



Facial Nerve in Parotid Surgery- do Landmarks Differ With Varying Statures?

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Abstract

Aim: To measure the distance of facial nerve from tragal pointer, tympanic plate and digastric muscle, also length of the facial nerve trunk and to establish any variation according to different patient stature. **Methodology:** Intraoperative measurements were taken using Castroviejo Callipers (20 mm). Height and weight of each was taken and tabulated. **Results:** The average height was 162 ± 9 cm while the average weight was 58 ± 9 kg. The average length of the extratemporal part of the facial nerve trunk, distance of the facial nerve from the tragal pointer, distance from the outer edge of tympanic plate, distance from the posterior end of the superior border of posterior belly of digastric muscle was 1 ± 0.2 cm, 1 ± 0.1 cm, 0.3 ± 0.2 cm and 0.2 ± 0.1 cm, respectively. **Summary:** No major difference was found in the landmarks despite varying stature.

Keywords Parotid · Facial nerve · Landmarks · Difference · Varying statures

Introduction

The parotid glands are a pair of major salivary glands situated on either side, just below the ear lobes (*par- near, otis-ear*). They lie in the retromandibular fossae, posterior to the ascending ramus of the mandible and in the area antero-inferior to the external auditory canal [1]. Enlargement of these glands may happen either with viral or bacterial infections or due to tumour involvement, benign or malignant. Each parotid gland comprises two lobes, superficial and deep,

defined by the plane of the facial nerve and its branches. Surgery of the parotid gland may involve superficial or deep lobe or both, depending on the site involved ; therefore the facial nerve remains an important structure in any kind of parotid surgery. This nerve emerges from the stylomastoid foramen and then divides into its terminal branches in the substance of the parotid. Accurate prediction of the position of the nerve is, therefore, of vital importance in parotid surgery in order to avoid post-operative facial paresis or palsy. In some cases, when it is neither possible nor wise to directly access the facial nerve trunk, it is better to locate one of its major branches and dissect centrally or peripherally from there [2]. Different pointers have been described in the medical literature to identify and locate the facial nerve, like the tragal pointer, the tympanic plate etc. Though the facial nerve trunk can vary in measurement from 5 to 15 mm [1], the anatomic landmarks are usually consistent (Fig. 1). The tragal pointer is a deep cartilaginous landmark which is 1 cm posterosuperior and superficial to the nerve [3]. The nerve emerges a few millimetres deep to the outer edge of the tympanomastoid suture line, and is just superior to the posterior end of the superior border of posterior belly of digastric [3]. An effort has been made to establish the relation between different pointers and landmarks and the facial nerve and determine if there is any notable variation in patients of different stature and weight.

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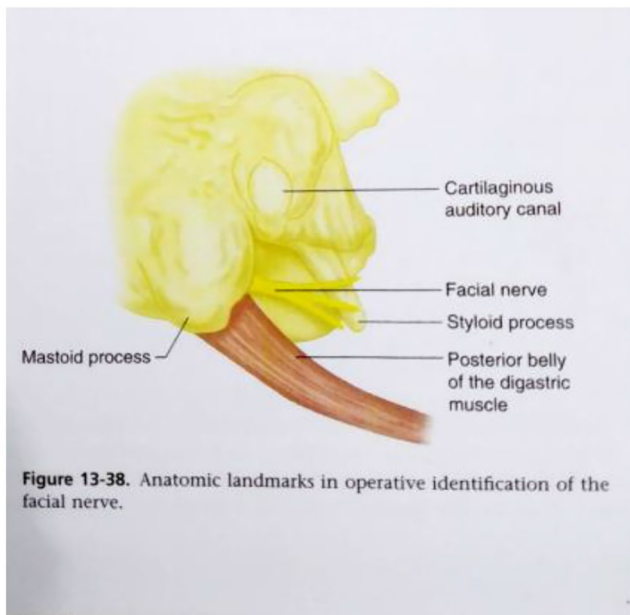


