



GROSS ANATOMICAL STUDY OF MASSETER MUSCLE IN NORTH INDIAN ADULTS

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ABSTRACT **INTRODUCTION :** Masticatory muscles have an important role in mastication, swallowing, pronunciation, speech and facial symmetry. Among the four principal masticatory muscles, masseter is one of them. Knowledge of the anatomy of masseter muscles is necessary for the best surgical approach. Previous studies have shown that the masseter muscles originated from the zygomatic arch of the cranium and was inserted on to the mandible.

MATERIALS AND METHODS : Dissection was carried out on thirty embalmed adult cadaveric head-halves carefully while preserving the related nerves and vessels. Anatomical features of the masseter muscles were recorded.

RESULTS : The present study provides information about the anatomical details of the masseter muscles in cadaveric specimens especially in relation to its attachments. Masseter muscle comprised of three layers – superficial, middle and deep. The cranial attachment of the muscle was found to be at the anterior two-third of the zygomatic arch and from the deep surface of the zygomatic arch, while the mandibular attachment of the muscle was found to be at the angle and lateral surface of the ramus of mandible.

CONCLUSION : The results of the present study hopes to provide information regarding the attachments of the masseter muscles and its related variations. This might be of paramount importance for dentists, maxillo-facial surgeons and radiologists since an accurate diagnosis is crucial to plan the appropriate treatment.

KEYWORDS : masseter muscle, zygomatic arch, mandible, cadaveric study.

INTRODUCTION

Muscles of mastication play a key role in mastication, speech and swallowing. Masseter, temporalis, lateral pterygoid and medial pterygoid are the four principal muscles of mastication. Masseter originates from the lower border and medial surface of the zygomatic arch. Its fibres run downwards and backwards to gain attachment on to the lateral surface of the ramus of mandible and its coronoid process. It elevates the mandible to occlude the teeth in mastication. It also helps in side-to-side movements, protraction and retraction.[1]

Masticatory muscle hypertrophy is characterised by an increase in volume of the muscle mass and affects all the muscles of mastication, but most commonly affected muscle is the masseter muscle. It may occur either unilaterally or bilaterally. This hypertrophy is treated by both medical and/or surgical methods.[2] Botulinum injection shows some beneficial effects in the management of myofascial pain of the masticatory muscles.[3]

Surgeons are required to have a detailed knowledge of the anatomy of masseter muscle and its blood supply to carry out the various surgical procedures such as formation of masseter muscle flap in resection of mandible and parotidectomy. Without the anatomical knowledge, serious complications can occur which may endanger the life of the patients.[4]

The masseter muscle is used as a transposition flap for rehabilitation of the facial paralysis. Thus, adequate knowledge of its anatomical details is essential for the prevention of the neurovascular damage, when the muscle is split for reanimation.[5] Therefore, the present study was performed to examine the attachments and orientation of the fibres of masseter muscles through the cadaveric study in North Indian adults.

MATERIALS AND METHODS

The study was conducted in the Department of Anatomy, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi.

The study was carried out on thirty embalmed adult human cadaveric head-halves. The specimens showing the evidence of any deformity, trauma or lesions were excluded from the study. The cadaveric study was performed in supine position. After giving skin incision, all the skin flaps were reflected and superficial fascia along with the parotid gland and branches of the facial nerve were exposed. After delineating the branches of facial nerve and parotid duct, fascia superficial to the

masseter muscle was removed. Anatomical features of the masseter muscles were recorded. The study was also focussed in exploring the variations of masseter muscles.

OBSERVATIONS AND RESULTS

The masseter muscle was observed as a quadrilateral muscle (fig-1). It comprised of three layers – superficial, middle and deep. The superficial layer of masseter muscle was found to be the largest. The cranial attachment of the superficial layer of masseter muscle was seen at the anterior two-third of the lower border of zygomatic arch by a strong tendinous band, while the middle layer of muscle was found to be attached at the medial aspect of the anterior two-third of zygomatic arch and from the lower border of the posterior one-third of zygomatic arch. The deepest layer of masseter muscle was attached at the deep surface of zygomatic arch. However in one specimen, it was noticed that the anterior border of masseter muscle was steeply curved as its cranial attachment which was found to extend on to the maxillary process of the zygomatic bone (fig-2). The concavity was present in the upper two-third, though in lower one-third, it was almost vertical. In another specimen, this anterior border was found to be gently curved (table-1). The mandibular attachment of the superficial layer of masseter muscle was seen at the angle and at lower half of the lateral surface of ramus of mandible, while that of the middle layer of muscle was found to be at the middle part of lateral surface of the ramus of mandible. The deepest layer of the muscle was inserted at the upper part of ramus of mandible. The fibres of superficial layer of masseter muscle were found to traverse downwards, backwards and laterally. However, fibres of the middle and deep layers of masseter muscle were oriented vertically downwards.

