6 Treating Soft Tissue Dehiscence Around Zygomatic Implants

Appendix

JUAN F. GONZALEZ
SHOUVIK PONNUSAMY
ROSENVALDO MOREIRA JÚNIOR
CARLOS APARICIO

The foundation of the ZAGA philosophy is individualizing treatment to make it predictable, and the ability to anticipate and prevent complications is crucial. In other words, the goal is not to treat complications, some of which can be very difficult to manage, but to prevent them from ever occurring. Patients for whom zygomatic implant therapy is indicated, however, present with the most anatomically complex situations in dentistry. Often, previous treatments undergone by these patients have failed, leaving sequelae in the form of anatomical irregularities, severe atrophy and bony defects, and oroantral communication(s). Therefore, despite all efforts to prevent them, it is relatively common for complications to arise. This appendix describes several clinical cases and the workflows of some of the few known methods for treating peri–zygomatic implant soft tissue dehiscence and oroantral communication.

The following cases suggest that a key factor to success when treating zygomatic implant complications is closing the transepithelial connection by disconnecting the transepithelial abutment. The second key factor is tension-free wound closure using, if possible, multiple layers of connective and fatty tissue and epithelium. Clinicians should understand, however, the limitations of the solutions presented in this appendix. These protocols are technique sensitive, and their application in clinical practice is still limited.

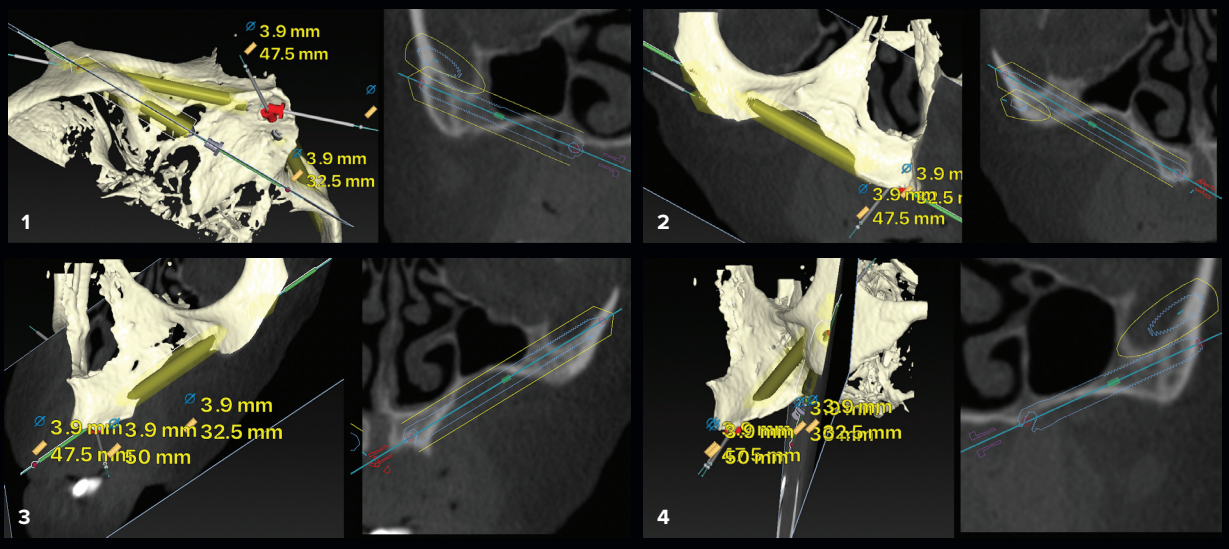
Case 1: Basic Management of Postsurgical Gingival Necrosis and Subsequent Dehiscence

CARLOS APARICIO

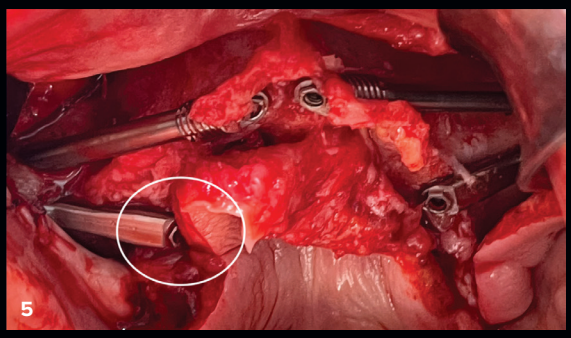
Case 1 illustrates that the ideal first treatment option for a gingival problem should be the simplest. It is a matter of allowing nature to act by eliminating possible negative stimuli. This is the case of a 65-year-old woman with no known allergies or relevant medical history. She presented with severe maxillary atrophy and extensive posterior expansion of the nasal cavity down to the molar areas (Case 1-1 to 1-4). Her palate was extremely flat and narrow, which made it very difficult to position the handpiece to achieve the proper angle for performing the osteotomy.

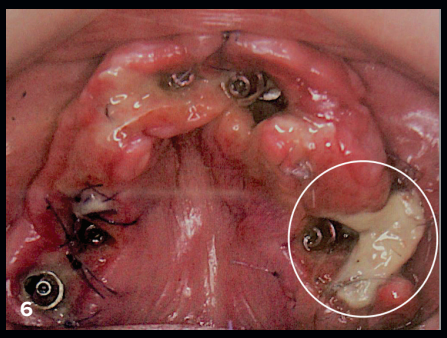
To tilt the drill sufficiently, detachment of the palatal mucosa had to be performed more aggressively than usual. Again, note the uniqueness of the right posterior anatomy (see Case 1-1). Under these difficult circumstances, four zygomatic implants and one pterygoid implant on the left side were placed (Case 1-5). Straumann ZAGA Round implants were used in the anterior sites, and Straumann ZAGA Flat implants in the posterior sites. All five implants were placed with insertion torques > 55 Ncm.

