Endoscopic Endonasal Repair of Orbital Floor Fracture

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Background: High-resolution endoscopes and the advent of endoscopic instruments for sinus surgery provide surgeons with excellent endonasal visualization and access to the orbital walls.

Objective: To demonstrate repair of orbital floor blowout fractures through an intranasal endoscopic approach that allows repair of the orbital floor fracture and elevation of the orbital content using a balloon catheter without an external incision.

Design: This study was a retrospective analysis of 11 patients who underwent surgical repair of orbital floor fractures from September 1994 to June 1997. There were 10 male patients and 1 female patient, aged 12 to 32 years (mean age, 24 years). These patients had undergone primary repair of pure orbital blowout fractures and were followed up at least 6 months after surgery.

Results: There were no intraoperative or postoperative complications. Nine patients showed a complete improvement of their diplopia. Two patients with posterior fractures showed persistent diplopia, which was well managed by prisms.

Conclusion: Endoscopic repair of the orbital floor blowout fracture using an endonasal approach appears to be a safe and effective technique for the treatment of diplopia.


RESULTS

Demographic and clinical patient profiles are given in the Table. There were no intraoperative or postoperative complications. All patients had some improvement in their diplopia by 2 weeks. Based on the degree of diplopia, scores of 0 to 3 (severe = 3, moderate = 2, slight = 1, none = 0) were assigned in each field of gaze. A total score of 27 was possible. In 8 patients, the diplopia in all fields of gaze was almost completely resolved by 2 months. Three patients continued to have slight vertical diplopia in the reading position (Figure 2). Computed tomographic findings and endoscopic observations during surgery indicated that the patients with persistent diplopia after surgery had posterior fractures with entrapped extraocular muscles. Six months after surgery, 1 of these 3 patients had no diplopia in any position whereas the other 2 patients with residual diplopia in the primary gaze could obtain good alignment with the use of prisms.

All patients showed a notable improvement in results of the Hess screen test.
after surgery. Figure 3 shows typical charts of the preoperative and postoperative Hess screen test in a representative case.

Postoperative computed tomographic scans or magnetic resonance images were not obtained routinely since they all showed steady clinical improvement. Figure 4 shows preoperative magnetic resonance images in a representative case, in which the right orbital contents are prolapsed from the orbital floor. The postoperative image (Figure 5) demonstrates that the extruded orbital contents were effectively resolved and that the inferior rectus returned to a more normal position, consistent with the resolution of the patient’s diplopia.
The advent of endoscopic techniques has greatly enhanced surgeons’ ability to operate on orbital structures through the nose. Orbital decompression, drainage of subperiosteal abscess, endoscopic dacryocystorhinostomy, and optic nerve decompression can be safely and effectively performed without external incision. Endoscopic endonasal repair of orbital floor fractures affords the surgeon excellent visualization for safe removal of bony fragments and correction of periorbita in the orbital floor. In contrast to the transantral approach, the endoscopic approach avoids postoperative infraorbital nerve hypesthesia. Another advantage of the endoscopic approach is that it results in less intraoperative blood loss and shorter hospitalization than the transantral and transorbital approaches. Because implants of silicone sheets or metallic mesh to support the orbital content are not needed, inflammatory reactions against foreign bodies are reduced.

There is a controversy about the timing of surgical repairs for blowout fractures. Smith and Regan advocated surgical repair of any blowout fracture within 7 to 10 days. On the other hand, Putteman recommended delaying surgery for at least 4 to 6 months. Similarly, Emery et al failed to show a significant difference in the incidence of enophthalmos between the surgical and nonsurgical groups. During the past decade, many studies have advocated early surgical exploration in patients with large fractures and in those with disabling diplopia or enophthalmos.

The excellent visualization of the fractured orbital floor provided by the endoscope may enable better manipulation than that afforded by the naked eyes. The fracture location is one of the important factors that determines the persistence of diplopia. The inferoposterior orbital fat tissue is fibrous and dense with connective tissue septae that attach to the extraocular muscles. If this residual fat is trapped by a posterior floor fracture, diplopia may easily result. One of 3 cases with a posterior floor fracture in this study could be repaired under endoscopic control.
The use of the endoscope may improve the success rate of surgical repairs of diplopia even in cases of posterior floor fracture.

In conclusion, we performed surgical repair of orbital floor fractures using an endoscopic endonasal approach. The endoscopic approach provided better visualization of the fractured structures of the orbital floor, enabled meticulous manipulation of the repair, and reduced intraoperative and postoperative complications.

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