

BACKGROUND

The supraoptic triangle (SOT) is a bony–dural region located along the superolateral surface of the optic canal. It is bounded inferiorly by the optic nerve, laterally by the projection of the lateral optico-carotid recess, and superomedially by the planum sphenoidale.

Despite extended transtuberulum–transplanum drilling, lateral access to the SOT remains restricted during endoscopic endonasal surgery (EEA).

Ethmoidal artery division, commonly performed for devascularization of anterior skull base tumors, enables lateral periorbital displacement and may expand the surgical corridor. However, quantitative evidence supporting this effect remains limited.

OBJECTIVE

To quantitatively assess the effect of posterior ethmoidal artery (PEA) and combined anterior + posterior ethmoidal artery (AEA+PEA) division on SOT exposure.

METHODS

Endoscopic endonasal cadaveric dissections were performed.

SOT exposure was sequentially assessed in three stages:

1. Baseline after transtuberulum–transplanum drilling
2. After posterior ethmoidal artery (PEA) division
3. After combined anterior + posterior ethmoidal artery (AEA+PEA) division

Quantitative metrics included:

- Exposed SOT area (mm²)
- Largest SOT diameter (mm)

Measurements were obtained using calibrated image analysis (ImageJ). Calibration was performed using a microruler placed in the surgical field to convert pixel measurements into real distances, ensuring accurate area and diameter calculations.

RESULTS

Six sides were analyzed.

SOT Area

Mean exposed SOT area increased progressively:

- Baseline: 34.8 ± 24.1 mm²
- After PEA: 43.7 ± 28.9 mm²
- +25.6 ± 9.3% (p = 0.012)
- After AEA+PEA: 50.8 ± 36.1 mm²
- +43.9 ± 11.1% vs baseline (p = 0.003)

Largest Diameter

Largest SOT diameter expanded significantly:

- Baseline: 6.1 ± 0.4 mm
- After PEA: 7.0 ± 0.5 mm
- +15.2 ± 4.8% (p = 0.021)
- After AEA+PEA: 8.2 ± 0.4 mm
- +34.4 ± 6.9% vs baseline (p < 0.001)

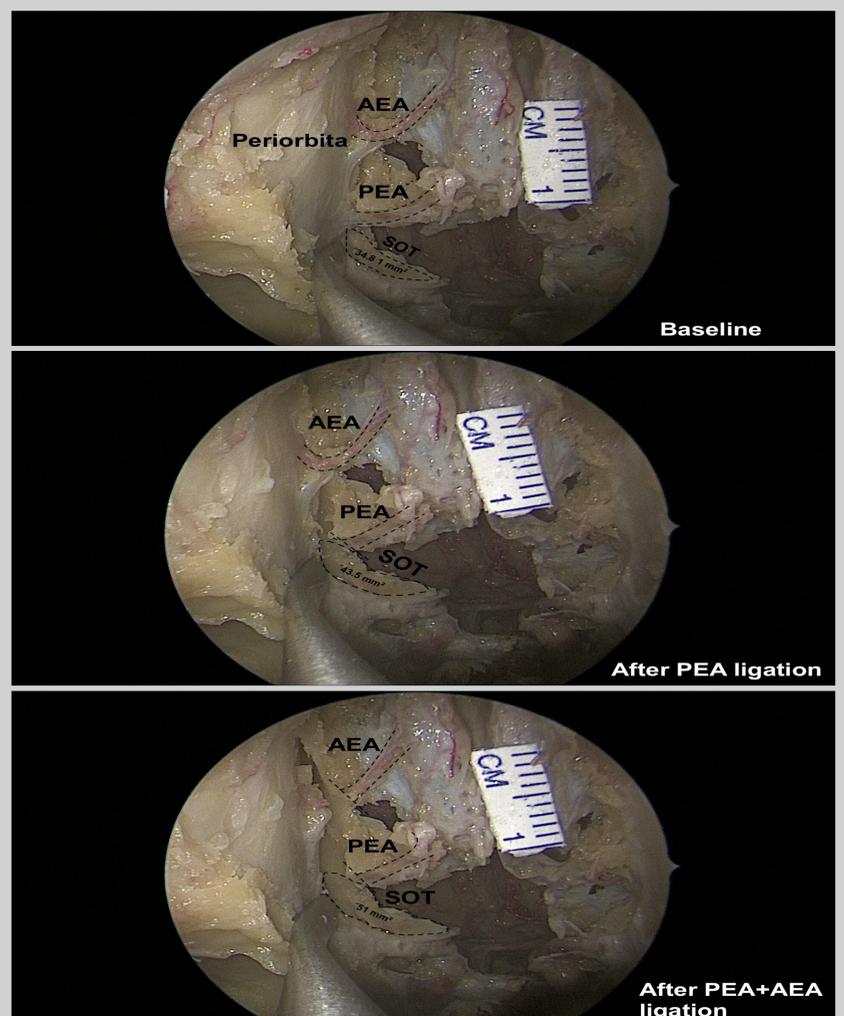
KEY FINDINGS

- Ethmoidal artery division results in stepwise lateral corridor expansion
- Both SOT area and diameter increased significantly
- Combined AEA+PEA division produced the greatest exposure gain
- Findings support periorbital displacement as the underlying mechanism

CONCLUSION

Posterior and anterior ethmoidal artery division provide significant, stepwise lateral expansion of the supraoptic triangle during endoscopic endonasal surgery.

These findings support ethmoidal artery ligation as a practical adjunct to enhance lateral optic canal and supraoptic triangle exposure in selected cases.



REFERENCES

1. Kassam, A. B., Gardner, P., Snyderman, C., Mintz, A., & Carrau, R. (2005). Expanded endonasal approach: Fully endoscopic, completely transnasal approach to the anterior skull base and clivus. *Neurosurgical Focus*, 19(1), E6. <https://doi.org/10.3171/foc.2005.19.1.7>
2. Cavallo, L. M., Cappabianca, P., Galziz, R., Iaconetta, G., de Divittis, E., & Tschabitscher, M. (2005). Endoscopic endonasal approach to the sellar and suprasellar region: Anatomical study and clinical considerations. *Neurosurgery*, 56(Suppl 1), 136–147.
3. Fernandez-Miranda, J. C., Gardner, P. A., Snyderman, C. H., Devaney, K. O., & Kassam, A. B. (2009). Endoscopic endonasal approach for anterior skull base tumors: Anatomical study. *Neurosurgery*, 65(6 Suppl), 54–60.
4. Tabae, A., Anand, V. K., Barrón, Y., Hiltzik, D. H., Brown, S. M., Kacker, A., & Schwartz, T. H. (2009). Endoscopic pituitary surgery: A systematic review and meta-analysis. *Journal of Neurosurgery*, 111(3), 545–554.
5. de Notaris, M., Solari, D., Cavallo, L. M., & Cappabianca, P. (2014). The lateral optocrotid recess: Surgical anatomy and role in endoscopic endonasal approaches. *Neurosurgical Review*, 37(4), 555–562.