Treatment of the Atrophic Maxilla: A Case Study Utilizing the NIRISAB Approach

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ABSTRACT

- The purpose of this case study is to demonstrate several techniques used to reconstruct the alveolar bone in an atrophic maxilla, allowing the placement of implant restorations which will provide the patient with suitable oral function, health and esthetics. Using principles of Dr. Hilt Tatum's NIRISAB (Natural Implant Restorations In Stable Alveolar Bone) philosophy, the patient was first treated with simultaneous bilateral sinus augmentations and block grafting of the premaxilla, utilizing remote incision design. The first stage of the surgery was allowed to heal for eight months before implant placement was completed.

BACKGROUND

- Dr. Hilt Tatum first described the sinus augmentation procedure through lateral window approach in 1975. This procedure has allowed prosthetic reconstruction utilizing Dr. Tatum's NIRISAB philosophy in the posterior maxilla. NIRISAB stresses the importance of long-term success for implants in function, while following strict criteria for bone and soft tissue management.

- Dr. Tatum currently performs surgeries like these with students in the AAID MaxiCourse® program in San Juan, Puerto Rico.

- The patient’s desire is to have a removable prosthesis supported by implants and tissue. The patient had sufficient mandibular bone width and height to place four, 23mm Tatum “One-Piece” implants in the anterior region. The maxillary arch was deficient in both width and height in both the posterior and premaxilla. Bilateral sinus augmentation via lateral window was treatment planned to correct the need for bone height in the posterior maxilla. An onlay bone graft was proposed to gain both height and width in the anterior maxilla.

- Following integration and healing of the planned grafts, six maxillary implants were placed using bone manipulation techniques. Five Tatum “D” implants, one Tatum “Integrity” implant, and one Tatum “One-Piece” piece implant were placed with bilateral pedicle flaps to overcome soft tissue deficiencies.

- Patient is ASA II, with mild systemic disease. Patient has been completely edentulous for the past 12 years. None of his current medications have a significant effect upon the surgery or upon post-op sequela. Patient is taking Levothyroxine (50mcg/day for hypothyroidism), Terazosin (2mg/day for BPH), Simvastatin (20mg/day for hypercholesterolemia).

- Pre-op medications: Patient received a pre-op dose of Amoxicillin of 1g P.O. 1 hour before the procedure and 12mg of dexamethasone I.V. at the beginning of the procedure. Anesthesia achieved with 2% Lidocaine with 1:100,000 epinephrine in V2, ASA, MSA, PSA blocks in conjunction with local infiltration.

- Intravenous sedation was induced with 2mg midazolam and maintained with intermittent “bump” doses of 1mg midazolam as necessary along with intramuscular injection of 50mg demerol and 25mg promethazine.

- 1g Amoxicillin powder from capsules was added to the irradiated cancellous bone allograft used in the sinus augmentation and the patient was maintained on Amoxicillin 500mg TID for 7 days.

- The palatal tissue was advanced to cover the allograft blocks. This tissue advancement created a broad band of keratinized gingiva for future implants. Also, it is important to note, in both sinus augmentations and block grafts, the incisions were made remote and not over the grafted areas.

METHODS

- Sinus augmentation:
  - Tatum sinus grafting instrument kit was used for sinus lining elevation. The convex portion of the instrument was extended slightly over the inner edge of the bone, pulling outward to break off remaining spicules around the border of the window (see fig. 1). The window was gently pushed medially, elevating the lining from the alveolus. Elevation was carried distally, then on the lateral wall, across the floor and to the medial wall. Superior and inferior walls of the window were elevated next. Due to the anterior portion of a maxillary sinus being the most narrow portion, all tension must be relieved before elevating anterior. Great care is taken to keep the convex portion of instrument touching bone and parallel to the lining during elevation.

- Premaxilla Augmentation
  - Flap reflection from the posterior palate allowed access to the deficient premaxilla, while keeping anterior blood supply to flap (see fig. 4). A 15 blade was used to decorticate facial bone. Two 10x10x20mm irradiated allogenic bone blocks were molded and sharp edges removed before fixation to premaxilla (see fig. 5). Irradiated allogenic cancellous bone was used to mortise around the block. A resorbable collagen membrane was used to cover the graft material with L-PRF membranes placed just prior to flap closure.