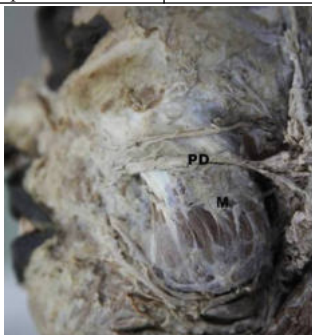
Table – 1. Features of Masseter muscles in cadaveric specimens

Parameters	n = 30
Usual attachments	28
Curved anterior border	2

The superficial aspect of masseter muscle was found to be aponeurotic in upper half of the muscle and fleshy in lower half of the muscle in 28 out of 30 specimens studied. In one of these specimens, it was predominantly aponeurotic. In this specimen, only lower one-fourth of the muscle appeared to be fleshy (fig-3). In another specimen, this layer was found to be entirely aponeurotic (fig-2). The surface profile of masseter muscle is depicted in table – 2.

Table – 2. Surface profile of Masseter muscles in cadaveric specimens

Parameters	n = 30
Usual profile	28
Predominantly aponeurotic	1
Entirely aponeurotic	1

**Fig – 1. NORMAL DISPOSITION OF MASSETER MUSCLE (Left)**

M – MASSETER MUSCLE
PD – PAROTID DUCT

**Fig – 2. ARROW MARKS THE CURVED ANTERIOR BORDER OF MASSETER MUSCLE (Right)**

M – MASSETER MUSCLE

**Fig – 3. PREDOMINANTLY APONEUROTIC PROFILE OF MASSETER MUSCLE (Left)**

M – MASSETER MUSCLE
FV – FACIAL VEIN

DISCUSSION

Gross anatomical knowledge of masseter muscles and their mutual relationships is essential for oral and maxillo-facial surgeons.[6] In many aspects, observations of the present investigation almost correspond with the findings of previous literatures on masseter muscles. In the present study, masseter muscle comprised of three layers – superficial, middle and deep. Gaudy JF et al also described the three layers of masseter muscle – superficial, intermediate and deep. According to their findings, the superficial layer of masseter muscle had a tendinous sheet which was attached superiorly to the inferior border and temporal process of zygomatic bone and also to the zygomatic process of maxilla. This layer was attached inferiorly on the angle of mandible. The intermediate layer of masseter muscle

extended from the zygomatic arch to the lateral part of the ramus of mandible. The deep layer of masseter muscle extended from the inferior border of zygomatic arch upto the lateral aspect of the ramus of mandible. The trilaminar constitution of masseter muscle observed in the current study is in accordance with the earlier report.[7] However, attachment of the superficial layer of masseter muscle in the present study is at slight variance with the study of Gaudy et al.[7]

Sebilau P also classified the masseter muscle into three parts – anterior, posterior and internal masseter muscle which corresponds to the superficial, middle and deep layers of masseter muscle of the present findings.[7]

Ketelbant and colleagues divided the masseter muscle into two parts – superficial and deep masseter muscle. They again subdivided the superficial masseter muscle into two layers – anterior and posterior layer. Thus observations of the present study are in disagreement with the reports of Ketelbant and colleagues.[8]

In one specimen, the anterior border of masseter muscle was steeply curved as the cranial attachment of the superficial layer of masseter muscle was extended on to the maxillary process of zygomatic bone. It has been reported in the earlier studies that the superficial layer of the masseter muscle was attached to the zygomatic process of maxilla resulting in the prominence of the anterior border of masseter muscle.[7] However, no such findings have been reported in view of Indian literature.

The surface profile of masseter muscle was found to be predominantly aponeurotic in one specimen and entirely aponeurotic in another one. This observation is well in accordance with the study conducted by Gaudy JF et al. They reported the presence of fleshy part only in the inferior one-third of the superficial layer of the masseter muscle.[7]

Bravetti P. et al showed the attachment of masseter muscle on the capsule of temporo-mandibular joint.[9] Velasco JRM et al reported the attachment of the fibres of masseter muscle on the anterolateral one-third of the disc of temporo-mandibular joint.[10] This observation is at slight variance with the findings of the present study as no attachment of masseter muscle was observed at the disc or capsule of the temporo-mandibular joint.

CONCLUSION

The results of the present study provides information about the anatomical details of masseter muscles in cadaveric specimens especially in relation to its attachments. It is expected that the results of the present investigation would be helpful for dentists, maxillo-facial surgeons and radiologists since an accurate diagnosis is crucial to plan the appropriate treatment. The present study should also serve as an anatomical reference for researchers. The differences between observations of the present study and those of the earlier researchers might be due to regional variations.

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