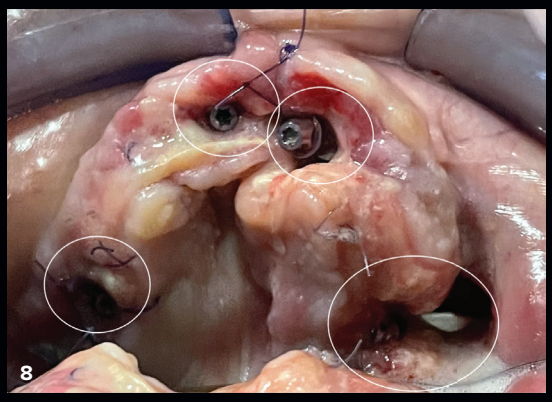
A few days after the immediate prosthesis was placed, necrosis was observed around the right posterior zygomatic implant, and there were large gaps between the abutments and the surrounding gingiva (Case 1-6 to 1-9). Following removal of the necrotic tissue, all the definitive abutments were replaced with healing abutments (Case 1-10). The healing abutment of the problematic implant was removed 6 weeks later, and the implant was left buried for an additional 2 months (Case 1-11). Finally, gingival closure was achieved without further action (Case 1-12). The CBCT images at the annual follow-ups continued to show healthy sinus conditions (Case 1-13 to 1-17).

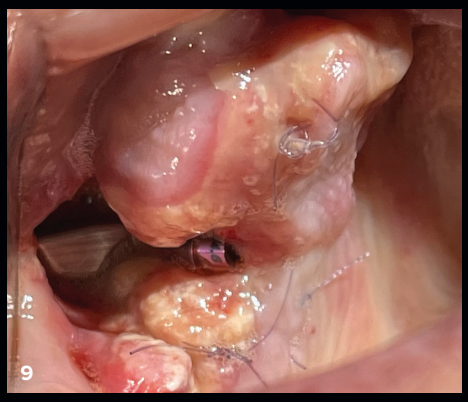


CASE 1 *(1)* CBCT slice showing the unique anatomy of the maxillary right first molar/second premolar area. Note the hyperpneumatization of the nasal cavity and the concavity in the buccal area, which make it difficult to place the implant with the proper angulation. *(2)* Planning for a 47.5-mm-long Straumann ZAGA Round anterior implant in the right lateral incisor area. *(3)* Planning for a 50-mm-long ZAGA Round anterior implant in the left lateral incisal area. *(4)* Planning for a posterior implant in the left premolar/molar area. Due to the special anatomy and the extension of the nasal cavity to the posterior sinuses, a 32.5-mm-long Straumann ZAGA Flat implant was chosen. >>

