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Variation in Branching Pattern of Facial Nerve in the Face: A Case Report

Sharma M[1*], Prashar R[2], Sharma T[3], Gulati S H[4]
[1]Associate Professor, Department of Anatomy, Punjab Institute of Medical, Sciences Jalandhar, Punjab, India
[2]Department of Surgery, Civil Hospital, Kapurthala, Punjab, India
[3]Professor, Department of Anatomy, Punjab Institute of Medical, Sciences Jalandhar, Punjab, India
[4]Tutor, Department of Anatomy, Punjab Institute of Medical, Sciences Jalandhar, Punjab, India

***Corresponding Author:**
Name: Dr. Mamta Sharma
E mail: rprashardr1195@rediffmail.com

Abstract: The facial nerve exits the skull at the stylomastoid foramen and enters the parotid gland high up on its posteromedial surface and passes forward and downwards behind the mandibular ramus. Within the substance of parotid it branches into superior (temporofacial) and inferior (cervicofacial) trunks which collectively give five main peripheral branches radiating out across the face. During routine dissection of head and neck region for medical undergraduates, the face was dissected of an 86 year's old embalmed female cadaver in the Department of Anatomy, Punjab Institute of Medical Sciences, Jalandhar. Following the fine dissection, we noticed the variation in branching pattern of facial nerve on the right side of face and same pattern was observed on left side too. The challenge to head and neck surgeons in parotid surgery is adequate removal of the tumour with functional and anatomical preservation of all branches of the facial nerve. So surgeons have to keep in mind the variations for successful surgery.
Keywords: Facial Nerve, Parotid gland, Mastoid process, Stylomastoid foramen

INTRODUCTION

The facial nerve exit the skull at the stylomastoid foramen and so initially deep to the posterior margin of the external acoustic meatus and immediately gives off the nerve to posterior belly of digastrics and stylohyoid and the posterior auricular nerve that supplies the occipital belly of occipitofrontalis and some auricular muscles. The nerve next enters the parotid gland on its posteromedial surface and passes forward and downwards behind the mandibular ramus. Within the substance of parotid it branches into superior (temporofacial) and inferior (cervicofacial) trunks, usually just behind and superficial to the retromandibular vein that collectively give five main peripheral branches radiating out across the face. These branches diverge within the parotid gland and leave by its anteromedial surface, medial to anterior margin, to supply the muscles of facial expression [1]. Within the parotid gland, there is further branching with many individual variations [2]. Therefore, the knowledge of topographical and surgical landmarks that aid location of its branches is important if the nerve is to be preserved during surgery [1]. Adequate removal of the tumour with functional and anatomical preservation of all branches of the facial nerve in parotid surgery is a challenge to head and neck surgeons [2-5]. Facial nerve branching variation can be understood through an awareness of its embryonic development. The main patterns of the nerve's complex course, branching pattern, and structural relationships are established during the first three months of prenatal life. Important steps in facial nerve development occur throughout the period of gestation, and significantly, the nerve is not fully developed until approximately four years after birth [6].

CASE REPORT

During routine dissection of head and neck region for medical undergraduates, the face was dissected in a 86 years old embalmed female cadaver in the department of Anatomy, Punjab Institute of Medical Sciences, Jalandhar. The facial nerve trunk was dissected and traced to the stylomastoid foramen. Branching of the facial nerve and number of rami of all the branches, anatomical relationship between the branches and its adjacent structures were noted and photographed.

The main trunk of facial nerve on right side, after its exit from stylomastoid foramen divided into two divisions i.e superior and inferior (Fig. 2). The superior division was further giving temporal branch, two twigs of zygomatic branch, two buccal branches i.e., upper and lower buccal. The upper buccal was further divided into superficial and upper deep buccal but lower deep buccal got origin from superior division directly. Lower deep buccal joined the upper deep buccal just above the parotid duct crossing it

superficially. The two buccal branches again got separated to form a loop over the buccinator and this loop was giving number of branches supplying the muscles in the region (Fig. 1 and 2).

The inferior trunk was further dividing into marginal mandibular and cervical. A communicating twig was noticed between marginal mandibular and loop formed by buccal nerves (Fig. 2). The same pattern was observed on left side too.

