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Case of the Month
Comprehensive Treatment for Maxillary Locator Implant Retained Denture in the General Practitioner’s Office

Ara Nazarian, DDS¹

Abstract

The ability for the general practitioner to deliver comprehensive dental care under one roof, in many cases, increases patient acceptance of treatment. The following case demonstrates patient treatment with a maxillary locator implant retained denture. The patient had all hopeless maxillary teeth removed and site preservation was performed at the time of surgery. After a healing phase, a surgical guide was fabricated to assist in the placement of dental implants. Following an osseointegration healing phase, locator attachments were placed onto the healed dental implants and the maxillary denture was modified to secure to these attachments. All care was delivered in one office, by one practitioner. Care in this manner streamlined the patient’s visits and allowed faster delivery of the final prosthesis.

KEY WORDS: Dental implants, dentures, maxilla, prosthetics

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Disclosure
Dr. Nazarian reports no financial disclosures for this article.

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Background: This paper describes the use of a dental implant with dual stabilization technology to immediately restore a single tooth edentulous space.

Methods: A dual stabilization dental implant was placed using a flapless technique. After placing this one piece implant, an immediate impression for the final restoration was taken and full contour temporary restoration was put into full function.

Results: By attaining an ISQ reading of 62, an insertion torque of 50 N/cm at the time of placement due to the unique features of the dual stabilization implant used in this paper, an immediate restoration was possible.

Conclusions: Primary stability is a necessary tenant for implant survival and it is even more crucial when immediately loading a dental implant. The macro structure of the dental implant used in this paper allowed for immediate loading capability for this particular case.

KEY WORDS: Dental implants, immediate load, prosthetics

1. Director of Education and Clinical Affairs, OCO Biomedical
BACKGROUND

In 2000, Buser and Schenk postulated that primary stability was a necessary tenant for an implant to be successful. Stability at the time of placement must be sufficient to enable the implant to resist micro-movement until sufficient biologic stability (secondary stability) is adequately established. During this period of transition between primary and secondary stability, the implant faces the greatest risk of micro-motion and potential failure. Extrapolating from research in dogs, it is estimated that this period in humans occurs roughly two to three weeks after implant placement. A micro-movement of more than 50-150 microns will disrupt Osseointegration.

Primary stability can be characterized by two different methods; insertion torque value and ISQ readings. An insertion torque value of > 35N/cm is considered stable enough to load clinically. Johansson & Strid described a technique whereby bone quality as a function of density and hardness could be derived from the torque forces needed during the implant insertion. ISQ readings (RFA-resonance frequency analysis) utilizing an Osstell unit have been proven to be a reliable indicator of implant stability. Implant stability above 65 ISQ should be regarded as optimal, above which few failures should be expected. An ISQ of < 50 may indicate potential failure or increased risk of failure.

Research has shown a relevant dependency between insertion torque and bone quality and a very weak dependency between RFA and bone quality. Again, the statistical analysis shows a quite weak correlation between length or diameter and insertion torque, but it shows a relevant correlation between length and RFA. Implant stability can be categorized in two ways; short-term stability (primary stability) and long-term stability (secondary stability). Primary stability is dependent on the macro structure of the implant while long-term stability is dependent on the microstructure of the implant and its ability to promote laminar bone growth.

Primary stability can be improved by adapting the surgical technique and by implant selection. For instance, the use of thinner drills and wider and tapered implant designs will result in a high primary stability. This improvement is due to lateral compression of the bone trabeculae and an increase of the interfacial bone stiffness. A high ISQ value achieved after such a procedure should not be relied upon as an indication for immediate loading, since this value may decrease over time as a result of mechanical relaxation. This means that a high ‘manipulated’ ISQ value after using thinner drills and wider and tapered implants describes a temporary increase of stiffness rather than the true load-bearing capacity of the bone-implant complex.