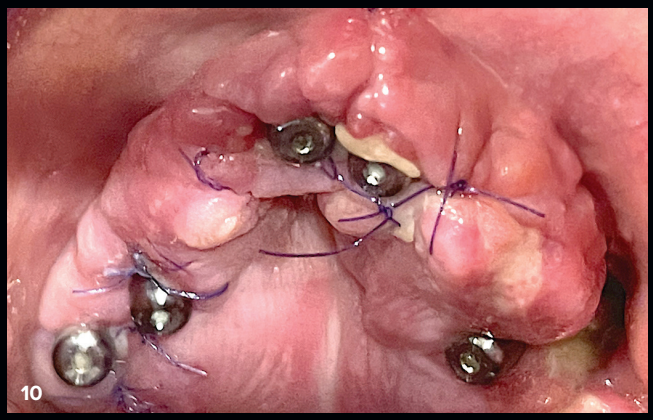


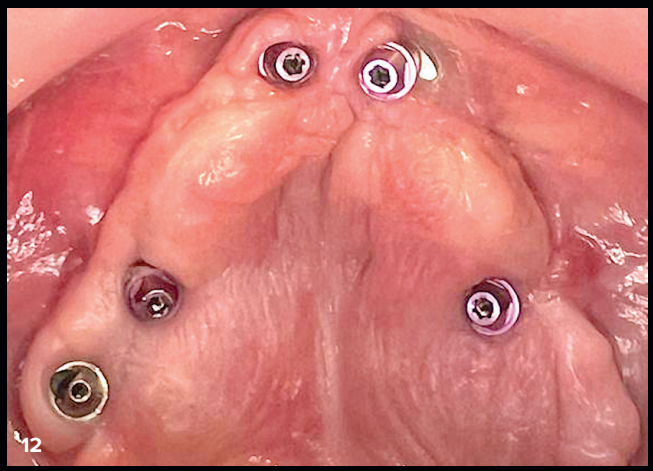






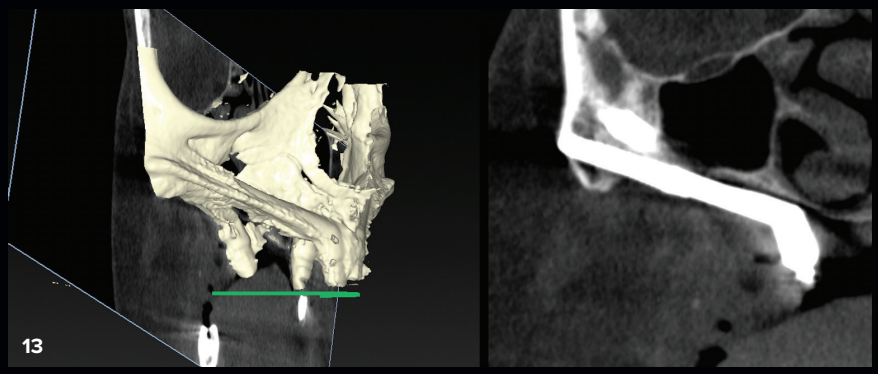
(5) Placement of the four zygomatic implants. ZAGA Round implants were placed in the anterior and ZAGA Flat implants in the posterior. Note the extensive detachment of the palatal mucosa performed to provide drill access to the osseous tissue with the appropriate angulation. The *white circle* shows the site of the future complication. *(6)* Necrosed area around the posterior right implant *(white circle)*. *(7)* The necrosed fragment separated from the mucosa. *(8)* Approximately 2 weeks after surgery, extensive swelling and a lack of union between the mucosa and the definitive abutments *(white circles)* could be observed. The necrotic fragment was removed and the area washed with oxygen peroxide and saline. *(9)* The remaining defect after excision of the necrotic fragment. >>

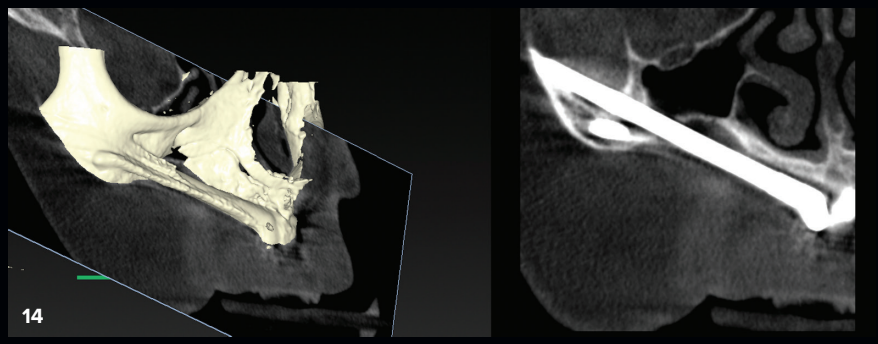


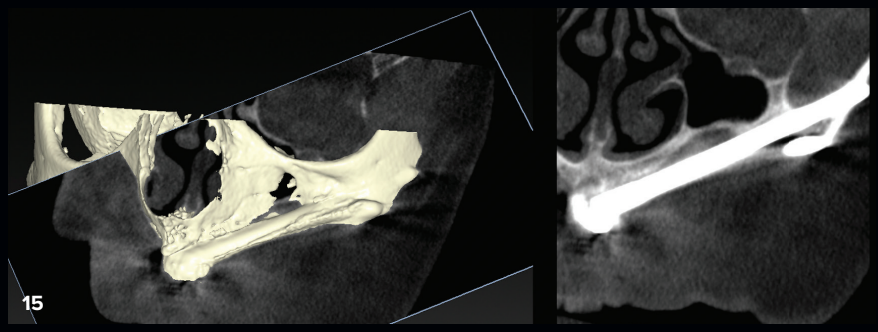


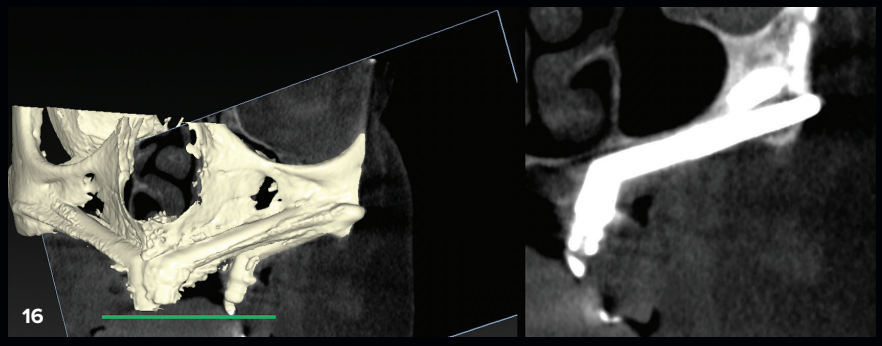
CASE 1 cont. *(10)* After de-epithelialization of the mucosal edges around the abutments placed in the first surgery, the abutments are replaced with healing abutments, and the immediate prosthesis is removed. *(11)* To accelerate the healing process, the healing abutment is removed from the problem implant and replaced with a cover cap, and the implant is left buried. *(12)* Occlusal view of the mucosa at the 1-year follow-up. >>

