

Branching Patterns of the Facial Nerve within the Parotid Gland Among Sudanese

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ABSTRACT

Background: This study examines the anatomic relationships and variability of the facial nerve trunk and its branches, with emphasis on the intraparotid region. The study aims to identify the variations of the course and main divisions of the facial nerve in Sudanese people.

Methods: This is a descriptive, cross-sectional study, done in Khartoum and North Kordofan states, Sudan. Between April to June 2017. Dissections were performed on 21 Sudanese heads on one site, and the facial nerve trunks and branches were exposed.

Results: The bifurcation of the temporofacial (upper) and cervicofacial (lower) divisions was seen in all dissections (100%), the division was pre parotid in (76.1%), intraparotid in (23.9%). No post parotid division has seen. The retromandibular vein was found to be medial to the nerve in (76.1%), lateral to it in (19%) and in one cadaver it was in between nerve divisions (4.7%).

Conclusion: Familiarity with these common variations in the facial anatomy provides useful information for the surgeon in careful dissection, preservation of the facial nerve, and complete removal of the tumours in the parotid region.

Introduction

The extratemporal component of the facial nerve starts when the facial nerve exits the stylomastoid foramen [1,2]. In the adult, it is protected laterally by the mastoid tip, tympanic ring, and mandibular ramus, whereas in children younger than 2 years it is relatively superficial [3]. Postauricular incisions in this younger population must be carefully planned because the trunk of the facial nerve is a subcutaneous structure at this level [1,4]. After exiting the stylomastoid foramen, the facial nerve gives off motor branches to the posterior belly of digastric, stylohyoid, and the superior auricular, posterior auricular, and occipitalis muscles [5]. The facial nerve then travels along a course anterior to the posterior belly of the digastric and lateral to the external carotid artery and styloid process before dividing into its main motor branches at the

posterior edge of the parotid gland. The facial nerve trunk is usually identified approximately 1 cm deep and just inferior and medial to the tragal pointer [6].

The parotid and superficial musculoaponeurotic system (SMAS) can then be carefully divided to expose the facial nerve for facial nerve reconstruction [7]. Alternatively, branches of the facial nerve can be identified distally as they exit the anterior border of the parotid gland. Here, the buccal branches of the facial nerve become quite superficial, lying immediately beneath the SMAS. Facial nerve branches are then traced posteriorly to the main facial nerve trunk. Advocates of this technique note that damage to a small branch of the facial nerve during the initial exploration is far less devastating than an inadvertent injury to the entire motor trunk. However,

these peripheral branches are more difficult to identify because of their smaller size and a lack of consistent landmarks [8-10]. The barbarization of the extratemporal facial nerve typically begins within the substance of the parotid gland and ultimately gives rise to the cervical, marginal mandibular, buccal, zygomatic, and frontal (or temporal) nerve branches [11]. The aim of this study is to describe variations of the course and main divisions of the facial nerve in Sudanese people -cadaveric study.

Materials and Methods

Study Design

A descriptive, cross-sectional study.

Study Area

Dissection rooms of the Sudanese Medical colleges in Khartoum and North Kordofan states.

Study Duration

In the time between April to June 2017.

Data Collection

Data collection sheet.

Sample Size and Sample Technique

I shall collect 20 random samples of cadavers from about 7-10 medical schools.

Data Analysis

Data analysed by SPSS (Statistical Package for Social Sciences).

Result

Research about a pattern of branching of the Facial nerve within the parotid region was done after dissecting 10 cadavers fixed with formalin bilaterally and one cadaver unilaterally.

The following were observed:

- 16 facial nerves were divided before reaching the parotid gland. Show Table 1 and Figure 1.

- 5 facial nerves were divided within the substance of the gland.
- No post parotid division was observed.
- In one cadaver on the right side the division was pre parotid while on the left side it was within the parotid gland substance.

Relation of the Facial Nerve to Retromandibular Vein

In 7 cadavers the retromandibular vein was medial to the facial nerve, In one cadaver the vein lies in between nerve divisions on the left side and medial to the nerve on the right side. In Two cadavers the retromandibular nerve was lateral to the facial nerve. show Tables 2-5 and Figures 2-4. In all the dissected cadavers the facial nerves were divided into upper and lower trunks only.

Table 1: Shows the site of division of the Facial nerve in relation to parotid gland.

Preparotid	Within the parotid	Post parotid
16	5	0

Table 2: Shows Relation the of the facial nerve to Retromandibular Vein.

Medial to the Facial Nerve	Lateral to the Facial Nerve	In between the facial Nerve
16	4	1

Table 3: Shows the No. of divisions.

