Post-operative suprasellar CSF leak in non-pituitary pathology: A single institution case series

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Background

- Endoscopic endonasal surgery is being increasingly utilized over transcranial approaches for suprasellar lesions including meningiomas, Rathke cleft cysts, and craniopharyngiomas.
- Accessing these suprasellar tumors presents challenges over other locations in the sagittal plane as their superior extension thins the diaphragma or may erode into the third ventricle making intraoperative high flow leaks much more common and oftentimes unavoidable.

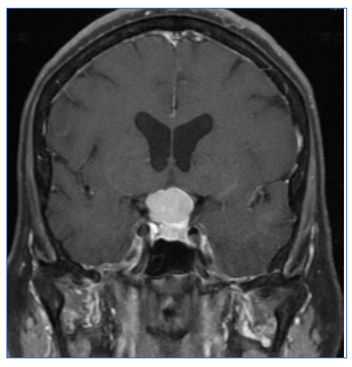

Figure 1. Coronal T1 with contrast MRI with contrast enhancing mass consistent with tuberculum sella meningioma, with upward mass effect on the optic chiasm.

Objective

This study aims to use a decade-long experience with suprasellar pathology to identify etiology of post-operative CSF leaks as well as best practices for avoidance and management.

Methods and Materials

This is a single-institution retrospective case series reviewing post-operative CSF leaks associated with suprasellar defects for **non-pituitary pathology** from 2015-2025. Patients with other extended approaches in the sagittal plane, including transcribriform and transclival, were not included in this analysis. Patient demographics, operative and reconstructive techniques, and strategy for post-operative leak management were among the variables collected.

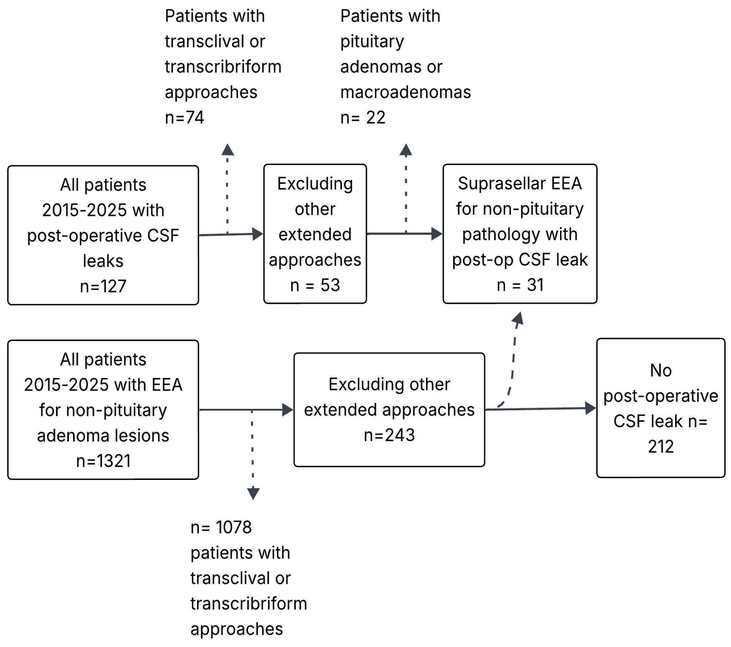

Figure 2: Study design and inclusion criteria.

Results

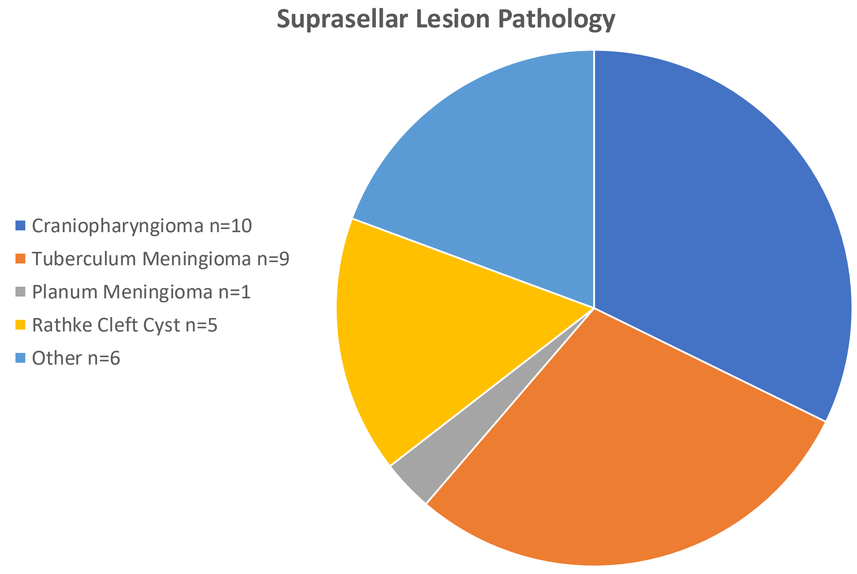

Figure 3: Distribution of included suprasellar pathologies.

Results

Table 1: Details on patient CSF leaks and reconstructive techniques at time of initial tumor resection.

