

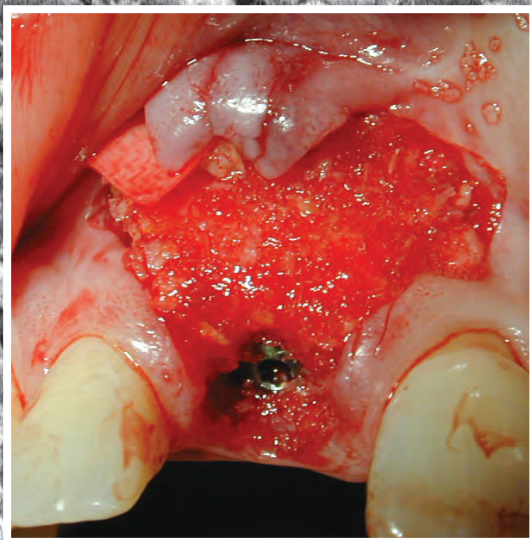
VOLUME 3, No. 4

MAY/JUNE 2011

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The Journal of Implant & Advanced Clinical Dentistry

Dental Implant Survival Comparison A 5 Year Study



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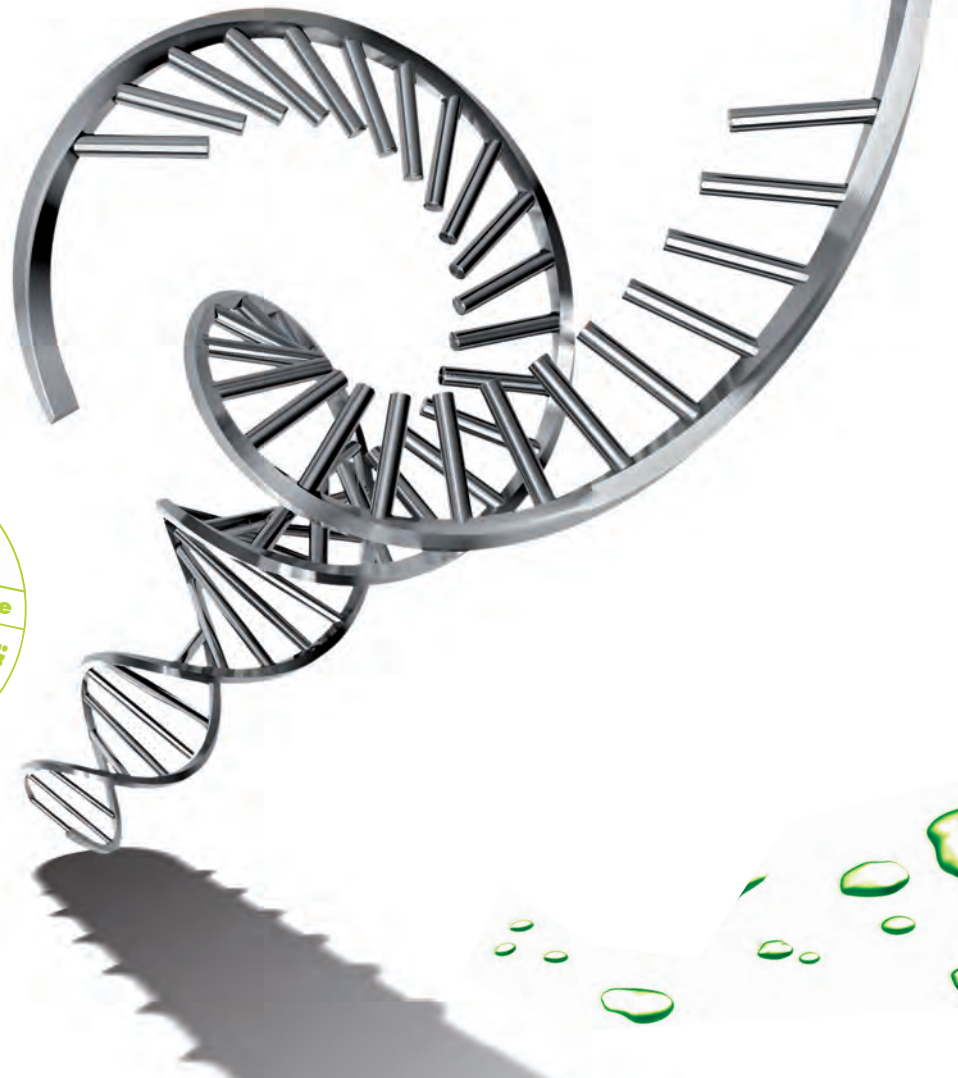


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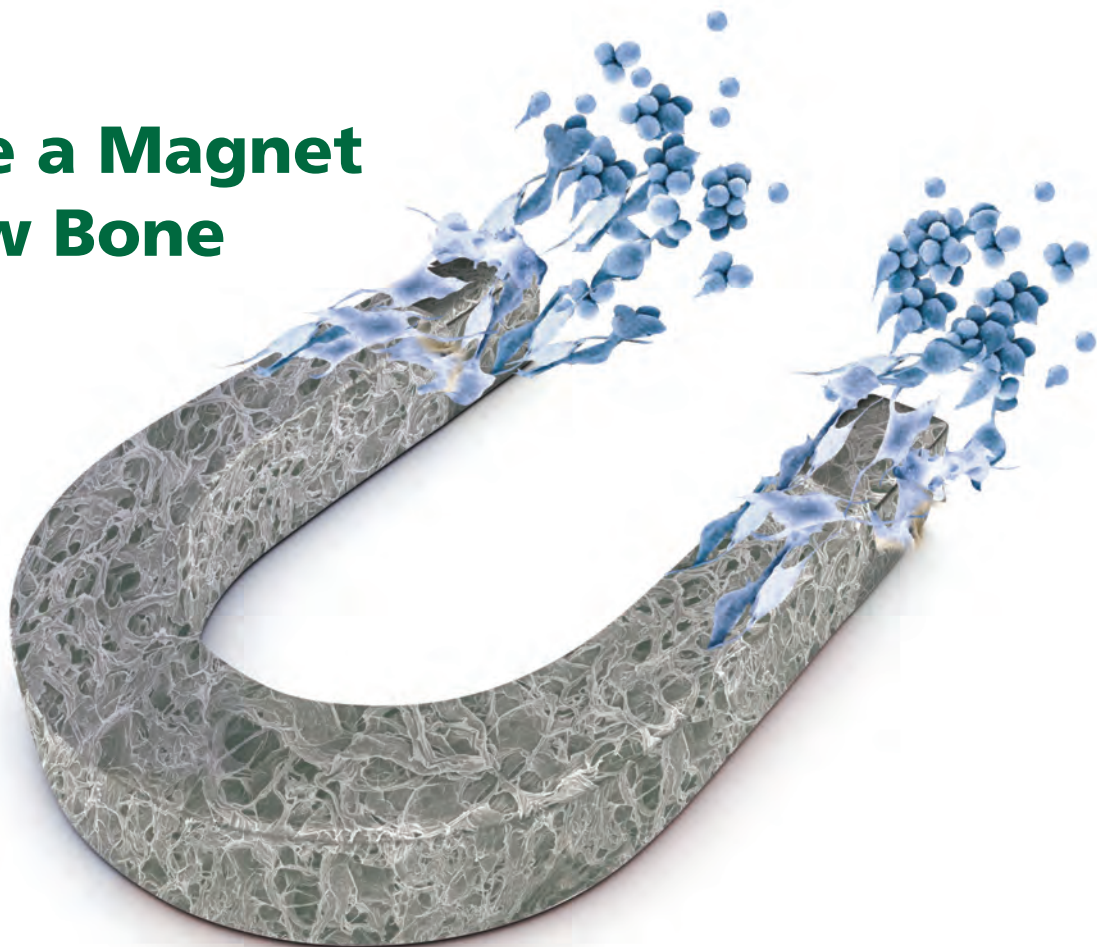
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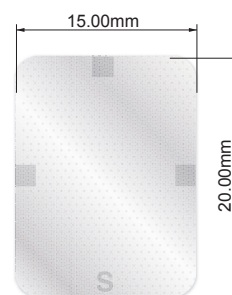
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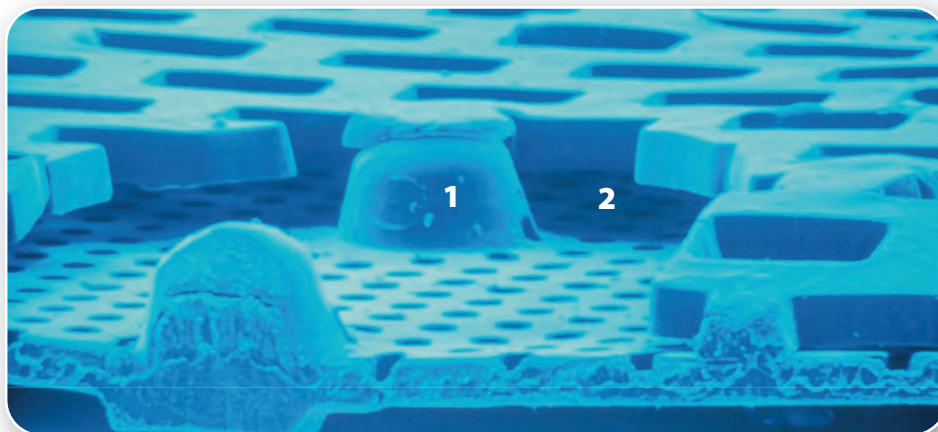
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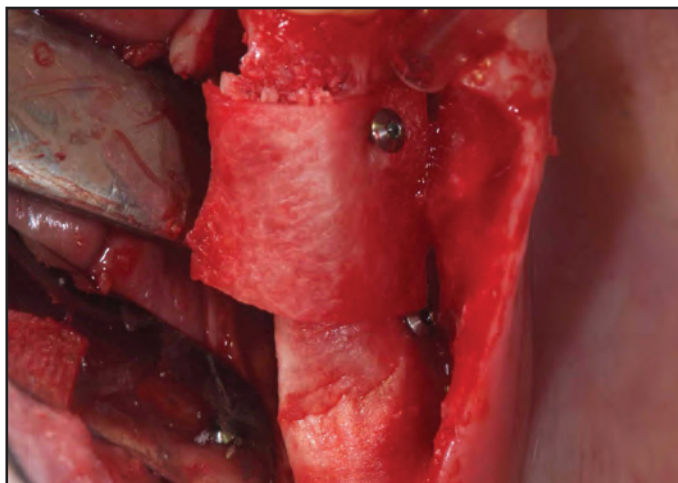
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References: ¹Sanz M, et. al., J Clin Periodontol 2009; 36: 868-876. ²McGuire MK, Scheyer ET, J Periodontol 2010; 81: 1108-1117. ³Herford AS, et. al., J Oral Maxillofac Surg 2010; 68: 1463-1470. Mucograft[®] is a registered trademark of Ed. Geistlich Söhne AG Für Chemische Industrie and are marketed under license by Osteohealth, a Division of Luitpold Pharmaceuticals, Inc. ©2010 Luitpold Pharmaceuticals, Inc. OHD240 Iss. 10/2010

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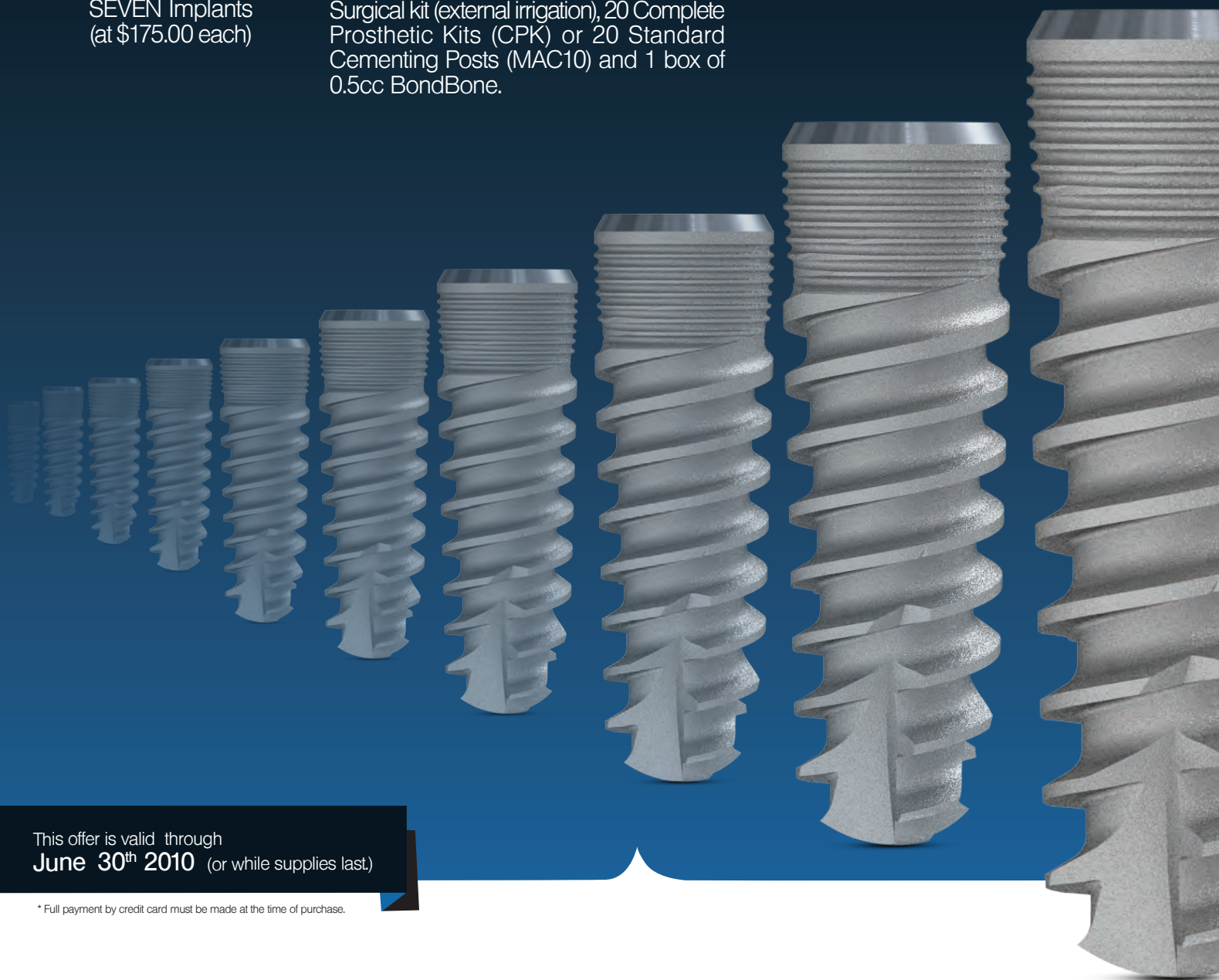