One division	Two divisions	Three divisions
0	21	0

Table 4: Compare between Sudanese and Turkey study.

Retromandibular Vein	In Sudanese study	In Turkey study
Medial to the Facial Nerve	76.19%	90%
Lateral to the Facial Nerve	19.04%	0%
In between the facial Nerve	4.76%	10%

Table 5: Compare between Sudanese, Korean and Malaysian studies.

Trifurcation Pattern	In Sudanese study	In Korean study	In Malaysian study
Percentage	0%	13.30%	3.80%

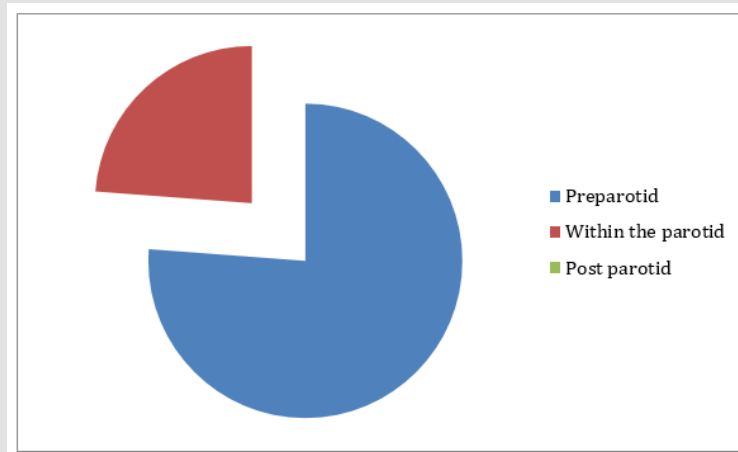


Figure 1: Shows the site of division of the Facial nerve in relation to parotid gland.

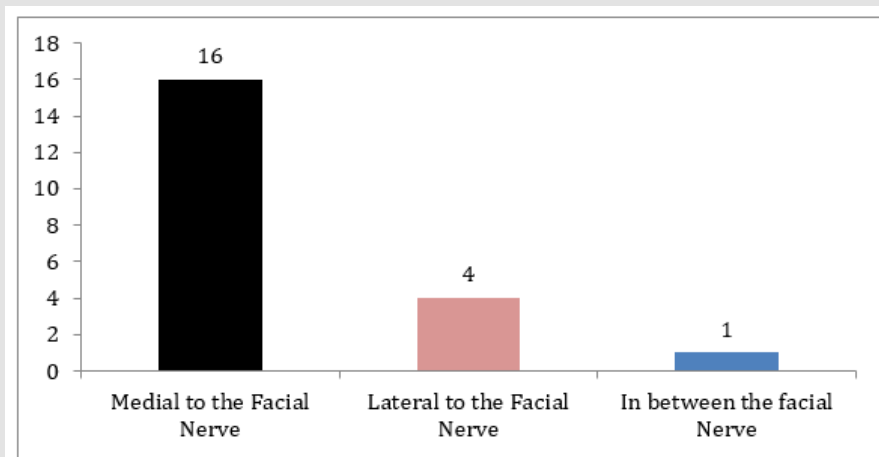


Figure 2: Relation of the facial nerve to Retromandibular Vein.

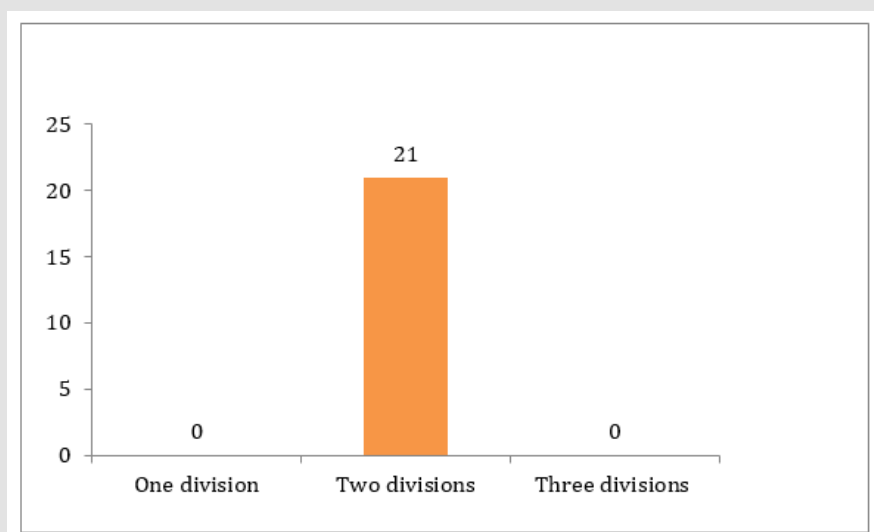


Figure 3: Shows the No. of divisions.

