



# Near Universal Vision Improvement Following EEA for Craniopharyngioma Irrespective of Optic Pathway Involvement

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## Introduction

- Visual dysfunction represents a major presenting symptom in craniopharyngioma, with tumors frequently compressing or invading the optic apparatus
- Endoscopic endonasal approaches (EEA) offer direct visualization and decompression of optic structures
- The prognostic value of specific preoperative anatomic involvement patterns (chiasm vs. tract vs. combined) is unclear.

**Objective:** Investigate whether specific optic pathway involvement patterns serve as prognostic indicators for visual recovery following EEA

## Methods and Materials

**Study Design:** Single-institution retrospective cohort (2008-2024); adult and pediatric patients undergoing EEA for craniopharyngioma. N = 114 patients; 84 (73.7%) with preoperative visual disturbance; 75 with documented outcomes

### Assessments

| Domain                     | Classification  |
|----------------------------|---|
| Preoperative visual status | Decreased acuity or field defects on formal ophthalmologic evaluation |
| Postoperative outcome      | Normalized, partially improved, unchanged, or worsened                |
| Radiographic Compression   | Chiasm-only, tract-only, combined, or neither                         |

### Statistical Analyses:

- Continuous variables: t-test or Wilcoxon rank-sum
- Categorical variables: Chi-squared or Fisher exact

## Results

**Table 1.** Patient Characteristics by Preoperative Visual Status

| Characteristic           | Visual Disturbance (N=84) | Without (N=30) | p-value                    |
|--------------------------|---------------------------|----------------|----------------------------|
| Age, years (mean)        | 44.9                      | 28.7           | <b>0.005</b> (t-test)      |
| Optic chiasm involvement | 86.7%                     | 57.9%          | <b>0.012</b> (chi-squared) |

**Table 2.** Visual Outcomes (N=75)

| Outcome             | N  | %     |
|---------------------|----|-------|
| Normalized          | 53 | 70.7% |
| Partially improved  | 10 | 13.3% |
| Unchanged           | 8  | 10.7% |
| Worsened            | 4  | 5.3%  |
| Overall Improvement | 63 | 84%   |

**Table 3A.** Visual Improvement Rate by Location of Radiographic Compression (N=65)

| Radiographic Compression | N  | Improved | Improvement Rate |
|--------------------------|----|----------|------------------|
| Chiasm-only              | 16 | 15       | 93.8%            |
| Neither                  | 6  | 5        | 83.3%            |
| Combined                 | 40 | 33       | 82.5%            |
| Tract-only               | 3  | 2        | 66.7%            |
| p-value (chi-squared)    |    |          | 0.662            |

**Table 3B.** Pre-operative vs. Post-operative MRI by Location of Radiographic Compression

| Location    | Pre-operative MRI | Post-operative MRI |
|-------------|-------------------|--------------------|
| Chiasm-only |                   |                    |

## Results

| Location   | Pre-operative MRI | Post-operative MRI |
|------------|-------------------|--------------------|
| Tract-only |                   |                    |
| Combined   |                   |                    |
| Neither    |                   |                    |

**Table 4.** Comparative tumor characteristics of patients with [worsened] vs. [not worsened] visual outcomes

| Characteristic                       | Worsened (N=4) | Not Worsened (N=71) | p-value          |
|--------------------------------------|----------------|---------------------|------------------|
| Combined chiasm + tract involvement  | 100% (3/3)     | 53.6%               | 0.074 (Fisher)   |
| Third ventricle involvement          | 100% (3/3)     | 48.9%               | 0.090 (Fisher)   |
| Hypothalamic invasion                | 66.7% (2/3)    | 73.2%               | 1.000 (Fisher)   |
| Recurrent tumor                      | 75% (3/4)      | --                  | 0.284 (Fisher)   |
| Tumor volume, cm <sup>3</sup> (mean) | 12.5 ± 7.5     | 10.0 ± 16.2         | 0.534 (Wilcoxon) |
| GTR achieved                         | 25% (1/4)      | 47.3%               | 0.357 (Fisher)   |

## Discussion

### Visual Outcomes in Context:

- Our 84% improvement rate aligns with published series reporting 60-90% visual improvement following craniopharyngioma surgery [1,2]
- Multi-institutional studies demonstrate visual outcomes correlate most strongly with preoperative deficit severity and symptom duration rather than specific anatomic involvement patterns [3]

### Key Finding:

- Neither chiasm, tract, nor combined involvement predicted visual outcomes (p=0.662)
- This challenges the assumption that more extensive optic pathway involvement portends worse visual prognosis, however, limitations in power caution interpretation, such as: Post-hoc comparison of chiasm-only (93.8%) vs. tract-only (66.7%) yields an OR = 7.50 (p = 0.298, Fisher exact), yet underpowered with only 3 tract-only cases
- EEA provides direct visualization of the entire optic apparatus, which may explain uniformly high improvement rates regardless of involvement pattern

**Worsened Vision Subgroup (n=4):** All had combined chiasm + tract involvement (p=0.074), third ventricle extension (p=0.090). 75% were recurrent tumors. Worsened outcomes appear associated with greater anatomic extent of tumor burden rather than any single anatomic location

**Limitations:** Retrospective design; postoperative visual assessment not uniformly formal ophthalmologic testing; small worsened subgroup (n=4) limits power for predictor analysis

## Conclusions

Visual improvement following EEA is near-universal (84%) and independent of preoperative optic pathway involvement pattern. Combined chiasm and tract involvement (p = 0.074) and third ventricle extension (p = 0.090) trended toward association with worsened outcomes, suggesting greater anatomic tumor burden, rather than any single location of compression, may be the relevant prognostic factor. Direct visualization of the entire optic apparatus may explain the uniformly favorable outcomes across involvement patterns.

## Contact

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## References

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