

Macro anatomical investigation of brachial plexus of the White New Zealand rabbit (*Oryctolagus cuniculus*)**

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ABSTRACT

In present study, the brachial plexus of the White New Zealand rabbit (*Oryctolagus cuniculus*) was investigated. Five adult rabbits were used and organizations of the brachial plexus of them were investigated. It was found that the brachial plexus of the rabbit was formed by rami ventralis of fifth cervical spinal nerve (C5), sixth cervical spinal nerve (C6), seventh cervical spinal nerve (C7), eighth cervical spinal nerve (C8), first thoracic spinal nerve (T1) and second thoracic spinal nerve (T2). The rami ventralis of C5 spinal nerve and T2 spinal nerve were divided into two branches. The caudal branch of C5 spinal nerve and cranial branch of T2 spinal nerve contributed to the brachial plexus. The caudal branch of C5 spinal nerve and C6 spinal nerve constituted the cranial trunk and the caudal trunk was formed by a branch which came from cranial trunk, rami ventralis of C7, C8, T1 spinal nerves and the cranial branch of ventral ramus of T2 spinal nerve. Contribution of caudal branch of ventral ramus of C5 spinal nerve and cranial branch of ventral ramus of T2 spinal nerve to the formation of the brachial plexus of rabbit and division of the brachial plexus to the caudal and cranial trunks resemble to porcupine and differ the brachial plexus of this species from those of rat, mouse and mammals.

Key words: Spinal nerves, *Oryctolagus cuniculus*, Brachial plexus, Rabbits.

INTRODUCTION

Bangladesh is developing country of the world. Using of laboratory animals like rabbits, rats and guinea pigs is increasing day by day for experimental purposes. Beside this, rabbits are excellent source of lean meat with high quality proteins. The knowledge of anatomical variations is important for radiological and surgical procedures in humans and animals due to its practical and theoretical significance for experimental research and surgical practice in experimental and domestic animals^[1, 2]. Particular attention has been paid to the dissective or neurological study of the different organs or region of the body, because of the variations noticed among various animal species. Some authors have studied the formation of nerve plexuses in domestic animals showing that its organization is very variable^[3,5]. Rabbits have been used as an experimental model in many diseases, such as: erectile dysfunction^[6,7], and portal hypertension^[8,9]. Moreover, they have been used for the study of toxicology, pharmacology and surgery for the veterinary medicine course in many universities. However, some aspects of their macro anatomy need a more detailed description, especially the formation of brachial plexus and lumbo sacral plexus, which has a huge variability in distribution and trajectory.

The laboratory rabbit (*Oryctolagus cuniculus*) belongs to the family Leporidae of the order Lagomorpha^[10]. The brachial plexus has been studied in variety of mammals including dogs(*Canis*

lupis familiaris)^[5, 11,12], cats(*Felis catus*)^[3,13], Vervet monkeys(*Chlorocebus pygerythrus*)^[14], Chacma baboon(*Papio ursinus*)^[15], mouse (*Mus musculus*)^[17,18], rats (*Rattus norvegicus*)^[18,19,20], porcupines (*Hystrix cristata*)^[4] from legomorpha, brachial plexus of the White New Zealand rabbit (*Oryctolagus cuniculus*) has not been investigated in detail. For this reason, the aim of this present study was to investigate the spinal nerves that constitute the brachial plexus of the White New Zealand rabbit (*Oryctolagus cuniculus*) to give morphological aid and support for experimental research and for the clinical, radiological and surgical practice of this animal.

MATERIALS AND METHODS

A total of five adult White New Zealand rabbit (2 males and 3 females) of both sexes were purchased from the local market of Chittagong district in Bangladesh. Overdose of diazepam (10mg/kg body weight) was introduced in external jugular vein to kill those rabbits. To document the spinal nerves forming the brachial plexus, skin and muscles were carefully dissected and adipose tissues, mucous substances were removed carefully. The brachial plexus in both forelimbs were examined and pictured. The organization of the main branches of the brachial plexuses of 5 adult White New Zealand rabbit (2 males and 3 females) was investigated. Observations were performed on the non-fixed material, usually within 3 hours after death of the

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**Short Communication

animals. When necessary, a low-power binocular dissection-microscope was used to facilitate observation of details of branching of the nerve fasciculi.

The data obtained were compared, whenever possible, with previous statistical data available, especially with the data concerning the dogs (*Canis lupis familiaris*)^[5, 11, 12], cats (*Felis catus*)^[3, 13], Vervet monkeys (*Chlorocebus pygerythrus*)^[14], Chacma baboon (*Papio ursinus*)^[15], mouse (*Mus musculus*)^[16, 17], rats (*Rattus norvegicus*)^[18, 19, 20], porcupines (*Hystrix cristata*)^[4].

RESULTS

The brachial plexus of White New Zealand rabbit emerges between dorsal scalenus and ventral sclaneus muscle, just proximal to the first rib and medial aspect of scapula.

The brachial plexus of White New Zealand rabbit was constituted by ventral rami of C5, C6, C7, C8, T1 and T2 spinal nerves. The ventral rami of C5 spinal nerve and T2 spinal nerve were divided into two branches. The contribution of caudal branch of ramus ventralis of C5 spinal nerve and the cranial branch of ramus ventralis of T2 spinal nerve was observed. The cranial branch of ramus ventralis of C5 spinal nerve and the ramus ventralis of C6 spinal nerve formed the cranial trunk and cranial branch of T2 spinal nerve and rami ventralis of C7, C8 and T1 spinal nerves formed the caudal trunk which was the largest trunk. Two branches originated from the cranial trunk were bound to the cranial part of the caudal trunk (Fig 1 & 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 scalenus dorsalis muscle and at the first rib, they turned to the caudal and dispersed into serratus ventralis thoracis muscle.