Fig. 1 Depicting facial nerve relations (Image from Jatin Shah's Head and Neck Surgery and Oncology)



Fig. 2 Castroviejo Calipers

AIM

- I. To measure the height and weight of patients taken up for parotidectomy.
- II. To measure the distance of the facial nerve from the tragal pointer, the outer edge of tympanic plate and the posterior end of the superior border of the posterior belly of the digastric muscle as well as the length of the facial nerve trunk measured from the emergence of the nerve from the stylomastoid foramen to the point where it bifurcates.
- III. To establish if there is any notable variation in the parameters according to different patient stature.

Materials and Methods

The study was conducted at Nightingale Hospital, Guwahati. A total of 58 patients taken up for parotidectomy with intact pre-surgery facial function during the period from May 2020 to April 2022 were included in the study. Patients with pre operative impaired facial nerve function were excluded from the study. Informed consent for being a part of research work was obtained from each patient (including use of photographs). A note of height and weight of the patient was made. Intraoperative measurements of the facial nerve described above were taken using Castroviejo calipers (0-20mm) (Fig. 2). The measurements of the facial nerve and its relations were taken after removal of the gland specimen. (Figs. 3, 4 and 5)

Results and Observation

A total of 58 patients were included in the study who underwent some form of parotid surgery, of whom 37 were males, 21 were females. Height distribution seen in the patients was 153–159 cm in 28 patients, 160–165 cm in 21 patients and 166–171 cm in 9 patients while the average height was 162 ± 9 cm (Fig. 6). Weight distribution seen was 49–55 kgs in 21 patients, 56–61 kgs in 25 patients and 62–67 kgs in 12 patients while the average weight was 58 ± 9 kgs (Fig. 7). The average length of the extratemporal part of the facial nerve trunk was 1 ± 0.2 cm (Fig. 8). The average distance of the facial nerve from the tragal pointer was 1 ± 0.1 cm (Fig. 9). Not much variation was seen in the relationship with the outer edge of tympanic plate where the average was 0.3 ± 0.2 cm (Fig. 10). The average distance from the posterior end of the superior border of posterior belly of digastric muscle was found to be 0.2 ± 0.1 cm (Fig. 11).

Fig. 3 and 4 Distance being measured between the facial nerve and tragal pointer

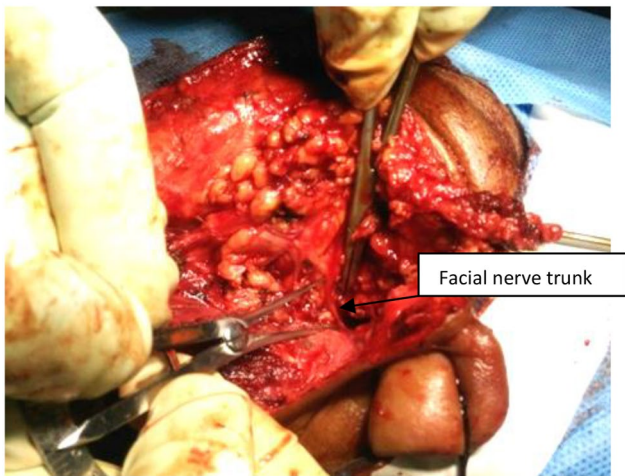
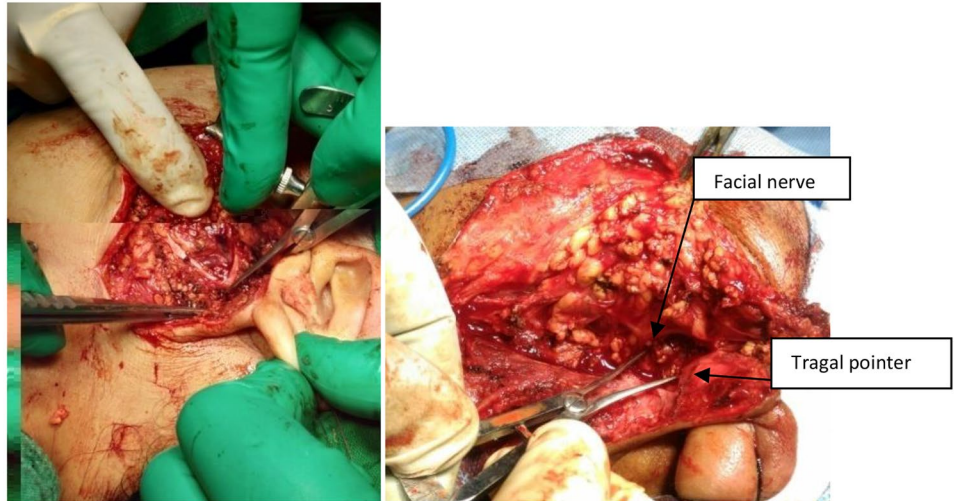