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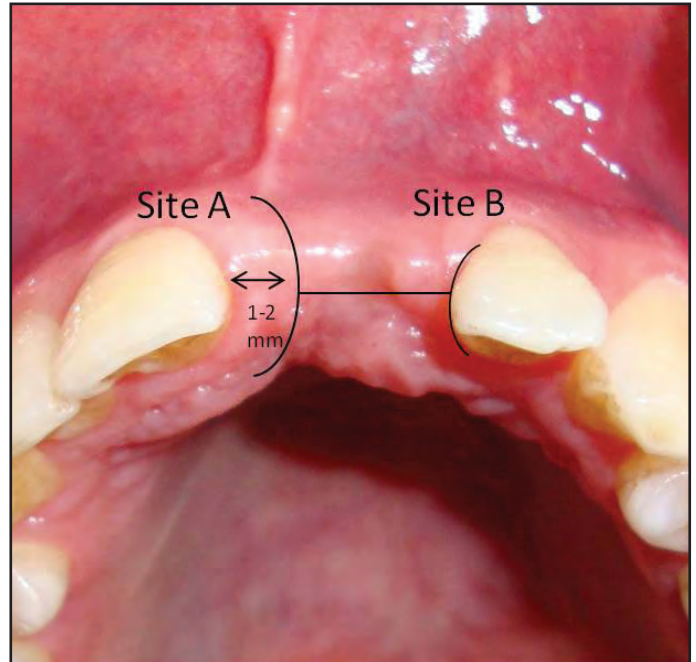
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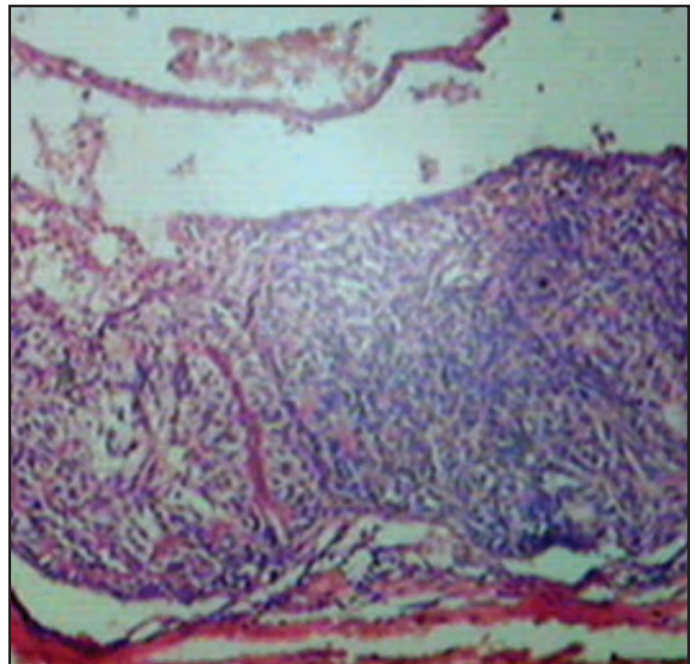
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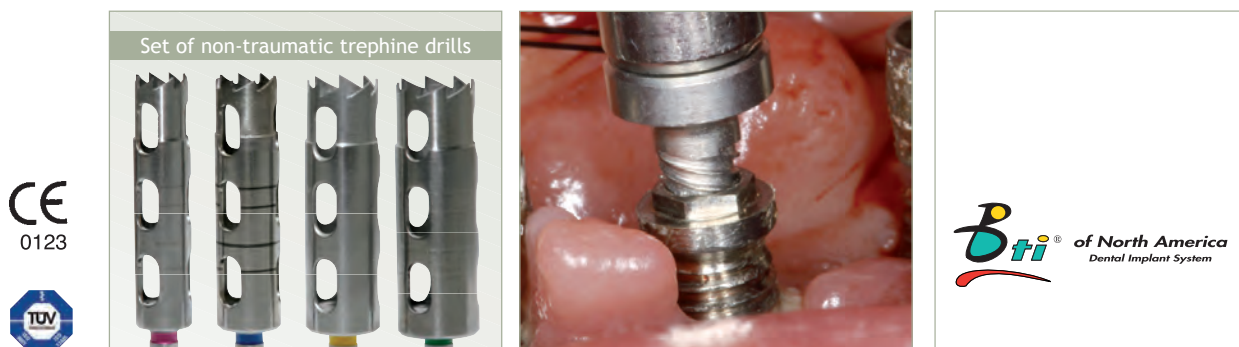
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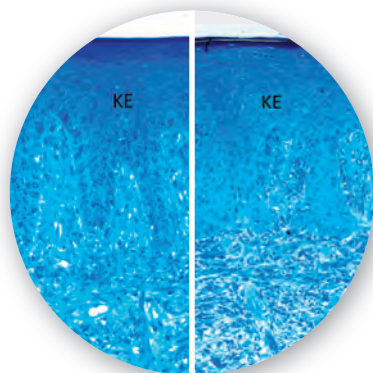
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Letters to the Editors

JIACD has been a great addition for dentists to learn about the latest in techniques and interdisciplinary care. The thing that has impressed me the most about this journal is that the information is online, easy to access, and the quality of the photos and case presentations is amazing.

Dr. Paul Rosen, Philadelphia, Pennsylvania, USA

I really appreciate JIACD because it's a fundamental tool for both practitioner and researcher in the field of Periodontology and dental implant continuing education. What I prefer most is the reliability, the friendly use, and the extremely high quality of the images and the interesting topics. Clinicians and scientists can find clear clinical suggestions and solutions to new and old problems for daily practice.

Dr. Giulio Rasperini, Italy

JIACD is a very informative and educational online journal. Each issue educates with cutting edge clinical technology. The best advantages of JIACD are unlimited openness to clinicians all over the world. I highly recommend dental clinicians to become subscribers of JIACD.

Dr. Dong-Seok Sohn, Republic of Korea

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Dr. Tom Wilcko, Erie, Pennsylvania, USA

JIACD brings to all aspects of dentistry some things that are lacking with other journals. The articles are timely, relate to all aspects of dentistry, and are relevant to all readers. As a researcher and clinician, I appreciate the timeliness of getting my articles published AND reading the current research performed by others in the field. This is what dentistry has needed for a long time to help us all move forward more quickly to deliver the best, latest, state-of-the-art care to our patients.

Dr. Robert Horowitz, Scarsdale, New York, USA

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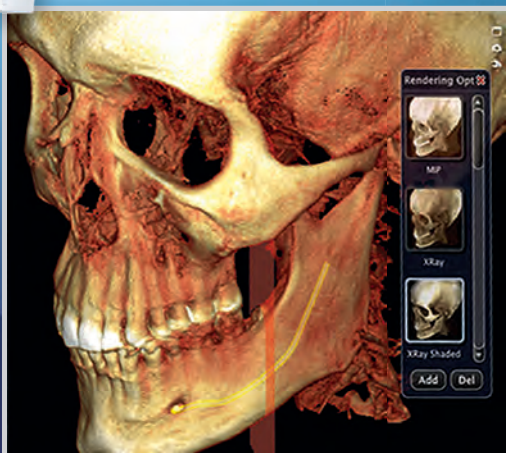
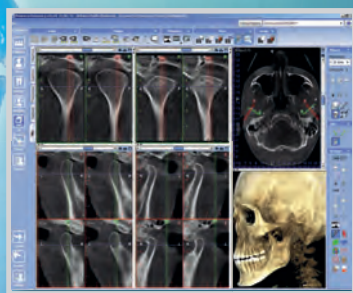
Dr. Gary Henkel, Horsham, Pennsylvania, USA

After reading several informative, well written articles by highly respected educators and clinicians I was inspired to submit my own article to JIACD. The editorial process was speedy and painless and the reviewers made some very helpful suggestions actually improving my original submission. I intend to continue writing for the journal as I am anxious to be a part of this superb online educational process.

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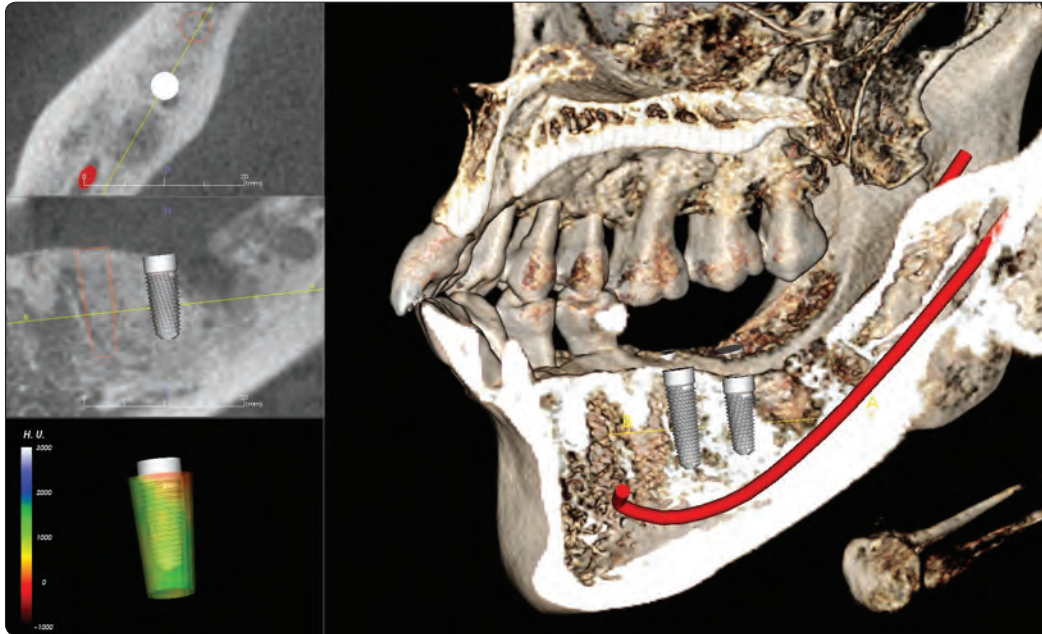
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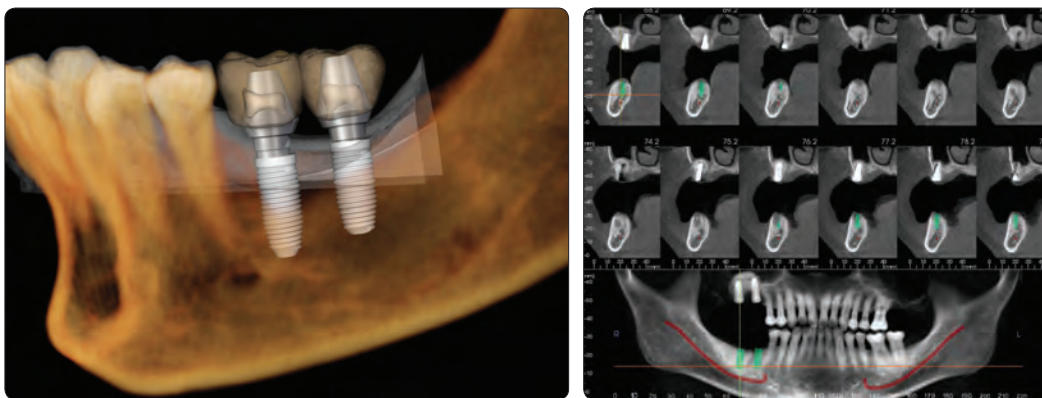
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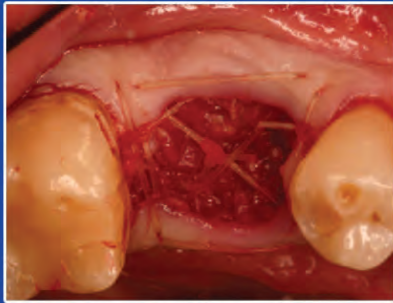
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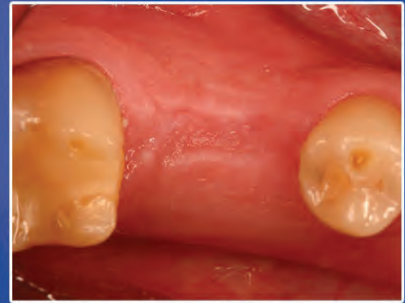
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Case of the month

Split Crest and Crown Lengthening

Luis Pazos, MD, DDS¹

Abstract

Maxillary bone resorption as a result of atrophy takes place predominantly at the expense of the labial plate. Consequently, there is minimal loss in ridge height accompanying the significant reduction in ridge width. Restoration of the edentulous maxillary ridge with implants often requires the ridge width to be augmented. To get it, there are some classic techniques which have been frequently reported in the literature such as guided bone regeneration and the use of block grafts.

Recently a new procedure called “Maxillary Ridge Expansion” has been introduced in the literature allowing the widening of the crest so as to place implants at a second stage. Tatum originally developed the technique for the placement of thin transmucosal implants.

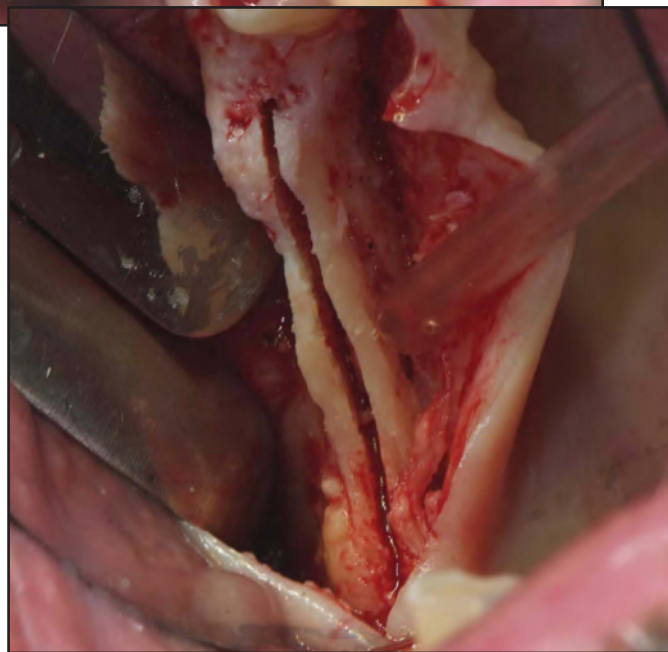
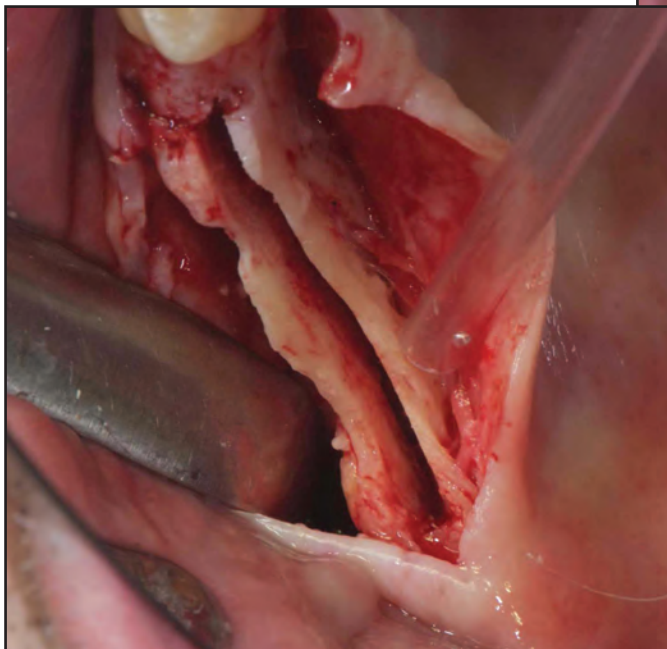
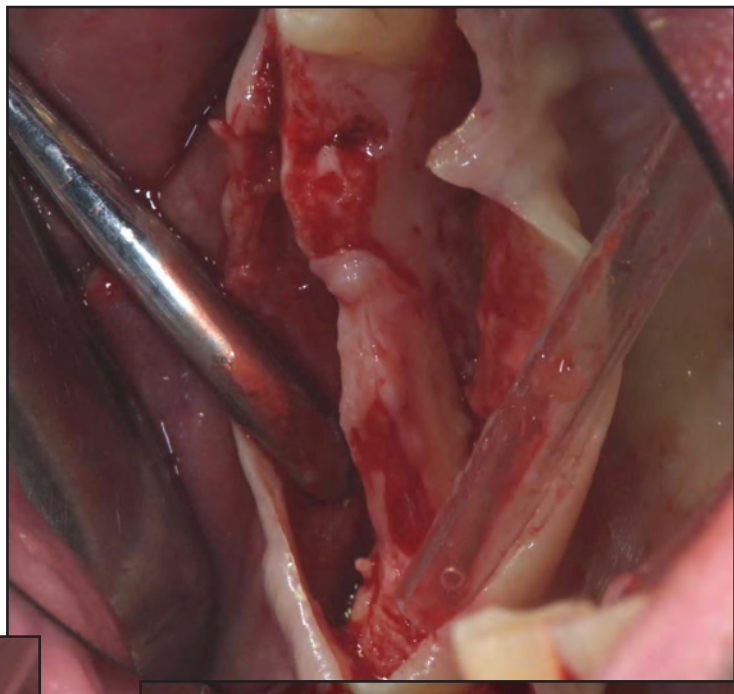
The technique of ridge splitting has also been described and modified for the placement of grafts. The ridge that needs to be expanded must have labial and palatal cortical plates that are not fused and are separated to facilitate the introduction of instruments for expansion

