EMPORALIS muscle atrophy can be one of the cosmetic and functional complications of pterional craniotomy, which may cause delay in recovery or inability of patients to return to their previous occupations. The factors causing muscle atrophy are as follows: 1) denervation; 2) loss of blood supply; 3) inappropriate muscle tension; and 4) muscle fiber injury. To prevent temporalis muscle atrophy, surgical procedures should preserve the deep temporal nerve and artery and reattach the muscle to an appropriate place without causing muscle atrophy.

Retrograde dissection of the temporalis muscle preventing muscle atrophy for pterional craniotomy

Technical note

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A procedure for preventing muscle atrophy in pterional craniotomy by temporalis muscle dissection is described, along with anatomical considerations. The inferior to superior dissection of the temporalis muscle is a very simple technique and is less invasive than other approaches.

**KEY WORDS** pterional craniotomy • temporalis muscle • retrograde dissection • subperiosteum • operative technique

**Fig. 1.** Artist’s drawing illustrating the anatomy of the temporalis muscle. The deep temporal arteries and nerves run just superficially to the subperiosteum. ECA = external carotid artery.
damage. We describe a new method of preventing temporali-
muscle atrophy, along with some anatomical consider-
ations.

**Anatomical Considerations**

The temporalis muscle arises from the temporal plane and is inserted into the coronoid process of the mandible. The muscle is innervated by the deep temporal nerve, which arises from the motor root of the mandibular nerve. The deep and middle temporal arteries supply blood to the muscle. The deep temporal artery, which is the dominant feeding vessel, originates from the maxillary artery. A thin membrane called the subperiosteum exists between the temporalis muscle and the bone, which is the true periosteum in the temporal region. The subperiosteum can be easily recognized after dissection of the temporalis muscle. The deep temporal nerve and artery arise in the infratemporal fossa and course in the medial surface of the temporalis muscle, which lies just superficially to the subperiosteum (Fig. 1).

**Operative Technique**

The skin incision begins just behind the hair line at 1 cm contralateral to the midline. The incision extends along the hair line just anterior to the external auditory canal at the level of the zygomatic arch. The pericranium and the temporalis muscle are cut along the skin incision. The pericranium is dissected from the bone, beginning superiority. The temporalis muscle is dissected from the temporal plane with a periosteal elevator or Penfield dissector through the muscle incision, beginning inferiorly to the inferior temporal line (Fig. 2A). The subperiosteum should not be damaged; the deep temporal nerve and artery can be easily preserved with this dissection (Fig. 2B and C). Monopolar cautery should not be used. Even tight adhesion at the inferior temporal line can be dissected superiorly using a periosteal elevator or a raspatory without cautery. The skin flap with the temporalis muscle is reflected inferiorly. A frontotemporal craniotomy is then performed with a free bone flap (Fig. 2D). After intradural procedures, the bone flap is replaced and secured with silk sutures. The cut edges of the temporal fascia and pericranium are sutured. If the fascia or pericranium cannot be approximated, the edge is secured at the silk sutures used for fixing the bone flap. The skin is closed in layers.

**Discussion**

The purpose of the pterional craniotomy is to obtain a maximum surface exposure along the sphenoid ridge without complications. Numerous techniques for pterional craniotomy have been described, however, most of them are related to preserving the facial nerve. A technique used to prevent temporalis muscle atrophy was described by Spetzler and Lee in 1990. They recommended reconstruction of the temporalis muscle leaving a cuff of the muscle attached to the skull. This procedure allows maintenance of muscle tension to prevent atrophy; however, a number of muscle fibers are injured as a result. Microfixation of the temporalis muscle using microscrews was reported by Zager, et al, and was more reliable for obtaining appropriate muscle tension without muscle injury. Horimoto, et al, described subfascial temporalis dissection, in which the temporalis muscle was reflected inferoposteriorly without incising the muscle. This procedure was better but a little complex.

These previous reports do not refer to the direction of muscle dissection. The temporalis muscle arises from the plane of the temporal bone at an acute angle and is inserted inferiorly into the coronoid process. Dissection from the side of acute attachment of the muscle is easier than from the other side. We call it retrograde dissection, because the direction of the dissection is against the muscle direction. The retrograde dissection aims to preserve the subperiosteum as much as possible and can easily preserve innervation as well as blood supply with minimum muscle fiber damage. This method is simple and useful for prevention of temporalis muscle atrophy, with maximum exposure along the sphenoid ridge and preservation of the facial nerve. We have used this method routinely since 1990 in over 100 patients, none of whom have experienced temporalis muscle atrophy-related cosmetic and functional problems, and there have been no complications.
Retrograde dissection of temporalis muscle

References


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