

ORIGINAL RESEARCH

Multiple complex anastomosis among the branches of temporofacial and cervicofacial trunk of Facial NerveAlka Bhingardeo¹, Durgesh Kumar Dey², Lasya Priya Gattu³, Mrudula Chandrupatla⁴¹Assistant Professor, Department of Anatomy, AIIMS Bibinagar, India.²First Year MBBS, AIIMS Bibinagar, India.³First Year MBBS, AIIMS Bibinagar, India.⁴Head, Department of Anatomy, AIIMS Bibinagar, India.

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ABSTRACT

Background: Facial nerve conservation during parotid and some submandibular surgeries determines post-operative outcomes. High attention is to be paid to the branching pattern of facial nerve. Variations in trunks and branches of facial nerve are not uncommon. Davis et al, Kwak, Kantz and others have tried classifying branching pattern of facial nerve into different categories. This case report highlights one unique variant bilateral pattern with multiple complex anastomoses among the branches of temporofacial and cervicofacial trunk of facial nerve. Presence various communicating branches and formation of new branches by union of rami of main branches are observed. Knowledge of such variant patterns is essential not only for parotid surgeries but also for procedures like facial rhytidectomies, nerve transfer procedures and ligament release in various cosmetic surgeries.

Key words: Facial nerve, parotid, temporal, zygomatic, buccal, marginal mandibular, cervical, Davis classification

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INTRODUCTION

Facial nerve is the seventh cranial nerve which has mixed peripheral innervations. It is the nerve of second pharyngeal arch so supplies all the structures developing from its mesoderm. From the third month of intrauterine life, the course and branching pattern of facial nerve is well appreciated. It emerges in form of two roots, Sensory (Nervous intermedius of Wrisburg) and Motor, from the ventral aspect of the Pons. Within the stroma of the parotid gland, it divides into two trunks, Temporofacial and Cervicofacial which give rise to branches emerging out from the anterior border^[1-4]. The temporofacial nerves give out Temporal and Zygomatic branches while Buccal, Marginal Mandibular and Cervical branch arise from the Cervicofacial trunk.

Variations in the origin of trunks of facial nerve and its subsequent division into branches are not uncommon. So many times we find intercommunicating branches not only in the same trunk but between the branches of two trunks. Parotidectomy is the practical surgical approach for parotid tumors. Parotid surgeries involve conservation of trunks and branches of facial nerve to avoid post-operative comorbidities like facial weakness or facial palsy. Injuries to these terminal branches are not uncommon during parotidectomy, anaesthesia, cervicofacial rhytidectomy, so surgeons have to be careful during the procedures^[5-7]. Present

article is dissection based cadaveric report of the unique terminal branching pattern of facial nerve and their inter-communications in temporofacial and cervicofacial trunk.

CASE REPORT

During routine cadaveric dissection in 50 year old female cadaver, we found bilateral variant terminal branching pattern of facial nerve. While doing routine dissection by piecemeal procedure we observed more than five terminal branches of facial nerve emerging from anterior border of parotid gland. When traced to the level of trunks, we noticed many complex anastomoses and intercommunications among different branches which can be summarized as below -

Variations in Temporofacial trunk

1. Two temporal and one zygomatic branch from the temporofacial trunk. The upper and lower temporal gave three ramii each.
2. There is a communication between the third ramus of the upper temporal and the first ramus of lower temporal.
3. The second ramus of lower temporal gave further branches.
4. Ramus from the lower temporal and zygomatic branch unite and form another branch passing between temporal and zygomatic

Variations in Cervicofacial trunk

1. There were two separate buccal branches –upper and lower arising from cervicofacial trunk
2. Lower buccal and marginal mandibular divided into three rami
3. Ramus from lower buccal and marginal mandibular united and formed one branch passing between lower buccal and marginal mandibular

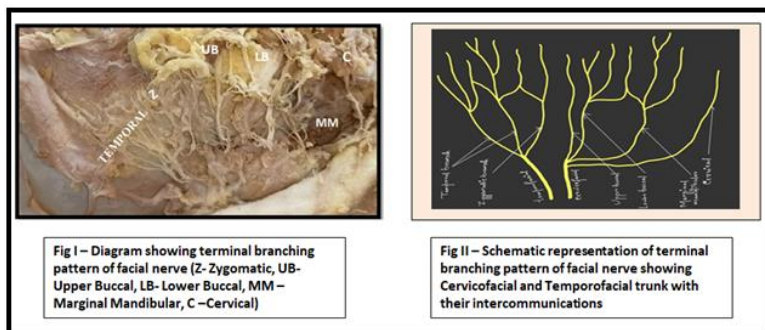


Figure 1

Figure 2

DISCUSSION

The variations in terminal branching pattern of facial nerve are not uncommon. The knowledge of different patterns of intraparotid branches and communications of the facial nerve help in giving a detailed map to the surgeons to curtail post-operative morbidity associated with parotid surgeries^[8]. Varied classifications of the terminal branching pattern of the facial nerve by Davis et al^[9,10] and other scientists mentioned when we reviewed the literature.

