VETERINÁRIA NOTÍCIAS

Case report

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Anatomical variation of the dorsal buccal branch of the facial nerve in sheep: a case report

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Abstract: The disposition and topography of the facial nerve are arguably of critical importance for professionals who work directly with oral health. This paper reports a case of anatomical variation in which the dorsal buccal branch of the facial nerve perforated the parotid lymph node parenchyma in two hemiheads of *Ovis aries*. The infratemporal and facial regions of 30 hemiheads were dissected in a practical class following the methodology indicated in the literature. As expected, after emerging from the stylomastoid foramen, the facial nerve subdivided into the dorsal and ventral buccal branches in all animals. However, in 6.66% of the hemiheads, the dorsal branch perforated longitudinally the parotid lymph node parenchyma. We concluded that even with a low rate of occurrence, anatomical variations of the dorsal buccal branch of the facial nerve may be present in sheep. This knowledge is of essential importance because subsequent traumatic and/or inflammatory changes can cause neural compression and compromise the innervation of the face, leading to semiological and diagnostic confusion.
Keywords: Anatomy, Parotid lymph node, Cranial nerves, Sheep farming.

Introduction

Understanding the facial nerve is arguably of critical importance for professionals who work directly with oral health (TAKEZAWA; TOWNSEND and GHABRIEL, 2018). The axons of this nerve arise from two separate

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nuclei (KÖNIG and LIEBICH, 2020) at the lateral end of the trapezoid body (GODINHO; CARDOSO and NASCIMENTO, 1981; SINGH, 2018). The motor nucleus is located in the most ventral region of the trapezoid body (KÖNIG and LIEBICH, 2020) and gives rise to a long motor branch (GETTY, 1986), while the parasympathetic nucleus is located caudally to the former (KÖNIG and LIEBICH, 2020) and gives rise to a short intermediate nerve (GETTY, 1986). From this point, the facial nerve proceeds toward the internal acoustic meatus accompanied by the vestibulocochlear nerve and penetrates the facial canal (EVANS and DELAHUNTA, 2017; SINGH, 2018; KÖNIG and LIEBICH, 2020). The facial nerve emerges from the cranial cavity through the stylomastoid foramen (GODINHO; CARDOSO and NASCIMENTO, 1981; BUDRAS and HABEL, 2003; EVANS and DELAHUNTA, 2017; KÖNIG and LIEBICH, 2020) to branch mainly into the caudal and internal auricular nerves, the auriculopalpebral nerve, and the dorsal buccal and ventral buccal branches (GODINHO; CARDOSO and NASCIMENTO, 1981; BUDRAS and HABEL, 2003; SINGH, 2018; KÖNIG and LIEBICH, 2020). It innervates, as a motor component, the muscles of the face and ear, the caudal belly of the digastric muscle, and the stylohyoid muscle. As a sensory component, the facial nerve innervates the two most rostral thirds of the tongue, the soft palate and adjacent pharynx, and part of the external acoustic meatus. And, as a parasympathetic component, it is present in the lacrimal, nasal, palatal, and salivary glands (GETTY, 1986).

After recognizing the arrangement and topography of the facial nerve and its critical importance for medical practice (ZOULAMOGLOU et al., 2017; TAKEZAWA; TOWNSEND and GHABRIEL, 2018), this paper aims to report a case of anatomical variation in which the dorsal buccal branch of the facial nerve perforated the parenchyma of the parotid lymph node in two hemiheads of sheep specimens.

Case report and discussion

The case of an anatomical variation observed during the dissection class of "Animal Anatomy II" of the School of Veterinary Medicine of the University Center of Patos de Minas (UNIPAM, Brazil) is reported here. In the occasion, the infratemporal and facial regions of 30 *Ovis aries* hemiheads were dissected. The specimens were acquired from commercial breeders in Ituiutaba/MG, Brazil, to form the didactic collection of the Animal Anatomy Laboratory of the institution, and they were not divided according to age and sex. The study was approved by the Ethics Committee on Animal Use of the University Center of Patos de Minas: 140/18.

The animals were fixed with an injection of 10% formaldehyde aqueous solution in the common carotid artery for tissue fixation (Chemco® – formaldehyde solution, Brazil), and a 50% latex aqueous solution stained with a specific red pigment to mark the arterial system (Artecola®, Brazil; Suvinil® Tintas e Pigmentos, Brazil).

