

## Intro

Craniopharyngiomas (CP) are tumors arising from the sellar/suprasellar region.<sup>1</sup> These tumors often have a mix of solid and cystic components and are known to experience frequent recurrences.<sup>2</sup> In patients with CP, cyst fenestration is often performed during surgery to drain the fluid and ideally prevent fluid reaccumulation.<sup>2</sup> Whether or not piercing the cyst through both the near and far walls into a CSF space (deep fenestration) affects recurrence is unknown.<sup>3</sup> This consideration is especially important when recurrence of the cystic component impinges on vital neuronal pathways.<sup>4</sup>

## Objectives

To assess the association between deep fenestration and recurrence, stratified by extent of resection (EOR).

## Methods and Materials

We retrospectively identified a cohort of 80 patients who underwent surgery for craniopharyngioma at the Johns Hopkins Hospital between January 1, 2015, and January 1, 2025. "Deep fenestration" was defined as creation of a communication through both cyst walls. "No deep fenestration" included punctures or single-wall openings. Patients were stratified by EOR into gross total and near total resection (GTR and NTR; n = 40) and subtotal resection (STR; n = 40). Primary outcomes were recurrence and time-to-recurrence (TTR). Group comparisons were performed using the appropriate two-sample test based on variable distribution: Student's t-test (parametric, equal variance), Welch's t-test (parametric, unequal variance), or Mann-Whitney U test (nonparametric). Progression-free survival (PFS) was calculated with Kaplan-Meier and compared with log-rank testing. All analyses were completed in R.

## Results

In the GTR cohort, deep fenestration (n = 12) vs. no deep fenestration (n = 28) showed similar recurrence rates of 33.3% vs 42.9%, respectively (p = 0.573). Among those who recurred, median TTR was shorter after deep fenestration (median: 99 days) than without deep fenestration (median: 494.5 days) (p = 0.067). In the STR cohort, deep fenestration (n = 11) vs. no deep fenestration (n = 29) also showed similar recurrence rates of 63.6% vs 55.2%, respectively (p = 0.485). The median TTR in the STR cohort was 164 days for the deep fenestration group and 104.5 for the no deep fenestration group. Kaplan-Meier PFS curves showed no significant difference between deep and no deep fenestration in either stratum.

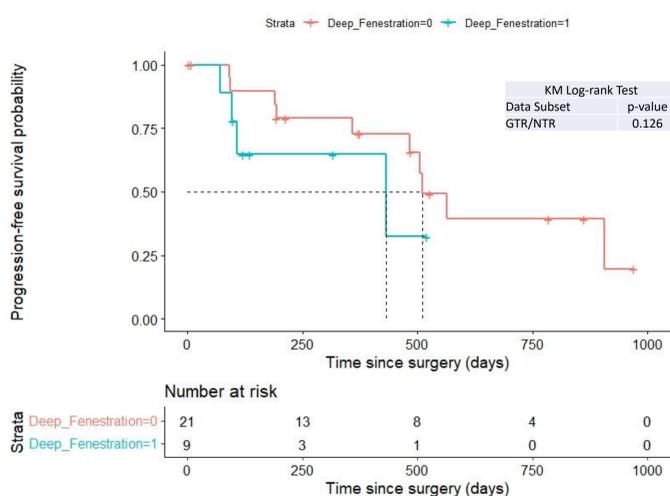
**Table 1.** Gross total resection/ near total resection (GTR/NTR) demographics and recurrence

Characteristic	GTR/NTR (n=40)		p-value
	Deep Fenestration (n=12)	No (n=28)	
Age (years)	35.5 (24.5)	50.5 (27.0)	0.094
Sex (Male)	8 (66.7%)	14 (50.0%)	0.332
Race			
White	8 (66.7%)	16 (57.1%)	0.794
Black or African American	2 (16.7%)	8 (28.6%)	
Asian	0 (0.0%)	0 (0.0%)	
Other	2 (16.7%)	4 (14.3%)	
CP Histologic Subtype			
Adamantinomatous	10 (83.3%)	25 (89.3%)	0.602
Papillary	2 (16.7%)	3 (10.7%)	
CCI	2.0 (0.5)	4.0 (2.3)	0.057
MFI-11	0.0 (1.0)	0.0 (1.0)	0.207
Recurrence	4 (33.3%)	12 (42.9%)	0.573
Time to Recurrence (days)	99.0 (11.0)	494.5 (455.9)	0.067

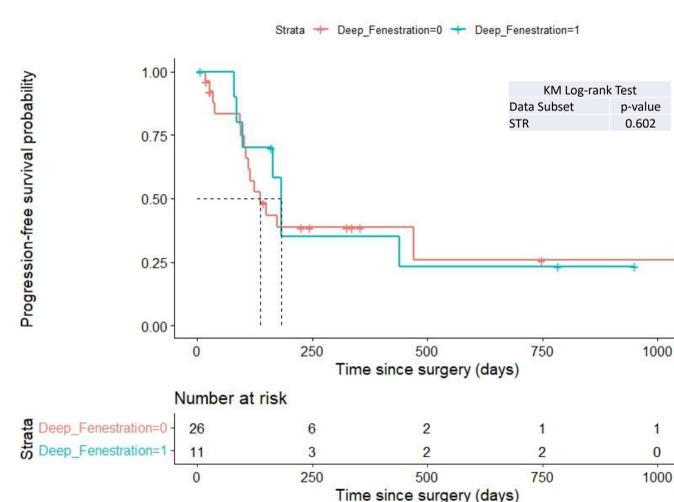
**Table 2.** Sub total resection (STR) demographics and recurrence results

Characteristic	STR (n=40)		p-value
	Deep Fenestration (n=11)	No (n=29)	
Age (years)	17.0 (43.5)	34.0 (44.0)	0.565
Sex (Male)	6 (54.5%)	10 (69.0%)	0.247
Race			
White	3 (27.3%)	16 (55.2%)	0.235
Black or African American	5 (45.5%)	8 (27.6%)	
Asian	0 (0.0%)	2 (6.9%)	
Other	3 (27.3%)	3 (10.3%)	
CP Histologic Subtype			
Adamantinomatous	10 (90.9%)	21 (72.4%)	0.211
Papillary	1 (9.1%)	8 (27.6%)	
CCI	3.0 (1.0)	3.0 (2.0)	0.867
MFI-11	1.0 (1.5)	0.0 (1.0)	0.250
Recurrence	7 (63.6%)	16 (55.2%)	0.711
Time to Recurrence (days)	164.0 (90.5)	104.5 (97.8)	0.485

**Figure 1.** Time-to-recurrence following GTR/NTR



**Figure 1.** Time-to-recurrence following STR



## Discussion

In this single-institution study, we explored the efficacy and utility of fenestrating the near and far walls of the cystic component of craniopharyngiomas in preventing or delaying recurrence. Our results indicate that deep fenestration is not associated with a change in recurrence probability or time-to-recurrence. This study is limited by its retrospective design and small cohort sizes.

## Conclusions

Deep fenestration of CP cysts was not associated with lower recurrence in either EOR subgroup. Overall, this data suggests that deep fenestration should not be assumed to mitigate recurrence risk. As a result, its value can be perceived as decompressive rather than disease-modifying. Validation of these results in larger, multi-institutional cohorts will be important to further define its clinical utility.

## Contact

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## References

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