Maxillary sinus elevation by the lateral window approach has been shown to be a highly predictable surgical procedure for increasing bone volume in the posterior maxilla. There are occasions, however, where this procedure may be difficult or impossible to perform in a highly predictable manner. There are many presurgical conditions and anatomical features that can make lateral window access difficult, leading to an increase in intraoperative complications and procedural failures. These complicating factors include complex internal sinus anatomy (multiple septa, anteroposterior septa), a narrow available window space, a thin or absent labial plate on adjacent teeth, and the presence of a root apex in the proposed window area, or it may be due to iatrogenically created defects, such as a previous failed sinus elevation, a healed oroantral fistula, or defects created by difficult extractions. While not frequently used or routinely reported in the literature, the palatal window approach may negate many of these obstacles. When it is reported, success rates are similar to those of lateral window procedures, and as an added advantage, postoperative morbidity is dramatically reduced, allowing the patient to wear a removable appliance immediately after surgery. There are, however, anatomical limitations that dictate when this procedure can be used. This case report is unique in that many of the lateral window complicating factors are present, and the palatal anatomy proved ideal for performing the technique.

The lateral wall approach is considered by many to be the most predictable technique for sinus entry when the crestal bone height is 3 to 4 mm or less or when multiple implants are to be placed in a sinus with limited crestal bone height.

The lateral wall approach offers the operator the best access and vision with which to assess and elevate the sinus membrane with the fewest complications. Vision is as close to direct as is possible given the local anatomy and the patient’s facial musculature. Anatomically, the position of the internal branch of the posterior superior artery presents the major possible complicating factor to this approach. The incidence of excessive bleeding following injury to this artery is historically quite low, about 2%. The incidence of this complication has almost disappeared with the use of nonrotary surgical techniques such as piezoelectric surgery.

There are, however, situations where the lateral window approach may become extremely restrictive or almost impossible. Possible complicating factors can include a complex internal sinus anatomy (multiple septa, a septum running in an anteroposterior direction), iatrogenically created defects, or changes in the lateral wall area (previous failed sinus elevation, a healed oroantral fistula, a defect in the lateral wall created by a difficult extraction). It is likely that utilizing the lateral wall approach in these circumstances may lead to a difficult surgical intervention with an increase in complications or the need to abort the procedure. In cases with these anatomical limitations, it may be possible to avoid potential complications by assessing the sinus via a palatal approach.

There are a number of situations in which a lateral window may not be an appropriate choice for entry to the maxillary sinus. Consider the case of a previous lateral window that failed to elevate the sinus membrane fully across the sinus floor and up the medial wall. The resulting situation would be a very thick lateral wall with insufficient medial height and width to place an implant. A palatal approach would eliminate the need to obliterate, via osteoplasty, the previous graft and newly formed bone. A palatal window approach would also provide direct access to the medial nongrafted area. An alternative solution would involve placing the implants in the available bone and to correct the inclination with an angulated abutment. Another clinical situation in which a palatal approach might be indicated is that of a high and long anteroposterior septum. It is possible that a graft might only be needed in the medial sinus compartment where the implant would be placed. Utilization of a lateral approach would necessitate making a “window within a window” to reach this medial compartment, a most difficult surgical intervention.

Bilateral clinical studies have shown results similar to those of the lateral approach with regard to implant survival and perforation rates (19%). There was less postoperative inflammation and less discomfort in the palatal window group than was observed in the vestibular window group. The reduced inflammation allowed for the immediate postoperative insertion of existing partial dentures.

When considering a palatal approach, the computed tomography (CT) scan must show sufficient vertical access to the sinus between the residual crestal bone and the palatal vault. This would generally be a case with extensive pneumatization and a fairly high palatal vault. A CT study has shown that the palatal approach is generally feasible in 93.6% of sinuses with crestal bone heights up to 4 mm, while sinuses with crestal heights ≥ 5 mm or thick palatal walls limit this approach.

Case Report

Diagnosis

The following case is one that required a palatal approach. It qualifies anatomically, as there is a crestal bone height < 2 mm and there is an 8-mm area on the palatal wall of the alveolus in which to make a window (Fig 1). The greater palatine artery is located in a channel on the palate and not in the area of flap reflection. The left posterior sextant is completely edentulous, simplifying the flap design. Attached keratinized mucosa was present in the crestal area, simplifying flap reflection. The patient wears a maxillary partial denture, which, with the palatal approach, he will be able to wear immediately after surgery.
Significant previous history is that of a failed sinus elevation procedure approximately 1 year prior. A large perforation occurred and was improperly repaired, resulting in the loss of graft material into the sinus and the inadequate formation of new bone in the anterior portion of the sinus. While there were minor postoperative symptoms (nose bleed), there were no visible symptoms of postoperative infection or sinusitis. A preoperative CT scan was available to assess the internal sinus issues that would be present upon reentry surgery, as discussed in the list of factors below.

The panoramic CT scan revealed mild to moderate sinus membrane thickening in the non-grafted anterior region (tooth site 25; FDI tooth-numbering system) and around the incorporated and nonincorporated previous graft material (1 to 2 mm; Bio-Oss, Geistlich) (Fig 2). The main body of the sinus and the region around the ostium and ostiomeatal complex showed no signs of inflammation. The patient was free from sinus symptoms and was a candidate for a reentry intervention. It should be noted that the prosthetic treatment plan was changed from that of a three-unit implant prosthesis to that of a single implant restoration in the nongrafted site 25. The surgical plan was to gain access to this site using the palatal approach in order to graft the site while avoiding and leaving behind all of the previous grafting material.

