Surgical Management of Compressive Optic Neuropathy due to Orbital Osseous Lesions

Gregg H. Goldstein, M.D., Eunice E. Park, M.D., Ebrahim Elahi, M.D., Michael R. Shohet, M.D.
Mount Sinai School of Medicine, Department of Otolaryngology—Head and Neck Surgery, New York, NY

Introduction

Optic neuropathy due to compression of the optic nerve is a rare condition caused by a variety of pathologic conditions including tumor, infection, bone dysplasia or trauma. The diagnosis of optic nerve compression due to an osseous lesion is often determined by computed tomography (CT) scans, with thin slices in the axial and coronal planes, as well as visual acuity and visual field testing performed by an ophthalmologist. When conservative medical management with high dose steroids and immunomodulating agents fail to halt the progression of vision loss, surgical intervention is often required.

Multiple surgical approaches have been described for orbital decompression including transorbital and transantral approaches, extranasal transethmoidal approaches and neurosurgical or craniotomy approaches. Transnasal endoscopic optic nerve decompression, however, has mostly been described in the setting of orbital trauma and few series exist describing its utility in the treatment of nontraumatic, compressive optic neuropathy.

The course of the optic nerve is divided into three segments including the intraorbital, intracanalicular and intracranial segments. The intracanalicular portion is the most common site of osseous compression where endoscopic surgery allows access to the medial and inferior aspects of the nerve. The nerve is typically encountered just superior to where the internal carotid artery creates a bulge in the lateral wall of the sphenoid sinus. The ophthalmic artery usually enters the nerve sheath from an inferolateral direction, away from the medial endoscopic approach. Preoperative imaging, however, is important to identify the 10-15% of cases where the nerve travels through a posterior ethmoid or Onodi cell and the 15.5% of cases when the ophthalmic artery is susceptible to injury along the medial aspect of the optic canal.

Discussion

Due to the rarity of nontraumatic osseous lesions of the orbit, few series exist that describe endoscopic orbital decompression as an effective treatment for compressive lesions. The majority of outcome studies that examine the surgical management of traumatic optic neuropathy are complicated by the relatively high rate of spontaneous recovery of visual acuity without surgery. In contrast, nontraumatic orbital osseous lesions usually follow a progressive course once medical management has failed, and visual acuity and visual field testing results can be more closely attributed to the success of surgical intervention.

The standard surgical approach involves an endoscopic sphenoethmoidectomy with a Kerrison rongeur to enlarge the sphenoidotomy. Using image guidance the landmarks of the distorted opticocarotid recess are confirmed and decompression typically begins in an anterior to posterior direction. Atraumatic technique is utilized at the periorbita in order to minimize herniation of orbital fat into the operative field. A modified diamond drill with an irrigation system is used to thin the irregular bone to an egg shell consistency along the posterior orbit.

The advantages of the endoscopic approach include excellent visualization of anatomical landmarks, preservation of olfaction, rapid recovery time and a lack of external scars. Additional procedures are typically complemented by prior surgery rather than hindered by scar artifact or difficult fibrosis.

Conclusions

Progressive osseous lesions of the orbit often require multiple decompressions with a precise surgical approach and minimal morbidity. Recent advances in instrumentation and surgical technique have made endoscopic decompression of the optic nerve a less invasive and more favorable procedure than the traditional craniotomy and transfacial approaches. This case report describes the details and results of the endoscopic approach to orbital osseous lesions to improve or stabilize visual acuity.

Case Report

Five endoscopic optic nerve decompressions were performed on three patients from 2005-2008. The study population consisted of two females and one male patient, age ranging from 10-61 years old, and all patients exhibited preoperative compressive optic neuropathy with decreasing visual acuity. The primary diagnoses consisted of Albright’s syndrome with polyostotic fibrous dysplasia, osteoma and ossifying meningioma. There were no intraoperative or postoperative complications. Median hospital stay was less than 24 hours.

All five procedures in this case report demonstrated an improvement in postoperative visual acuity and visual field testing and there were no complications. Average blood loss was 220cc with an average hospital stay of two days. Patients were followed on average over a course of 32 months. One patient required multiple decompressions due to the progression of the fibrous dysplasia with recurrent impingement on the optic nerve.

References


Contact
Gregg Goldstein, MD
Mount Sinai School of Medicine
Email: gregg.goldstein@mssm.edu