



External medial maxillectomy

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The external medial maxillectomy has long been used to manage benign and malignant tumors of the lateral nasal wall. Although many advocate for an endoscopic approach to these tumors, there are still tumors that may lend themselves to an external medial maxillectomy. This article describes the authors' technique for performing an external medial maxillectomy.

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Partial maxillectomies have been reported for well over a century, with the first credited to Liston in 1841. Since that time, there have been many variations in the techniques and approaches. Sessions and Larson are credited for the term "medial maxillectomy" in their description of the technique and report on 10 patients from 1977. They described the use of a lateral rhinotomy incision for exposure, with well-described bone cuts to remove the tumor en bloc. Since that time, it has been used extensively for lesions of the lateral nasal wall. The external medial maxillectomy has been considered the gold standard for tumors of the lateral nasal wall.

Indications

The external medial maxillectomy is indicated for benign and malignant tumors involving the lateral nasal wall, medial wall of the maxillary sinus, and the adjacent ethmoid cells (Figure 1).³ The technique has been described to address inverted papillomas, esthesioneuroblastomas, angiosarcomas, squamous cell carcinomas, sarcomas, and bony osseous tumors.³

The approach may be combined with a frontal craniotomy to address tumor extending into the cranial vault. It may also be included with orbital surgery to address neoplasms with orbital involvement. Tumors with extension into the ethmoid air cells may also be addressed with this approach. Occasionally, a more extensive incision, such as a superior rhinotomy, or an ipsilateral lower lid incision may be used to improve exposure.³

Technique

The external medial maxillectomy is most commonly performed with a lateral rhinotomy for exposure. The planned incision line is injected with local anesthetic to aid in hemostasis. The incision extends from just inferior to the medial brow, medial to the medial canthus, down the lateral nose at the junction of the nasal sidewall and the face of the maxilla, around the ala in the alar crease to the lateral edge of the philtrum (Figure 2). A gentle "W" in the region of the medial canthus can help decrease the postoperative webbing. The incision can be extended down the lateral edge of the philtrum through the lip for additional exposure, although lip splitting may be unnecessary.^{4,5} If the lip-split incision is used, it is recommended to stair step the incision at the vermilion border to avoid notching of the lip. An ipsilateral sublabial incision in the gingivobuccal sulcus on the maxillary gingiva, connected to the lateral rhinotomy, allows for lateral distraction of the maxillary skin. This

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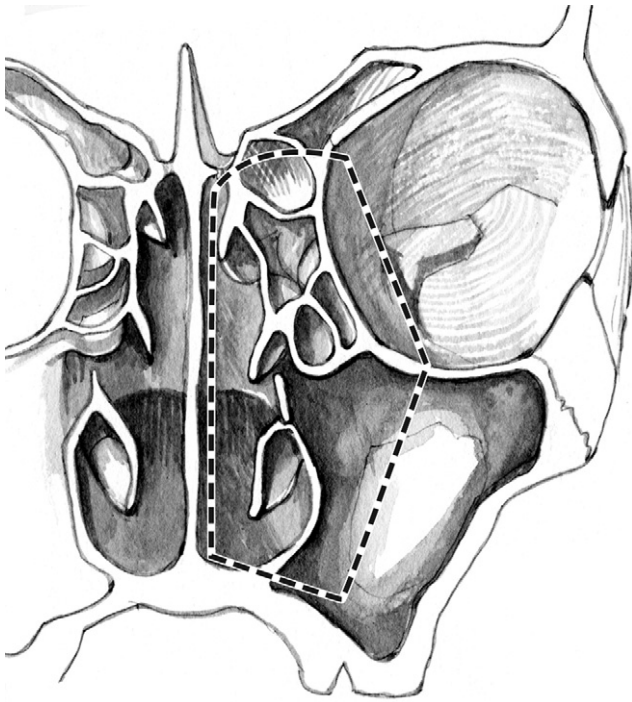


Figure 1 Diagram outlining the limits of the standard medial maxillectomy.

incision may be extended or combined with other approaches, depending on the extent of the disease process.

Once the incision is created, a subperiosteal plane is elevated over the face of the maxilla. The dissection is carried laterally to the infraorbital nerve, which is left intact, and medially to the pyriform aperture. Superiorly, the dissection is carried medially to expose the nasal bones. A low nasal bone osteotomy followed by a medial osteotomy allows for medial retraction of the nasal bones and the nose.