Fig. 5 Measurement of facial nerve trunk

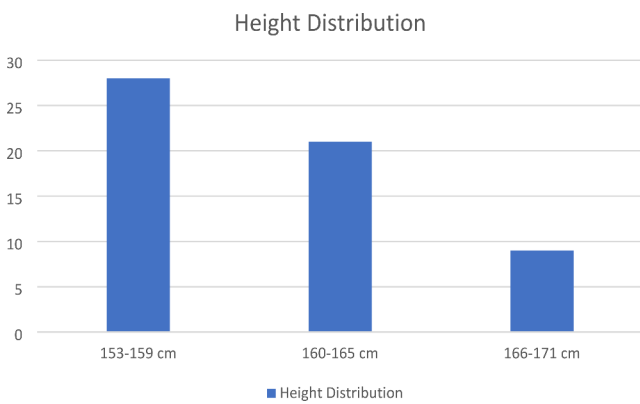


Fig. 6 Height Distribution

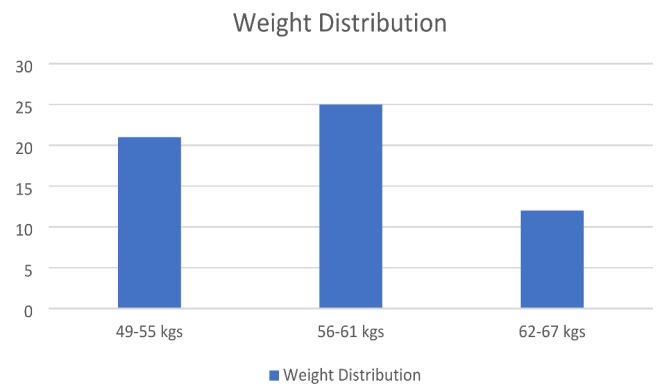


Fig. 7 Weight Distribution

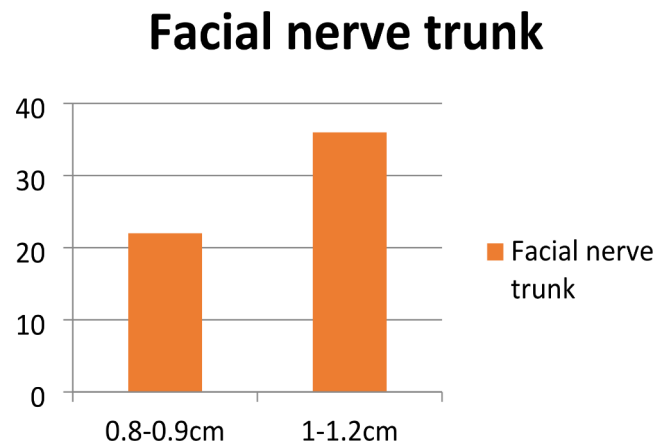


Fig. 8 Measurement of Facial nerve trunk

Discussion

Head and neck surgery is increasingly becoming popular among ENT surgeons, among which surgery of the parotid gland requires an intricate knowledge of the anatomic details of the gland and the surrounding structures, especially the

