Surgical Landmarks to Locating the Main Trunk of the Facial Nerve in Parotid Surgery: A Systematic Review

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Purpose: The purpose of this study was to describe distances from commonly used anatomic landmarks to the main trunk of the facial nerve during parotid surgery.

Materials and Methods: A systematic search of the published literature was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. All studies from January 1, 1990 to January 1, 2017 that measured distances to the main trunk of the facial nerve from common anatomic landmarks were eligible. Inclusion criteria were English-language articles with distances measured from the main trunk of the facial nerve to anatomic landmarks. The primary outcome variable was the distance from the respective anatomic landmarks. Other variables included surgical approach, year, and existential status of subject (cadaveric or living).

Results: The search yielded 1,412 studies (1,397 by PubMed, 15 by reference searching), with 10 studies meeting the inclusion criteria. Within the 10 studies, there were 30 reported means and 375 dissected cadavers. The most common incision was the standard preauricular incision; the mean distances to the facial trunk from landmarks were 13.6 ± 11.0 mm (n = 6 reported means) for the tragal pointer, 8.79 ± 3.99 mm (n = 7 reported means) for the posterior belly of the digastric muscle, 10.5 ± 1.4 mm (n = 4 reported means) for the tip of the mastoid process, 14.99 ± 1.68 mm (n = 3 means) for the transverse process of C1, 3.79 ± 2.92 mm (n = 6 means) for the tympanomastoid fissure, 9.80 ± 0 mm (n = 1 mean) for the styloid process, and 11.77 ± 1.42 mm (n = 3 means) for the external auditory meatus. Formal assessment of inter-study variability could not be assessed because of the small number of studies and measurements.

Conclusion: There are substantial variations in measurements from anatomic landmarks to the main trunk of the facial nerve in the literature. Therefore, multiple landmarks can be used to identify the main trunk of the facial nerve during parotid surgery. The distances reported in this study can guide surgeons during parotid surgery to decrease the risk of facial nerve damage.

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Facial nerve palsy is a known risk associated with parotid surgery. Inadvertent damage to the nerve can result in permanent or transient paralysis, corneal irritation from lack of motor function, Frey syndrome, pain, or changes in facial appearance.[1] Common anatomic landmarks that can indicate the position of

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the main trunk of the facial nerve during parotid surgery include the tragal pointer cartilage, the styloid process, the tympanomastoid fissure, the tip of the mastoid process, and the posterior belly of the digastric muscle[2,3] (Fig 1). A recent systematic review and meta-analysis by Sood et al[4] on the usefulness of intraoperative facial nerve monitoring showed that in previously unoperated cases of parotidectomies, intraoperative facial nerve monitoring decreased immediate postoperative facial nerve weakness but did not decrease permanent damage.[4] Being able to safely locate the main trunk of the facial nerve using surgical landmarks is important despite the use of intraoperative facial nerve monitoring.

A review of the literature showed marked controversy among surgeons regarding the intraoperative accuracy and precision of these bony and nonbony landmarks. The authors were compelled to provide an update on the current literature on the use of surgical landmarks to locating the main facial nerve trunk. The specific aims of this study were to determine the average distance and variability of each anatomic landmark to the main trunk of the facial nerve in the literature.

Materials and Methods

The authors conducted a systematic review of PubMed. The full search strategy is as listed: ((("Anatomy"[MeSH] OR "anatomy and histology"[Subheading] OR anatomy[tw]) OR ("Dissection"[MeSH] OR Dissection*[tw]) OR ("surgery"[Subheading] OR surgery [tw])) OR (parotidectomy[tw])) AND ("Facial Nerve"[Mesh] OR ("Cranial Nerve"[tiab] AND (Seventh[tiab] OR VII[tiab])) OR ("Facial Nerve"[tw] OR "Parotid Gland"[MeSH] OR "Parotid Neoplasms"[MeSH]) AND