The superior dissection is carried medially and the orbital contents are dissected in a subperiosteal plane along the medial orbital wall and the medial aspect of the orbital floor. Care should be taken to dissect the lacrimal sac and trochlea. The medial canthal tendon is either transected and tagged for repair at the completion of the procedure or elevated intact with the periosteum. The lacrimal duct may then be transected, allowing for greater lateral movement of the orbital contents. This exposes the anterior and posterior ethmoid arteries, which should be cauterized using bipolar electrosurgery and divided at this point to decrease total blood loss for the procedure. Vessel clips may interfere with postoperative imaging and, thus, should be avoided.

The anterior wall of the maxillary sinus is removed with rongeurs. This bone can be taken laterally as needed to provide adequate access with the osteotomes to make the bone cuts for the medial maxillectomy.

The first bone cut is made in an anterior-to-posterior direction along the inferior-most portion of the medial wall of the maxillary sinus, in the inferior meatus. This cut should extend the entire length of the inferior turbinate (Figure 3A). The second cut is made in a vertical plane extending from the floor of the maxillary sinus to the superior aspect of the lacrimal fossa. This should be just poste-

rior to the lacrimal duct. The third bone cut is made just inferior to the fronto-ethmoidal suture line through the medial orbit (Figure 3B). Staying inferior to this suture line will help avoid a cerebrospinal fluid leak. The orbital contents are retracted laterally during this cut. The fourth bone cut goes through the orbital floor. The orbital contents are retracted superiorly and laterally, and the cut is made through the floor, starting just medial to the infraorbital nerve and canal (Figure 4A). It extends posteriorly in a medial direction, joining the third cut at its most posterior aspect. The thin bone of the orbital floor, just posterior to the orbital rim, is freed medially to the anterior point of the third cut. The nasal cut is directed at the remaining bony attachment, the vertical section of the palatine bone that extends from the floor of the nose to the posterior tip of the superior turbinate. Heavy, curved scissors are passed along the first bone cut, with one blade in the maxillary sinus and the other in the nasal cavity (Figure 4B). Given the location of the posterior, or fifth cut, the optic nerve is at risk, and care must be taken to avoid damaging this. The palatine bone is cut inferiorly just posterior to the middle turbinate attachment; however, it is technically impossible to cut the entire length of the palatine bone. Therefore, this bone is broken with careful rocking of the specimen. One finger is passed in the nasal cavity, the other in the maxillary sinus, and this bone is fractured (Figure 5). The remaining soft tissue attachments may be cut with the scissors. The specimen is removed anteriorly through the nasal aperture or the maxillary sinus, and hemostasis is achieved with bipolar electrosurgery.

There are several key steps with the closure that help optimize postoperative healing. The first is primary repair of the nasolacrimal duct. The duct should be stented with a polyethylene or Silastic tube, similar to what is done for a

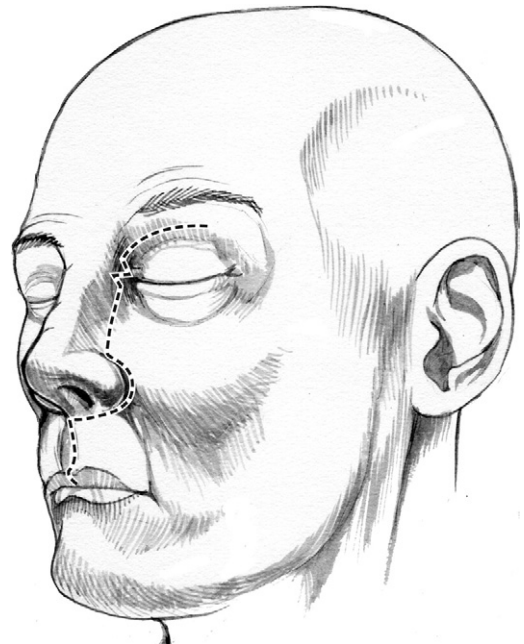


Figure 2 Skin incision for the lateral rhinotomy. Depending on the location and extent of the tumor, lip splitting and lateral extension of the superior incision may not be necessary.

