ABSTRACT

Objective: Accessing the lateral orbit can be achieved using transfrontal, pterional, and cranio-orbital approaches. These corridors require brain retraction and extensive craniofacial resection. The associated morbidities with open approaches provided the impetus for less invasive techniques. Total lateral orbitotomies obviate a craniotomy, however, the resection of zygomatic and frontal bones still create significant exposure and cosmetic damage. With the development of the endoscope, minimally invasive surgical access has been achieved to the medial and inferior aspects of the orbit. Expanding the access to the lateral orbit transantrally with an endoscope could create a minimally invasive corridor and eliminate the need for an open procedure.

Methods: Using latex injected anatomical specimens, endoscopic dissections of the infero-lateral orbit were undertaken. A sublabial transmaxillary ostomy was created and a 45-degree endoscope was advanced into the maxillary sinus. Using a microsurgical dissection technique the inferior wall of the orbit was removed laterally to the inferior optic nerve. Then the lateral contents of the orbit were dissected and identified. Photographic evidence was obtained for review.

Results: The transantral endoscopic approach to the orbit provided an adequate surgical window inferiorly. Access laterally was also possible, however, it became limited as dissection advanced superior to the lateral rectus muscle. The relevant anatomy was identified without difficulty.

Conclusion: An endoscopic transantral approach to the infero-lateral orbit is anatomically feasible. The morbidity associated with an open approach could possibly be avoided.

INTRODUCTION

Space occupying lesions of the orbit are of great concern for both the patient and the physician who is treating the condition. The orbit is an enclosed space with highly complex and critical anatomy. Much like the cranial vault, pathology that has mass has the potential to disrupt normal functioning. Tumors present in the enclosed orbit can have serious consequences and in some cases causing loss of vision (1). This is very traumatizing to the patient both physically and emotionally. The consequences of which could also effect employment, further impacting the individual’s family and society as a whole. The critical nature of orbital surgery demands skill, experience, and an appropriate surgical corridor. The challenge has been to develop a surgical approach that achieves the goal of obtaining negative margins while preserving the anatomy and functionality of the orbit.

Microsurgical technique emphasizes the lessening of iatrogenic damage by decreasing the size of the surgical window. The overall effect is a decrease in morbidity (2). For microsurgical dissection a microscope was traditionally used and this provided the operator the ability to discern the fine posterior structures of the orbit. (3,4) When the microscope is used, an open approach involving resection of the skull and skull base is typically required (5). Of course the amount of resection required for an adequate corridor depends largely on the location of the pathology. However this contrasts greatly with keyhole incisions that employ the use of an endoscope.

The endoscope has become an invaluable surgical tool allowing direct visualization with minimally invasive access. This technology has created endoscopic assisted surgery, providing an alternative to major resection through a smaller surgical corridor. The endoscope has been employed in a wide range of disciplines at great benefit to the patient. Shorter hospital stays, with lessened morbidities and better cosmetic outcomes have been well documented (6).

There have been several documented approaches to the orbit, including lateral, endonasal and combined transantral-endonasal (7,8,9,10). These approaches have been adequate to access lateral medial and posterior aspects of the retrobulbar area of the orbit. A lateral approach still requires an external excision into the temporal area including bone and muscle and has a tendency to leave a cosmetic defect. The endonasal and combined transantral-endonasal approaches require excision of large portions of the internal nasal anatomy including the medial wall of the maxillary sinus and turbinates (9). This leaves a permanent intranasal defect.

Continuing the theme of minimally invasive endoscopic access, the purpose of this study is to do a preliminary assessment on the feasibility of using a transantral only approach to the orbit. A transantral approach could eliminate the need for extensive endonasal excision. Depending on the tumor location it could also provide an alternative to a lateral approach.

RESULTS

METHODS AND MATERIALS

Specimens
Four cadaveric specimens were obtained. They were selected based on the closeiness to the time of death and patent vasculature. They were preserved in alcohol and injected with red and blue latex according to the technique outlined by Sanan et al (11). This allowed discrimination between the arterial and venous structures and provided clear visualization of the anatomical relationships.

Endoscopic Dissection Technique
This endoscopic approach utilized a sublabial transantral corridor. The superior labia was retracted and the submucosa was dissected from the maxillary bone to reveal the inferior orbital ostium (7,12). This was done slightly inferior to the inferior orbital meatus approximately midline to the orbit.

A 45 degree endonasal endoscope (Stryker, Kalamazoo MI) was advanced into the maxillary cavity. After removing sections of the mucosa of the posterior wall of the maxillary sinus the inferior optic nerve was identified. Using a microsurgical technique with angled instruments the inferior wall of the orbit was removed lateral to the inferior optic nerve and artery (figure 1 & 2). The inferior rectus muscle was identified superiority to the inferior division of the oculomotor nerve. The periorbital fat was removed to expose the lateral rectus muscle laterally. The optic nerve was then exposed along with the long and short ciliary nerves and the ciliary ganglion (figure 3). Care was taken to preserve the associated vascular structures.

CONCLUSIONS

The approach of surgery is largely determined by tumor size, location and surgeons experience. Ultimately this will determine if an open or minimally invasive approach needs to be undertaken. In some cases minimally invasive techniques can obviate the drawbacks of open approaches, provide an alternative method of access. Gaining better understanding of the endoscopic anatomy can help provide the surgeon with alternative operative corridors and thereby expanding the armamentarium. An endoscopic transantral approach to the infero-lateral orbit is anatomically feasible. The morbidity associated with an open approach could possibly be avoided, improving patient outcomes. Further understanding of the endoscopic anatomy of the orbit can allow for advances in surgery with improved safety and efficacy.

REFERENCES