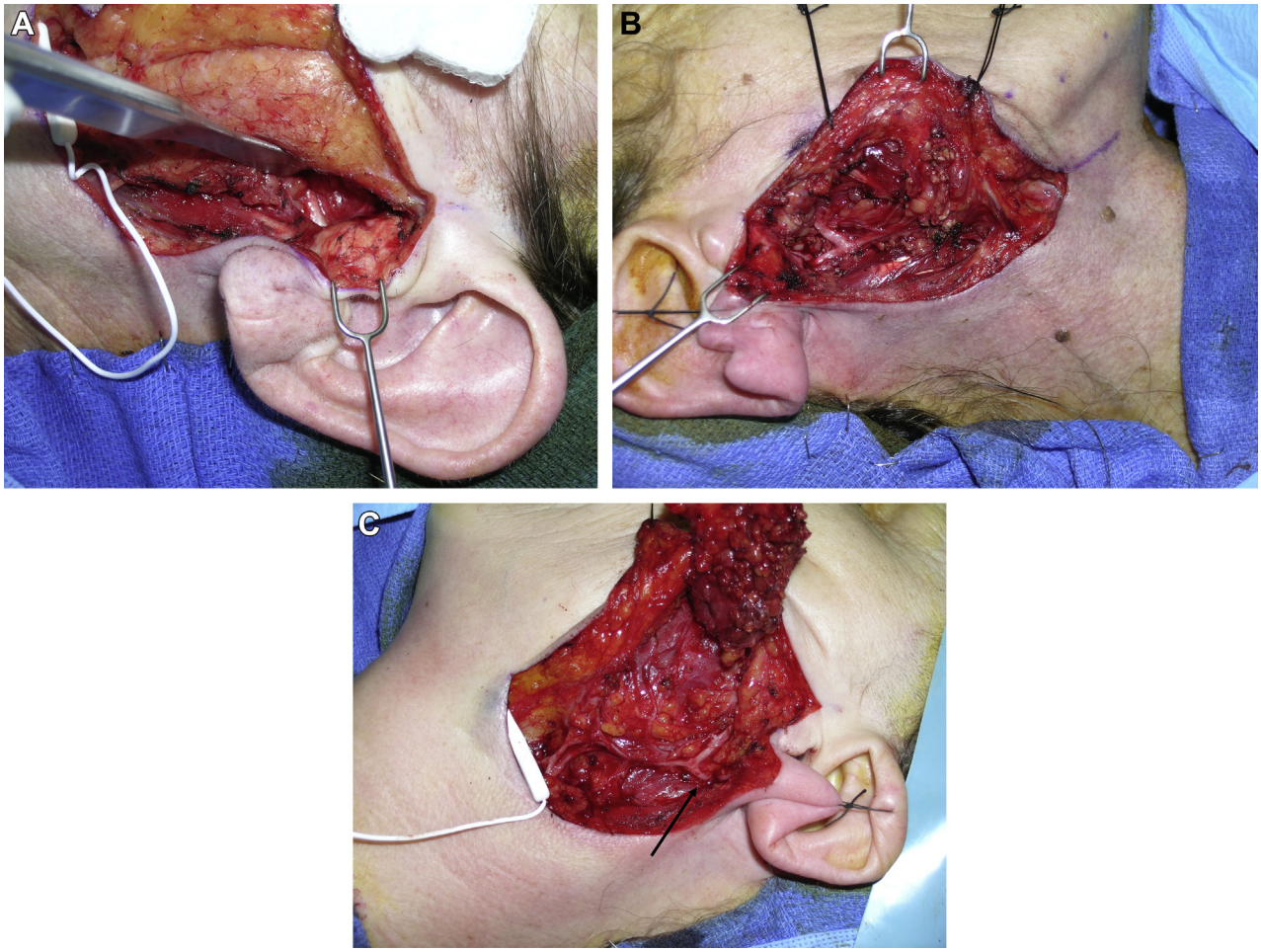

FIGURE 1. *A*, Identification of the main trunk of the facial nerve during superficial parotidectomy. The auricular cartilage is identified that leads to the location of the tragal pointer cartilage. *B*, The pointer cartilage points to the main trunk of the facial nerve but is more superficially located than the main trunk of the facial nerve. *C*, The intersection of the posterior belly of the digastric muscle and the sternocleidomastoid muscle (*arrow*) is located approximately 4 to 5 mm inferior to the main trunk of the facial nerve and at the same depth as the main trunk of the facial nerve. Under the circumstances, and from a practical perspective, this anatomic landmark is very useful to the identification of the main trunk of the facial nerve.