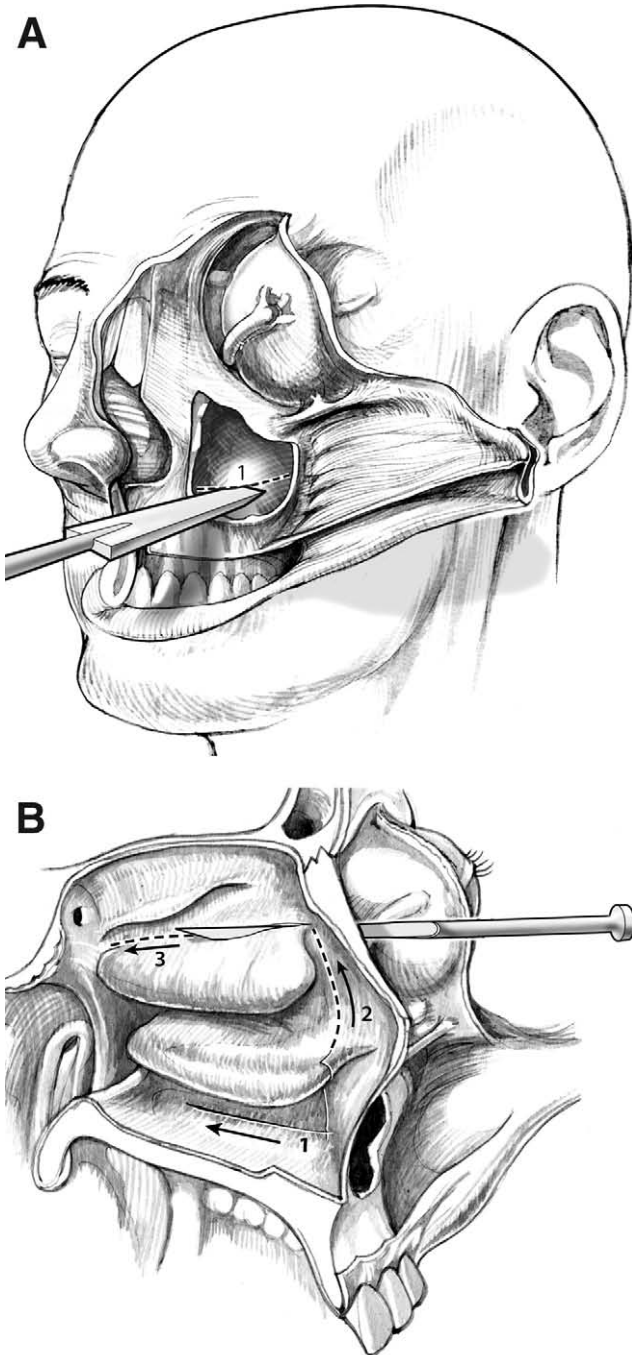


Figure 3 Diagram of the first, second, and third cuts, as described above (A,B).

dacryocystorhinostomy. This tube can be left in place anywhere from 1 to 3 months to allow for healing of the duct.

The second key step is the reattachment of the medial canthal tendon to its insertion on the lacrimal crest. If this is not properly secured, it can lead to lateralization of the medial canthus or asymmetric vertical position of the medial commissures. A small hole is drilled in the maxillary bone adjacent to the normal insertion site of the medial canthal tendon. The tendon is then secured to the bone with nonresorbing sutures. If the bone of the normal attachment site was removed, or damaged with the resection, the tendon can be secured using a miniplate attached to the nasal bone

The incision should be then closed in two layers, using careful technique to minimize scarring.

Complications

Complications may arise from the lateral rhinotomy in addition to the medial maxillectomy and most commonly involve the orbit. Additional complications can be related to crusting of the cavity, cerebrospinal fluid leaks, as well as a variety of other issues, including mucocele formation, osteomyelitis, facial neuralgia, nasal septal perforation, nasal collapse, synechia formation, vestibular stenosis, alar retraction, and loss of eyebrow hair if the incision extends into the eyebrow.

