

# ORBITAL FLOOR FRACTURES: THE MAXILLARY APPROACH

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## ABSTRACT

*The repair of orbital floor fractures is complicated not only by the technical aspects of the procedure, but by the decision-making process one must initiate to determine when and if the fracture should be repaired. This article examines the indications for repairing orbital floor fractures through the maxillary approach and describes the technical aspects and results that can be achieved with this technique.*

*Key Words:* Orbital floor fractures; Maxillary approach.

The management of orbital floor fractures is complicated not only by their technical difficulty but by the multitude of factors necessary to make a decision as to the proper timing of the repair. In the current literature, various reports depict a wide spectrum of opinions on the repair of orbital floor fractures, which range from always operating on them, to operating on such fractures relatively quickly, to allowing all the components of the fracture to heal themselves and then operating as late problems become manifest [1,2]

The role of the maxillary approach to the repair of orbital floor fractures whether in the immediate short-term phase or in the late reconstruction phase when the late sequel or an unoperated orbital floor fracture - enophthalmos or diplopia - are manifested will be examined. The addition of the maxillary approach to the surgeon's armamentarium facilitates some of the technical problems associated with this difficult procedure; moreover, because of the increase exposure, it allows a more logical and judicious repair.

## INDICATIONS

The indications for using the maxillary approach for the repair of orbital floor fractures is best examined in two stages; immediate and late. Each stage has its own set of technical problems. The early stage presents problems of entrapment of orbital contents and loss of orbital fat into the maxillary sinus. The late reconstructive phase presents problems of entrapment with fibrosis and enophthalmos secondary to escape of orbital fat into the maxil-

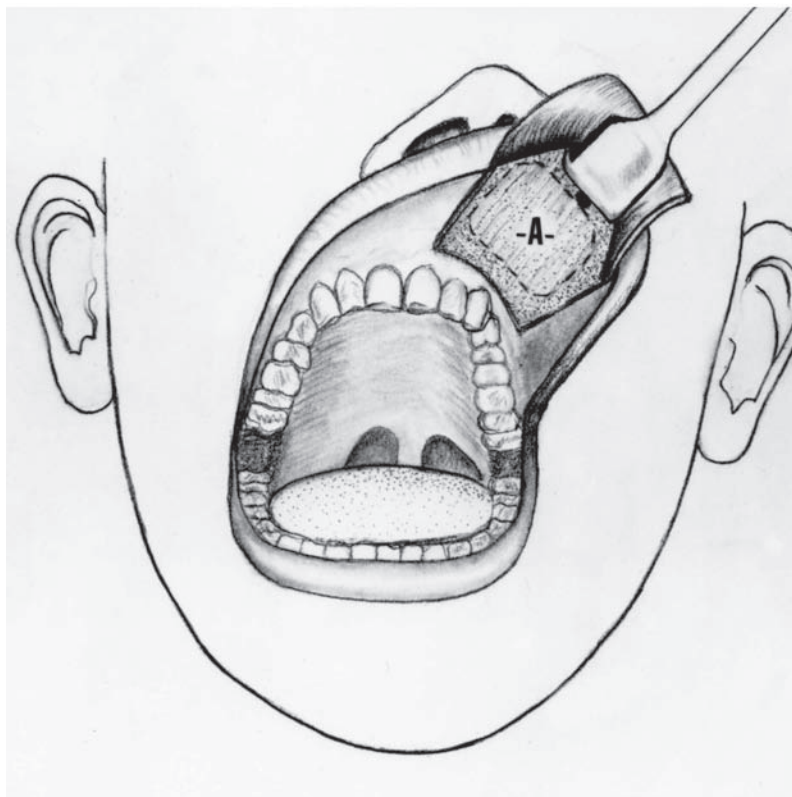
lary sinus, backward traction of the globe by entrapped muscles, or enlargement of the cavity by displacement of associated bony fragments.

The maxillary approach is first indicated when entrapped inferior oblique or rectus muscle cannot be adequately released through a direct orbital approach. Secondly, when loss of significant amount of orbital fat or bone into the maxillary sinus is evident either by early enophthalmos or roentgenologic data, retrieval of the fat is necessary to prevent a late occurring enophthalmos. The maxillary approach is advised because it facilitates fat retrieval.

Complex orbital fractures associated with adjacent bones including orbital rim, zygoma, and ethmoid, the so-called "impure blowout fracture," are usually associated with massive prolapse of orbital contents into the maxillary sinus and thus certainly indicate a need for improved exposure and full exploration of this cavity. In addition, these complex orbital fractures require additional external support, which can be adequately delivered through the maxillary sinus either by gauze packing or balloon.