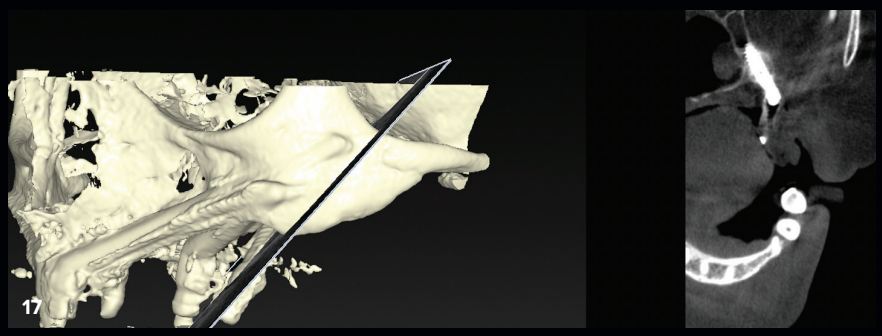
(13) Condition of the maxillary sinus and hard tissues 1 year after surgery. Note the extent of the nasal cavity. *(14)* Condition of the maxillary sinus and hard tissues in the area of the right canine 1 year after surgery. *(15)* Condition of the maxillary sinus and hard tissues in the area of the left canine 1 year after surgery. *(16)* Condition of the maxillary sinus and hard tissues in the area of the left second premolar/first molar 1 year after surgery. Note the extent of the nasal cavity on the left side. *(17)* Implant placement in the maxillary pterygoid region.











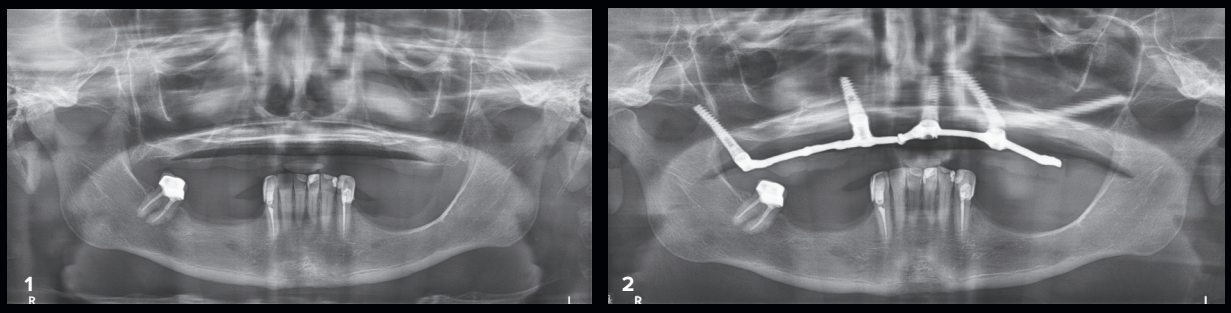
Case 2: Management of Soft Tissue Dehiscence With a Partial-Thickness Epithelial Rotational Flap

ROSENVALDO MOREIRA JÚNIOR

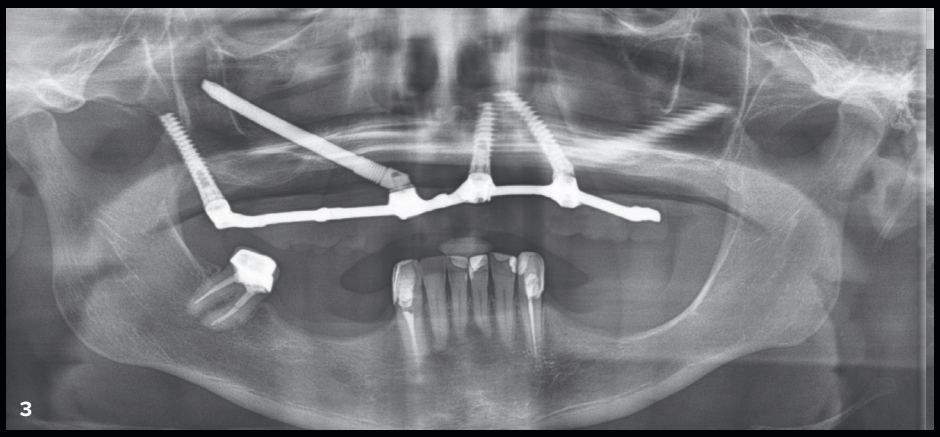
Case 2 illustrates the treatment of dehiscence of the mucosa covering a zygomatic implant. The patient in this case received four standard implants in the maxilla and an immediate prosthesis. Two of the implants were placed in the areas of the lateral incisors, and the other two implants were mesially tilted in the positions of the premolars. The implant in the location of the right second premolar did not achieve primary stability, so it was replaced with an implant in the pterygoid area, and impressions for immediate loading were taken (Case 2-1 and 2-2).

Approximately 4 months later, the patient reported pain in the right anterior area when eating. After the prosthesis was disconnected, it was found that the implant in the right anterior position had also not achieved secondary stability. Consequently, it was replaced with a zygomatic implant (Case 2-3). At the follow-up appointment for relining of the prosthesis 2 months later, the stability of the four implants was confirmed. However, dehiscence of the mucosa covering the zygomatic implant was observed (Case 2-4 to 2-6). Although the implant was stable with no signs of rotation or pain, the patient was very dissatisfied with the exposure of the implant and did not accept the esthetic result. Therefore, it was decided to perform an intervention to cover the dehiscence.

