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Description of a communication between the facial and zygomaticotemporal nerves

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Summary Communicating branches between the facial and the trigeminal nerves are known to exist; however, both their frequency and significance are incompletely understood. In our anatomic dissections, we observed a consistent anastomosis between the temporal branch of the facial nerve and the zygomaticotemporal branch of the trigeminal nerve.

The facial nerves were dissected in 17 cadaveric half faces. The communicating facial-zygomaticotemporal nerve branches piercing the superficial layer of the deep temporal fascia were identified and followed through the fascial and muscular planes.

Fourteen out of 17 dissected cadaveric half faces contained communications between trigeminal and facial nerves. In these specimens, one or two branches from the temporal branch of the facial nerve would penetrate the superficial layer of the deep temporal fascia to join the zygomaticotemporal nerve. These communications were found at an average of 36 mm lateral and 2 mm superior to the lateral canthus.

Due to the cadaveric nature of the study it is difficult to ascertain the function of the described communication. Our histochemical analysis suggests that these connections contain myelinated fibers, which could either be proprioceptive or motor fibers.

Introduction

Anatomic studies have delineated a number of connections between facial nerve (CN VII) and other cranial nerves. In the extratemporal segment of the facial nerve, communications have been noted between the auriculotemporal nerve and facial nerve in the parotid area[1] and between the facial nerve and buccal nerve in the area of the modiolus.[2] In addition, communications between the facial nerve and the infraorbital nerve have been reported.[3] In his review of

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communications between the trigeminal (CN V) and facial nerves, Baumel focused his analysis on the auriculotemporal-facial and buccal-facial communications, as he found them to be the largest and most consistent communications. In addition, he mentioned that such connections exist between all terminal branches of the two cranial nerves (CN V and CN VII).[4]

In the present study, we report a consistently found facial-trigeminal anastomosis between the temporal branch of the facial nerve and the zygomaticotemporal nerve, a branch of the maxillary division of the trigeminal nerve. We determined the location and branching pattern of this communication and performed histological analysis to investigate its consistency.

Materials and methods

Dissections were performed on 17 half faces of formalin fixed cadaveric specimens, six female and 11 male. After removing the skin on the face lateral to the orbit and malar eminence, the superficial temporal fascia was incised and dissection proceeded along the plane between the superficial temporal fascia and the superficial layer of the deep temporal fascia. The temporal branches of the facial nerve were identified at the level of the zygomatic arch and followed cephalad. Furthermore, the zygomaticotemporal nerve was identified as it emerged from the superficial layer of the deep temporal fascia. The communicating branches between the facial and zygomaticotemporal nerve were identified and documented photographically. The location where these communicating branches were found to pierce the deep temporal fascia was measured with respect to the line connecting the lateral canthus with the superior sulcus of the ear. Four of the samples were embedded in paraffin and stained for microscopy with hematoxylin and eosin (H&E) and, to demonstrate the presence of Schwann cells, S100 immunohistochemical stain in a clinical pathology laboratory following the standard protocols used in clinical practice. Appropriate positive and negative control staining was observed. Image processing was performed with Adobe Photoshop™.

Results

Dissection of the temporal branches of the facial nerve from the zygomatic arch toward the frontalis muscle revealed communicating branches with the zygomaticotemporal nerve in 14 out of 17 dissections (Figure 1). These communications consisted of one ($n = 9$), or in some cases two branches ($n = 5$) that would deviate from the path between the superficial temporal fascia and the deep temporal fascia, to perforate the superficial layer of the deep temporal fascia. Dissection was perforemd through the fascial and muscular planes up to the zygomaticotemporal foramen (Figure 2).

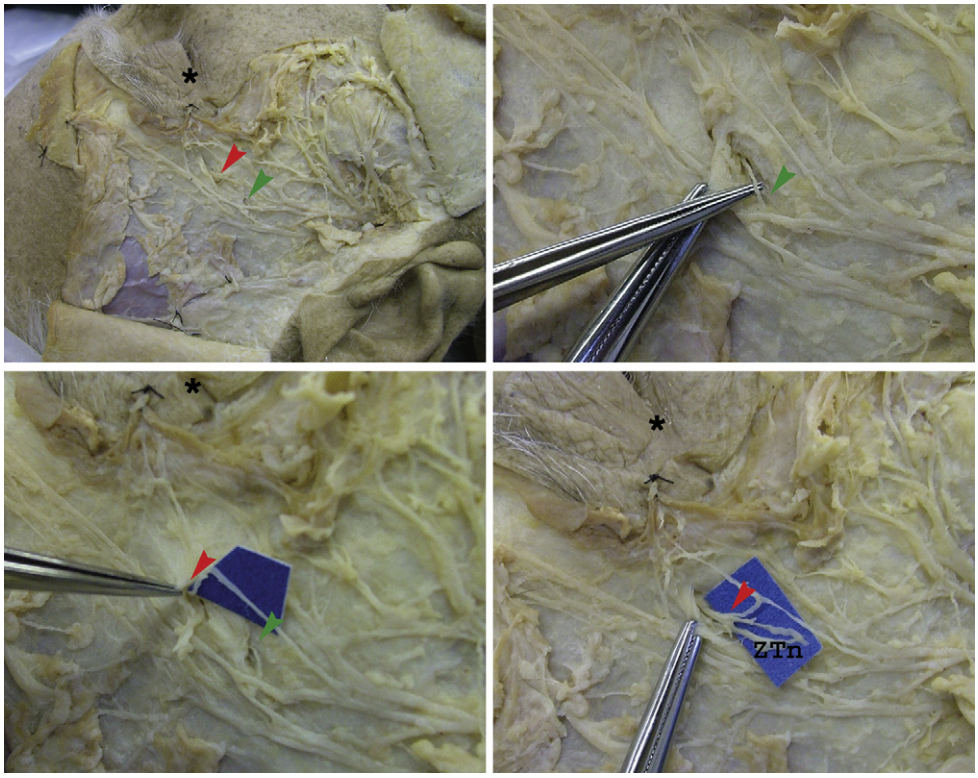

Figure 1 Communicating facial-zygomaticotemporal nerve branches. Two communicating branches from the facial nerve piercing the superficial layer of the deep temporal fascia. Location where these branches perforate the deep temporal fascia is marked by the green and red arrowheads (*above*, *left*). Further exposure of these communicating branches after opening the superficial layer of the deep temporal fascia. Asterisks mark the lateral canthus (*above*, *right*; *below*, *left and right*).