The maxillary approach is also used to obtain graft tissue from the anterior maxillary sinus wall when the orbital floor fracture is of a significant nature, and an autogenous, as opposed to an alloplastic, implant is desirable. Natural tissues will have a decrease incidence of extrusion and may help promote new bone growth in the floor of the orbit.

The late repair of an orbital floor fracture is a difficult, technical procedure and is best accomplished by a double approach, that is, a combined direct orbital and maxillary antral technique to achieve better visualization and to facilitate the technical aspects of releasing scarred, entrapped orbital contents from a fibrosed maxillary antrum. In reconstruction of enophthalmos using bone grafts, addition of the maxillary approach will aid the technically



*Figure 1. View of anterior maxillary wall. Graft material (A).*

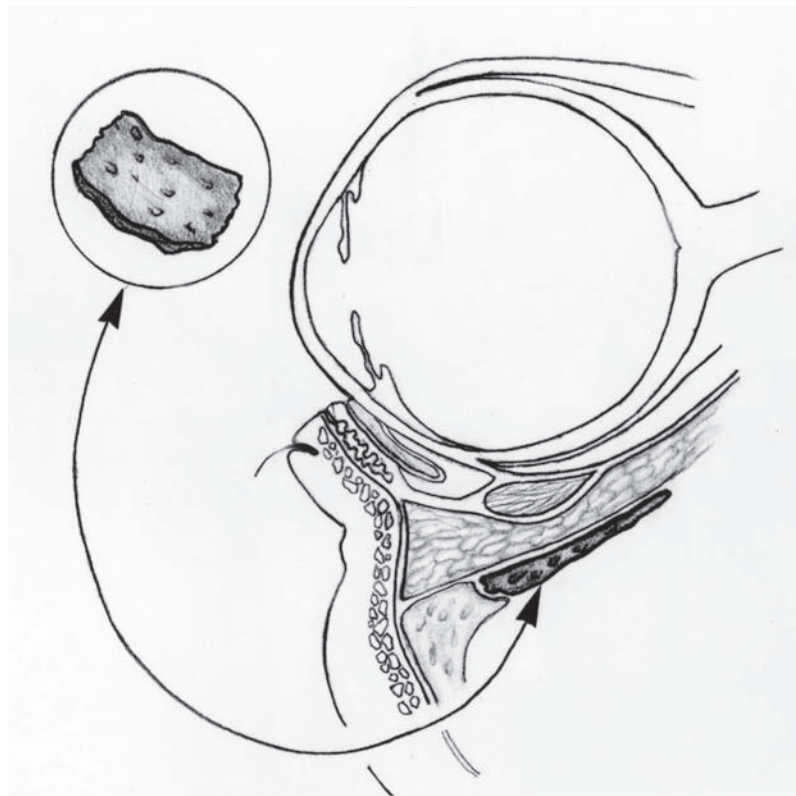


Figure 2. Placement of anterior maxillary wall graft into orbital floor.

difficult maneuver. In particular, when a previously placed alloplastic implant extrudes, the anterior maxillary approach is well suited for the extra visualization and manipulation necessary to secure a secondary implant. Use of more natural autogenous implant is advised for a case of primary extrusion; the anterior maxillary wall is an excellent source of this tissue (Figure 1).

### TECHNIQUE

The incision is made through mucosa and periosteum in the upper gingival buccal sulcus leaving -0.5 cm of mucosa inferiorly so that resuturing of the mucosa is facilitated. The area is first injected with xylocaine 1% with 1:100,000 epinephrine to enhance hemostasis. The periosteum is raised with a periosteal elevator to the level of the infra orbital nerve superiorly; laterally to the beginning of the curvature of the maxillary sinus, and medially to -1 cm before approaching the pyriform aperture. Soft tissue retractors are then placed deep to the periosteum, and the anterior maxillary wall is visualized. An area of anterior maxillary sinus wall is outlined with methylene blue, and a high-speed drill is used circumferentially to harvest the anterior maxillary bone for grafting (Figure 1). The antrum is then entered and suctioned clear of debris and blood. The head is then tilted posteriorly, and the floor of the orbit is visualized; the infraorbital nerve in the root of the sinus is isolated and identified.