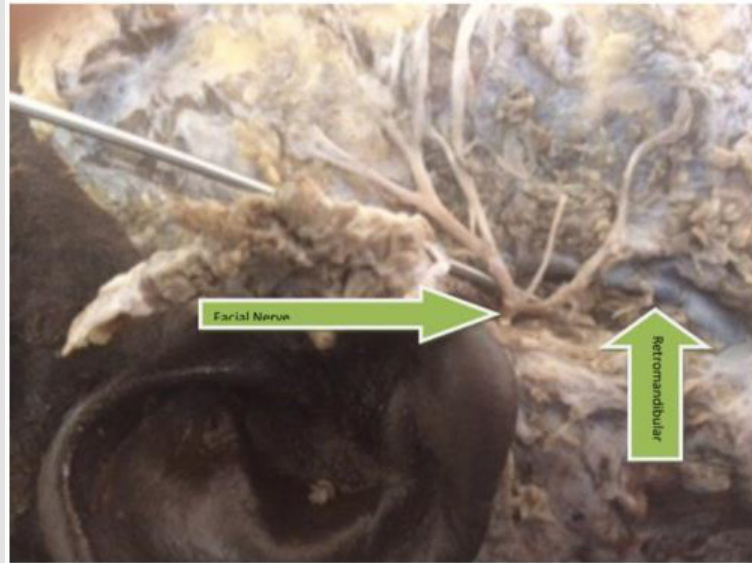


Figure 4: Show a dissected part of the facial nerve.

Discussion

Knowledge of the main landmark of the facial nerve trunk is crucial for safe and effective surgical outcome in the region of the parotid gland [12]. The branching pattern of the facial nerve within the parotid region shows individual variations [13-15]. This study examines the anatomic relationships and variability of the facial nerve trunk and its branches [16], with emphasis on the site of division in relation to the parotid gland, number of divisions and the position of the retromandibular vein in comparison to the facial nerve [17,18]. Dissections were performed on 11 Sudanese cadavers fixed with formalin; 21 half-heads has been dissected [19], and the facial nerve trunks and branches were exposed [20]. The facial nerve trunk bifurcated into two main divisions in all cases (100%), and no trifurcation pattern was seen (0%). In 16 cases (76.19%) it bifurcates before the parotid gland, while in 5 cases (23.8%) it bifurcates within the gland. In one cadaver the bifurcation on the right side was before the parotid while on the left side it was within the gland [21,22].

We also investigated the relationship between the facial nerve and the retromandibular vein. In 16 (76.19%) of the cases the retromandibular vein was located on the medial side of the upper and lower trunks of the facial nerve, and in 4 (19.04%), the course of the retromandibular vein was lateral to the lower and upper trunks [23]. In one (4.76%) case the retromandibular vein was medial to the upper trunk and lateral to the lower trunk, the course of the retromandibular vein was different on the right and left sides of the face in the same cadaver [24,25]. A study in Korean cadavers revealed that (86.7%), the facial nerve trunk bifurcated into two main divisions, and a trifurcation pattern was seen in the

other cases (13.3%) [26]. Another study in Turkey 50 dissections were performed in 30 cadavers in (90%) of the cases the retromandibular vein was located on the medial side of the upper and lower trunks of the facial nerve [27], and in (10%) the course of the retromandibular vein was lateral to the lower trunk and medial to the upper trunk. also, there is a study done in 79 facial halves from formalin-fixed cadavers in Malaysian subjects .trifurcation was seen in three facial halves (3.8%) [28-30]. For me the absence of trifurcation pattern in Sudanese people compared To those in Turkey and Malaysian could be due to racial and environmental differences [31,32].

In Conclusion

The facial nerve trunk bifurcated into two main divisions in all cases (100%), in 16 cases it bifurcates before the parotid gland, 5 cases it bifurcates within the gland and only one cadaver the bifurcation on the right side was before the parotid while on the left side it was within the gland. In 16 of the cases the retromandibular vein was located on the medial side of the upper and lower trunks of the facial nerve, four of them course of the retromandibular vein was lateral to the lower and upper trunks, In one case the retromandibular vein was medial to the upper trunk and lateral to the lower trunk.

Ethical Clearance

Permission and ethical clearance was obtained from anatomy head departments in target medical schools.

Conflict of Interest

None.

Written Consent from the Patient

Obtained.

Funding

No fund have been received.

Availability of Data and Materials

All the data used in the study are available from the first and corresponding author on reasonable request.

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