Distance from tragal pointer

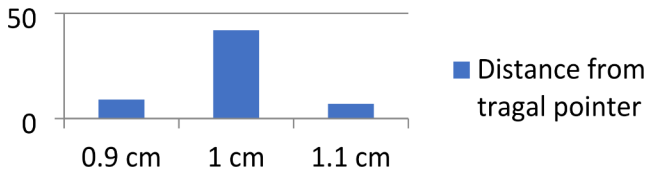


Fig. 9 Distance of Facial nerve from tragal pointer

distance from tympanomastoid suture

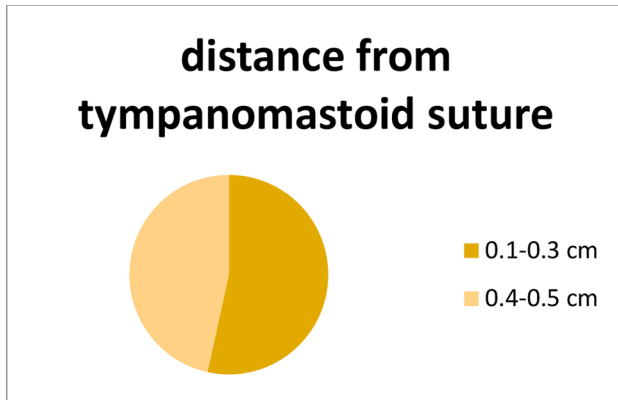


Fig. 10 Distance of Facial nerve from Tympanomastoid suture

distance from digastric muscle

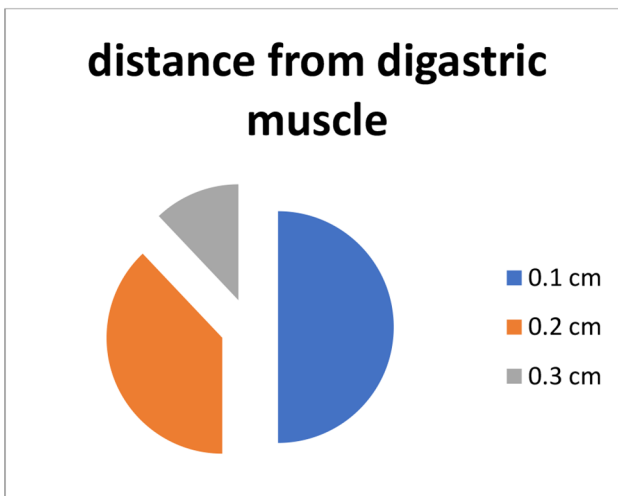


Fig. 11 Distance of Facial nerve from posterior end of Posterior belly of Digastric

facial nerve. Responsible for facial movements, this nerve helps with different facial expressions. Any inadvertent injury to it during surgery causes a great deal of difficulty and embarrassment to the patient. Different anatomic landmarks have been defined in the literature which are used to locate the facial nerve during surgery and prevent any