Cohort	n= (%)
Total patients with suprasellar EEA	243
Total with post-operative CSF leak	31 (12.8)
Patients with Post-Operative Leaks (n=31)	
Recurrent lesion	12 (38.7)
Intra-operative Leaks	28 (90.3)
Low Flow	0 (0.0)
High Flow	28 (100)
Reconstruction at initial surgery	
Dural substitute inlay	26 (83.9)
Fascia lata onlay	9 (29.0)
Nasoseptal flap	26 (83.9)
Free mucosal graft	2 (6.5)
Pericranial flap	1 (3.2)
No mucosal coverage*	2 (6.5)
Lumbar drain or EVD (initial surgery)	6 (19.4)
Management of leak	
Return to OR for exam	31 (100)
Lumbar drain or EVD (take back surgery)	27 (87.1)

- = No mucosal coverage was used in two patients with Rathke cleft cysts that had no evidence of intraoperative CSF leak

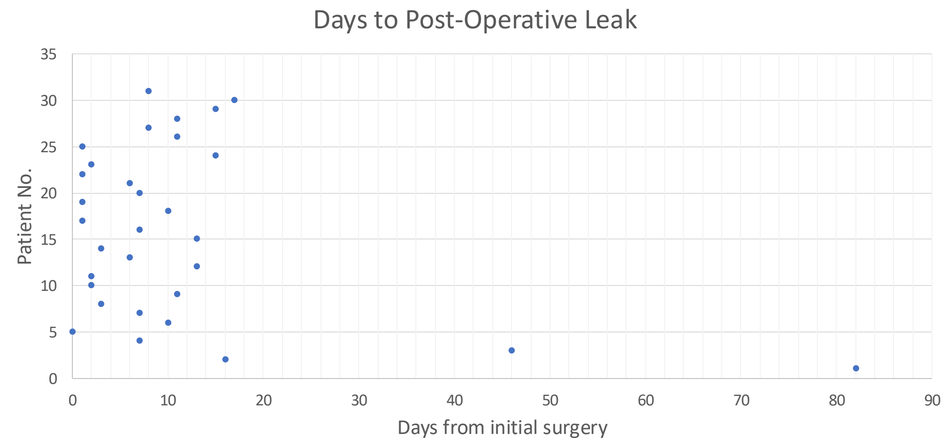

Figure 4: 11 patients presented with post-operative leaks during their same admission, whereas 20 patients were readmitted for leak management.

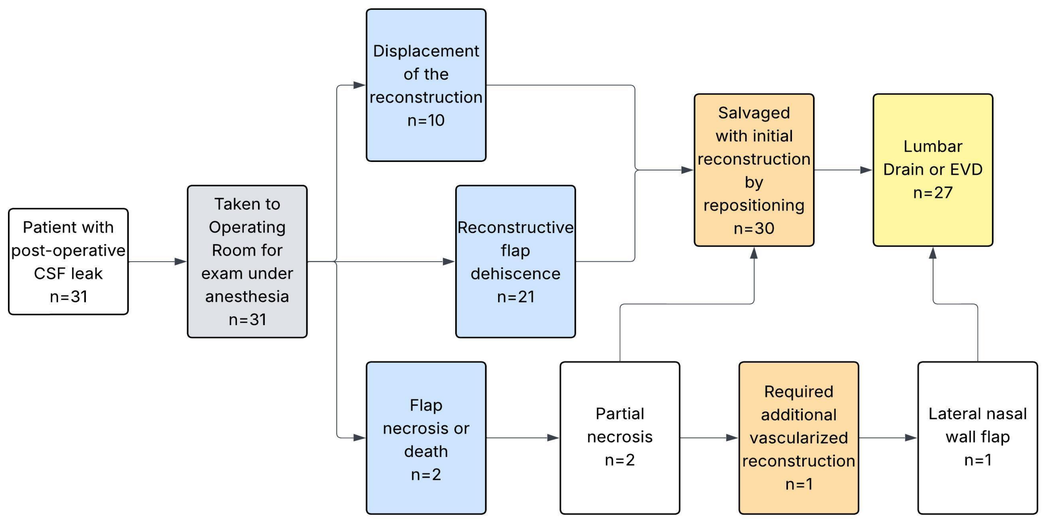

Figure 5: Management of and intraoperative findings for post-operative CSF leaks.

Conclusions

- Overall post-operative leak rate for suprasellar non-pituitary adenoma lesions was 12.8%
- A majority of suprasellar leaks result from displacement or dehiscence of the reconstruction
- Flap necrosis is a rare reason for post-operative CSF leak
- Most can be salvaged with return to the operating room for leak identification and reconstruction repositioning and securing
- **All leaks should be managed by prompt return to the OR**
- Future efforts to reduce the incidence of suprasellar CSF leaks could focus on optimizing technique to avoid flap dehiscence and novel techniques to better secure the reconstruction.

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References

1. Jimenez AE, Harrison Snyder M, Rabinovich EP, Malkawi D, Chakravarti S, Wei O, Cheshire M, Carrie Price MLS, Khalafallah AM, Rowan NR, Mukherjee D. Comparison and evolution of transcranial versus endoscopic endonasal approaches for suprasellar Meningiomas: A systematic review. J Clin Neurosci. 2022 May;99:302-310. doi: 10.1016/j.jocn.2022.03.029. Epub 2022 Mar 21. PMID: 35325729.
2. Li B, Zhao S, Fang Q, Nie D, Cheng J, Zhu H, Li C, Gui S, Zhang Y, Zhao P. Risk factors and management associated with postoperative cerebrospinal fluid leak after endoscopic endonasal surgery for pituitary adenoma. Front Surg. 2022 Sep 7;9:973834. doi: 10.3389/fsurg.2022.973834. PMID: 36157406; PMCID: PMC9489931.
3. Zwagerman NT, Wang EW, Shin SS, Chang YF, Fernandez-Miranda JC, Snyderman CH, Gardner PA. Does lumbar drainage reduce postoperative cerebrospinal fluid leak after endoscopic endonasal skull base surgery? A prospective, randomized controlled trial. J Neurosurg. 2018 Oct 19;131(4):1172-1178. doi: 10.3171/2018.4.JNS172447. PMID: 30485224.