There were many anatomical factors favoring the palatal approach:

First, the area for a lateral window was mesiodistally narrow due to the previously placed graft (Fig 2). Second, the facial wall in site 25 is thick and has a ledge, and there is free-floating grafting material apically from the previous grafting attempt. No grafting material is present on the palatal aspect of the site (Fig 3). Third, the tooth just anterior to the proposed window area (site 24) was facial in position, with the likely absence of a facial bony plate. In addition, the apex of this tooth was located in the lateral wall, just inside the proposed window area (Fig 4). Finally, an acute 83-degree palatonasal recess was present < 10 mm in height from the crest (Fig 5). A study by Chan et al21 puts this location well within the risk area (angle < 90 degrees and located < 15 mm from the crest, which occurs in 15% of second premolar sites). It would be almost impossible to elevate the sinus membrane from this area using a lateral approach without perforation (narrow access, acute angle),
and this would negatively affect the outcome of the grafting procedure.

Surgical Procedure

Anesthesia was accomplished with a second-division maxillary nerve block (V2) with infiltration anesthesia (lidocaine 2% with 1:50,000 epinephrine; Cook-Waite) on the buccal aspect. A midcrestal incision was made from the distal tooth to the area of the second molar. A short vertical incision was made on the distal aspect, and the midcrestal incision was extended in the palatal intrasulcular area for a distance of two teeth (Fig 6). A full-thickness flap was reflected to the junction of the alveolus and the horizontal palatal vault, exposing the palatal aspect of the alveolus (Fig 7). A piezoelectric device (VarioSurg, NSK) was utilized to make a palatal window via osteoplasty, exposing an intact sinus membrane (Fig 8). The window was approximately 7 × 7 mm. One of the major benefits of this palatal approach window was the almost complete elimination of the palatonasal recess. This was possible due to one of the walls of the acute angle (the medial alveolar wall) being almost completely eliminated by the palatal osteotomy (Fig 9).

The sinus membrane was elevated without perforation after detaching it from the sinus floor and the adjacent residual incorporated graft (Fig 10). The sinus was grafted with 1.5 g of small-particle Bio-Oss (Fig 11) and covered with a Bio-Gide membrane (Geistlich; Fig 12). The
Fig 7  A palatal flap was raised, exposing the medial wall of the alveolar process.

Fig 8  Clinical view of an exposed, intact sinus membrane.

Fig 9  The overlay (red line) shows how the window eliminates one wall of the palatonasal recess.

Fig 10  The sinus membrane was elevated. Note the portion of previous graft material on the distal aspect, which was an obstacle to successful membrane elevation.

Fig 11  The graft material was placed (100% small-particle xeno-graft).

Fig 12  A collagen barrier (Bio-Gide) was placed over the window.
The flap was closed utilizing interrupted suturing with 4-0 Vicryl sutures (Ethicon, Johnson & Johnson), and the patient was told that he could wear his partial denture immediately (Fig 13).

The patient was given augmentin (875 mg, twice daily) to start the night before the procedure and to be continued for 10 days. Ibuprofen was prescribed to control discomfort. Chlorhexidine rinses were to be used until suture removal. The patient was cautioned not to blow his nose and to sneeze out the mouth, if needed, to avoid increasing the intranasal pressure, which is a risk factor for membrane rupture.

Early postoperative communication with the patient revealed that his postsurgical discomfort level was half that of the previous lateral window in the same site.

Postoperative Follow-up

The patient reported a slight nosebleed for the first day. He also stated that postoperative discomfort was half that of his previous procedure in this area. There was no postoperative edema, and the patient had no problem wearing his partial denture. Figure 14 shows the final photograph that was taken 2 weeks after the surgery. The postoperative CT scan taken at the same time point revealed the three-dimensional success of the new graft (Fig 15).

It should be noted that the residual free-floating graft material was left in place, as removing it would have required an additional surgery due to the expected disruption of the sinus membrane. Because the patient was asymptomatic for 1 year after the initial surgery, there would have been no positive gain accomplished by its removal (Fig 16).

Conclusions

This case report is unique in that it demonstrates five clinical conditions that justify utilizing a palatal approach for maxillary sinus elevation. Some conditions are related to the previously failed sinus graft, while others are related to the anatomy of the proposed window site: (1) a small area available for the second lateral window; (2) a thick facial wall resulting from the first attempt, with no graft near the medial wall; (3) the facially positioned adjacent tooth, which is likely without a facial bony plate; (4) potential difficulties in elevating the sinus membrane due to residual graft from the failed first attempt; and (5) the presence of an acute palatonasal recess in the “risk area” of the proposed elevation. The palatal approach utilized in the present case eliminated the
above as risk factors in the procedure. Of course, certain anatomical preconditions must be present, such as presence of sufficient vertical access to the sinus between the residual crestal bone and the palatal vault to make the palatal approach possible.

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References


Fig 15 (a) Panoramic and (b) paraxial CT views at 2 weeks postoperative show three-dimensional success of the new graft.

Fig 16 A postoperative paraxial CT view shows free-floating graft from the original procedure, which was left in place.