Nerves originated from cranial trunk: Phrenic nerve, suprascapular nerve, the first branch of subscapular nerve and a branch binding to the caudal trunk were originated from cranial trunk of brachial plexus of rabbits (Fig 1 & 2)

Nerves originated from caudal trunk: Cranial pectoral nerve, axillary nerve, the second branch of subscapular nerve along with axillary nerve, thoracodorsal nerve, musculocutaneous nerve, radial nerve, ulnar nerve, median nerve, lateral thoracic nerve and caudal pectoral nerve were originated from caudal trunk of brachial plexus of rabbits (Fig 1 & 2)

A – Caudal trunk, B – Cranial trunk, C – Branch binding from cranial trunk to caudal trunk, 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; 1 –

Suprascapular nerve, 2 – Subscapular nerve, 3 – Axillary nerve, 4 – Thoracodorsal nerve, 5 – Musculo-cutaneous nerve, 6 – Radial nerve, 7 – Median nerve, 8 – Ulnar nerve, 9 – lateral thoracic nerve, 10 – Cranial pectoral nerve, 11- Caudal pectoral nerve; a – Subscapular muscle, b – Latissimus dorsi muscle, d- Pectoralis ascendens muscle, e- Pectoralis descendens muscle,

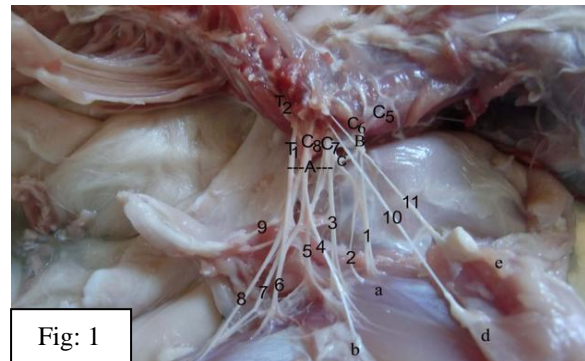


Fig: 1

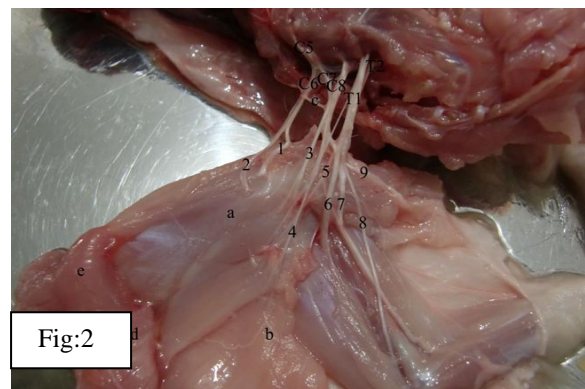


Fig:2

(Fig: 1&2): lateral and Medial view of the brachial plexus in the New Zealand white rabbit

DISCUSSION

It has been reported that the formation of the brachial plexus varies in some species. The brachial plexus of rat is formed by contribution of ventral rami of C5, C6, C7, C8, T1 and T2 spinal nerves^[18,19]. However, in rat Bertelli *et al.*,^[20] reported that ramus ventralis of T2 spinal nerve is not involved. Another study revealed that the brachial plexus of porcupine is formed by ventral rami of C5, C6, C7, C8, T1 and T2 spinal nerves^[4]. The brachial plexus is formed by ventral rami of C5, C6, C7, C8 and T1 spinal nerves in mouse^[16, 17], by rami ventralis of C5, C6, C7, C8, T1 and T2 spinal nerves in Wervet monkey^[14] and Chacma baboon^[15], the contribution of ventral rami of C6, C7, C8 and T1 spinal nerves in cat^[3, 13]. Tipirdamaz and Erden^[11] reported that dog brachial plexus is formed by ventral rami of C6, C7, C8, T1 and T2 spinal nerves, while Miller *et al.*,^[5] and Getty^[3] reported that T2 spinal nerve is involved occasionally. The brachial plexus of White New Zealand rabbit (*Orycotolagus cuniculus*) is formed by the contribution of ventral rami of C5, C6, C7, C8, T1 and T2 spinal nerves and its formation

resembles that of rat^[18, 19], porcupine^[4], Vervet monkey^[14], Chacma baboon^[15] and differs from that of rat^[21], mouse^[16,17], cat^[3, 13] and dog^[3, 5, 11,12]. The ventral rami of C5 spinal nerve and T2 spinal nerve divided into caudal and cranial branches^[4]. The caudal branch of C5 spinal nerve and cranial branches of T2 spinal nerve contribute to the formation of brachial plexus^[4] to which the result of the present study is in parallel. The brachial plexus of White New Zealand rabbit (*Oryctolagus cuniculus*) consisted of caudal and cranial trunks as that of porcupine^[4] and in this respect it differs from those of rat^[20] and Chacma baboon^[16] which is formed from caudal, medial and cranial trunks.

As in Vervet monkey^[14], Chacma baboon^[15] and cat^[3] 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 dogs^[11,12] in which the nerve was originated from the ventral rami of C7 and C8 following the formation of plexus.

Brachial plexus of rabbit form a network which was resembles to rat^[20], mouse^[16,17] and other mammals and brachial plexus of rabbit consist of two trunks as cranial and caudal which were formed by ventral rami of C5, C6, C7, C8, T1 and T2 in White New Zealand rabbit (*Oryctolagus cuniculus*), similar to porcupine^[4] and differs from those of rat^[20] and Chacma baboon^[15] which are formed from caudal, medial and cranial trunks.

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