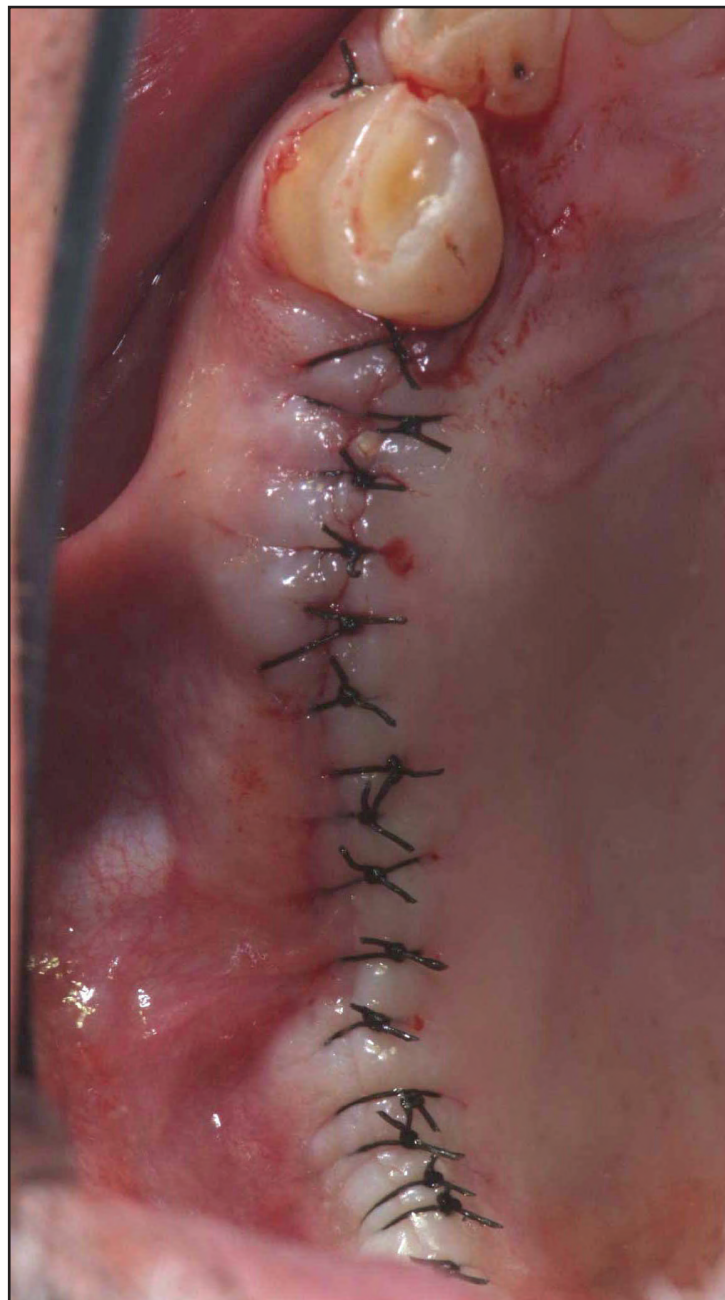
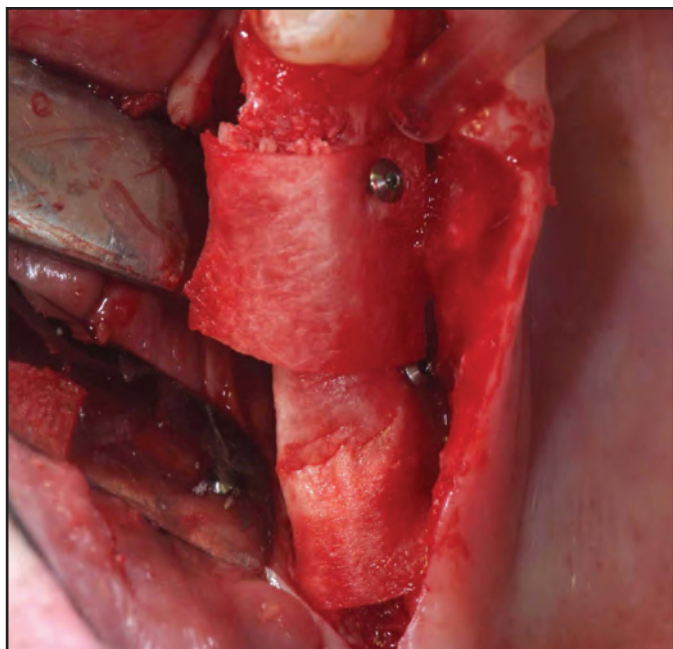
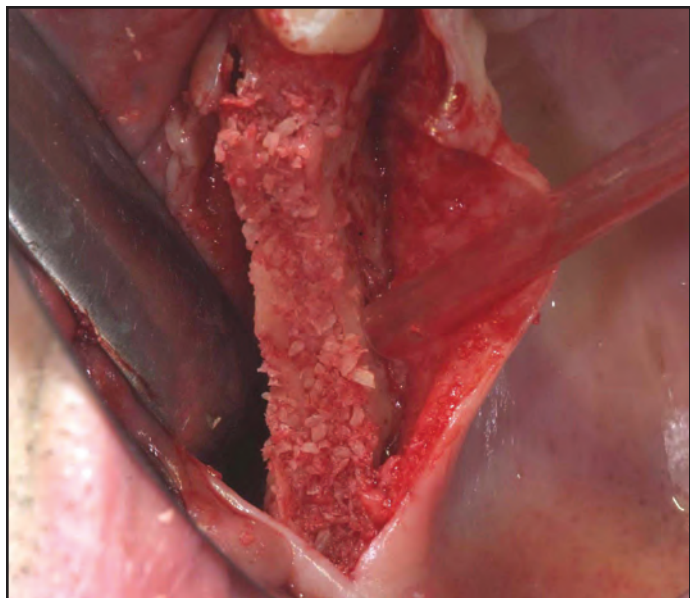
of the ridge. The beginning of the ridge splitting is being done using special designed piezosurgery tips so as to continue the approach utilizing chisels and osteotomes. The new space created is filled with a mix of allograft and xenograft and covered by a collagen membrane. Four months later the implants can be placed.

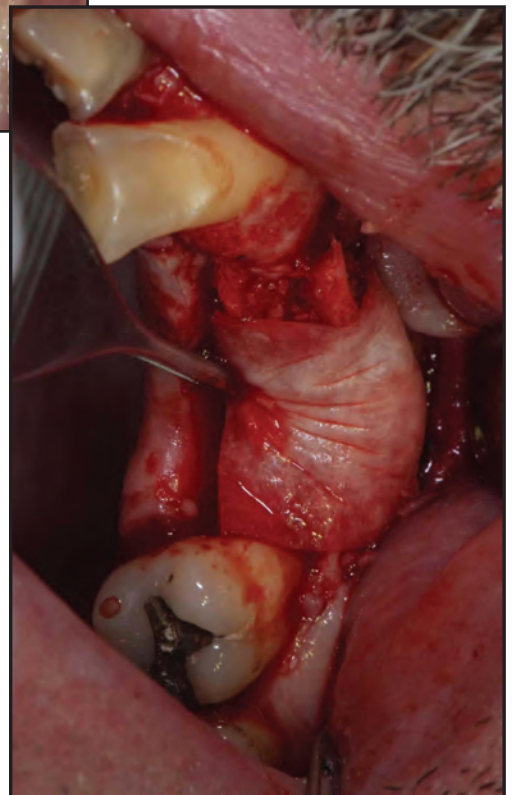
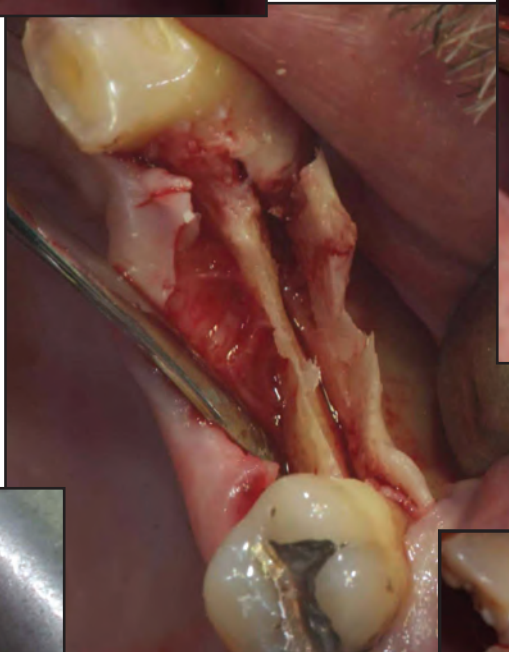
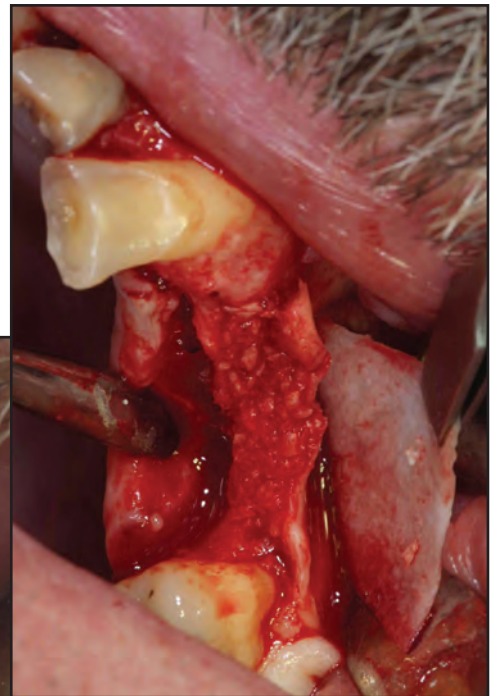
In the case described in the article, the patient is seeking rehabilitative treatment for his severely worn dentition. Restoration of a worn dentition is always challenging, so in this case it was necessary to combine ridge splitting technique with crown lengthening surgery procedure so as to get a satisfactory final result. Finally, the case was restored with six metal free ceramic LAVA crowns over the upper incisors and canines and one metal ceramic screwed implant bridge to replace the right bicuspid and the first molar. In the left side the inclination of the implants obliged us to build a metal ceramic bridge cemented over two gold cast UCLA abutments. The final esthetic result achieved was considered successful and the patient was completely satisfied.

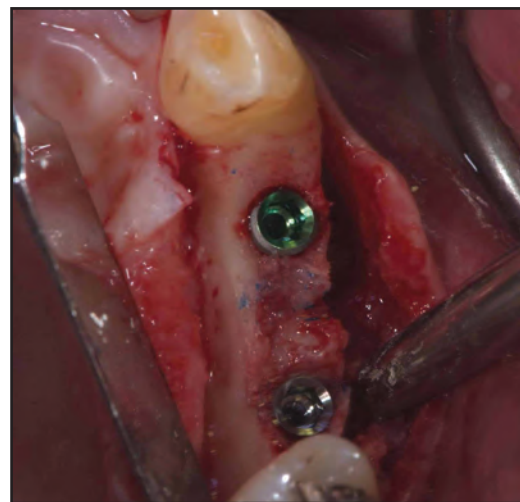
KEY WORDS: Ridge expansion, dental implants, crown lengthening, prosthetics

1. Private practice, Gijón, Spain

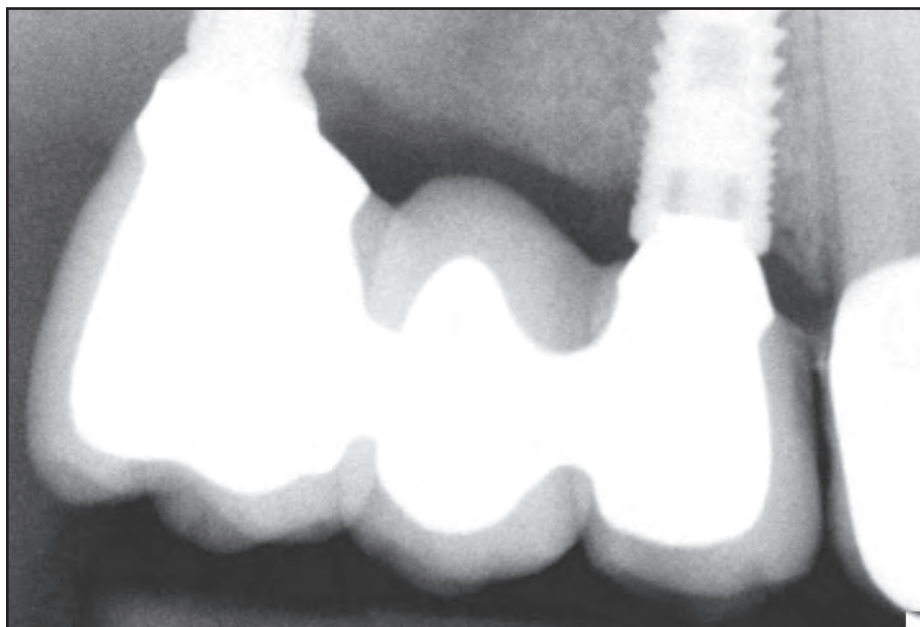












DISCLOSURE

The author reports no conflicts of interest with anything mentioned in the article.

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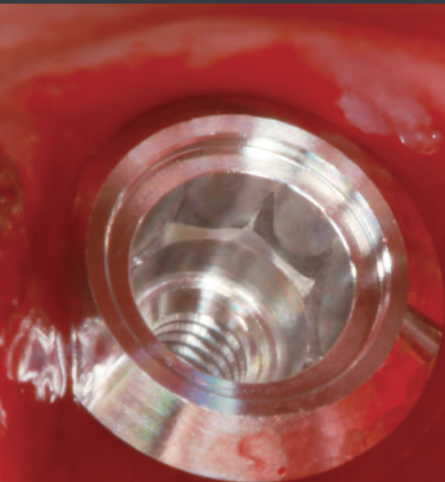
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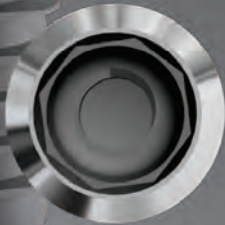
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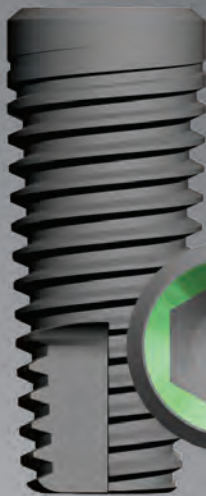
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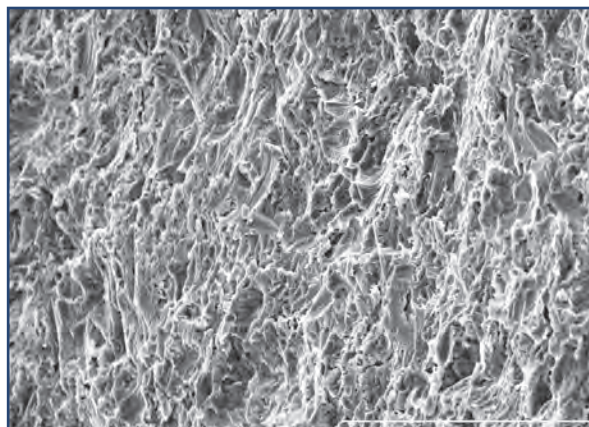
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Long Term Clinical Survival of Two Tissue Level Implant Systems With Different Surface Modifications: A Retrospective Comparison With up to Five-Year Results

Asher S. Gelman, DMD¹ • Emil M. Verban, Jr, DDS²

Abstract



Purpose: The objective of this retrospective study was to compare the survival rate of two macroscopically similar tissue level dental implants with different surface modifications.

Materials and Methods: 130 patients received 262 implants placed between December 2005 and July 2008. Implants were either Straumann® Standard Plus (Straumann® AG, Basel, Switzerland) with SLA® surface modification (ST, n=133) or Blue Sky Bio® (Blue Sky Bio®, LLC, Grayslake, USA) with resorbable blast media surface modification (BL, n=129) and were either placed immediately (IM, n=99,

[STIM n=43, BLIM n=56]) into fresh extraction sockets or following a delayed protocol (DE n=163 [STDE n=90, BLDE n=73]). Implants were followed for up to four years for survival.

