SHORT REPORT

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Variation of the middle deep temporal nerve: A case report

C. Madhavi, B. Isaac and T.M. Jacob

Department of Anatomy, Christian Medical College, Vellore – 632 002, India

SUMMARY

During routine dissection of the temporal and infratemporal region of a 60-year-old male cadaver, a variation in the supply of the middle deep temporal nerve was observed. It was seen to arise from the anterior trunk of the mandibular nerve. It passed deep to the tendinous arch on the infratemporal crest to reach the temporal region, where it supplied the temporalis muscle. Then, it pierced the muscle and coursed upward, piercing the temporal fascia and supplying it and the overlying skin. The presence of cutaneous sensory fibres in the middle deep temporal nerve has not been reported earlier. The compression of nerve branches that penetrate muscles has been implicated as a cause of neuralgic pain in the trigeminal region and compression of the middle deep temporal nerve by a spastic or hyperactive temporalis muscle might be a causal factor of pain in the temporal region.

Key words: Variation – Temporalis – Middle deep temporal nerve – Trigeminal neuropathy

INTRODUCTION

Entrapment neuropathies are specific forms of compressive neuropathies that occur when nerves pass through anatomic structures that have the potential to compress the nerve. Compression of sensory branches of the deep temporal nerve by the temporalis muscle is a possible cause of neuropathy, such as neuralgia or paresthesia. In the trigeminal region, Maeda et al. (2001) observed that the buccal nerve pierced the anterior part of the temporalis muscle. They reported that compression of the nerve by a hyperactive temporalis muscle may result in neuralgia – like paroxysmal pain.

This article reports a previously undocumented variation of the middle deep temporal nerve and its clinical implications.

CASE REPORT

During routine dissection of the temporal and infratemporal region of a 60 – year old male cadaver, a variation in the middle deep temporal nerve was noted on the right side. The three deep temporal nerves (anterior, middle and posterior) were seen to arise independently from the anterior trunk of the mandibular nerve. The anterior deep temporal nerve was seen to pass above the superior head of the lateral pterygoid 1.8 cm. posterior to the anterior end of the pterygomaxillary fissure. It pierced the deep surface of the tempo-

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Correspondence to:
Dr. B. Isaac. Department of Anatomy, Christian Medical College, Vellore – 632 002, South India. Phone: 0091-0416/2284245/2222102 ext. 4245; Fax: 0091-0416-2262788/2262268/2232035. E-mail: isaac_bina @yahoo.co.in

Fig. 1. The right infratemporal region. **A**: Anterior deep temporal nerve; **M**: Middle deep temporal nerve; **P**: Posterior deep temporal nerve; **T**: Temporalis muscle; White arrowhead: Middle deep temporal nerve piercing temporalis; Asterisk: Auriculotemporal nerve; Black arrow: Tendinous arch.

Fig. 2. The temporal fascia has been slit open to show the middle deep temporal nerve piercing the temporalis muscle (white arrowhead) to become cutaneous (black arrowhead); **T**: Temporalis muscle.

ralis muscle 2 cm. above the infratemporal crest, supplying it.

The middle deep temporal nerve passed above the superior head of lateral pterygoid 3 cm. posterior to the anterior end of the pterygomaxillary fissure. It was separated from the muscle by a tedinous arch on the infratemporal crest (Fig. 1). It gave off a branch to the temporomandibular joint and pierced the temporalis muscle 1 cm. in front of its posterior border, and 6 cm. above the coronoid process (Fig. 2). It continued to pass upwards and posteriorly, piercing the temporal fascia and becoming cutaneous 6.5 cm. lateral to the orbital margin and 2 cm. above the zygomatic arch (Fig. 3). The posterior deep temporal branch had a common origin with the nerve to the masseter and was also seen to pass above the superior head of the lateral pterygoid. It passed backwards 1 cm. posterior to the middle deep temporal branch and entered the parotid gland. Another variation noted on this side was the course of the middle meningeal artery. Although two roots of the auriculotemporal nerve were present, the middle meningeal artery passed anterior to the two roots, not between them.

No variation of the middle deep temporal nerve was observed on the left side.

