray), JADA, Nov 2004; vol.135:1643

Dan McEwen, DDS, is a 1982 graduate of Loma Linda School of Dentistry and has been in private practice for 26 years. He is a founding member of the World Clinical Laser Institute, achieving a mastership level of proficiency. He has been active in FDA approval of oral surgery techniques using Erbium lasers. McEwen has lectured and trained internationally in techniques using lasers in general and specialty dental fields. He a member of the ICOI and is active in implantology. McEwen has been involved in cone-beam technology for more than five years and owns 3D Imaging Center in Maryland.
Blade implants in the treatment of thin ridges

Indications and techniques

The conception of the endosseous blade implant arose from the intuitions of L.I. Linkow and R. Roberts; its development and diffusion, however, must be attributed to Prof. Leonard Linkow, who presented it in 1967 and published on the subject in 1968, thereby making it possible to treat the problem of edentulism of tens of thousands of patients from that time to this day.1,2

Given the thinness of the blade, this implant can be used in any alveolar crest, but it is particularly useful in the thinnest, where the use of root-form implants is difficult and needs bone regeneration procedures. When the ridge is thin, it permits tricortical anchorage, i.e., the implant is stabilized by press-fit in both the internal and external bone cortex, as well as the deep cortex. This condition represents the optimum to allow immediate loading with a functional provisional prosthesis.

Blade implants are made of titanium. Osseointegration of titanium implants has been confirmed by numerous histological studies, done on any implant shape.

Histological studies on blade implants demonstrate their osseointegration and thickening of bone tissue around their surface consequent to load.3,7,18,19 Figures 1a and 1b allow you to appreciate the bone thickening around the neck and body of a blade implant, which represents bone reaction accrued during 11 years of functional work.

Due to the fact that bone response is the same, you can build fixed prosthetic bridges supported by screw and blade implants. Figures 2a-2c were taken immediately after positioning a screw implant and a blade implant in the superior posterior area, in order to build a three-elements bridge. The blade is leaning on the cortical of the maxillary sinus, engaging it in some points.

Blades allow:
• possibility of making the most of even the narrowest alveolar crests;
• adaptability to the majority of anatomical conformations;
• valorization of existing tissue and obviation of bone expansion and regeneration procedures;
• mechanical correction of parallelism issues during implant surgery;
• versatility in adaptation to the deep anatomical structures possible by modifying the implant;
• presence of numerous stabilizing contacts with deep cortical layer;
• possibility of inserting a part of the implant below the intact cortex (as compared to EDE technique);
• adequate management of attached gingiva during implant surgery;
• simple surgical technique performed with standard instruments.

Authors Luca Dal Carlo, DDS; Marco E. Pasqualini, DDS; Michele Nardone, Medical Officer, Ministry of Health, Rome, Italy; and Prof. Leonard I. Linkow, DDS

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The blade implant can be modified to perfectly suit the deep bone anatomy (Figs. 1a–2c), and the body can be curved to follow the anatomical profile. If the abutment needs to be angled, this can be achieved mechanically, up to a maximum of 20 degrees, before the implant is positioned using two pairs of steel pliers, thus resolving any problems that could arise due to incongruous abutment positioning (Figs. 3a–3c).

**Immediate loading**

The blade implant can be immediately loaded if adequate stability has been achieved. Anchoring the implant through two cortical layers and in contact with the deeper cortex should confer best stability. Static and dynamic occlusion should be meticulously checked upon fitting of both temporary and permanent crowns.

**Variations**

Several authors have proposed variations on the original technique that fit to certain situations. The technique known as Endosseous Distal Extension (E.D.E.) is particularly useful for treatment of lower posterior sectors featuring scarce bone density.
Used since 1993, E.D.E. was first published in 2001.7-8 The type of blade implant to use is ramus blade, which was conceived during the 1970s by Roberts and Linkow.

The technique involves tracing the implant housing mesial to the implant positioning site, so that the blade is gradually rotated distally until it reaches the distal border of the post housing (Fig. 4a). In this way almost all of the implant is placed beneath the intact bone and soft tissues. The presence of intact superficial bone tissue posterior to the abutment can be seen upon radiographic examination (Fig. 4b).

Reliability

Numerous articles have attested to the long-term stability of this type of implant and document the histological confirmation of their osteointegration, without connective tissue interposition at the bone/implant interface.9-22 This kind of procedure is characterized by excellent soft-tissue response.

Conclusions

The blade implant is a valid therapeutic device useful for treating cases with particular anatomical features such as narrow bone crest and scarce spongy bone in the lower distal sector.