Results: The survival rates of the compared groups were similar: 96.9% for group ST vs. 96.1% for group BL; 95.2% for STIM vs. 98.2% for BLIM; 97.3% for STDE vs. 95.6% for BLDE.

Conclusion: No statistically significant difference in long term survival of implants was observed between the compared groups. Both implants have predictable clinical survival rates.

KEY WORDS: Dental implants, implant survival, retrospective analysis

1. Private practice, Chicago, Illinois, USA

2. Private practice Bloomington, Illinois, USA

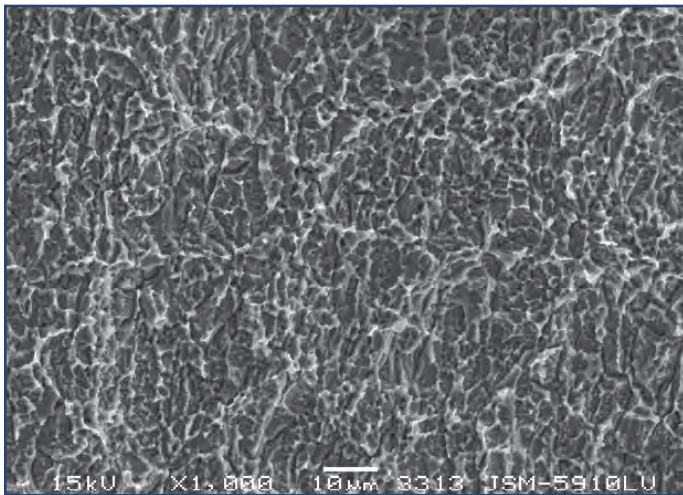


Figure 1: Scanning electron micrograph of SLA® surface.

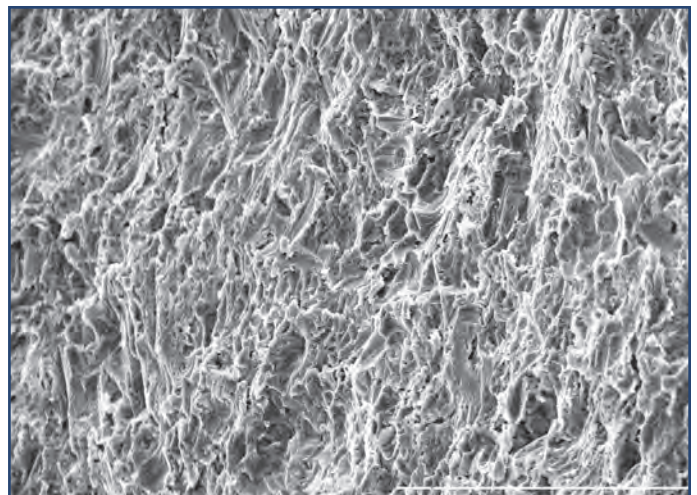


Figure 2: Scanning electron micrograph of RBM surface.

INTRODUCTION

Implant designs have been developed with variations in macroscopic topography and surface modification in order to improve biomechanical properties.^{1,2} Tissue level implants are designed with a trans-gingival collar to facilitate trans-gingival healing and a single stage surgical protocol.³ This protocol decreases the number of procedures, improves patient comfort and results in bone levels, success and survival rates similar to a two-stage protocol.^{4,5} Success has been attributed to a design that places the abutment/implant platform micro-gap coronal to the alveolar crest, in order to avoid bacterial insult and respects biologic width.⁶⁻⁹ Both tissue-level implant systems studied feature cylindrical body, 8-degree Morse-type tapered, internal octagon connection, smooth trans-gingival cervical portion, 45-degree shoulder, and surgical and prosthetic compatibility. Though macroscopically similar, each employs a unique surface modification (Figures 1,2).

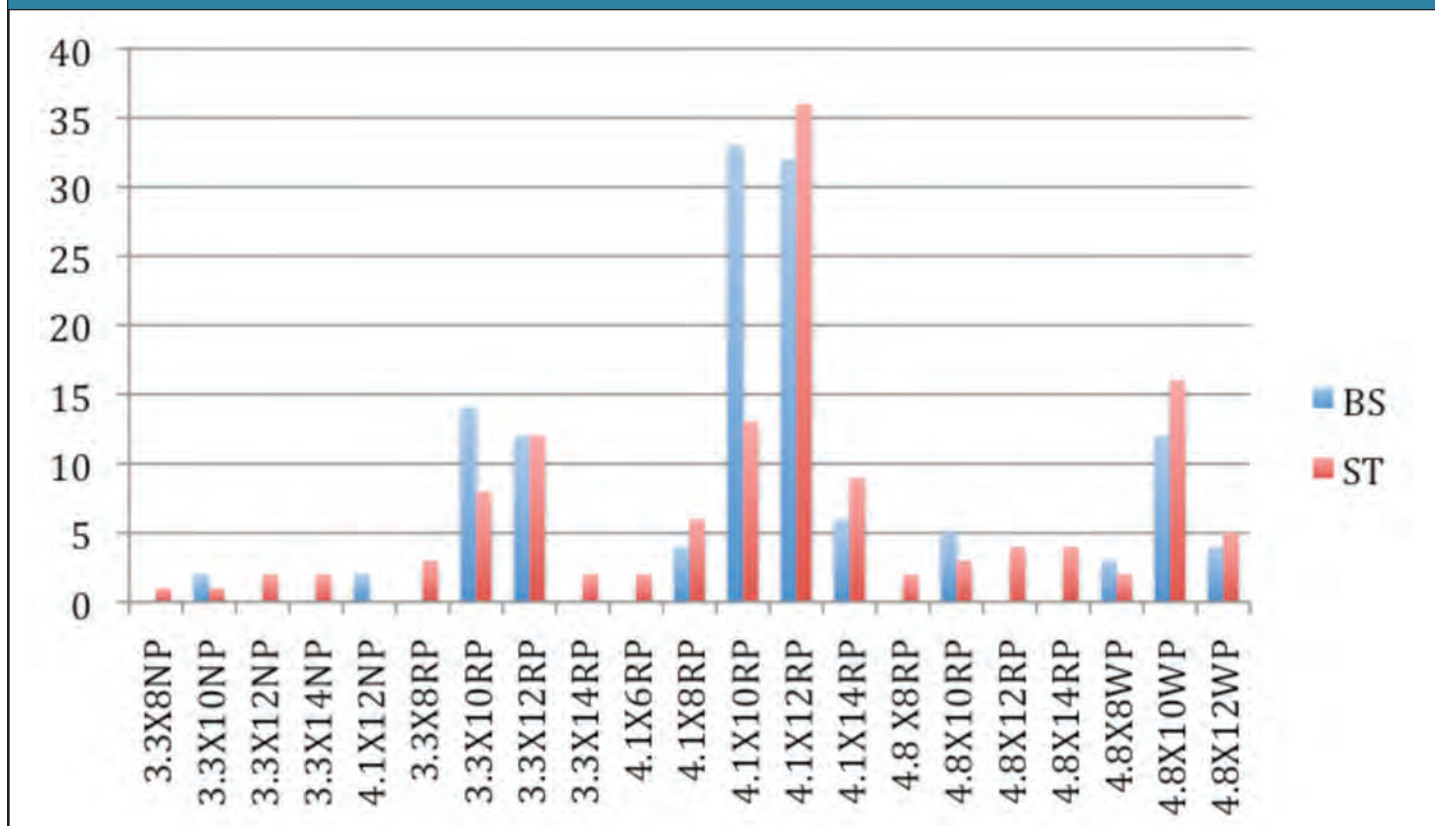
The Straumann® implant features a sand blasted large grit acid etched surface modi-

fication (SLA®). According to the manufacturer, the titanium surface is blasted with corundum particles to create macro-roughness and is then etched in a bath of heated HCl/H₂SO₄ acid solution to create micropits free of enclosed porosities.¹⁰ The surface modification produces a high bone to implant contact and high removal torque values.^{11,12}

The Blue Sky Bio® implant features a resorbable blast media surface treatment. The titanium implant surface is blasted with tricalcium phosphate and hydroxyapatite and then washed in nitric acid solution to remove all residue of blasting material.¹³ The process results in a predictable roughness without application of high temperatures and without introducing any foreign materials that may become embedded in the implants.^{13,14} Literature suggests that this surface promotes significantly more bone implant contact than machined surfaces, and promotes more bone apposition than surfaces blasted with nonresorbable bioceramics.^{15,16}

This retrospective study compared the clini-

Graph 1: Implant Size Distribution



cal survival rate of these two similarly designed tissue level implants. The similarity of the macroscopic topography and surgical protocol of the two systems offers an opportunity to compare the effect of the different surface modification.

METHODS

Records of all patients who had implants placed between December 5, 2005 and July 10, 2008 were evaluated. The implants were placed and restored by one clinician in a single private practice setting. A total of 130 patients were evaluated. All patients treated during that period were included in this study.

Patients were screened for medical and dental contraindications to implant placement by submitting to a medical questionnaire and completing medical and dental interview. Patients with incomplete jaw growth or reported history of intravenous bisphosphonate therapy, radiation therapy to the jaw, uncontrolled diabetes, severe metabolic bone disorders, uncontrolled systemic disease and metastatic cancer with involvement of bone were categorically excluded from treatment. In addition, other patients with chronic complex medical, emotional and psychological conditions were excluded either based on the judgment of the dentist or the consulting physician. Patients

Table 1: Implant Surgical Protocol and Location

Surgical Protocol	ST	BS
Immediate Placement	43	56
Delayed Placement	90	73
Implant Location	ST	BS
Anterior Maxilla	35	23
Posterior Maxilla	47	49
Anterior Mandible	11	23
Posterior Mandible	11	23

Table 2: Implant Failure/Survival Summary

	ST	BS
IM	1	2
DE	4	2
Total Failures	5	4
Total Loss to Recall	1 (IM)	1 (IM)
% Survival IM (based on recalled patients only)	98.2	95.2
% Survival DE	95.6	97.3
Cumulataive % Survival (based on recalled patients)	96.1	96.9

had to exhibit good oral hygiene and commitment to regular dental follow-up. Written informed consent was obtained from all patients.

Dental evaluation consisted of comprehen-

sive hard and soft tissue exam. When appropriate, mounted diagnostic models were used to evaluate inter and intra arch restorative space and occlusion. Implant sites were evaluated for



Figure 3: Blue Sky Bio® implants at time of immediate surgical placement.



Figure 4: Blue Sky Bio® radiograph at 11 months post-op.



Figure 5: Photo of Blue Sky Bio® restorations at 11 months post-op.

adequate bone width and height with periapical and panoramic radiographs, digital palpation and/or bone mapping. For implants placed into fresh extraction sites, visual and tactile inspection of extraction sockets provided more information.

A total of 262 tissue-level dental implants were placed in the reviewed period. Implant diameters and lengths varied based on site and prosthetic considerations. (Implant size distribution

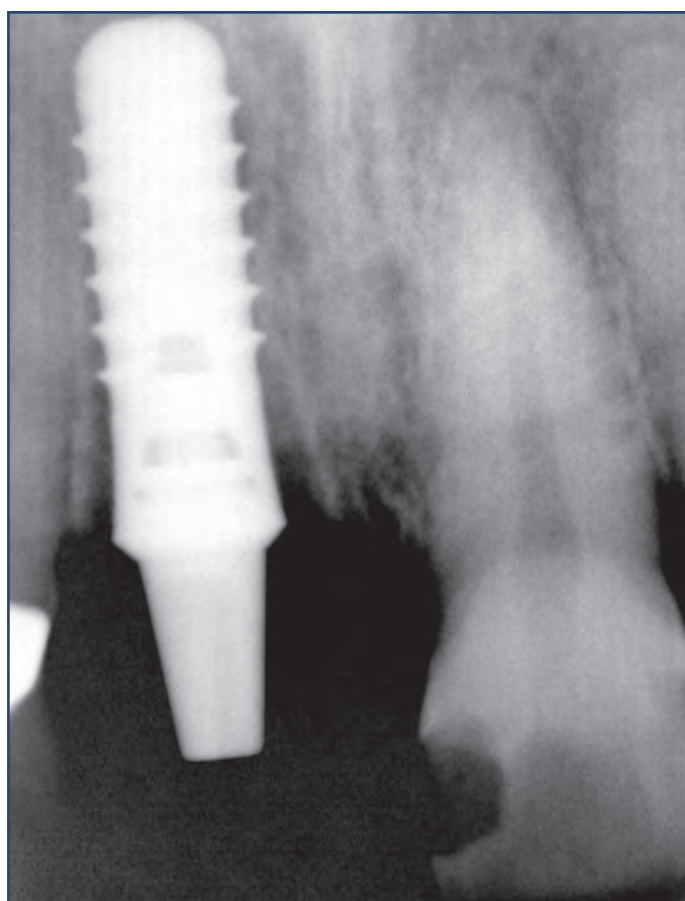


Figure 6: Straumann® implant at time of immediate surgical placement.

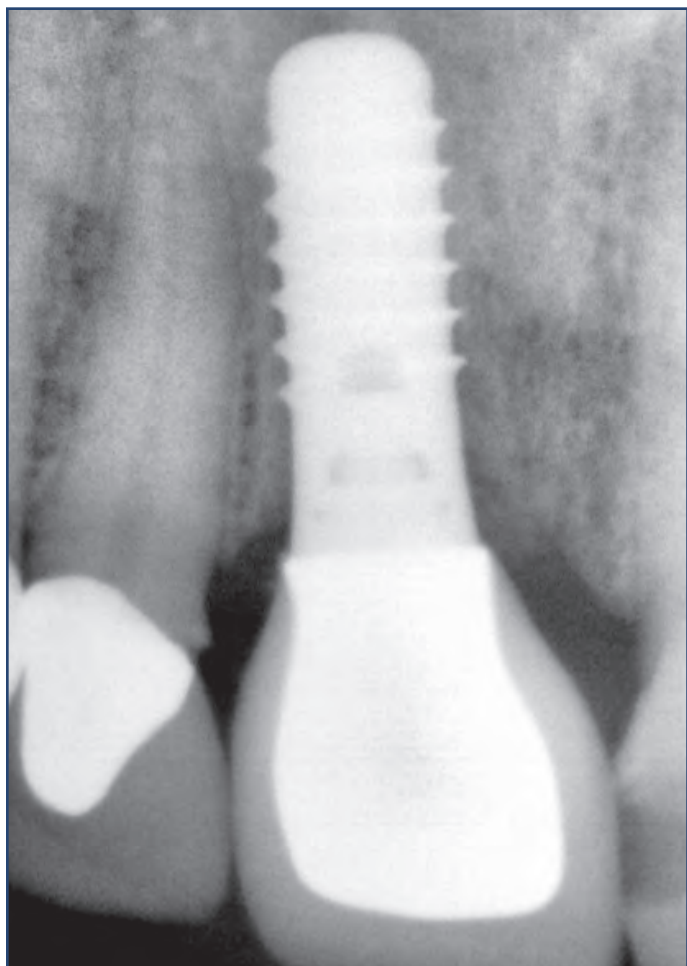


Figure 7: Straumann® implant at 18 months post-op.



Figure 8: Photo of Straumann® restoration at 18 months post-op.

is summarized in Graph 1). Of these, 133 were Straumann® Standard Plus SLA® and 129 were Blue Sky Bio® One Stage resorbable blast media. Of the Straumann®, 43 were placed into fresh extraction sites and 90 were placed into healed edentulous sites. Of the Blue Sky Bio® group, 56 were placed into fresh extraction sites at the time of extraction and 73 into healed edentulous sites. Implant site location, and placement protocol is summarized in Table 2. Straumann® instrumentation was used for both groups following the manufacturer's recommendations when possible. This was possible because Blue Sky Bio® implants are

designed to be surgically compatible with Straumann® instrumentation. Surgery was performed under sterile conditions and site appropriate local anesthesia was administered. All implants were placed with a one-stage protocol with a healing abutment or immediate provisional restoration to avoid second stage surgery to uncover implants. Permanent restorations were placed after a healing period ranging from 10 weeks to 54 weeks.