injury to it. In our study we have taken into consideration the tragal pointer, the outer edge of the tympanic plate and the posterior end of the superior border of posterior belly of the digastric. There was no major variation in the distance of the nerve from these landmarks despite variations in stature of the patients, which further validates the claim of accuracy of the anatomical landmarks. In addition, a study by Miccuci SB, et al. in 2019^[4] described that parotid fascia, particularly the parotid-mastoid segment, can be utilized as an additional landmark of depth to help identify the nerve. However, the relationship between the buccal branches and the Stensen’s duct was found to be complicated in a study by Tsai CH et al. on adult Taiwanese cadavers^[5]. Kikuta S, et al. did an anatomical study of the posterior auricular branch of the facial nerve in application to parotid surgery^[6]. The distance from the stylomastoid foramen to where the posterior auricular nerve branched from the facial nerve was 0.40 ± 1.25 mm. A new method for tracing the facial nerve trunk using the posterior auricular nerve was also stated by Blau I, et al. (in 2019)^[7] who dissected 75 cadaveric heminecks, exposed the auricularis posterior muscle and adnexa, and attempted to follow the posterior auricular nerve to the facial trunk. The average length of the nerve from the auricularis posterior muscle to the facial nerve trunk was $28 \text{ mm} \pm 6.2$ mm. Green Sanderson K, et al.^[8] concluded in a study that the average distance from the apex of the tragus to the point where the frontotemporal branch of the facial nerve crossed the inferior border of the zygomatic arch was 3.21 ± 0.05 cm. Liu M, et al. (in 2018) found in a study that the facial nerve trunk crossed the posterior auricular artery inferior to the stylomastoid foramen and could be identified precisely by tracing the posterior auricular artery proximally^[9]. The distance from the crossing point of the posterior auricular artery and the facial nerve to the external meatal cartilage was 5.2 ± 0.2 mm.

Conclusion

The study was done to establish the consistency in the relationship of the facial nerve with different landmarks during surgery of the parotid gland in patients of varying statures. The average distance of the nerve from the tragal pointer, the tympanic plate and the posterior belly of the digastric were 1 ± 0.1 cm, 0.3 ± 0.2 cm and 0.2 ± 0.1 cm, respectively. No major difference in the measurements could be seen in patients with different statures.

Summary

- Locating the facial nerve during surgery of the parotid gland is of vital importance in preventing any inadvertent damage to this important nerve.
- The landmarks described in the medical literature provide a valuable guide to locate the nerve.
- In this study, we did not find any major difference in the relationship of these landmarks to the facial nerve in spite of different stature of patient, thus further consolidating the consistency of the landmarks.

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Declarations

Conflict of Interest There are no conflicts of interest.

Ethical Approval Clearance has been obtained from institutional ethical committee with adherence to the “The Declaration of Helsinki”.

Patients’ consent The authors declare that strict ethical discipline was followed in doing this research and informed consent was taken from each patient for photograph and other data.

References

1. Jatin Shah’s Head and Neck Surgery and Oncology (4th edition; p 536)
2. Scott-Brown’s Otorhinolaryngology, Head and Neck Surgery (7th edition; p 2486)
3. Stell and Maran’s Textbook of Head and Neck Surgery and Oncology (5th edition; p 715)
4. Steven B, Miccuci SS, Chang T, Song (2021) Barry Rasgon. The role of the parotid-mastoid fascia in identification of the facial nerve trunk during parotidectomy ear nose Throat J. 100(7):504–508
5. Tsai C-H, Ting C-C, Wu S-Y, Chiu J-Y, Chen H, Igawa K et al (2019 Nov) Clinical significance of buccal branches of the facial nerve and their relationship with the emergence of Stensen’s Duct: an anatomical study on adult taiwanese cadavers. J Cranio-maxillofac Surg 47(11):1809–1818
6. Shogo Kikuta J, Iwanaga K, Watanabe J, Kusukawa R, Shane Tubbs et al (2020) Anatomical study of the posterior Auricular Branch of the facial nerve: application to parotid surgery. J Craniofac Surg Jan/Feb 31(1):300–302
7. Ilan Blau Y, Vaisbuch (2019 Apr) Assaf Marom a new method for tracing the facial nerve trunk using the posterior auricular nerve; clin Anat. 32(3):453–457
8. Sanderson KG, Colussi AContiM (2020) Cara Connolly a simple clinical application for locating the Frontotemporal Branch of the facial nerve using the Zygomatic Arch and the Tragus; Aesthet Surg J. Apr 14;40(5);NP223-NP 227
9. Muyuan Liu SJ, Wang A, Benet AT, Meybodi H, Tabani, Ivan H (2018 Jul) Ei-Sayed posterior auricular artery as a novel anatomic landmark for identification of the facial nerve: a cadaveric study ;Head Neck. 40(7):1461–1465

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