INCIDENCE OF LATERAL RECTUS PALSY IN ANTERIOR PETROSECTOMY APPROACHES

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Abstract

Objectives: To review cases of abducens nerve palsy in anterior petrosectomy / extended middle cranial fossa approaches performed for removal of disease or as a surgical corridor to the clivus, ventral brainstem, or other portions of the intracranial anatomy. This data is not well documented in the neurotology literature.

Study Design: Retrospective chart review.

Methods: Over the past 12 years, approximately 245 patients underwent anterior petrosectomy, petrous apicectomy, or extended middle fossa approaches for a variety of lesions. Their charts and postoperative outcomes were reviewed.

Results: Average age of patients in our study was 43.5 years (range of 8-84 years). 57.6% of our patients were male; 42.4% were female. Three patients suffered from postoperative lateral rectus palsy.

Conclusions: Although approaches to the petrous apex can often be performed without significant morbidity, there is a risk of injury to the abducens nerve and resultant lateral rectus palsy. While the majority of the palsies are reversible, temporary, and not of significant consequence, it is important for the practicing neurotologist to know the petrous apex anatomy well and find ways to reduce the incidence of subsequent injury and morbidity.

Introduction

Safe surgical treatment of lesions of the petrous apex requires a thorough knowledge of the complicated and compact anatomy of the temporal bone, as numerous important structures traverse this area. In particular, the sixth cranial nerve (abducens) is subject to injury during transtemporal skull base surgery for access to the petrous apex.

The abducens nerve, responsible for controlling the lateral rectus muscle, exits the pons medially and enters the dura lateral to the dorsum sellae and travels superiorly along the clivus. As it reaches the apex of the petrous ridge the nerve enters Dorello’s canal along with the inferior petrosal sinus. The nerve then turns one hundred and twenty degrees anteriorly to enter the cavernous sinus.

Dorello’s canal is a significant anatomic landmark in understanding the mechanism of abducens palsy. The canal consists of an osteofibrous space beneath the petrophenoidal (Gruber’s) ligament and between the petrous apex and posterior clinoid of the clivus. As it traverses the narrow canal the nerve is tightly fixed to the dural covering of the petrous apex and Gruber’s ligament. The nerve is highly sensitive to trauma or bleeding in this region due to both the narrow diameter of the canal and its fixation to surrounding structures.

Our case study series will illustrate the types of surgeries where abducens palsy may occur. This should raise awareness in neurotologists of the potential complication when performing these types of cases. Patients should also be preoperatively counseled about the symptoms of lateral rectus palsy for early recognition.

Materials and Methods

Approval of our study was granted by the University of Cincinnati Institutional Review Board prior to initiating our review. Patients who had undergone surgery of the petrous apex were identified using current procedural terminology coding. A database containing patient demographics and surgical details was generated. A chart review was then performed to identify patients who had suffered lateral rectus palsy after surgery of the petrous apex. Those patients with identified lateral rectus palsy had further chart review to identify prognosis regarding their palsy, and a more thorough pre and postoperative chart review was also performed to better delineate indications for surgery, as well as their immediate and long-term postoperative course.

Results

Using current procedural terminology coding 288 patients were initially identified. Of these 288 patients, 9 were excluded after further review revealed their surgery to be lateral temporal bone resection in conjunction with a total parotidectomy. Of the remaining 279, 34 patients were excluded from our study due to inability to obtain their medical records. In total 245 patients who had surgery of the petrous apex over the past twelve years underwent chart review. The average age of patients in our study was 43.5 years with a range of 8-84 years. 57.6% of our patients were male and 42.4% were female. Three patients were identified who had suffered postoperative lateral rectus palsy giving a complication rate of 1.2%.

Case 1

A 59 year old female was noted to have a five day history of altered mental status, dizziness, and frequent falls. MR imaging revealed a cavernoma of the right pons with evidence of recent hemorrhage. She underwent right temporal craniotomy and anterior petrosectomy for cavernoma resection. Postoperatively she was noted to have a right lateral rectus palsy with no other neurologic sequela. At a one month postoperative visit her palsy was still present. At a three month follow-up visit her lateral rectus palsy had entirely resolved and she was doing well.

Case 2

A 54 year old male with a past medical history of basilar artery aneurysm coiling for subarachnoid hemorrhage with multiple brain aneurysms developed recanalization of his aneurysm. He underwent a left extended middle cranial fossa approach with anterior petrosectomy for resection of this aneurysm and arterial bypass. His postoperative course was complicated by a slow neurologic recovery. In the immediate postoperative period he displayed both receptive and expressive aphasia. Over the course of a week his neurologic status slowly improved and his aphasia resolved. At that point, physical exam revealed a left lateral rectus palsy. At a two month postoperative visit his palsy was still present. At a three month follow-up visit his lateral rectus palsy had entirely resolved and his cranial nerve exam was documented as entirely normal.

Case 3

A 37 year old female with a past medical history of childhood acute lymphoblastic leukemia (treated by chemotherapy and radiation) developed seizures. MRI revealed a left sphenoid wing middle fossa meningioma which was treated with subtotal resection at an outside hospital. Just over a year later she was noted to headaches and repeat imaging revealed recurrence in the inferior temporal fossa extending to the petrous apex. With the findings of his initial workup, he underwent a petrous apicectomy and transpetrosal approach to the petrous apex. Three patients were identified who had suffered postoperative lateral rectus palsy giving a complication rate of 1.2%.

• Our data also confirm the common assumption that lateral rectus palsy after petrosectomy is usually transient in nature. Two of our reported palsies resolved entirely over a three month period.

Summary

- Petrosectomy for both eradication of disease of the petrous apex or as a surgical corridor for access to intracranial anatomy is an efficacious and low morbidity procedure in the hands of an experienced neurotologist.

- Complication of lateral rectus palsy after petrosectomy is not well documented in the literature. In reviewing our large series of patients undergoing anterior petrosectomy, we found the complication of a postoperative lateral rectus palsy to be 1.2%.

- Our data also confirm the common assumption that lateral rectus palsy after petrosectomy is usually transient in nature. Two of our reported palsies resolved entirely over a three month period.

References