In a review of the literature focusing on early wound healing adjacent to endosseous dental implants, Raghavendra et al. point out that a critical period occurs after implant placement, when osteoclastic activity has decreased the initial mechanical stability of the implant, but not enough new bone has been produced to provide an equivalent or greater amount of compensatory biological stability. ISQ values significantly decreased at 3 weeks and increased at 6 weeks.

The dental implant used in this case report (OCO Biomedical, New Mexico, USA) uses a patented macro structure to not only provide exceptional primary stability, but maintain that stability while biological healing occurs. The combination of the imbedded tapered platform...
and the auger tip place healing bone under tension. This tension potentially speeds up the healing of bone and decreases remodeling by increasing the expression of TGF-β1/OPG and results in the disappearance of osteoclasts.\textsuperscript{11}

In this paper, a case is presented which not only results in outstanding primary stability, but allows at the time of surgery to take the final impression, immediately load with a temporary restoration and allowed the patient to leave the office without the need for an acrylic temporary partial.

**CLINICAL CASE**

A 33 year old female presented to the clinic with an edentulous space at \#20. The bicuspid had been extracted approximately 17 years prior without socket preservation and her previous dentist had placed a banded orthodontic retention device at the time of extraction, thus resulting in a narrowed ridge. This was confirmed by CBCT scan.

After local infiltrate anesthesia was achieved using Septocaine with 1:100,000 epinephrine (Septodont Inc., New Castle, Delaware) a flapless approach was decided upon to gain access. The
osteotomy position was marked using a #8 surgical round bur through the gingival complex and making a purchase point in the crestal bone. This is important in order to avoid having the pilot drill skip across the crestal bone prior to engaging it.

Orientation in 3 dimensions was established, and a 1.8mm pilot drill with an 8mm depth stop was used to establish the path of the osteotomy. A paralleling pin with a 3.25mm platform was inserted into the pilot hole to verify position, trajectory and evaluate the mesiodistal space requirements.

A 3.0 guided tissue punch was used to remove a plug of keratinized tissue and expose the osseous crest. A 3.25mm countersink was used to the appropriate platform depth to prepare the upper portion of the osteotomy to accept the imbedded tapered platform of the 3.0 Mini implant. The countersink also negated any variations in ridge topography. The combination of the embedded tapered platform, cortical micro threads and the patented auger tip of
the implant, makes dual stabilization possible.

Once the countersink procedure was completed, the 1.8mm pilot with a 10mm depth stop was taken to the intended implant length. It was determined that the bone density was of a Type 3 variety. The black O-ring depth indicator was adjusted to approximate the proper depth/length of the implant to compensate for the soft tissue thickness.

A 3.0 x 10mm mini-implant is taken to the mouth utilizing an insertion driver and thumb-wheel. Once resistance was encountered, it was driven to its final position with a ratchet and finally a torque driver. A final torque value of 50N/cm was achieved. An ISQ reading of 62 for both M-D and B-L direction was recorded.

Since such a high primary stability was attained and ideal soft tissue architecture was present, the decision to immediately restore was decided upon. The 3.0 Mini is a one piece implant with a 5.5mm tall abutment. A TRIP (tissue retraction impression pickup) was snapped
into place and a polyvinylsiloxane (PVS) impression taken along with a bite registration. The impression was kept in the clinic until the two week follow-up appointment just in case soft tissue changes were present.

A full contour temporary was fabricated with a Protemp crown (3M ESPE, Irvine, CA). This temporary crown is made of unpolymerized Protemp material and once contoured to the abutment, it can be polymerized using a standard curing light. Once occlusion was adjusted, the patient was dismissed with a temporary under full function. Two weeks post implant placement, the patient returned to the clinic in order to evaluate the soft tissue for esthetics and any possible change. At that point the final impression was sent to the laboratory for fabrication of the definitive restoration. If any significant changes in soft tissue architecture were observed, the patient would have been reappointed in one month for re-evaluation and possibly take a new impression.

