



Variant Terminal Branching Pattern of Facial Nerve-Application in Parotid Surgeries

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KEYWORDS

Facial nerve, nerve anastomosis, temporal branch, zygomatic branch, buccal branch, marginal mandibular branch, cervical branch, parotid surgery

ABSTRACT:

Background:

Facial nerve is seventh cranial nerve. It is a mixed nerve with both motor and sensory component. It is also called smiling nerve as it supplies to all muscles of facial expression. Variations in terminal branching pattern of facial nerve are common. Devis, kwak, kantz and many more authors tried to classify it. Present case report represents bilateral variant terminal branching pattern of facial nerve with multiple anastomosis. Knowledge of these variations to surgeons provide road map for right surgical approach conserving facial nerve branches and thus reducing postoperative facial nerve weakness and injury in parotid, maxillofacial and cosmetic surgeries.

INTRODUCTION

Facial nerve (FN) is a mixed cranial nerve and nerve of second pharyngeal arch. It is called queen of face as it supplies motor innervation to muscles of face.^[1] After emerging from the stylomastoid foramen, FN enters parotid gland from its posteromedial surface. It winds around isthmus of the gland and divides into two nerve trunks, temporofacial and cervicofacial. These nerve trunks form terminal branches of nerve which emerge out from the anterior border of the gland. These branches are temporal, zygomatic, buccal, marginal mandibular and cervical.^[1,2]

Surgical procedures related to FN like cosmetic surgeries, maxillofacial surgeries and parotid surgeries are frequent.^[3,4] Tumors of parotid gland accounts for 70 to 80 % of total salivary gland tumors.^[5,6] If tumors are located in superficial lobe of gland, partial parotid gland removal is done while for deep seated tumors total parotidectomy is done.^[7,8,9] Most common postoperative complication of such surgeries is FN weakness.^[3]

Successful outcome of these surgeries depends on knowledge of branching pattern and variations of

FN.^[10] Variations in the number and presence of anastomosis of terminal branches of facial nerve is not uncommon. Many authors like Devis, Kwak, Kopuz, Kantz and Martínez Pascual P tried to classify these pattern.^[2,5,11] Present case report is about bilateral variant FN terminal branching pattern found during routine dissection where loop and intercommunications are found among terminal branches of FN.

CASE REPORT

In a 50 year old male cadaver during dissections of parotid gland we observed bilateral variant pattern of facial nerve. After midline incision on face, skin flaps were dissected laterally. After dissection of facial muscles, zygomatic branch was found first. When traced in retrograde manner, trunk of facial nerve was noted. During piece meal removal of parotid gland, we found multiple branches with loops and intercommunications on right side [Fig 1]. With respect to trunk and zygomatic branch other branches were dissected carefully and identified. When traced, these branches were arising from three trunks instead of two. Normally only two



trunks are present temporofacial and cervicofacial. Left side parotid region also dissected in similar manner. It showed many branches and intercommunications [Fig 2]. The terminal nerve branching pattern on right side was different from that of left side.

Variations on the right side –

- Five temporal branches are seen
- Distal most temporal branch formed a loop with adjacent zygomatic branch
- Intercommunications present between second and third temporal branches
- Three zygomatic branches seen
- Intercommunications present between zygomatic branches
- Zygomatic branch formed loop with upper buccal branch
- From the loop of zygomatic and upper buccal one nerve branch emerged
- Two marginal mandibular branches seen
- Distal marginal mandibular bifurcated
- Single cervical branch bifurcating to two seen

Variations on the left side –

- Three temporal branches seen
- Two upper buccal branches seen
- Parotid duct was present between the two upper buccal branches
- Parotid duct formed by union of two small ductules
- Intercommunications found between two upper buccal branches
- Two lower buccal branches present
- Marginal mandibular branch formed by union of two nerve twigs