It can be used, due to the numerous forms available, not only in the upper and lower posterior sectors, but also to provide deep anchorage in posterior and anterior (esthetic) sectors alike. It is therefore a treatment of choice in cases where the outcomes of alternative procedures are less predictable and the procedures themselves are more likely to compromise the integrity of the local bone tissue.

Due to the fact they induce the same bony reaction, blade implants can be used in combination with other implant types (Fig. 5).

Furthermore, this method offers excellent response of the surrounding soft tissues. Nonetheless, to prevent failure, practitioners would be wise to bear in mind that blade implants are not indicated in wide alveolar crests or in areas where bone density is insufficient and the implant cannot engage the deep cortical layer.

It is very important that colleagues who want to learn the blade implant technique carefully follow training courses held by expert fellows, who can teach you how to practice this technique while avoiding the mistakes that have caused unfair bad press in the past.
Theoretical and practical courses are organized in New Jersey and Jamaica by Atlantic Dental Implant Seminars (www.adiseminars.com), under supervision of Leonard I. Linkow, blade implants inventor.

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20) Statistical study about 6,200 implants inserted during 20 years in 2,800 interventions. www.odontoline.it, 2011

About the Author

Luca Dal Carlo, DDS, graduated from the University of Padua (Italy) in 1988. He is the founder of the New Italian Group for Studies in Implantology (NuovoGISI). He has lectured throughout the world for dental schools, dental societies and specialty groups and has written more than 50 articles and chapters in professional journals and textbooks. Dal Carlo maintains a private practice in Venice, Italy. He may be reached at lucadalcarlo@yahoo.it.
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The ICOI’s Spring Symposium will take place at the Bellagio Hotel in Las Vegas from May 16–18. (Photo/www.sxc.hu)

That old bromide, “nothing succeeds like success,” is very appropriate when it comes to the ICOI and its devotion to Las Vegas and the Bellagio Hotel.

The International Congress of Oral Implantologists (ICOI) will return to the Bellagio for the sixth time as it hosts the spring implant symposium from May 16–18. Dr. Michael Pikos is the scientific chair for the three-day conference of dental implant continuing education opportunities. The theme for this spring symposium will be “The Maxilla: Single Tooth to Full-Arch Reconstruction.”

Attendees will be exposed to a group of experienced private practice and academic-based clinicians who will share their wealth of knowledge in a friendly and scientific environment. The general session will commence at 1 p.m. on Thursday, May 16, and conclude on Saturday, May 18, at 6:30 p.m.

Main podium speakers, in order of their appearance, are Dr. Jaime L. Lozada,
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The ICOI designates the scientific program for 20 C.E. credits.

The general session will be preceded by several pre-symposium workshops that will take place on Thursday morning.

The lineup of the four-hour pre-symposium workshops held by the sponsors of this symposium will feature the following:

- Dr. Miguel Stanley will present a course on treatment planning titled “Practice Building Through Simplified Advanced Techniques,” sponsored by MIS.
- Dr. David Wong's course, sponsored by DENTSPLY Implants, will cover “Successful Socket Grafting and Ridge Augmentation: Maximizing Predictability in Everyday Implant Situations.”
- Dr. Michael Toffler will educate delegates on “Transcrestal Sinus Floor Elevation: Redefining Limitations,” in a course sponsored by Hiossen.
- Dr. Carl Misch will discuss “Prosthetic Complications” because of screw loosening, porcelain fracture and residual cement. His course is sponsored by the Misch International Implant Institute.
- Dr. Randolph Resnick’s four-hour course will discuss “Medical/Dental Emergencies and Complications in Implant Dentistry.” The course is sponsored by Salvin Dental Specialties.
- Dr. Michael Pikos will hold a hands-on course dealing with “Extraction Site Management for Implant Reconstruction,” sponsored by Osteogenics Biomedical.
- Barb Herzog will deal with “Changes in Latitude, Changes in Attitude: Keeping Pace with How New Technologies Effect Your Financial Arrangements.” This course is sponsored by Springstone Patient Financing.
- ZEST Anchors will sponsor Drs. Ara Nazarian and Paresh Patel’s workshop, which features narrow-diameter implants, in a lecture on “Utilizing the Next Generation of Narrow-Diameter Overdenture Implants to Expand Your Practice Revenue Opportunities.”

In addition to the program for the doctors, the ADIA will present a 2½-day program for team members. On Thursday, May 16, the auxiliary program will feature the following main podium speakers: Teresa Duncan, Carla Frey, Michelle Kratt and Yva Khalil.

On Friday, the auxiliaries will hear lectures from Dr. Mitra Sadrameli, Dr. Avi Schettritt, Dr. Jin Kim, Dr. John Olsen, Dr. Ira Langstein, Dr. Thomas Ford and Dr. Justin Moody. The ADIA program will conclude on Saturday with four certification programs held simultaneously for dental hygienists, dental assistants, practice management coordinators and implant coordinators. This 2½-day program is applicable for 18 C.E. credits.

