

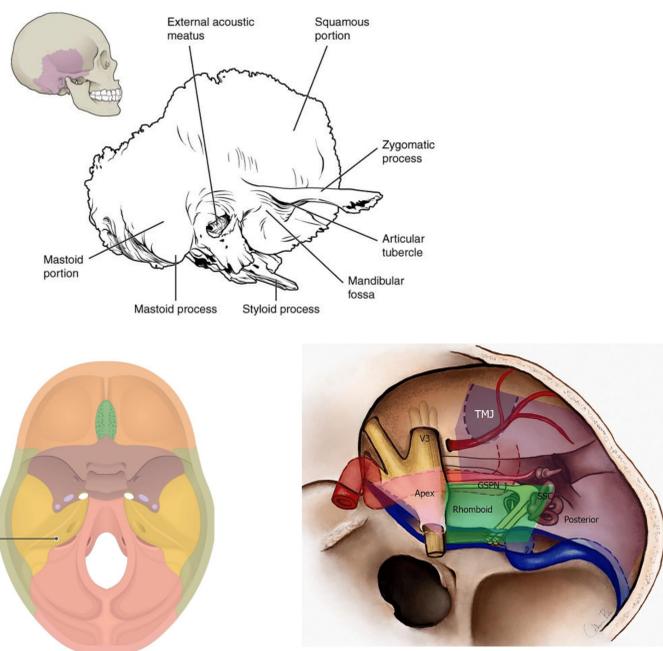
What We Have Learnt From Quantitative Measurements and Morphometric Analysis of Anterior, Posterior, and Combined Petrosectomies: Systemic Review of Cadaveric Studies

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Introduction

Complex middle fossa and posterior fossa skull base pathologies often require drilling into the petrous bone to maximize the surgical corridor and increase exposure. In the past few decades, there have arisen many nuanced approaches to perform a petrosectomy, and multiple cadaveric studies have highlighted the results. No previous study has performed a quantitative analysis of cadaveric studies on these approaches.

This study analyzed published morphometric cadaveric studies on the distinct cuts of the petrous bone to expand on visualization and access to deep anatomical locations.



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Methods

One investigator independently assessed the collected studies and extracted the following parameters: year of publication, number of specimens and dissected sides, surgical approach, incision type, craniotomy size, target of interest, horizontal and/or vertical angle of attack (h/vAOA), surgical freedom (SF via measuring superficial AOE or volume of corridor), area of exposure (AOE), and qualitative data.

Eligibility criteria:

This study included all articles meeting the inclusion criteria:

- (1) Studies must be on wet cadaveric specimens for petrosectomies, including anterior, posterior, combined or variations of these approaches;
- (2) They must quantitatively assess at least one of the metrics: angle of attack, surgical freedom, area of exposure, or surgical exposure area;
- (3) Metrics must be measured using neuronavigational or virtual systems;
- (4) Studies are available in English;
- (5) Published between 2000-2025

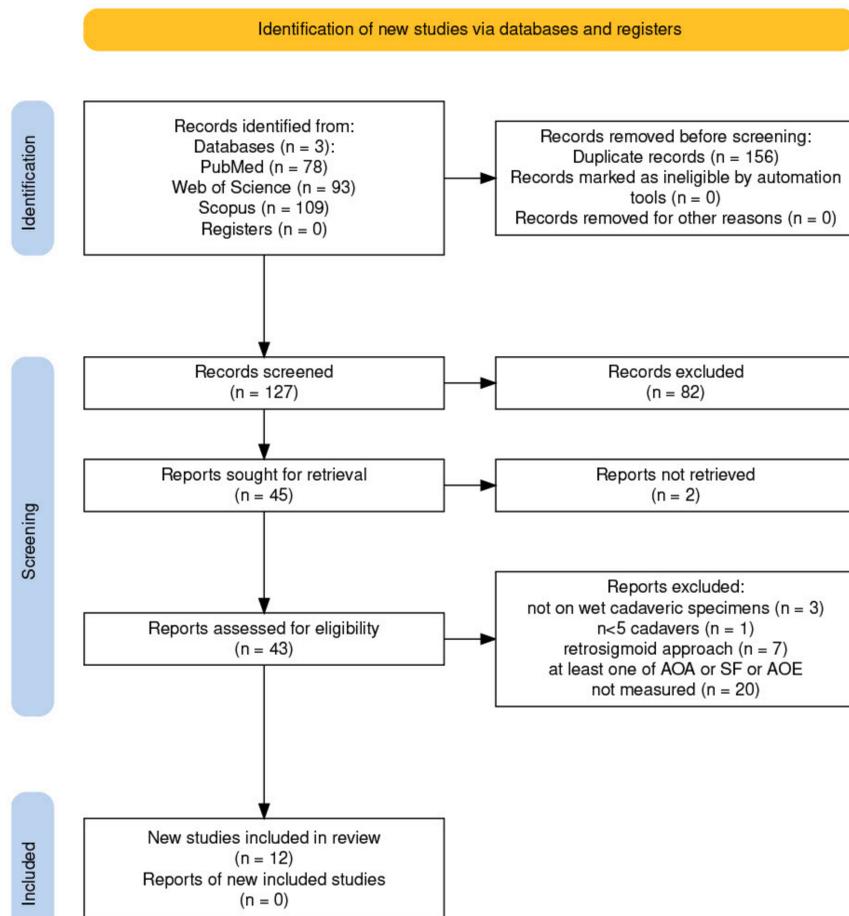
Studies excluded articles that analyzed fewer than four cadaveric specimens, described purely qualitative or clinical work, included the retrosigmoid approach, or utilized only bony cadaveric specimens.

Databases: PubMed, Scopus & Web of Science
*following PRISMA guidelines



Results

Initial search yielded 283 results, primary refinement based on title and abstract screening included 46 and secondary refinement based on full text for comparable studies included the final 12 studies. Due to the unexpected and wide variability in definitions of surgical approaches and reported measurements among published studies, a meta-analysis was not indicated, and my results are presented as a quantitative summary.



Abbreviations: AICA (anterior inferior cerebellar artery), AOA (angle of attack), AOE (area of exposure), ATPA (anterior transorbital petrosectomy), CTPA (combined transpetrosal approach), ETOA (endoscopic transorbital approach), h/v (horizontal/vertical), REZ (root exit zone), SF (surgical freedom)

Conclusions

The results from the collected studies include that anterior petrosectomies generally afforded greater angles of attack and exposure areas (ATPA afforded a vAOA of $27.5 \pm 3.9^\circ$ & hAOA of $33.8 \pm 2.2^\circ$ compared to ETOA measurements including vAOA $8.3 \pm 3.3^\circ$ and hAOA of $11.8 \pm 2.9^\circ$ to CNV REZ) compared to endonasal and endoscopic routes. Anterior petrosectomy offered an average volume of surgical freedom of 2649.15mm^3 and the combined approach afforded volumes of surgical freedom from $1244.8 \pm 253.3\text{mm}^3$. Combined approaches offered wider horizontal AOA ($64.6 \pm 13.6^\circ$ compared to $53.0 \pm 6.5^\circ$ for the peritrigeminal zone) and larger exposure surfaces, with CTPA affording the greatest AOE ($25.8 \pm 7.9^\circ$ to CNV REZ and $13.2 \pm 4.9^\circ$ to AICA) to petroclival and brainstem regions. The mini-CTPA approach had only minor reductions in exposure to these regions ($26.2 \pm 12.2^\circ$ to CNV REZ and $12.4 \pm 7.1^\circ$ to AICA).

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