

# RESCUE FLAP STRATEGY FOR SKULL BASE SURGERY: SELECTIVE CONVERSION TO NASOSEPTAL ONLY IN TRANSOPERATIVE CSF LEAK

Núñez-Velasco Santiago, Ramos-Mora Andrea Paola, Ramírez-Medina Estefania, Gómez-Zamora Gabriel, Jáuregui-Gamboa José de Jesús, Orozco-Navarro Ana Carolina, Ortiz-Hernández Enrique Gerardo.

Neurosurgery Department, Hospital Civil de Guadalajara, "Fray Antonio Alcalde".  
University of Guadalajara, Centro Universitario de Ciencias de la Salud.

## INTRODUCTION

Cerebrospinal fluid (CSF) leaks remain one of the most relevant complications following endoscopic transnasal pituitary surgery. Traditional risk factors include tumor size, parasellar invasion, and patient-related factors such as overweight and diabetes.

The conventional nasoseptal flap is elevated at the beginning of surgery to provide vascularized reconstruction, but this approach increases nasal morbidity.

The "rescue flap" is a selective, vascularized reconstruction technique designed to prevent postoperative leaks while minimizing morbidity, it allows to preserve the vascularity and could be elevated only if reconstruction is required.

## OBJECTIVE

Evaluate the effectiveness of selectively use of the nasoseptal flap for intraoperative CSF leaks in skull base surgery.

## METHODS

### Cross-sectional observational study

114 patients  
Endoscopic transnasal surgery  
2021 → 2025

Intraoperative CSF leaks were classified by grade (0–3). The use of a nasoseptal rescue flap and the occurrence of postoperative CSF leak were recorded.

Associations between intraoperative leak grade and flap use were analyzed using the Chi-square test.

Student's t-test was used to assess the relationship between weight or body mass index (BMI) and postoperative CSF leak.

## REFERENCES

1. Zhang C., Zanation A., Hadad G. & Ebert C. (2023). Strategy Of Skull Base Reconstruction After Endoscopic Surgery. *Frontiers In Surgery*, 10, 23-159.
2. Gardner Wheless S. & Zanation A. (2021). Nasoseptal Rescue Flap: A Novel Modification Of The Nasoseptal Flap Technique. *Laryngoscope*, 1-83(4).
3. Sung K., Lee S. & Moon, H. (2020). Anterior Skull Base Reconstruction Using Nasoseptal Flap. *Journal Of Otolaryngology. Head & Neck Surgery*, 49(1).

## RESULTS

The mean patient age was 47.7 years (range 16–86), and 61% were female. The mean BMI was 28.0, and 18% of patients had diabetes mellitus.

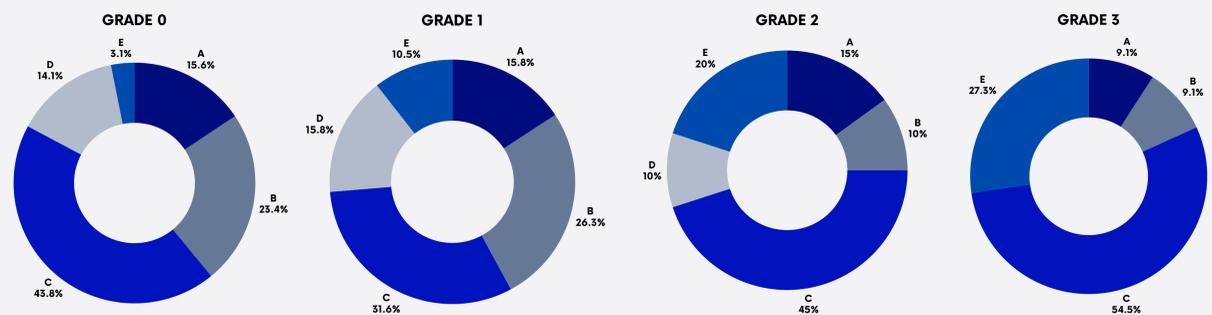


Figure 1.

Intraoperative CSF leak grades were distributed as follows: grade 0 in 64 patients, grade 1 in 19, grade 2 in 20, and grade 3 in 11 (Figure 1). Postoperative CSF leak occurred in 5 patients (4.4%), primarily in the extreme leak grades (0 and 3), although this association was not statistically significant ( $p = 0.10$ ) (Figure 2).

Figure 2. Grade of intraoperative CSF leak

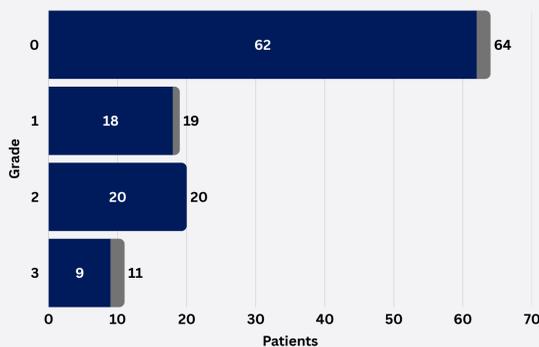
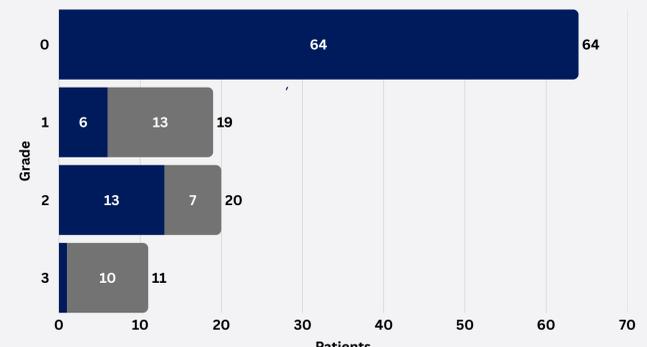


Figure 3. Grade of intraoperative CSF leak vs rescue flap



A nasoseptal rescue flap was used in 30 patients (26%) and showed a strong proportional relationship with intraoperative leak severity, which was statistically significant ( $p < 0.0001$ ) (Figure 3).

## DISCUSSION

The postoperative CSF leak rate of 4.4% is consistent with previously published series. Intraoperative CSF leak grade was the primary factor guiding nasoseptal flap use ( $p < 0.0001$ ), supporting a selective rather than routine reconstructive strategy. These findings suggest that surgical and anatomical factors play a more relevant role than demographic or tumor classification variables.

## CONCLUSIONS

In this case series, intraoperative CSF leak grade was the main determinant guiding selective use of the nasoseptal rescue flap in endoscopic transnasal pituitary surgery. Only two patients who did not receive a flap developed postoperative CSF leaks, indicating that a tailored, leak-based reconstructive strategy is both safe and effective. High-grade leaks benefited most from flap reconstruction, while low-grade or absent leaks were associated with a low risk of postoperative CSF leakage. This approach minimizes unnecessary nasal morbidity without compromising surgical outcomes.