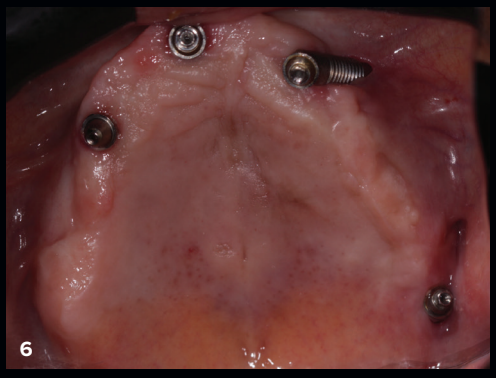
After de-epithelializing the edges of the mucosa in contact with the implant, the implant was exposed. The adjacent areas were protected with moistened gauze, and the accessible threads of the implant were smoothed and polished. The area was cleaned of titanium shavings and disinfected with hydrofluoric acid for about 10 minutes. Then it was washed abundantly with saline. A partial-thickness flap in the palatal area and a full-thickness flap in the vestibular area were performed to access Bichat's fat pad. Once mobilized, the position of the buccal fat pad was stabilized with resorbable sutures proceeding through two perforations created in the residual alveolar ridge. Finally, the gingival rotational graft was mobilized to cover the implant and the fat tissue (Case 2-7 and 2-8). The postoperative period was uneventful, and the soft tissue status of the area remained good 2 years after correction (Case 2-9 and 2-10).

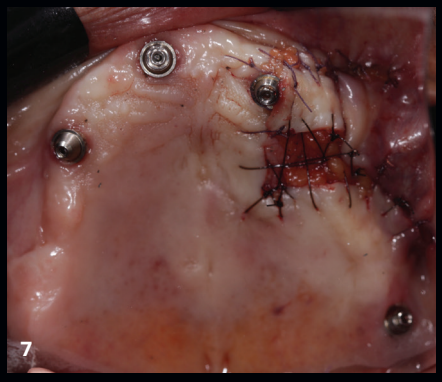


CASE 2 *(1)* Preoperative panoramic radiograph. *(2)* Radiograph after replacement of the implant in the position of the maxillary right second premolar with an implant in the pterygoid area. >>

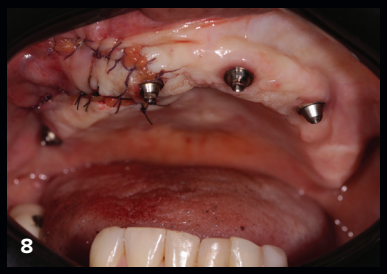


(3) Radiograph after replacement of the implant in the site of the maxillary right lateral incisor with a zygomatic implant. >>





(4) Frontal view of the patient at the follow-up 2 months after zygomatic implant placement. *(5)* Frontal view after unscrewing the prosthesis. Note the dehiscence around the zygomatic implant with the rough surface and threaded neck. *(6)* Occlusal view after unscrewing the prosthesis. The dehiscence shows the rough surface and the threaded neck of the zygomatic implant. Note the lack of keratinized tissue. *(7)* Occlusal view of the rotational graft sutured onto the buccal fat pad overlying the implant. >>



(8) Attempt to cover the implant with multiple layers of tissue. *(9)* Appearance of the mucosa after healing. *(10)* The dehiscence has been resolved. The prognosis is good, as a band of keratinized tissue has been achieved around the neck of the implant.

Staged Closure of Oroantral Communications and Soft Tissue Recession Defects: The SCOARD Technique

SHOUVIK PONNUSAMY
JUAN F. GONZALEZ

Complications involving oroantral fistulae and soft tissue recession defects are often observed simultaneously. A consistent, reproducible, and efficacious technique is needed to successfully address these problems without removing the implant. Here, we propose the staged closure of oroantral tissue recession defects (SCOARD) technique. The protocol described in this appendix is the authors' preferred treatment of choice for both oroantral fistulae and peri-zygomatic recession defects. However, some of the steps detailed are specific to oroantral fistulae and can be omitted when treating an isolated dehiscence defect. The authors have now performed this technique with a 100% success rate on six separate patients who all had oroantral fistulae and recession combination defects. Success was defined as the absence of recurring fistulae or recession, and the longest follow-up time was 1 year. Although this technique may prove to demonstrate short-term consistent and successful outcomes, additional research with larger sample sizes and longer-term follow-ups are, of course, required.

SCOARD technique protocol

When an oroantral communication is identified, it is imperative to first optimize the health of the maxillary sinus before closing the fistula. A variety of protocols exist for treating acute sinusitis, including oral antibiotics in combination with culture and sensitivity testing if purulent discharge is observed.[1] If the sinus is completely opacified, patient referral to an otolaryngologist for functional endoscopic sinus surgery may be indicated. If the mucociliary escalator is not functioning correctly, the success of oroantral communication closure techniques will be limited.[2]