Patients were seen for follow-up evaluations at approximately 1 week, 3 weeks, 2 months, when abutments were torqued for final restoration, and at periodic dental recall appointments thereafter. Abutments for final restorations were torqued according to manufacturer's recommended torque between 0 and 52 weeks. Prior to final restoration, implant integration was manually evaluated with percussion and palpation, visual inspection and radiographic appearance (Figures 3-8). Clinical survival was defined as absence of mobility upon manual testing, and applica-

tion of restorative torque as well as absence of mechanical failure of implants and irresolvable clinical symptoms, such as pain, discomfort, numbness, infection, or peri-implant bone loss.

RESULTS

Of the 262 implants placed, there were a total of 9 failures: 4 Straumann®, and 5 Blue Sky Bio®. Two of the failed Straumann® implants were placed immediately one of which was also provisionally restored at time of placement. One of the failed Blue Sky Bio® implants was placed immediately and was also provisionally restored at time of placement. The survival rates of the compared groups were statistically similar: 96.9% for group Straumann® vs. 96.1% for group Blue Sky Bio®; 95.2% for Straumann® Immediate vs. 98.2% for Blue Sky Bio® Immediate; 97.3% for Straumann® Edentulous vs. 95.6% for Blue Sky Bio® Edentulous. Survival data is summarized in Table 2.

CONCLUSION

Within the observation period and the limitations of the parameters “implant survival,” no clinically relevant differences were observed between implants possessing a surface modification created by blasting with corundum particles followed by acid etching and those with a surface roughness produced by blasting with resorbable media particles followed by an acid wash. ●

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Disclosure: The authors report no conflicts of interest with anything mentioned in this article.

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1. Jaw R, Silveria E, Yonchek J, Kirk J, Nataraj C. Comparative Analysis of Osteoinductivity Testing Methods. Pittsburgh Bone Symposium, Pittsburgh PA: 523-536, 2003



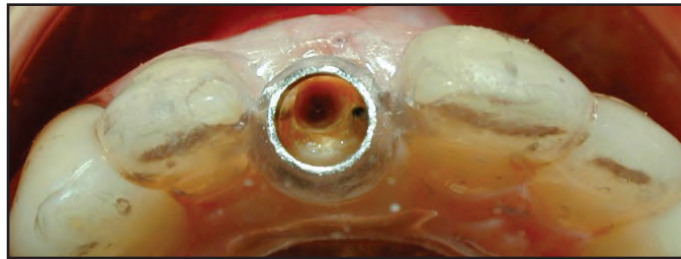
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Van Meter Technique of Guided Surgical Stent Construction for Dental Implant Placement: A Photo Essay

Phil Van Meter, DDS¹ • Norman Thomas, DDS²

Abstract



Background: Guided dental implant surgery utilizing cone beam computed tomography (CBCT) and planning software is a recent technique that has gained popularity in contemporary dentistry. The intent of this article is to introduce the author's personal technique and application of this technology via photo essay.

Methods: A 50 year old female presented with a fractured a maxillary central incisor that was deemed restoratively hopeless. Presurgical evaluation was utilized to create a custom stent to aid dental implant placement and also found a deficiency of the labial plate with a coronal dehiscence defect. Following placement of a dental implant into the extraction site with the prefabricated stent, bone allograft (Regenaform, Exactech, Gainesville, Florida, USA) was used

to reconstruct the bone deficiency. Primary closure of the site was achieved and the implant/bone were allowed to heal in an unloaded fashion.

Results: The implant integrated successfully and was restored with good esthetics. CBCT evaluation of the site post-surgically revealed normal healing of the dental implant and formation of new bone at the grafted dehiscence site.

Conclusion: This case report demonstrates that presurgical planning and guided dental implant surgery can make the placement of dental implants a more predictable technique. Premade surgical stents and high quality bone allograft may be used for ideal dental implant positioning and creation of improved esthetic outcomes.

KEY WORDS: Dental implants, bone grafting, CBCT, guided dental implant surgery

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Figure 1: Pre-surgical photo of retracted anterior view of fractured endodontically treated tooth #8.

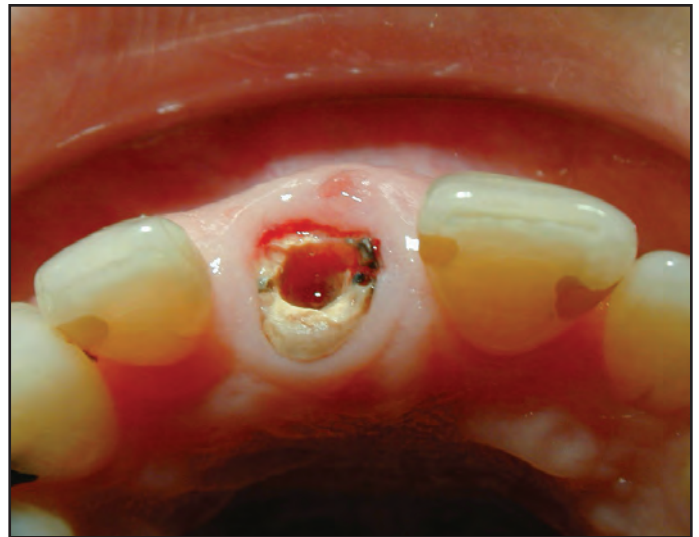


Figure 2: Incisal view of tooth from figure 1.



Figure 3: Pre-surgical radiograph of tooth from figure 1.

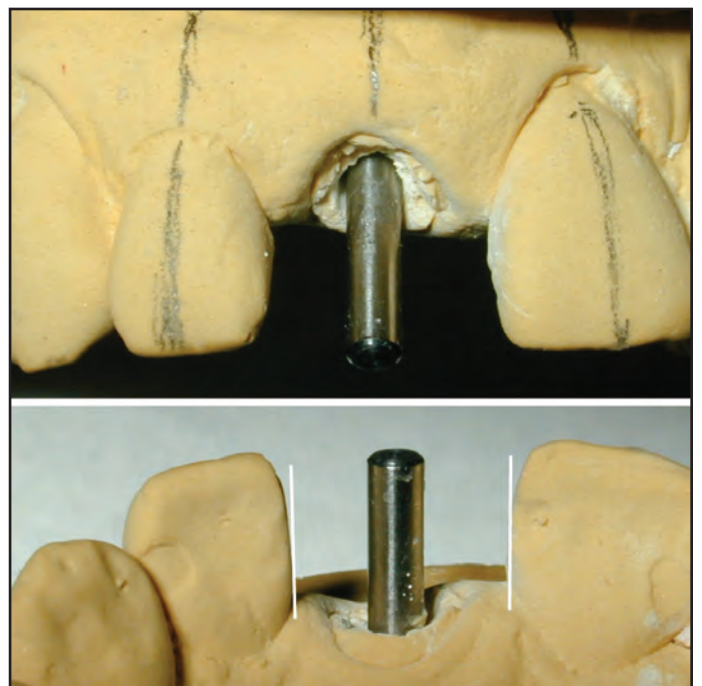


Figure 4: VanMeter technique utilizes drilling a centralized hole approximately 10+ mms with an electric hand piece in a cast model with a Zimmer pilot drill (2.3 mms diameter).

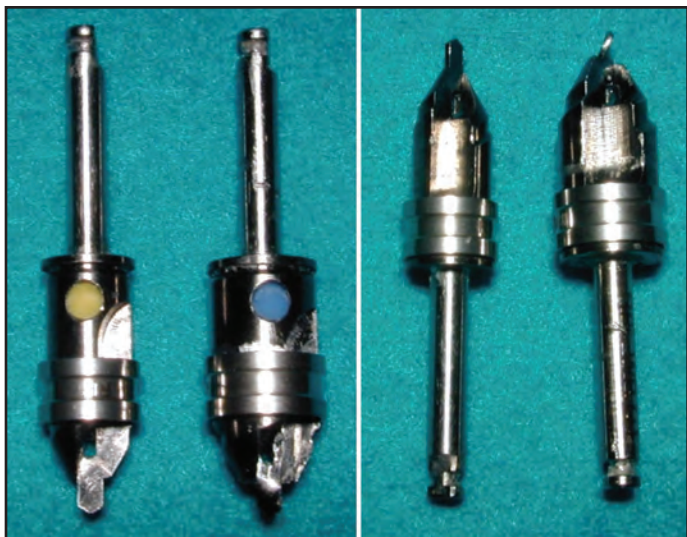


Figure 5: The Nobel Biocare guided start/counterbore drill of the desired final implant size is inserted into the drilled model hole placing the drill stop at tissue level or 1 to 2 mms above (blockout with wax).

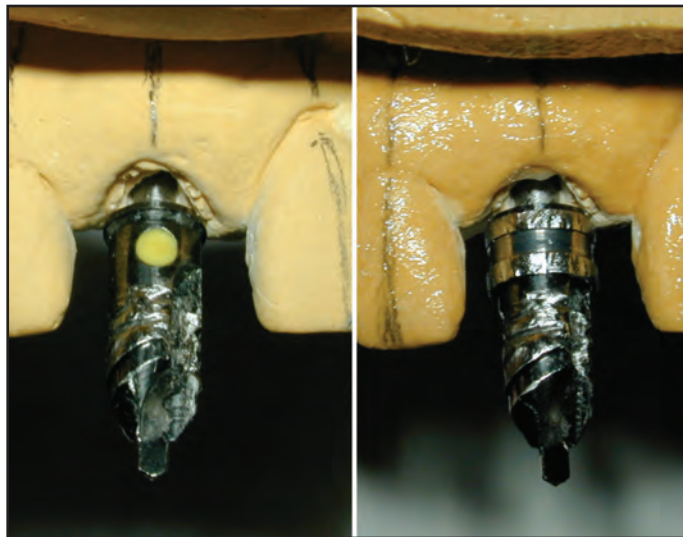


Figure 6: The NB sleeve is positioned down to the drill stop which prevents any movement during acrylic base construction. *Note – There is no true depth control only an estimate of implant platform location.



Figure 7: Any thermoplastic former (Biostar) can be used to construct a 1 to 2mm acrylic base and cut and trim for proper support on adjacent teeth.



Figure 8: Initial try-in of VanMeter guided surgical stent prior to extraction of fractured tooth #8.

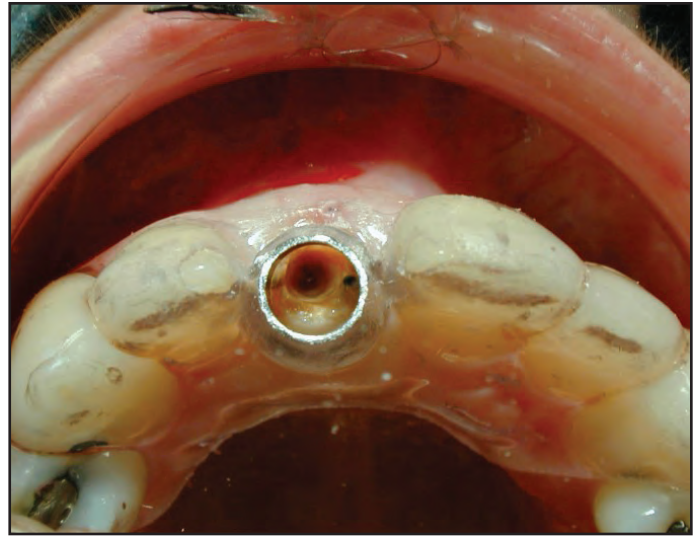


Figure 9: Incisal view of sleeve positioned to palate off labial plate in the surgical stent.



Figure 10: Atraumatic extraction of tooth #8 utilizing a periosteal elevator to sever attachment initially.



Figure 11: A deep labial fractured root portion is removed prior to extraction.



Figure 12: Examination of the socket with a perio probe reveals a deep 6mm labial dehiscence defect.



Figure 13: Following the drill sequence protocol, the final NB RP drill stop touches the sleeve.

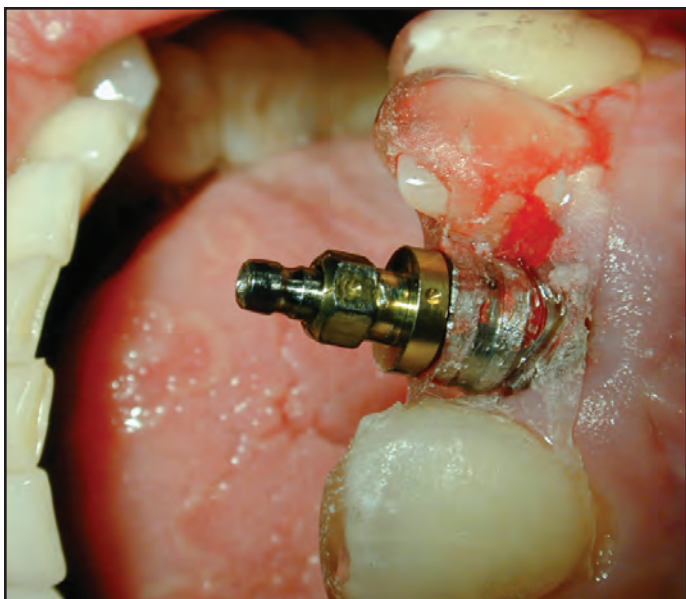


Figure 14: An implant mount is attached to the implant and 'guided' to place through the sleeve using either a hand piece or torque wrench.



Figure 15: An incisal view of immediate implant #8 placement and the triangular platform positioned at correct depth and relation in the socket.

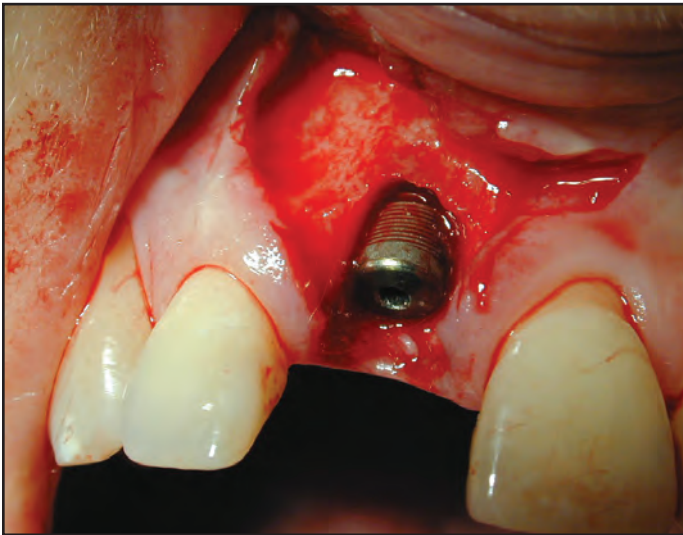


Figure 16: Curvilinear papillae sparing incisions made with flap reflection revealing deep extent of dehiscence defect in relation to implant position.



Figure 17: With collagen membrane on the labial, Regenaform (frozen) was thawed and molded to place covering the implant and bone defect while augmenting the alveolar plate.



Figure 18: The labial flap is advanced and secured over the Regenaform allograft and socket opening.



Figure 19: Radiograph of immediate placement implant #8.



Figure 20: Post-surgical photo at four months, revealing new Regenaform bone regeneration eliminating the labial defect, integrating to the implant and forming an apical shelf.



Figure 22: Retracted anterior view of final implant crown #8.

