Brachial plexus of the porcupine *(Hystrix cristata)*

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ABSTRACT: In this study, the brachial plexus of the porcupine (*Hystrix cristata*) was investigated. Four porcupines (two males and two females) were used and the brachial plexus of them were dissected. It was found that the brachial plexus of the porcupine was formed by rami ventralis of C5, C6, C7, C8, T1 and T2. The rami ventralis of C5 and T2 were divided into two branches. The caudal branch of C5 and cranial branch of T2 contributed to the brachial plexus. The caudal branch of C5 and C6 constituted the cranial trunk and the caudal trunk was formed by a branch which came from cranial trunk, rami ventralis of C7, C8, T1 and the cranial branch of ventral ramus of T2. Contribution of C5 and T2 to the formation of the brachial plexus and division of the brachial plexus to the caudal and cranial trunks differ the brachial plexus of this species from those of rat, mouse and mammals.

Keywords: spinal nerves; *Hystrix cristata*; brachial plexus; porcupines

List of abbreviations: m – musculus, C5 – caudal branch of ramus ventralis of C5, C6 – ramus ventralis of C6, C7 – ramus ventralis of C7, C8 – ramus ventralis of C8, T1 – ramus ventralis of T1, T2 – cranial branch of ramus ventralis of T2

The porcupine is a member of Hystricidae family, a little group of rodentia (Weichert, 1970; Kuru, 1987; Demirsoy, 1992). The brachial plexus has been studied in variety of mammals including dog (Miller *et al*., 1964; Tipirdamaz and Erden, 1988; Dursun *et al*., 1994), cat (McClure *et al*., 1973; Getty, 1975), Wervet monkey (Booth, 1991), Chacma baboon (Booth *et al*., 1997), rabbit (Aslan, 1994; Yilmaz *et al*., 1995), mouse (Cook, 1965; Bogusch, 1987) and rat (Green, 1968; Chiasson, 1980; Bertelli *et al*., 1992). To the author's knowledge this is the first study on the brachial plexus of porcupines (*Hystrix cristata).* The purpose of this study was to document the spinal nerves that constitute the brachial plexus of the porcupines (*Hystrix cristata*).

MATERIAL AND METHODS

Four porcupines (two males and two females) hunted by hunters were used. To document the spinal nerves forming the brachial plexus, skin and muscles were carefully dissected. The brachial plexus in both forelimbs were examined and pictured.

For the terminology, the Nomina Anatomica Veterinaria (1994) was used.

RESULTS

The brachial plexus of porcupines was constituted by ventral rami of C5, C6, C7, C8, T1 and T2. The ventral rami of C5 and T2 were divided into two branches. The contribution of caudal branch of ramus ventralis of C5 and the cranial branch of ramus ventralis of T2 was observed. The cranial branch of ramus ventralis of C5 and the ramus ventralis of C6 formed the cranial trunk and cranial branch of T2 and rami ventralis of C7, C8 ve T1 formed the caudal trunk which is the largest. A branch originated from cranial trunk was bound to the cranial part of caudal trunk (Figures 1 and 2).

Long thoracic nerve: Before joining to the brachial plexus, the ventral branches of C6 and C7, as each of C6 and C7 divided into two thin branches, passed beneath the m. scalenaus dorsalis and at the first rib they turn to the cauda and dispersed into serratus ventralis thoracic muscle.

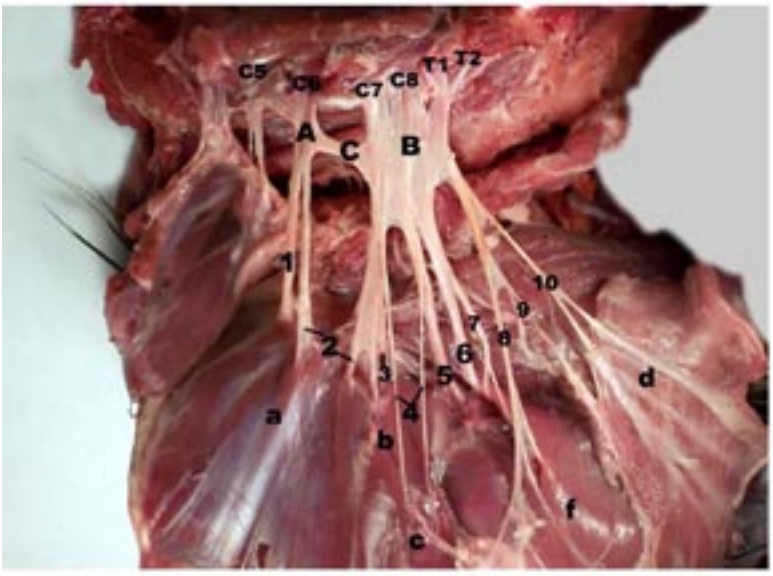

Figure 1. Lateral view of the brachial plexus in the porcupines. A – cranial trunk, B – caudal trunk, C – branch binding from cranial trunk to caudal trunk, C5 – caudal branch of ramus ventrali of C5, C6 – ramus ventralis of C6, C7 – ramus ventralis of C7, C8 – ramus ventralis of C8, T1 – ramus ventralis of T1, T2 – cranial branch of ramus ventralis of T2; 1 – suprascapular nerve, 2 – subscapular nervi, 3 – axillary nerve, 4 – thoracodorsal nerve, 5 – radial nerve, 6 – median nerve, 7 – ulnar nerve, 8 – cranial pectoral nerve, 9 – lateral thoracic nerve, 10 – caudal pectoral nerve; a – subscapular muscle, b – teres major muscle, c – latissimus dorsi muscle

