Understanding Surgeon Decision-Making Between Endoscopic Endonasal and Open Transcranial Approaches for Craniopharyngioma: A Systematic Review of Imaging and Tumor Characteristics



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Abstract

Background: Craniopharyngiomas are rare suprasellar tumors resected via endoscopic endonasal (EEA) or open, transcranial approaches, but the indications for each have not been clearly defined. Here, we seek to review the literature and compare the tumor and clinical characteristics of lesions resected by the EEA versus open approach.

Methodology: A comprehensive database of PubMed, Google Scholar, and Embase was conducted. Studies were included both EEA and open approaches were utilized. Systematic reviews, meta-analyses, case reports, and articles not written in English were excluded.

Results: A total of 16 studies met inclusion criteria. No studies reported a

Results

- 16 studies were included for data extraction (Figure 1).
- Demographic Differences:
 - 50% of studies that reported race found significant differences, with white patients being more common in both the EEA and open groups.
- **Preoperative Tumor Differences**
 - No significant differences in tumor location, consistency, pathological type, or calcification.
 - One study found larger preoperative tumor volume in the open group (p<0.001).⁶

significant difference in tumor location, consistency, pathologic type, or presence of calcification. Only one study reported an increased preoperative tumor volume with the open approach. In 3 out of 16 studies, gross total resection (GTR) was found to be significantly more common in the endoscopic group. The open approach was found to be significantly associated with a longer follow-up period (4/16) and hospital length of stay (2/16), and a greater rate of recurrence (2/16) and mortality (1/16). New onset diabetes insipidus (3/16) and vision deterioration (3/16) following surgery was significantly more common following an open approach.

Conclusions: Inherent in the surgical decision-making regarding approach are the anatomical considerations of the tumor. Interestingly, we found that tumor characteristics through the literature search were not substantially different for the different approaches, even though this is consistent with our clinical experience. This may be related to the development and refinement of endonasal techniques which allow larger, suprasellar tumors to be amenable to GTR moreso than the past.

Introduction

- The intricate location of craniopharyngiomas and diverse clinical \bullet manifestations make surgical treatment a challenge for physicians.¹
- The two most common approaches for craniopharyngioma resection include an endoscopic endonasal (EEA) and transcranial (open) approach.¹

- **Gross Total Resection Rates**
 - The EEA group had higher rates of gross total resection (GTR) in 3 out of 13 studies (EEA: 13.4%-94.3% vs. Open: 12.8%-90.5%). Other studies showed no differences
- Outcomes ullet
 - The **open approach** was found to be significantly associated with a longer follow-up period (4/16) and hospital length of stay (2/16), and a greater rate of recurrence (2/16) and mortality (1/16)
 - New onset diabetes insipidus (3/16) and vision deterioration (3/16) following surgery was significantly more common following an open approach, with rates as high as 25% compared to 10% in the endoscopic group for visual complications
 - CSF leak was significantly more common in the endoscopic group (4/16).



Figure 2.

Representation of Craniopharyngioma Anatomy.

- While both approaches are used for craniopharyngioma resection, the indications for each have not been clearly delineated.³⁻⁵
- Here, we seek to review the literature and compare the tumor and imaging characteristics of craniopharyngiomas resected by the EEA versus the open approach



Figure 1. Systematic Review Process Flow

Methods and Materials

- A systematic literature search was performed using the following databases: PubMed, Embase, and Google Scholar.
- Studies were uploaded into Covidence (Cochrane, London, UK) \bullet
- Inclusion criteria: Papers comparing endonasal endoscopic (EEA) and open approaches for craniopharyngioma resection
- Exclusion criteria: Papers that only utilized one approach (ex: an institutional study looking at the outcomes of EEA approaches for

Adapted from Terese Winslow LLC.

Discussion

- Interestingly, tumor characteristics (ex: location, consistency, pathologic subtype, presence of calcification) were not substantially different for the different approaches.
 - While these findings may reflect surgeon preferences or training influences, they also raise intriguing questions about the evolution and utility of endoscopic surgery.
 - **Endoscopic techniques** have advanced significantly, and **have** likely led surgeons to resect tumors that were previously considered suitable only for open surgery
- The advances in endoscopic surgery may also be reflected by its higher rates of GTR
- Postoperative complications were generally more common in the open group compared to the EEA group.
 - These decreased rates of postoperative complications in the endoscopic group may reflect the better quality of life the

craniopharyngiomas Case reports, systematic reviews, meta-analyses, or not written in English

approach offers to patients, especially in relation to visual and endocrine function

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