Author Davis et al⁹ explained the varying patterns under six categories. According to the above the classification, the variation in the terminal branching pattern of facial nerve in our cadaver comes under Type VI. When reviewed literature, authors Maliq^[11], Khaliq^[12] and Singh^[13] in their study found maximum cases of category I where no anastomosis was there and cases were normal. Authors Park and Lee^[14], Bernstein^[15], Katz^[16], Mynt^[17] and Gataa and Faris^[18] reported maximum cases of category III of Devis where single

anastomotic branch exist between the temporofacial and cervicofacial trunk. In our case, we found temporal branches. Hwang K ^[19] in his article mentioned that he found 4 temporal branches in maximum number of cases. As per author highest order of ramification of temporal branch was 7. Gossain A K ^[20] reported intercommunications between temporal and marginal mandibular and zygomatic and buccal branches. But we have not found any similar communications in our case report.

Another classification on variations in the terminal branching pattern and anastomotic connections of facial nerve based upon the origin of buccal branches is given by Kwak ^[10] According to the above the classification, the variation in the terminal branching pattern of facial nerve in our case is not similar to any of the categories as the two divisions of buccal branch arise from only one trunk –cervicofacial trunk.

Another classification is also given by Katz ^[16] on the complexities of the branching pattern and communications in the terminal branches of seventh cranial nerve. According to the above the classification, the variation in the terminal branching pattern of facial nerve in our cadaver comes under Type IV.

Author Omar Salem ^[21] in his study, proposed new classification depending upon origin of trunks and classified patterns into three categories. As per this new classification, our case can be included in Category III, where two trunks arise separately from the facial nerve and subsequently give branches.

Therefore, surgeons should a clear idea about the anastomotic connections and the arrangement pattern of the terminal branches of the facial nerve so as to preserve even the tiniest communicating rami, although sacrificing one does not apparently result in loss of motor movements but help in preventing associated post-operative morbidities ^[22-25].

DEVIS CLASSIFICATION

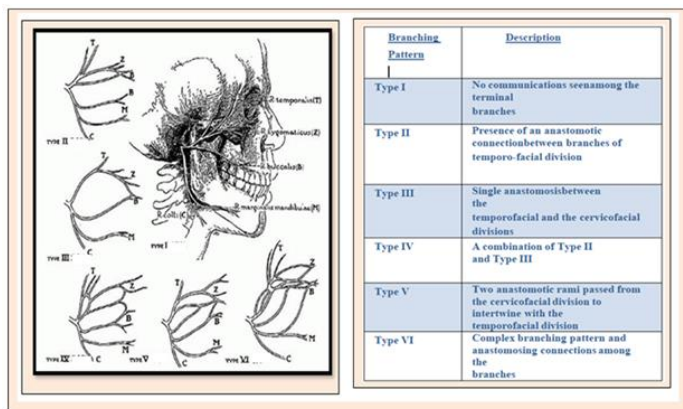


Figure 3

KWAK CLASSIFICATION

Branching Pattern	Description
Type I	Buccal branch arise from the two main divisions of the trunk and not from other branches.
Type II	Buccal arising from the two main divisions is interconnected with the Zygomatic branch.
Type III	Marginal mandibular branch sent nerve twig to the buccal branch which originated from the upper and lower divisions.
	The nerve twigs from the zygomatic and the marginal mandibular

Type IV	branches merged to the buccal branch arising from the two main divisions
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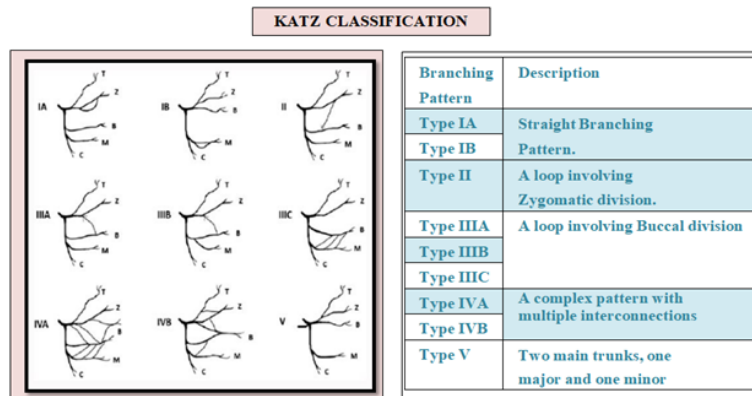


Figure 4

CONCLUSION

There are profound variations in the branching pattern of facial nerve. Surgeons, Radiologists, Physiotherapists must be aware of such variant patterns. Knowledge of such complex plexiform arrangement of the anastomotic connections during various procedures such as facial reconstructive surgeries, neck dissections and nerve transfer procedures may help in reducing facial palsy and other complications

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