



FACIAL NERVE BRANCHING PATTERN AS SEEN IN PAROTIDECTOMY IN INDIAN POPULATION – A SINGLE CENTRE EXPERIENCE

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ABSTRACT

Objective: A prospective study to analyze the facial nerve branching pattern as seen in superficial parotidectomy in Indian population. **Methods:** The prospective study was conducted in 20 patients undergoing superficial parotidectomy in a tertiary referral centre. Facial nerve branching pattern was classified according to the description given by Davis. Length of the main trunk of facial nerve and relationship of facial nerve to tympanomastoid suture was determined and recorded using sterile measure (wire/thread) which was then measured on caliper. **Results:** The most common type of branching pattern of facial nerve in our study was type I seen in 8 (40%) patients, followed by type III seen in 5 (25%), followed by type II in 3 (15%), type IV in 2 (10%) patients, followed by type V and VI each in 1 (5%) patient. 15 (75%) patients had an average length of main trunk of facial nerve between 16 – 20 mm. In 12 (60%) patients, the distance of facial nerve from tympanomastoid suture was between 2.5-3mm. **Conclusion:** Type I branching pattern is the most common branching pattern of the facial nerve (40%) followed by type III (25%), following the pattern as described by Davis. Average length of main trunk of facial nerve in the present study was 16.45mm and most of the patients had the length between 16-20 mm.

KEYWORDS: Superficial parotidectomy; facial nerve; branching pattern; tympanomastoid suture.

INTRODUCTION

Successful surgical outcomes in case of parotid tumors depend upon good exposure and preservation of facial nerve which requires a thorough knowledge of extra temporal anatomy of facial nerve and an awareness of possible anastomosis/ variations amongst its branches. The facial nerve with its two main divisions, the temporofacial and cervicofacial and the subsequent terminal branches including the temporal, zygomatic, buccal, marginal mandibular and cervical branches have made the surgeons feel like wanderers in the parenchyma of parotid for centuries. Facial nerve branching pattern is not uniform as shown by the studies conducted by various authors.^[1-8] In the present study we aim to determine the percentage of branching pattern of facial nerve in Indian patients according to the classification given by Davis^[1].

There is lack of literature on the branching pattern of facial nerve in Indian population. Therefore, the present study was conducted to determine the branching patterns of facial nerve as seen during parotidectomy with special focus on the relation of the main trunk of facial nerve to surrounding fixed bony landmark (tympanomastoid suture).

MATERIALS AND METHODS

The prospective study was conducted in 20 patients undergoing superficial parotidectomy for different pathologies in a tertiary referral centre in the age group of 30-50 years within a period of 2 years. Out of these, 12 (60%) were females and the rest 8 (40%) were males. Patients with pre-operative facial nerve palsy / paresis, tumor fixation to overlying skin, recurrent tumor or with lymph node involvement were excluded from the study.

Ethical considerations

After having explained the risks and consequences of the suggested surgery, those who volunteered were included and written, informed consent was taken each time and ethical committee clearance was obtained for the same.

Exposure of the facial nerve: The facial nerve was dissected from its emergence from the stylomastoid foramen using its landmarks like tragal pointer, posterior belly of digastric, tympanomastoid suture, mastoid process and its facial branches were traced very carefully repeating these four steps – insert, spread, lift, cut through the parotid gland and beyond it distally. The two primary divisions of the facial nerve were exposed and small anastomotic branches between the terminal branches of the facial nerve were carefully dissected.

Branching patterns of the facial nerve

The branching patterns of 20 cases were classified into six types based on the description given by Davis^[1] as follows

Type I: No anastomosis between branches of facial nerve.

Type II: Presence of an anastomotic connection between branches of temporofacial division.

Type III: A single anastomosis between temporofacial and cervicofacial division.

Type IV: A combination of type II & III.

Type V: Two anastomotic rami passing from cervicofacial division to intervene with branches of temporofacial division.

Type VI: Plexiform arrangement, the mandibular branch sending twig to join any members of temporofacial division.

The percentage of each type of pattern was calculated as shown in the figure 1 (a). Length of the main trunk and relationship of facial nerve to tympanomastoid suture was determined and recorded using sterile measure (wire/thread) which was then measured on caliper as shown in the Figure 1 (b).

RESULTS

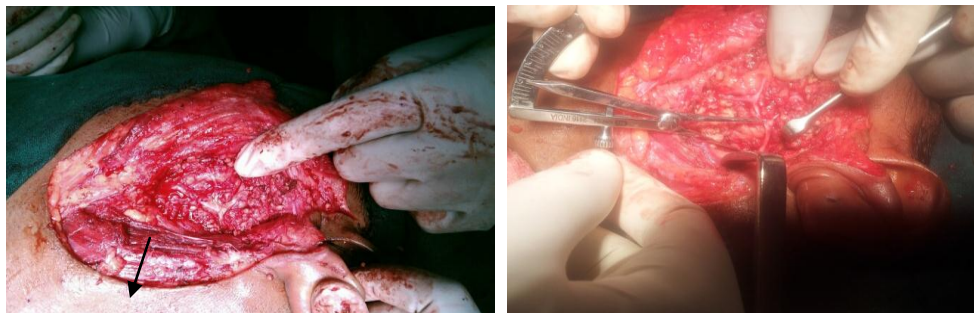


Figure 1 (a) Showing branching of facial nerve and 1 (b) measuring the length of main trunk of facial nerve.