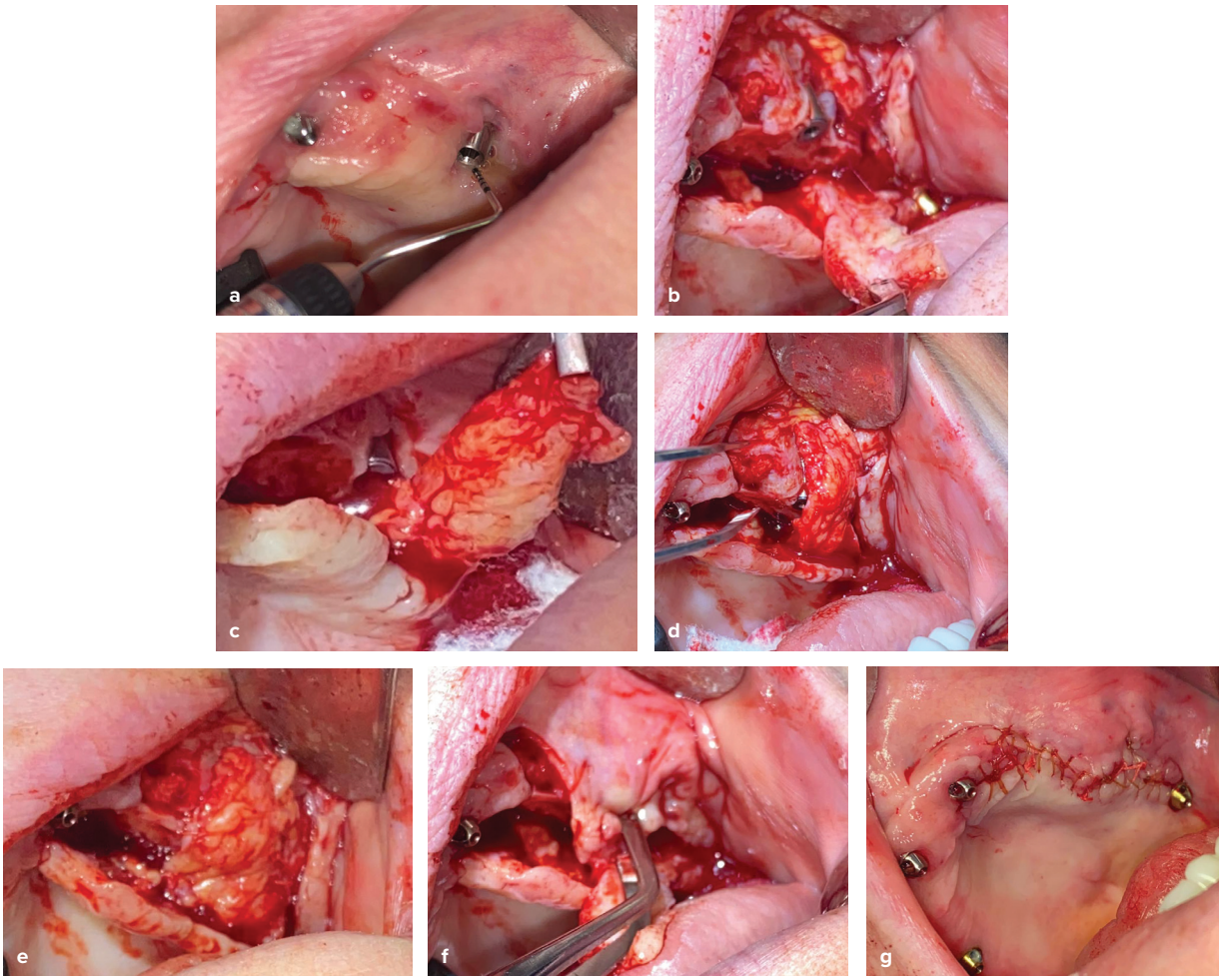
Once the maxillary sinus health of the patient has been optimized, the procedure may be performed with local anesthesia, intravenous (IV) sedation, or general anesthesia. First, the fixed prosthesis is removed with the multiunit abutment of the associated zygomatic implant (App Fig 6-1a). Then, a flush, 0-mm cover screw is placed. A palatally based "big dipper"–style incision extending from the maxillary tuberosity to the anterior maxilla is made, along with anterior and posterior releasing incisions. If the buccal fat pad has already been harvested in a previous surgery, the posterior releasing incision may be omitted, although this release may assist the surgeon in obtaining tension-free primary closure. Modifications to the incision may be indicated. In the case of a peri-zygomatic implant oroantral fistula, the mucosal fistula may be excised and the surrounding sinus mucosa invaginated into the maxillary sinus cavity itself, if possible.

A full-thickness flap is then elevated to expose any lateralized aspects of the zygomatic implant body, and an anteriorly or posteriorly based pedicled subepithelial connective tissue graft is harvested (App Fig 6-1b). This graft is draped over both the zygomatic implant platform and the body of the implant if a lateralized approach was used during implant placement (App Fig 6-1c and 6-1d). Suspension periosteal sutures or intraosseous sutures are then used to secure the connective tissue graft in place. If native buccal fat is still present, it may be harvested, advanced, and sutured over the subepithelial connective tissue graft and implant platform and body to serve as a second layer. Then, periosteal releasing incisions and flap advancement is performed to obtain tension-free primary closure (App Fig 6-1e to 6-1g). The goal is to create a multilayered closure to create a thick fibrous band between the sinus and the oral epithelia.

At this point, if an implant protocol incorporating appropriate backup plans (such as the PATZI protocol[3]) was used, then the prosthesis may be loaded on the remaining implants. However, if the full-arch implant configuration consists of only four implants in total, a provisional removable denture must be used during the healing period. Postoperative antibiotics and instructions about sinus precautions are provided to the patient.