In the classroom, the methodology for dissection and study of the hemiheads followed the script proposed by Godinho, Cardoso, and Nascimento (1981). The skin and cutaneous muscle of the face were retracted rostrally, and the parotid-auricular muscle dorsally. The parotid salivary gland was identified, delimited and carefully removed until the emergence of the facial nerve through the stylomastoid foramen and the origin of the external carotid artery from the common carotid artery were visualized. At this point, as described for domestic animals (GODINHO; CARDOSO and NASCIMENTO, 1981; GETTY, 1986; BUDRAS and HABEL, 2003; SINGH, 2018; KÖNIG and LIEBICH, 2020) and for the maned wolf (*Chrysocyon brachyurus*) (SILVA et al, 2020), the facial nerve of sheep branched mainly into the caudal auricular and auriculopalpebral nerves and the dorsal buccal and ventral buccal branches, having terminal branches widely distributed in the very parenchyma of the already removed parotid salivary gland.

As expected for domestic ruminants (GODINHO; CARDOSO and NASCIMENTO, 1981; GETTY, 1986; BUDRAS and HABEL, 2003; SINGH, 2018), the caudal auricular nerve was directed dorsally to distribute itself in the caudal muscles of the ear. The auriculopalpebral nerve gives off thin branches to the rostral muscles of the ear and continued as the zygomatic branch from the dorsal limit of the zygomatic arch, being responsible for innervating the frontal and orbicular muscles of the eye as it addressed the lateral angle of the eye and the lateral part of the base of the horn. The dorsal buccal and ventral buccal branches were positioned rostrally and superficially to the masseter muscle, following the parotid duct and the transverse artery and vein of the face. In the maned wolf, the origin of the dorsal buccal branch occurred together with the auriculopalpebral nerve from a bucopalpebroauricular trunk, so far unreported in canids (SILVA et al., 2020).

Specifically regarding the dorsal buccal branch of the facial nerve, it crossed deeply and rostrally the zygomatic muscle until it reached the lateral region of the nose and distributed in the canine, malar, orbicular of the mouth, depressor and elevator of the upper lip, and nasolabial elevator muscles. However, in two (6.66%) of the 30 dissected hemiheads, there was an anatomical variation in which the nerve perforated longitudinally the parenchyma of the parotid lymph node in the infratemporal region (Figure 1). According to Godinho, Cardoso, and Nascimento (1981) and Getty (1986), the topographic relationship between these two structures is relatively variable in domestic ruminants, sometimes laterally, sometimes ventrally, but without reference to a possible lymphatic perforation. After this deviation, the dorsal buccal branch of the facial nerve received the communicating branch of the ventral buccal branch of the facial nerve near to the rostral margin of the masseter muscle, and formed a buccal plexus that innervated the cutaneous facial, zygomatic, and buccinator muscles. The ventral buccal branch of the facial nerve, in contrast, followed along the lower lip depressor muscle to branch into the lower lip depressor and buccinator muscles

(GODINHO; CARDOSO and NASCIMENTO, 1981; GETTY, 1986; BUDRAS and HABEL, 2003; SINGH, 2018; KÖNIG and LIEBICH, 2020).

