Facial Nerve Localization: Is Triangulation the Key?

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ABSTRACT

OBJECTIVES: To determine if triangulation of multiplanar intersections can aid in surgical localization of the facial nerve (CN VII) during parotidectomy surgery.

METHODS: A prospective study of Otolaryngology residents training in parotid surgery. Residents were divided into experimental and control groups. The experimental group was taught traditional method instruction, while the control group received triangulation method instruction. The increase in confidence of reliably finding CNVII when identifying the nerve trunk early in the procedure is critical to preventing injury. Identification and careful dissection of the CN VII nerve trunk during parotidectomy in general, and parotidectomy, in particular.

RESULTS: The dissection time after receiving instruction for the experimental and control groups was not significantly different (experimental group improvement: 5.4 minutes; control group improvement: 5.6 minutes).

Figure 1 displays a graphical representation of the positive effect seen after residents received teaching in the triangulation method of localizing CNVII.

Residents reported increases in their agreement with all the statements on the questionnaires. The statements/questions were as follows:

Q1: I am confident I can accurately find CNVII.
Q2: This technique is easily to understand.
Q3: This technique is easy to perform.
Q4: I am confident I can reliably find CNVII.
Q5: I am confident I can quickly find CNVII.

Questions 3-5 showed a statistically significant percentage increase in agreement/confidence (those receiving only traditional teaching). Question 4 showed a statistically significant increase greater than the control group, while all other questions showed no significant difference when compared to the control group.

DISCUSSION

We should optimize how we teach and learn surgical approaches and techniques to ensure efficiency, consistency and accuracy. The application of triangulation (or multiplanar intersection) to surgical approaches is a novel concept. Our method of targeted localization using the intersecting planes of the tympanomastoid suture and posterior digastic muscle is a unique, efficient, reproducible, and understandable technique to teach Otolaryngology residents and fellows how to reliably localize the CN VII. While no increase in the speed of dissection was found, residents did benefit from an increase in confidence of reliably finding CNVII when compared to controls.

CONCLUSIONS

One can visualize imaginary planes formed by both the tympanomastoid (TM) suture and stylomastoid foramen (SMF), (Figure 2). The 2-dimensional plane which lies on the lateral surface of the DM forms the base plane (or floor, in a sagittal orientation), located at the depth for the CN VII trunk. A second plane, which lies in the plane (in an axial orientation) of the TM suture, forms an intersecting plane to the DM corresponding to a line forming by the intersecting planes, only two intersecting reference planes are needed to localize the CNVII trunk. If we were interested in a specific point along the nerve then a third intersecting anatomic plane could be added.

A dissected facial nerve during a standard parotidectomy is seen in Figure 3A. The tines of the angled nerve dissector are sitting within the DM. The DM is visualized. Figure 3B shows the imaginary nonparallel planes formed by these landmarks and the resulting intersection (resultant line) overlaying the main trunk of the facial nerve. Photographs demonstrate a general region for finding the facial nerve, which is non-specific (a neighborhood) and no targeted localization can be extrapolated. Additionally, several articles use radiological data to describe anatomical relationships between CN VII and nearby structures. Many of these studies use CT and MRI localization of CN VII. The distance from reference points to these landmarks are not practical from a surgeon’s perspective, because the reference points are not usually accessible in the surgical field.

METHODS AND MATERIALS

The literature and common Otolaryngology textbooks were reviewed to assess the reported methods that are used to teach surgical localization the facial nerve trunk. As a result of the identified lack of a precise and reproducible surgically relevant method in publications for locating the CNVII during parotidectomy, the attached schematics were developed (Figures 2 & 3, description in discussion). IRB approval was then obtained to perform a prospective study of Otolaryngology Residents attending a Head and Neck Anatomy Course. Otolaryngology residents were randomly divided into two groups. Both groups received CNVII localization training, the increase in confidence afforded by this technique argues for incorporating this method into the early training of surgeons.

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