Computed Tomography as an Adjunct for Cadaveric Temporal Bone Drilling

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Introduction

Our purpose was to determine the educational value of the novel use of serial Computed Tomography (CT) scans of cadaveric temporal bones during temporal bone dissection lab.

Methods

We conducted a prospective cohort study over two years (2020-2021). Six otolaryngology residents were surveyed prospectively on the usefulness of serial CT scans of cadaveric temporal bones prior to, during, and after temporal bone drilling. CT scans were performed on cadaveric temporal bones a total three times: first prior to any dissection, second after initial dissection of a canal wall up procedure, and third after a canal wall down procedure (Figure 1). CT images were reviewed by the operative resident and the staff otologist after each acquisition. Pre and post drilling Likert (1-7) surveys rating the confidence in identifying 14 radiologic landmarks on CT imaging as well as 20 surgical intraoperative landmarks were collected.

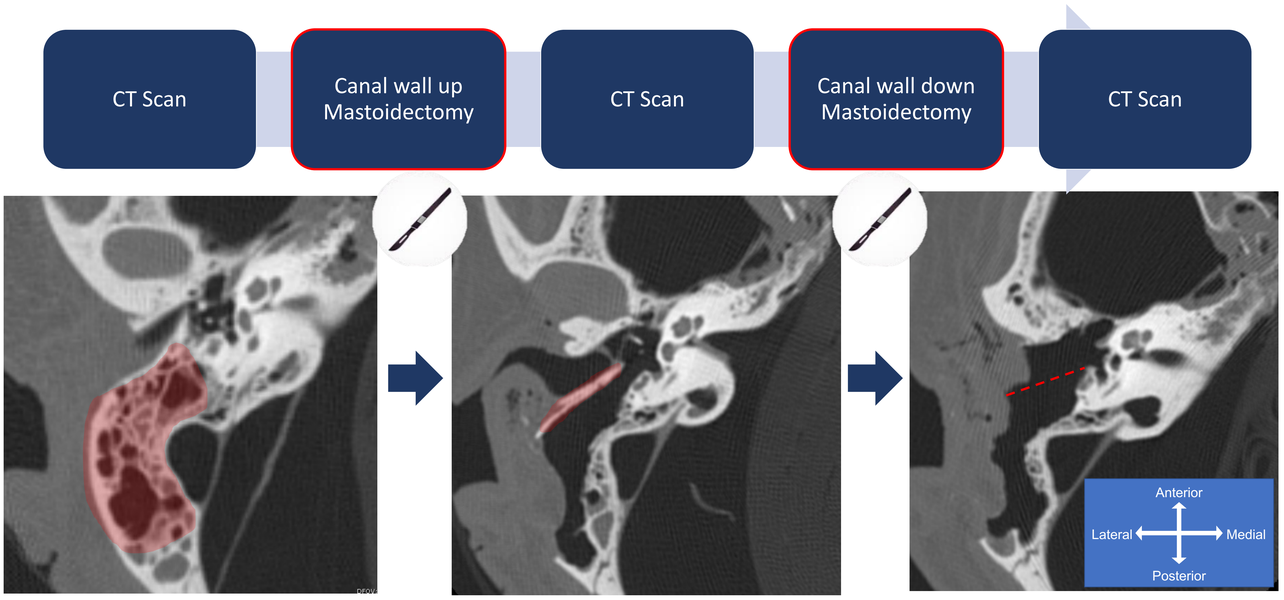
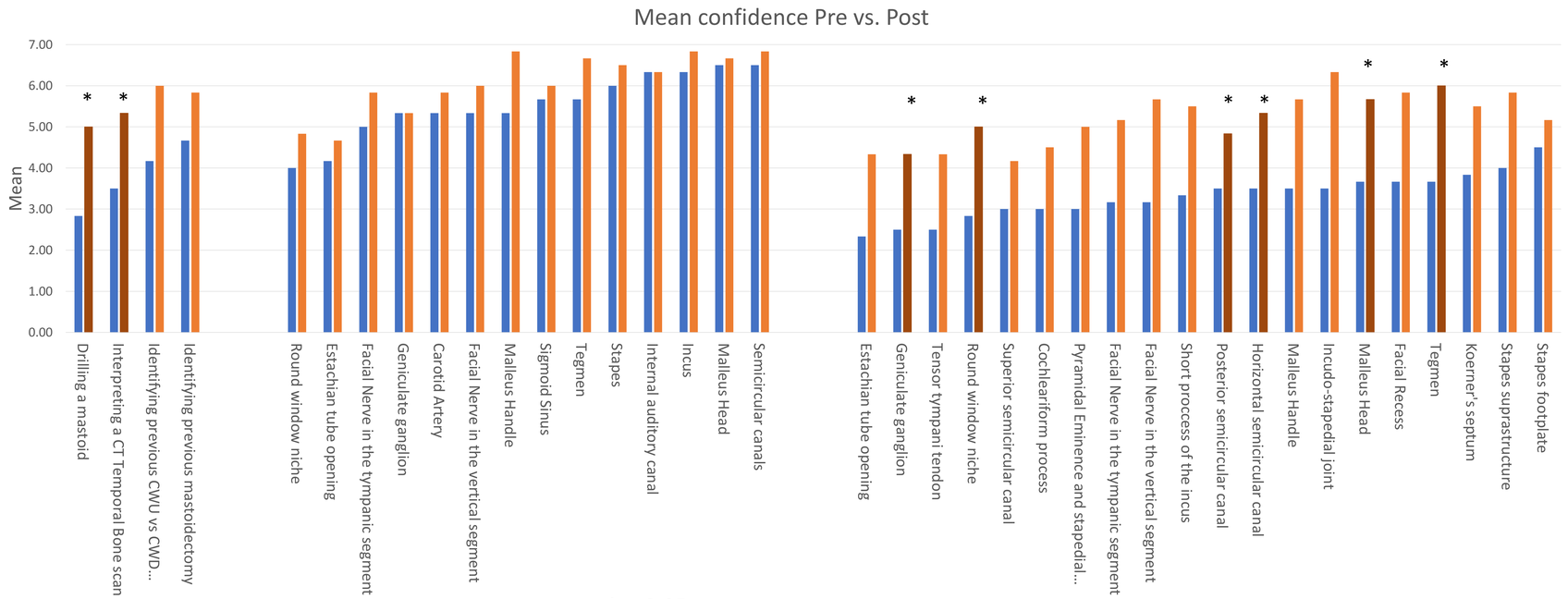