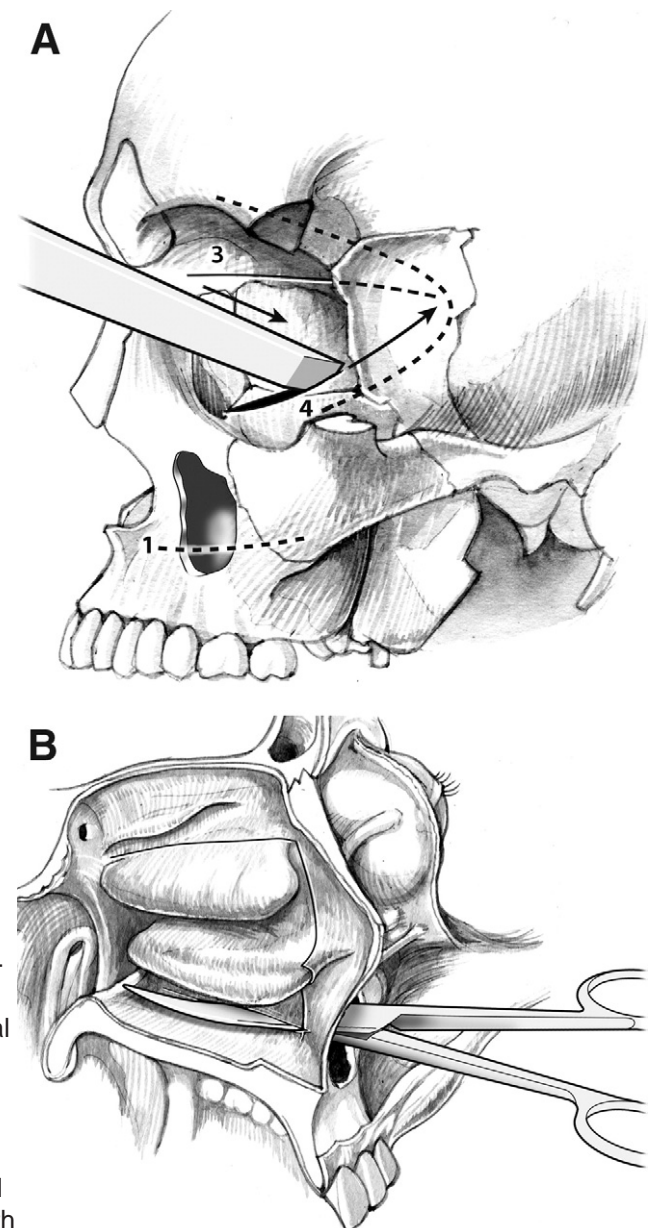


Figure 4 The fourth cut goes through the orbital floor extending posteriorly and medially so it joins with the third cut. The fifth cut addresses the remaining bony attachments as described above (A,B).

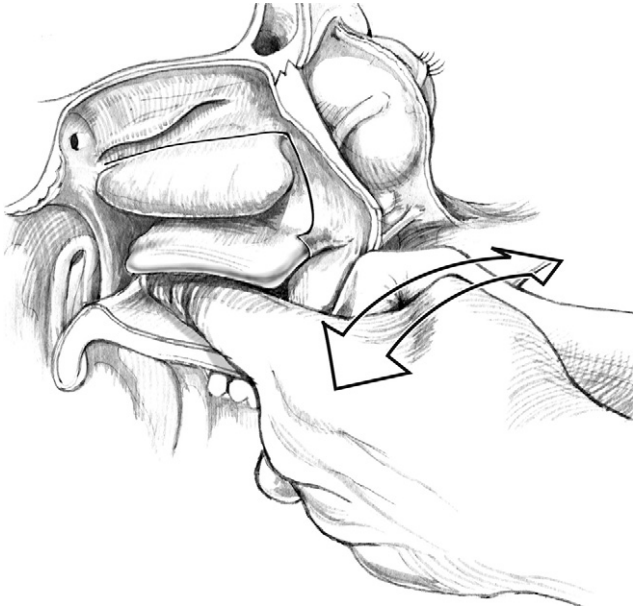


Figure 5 The nasal bony connections are fractured using a rocking motion, as shown here.

The more common orbital complications include epiphora and diplopia. In their initial report, Sessions and Larson described transient epiphora in 2 of the 10 original patients, whereas others have reported it at a much higher rate.^{2,3} Sessions later described transection of the lacrimal duct with primary repair using polyethylene tubing to help the duct heal properly.⁴ Occasionally, dacryocystorhinostomy is required to resolve the postoperative epiphora. The diplopia was reportedly transient and less common if the periorbita is left intact and with careful subperiosteal elevation of the trochlea from its fossa.^{2,5}

Lateral drifting of the medial canthus due to scar contraction has also been reported. This is reportedly prevented by using a gentle “W” around the medial canthus and the above-described techniques to fix the canthal tendon to the medial orbital rim.

Crusting of the defect cavity is a common complication following medial maxillectomy, and the reported duration of the crusting varies between authors. The reports range from 4-6 weeks after surgery to the remainder of the indi-

viduals' lives. The crusting responds well to active saline irrigations of the cavity.

Discussion

As mentioned, maxillectomies have been performed for the better part of two centuries. It has been the workhorse procedure for both benign and malignant lesions of the lateral nasal wall. Most case series have reported on inverted papilloma, given its increased relative frequency; however, malignant neoplasms have also been reportedly managed with the external medial maxillectomy.

With the introduction of nasal endoscopes, the endoscopic medial maxillectomy has seemed to replace the external approach; however, the external medial maxillectomy has long been considered the gold standard with which the endoscopic techniques have been compared. The endoscopic approach is favored for its decreased invasiveness and avoidance of the lateral rhinotomy. Recent reports have shown decreased morbidity and equivalent if not improved recurrence rates using endoscopic techniques.^{6,7}

Despite these data, otolaryngologists may still encounter situations that lend themselves to the external medial maxillectomy; thus, familiarity with the procedure is still quite valuable.

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