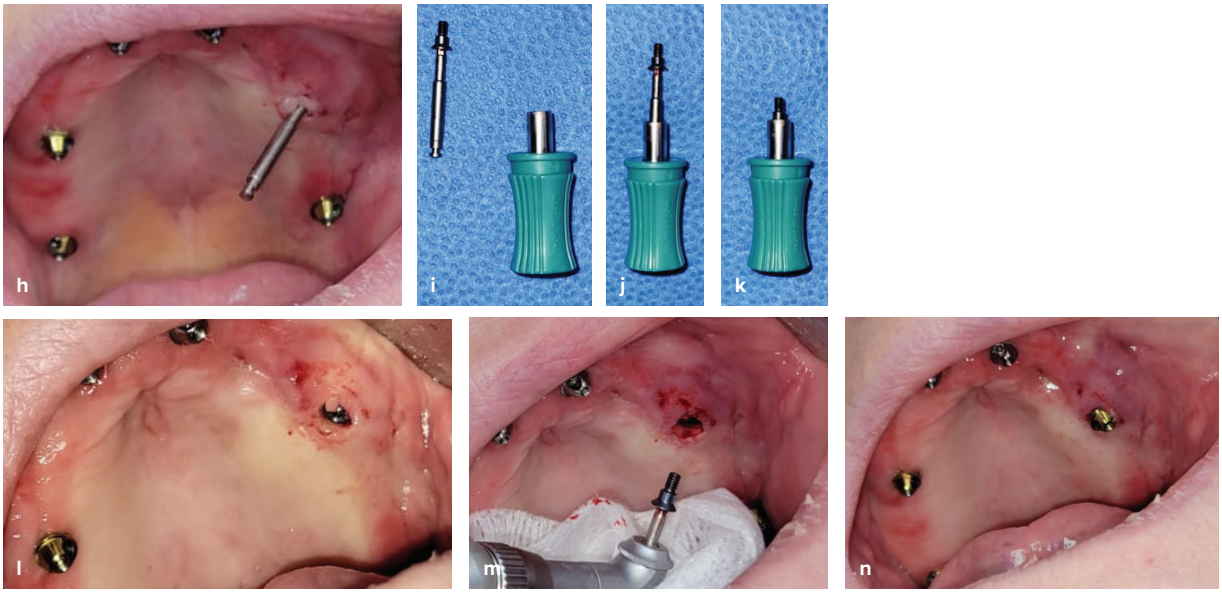
After 6 to 8 weeks of complete soft tissue healing, the prosthesis is removed and the surgical site is examined. When treating an oroantral fistula, a gentle Valsalva maneuver may be performed to confirm complete closure of the fistula. When treating a recession defect alone, complete coverage of the zygomatic implant body with soft tissue should be confirmed.

At this time, the minimally invasive uncovering procedure is initiated. This step may be performed under local anesthesia. After administration of local anesthesia, a periodontal probe is used to locate the zygomatic implant platform. A very conservative stab incision is made with a no. 15C blade, with the narrowest point of



APP FIG 6-1 *(a)* Mucosal recession around a smooth-surfaced zygomatic implant is visible with the fixed prosthesis removed. The periodontal probe demonstrates the total absence of soft tissue sealing or alveolar bone between the buccal and sinus mucosa. Buccal soft tissue with a thin phenotype covers the zygomatic implant. *(b)* After a "big dipper"–style incision is made and a full-thickness flap has been elevated, a posteriorly based subepithelial connective tissue graft is harvested. In this case, the performance of a posterior vertical releasing incision was omitted because the buccal fat was harvested at the time of implant placement and the soft tissue cuff around the existing pterygoid implant was intended to be left undisturbed. *(c)* The surgeon checks that the amount of tissue is sufficient to cover the recession. *(d)* Harvested pedicled subepithelial connective tissue graft providing complete coverage of the implant platform and exposed implant body. *(e)* The connective tissue graft sutured to the periosteum. *(f)* Periosteal releasing incisions and blunt dissection performed to allow for flap advancement. *(g)* Tension-free primary closure with complete coverage of the zygomatic implant platform and body. Note that the implant has been buried and covered with a sealing cap. >>

the blade incising down to the cover screw. Then, using the head of the implant system's prosthetic driver, the cover screw is engaged (App Fig 6-1h). A 3-mm tissue punch is then carefully positioned over the driver shaft to precisely and circumferentially incise the fibrous reconstructed soft tissue overlying the zygomatic implant cover screw (App Fig 6-1i to 6-1k). This technique is inspired by the same principles that apply to the Seldinger technique in medicine, which is commonly used for angiography, percutaneous gastrostomy, and central venous access and allows for conservative access of deep structures.[4] At this point, the punched tissue is carefully lifted off the cover screw and discarded, the cover screw is removed, and an appropriate multiunit abutment is placed (App Fig 6-1l to 6-1n). The circumferential thick fibrous connective tissue that acts as the

