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The Intracranial and Intracanalicular Optic Nerve as Seen Through Different Surgical Endoscopic and Transcranial Windows

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Introduction

Lesions involving the intracranial or intracanalicular portions of the optic nerve can be approached through a number of different surgical windows. Given the complex anatomy of the optic nerve and its surrounding neurovascular structures, it is essential to understand the optic nerve's conventional and topographic anatomy from different surgical perspectives as well as its relationship with surrounding structures. We describe the intracranial and intracanalicular course of the optic nerve and present an analytical evaluation of the degree of exposure provided by a number of different transcranial and endoscopic surgical approaches.

Methods

Using 5 preserved cadaveric specimens (10 sides), pterional, mini-pterional, fronto-temporo-orbital, supraorbital, subfrontal, and extended endonasal approaches were performed. The transcranial approaches were extended by removing the anterior clinoid process, unroofing the optic canal, and/or cutting the falciform ligament. The endonasal approach was extended using the transtubercular-transplanum, trans-medial optic carotid recess, and transcanalicular modifications. The optic nerve was divided coronally into segments and subsegments and surgical exposure and maneuverability were assessed within each.

Results

The pterional, mini-pterional, and supraorbital approaches allowed for exposure of the superior and lateral segments with visualization of some aspects of the contralateral nerve, while the subfrontal approach allowed for wide superior exposure. The fronto-temporo-orbital approach combined exposure offered by the frontotemporal and supraorbital approaches. The extended endoscopic endonasal approaches provided good surgical access to the inferior and medial segments of the nerve. The superior segments of the distal and proximal portions of the nerve were visualized with the use of an angled endoscopes.

Conclusions

The transcranial routes allowed a good exposure of the supero-lateral quadrants while the inferior and medial quadrants of the optic nerve can be well visualized with the endoscopic endonasal approach and its extensions. Endoscopic and transcranial approaches can be complementary if a circumferential exposure of the optic nerve is desired.

Learning Objectives

By the conclusion of this session, participants should be able to describe the expose each of the given approaches provides of the optic nerve intracranially