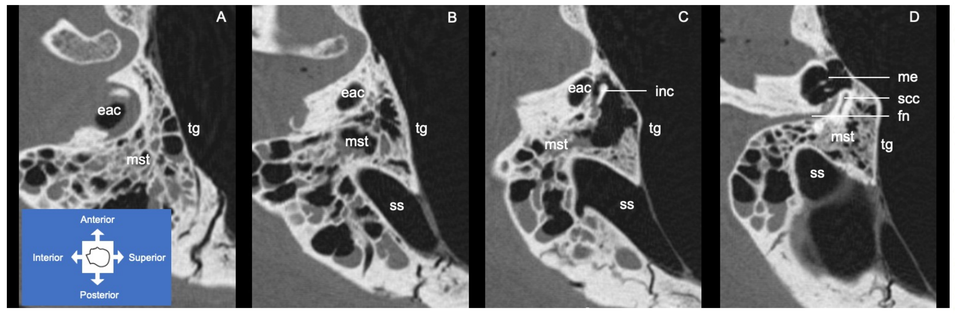
Figure 1: Serial Axial CT of a right cadaveric temporal bone. Red highlighted areas demarcate drilled areas between CT scans; from left to right (pre-drilling, after mastoidectomy, after canal wall down).

Figure 2: Graph of the average pre-and post drilling confidence (1-7 Likert scale) of residents



Results

There was an overall increased confidence in identifying both radiographic structures on CT and intraoperative landmarks. There was higher pre-dissection confidence in radiologic landmarks than in surgical landmarks. 0/14 radiologic and 6/20 surgical landmarks had statistically significant improvement ($p < 0.05$) in post-drilling confidence compared to pre-drilling confidence (Figure 2). There was a greater improvement of confidence levels in junior residents compared to senior residents.



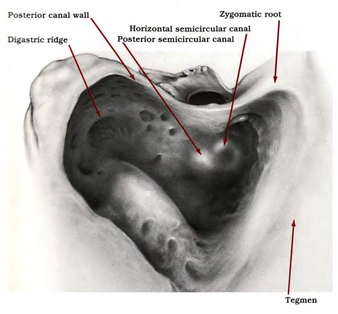


Figure 3: Sagittal CT series from lateral to medial of a left temporal bone. 90-degree clockwise rotation of the CT images to mimic a surgical orientation.

Conclusion

CT images as an adjunct to temporal bone dissection are useful in familiarizing the novice surgical resident to the complex anatomy of the temporal bone. It also facilitates correlation of the surgical and radiologic landmarks. Interval scans provided feedback on the extent, thoroughness, and safety of the temporal bone dissection. Novel radiological reformatting (sagittal with rotation to new surgical view) for surgical teaching was used (Figure 3) with overall positive feedback from residents. This is our new standard teaching method as part of the residents' semiannual temporal bone course.