Out of 20 cases in our study, 17 (85%) were pleomorphic adenoma, 2 (10%) had mucoepidermoid carcinoma and 1 patient had Warthin's tumor. Out of all, right side parotid was involved in 7(35%) cases while in 13(65%) it was left sided involvement. In all cases, main trunk was divided into a larger temporofacial (upper) division and a smaller cervicofacial or lower division. The most common type of branching pattern of facial nerve seen in our study was Type I and percentage of each type of pattern is shown in the Table I. Distribution of length of main trunk of facial nerve is shown in Table II.

Table I. Branching pattern of facial nerve seen in the study

Type of branching pattern	Number (out of 20)	Percentage
Type I	8	40%
Type II	3	15%
Type III	5	25%
Type IV	2	10%
Type V	1	5%
Type VI	1	5%

Table II. Length of main trunk of facial nerve

Length	5-10mm	11-15mm	16-20mm	> 20mm
Number	0	4	15	1
Percentage	0	20%	75%	5%

Table III. Distance of facial nerve from tympanomastoid suture

Distance from Tympanomastoid Suture	<2.5mm	2.5-3mm	3-3.5mm	>3.5mm
Number	5	12	2	1
Percentage	25%	60%	10%	5%

Table IV. Comparison of our results with different Authors (based on Davis classification)

Author	Type – I	Type – II	Type – III	Type – IV	Type – V	Type – VI
Davis et al (1956) (n = 356)	13%	20%	28%	24%	9%	6%
Myint et al (1992) (n = 79)	11.4%	16%	34%	19%	7.6%	12.7%
Ekinici (1999) (n = 27)	52%	7%	7%	30%	4%	-
Kim et al (2002) (n = 23)	57%	17%	17%	9%	-	4%
Present Study (n = 20)	40%	15%	25%	10%	5%	5%

Out of the 20 cases in our study, in maximum cases i.e. 12 (60%) the distance of facial nerve from tympanomastoid suture was between 2.5-3mm, followed by 5 (25%) cases having a distance of <2.5mm. 2 (10%) cases had a distance between 3-3.5mm, whereas only 1 (5%) case had a distance of >3.5mm from the tympanomastoid suture as shown in Table III.

DISCUSSION

Facial nerve topography during parotidectomy is always a challenging task for the surgeon because of unknown and unpredictable alterations or variation in the branching pattern of facial nerve. The purpose of the present study is to highlight the different patterns of intra- parotid distribution and anastomosis of facial nerve so as to provide guideline map for the operating surgeons to reduce post-operative morbidity related to facial nerve injury during surgery. Numerous studies have been conducted in the past on this subject. Although most of the studies classified it into 6 types, Katz and Catalano³ reported only 5 types in their study. The most common pattern in our study was type I (40%), in accordance with Ekinci⁵ and Kim et al⁶, while Davis et al¹ and Myint et al⁴ have reported a lower incidence of type I branching pattern in their studies. They reported it 13% and 11.4% respectively. Type I is clinically important since if anterior branch is sacrificed, there can be resultant paralysis of the muscles as there is no anastomosis between the branches.

Type III branching pattern was the second most common (25%), in accordance with Myint et al⁴ and Davis et al¹ who have reported the incidence to be 34% and 28% respectively. Type V and type VI branching patterns are the least commonly reported branching patterns in almost all of these studies, though Myint et al⁴ reported a relatively higher incidence (12.7%) of type VI branching pattern in their study. In the present study type V and type VI branching pattern were seen in only 5% cases (Table IV).

In this study most of the patients had the length of main trunk of facial nerve between 16-20 mm with the average length of 16.45 mm which was in accordance to finding by Kwale et al⁸ who reported the length as 13.0 ± 2.8 mm.

The average distance of facial nerve from tympanomastoid suture in the present study was 2.75 mm, the lowest value being 2.1 mm and the longest 3.8 mm. Most of the cases (60%) had a distance of 2.5-3 mm of facial nerve from tympanomastoid suture which is in accordance with Alexander et al⁷ who reported a distance of 2.7 mm.

CONCLUSIONS

Facial nerve topography during parotidectomy is always unique and a challenging task for the surgeon because of unknown and unpredictable alterations or variation in the branching pattern of facial nerve. The purpose of the

present study is to highlight the different patterns of intra- parotid distribution and anastomosis of facial nerve so as to provide guideline map for the operating surgeons. If all these factors are kept in mind during the parotid gland surgery, the surgeon will be safe from unpleasant surprises and unpredictable results.

CONFLICT OF INTEREST

No financial interest or any conflict of interest.

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