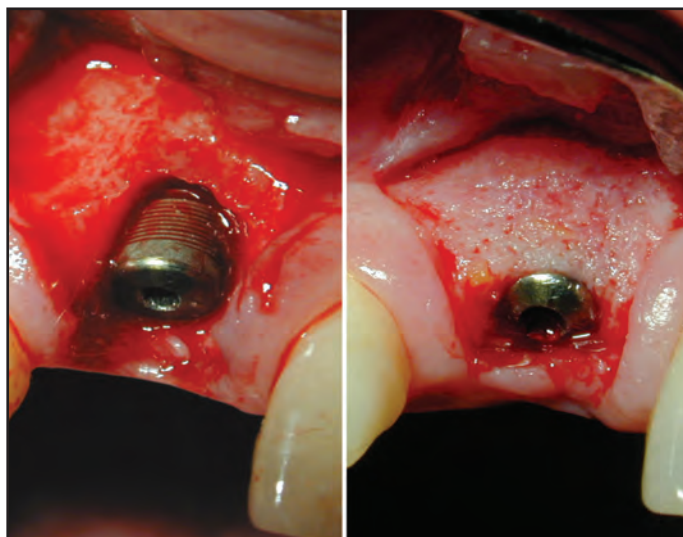


Figure 21: Before and after comparison of new bone regeneration

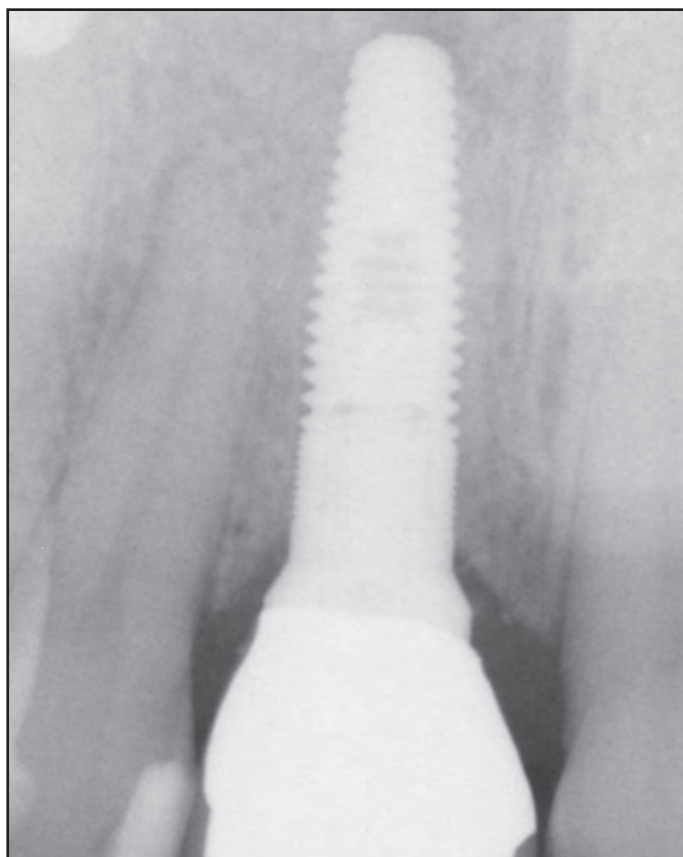
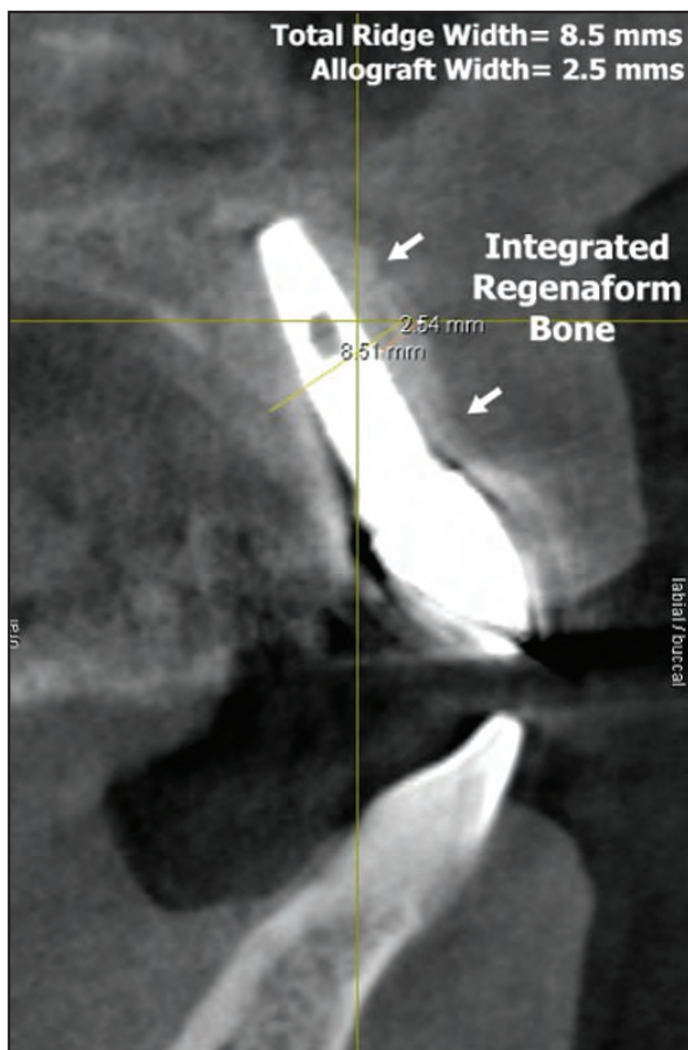


Figure 23: Radiograph of final abutment and crown implant #8.



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Disclosure

The authors report no conflicts of interest with anything mentioned in this article.

Figure 24: CBCT cross-sectional scan of implant #8 with final crown revealing 2.5mm of new bone formation which has integrated to the implant surface.

ATTENTION PROSPECTIVE AUTHORS

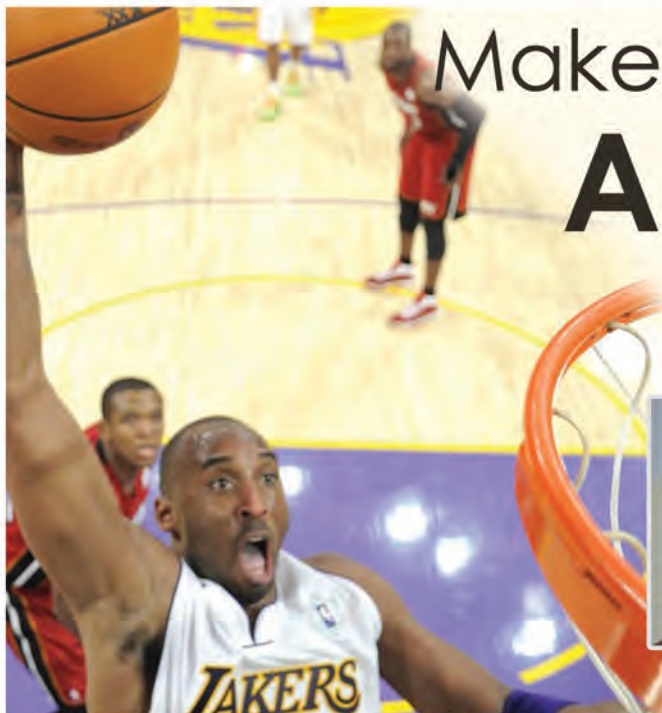
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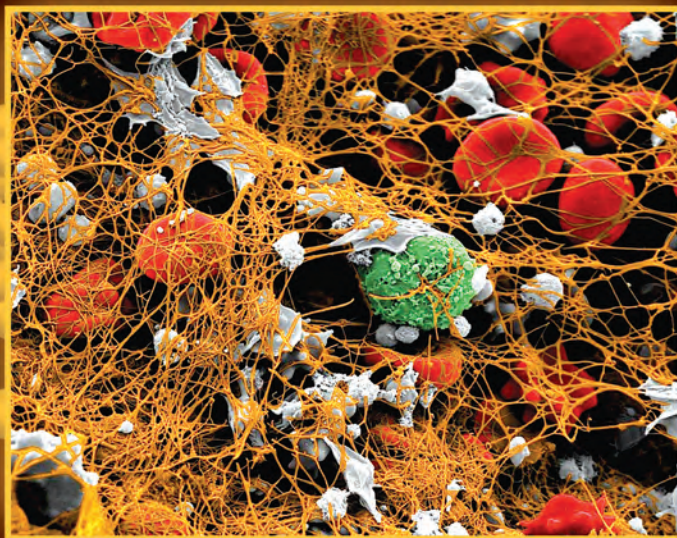
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Efficacy of Preservative Interproximal Papilla Flap Design in Minimizing Crestal Bone Loss Around Single Tooth Implant: A Randomized Controlled Clinical Trial

Dipen Shah, MDS¹ • Dilip Nayak, MDS² • Ashita Uppoor, MDS³
Vijendrapal Singh, MDS⁴

Abstract

Background: Function and esthetics are the two most important criteria that determine the implant success and both of these factors depend on the crestal bone level around the implant. Preservative interproximal papilla flap design is suggested as a preventive approach to minimize crestal bone loss following implant surgery. In the presented randomized controlled clinical trial, efficacy of preservative interproximal papilla flap design, in minimizing peri-implant interproximal crestal bone loss around single tooth implants, was evaluated by comparing it with conventional flap design around the same implant.

Method: A total of 20 sites (mesial and distal) around 10 implants were included in the study: The preservative interproximal papilla flap design that preserves 1-2 mm mucosa on the

ridge in the interproximal area was allocated to 10 sites (site A) whereas the conventional flap design that involves complete mucosal reflection from interdental area was allocated to other 10 sites (site B). The resulting bone loss at both the sites was evaluated and compared at 3 months and at 6 months time radiographically.

Results: The data were subjected to statistical analysis using student unpaired t-test and paired t-test. There was a statistically significant difference in the bone loss between site A and site B, with site A was consistently showing less crestal bone loss compared to site B.

Conclusion: Preservative interproximal papilla flap design for single-tooth implants is indicated to minimize interproximal crestal bone loss and to avoid possible loss of the papillae.

KEY WORDS: Dental Implant, single tooth, flap design, Crestal bone loss

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INTRODUCTION

Implantology has evolved into an accepted, predictable treatment for restoring lost teeth.¹ Stable crestal bone support is the most important factor for the functional outcome, soft tissue esthetics and overall success of the implant.² Therefore it is very important to control the factors which lead to the crestal bone loss. Studies^{3,4} have indicated that when dental implants are placed mucoperiosteal flap reflection, there is generally some crestal bone resorption due to disruption of periosteal blood supply. Although, it is not known to what extent the trauma to the soft and hard tissues, created by the surgical flap reflection, influences peri-implant crestal bone loss, it has been documented that preserving the interdental tissue for maintaining the blood supply of the underlying bone reduces the amount of crestal bone resorption around implants, resulting in ideal functional and esthetic outcomes.⁵

There are two principle techniques which allow the implant placement without periosteal separation from the adjacent interproximal area. The popular one is flapless technique, which provides simple, fast and least traumatic surgical solution in certain cases.⁶ But, at the same time, loss of invaluable attached gingiva, potential for implant contamination and inherent blind nature of the technique may not allow implication of the technique in all the cases.⁷ Recently, the use of papilla preservative flap designs has become very popular in implant surgeries in the hope of minimizing crestal bone resorption. This technique, as described by Abd El Salam Askary,⁸ has the advantage of better visibility by flap reflection and also, it leaves papilla intact in the interproximal area. However, it is not known how far this technique is effective

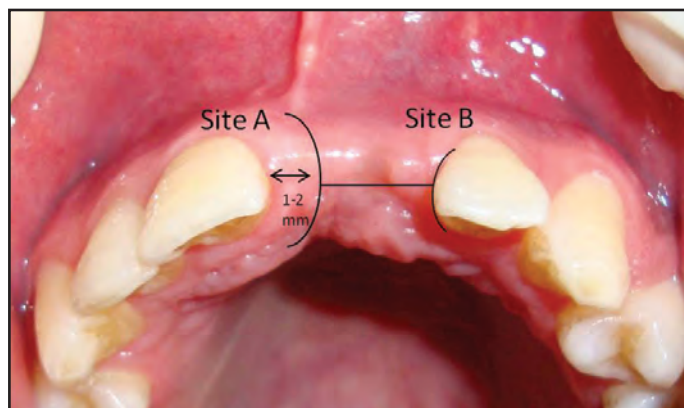


Figure 1: Flap designs used in the study. Preservative interproximal papilla flap design was used on mesial side whereas conventional flap design was used in distal side.

in minimizing peri-implant interproximal crestal bone loss. The aim of the present study was to radiographically evaluate the interproximal crestal bone loss around single tooth implants at 3 months and at 6 months using two different flap designs before loading of the implant. One design does not involve papilla reflection which is also known as preservative interproximal papilla flap design⁸ whereas other design involves papilla reflection that is conventional flap design. Both the designs were employed on either proximal sides of a single tooth implant.

MATERIALS AND METHODS

A total of ten systemically healthy patients (7 males and 3 females), aged 19-49 years (mean age 35.5 ± 10.05 years) were screened from those reporting to the Out Patient Department of Periodontology and Implantology, Manipal College of Dental Sciences, Mangalore, India. Prior to initiating the study, the patients were informed of the purpose and design of this clinical trial and were required to sign an informed consent. The study protocol and consent form were approved



Figure 2: Incision that preserves the papilla was given on mesial side.

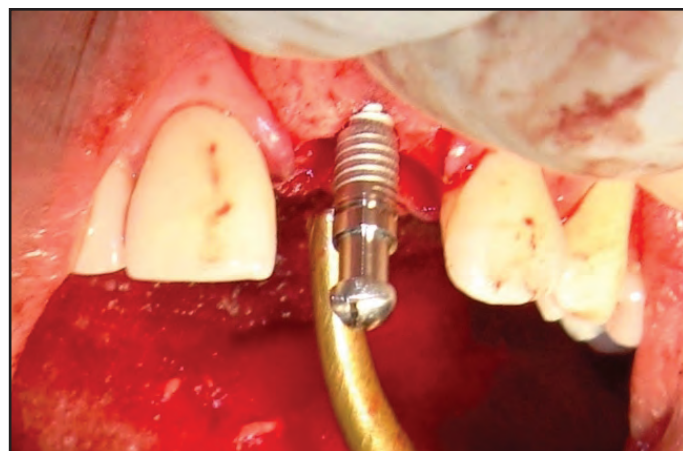


Figure 3: Implant (FRIALIT-2) placement.

by the *Institutional Ethics Committee, Manipal College of Dental Sciences, Mangalore*.

The patients aged between 18 to 55 years, who required single tooth replacement with adequate bone volume to accommodate a standard diameter implant were included in the study. The following patients were excluded: Medically compromised patients, patients who were unable to perform routine oral hygiene procedures or not complying with oral hygiene instructions, patients with history of smoking or excessive alcohol abuse, patients with psychoses and parafunctional habits, radiation therapy within the last 6 months and patients who had local pathology or infection at the implant site, e.g. cyst, abscesses, etc.

Study Design

The study was a randomized controlled clinical trial. A total of 20 proximal sites around 10 single tooth implants (FRIALIT-2, DENTSPLY) were included in the study. Preservative interproximal papilla flap design was performed on 10 proximal sites (site A) and conventional flap design was performed on another 10 proximal sites (site B)

around 10 implants. Allocation (mesial/distal) of each design was decided by coin toss. Following initial examination and treatment planning, all the patients had undergone phase I therapy. Detailed instruction regarding self performed plaque measures were given to signify its importance on the success of the implant therapy. After 2 weeks only those patients maintaining optimum oral hygiene were subjected to surgical procedure.

Surgical Protocol

Pre surgical rinsing with 0.2% chlorhexidine (Plakil™ India) was advocated prior to preparation and isolation of the surgical site was done. The area was anesthetized with 2% Lignocaine HCl with adrenaline 1:200,000 (Astra Zeneca Pharma, India Ltd). At the implant recipient site, on one side (Site A) preservative interproximal papilla flap design that preserves 1-2 mm mucosa on the ridge while on the other side (Site B) conventional flap design that includes the ridge mucosa in the flap were carried out (figure 1). The incision was given from facial margin of site A and extended up to the lingual margin

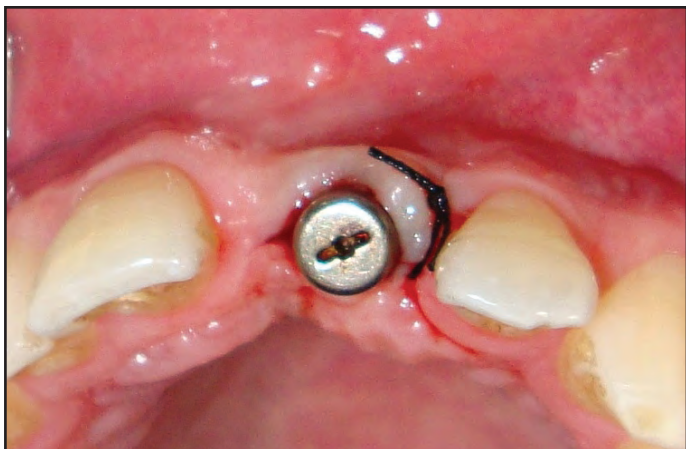


Figure 4: After 3 months Implant uncovering was performed and gingival former was attached.



