

Ali Tafreshi; Robin Du BS; Daniel Donoho MD; Gabriel Zada MD MS
 Department of Neurological Surgery
 Keck School of Medicine of the University of Southern California

Introduction

Fourth ventricular lesions may pose a significant surgical challenge, often requiring a telovelar approach. Early reports suggest that endoscopy may provide improved visualization in selected cases; however, its utility in suboccipital approaches for fourth ventricular lesions has not been well-studied. Our case series reports the use of an adjustable-angle neuroendoscope in a suboccipital craniotomy and modified telovelar approach in the resection of 8 fourth ventricular lesions.

Methods

We retrospectively reviewed patients who underwent endoscopic-assisted fourth ventricular lesion resection via a median aperture and standard suboccipital approach at the Los Angeles County+USC Medical Center and the Keck Hospital of USC from 2011 to 2017. Depending on its role and need in each specific case, the endoscope was used for the entire tumor resection, to verify the extent of resection, for the resection of additional tumor, and/or to confirm cerebrospinal fluid (CSF) flow from the caudal cerebral aqueduct, with different combinations of the above uses often employed. Patient demographics, preoperative status, surgical details, pathology, and postoperative complications were analyzed.

Results

Our case series consisted of 8 patients. Preoperative symptoms included headache (n=7, 87.5%), nausea and gait disturbance (each n=4, 50.0%), vomiting and dizziness (each n=3, 37.5%), and blurry vision, dysphagia, and altered mental status (each n=2, 25.0%). In half of the cases, the endoscope was used for the majority of the resection or to resect additional tumor following microscopic resection. In the other half, it was used to confirm extent of resection and/or patency of the cerebral aqueduct. Gross total resection was achieved in 4 patients (50%). Postoperative pathology included 2 ependymomas, 2 rosette-forming glioneuronal tumors, 1 pilocytic astrocytoma, 1 metastatic melanoma, 1 epidermoid cyst, and 1 organized hematoma.

Median hospital length of stay was 18 days (range 5-42 days). Postoperative complications included one instance each of transient right arm weakness, transient intractable hiccups, and laryngomalacia which required postoperative reintubation and subsequent tracheostomy (Table 1). In addition, one patient was readmitted within 30 days of discharge for wound washout and ventriculostomy placement after presenting postoperatively with wound infection, meningitis, and leukocytosis. No other patients required reoperation. As a whole, there was improvement in clinical symptoms at postoperative follow-up.

Conclusions

An adjustable-angle endoscope inserted via the median aperture was used as an adjunct to suboccipital craniotomy to aid in the resection of fourth ventricular lesions via a median aperture approach, verification of the extent of resection, and/or confirmation of patency of the cerebral aqueduct by providing improved visualization. No instances of morbidity attributed to neuroendoscopic-assisted resection occurred. Our series demonstrates the feasibility of supplementing microsurgical approaches to the fourth ventricle using neuroendoscopy, across a variety of lesion types, with acceptable rates of postoperative complications.

Table 1: Case details

Case	Pathology	Extent of resection	Use of endoscope	Postoperative complications
1	Pilocytic astrocytoma	Biopsy & cyst fenestration	Entire resection	None
2	Rosette-forming glioneuronal tumor	GTR	Additional resection Confirm CSF flow	None
3	Metastatic melanoma	STR	Verify extent of resection	Transient right arm weakness
4	Ependymoma	GTR	Confirm CSF flow	Laryngomalacia, hyponatremia
5	Rosette-forming glioneuronal tumor	STR	Entire resection	Nausea, leukocytosis, hypokalemia, hyperglycemia
6	Epidermoid cyst	GTR	Verify extent of resection	Nausea, intractable hiccups, leukocytosis, seroma, shortness of breath
7	Organized hematoma	STR	Entire resection Confirm CSF flow	None
8	Ependymoma	GTR	Confirm CSF flow	Wound infection, meningitis, ventriculitis, leukocytosis

STR: subtotal resection; GTR: gross total resection

Learning Objectives

- By the conclusion of this session, participants should be able to:
- 1) Describe the various uses of an endoscope in the resection of fourth ventricular lesions
 - 2) Describe the range of pathologies for which an endoscopic telovelar approach would be useful
 - 3) Describe the complications of fourth ventricular lesion resection

References

Austerman, R., Lucas, J., Kammen, A., & Zada, G. (2017). Endoscopic-Assisted Median Aperture Approach for Resection of Fourth Ventricular Tumor and Confirmation of Patency of Cerebral Aqueduct Using an Adjustable-Angle Endoscope: Technical Case Report. *Operative Neurosurgery*, 13(2), 293-296.

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Figure 1: Preoperative symptoms vs. postoperative symptoms at follow-up