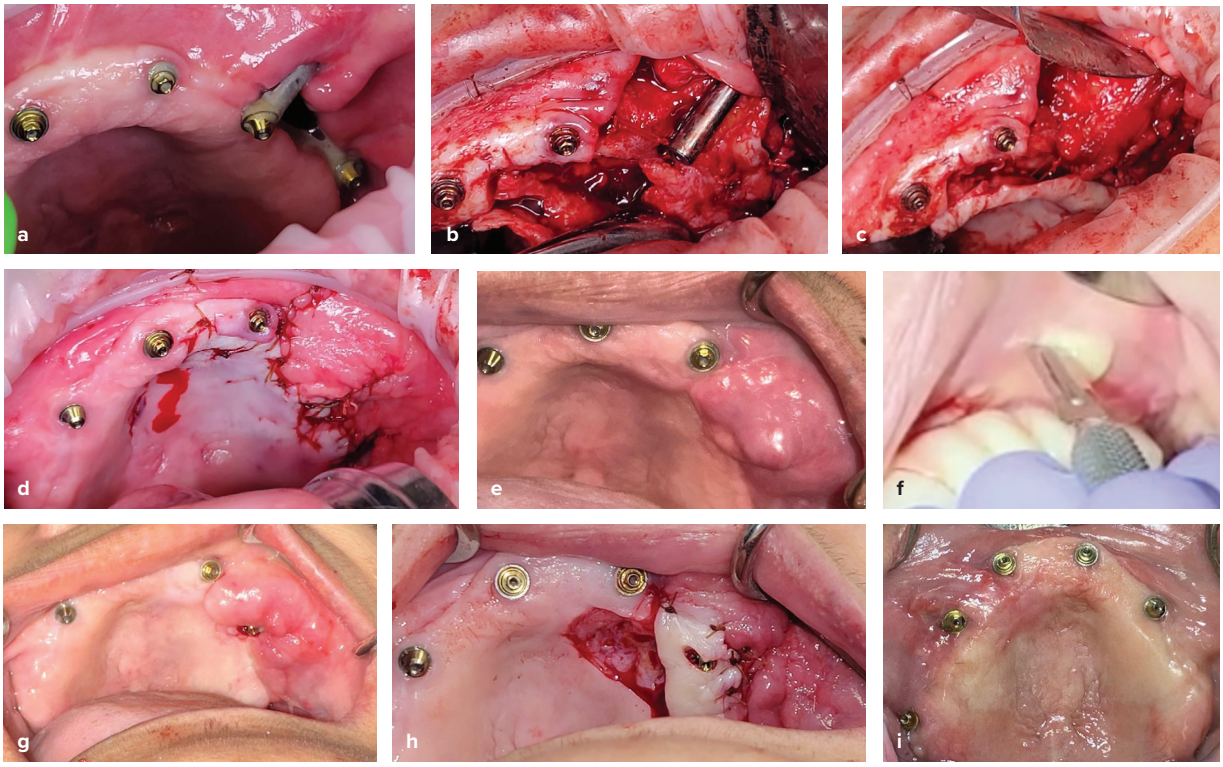


APP FIG 6-1 (cont) *(h)* Approximately 8 weeks later, the tissues have healed, and it is time to connect the implant through a minimally invasive opening. After performing the initial probing and a conservative stab incision, the screwdriver is engaged with the cover screw. *(i)* Prosthetic implant driver for engaging the cover screw. Note that the diameter of the tissue punch is wider than the shaft of the implant driver. A round scalpel is used to remove the mucosa covering the implant in the shape of a circle about 3 mm in diameter. *(j)* The tissue punch is then telescoped over the shaft of the implant driver, allowing it to follow the path of the implant driver. *(k)* Complete telescoping over the implant driver, allowing for a precise and conservative circumferential incision around the implant platform. *(l)* After conservative tissue removal, the cover screw is removed. Note the robust, thick fibrous soft tissue surrounding the implant platform. *(m)* The cover screw has been unscrewed. *(n)* It is time to screw in a new transepithelial abutment.

barrier to the maxillary sinus is undisturbed, which is imperative to long-term success. At this point, if the depth of the vestibule is adequate and there appears to be adequate keratinized gingiva, the treatment is complete, and the patient is monitored closely for the next 3 to 6 months.

Often, however, a contributing factor to oroantral fistulae and soft tissue recession defects is a thin soft tissue phenotype. Clinicians must use their judgment and diagnostic skills to determine the risk factors moving forward. Despite the increase in fibrous connective tissue thickness, there may still be a significant lack of keratinized gingiva, the absence of vestibular space, or an overly bulky soft tissue profile that inhibits passive seating of the prosthesis and satisfactory access for maintaining hygiene.

In cases where it may be appropriate to increase the amount of connective tissue surrounding the implant, an optional third stage of the protocol is performed. This final step may be performed at the time of uncovering or at a delayed time. A split-thickness flap is made palatal to the zygomatic implant platform, elevated superiorly, and secured apically to the underlying periosteum. Conservative debulking of the underlying fibrous connective tissue is then performed with sharp dissection as needed. This debulking must be performed with extreme caution to avoid coming within 2 mm of the underlying sinus mucosa surrounding the implant platform. Next, a full-thickness pedicled palatal finger flap is rotated laterally and secured to the underlying periosteum (App Fig 6-2). A tissue punch may be used through the palatal flap to create an accessible channel for the prosthetic multiunit (MUA) abutment. This third stage creates a robust and resilient soft tissue bed around the zygomatic implant platform and further prepares the soft tissue profile for an acceptable prosthesis with good access for hygiene.



APP FIG 6-2 *(a)* Extensive dehiscence and oroantral communication around a zygomatic implant. *(b and c)* The implant is exposed, and a partial-thickness flap is prepared to create a pedicled connective tissue graft. *(d)* The tightness in the buccal periosteum is relieved to allow tension-free closure. *(e)* In this case, an antral infection was suffered. However, the closure was successful as there was no discharge through it. *(f)* Drainage of the abscess. *(g)* A few weeks later, the implant is connected via the conservative technique described previously. However, after healing, a significant bulk of soft tissue with a lack of keratinized tissue was observed. *(h)* In this case, it was decided to reinforce the stability of the soft tissue by increasing the amount of connective tissue around the implant head. After apical positioning of a split-thickness flap and conservative fibrous tissue debulking, a full-thickness palatal rotational flap was advanced over the zygomatic implant platform. *(i)* Appearance of the mucosa 6 weeks after surgery.

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