Figure 5: View at 6 months, after crown placement.

preserving 1-2 mm tissue adjacent to the tooth. After this, preservative interproximal papilla incision, crestal incision was given extending from previous incision up to the gingival crevice of the adjacent tooth at site B which is followed by crevicular incision at site B. All the incisions were made with a #15 blade and the mucoperiosteal flap was elevated using a periosteal elevator. Using the appropriate drills, osteotomy sites of the desired depth and diameter were achieved. The implants were placed with implant angulations in favor of the prosthesis (figures 2, 3). Cover screw was placed and primary soft tissue closure was achieved with interrupted sutures.

Post Operative Care and Instructions

Postoperatively, subjects were prescribed antibiotics (Amoxicillin 500 mg TID for 7 days) to prevent post operative infection and analgesics (Ibuprofen 400 mg TID for 5 days) were prescribed for prevention of post operative pain. Patients were instructed to rinse with 0.2% chlorhexidine gluconate (twice daily for 4 weeks). Following surgery the patients were asked to

refrain from tooth brushing, flossing, and interdental cleaning techniques in the treated area for 4 weeks after surgery. At 1 week, sutures and any plaque present at the surgical site was removed. Recall appointments were then made at 15 days and 30 days for additional follow ups and plaque control. All the patients were recalled at 1, 3 and 6 month post-surgery for follow-up. At 3 and 6 month recall visits, full mouth plaque index and gingival indexes were recorded to monitor plaque control. At each recall appointment, supragingival scaling was performed using ultrasonic scalers and oral hygiene instructions were reinforced.

Second Stage Surgery and Prosthetic Appointment

Following the waiting period of 3 months, implants were exposed by the second stage surgical procedure during which a healing abutment was attached to the implant (figure 4). However, implants were not loaded until 3 months following the second stage procedure and the prosthesis was only attached after 6 months following implant placement (figure 5).

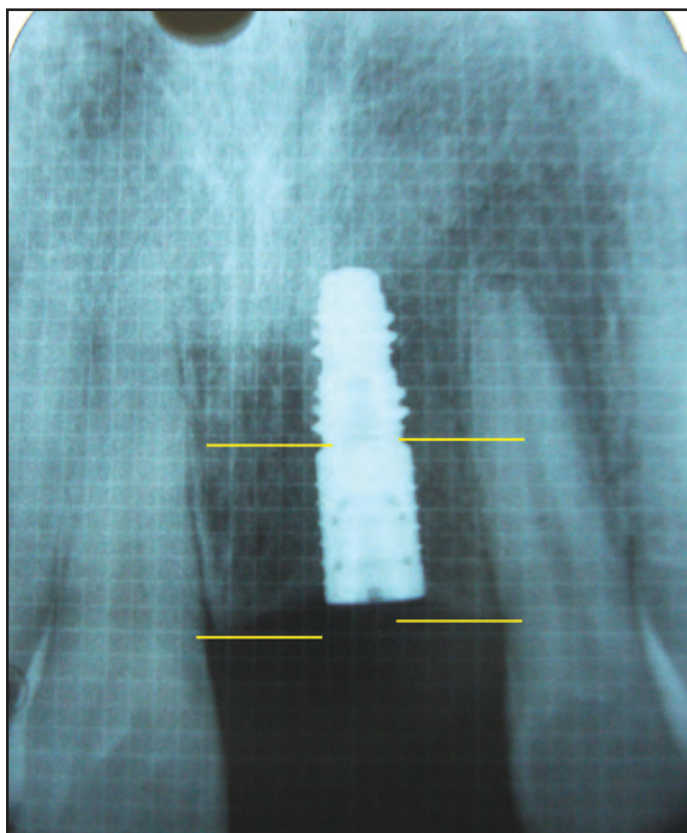


Figure 6: Measurement of crestal bone height at site A and site B.

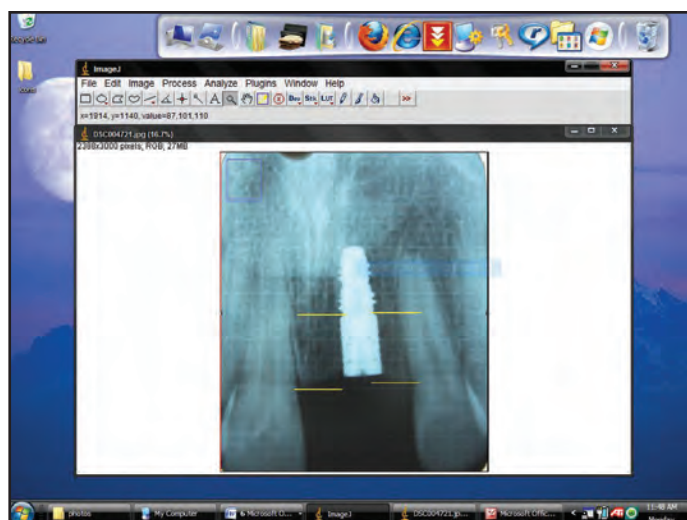


Figure 7: Use of "image J" software for measurement.

Radiographic Technique and Measurements

Intraoral periapical radiographs were taken for all the patients at the baseline immediately after implant placement, at 3 months and at 6 months. An intraoral periapical radiograph was taken for each selected site using the long cone paralleling technique. All radiographs were obtained utilizing an intraoral radiographic 'F' speed film (*Kodak Carestream Health Inc. New York, USA*) mount with mm grid scale. All radiographs were digitalized using the digital camera and transferred to the computer as JPEG image and radiographic measurements were carried out by using software, *Image J*, which was designed by National Institute of Health (NIH) for the radiographic measurements.⁹

Crestal Height of Bone

The crestal height of bone was defined as the measured distance between the apical end of first step of Frialit-2 implant and the most coronal point of the interproximal crestal bone. The linear radiographic distance was calculated by drawing a line between reference point (first step of implant) to the alveolar crest (or most coronal point of the interproximal crestal bone) on mesial and distal aspect of implant and length of that line was calculated by the image analysis software gives the bone height¹⁰ (figures 6,7). These measurements were done in all the radiographs taken at baseline, 3 months and 6 months.

Measurements

For each implant interproximal area, the differences in the interproximal crestal bone height between baseline and 3 months and between baseline and 6 months were calculated. For these time intervals, the differences in bone

Table 1: Comparison of Mean crestal bone loss at site A and site B

Time Interval (from Baseline)	Site A	Site B
3 months	0.32 ± 0.23	0.81 ± 0.61
6 months	0.52 ± 0.25	1.25 ± 0.54
Bone loss (in mm) as Mean ± SD		

loss between site A and site B were calculated. All the recorded measurements were entered in the standard proforma drawn for this study and subjected to statistical analysis.

STATISTICAL ANALYSIS

Statistical analysis was performed by using student unpaired t-test and paired t-test. Calculations were performed using the statistical package SPSS program version 11.5 (*SPSS Inc, Chicago, Illinois*). $P < 0.05$ was considered to be significant.

RESULTS

All the 10 patients completed full 6 months follow-up period and received the prosthesis successfully. None of the patients withdrew from the study and no follow up appointments were missed. No implants were lost during the study time period.

Statistically significant bone loss occurred at Sites A and B at 3 months and 6 months. The mean crestal bone loss at site A was 0.32 ± 0.23 mm and 0.52 ± 0.25 mm at 3 and 6 months time respectively. The mean crestal bone loss at site B was 0.81 ± 0.61 mm and 1.25 ± 0.54 mm at 3 and 6 months time

respectively (table 1). The mean difference in bone loss between site A and site B at 3 month was 0.49 ± 0.67 mm which was highly significant. At 6 months the mean difference in bone loss was 0.73 ± 0.56 mm which was very highly significant (table 2, graph 1).

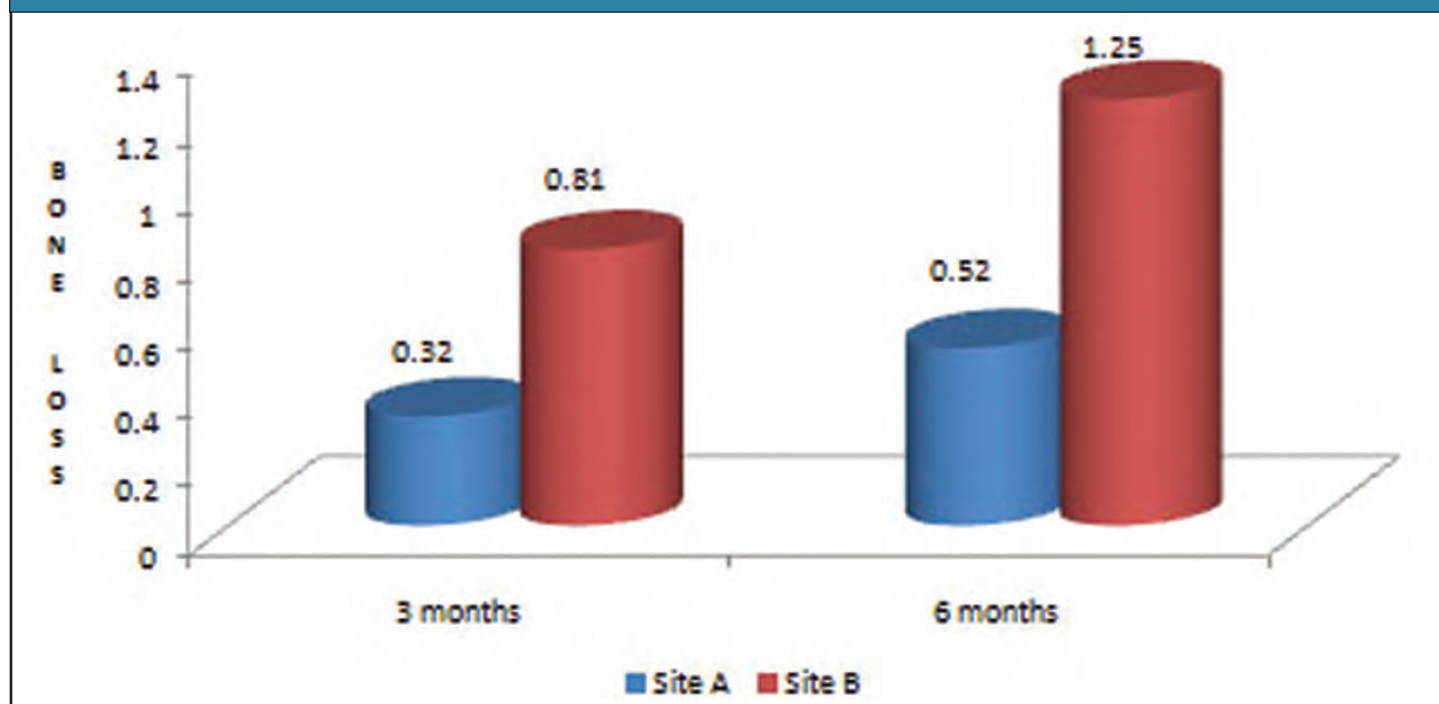
DISCUSSION

The main strength of this study is its unique flap design. In the present study, mesial and distal sites around the same implant were taken as site A and site B for comparison. This type of study design offers a significant advantage as the effects of the majority of the confounding factors are equally distributed. The allocation of each design to the mesial or distal site was decided by coin toss to randomize the study design and prevent any site related bias. In the present study, delayed loading protocol was followed for all the implants where prosthesis was delivered only after waiting period of 6 months. Although immediate, early loading protocols have shown promising results in recent times, to avoid the confounding effect of occlusal loading on crestal bone resorption it was decided to follow delayed loading protocol.¹¹

Table 2: Difference in Mean Crestal Bone Loss Between Site A and Site B With P Value
(Bone loss at site A < Site B)

Time Interval (from Baseline)	Difference in Bone Loss	p-Value
3 months	0.49 ± 0.67	0.005
6 months	0.73 ± 0.56	<0.001
Bone loss (in mm) as Mean \pm SD		

Graph 1: Comparison of mean crestal bone loss (mm) at 3 months and 6 months at Site A and Site B



Hermann et al.,¹² in a study evaluating the crestal bone changes around implants, compared the linear radiographic measurements with histologic measurements. The results of the study demonstrated that standardized periapical radiography can evaluate

crestal bone levels around implants clinically accurately (within 0.2 mm) in a high percentage (89%) of cases. These findings are significant because crestal bone levels can be determined using a noninvasive technique and block sectioning or sacrifice of the animal

subject is not required. In the present study, standardized intraoral periapical radiographs were used and to make radiographic measurements more accurate, the crestal bone changes were evaluated using Image-J image analysis software which has high accuracy and precision along with high specificity and sensitivity.

Kwon et al.¹³ demonstrated that, bone level related to the tooth is the dominant factor that influences the interproximal soft tissue dimension between a natural tooth and a single implant. Due to the above mentioned reason, the bone height was measured to the most coronal point of the interproximal crestal bone from the first step of implant.

Roman⁵ did a prospective study to investigate the interproximal crestal bone loss occurring after placement of single-tooth implants using 2 different flap designs. The sites which preserved the interproximal papilla showed a statistically significant less mean interproximal crestal bone loss at the time of crown placement and at one year after crown placement compared to the sites which did not preserve the interproximal papillae. However, the implant loading was performed during the evaluation period, which might have confounded the results.

Wilderman et al.¹⁴ reported that the mean horizontal bone loss after osseous surgery with periosteal elevation is approximately 0.8 mm. Comparable amount of bone loss was also reported in our study at 3 months at site B (0.81 ± 0.61 mm), where periosteum was elevated leaving the interproximal crestal bone completely exposed. Stripping the periosteum creates vascular stasis and compromises the vitality of the cortex. Moreover,

when periosteum is stripped, the osteogenic layer immediately adjacent to the bone surface is destroyed and the blood supply of the underlying compact bone is compromised.¹⁵ Since, this site remained devoid of its blood supply for a considerably long period of time; it showed higher crestal bone resorption.

Kleinheinz et al.¹⁶ from his study on cadavers demonstrated that the crestal area of the edentulous alveolar ridge is covered by a 1–2mm wide avascular zone with no anastomoses crossing the alveolar ridge however the papilla is supplied by vascular anastomoses crossing the alveolar ridge. The preservative interproximal papilla flap is designed in such a way that the incision was given on the crest, which consists of keratinized tissue, while preserving the interdental tissue by excluding it from the flap. Thus, apart from the consideration of periosteal maintenance of blood supply this design also takes into consideration the course of the vascular supply.

The present study provides a valuable insight into the expected bone resorption that may occur following the use of two commonly employed flap designs in implant placement. Since, soft tissue esthetics heavily depends upon the crestal bone level, knowledge of the expected bone resorption, help surgeon visualizing the final esthetic outcome. The drawback encountered with the use of this flap design was that it may not be always possible to preserve tissue on either side of the flap because of available space limitations in case of single-tooth implants. Saadoun¹⁷ mentioned that when the mesiodistal space is too constricted (less than 6mm), it becomes difficult to design a flap properly that spares the papillae, and the cor-

onal portion of the flap will become extremely narrow with a high risk of necrosis. The preference for placing larger diameter implants that could greatly increase bone-to-implant contact may not always permit such a flap design. The other drawback of the study is the small sample size. However, even the small sample size of the study showed statistically significant difference between the two groups. Apart from the large sample size, the use of custom made radiographic stent is advocated for the future studies to further standardize the radiographs.¹²

CONCLUSION

The use of preservative interproximal papilla flap design was associated with decreased interproximal crestal bone loss as compared to conventional flap design at 3 and 6 months time period following implant placement surgery.