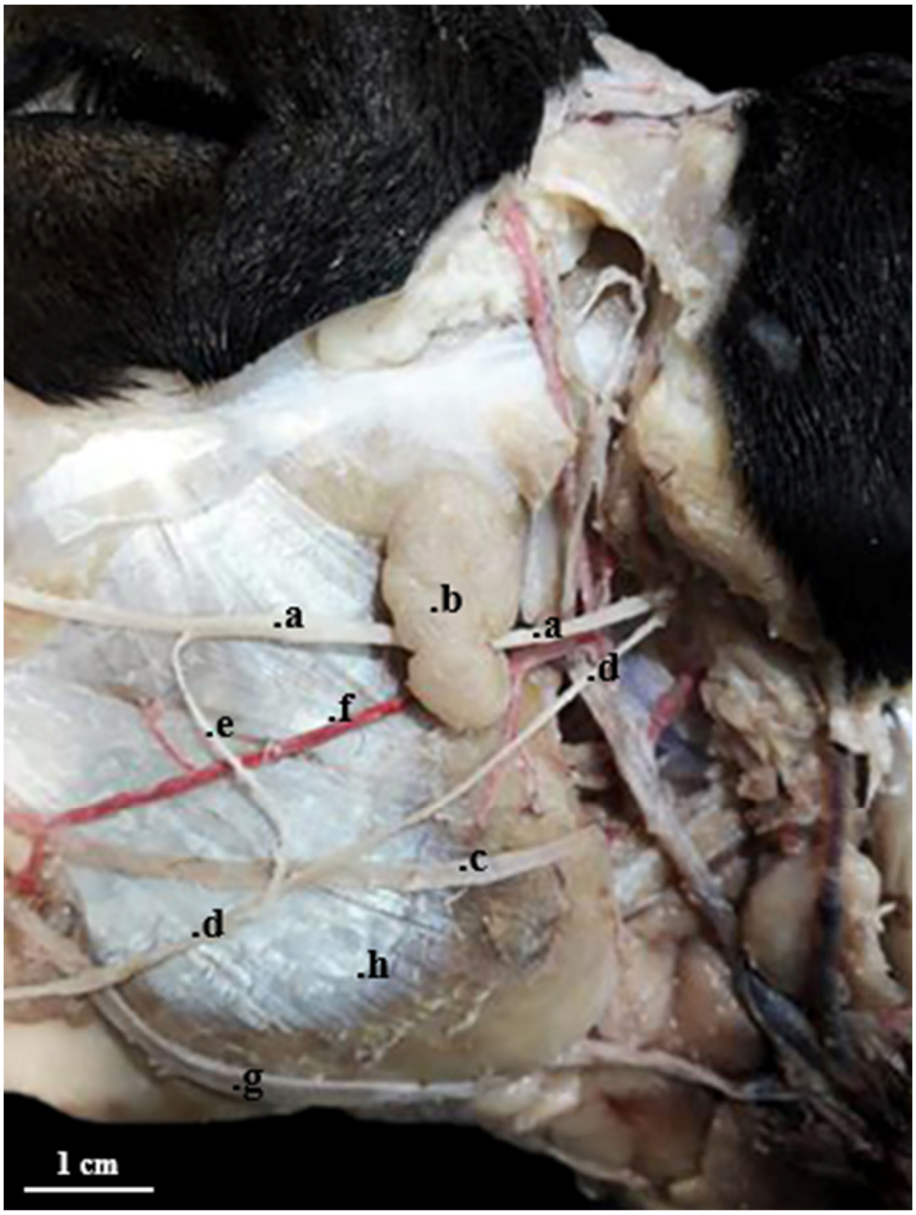

Figure 1: Lateral view of the left hemihead of sheep presenting an anatomical variation in which the dorsal buccal branch of the facial nerve (a) perforated the parenchyma of the parotid lymph node (b). Other structures: parotid duct (c), ventral buccal branch of the facial nerve (d), communicating branch of the ventral buccal branch of the facial nerve with the dorsal buccal branch of the facial nerve (e), transverse facial artery (f), facial vein (g), and masseter muscle (h).

Anatomical variations of the facial nerve have been reported in the human species (FARAHVASH et al., 2013; ZOULAMOGLOU et al., 2017) but rarely in domestic and wild animals. In Veterinary Medicine, the knowledge concerning this nerve is of fundamental importance for medical practice. For example, traumatic injuries can lead to loss of secretory activity of the lacrimal and salivary glands, and also to paralysis of the mimetic muscles or of specific structural groupings depending on the site of the alteration and the individual neural branching pattern (GODINHO; CARDOSO and NASCIMENTO, 1981; SINGH, 2018; KÖNIG and LIEBICH, 2020). Furthermore, by observing the anatomical variation reported here, we hypothesized that lymphadenitis – an inflammatory and sometimes caseous alteration of infectious and/or toxic origin in said lymph node – could cause in these specific cases a physical compression of the dorsal buccal branch of the facial nerve with subsequent regional neurological impairment and worsening of the patient's clinical condition.

Conclusion

We concluded that anatomical variations of the dorsal buccal branch of the facial nerve perforating the parotid lymph node parenchyma may be present in sheep. This knowledge is of essential importance since cases of traumatic and/or inflammatory alterations may cause neural compression and impairment of the facial innervation, leading to semiologic and diagnostic confusion.

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Variação anatômica do ramo bucal dorsal do nervo facial em ovino: relato de caso

Resumo: O nervo facial é, indiscutivelmente, um dos mais importantes para aqueles profissionais que trabalham diretamente com a saúde oral. Sabendo que a disposição e topografia do nervo facial são de importância crítica para a prática médica, objetivou-se relatar um caso de variação anatômica em que o ramo bucal dorsal do nervo facial perfurou o parênquima do linfonodo parotídeo em duas hemicabeças de *Ovis aries*. As regiões infratemporal e facial de 30 hemicabeças foram dissecadas e conforme esperado, após emergir pelo forame estilomastóideo o nervo facial subdividiu-se nos ramos bucal dorsal e bucal ventral em todos os animais, entretanto, em 6,66% das hemicabeças este primeiro ramo perfurou longitudinalmente o parênquima do linfonodo parotídeo. Concluiu-se que, ainda que com uma taxa de ocorrência baixa, variações anatômicas do ramo bucal dorsal do nervo facial podem estar presentes nos ovinos. Este conhecimento é de essencial importância uma vez que em casos como este as alterações traumáticas e/ou inflamatórias podem causar a compressão neural e comprometimento da inervação da face, possibilitando uma confusão semiológica e diagnóstica.
Palavras-chave: Anatomia, Linfonodo parotídeo, Nervos cranianos, Ovinocultura.

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