Endoscopic Techniques in Oral and Maxillofacial Surgery

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KEYWORDS

• Endoscopy • Minimally Invasive • Teaching
• Sialoendoscopy • Orthognathic • Trauma

There have been many advancements in endoscopic surgery since Takagi first used the technique in 1918.[1] The endoscope has been described as an "extra set of eyes," and is the basis for innovation across multiple surgical disciplines and the fabrication of a new class of instruments and surgical techniques. As a teaching tool, endoscopically assisted surgery allows trainee surgeons to follow the surgery, and for the teaching surgeons to describe the procedure in real time and preserve the experience on video. Although there is a learning curve, teaching of the technique is improving, and various other techniques continue to be introduced with this surgical adjunct.[2–4] Some surgical procedures may also be completed with less morbidity and, perhaps, with a greater margin of safety (ie, avoiding technical error) with the use of an endoscope.[5,6] Increasingly, more endoscopic procedures are being described in the craniomaxillofacial region. This article reviews the present use of endoscopic techniques for the treatment of craniomaxillofacial trauma, orthognathic deformities, obstructive salivary gland disease, maxillary sinus disorders, trigeminal nerve injury, and temporomandibular joint (TMJ) disorders.

TRAUMA

Accurate repair of complex craniomaxillofacial trauma can be a challenge. Access can be difficult, and endoscopic techniques can expand the surgeon's view and capabilities in certain situations. The endoscope is a useful tool in these situations, and advances in this technology have provided some new opportunities in the management of patients. The use of this unique tool has been described in a wide range of surgical treatments, including fractures and orbital, frontal sinus, and other maxillofacial injuries.

Orbital Floor Fractures

Techniques for the use of the endoscope in orbital fractures have been refined since the 1970s.[7] With this tool, a minimally invasive procedure can be performed to evaluate the extent and severity of the fracture from a transantral approach. A surgeon can easily identify the location and size of the defect without invading the content of the orbit.[8] With superior visualization a well-informed decision can be made regarding the extent of reconstruction necessary and the approach to repairing the fracture.

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Oral Maxillofacial Surg Clin N Am 22 (2010) 169–182
doi:10.1016/j.coms.2009.11.002
1042-3699/10/$ – see front matter

In traditional periorbital approaches, the posterior margin of the defect may be difficult to visualize.[9] These approaches require significant manipulation of the orbital tissues, and result in inflammation and the possibility of an ectropion or entropion. By using the transantral approach, these disadvantages are minimized. The transantral approach is technique sensitive and requires training and experience to be performed proficiently. Once experience is gained, the result can be comparable with that of the periorbital approaches.[9]

TRANSANTRAL ORBITAL FRACTURE REPAIR TECHNIQUE

The literature illustrates multiple approaches for repair of orbital floor fractures, including the use of a pure periorbital approach, a purely transantral approach, or a combination of the two.[10,11] The authors recommend that a purely transantral approach can be effective for the repair of the orbital blow-out fracture. With this technique, the posterior shelf of bone may be easily visualized (**Fig. 1**), and an implant placed transantrally to reconstruct the floor. This approach has the potential benefit of less manipulation of the orbital contents and periorbital tissues. Care is taken when manipulating the intraorbital contents from the antrum to avoid impingement of the musculature, periorbita, and optic nerve. It is important to reconstruct the posterior bulge of the orbital floor to restore orbital volume appropriately and avoid enophthalmos. Based on intraoperative findings, the surgeon should be prepared to access the orbital floor from a periorbital approach as needed.[10]

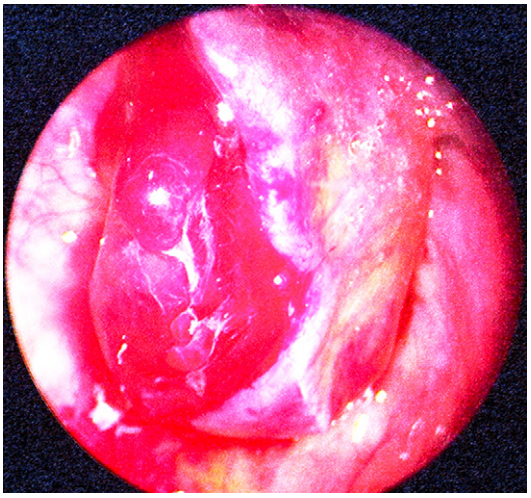

Fig. 1. Endoscopic view of the orbital floor from a transantral approach. Note the orbital content herniation into the sinus cavity.

A simple maxillary vestibular incision is used. An osteotomy in the anterior antral wall is performed. The endoscope is placed into the sinus, which acts as a natural optical cavity. A 30°, 4-mm-diameter endoscope (Karl Storz, Tuttlingen, Germany) with a xenon light source is preferred; a 0°, 45°, or 70° endoscope may also be used. A sinusotomy of the sinus roof/orbit floor is completed, sharp bone fragments are removed, and the margins of the fracture are identified. Each shelf is carefully dissected and the orbital contents replaced back into the orbit. If fractured segments can be reduced, they can be stabilized with a titanium mesh or other material. If the fractured bone cannot be salvaged, the orbital contents are reduced, and an implant placed onto the orbital side of the fracture. The implant is tested for stability with a forced duction test and an ocular pulse test. Mesh or other implant material can be adapted onto the antral side of the fracture and stabilized. It is important to provide adequate support for the orbital contents by recreating the appropriate anatomy with suitable material.

Mandibular Angle Fractures

The mandibular angle fracture is one of the most common injuries of the maxillofacial region,[12] and may be treated in various ways.[13] Several factors contribute to the high reported rate of complications.[14] When using an intraoral approach, it may be difficult to position fixation with a high degree of precision because of limited access. With the adjunct of the endoscope, a surgeon may fixate the mandible with a superior and inferior border plate with a higher degree of certainty of its placement. With the aid of the endoscope, anatomic reduction by visualization of the entire fracture line to include the inferior border is simple.

Endoscopically assisted mandibular angle fractures all but eliminate the risk of injury to the facial nerve. The authors' experience shows that the procedure can have several advantages, including efficiency, when compared with the extraoral technique. In the authors' opinion, advantages include allowing the patient to function immediately rather than endure closed reduction, the patient suffers less pain than with extraoral incisions, and the scar is much less visible.

TECHNIQUE

There has been limited discussion of endoscopic-assisted open reduction and internal fixation (ORIF) of the mandibular angle fracture. When