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Facial nerve branching pattern as seen in parotidectomy in Kashmiri population: our experience

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ABSTRACT

Background: A prospective study to analyze the facial nerve branching pattern as seen in various parotidectomy surgeries in Kashmiri population. Main objective was to find out various branching patterns among peripheral branches of facial nerve in parotid tissue so that new young ENT surgeons could get benefited and it should be easy for them to perform parotid surgeries with less complications and unpredictable outcome.
Methods: The prospective study was conducted in 35 patients undergoing superficial parotidectomy in our department of otorhinolaryngology GMC Srinagar over a period of one and half year. Facial nerve branching pattern was classified according to the description given by Davis et al. Branching pattern of main trunk was also observed in all cases.
Results: The most common type of branching pattern of facial nerve in our study was type I seen in 12 (34.2%) patients, followed by type III seen in 9 (25.7%), followed by type II in 5 (14.2%), type IV in 4 (11.4%) patients, followed by type V in 3 (8.5%) and VI in 2 (5.7%).
Conclusions: Type I branching pattern is the most common branching pattern of the facial nerve (34.2%) followed by type III (25.7%), following the pattern as described by Davis. Main trunk was found single in 32 (91.4%%) patients however in 3 (8.57%) patients trunk was dividing in 2 branches before dividing in peripheral branching pattern as described above.

Keywords: Facial nerve, Davis classification, Kashmir

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] Branching patterns of the facial nerve in 20 cases were classified into six types based on the description given by Davis as follows.[1]

- 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.

METHODS

The prospective study was conducted in tertiary centre SMHS Department of ENT & HNS between March 2015 to September 2016. Total of 35 patients undergoing superficial parotidectomy and total conservative parotidectomy for different pathologies in the age group of 20-60 years were registered. Out of these, 22 (62.85%) were females and the rest 13 (37.14%) 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 after properly explaining nature of surgery and our aim and purpose for this study.

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. 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. The percentage of each type of pattern analysed in our study was calculated as shown in Table 1 and percentage of main trunk division is shown in Table 2.

RESULTS

Out of 35 cases in our study, most of them were pleomorphic adenoma. Female involvement was more than males with mean age of involvement around 30 to 50 years. Most of these patients underwent superficial parotidectomy and in only 3 cases total conservative parotidectomy was done due to involvement of both lobes of parotid gland. Proper informed consent was taken from all patients included in this study. Facial nerve branching pattern types in parotid tissue were distributed in six types in accordance with classification of Davis et al.[1] In our study we found type I pattern most common followed by type III pattern (peripheral branching pattern) of facial nerve and type VI least pattern as shown in Table 1. We also found that main trunk of facial nerve of exiting from stylomastoid foramen sometimes divides in two braches before diving in peripheral branching pattern as described in Table 1 and Table 2. Comparison of our results with different Authors (based on Davis classification) was given in Table 3. Type – I, Type – II, Type – III, Type – IV, Type – V, Type – V1: 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%, 12.0%; Ekinci (1999) (n = 27) 52%, 7%, 7%, 30%, 4%; Kim et al (2002) (n = 23) 57%, 17%, 17%, 9%, 4%; Present study (2015-16) (n = 35) 34.2%, 14.2%, 25.7%, 11.4%, 8.5%, 5.7% respectively.

Out of the 35 cases in our study, in maximum cases i.e. 32 (91.4%) there was single trunk of facial nerve present and in rest 3 cases i.e. (8.57%) main trunk was dividing in two branches before diving in peripheral branches a pattern not seen in rest 91.4% cases.

Table 1: Distribution of patients on nerve branching pattern.

Facial nerve branching pattern as per (Davis et al)	Total no of patients (35) with type wise distribution	Percentage of each type of branching pattern
Type 1	12	34.2%
Type 11	9	14.2%
Type 111	5	25.7%
Type 1V	4	11.4%
Type V	3	8.5%
Type V1	2	5.7%

Table 2: Distribution trunk branching on basis of main trunk.

Main trunk branching	No of patients	Percentage
No branching (single trunk)	32	91.4%
Two branches of main trunk	3	8.57%

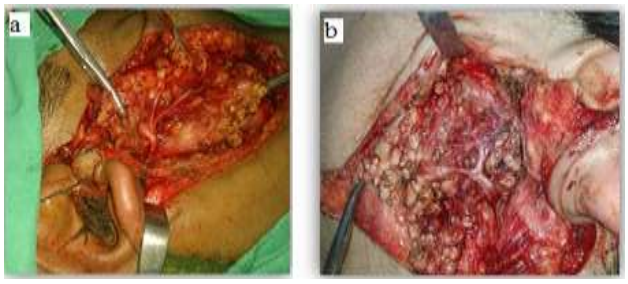

Figure 1a) Showing branching pattern of peripheral facial nerve branches in parotid tissue with two divisions of main trunk. 1b) Showing branching pattern of facial nerve peripheral branches with no division of main trunk.

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. Various studies have been conducted in the past on this subject. Although most of the studies classified branching pattern into 6 different types, Katz and Catalano reported only 5 types in their study.[3] The most common pattern in our study was type I (37.2%), in accordance with Ekinci and Kim et al, while Davis et al and Myint et al have reported a lower incidence of type1 branching pattern in their studies as described above.[1,4-6] 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 (25.7%), in accordance with Davis et al and Myint et al who have reported the incidence to be 28% and 34% respectively. Type V and type VI branching patterns are the least commonly reported branching patterns in almost all of these studies, though Myint et al reported a relatively higher incidence (12.7%) of type VI branching pattern in their study.[4] In the present study type V and type VI branching pattern were seen in only 8.5% and 5.7% cases respectively as in Table1. We also found main trunk of facial nerve dividing in two branches after exiting from stylomastoid foramen a pattern seen in few cases (8.57%) only which was different than what was present in most of our cases (91.4%) before dividing in terminal branches in parotid tissue as shown in Table 1 and 2.

Table 3: Comparison of our results with different authors.

Type	Davis et al; n=356(1956)	Myint et all; n=79(1992)	Ekinci et al; n=27 (1999)	Kim et al; n=23 (2002)	Our study; n=35 (2015-16)
I	13	11.4	52	53	34.5
II	20	16	7	17	14.2
III	28	34	7	17	25.7
IV	24	19	30	9	11.4
V	9	7.6	4	4	8.5
VI	6	12	0	0	5.7

CONCLUSION

Parotid gland is of utmost importance for surgeons due to presence of facial nerve branches in its tissue dividing parotid gland in superficial and deep lobe. So its very important for operating surgeons not only to know about facial nerve and its branching pattern but anatomy of parotid gland has also high significance for surgeon. 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 branches in parotid tissue 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 and morbidity and grave consequences associated with facial nerve damage.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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