The final IPS e.max crown (Ivoclar Vivadent, Amherst, NY) was tried-in. Once the occlusion was properly
adjusted, the restoration was cemented with RelyX (3M ESPE, Irvine, CA) cement.

**DISCUSSION**

In this world of immediate gratification, some patients are demanding shorter durations prior to final implant restoration. Up until now, with typical implant protocols, the pros and cons of immediate loading made this a risky procedure which many practitioners were unwilling to experiment with. The case shown in this paper demonstrates that immediate implant loading may be a possible option for some patients.

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Disclosure
Dr. Schlesinger is an employee of OCO Biomedical.

References
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The following paper presents the concept of biologic shaping to facilitate the placement of restorations without impingement of biologic width. Biologic shaping is a surgical technique that is significantly different than traditional crown lengthening. This paper will present the advantages of biologic shaping along with photographic examples of the technique.

**KEY WORDS:** Biologic width, osseous surgery, crown lengthening, dental prosthetics

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In today’s world of advanced dental procedures and technology, traditional or classic dental principles can easily be lost. This may especially be true with the decision-making process of saving teeth. Implants are wonderful options when appropriate, but they should not be selected when a tooth can be saved using a predictable periodontal or restorative protocol that yields excellent long-term prognoses. Too often today, good teeth are being removed in favor of implant placement that is occurring in a clinical environment of inadequate bone and soft tissue, as well as biomechanical compromise. Biologic shaping and soft tissue grafting offer a classic, proven methodology for treating teeth with absolute predictability.

Often our restorative treatment plans lead us to subgingival margins, furcation involvement, root flutes and concavities, in addition to a multitude of complex issues. Many of the issues we face are in the subgingival environment and require periodontal corrective procedures to return the foundation to a healthy state. Traditionally, crown lengthening was indicated for deep subgingival margins, not only to facilitate impression making but also to correct biologic width infringements. Biologic shaping is a periodontal corrective procedure reported in the literature that may complement traditional crown lengthening, yet it differs from traditional crown lengthening in the following ways.

**Figure 1:** This patient will undergo a maxillary full-arch restoration to correct occlusal issues and mild periodontal disease. When performing definitive restorative procedures, it is critical to have an ideal periodontal foundation to restore. There was an initial discussion on whether to restore the bicuspids. After review of occlusal issues, it was decided to include the bicuspids in the provisional phase of treatment.

**Figure 2:** Upon reflection of the tissue with a full-thickness flap due to the existing thick bone, the tooth surfaces exhibited calculus located in concavities.
Traditional crown lengthening moves the bone away from the margin. Biologic shaping moves the margin away from the bone.

Traditional crown lengthening requires osseous surgery to re-establish the biologic width. Biologic shaping may require minor osseous surgery, but it generally avoids major osseous surgery and still re-establishes biologic width because you have the choice to locate your restorative margin coronal to the old restorative margin (0.5 mm apical to the core is the coronal extent).

Traditional crown lengthening may open furcations and render a poor prognosis. Biologic shaping preserves the integrity of the furcation because aggressive osseous surgery was not needed. Traditional crown lengthening does not eliminate flutes, concavities or root clefts, leaving the postoperative lengthened crown at risk for disease recurrence due to increased susceptibility for plaque, calculus and caries formation. Biologic shaping leaves the subgingival area as smooth as glass; there are no areas for plaque, calculus or caries to hide.


Traditional perio is about pockets and probing. Biologic shaping is about preserving bone, smoothing out the rough spots, and making restorative dentistry predictable and a joy to perform.

The concept of biologic shaping is presented in the case that follows. The procedure stresses a 360-degree removal of tooth surface irregularities as well as all cementoenamel junctions (CEJs) and existing margins. An important aspect of the procedure is to remove any concavities or furcation involvements. Once the root surfaces are perfectly smooth, the flap is placed just coronal to the osseous surface and sutured in place. After 12 to 14 weeks of healing, the restorative dentist simply places a new margin just coronal to the gingival collar, which allows for a perfect impression to be taken. This case also features the specific correction of a mesial concavity on an upper first bicuspid.

