

Original Research Article

Branching pattern of marginal mandibular nerve-an anatomical study

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ABSTRACT

Background: Marginal Mandibular nerve, a branch of facial nerve, emerges at the lower part of the anterior border of parotid gland. It supplies risorius, muscles of lower lip and chin and joins mental nerve. This nerve has an important relationship with the lower border of mandible and is likely to be damaged during procedures in or around the submandibular area and can lead to certain morbid conditions like deviation of angle of mouth, drooling of saliva and difficulty in phonation.

Methods: Sixty formalin preserved specimens of head and neck were used for studying the branching pattern of marginal mandibular nerve. The present study was conducted in the department of Anatomy Govt Medical College Srinagar over a period of two and a half years from 2015 to 2017. Cadaveric dissection was also used in the study during the routine teaching of undergraduate MBBS and BDS students in the department. The photographs of the variations seen during the study were taken.

Results: In Forty-seven specimens (78.33%) there was a single branch of marginal mandibular nerve, in 10 specimens (16.6%) there were two branches of marginal mandibular nerve and in three specimens (5.0%) the marginal mandibular nerve was having three branches.

Conclusions: From the above study it was concluded that marginal mandibular nerve can have two or three branches. Therefore, it is advisable to take due care during surgical procedures in the lower part of face and upper part of neck to preserve marginal mandibular nerve and to ensure cosmesis and prevent morbidity.

Keywords: Facial artery, Marginal mandibular nerve, Morbidity, Parotid gland

INTRODUCTION

Facial nerve is the only source of nerve supply to the muscles of facial expression through its five branches which emerge at the anterior border of parotid gland. Of the five major branches marginal mandibular branch of facial nerve supplies muscles of the lower lip, risorius and chin and joins with the mental nerve. Marginal mandibular nerve emerges from the lower part of anterior border of parotid gland passes forwards towards the angle of mandible in the plane between platysma and the investing fascia in the upper part of digastric triangle and

then turning up and forwards across the body of mandible deep to depressor anguli oris.¹ At this point the nerve is superficial to facial artery and facial vein. Therefore, facial artery is an important landmark to locate the marginal mandibular nerve. Course of marginal mandibular branch of facial nerve can be localized accurately using the ramus of mandible and facial artery as both of these landmarks can be felt easily by palpation in humans and therefore they have practical importance for the surgeons.² This nerve has an important surgical relationship with the lower border of mandible. and the farthest point is 1.2cms from the lower border of

mandible and the reported incidence being 20-50%.^{3,4} Since circumoral muscles are involved in the smile which is by far the most important manifestation of emotions therefore any injury to nerve supplying these muscles will lead to the facial asymmetry and loss of the expression of emotions. The most common cause of paralysis of marginal mandibular nerve is injury during surgical procedures in the mandibular and parotid regions. Facial weakness following surgery in the face and upper part of the neck is mostly confined to the territory of marginal mandibular branch and manifested by weakness of lower lip on the affected side. This is because anastomotic arcades between Marginal mandibular branch and other branches of facial nerve are relatively rare.⁵ The most important step in surgical procedures in the submandibular and parotid region is identification of the facial nerve and its branches. The identification and preservation of marginal mandibular nerve is most critical step during these surgical procedures as injury to marginal mandibular nerve presents adverse outcome like cosmetic defect, lower lip asymmetry and imbalance which are radially notifiable particularly during opening of the mouth.

Marginal mandibular nerve is occasionally damaged during surgical procedures in the face and neck because of its location. Also, the relatively higher incidence of injury to this nerve is partly attributed to the proportionately higher number of procedures being performed in this region. Therefore, the knowledge of course, branching pattern and relations of marginal mandibular nerve are important to avoid such type of injuries therefore significant cosmetic deformity and morbidity can be prevented.

METHODS

The present study was conducted in the department of anatomy, government medical college Srinagar extending over a period of two and a half years. Sixty specimens including sagittal sections of head and neck and cadavers during dissection teaching of MBBS and BDS students were used for the study. A submandibular incision was given extending from tragus to symphysis menti.

The incision ran parallel to lower border of mandible. Platysma was exposed after cutting skin and superficial fascia. Blunt dissection was used to separate the muscle from underlying structures. Facial vessels were identified near the anteroinferior angle of masseter. The point where the marginal mandibular nerve crossed the facial vessels was identified and the nerve was traced from this point posteriorly upto the anteroinferior border of parotid gland. Small fine branches were followed using a magnifying glass.

The mode of origin, termination, course and branching pattern of marginal mandibular nerve were identified and noted. The relation of the nerve and its branches with the lower border of mandible were also noted. The point

where the nerve or its branches crossed the facial vessels were also identified and noted. The muscles supplied by marginal mandibular nerve and its branches were also identified. The nerve and its branches were carefully dissected and noted till the point of emergence from parotid gland.

RESULTS

In forty-seven specimens (78.3%) the nerve was single (Figure 1).

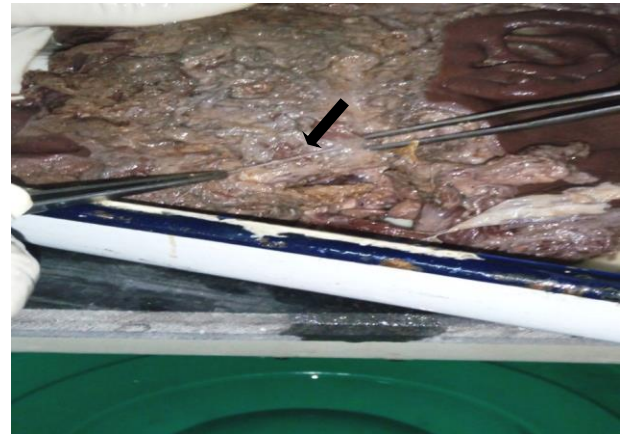


Figure 1: Specimen showing single marginal mandibular branch of facial nerve above the lower border of mandible (black arrow).