Discussion

Compression of the sensory branches of the mandibular nerve by the masticatory muscles has been reported to be a possible cause of symptoms of trigeminal neuropathy (Dubrul, 1980; Isberg et al., 1987). Akita et al. (2000) investigated the innervations and muscle bundles of the temporalis and lateral pterygoid muscles and reported many variations in the positional relationships between their muscle bundles and innervating branches. They observed that the main trunk of the mandibular nerve penetrated the lateral pterygoid muscle in 26 specimens. In a previous study, Shimokawa et al. (1998) observed a branch of the posterior deep temporal nerve that penetrated the temporalis muscle, and was distributed to the temporal fascia from its medial surface. In the present study, the middle deep tem-

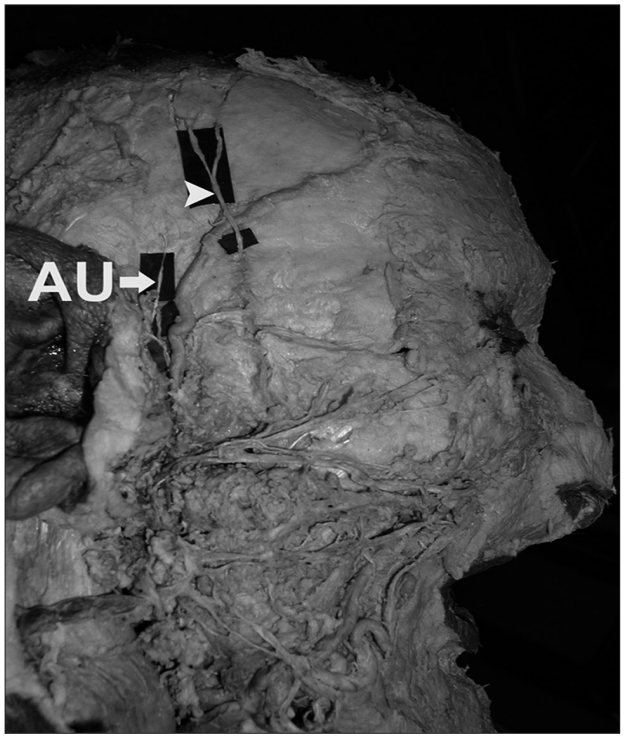

Fig. 3. Cutaneous part of middle deep temporal nerve (white arrowhead) is seen piercing the temporal fascia and crossing the frontal branch of the superficial temporal artery; **AU**: Auriculotemporal nerve.

poral nerve belonged to type A (Kwak et al., 2003) with regard to its branching pattern. It pierced the temporalis, supplied it, and then traveled upwards to supply the temporal fascia and the overlying skin.

Maeda et al. (2001) observed that the buccal nerve penetrated the anterior part of the temporalis muscle, and that, in three patients, an area of tenderness on the inside of the mandibular ramus corresponded to the area where the buccal nerve penetrated the temporalis muscle. It is therefore possible that the buccal nerve in these patients penetrated a hyperactive temporalis muscle, resulting in neuropathic pain. In an autopsy study, those authors observed that the buccal nerve pierced the temporalis muscle in six of fifty-two specimens from 26 cadavers. In another study, in three of fifty-two dissections, Loughner et al. (1990) found the three main branches of the posterior trunk of the mandibular nerve (lingual, inferior alveolar, and auriculotemporal nerves) passing through the medial fibres of the lower belly of the lateral pterygoid muscle. They also observed that the mylohyoid and anterior deep temporal nerves passed through the lateral pterygoid muscle in other specimens and concluded that a spastic condition of the lateral pterygoid muscle may be causally related to compression of an entrapped nerve leading to numbness, pain, or both in the respective areas of nerve distribution. Schon Ybarra and Bauer (2001) found that the medial portion of the temporalis muscle could entrap the maxillary nerve and its zygomatic branches inside the pterygopalatine fossa and this could be a possible factor in the etiology of some forms of tic douloureux. According to the present study, a spastic or hyperactive temporalis muscle might compress the middle deep temporal nerve and be a causal factor of pain in the temporal region.

According to the embryological study by Edgeworth (1914), the masticatory muscles were derived from the common anlage that was adjacent to the trigeminal (Gasserian) ganglion and branches of the mandibular nerve. This anlage divided into the separate muscles as development proceeded. Usually, cleavage between the anlage of each muscle may coincide with the branching of sensory nerves, such as the lingual and auriculotemporal nerves. In cases in which the cleavage of the muscle obstructs the route of the branching sensory nerves, they penetrate the muscles.

Entrapment neuropathy may result when a nerve is interlocked between muscle fibres. During muscle action, there may be friction between the muscle and the nerve fibres, and this could result in inflammatory edema due to fascitis around the nerves. Compression of the motor branches of the mandibular nerve can lead to paresis or weakness in the innervated muscle (Gordon and Ritland, 1974). Other motor nerve entrapments, such as the posterior interosseous and suprascapular syndromes, manifest dull pain as an outstanding feature of prolonged compression (Sarno, 1983). Therefore, impingement of the middle deep temporal nerve could cause pain at the site of its distal distribution. It is hoped that this anatomic description of the varied course of the middle deep temporal nerve will be helpful in the diagnosis and treatment planning of neuropathies of the temporal region.

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