At this juncture, I recommend that the direct eyelid or conjunctival approach to the orbital floor be performed as a combined procedure for adequate control and visualization of the operative field. This approach also allows added control of pressure that will be exerted on the orbital contents from the maxillary sinus with either gauze packing or balloon.

The repair is continued with placement of either the anterior maxillary bone graft into the floor of the orbit or an alloplastic implant (Figure 2). This implant is guided into place through the double approach after all scarred

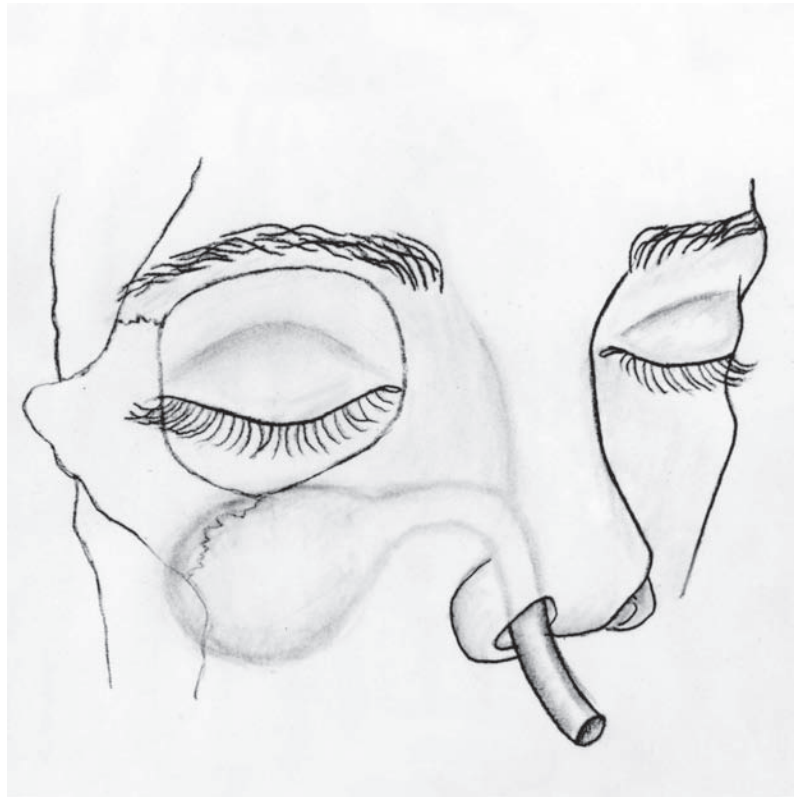


FIGURE 3. Balloon catheter placed in maxillary antrum with drainage through nose.

and fibrosed aspects of the orbital musculature and peri orbita are placed back into the orbit.

If the repair is to include a late stage of enophthalmos, the globe must be projected forward and the lost volume of orbital contents must be replaced. A bone graft taken from the internal iliac crest and carved in such a way that the floor of the orbit is reconstructed and thickened so that the globe is raised sufficiently but also has a posterior lip designed into the bony graft filling the posterior aspect of the orbit with additional volume, thus projecting the globe forward. This type of a graft, due to its bulk and necessity of exact placement, is much more easily manipulated through the dual approach. After the orbital contents are secured and the graft is in place, either packing or a balloon catheter is placed through the nose (Figure 3) into the maxillary sinus, and the appropriate pressure and amount of packing is adjusted so that there is no damage to the globe.

If the anterior area wall of the maxillary sinus is not used as a graft, it is discarded or frozen for future reconstructive efforts. The periosteum and overlying mucosa are then repositioned and sutured with a running 4-0 chromic suture and the sinus is drained through the nose either through the packing or through the balloon. No drain is placed anteriorly because it would communicate with the sinus and cause fistulization to occur between the antrum and the anterior mucosa wall. A light pressure dressing is then applied to the anterior face of the maxilla, and the operation is terminated.

### CONCLUSIONS

The maxillary approach to the repair of orbital fractures either in the early immediate stage or the late reconstructive stage is a valuable adjunct to the reconstructive surgeon. The anterior wall of the maxillary antrum not

only is an excellent source of implant material but also allows the added advantage of increased exposure for visualization and manipulation. It is also particularly advantageous to use the maxillary antrum as a further means of support when the orbital floor is compromised and needs additional inferiorly based support through either gauze or balloon. This is particularly applicable when the orbital floor fracture is complicated by adjacent facial bone fracture.

In general, the maxillary approach should be used when there is any question about the integrity of the orbital floor and when direct observation is necessary to manipulate graft material in an effective way.

#### REFERENCES

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