With more than 12,000 members worldwide, the ICOI is the largest professional dental implant organization and provides vast dental implant continuing education opportunities by sponsoring or co-sponsoring many meetings each year.

For more information on this symposium or about the ICOI, visit www.icoi.org.
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Since the advent of modern root form osseointegrated implant dentistry in 1952, clinicians have strived for improvements in implant positioning in the esthetic zone to achieve predictable restorative and esthetic results.

Years of clinical experience in congruence with controlled clinical studies have helped establish parameters as a guide for these results. Establishing a treatment plan and clinical protocol prior to implant placement is paramount.

Treatment planning traditionally begins with comprehensive medical and dental evaluations, articulated diagnostic casts, radiographs, cone-beam computed tomography (CBCT) scans and a diagnostic wax-up. Patient demands must be taken into consideration prior to surgery, and pre-surgical mockups may be necessary to convey the information to the patient.

The advancement of CBCT technology has led dentistry into a new realm of dimensional accuracy. In combination with the use of a surgical or guided stent, proper 3-D positioning of an implant has led to more accurate clinical results. The importance of the implant position can be manifested in the four dimensionally sensitive positioning criteria: mesiodistal, labiolingual and apico-coronal location, as well as implant angulation. The ultimate goal is not only to avoid sensitive structures but to respect the established biological principles to achieve esthetic results.

Mesiodistal criteria

Correct implant position in a mesiodistal orientation allows the clinician to avoid damaging adjacent critical structures. A minimum distance of 1.5 mm between implant and existing dentition prevents damage to the adjacent teeth and provides proper osseointegration and gingival contours. Distances of less than 3 mm between two adjacent implants furnishes

![Fig. 1a](image1.png) Minimum distance of 1.5 mm between implant and existing dentition.

![Fig. 1b](image2.png) Minimum distance of 3 mm between two adjacent implants.

![Fig. 2](image3.png) Proper labiolingual placement with 1.8 mm thickness of labial bone.
implants leads to increased bone loss and can reduce the height of the inter-implant bone crest. A distance of more than 3 mm between two adjacent implants preserves the bone, giving a better chance of proper interproximal papillary height (Fig. 1b).

**Labiolingual criteria**

An implant placed too far labially can cause bone dehiscence and gingival recession while an implant placed too far lingually can cause prosthetic difficulties. A thickness of 1.8 mm of labial bone is critical in maintaining an implant soft-tissue profile (Fig. 2). Labially oriented implants compromise the subgingival emergence profile development, creating long crowns and misalignment of the collar with respect to the adjacent teeth.

**Apico–coronal criteria**

Peri-implant crestal bone stability plays a critical role in the presence of interdental papilla. Implants placed too shallow may reveal the metal collar of the implant through the gingiva. Countersinking implants below the level of the crestal bone may give prosthetic advantages but can lead to crestal bone loss. The ideal solution would be the placement of an implant equicrestal or subcrestal to the ridge. However, the existing microgap at the implant abutment junction leads to bone resorption because of peri-implant inflammation. It is suggested that an implant collar be located 2 mm apical to the CEJ of an adjacent tooth if no gingival recession is present (Fig. 3).

**Implant angulation**

Implant angulation is particularly important in treatment planning for screw-retained restorations. Implants angled too far labially compromise the placement of the restorative screw while implants angled too far lingually can result in unhygienic and unesthetic prosthetic design. For every millimeter of lingual inclination, the implant should be placed an additional millimeter apically to create an optimal emergence profile. In general, implant angulation should mimic angulation of adjacent teeth (Fig. 4). Furthermore, maxillary anterior regions require a subtle palatal angulation to increase labial soft-tissue bulk.

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To read the article in its entirety, see www.inclusivemagazine.com

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Siamak Abai, DDS, received his doctorate of dental surgery degree from Columbia University, School of Dental and Oral Surgery, and his masters of medical sciences degree in oral biology and prosthodontics from Harvard School of Dental Medicine. He received two certificates of advanced graduate studies from Columbia University’s Advanced Education in General Dentistry program, where he was recognized as chief resident, while concurrently holding a position as associate clinical instructor of operative dentistry. In addition, he has held a prosthodontics position as an attending at the Edith Nourse Rogers Memorial Veterans Hospital. Abai is a specialist in prosthodontics and practices esthetics, reconstructive and implant dentistry at the W-Clinic in Newport Beach, Calif., while holding a faculty appointment at UCLA School of Dentistry.
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