Article continues on following pages
Figure 3: From a slightly different angle, the irregular contours of the bone can be seen. Osseous contouring will be necessary to create contours that will be compatible with the soft tissue when it is replaced. Once the flap is reflected, a split-thickness dissection is used to preserve the periosteum for suturing of the flap and for stability.

Figure 4: Using a C847-016 diamond bur (Axis Dental; Coppell, Texas), the tooth surface is gently smoothed to remove any irregularities of the root surface, as well as all CEJs. The concavity on the upper first bicuspid is also removed by gently blending the line angles approximating the concavity. Removal of the middle tooth surface of the bicuspid was avoided so as not to deepen the concavity.

Figure 5: Once the gross removal of tooth structure is completed, an F847-016 diamond bur (Axis Dental) is used to smooth the root surface.

Figure 6: A C801L-023 diamond round bur (Axis Dental) is then used to properly contour the bone to mimic the soft tissue. The term for this procedure is “creating a parabolic architecture,” and it is the key to forming an ideal interface between bone, tooth and tissue. This phase of the surgery helps to avoid the formation of pockets between the bone and soft tissue when the tissue is replaced.
Figure 7: Upon completion of the biologic shaping and osseous contouring, an ideal foundation is created over which the soft tissue can be sutured in place.

Figure 8: 5-0 chromic gut suture material is used to replace the flap just coronal to the osseous underlying foundation. An important aspect of suturing the flap is to involve the periosteum as an attachment apparatus for the suture. The suture grabs the periosteum apically to allow for perfect placement of the flap so that no movement or displacement of the flap can occur. There is no need for any dressing to be placed.

Figure 9: An occlusal view showing as much primary closure of the flaps as possible. This allows for decreased discomfort in the healing phase. Also note that no CEJs are present on any of the teeth. A recent article by Rapley and Cobb, et al. demonstrated with electron microscopy that the CEJs tend to hold biofilm and that these areas can be a source of periodontal breakdown. It is the belief of the author that by removing the CEJs, we are treating a cause of future breakdown, thus changing the environment for long-term maintenance.

Figure 10: The day of the reline appointment after four weeks of healing. The provisionals will be closed to fit the teeth, leaving 1 mm of space between the provisional and the tooth surface to allow for future biologic width growth in a coronal direction. No prepping of the tooth surface is done at this appointment.
Figure 11: Impressions day, 12 weeks post-op. All margins are placed just coronal to the gingival collars. A size 7/00 SilTrax® cord (Pascal International; Bellevue, Wash.) is placed in the sulcus to allow for the lab technicians to trim the dies.

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

References

Figures 12–14: Final restorations placed. All are IPS e.max® crowns (Ivoclar Vivadent; Amherst, N.Y.) with the exception of full-coverage gold on the second molars. All margins are supragingival. Ideal health exists between the crowns and the soft tissue with no inflammation present. (Restorations courtesy of Dr. Howard Chasolen of Sarasota, Fla.)
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This case report is of a mid-20 year old male of slight build with an unknown medical history. The patient was involved in a firefight while patrolling an unstable area of a Middle Eastern country. He was struck from behind with a small caliber projectile in the right lower occipital region. The bullet entered inferior to the occipital bone, posterior to the right ear, slightly lateral to the mastoid process. The projectile transected the right lateral pharangeal space, entering the oral cavity superior to the tongue, entered the mid hard palate obliterating a section of the palate as well as the maxillary alveolus and teeth 10, 11 and 12. The bullet exited the oral cavity barely grazing the superior labus. The patient suffered a fracture of the right mandibular body, perhaps in his fall or possibly as a result of blunt force trauma following the gunshot wound.

Due to the remote location where the injury occurred, limited prosthetic care was available. The patient’s injuries were diagnosed clinically and with state-of-the-art radiographic techniques. Once medically stabilized, the patient’s oral maxillofacial deficiencies were treated with a prosthetic obturator. This treatment provided the patient with a suitable aesthetic outcome and improved his functionality.