Hence preservative interproximal papilla flap design for single-tooth implants may be indicated to minimize interproximal crestal bone loss and to avoid possible loss of the papillae. Further studies with larger sample size are required to substantiate the results of this study. ●

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Disclosure

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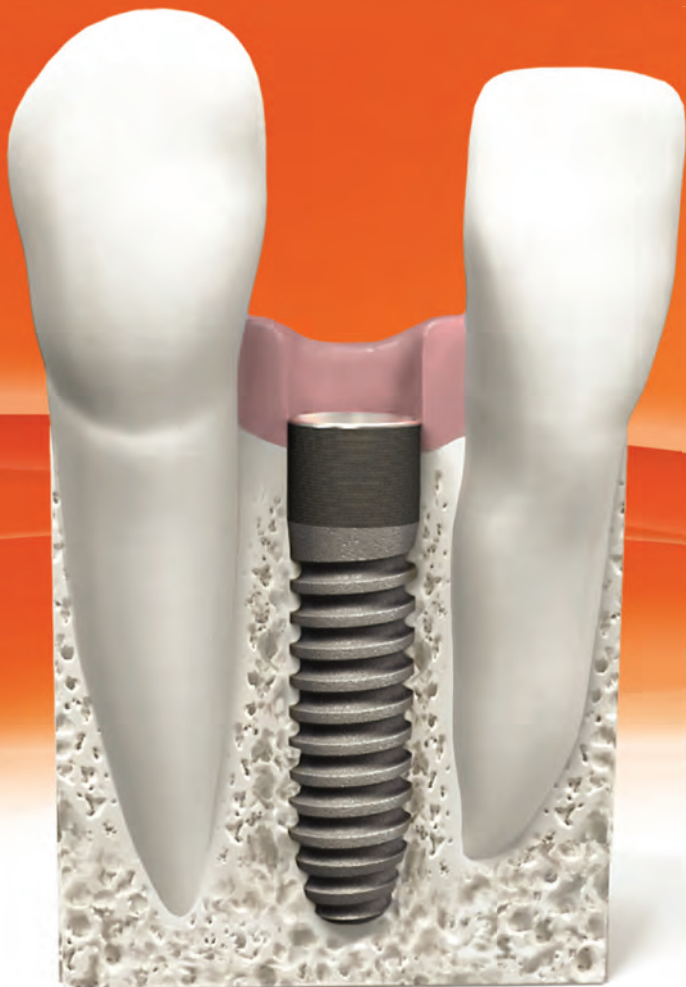
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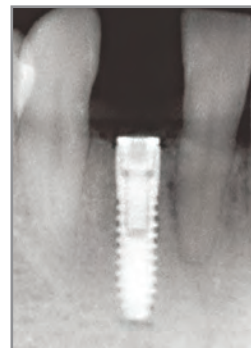


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Simultaneous Implant Placement and Osseous Regeneration in a Resected Mandibular Site: A Case Report

Lanka Mahesh, BDS¹ • Gregori Kurtzman, DDS, DICO²

Abstract



Reconstruction of alveolar bone in patients presenting with severe osseous defects resulting from gross pathologies is a challenging front in the field of oral rehabilitation. The task is all the more demanding when it comes to a resected mandibular site. A mandibular site presents with a challenge to preserve and prevent damage to the inferior alveolar nerve bundle which, if bypassed, would pose problems of paresthesia of the supplied region, temporary or permanent.

The treatment alternatives to rebuilding the alveolar ridge include bone grafts, guided bone regeneration and distraction osteogenesis. Autogenous bone grafting is by far considered the gold standard technique and is most widely used for

alveolar reconstruction with success rates ranging from 39% to 100%. Although the procedure of grafting such an area warrants a bone regeneration period of many months before implants can be placed in healthy bone, simultaneous placement of both is now commonly performed.

In this case report we describe the removal of a rare mandibular parasymphiseal Adenomatoid Odontogenic Tumor and subsequent simultaneous osseous and implant rehabilitation using allografts and dental implants in a young female patient who presented with a mandibular asymptomatic swelling of 3 month duration involving teeth 20-23. The histopathology confirmed an extra follicular Adenomatoid Odontogenic Tumor.

KEY WORDS: Adenomatoid Odontogenic Tumor, pathology, bone grafting, dental implants

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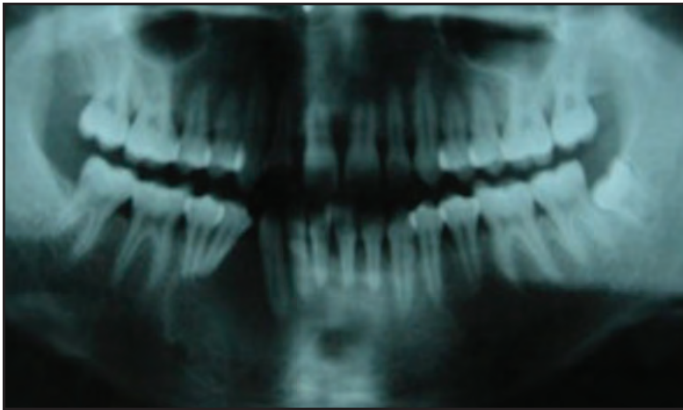


Figure 1a: Pre-operative radiograph (panoramic).

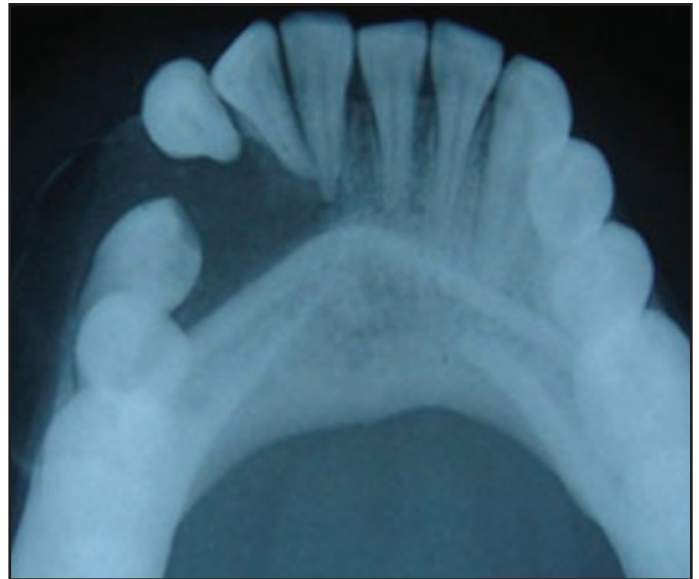


Figure 1b: Pre-operative radiograph (occlusal).

CASE REPORT

A 17 year old female patient reported with a complaint of painless swelling in the mandibular parasymphyseal region of 3 months duration. The patient had no relevant medical history or used any medication in that period. There was no history of trauma, pain, discharge or any other related lesions at that site. On clinical examination there was a facial asymmetry with a diffuse small swelling below the left commissure. The skin over the swelling was normal and the mass was slow growing, gradually increasing in size. Intraoral examination showed no buccolingual expansion of the left mandible and the teeth were mobile. There was displacement of the canine-premolar teeth in the region. The swelling was bony hard in consistency with egg shell crackling of the buccal cortical plate in the vestibule. The margins were well defined with normal overlying mucosa. There were no palpable lymph nodes in the area of drainage.

The swelling was aspirated at the first visit and it yielded minimal amounts of blood tinged serous fluid. The possibility of ameloblastoma and calcifying odontogenic epithelial tumor were considered preoperatively. Microscopic features suggested it to be an extra follicular Adenomatoid Odontogenic Tumor. Teeth 20-23 were extracted. The lesion was approached through the extraction socket and the tumor was removed.

The patient was followed up regularly and six months post operatively implant placement was planned out. Four implants were planned in the region of 20-24 with simultaneous osseous regeneration of the alveolar ridge in the same region. Tooth 24 was kept as a transitional abutment until the day of surgery. A mucoperiosteal flap was elevated with a crestal incision in the same region to expose the alveolar bone and three osteotomies were accomplished using surgical burs. The angu-



Figure 2: Removal of tumor with lining.

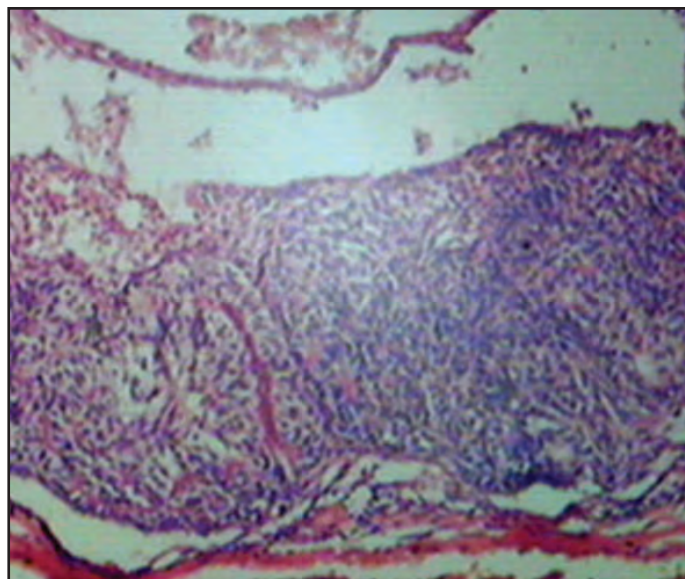


Figure 3: Biopsy confirmed the diagnosis of AOT.

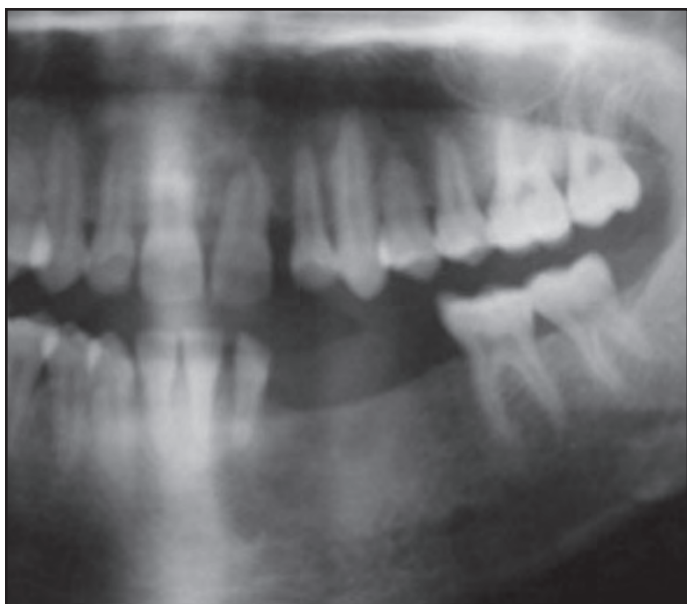


Figure 4: 6 months after tumor removal.



Figure 5: Tooth #24 kept as transitional until day of implant placement.

lations were verified using paralleling pins and implants were placed (3.5x12mm, Biohorizons, Alabama, USA). Tooth #24 was extracted with immediate implant placement (3.5x12 mm, Bio-

horizons, Alabama, USA). The area was then grafted using particulate graft (Bone Gen, USA) which was further secured in place by a barrier membrane (Biomend, Zimmer Dental,



Figure 6: Paralleling pins at implant sites.



Figure 7: Bone graft secured in place with barrier membrane.



Figure 8: Post-operative view with 4 implants and bone graft.



Figure 9: Post-operative radiograph.



Figure 10: Clinical view after prosthesis insertion.

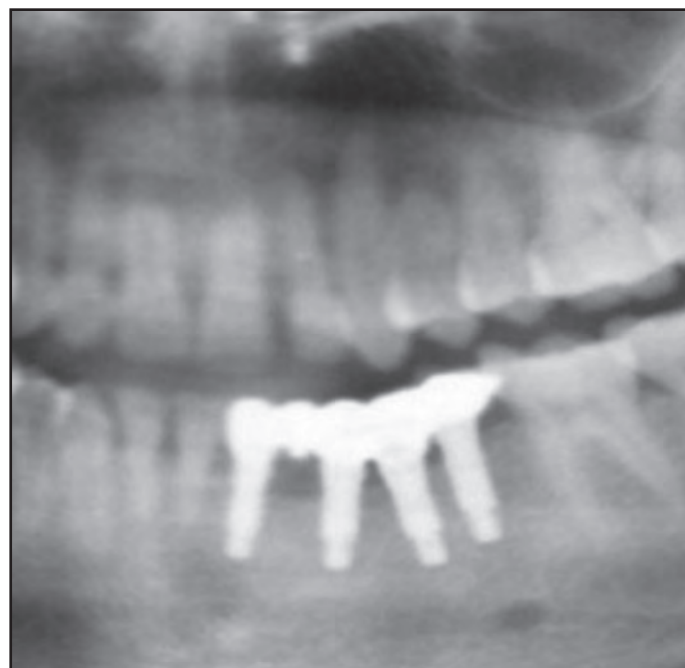


Figure 11: Radiographic view after prosthesis insertion.

California, USA). A cement retained crown and bridge prosthesis over angled custom-made abutments was later delivered. Recall over the next 4 years has been uneventful.

DISCUSSION

The treatment of oral pathologies such as large cysts and tumors not only includes their removal but also the compensation of the oral and dental losses inferred by them. Adenomatoid Odontogenic Tumor is an uncommon and completely benign tumor. It represents 3-7% of all odontogenic tumors. Clinically it is found in late adolescence or young adults. Females are twice as frequently affected as males. The tumor is most frequently located in the anterior maxilla and forms a very slow growing swelling. It appears usually as an asymptomatic swelling with cortical expan-

sion and displacement of adjacent teeth.

The treatment protocol suggests complete removal of the tumor with its lining, as was done the case presented, and regular reviews for any recurrences. Once the clinical and radiographic findings ensure complete healing, rehabilitation is the second phase. The routine problem encountered after tumor removals, apart from whole or part of missing dentition, is primary and secondary bone loss. The bone loss may be vertical or buccolingual but is usually a combination of both. This defect challenges the placement of dental implants as was the case in this young patient. The next protocol is then bone regeneration using grafts. Ideally, the osseous structure is regenerated first and then dental rehabilitation in a second operation after a period of healing. However, all other criteria being satisfactory, a simultaneous

graft and implant placement can be considered as a potential treatment option. The complication that may occur is failure of the graft with challenged implant stability. Although this is a possibility, no complications were observed at any stage of the procedure in this case report.

CONCLUSION

Resected mandibular sites are areas of concern and must be soon rehabilitated to prevent further bone loss and restore the patient with to functional and esthetic demands. A simultaneous osseous and implant placement, though challenging, can be considered a surgical technique both suitable and reliable for the treatment of such cases. ●

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Disclosure:

Dr. Lanka Mahesh lectures for BioHorizons Implant Systems whose products are mentioned in this article.

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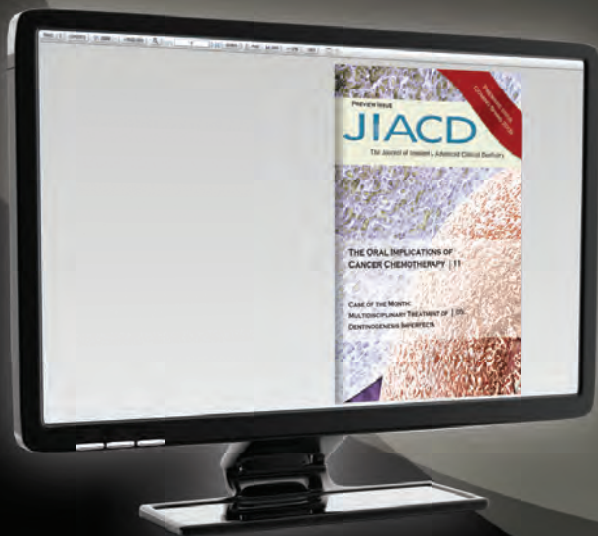
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