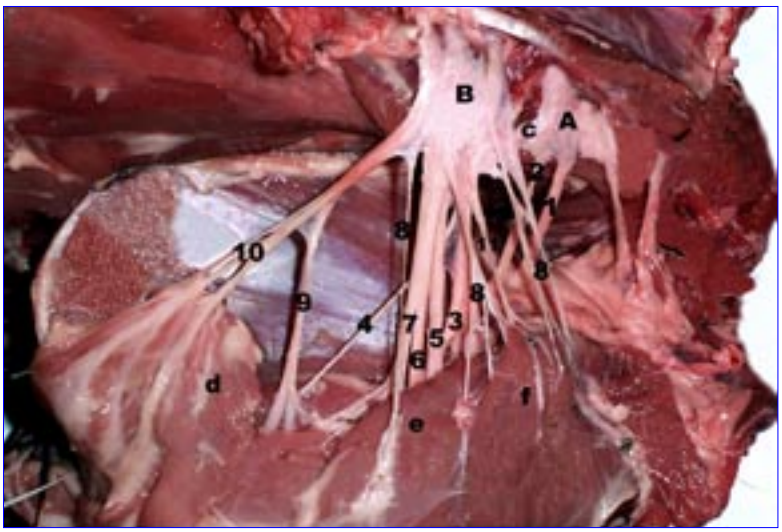

Figure 2. Medial view of the brachial plexus in the porcupines. d – pectoralis ascendens muscle, e – pectoralis transversus muscle, f – pectoralis descendens muscle

Nerves originated from cranial trunk: Phrenic nerve, suprascapular nerve, the first branch of subscapular nerve and a branch binding to the caudal trunk.

Nerves originated from caudal trunk: Cranial pectoral nerve, axillary nerve, the second branch of subscapular nervi along with axillary nerve, thoracodorsal nerve, musculocutaneus nerve, radial nerve, ulnar nerve, median nerve, lateral thoracic nerve, caudal pectoral nerve and an undefined branch swich innervates the coracobrachial muscle and biceps brachii muscle.

DISCUSSION

There are some contradictions on the formation of the brachial plexus of some species. According to Green (1968) and Chiasson (1980), the brachial plexus of rat is formed by contribution of ventral rami of C5, C6, C7, C8, T1 and T2. However Bertelli *et al*. (1992) reported that ramus ventralis of T2 is not involved. Yilmaz *et al*. (1995) reported that the brachial plexus of rabbit is formed by ventral rami of C5, C6, C7, C8, T1 and T2, while Aslan (1994) and McLaughlin and Chiasson (1987) reject the contribution of C5 and T2. The brachial plexus is formed by ventral rami of C5, C6, C7, C8 and T1 in mouse (Cook, 1965; Bogusch, 1987), by rami ventralis of C5, C6, C7, C8, T1 and T2 in Wervet monkey (Booth, 1991) and Chacma baboon (Booth *et al*., 1997), the contribution of ventral rami of C6, C7, C8 and T1 in cat (McClure *et al*., 1973; Getty, 1975). Tipirdamaz and Erden (1988) and Dursun *et al*. (1994) reported that dog brachial plexus is formed by ventral rami of C6, C7, C8, T1 and T2, while Miller *et al*. (1964) and Getty (1975) reported that T2 is involved occassionally. The brachial plexus of porcupines (*Hystrix cristata*) is formed by the contribution of ventral rami of C5, C6, C7, C8, T1 and T2 and its formation resembles that of rat (Green, 1968 and Chiasson, 1980), rabbit (Yilmaz *et al*., 1995), Wervet monkey (Booth, 1991), Chacma baboon (Booth *et al*., 1997) and differs from that of rat (Bertelli *et al*., 1992), rabbit (McLaughlin and Chiasson, 1987; Aslan, 1994), mouse (Cook, 1965; Bogusch, 1987), cat (McClure *et al*., 1973; Getty, 1975) and dog (Miller *et al*., 1964; Getty, 1975; Tipirdamaz and Erden, 1988; Dursun *et al*., 1994).

Yilmaz *et al*. (1995) reported that ventral rami of C5 and T2 divided into caudal and cranial branches and the caudal branche of C5 and cranial branche of T2 contribute to the formation of brachial plexus to which the result of the present study is in parallel.

The brachial plexus of porcupines (*Hystrix cristata*) consisted of caudal and cranial trunks as that of rabbit (Yilmaz *et al*., 1995) and in this respect it differs from those of rat (Bertelli *et al*., 1992) and Chacma baboon (Booth *et al*., 1997) which are formed from caudal, medial and cranial trunks.

Long thoracic nerve. As in Wervet monkey (Booth, 1991), Chacma baboon (Booth *et al*., 1997) and cat (Getty, 1975) the ventral rami of C6 and C7 in porcupines gives a branch to form long thoracic nerve before they contribute to the brachial plexus. This is different from the finding reported in dog (Tipirdamaz and Erden, 1988; Dursun *et al*., 1994) in which the nerve was orginated from the ventral rami of C7 and C8 following the formation of plexus.

In conculusion, although the brachial plexus resembles a network in rat, mouse and other mammals, it was determined to consist of two trunks as cranial and caudal which were formed by ventral rami of C5, C6, C7, C8, T1 and T2 in porcupines, similar to rabbit (Yılmaz *et al*., 1995).

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