KEY WORDS: Trauma, prosthetics, maxillofacial surgery
**CASE REPORT**

Mr. G, a thin, twenty-something year old man serving with the XXX National Police in XXX (Country location removed for security reasons), was involved in a fire fight with members of an insurgent group. In the fight, he was shot in the back if the head by a small caliber bullet. Within minutes, medics performed an emergency cricothyroidotomy in the field to facilitate respiration. The patient was evacuated by helicopter to a Combat Hospital arriving in less than an hour from the time of his injury. He was stabilized in the trauma bay and taken to radiology where a 64 slice CT scan was exposed. The resulting study revealed that the bullet entered just below right occipital bone, missing the right lateral process of the C1 by millimeter, fracturing the styloid process. Three dimensional reconstructions showed the projectile transected the lateral pharyngeal space, entered the oral cavity, and obliterated the left anterior hard palate and floor of the left maxillary sinus as well as teeth 10, 11 and 12 and the associated alveolus as it exited the oral cavity. The patient also suffered a fracture of the right mandible. This wound was treated successfully during his initial surgery and is not addressed here.

Within hours, the patient was taken to the operating room where the surgical team replaced the field tracheostomy with conventional tracheal apparatus. Pulsating hemorrhage in the pharynx made examination impossible. Once the arterial source was located, sutured and cauterized, intraoral examination was performed revealing a 4x5 cm oblong communication between the oral cavity and the left maxillary sinus. An alginate impression was made of the upper arch using twice the normal volume of impression material to fill the upper arch and left maxillary sinus. As anticipated, the resulting impression separated upon removal due to undercuts in the sinus and the fact that the impression material extruded from the nose. Arch bars were placed on teeth #s 3, 4, 5, 6, and 13, 14 and ligated into position with circumdental wires. The mandible fracture was reduced and fixed and the external soft tissue injuries closed.

In the dental clinic, the alginate impression was reassembled using cyanoacrylate glue, the excess material trimmed with a scalpel. It was then poured with dental stone in the usual manner. After setting, the resulting cast was separated and trimmed, leaving a hole in the base for access to the planned obturator. The entire treatment team evaluated the resulting cast to permit surgeons to determine how to revise the wounds and dentists to determine a method to fabricate a prosthesis. The model was modified to match the anticipated outcome of the surgery and a duplicate made reflecting those changes.

While the patient convalesced in the ICU, the dentist mixed denture repair acrylic creating a 3 x 4cm ball which was inserted into the sinus void of the duplicate model. After initial curing, the mass was removed and allowed to bench cure. This portion was adjusted to permit insertion on and removal from the cast. Denture teeth were chosen from a very limited selection and affixed to the cast with self-cure acrylic “dots.” Using a “salt and pepper technique,” the palatal portion of the obturator/partial denture was fabricated, extending the borders into the interproximal embrasures. After curing was complete, the device was removed from the cast by finger pressure from the underside of the model where a hole had been made for that purpose. The device was then seated on the original model where the labial extension was added. Upon comple-
tion, four small holes were made along the sides of the sinus extension of the acrylic and dental amalgam was condensed so the appliance could be visualized during radiologic examination.

Several days later the patient was returned to the operating room and anesthetized via the tracheostomy. The wounds were surgically modified, eliminating some boney undercuts as planned on the cast. The obturator was inserted into the oral/nasomaxillary defect with excellent approximation. Because the right and left portions of the remaining hard palate were quite mobile, the obturator appliance was wired into position with 25 gage stainless steel circum-dental wires utilizing holes drilled through the prosthesis in the OR with a fissure burr. Wired to teeth #’s 7, 8 and 13, the prosthesis served as a surgical stent to permit healing. Solid occlusion was verified on the right side.
Disclosure
The information contained in this article is the opinion of the author and does not reflect the views of the United States Army, United States Department of Defense, nor the United States Government.

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