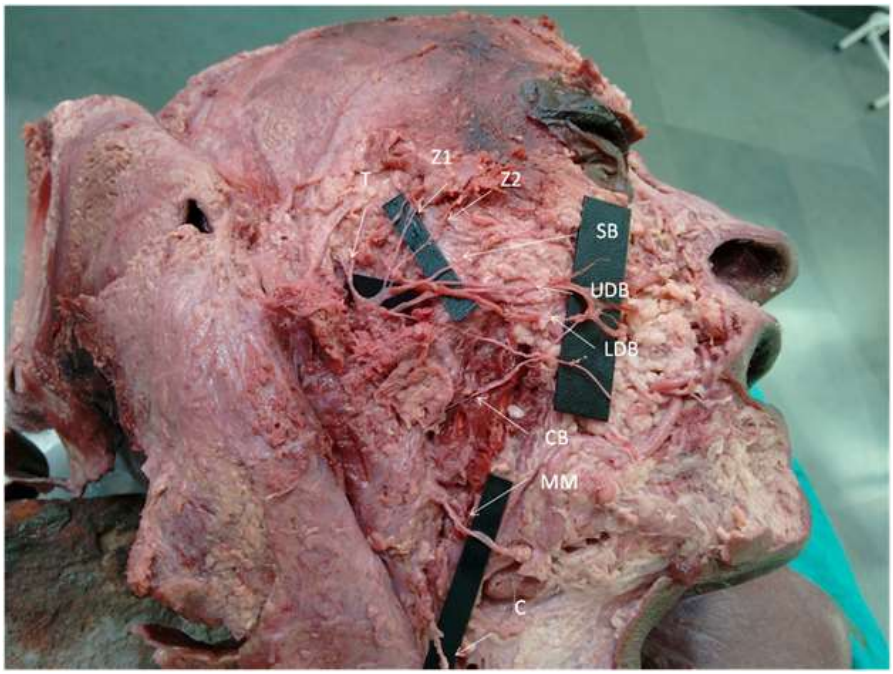

Fig. 1: Branching Pattern of Facial Nerve; T-Temporal, Z-Zygomatic 1 and 2, SB- Superficial Buccal, UDB-Upper deep buccal branch, LDB- Lower deep buccal branch, CB- Communicating branch, MM- Marginal Mandibular, C- cervical branch

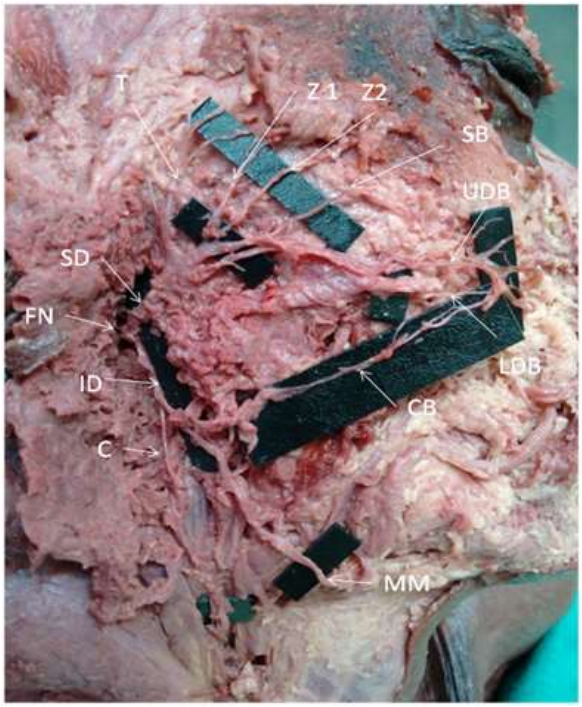

Fig. 2: Tracing of facial nerve in the parotid gland; FN-Facial Nerve, SD –Superior Division, ID- Inferior division T-Temporal, Z-Zygomatic 1 and 2, SB- Superficial Buccal, UDB-Upper deep buccal branch, LDB- Lower deep buccal branch, CB- Communicating branch, MM- Marginal Mandibular, C- cervical branch

DISCUSSION

One of the main hazards of operating on pathological lesions in the parotid gland is the risk of damage to the facial nerve. The anatomy of the extracranial course of nerve is documented in detail in most of anatomical texts and works on surgical anatomy but emphasis is given to the relationship of the main trunk to the pattern of its division [7]. Cadaveric and intra-operative microdissection studies have shown that the distribution of the rami that are given off from these branches is highly variable. Use of surface anatomical coordinates alone to locate is therefore unreliable, only can give an approximation of their underlying trajectory. The classification of the peripheral distribution of the facial nerve is based on the type and number of anastomoses between the peripheral branches [6].

Normally there are two trunks Superior (temporofacial) and inferior (cervicofacial). Temporofacial further gives temporal and zygomatic branches and cervicofacial gives buccal, marginal mandibular and cervical branches [8]. But in present case buccal nerves were arising from superior division. The buccal branches of the facial nerve in relation to the parotid duct associated with surgical procedures. Rhytidectomy and parotid gland surgery are relevant [9].

Davis *et al*. proposed that the patterns of branching of the facial nerve can be described as 6 types, and found in their series that the types accounted for the following percentage: type 1- 18%; type 2- 20%; type 3- 28%, type 4 – 24%; type 5 – 9% and type 6 – 6% and found that types 3 and 4 were most common and types 2, 3 and 5 made up 72% of all [2]. Numerous microdissection have demonstrated that branching patterns and anastomoses between branches, both within the parotid and on the face, exhibit considerable individual variations [10, 11].

CONCLUSION

The surgical treatment for tumours, especially in the parotid region has become common. The attention has been focused on the importance of an exact description of the anatomy of the facial nerve with special reference to its relation to the parotid gland for successful parotid gland and temporomandibular joint surgery.

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