- Implant placement
  - Two Tatum “Integrity” implants were planned in the premaxilla at the lateral incisor area. After placement of the second anterior implant, pedicle flaps were designed to correct soft tissue deficiencies during posterior implant placement. The pedicle flaps, a combination of split and full thickness, allow for stable keratinized tissue surrounding each implant – a staple of the NIRISAB philosophy. During flap elevation, it was discovered that the second “Integrity” implant had perforated out of the buccal wall (see photo). The implant was consequently removed, osteotomy redirected, and a Tatum “D” implant placed instead.

  - In the posterior maxilla, four Tatum “D” implants were placed using Dr. Tatum’s bone expansion technique. During the placement of the left side implants, a significant bone deficiency was noted. This is most probably due to the lateral window failing to fill with bone from the previous sinus augmentation. The deficiency was filled with cortical bone from Rocky Mountain Tissue Bank and a collagen membrane placed on top.

  - A Tatum “One-piece” ball implant was placed in the mid-palate to aid in denture retention and to prevent pressure while the other implants integrate.

Preoperative panoramic radiograph illustrating the pneumatized sinus and atrophic premaxilla.

Pre-operative occlusal view of atrophic maxilla.

Right lateral window with remote incision away from grafted sight.

Premaxilla exposed with split thickness flap to the height of alveolar ridge. The flap transitions to full thickness as it is carried superior.

Allogenic cortical-cancellous vertebral blocks were fixed in place with the Tatum fixation screw set. Delrin washers placed for ease of screw removal.
RESULTS

• Patient was seen for post-operative care at 2 weeks, 3 weeks, and 2 months following the first procedure. At the two week follow-up appointment, tissue was noted to have sloughing of the superficial layer of palate and anterior maxilla, initiation of secondary intention healing was also noted in the posterior palate. The patient reported a sinus pressure headache at the first follow-up appointment and a course of pseudoephedrine was initiated. Following the second post-op appointment, an antibiotic regimen was initiated again, consisting of Amoxicillin 500mg TID for 10 days and Metronidazole 500mg QID for 10 days. Coe-Soft™ liner was replaced at second follow-up appointment to give relief at area of secondary intention healing. Patient reported by phone no further pain, nor ulcerative sensations at the posterior palate following second post-op visit.

• All flanges of existing denture were removed the day of surgery and denture was retained with adhesive. At the 2 month follow up appointment, new flanges were added to the denture posteriorly.

• Following implant placement, the patient’s denture is relieved around all implants and a Coe-Soft™ liner placed. Every attempt is made to relieve pressure on all implants and prevent micro-movement during the osseointegration phase. The following day the patient returned for a quick-cure acrylic pick up of the ball implant located in the mid-palatal position.
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COMPLICATIONS

• After the two Tatum "Integrity" implants were placed at the lateral incisor area, it was discovered that the second "Integrity" implant had perforated out of the buccal wall (see photo). The implant was consequently removed, osteotomy redirected, and a Tatum "D" implant placed. The versatility of the Tatum "Unipost" system will allow for a 60 degree abutment to correct for the extreme angulation of the implant.

• In the posterior maxilla, four Tatum "D" implants were placed using Dr. Tatum's bone expansion technique. During the pre-op evaluation of the CBCT, a bony defect in the right posterior maxilla was discovered. This is most likely the result of incomplete bony healing from the previous lateral window sinus augmentation performed eight months prior. The deficiency was filled with cortical particulate allograft bone from Rocky Mountain Tissue Bank and a collagen membrane placed over before closure.

CONCLUSIONS

• Dr. Hilt Tatum's instruction and NIRISAB philosophy (Natural Implant Restorations in Stable Alveolar Bone) laid the foundation for long-term implant restorative success and were fundamental in this case. As the primary surgeon, with the support of Dr. Jose Pedroza, he guided his students through the initial bone augmentation surgery. Through this and many other teaching cases, Dr. Tatum and Dr. Pedroza gave their students the comprehensive knowledge of implantology required to successfully complete the second surgical phase of this patient’s treatment. This case has been a rewarding learning experience for the AAIID Puerto Rico Maxicourse® students and will result in restorations that aspire to the NIRISAB principles and restore the patient’s health, function and esthetics. The case will be restored after one sigma of healing in Nacogdoches, TX by Dr. Steven Puffer.