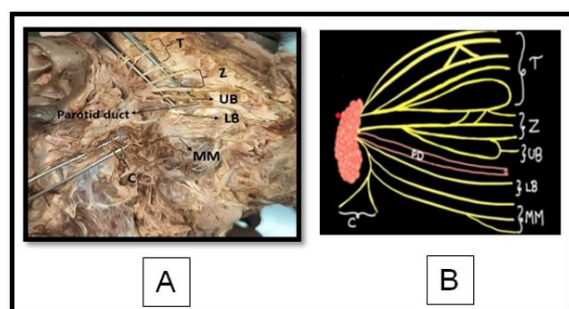


Figure 1: showing dissection image A with terminal branching pattern of facial nerve on right side. B- Schematic presentation of dissection image A drawn

for understanding of readers. (T-Temporal, Z-Zygomatic, UB-Upper buccal, LB –Lower Buccal, MM-Marginal Mandibular, C –Cervical, PD –Parotid duct)

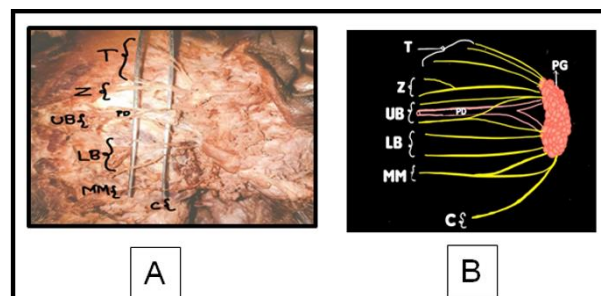


Figure 2: showing dissection image A with terminal branching pattern of facial nerve on left side.

B- Schematic presentation of dissection image A drawn for understanding of readers.

(T-Temporal, Z-Zygomatic, UB-Upper buccal, LB – Lower Buccal, MM-Marginal Mandibular, C – Cervical, PD –Parotid duct)

DISCUSSION –

FN normally has two nerve trunks. In present case trifurcation was found on right side where instead of two three nerve trunks were present. Similar trifurcation even quadrifurcation also where FN had four nerve trunks are reported in literature.[12,13,14,15,16] Author Kalaycioglu A had reported three trunks of FN trunks in 18.75% of cases.

Devis classification is based on intercommunication pattern among terminal nerve branches while Kwak classification revolves around buccal nerve and its communications. [17,18,19] As per Devis classification, in the present case report, the right side nerve branching pattern fits into Type VI which means multiple complex intercommunications in temporofacial and cervicofacial trunks while left side into type III which indicate single anastomotic communication between the two trunks. Author Devis and Myint had mentioned max number of cases with type III while Ekinci, Khaliq B A et al and Kim et al found highest number of type I cases in their study. [18,19,20]

As per Kwak classification right sided pattern will fit into type II which indicates intercommunication between buccal and zygomatic branch while left side pattern can be considered type I which means buccal branch was coming from two different trunks. AS per



Katz classification, right as well as left side patterns can be included as type IV depicting multiple anastomoses. [17]

There were five temporal branches on right side while three temporal branches on left side. Hawang K author had reported maximum 7 temporal branches in his study. [21] Temporal branch is always at a high risk of damage in plastic surgeries as there is less subcutaneous tissue in this region to protect it. [20] On right side two marginal mandibular [MM] branches were found while on left side MM branch was formed by two rami. Knowledge of variations and location of MM nerve branch is essential in submandibular and maxillofacial surgeries. [22]

FN is more prone to injury when it shows varied branching pattern. Knowledge of variations enables altered surgical approach in surgeries involving FN which can reduce post-operative morbidity associated with FN. Anastomosis and intercommunications among terminal branches of FN are helpful in sustained facial injuries.

CONCLUSION

Multiple anastomoses among terminal branches of FN are common. This knowledge of variation can help in reducing postoperative facial nerve weakness or facial nerve palsy in different surgeries involving FN like cosmetic, maxillofacial, submandibular and parotid surgeries.

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