In 55% of cases the nerve crossed the facial artery below the lower border of the mandible, in 30% of the cases it crossed the facial vessels at the lower border of mandible and in 15% of cases the marginal mandibular nerve crossed the facial vessels above the lower border of mandible. In 10 specimens (16.6%) there were two branches of marginal mandibular nerve.

In majority of the cases one branch crossed the facial vessels above the lower border of mandible and one branch crossed facial vessels at the lower border of mandible. In three specimens (5.0%) marginal mandibular nerve had three branches. In all the three cases the lowest branch crossed the facial vessels at the lower border of mandible and the upper two crossed the facial vessels above the lower border of mandible (Figure 2).

DISCUSSION

Marginal mandibular nerve is at the danger of iatrogenic injury due to the fact the surgeries in the face and upper part of neck are performed frequently. Deformities arising as a result of injury to other branches of facial nerve in the face are least because of the frequent anastomosis between different branches of the facial nerve. But Marginal mandibular nerve does not anastomose with other branches of facial nerve so frequently therefore the deformity occurring as result of

injury to Marginal mandibular nerve are more likely. Disorders of lower lip in facial expression are mostly caused by functional impairment of the marginal mandibular branch of facial nerve.

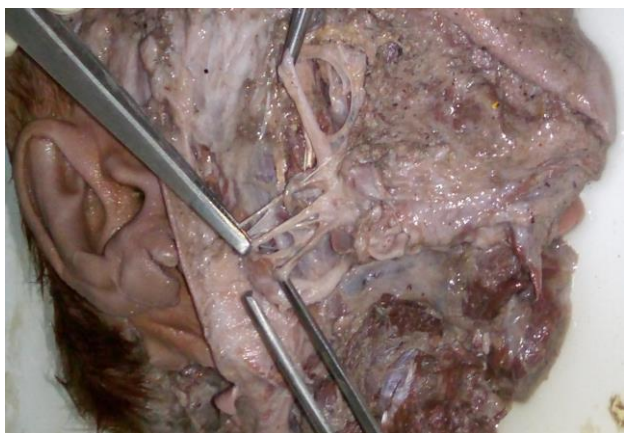


Figure 2. Specimen showing 3 branches of marginal mandibular nerve (black arrows). All the three-crossing facial artery (white arrow). The lowest one crossing facial artery at the lower border of mandible.

In a typical case active exposure of the incisors of the mandible is not possible and the lip appears distorted towards the healthy side.⁶ Therefore, a thorough knowledge about the branching pattern, course and distribution of this nerve is important. The present study was conducted in the department of anatomy govt medical college Srinagar over a period of two and a half years. Sixty specimens were used for the study. Ziarah et al while dissecting 110 facial halves observed that in 50% of the specimens, the mandibular nerve ran below the mandible and in significant proportion continued below the mandible distal to facial vessels.¹ In our present study we noted that in about 78% of the specimens, there was a single branch of Marginal mandibular nerve however Nelson DW et al observed that in an operative dissection of the mandibular branch of the facial nerve there were 3 branches in all dissections.⁷

In most of the cases the nerve crossed the facial vessels below the lower border of mandible. Arvind Paul Singh Batra et al while studying the branching pattern and course of Marginal mandibular nerve in 50 facial halves observed that 88% of the specimens had a single branch at origin and 92% had a single branch during the course.⁸ PG Balagopal et al while studying anatomic variations of marginal mandibular nerve in 202 patients who underwent neck dissection as part of the treatment for head and neck cancers between June 2005 and October 2006 observed that 79.7% of the subjects had a single division of marginal mandibular nerve.⁹ The findings in our present study correlate with these investigators.

In our present study we also noticed that Marginal mandibular nerve had two divisions in 16.6% of cases. Similar results were observed by PG Balagopal. In our

present study we also noticed that in three specimens the marginal mandibular nerve had three branches. The upper two crossed the facial artery above the lower border of mandible while as the lower branch crossed the facial artery at the lower border of mandible. PG Balagopal during their study noticed three branches of marginal mandibular nerve in 6.9% of the patients, in that case two branches crossed the facial artery above the lower border of mandible and the third crossed the artery at the lower border of mandible. Dingman and Grabb while dissecting 100 facial halves observed that marginal mandibular nerve was mostly superior to the lower border of mandible posterior to facial artery.¹⁰

In our study we observed that posterior to facial artery the course of marginal mandibular nerve was superior to the inferior border of the mandible. Wang TM, Lin CL et al while dissecting 120 chinese adult facial halves observed that in 90% of the cases marginal mandibular branch ran above the lower border of mandible and in 10% of cases its course was below the lower border of mandible.¹¹ The study performed by us also depict a similar finding pertaining to the course of marginal mandibular nerve posterior to facial artery.

CONCLUSION

Marginal mandibular nerve branch of the facial nerve is the only branch which rarely joins with other branches of the facial nerve. So, the deformity occurring due to injury to this nerve are more common. Given the fact that it shows considerable variation in its course and branching pattern and also the fair number of procedures being performed in this region of face and neck, Marginal mandibular nerve is at higher risk of iatrogenic injury. Therefore, it is concluded that the surgeon should have a sound knowledge about the course and branching pattern of Marginal mandibular nerve to avoid any injury to this nerve and resulting morbidity and deformity.

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