



A Case Report of an Abnormal Course of the Superficial Branch of the Radial Nerve

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Abstract

The Superficial Branch of the Radial Nerve (SBRN) in the forearm usually has a constant course, but sometimes there may be differences in its course and position. This report is about a case of difference in the normal course of this nerve. Normally, in the forearm, the SBRN passes between the brachioradialis muscle tendon and the Extensor Carpi Radialis Longus (ECRL) to become superficial. In this case, the SBRN passed through the brachioradialis tendon instead of passing between the brachioradialis muscle tendon and the ECRL. The position and course of this nerve can be very important for surgeons, radiologists, and physiotherapists in diagnosing and treating Wartenberg's syndrome and others.

Introduction

The radial nerve as the largest branch of the brachial plexus originates from the posterior cord of the brachial plexus in the axilla [1] and then reaches the radial groove on the back of the humerus after passing through the triangular interval and then enters the anterior compartment of the arm by piercing the lateral intermuscular septum of the arm above the elbow. It then enters the arm by passing in front of the lateral epicondyle of the humerus under the brachioradialis muscle [2]. At the level of the lateral epicondyle in the cubital fossa, this nerve divides into two superficial and deep branches. The deep branch enters the posterior compartment of the forearm by passing the supinator muscle [1]. After passing through the supinator muscle, it is known as the posterior interosseous nerve [2]. Another branch of the radial nerve is a sensory nerve known as the Superficial Branch of the Radial Nerve (SBRN). This branch is the direct continuation of the radial nerve. This branch, which usually has a consistent course, continues distally under the brachioradialis muscle [1-4]. In the distal part of the forearm, this branch passes backward under the tendon of the brachioradialis and becomes superficial by piercing deep fascia [3] between the brachioradialis and the ECRL muscle tendon [5] at approximately $8.31 \text{ cm} \pm 1.14$ above the styloid process [6]. Then it divides into four or five branches known as dorsal digital nerves [3]. These branches continue subcutaneously and with a little variation, supply the skin of the lateral two-thirds of the posterior surface of the hand and also the posterior surface of the proximal phalanges of the thumb, index, middle, and lateral half of the ring finger [1].

Anatomical variations in the radial nerve, especially its superficial branch, have been previously reported. Examples of these variations are the course of this branch superficial to the brachioradialis muscle [7], passing posterior and lateral to the external epicondyle of humerus [5], the presence of two superficial branches of radial nerves [8], the connection with the lateral cutaneous nerve of the forearm and the posterior branch of the ulnar nerve, absence of SBRN [8] and passing of SBRN through the brachioradialis tendon instead of passing between the brachioradialis and the extensor carpi radialis longus tendon [9,10].

The passage of the superficial branch of the radial nerve through the brachioradialis muscle tendon has been reported several times. But this case has not been reported in Iran so far and this report is the first case.

Case Presentation

When dissecting the left upper extremity of a 57-year-old man (donated cadaver) in the dissection room of Tehran University of Medical Sciences, according to the dissection guidelines, we first made two median incisions in anterior and posterior forearms, as well as two circular incisions around the wrist and elbow. Next, we incised the skin of the hand in the form of a middle longitudinal incision in the front of the hand and a middle longitudinal incision in the back of

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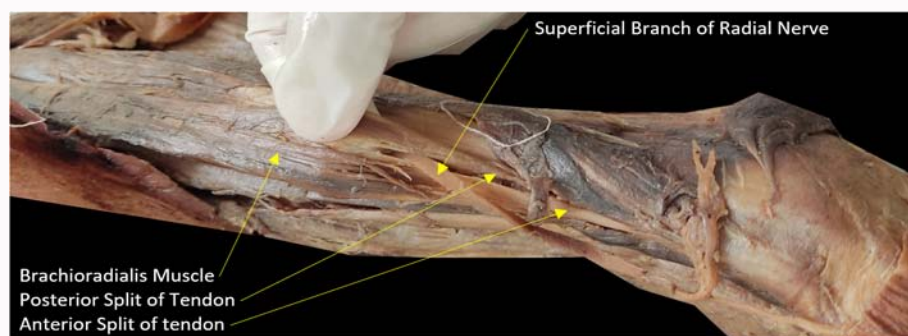


Figure 1: Radial Nerve.

the hand. After that, first, the skin of these parts was removed, and then the cutaneous nerves and veins were identified in the superficial fascia. In the next step, by removing the superficial fascia and other surface structures, we began to identify the muscles and other deep structures. When tracing the nerve course, we identified an abnormal course of the superficial branch of the radial nerve. In this case, SBRN was passed through the brachioradialis muscle tendon instead of its normal course between the tendons of the brachioradialis and the ECRL muscle. In this case, the brachioradialis tendon had two splits, the posterior split being thinner and weak and the anterior split thicker and wider. The superficial branch of the radial nerve became superficial by passing between these two splits. This case of anatomical variation has already been reported. In 4 cases reported by Turkof et al., Tendon splits had different ratios in thickness and width [11]. Similar to cases reported by Turkof et al., in our case, the anterior split was wider and thicker than the posterior split.

Also, considering the usual connections between the external cutaneous nerve of the forearm and the posterior cutaneous nerve of the forearm with the superficial branch of the radial nerve, these nerves were examined for anatomical variations that were normal. Other upper extremity nerves were also examined and no abnormalities were found. It should be noted that the distribution and course of the right radial nerve in the forearm and hand as well as the morphology of the right brachioradialis tendon were also completely normal.

This was the only case among 55 newly dissected Iranian cadavers (male and female) in the dissection room of the Tehran University of Medical Sciences (Figure 1).

Discussion

In the clinical aspect, Anatomical variations are important for surgeons, neurologists, physiotherapists, etc. also these cases can be the subject of research for anatomists, embryologists, etc.

The radial nerve is prone to entrapment and compression in different locations. One of the most prone locations for radial nerve entrapment and compression is the site where the superficial branch of the radial nerve passes between the tendon of the ECRL and brachioradialis. Wartenberg's Syndrome is a mononeuropathy caused by entrapment of the superficial branch of the radial nerve [11]. This nerve can become entrapped and compressed in different places, but one of the most common sites for entrapment is the posterior side of the brachioradialis tendon when this nerve becomes superficial [11]. Numerous causes have been reported for this syndrome, such as tight watches and wristbands, nerve compression due to fracture of the distal end of the radius and its subsequent surgery, falling, acupuncture, repeated supination and pronation, lipoma, neuroma,

and nerve entrapment between the brachioradialis and ECRL tendon, the use of splint (rare), etc. [10-13]. passing of the SBRN through the brachioradialis tendon has been reported several times and seems to be more reports in the future. Because of this, this variation should also be considered in the etiology of Wartenberg's syndrome. This type of entrapment can show all of the signs and symptoms of Wartenberg's syndrome. These symptoms include hypoesthesia, numbness, tingling and burning-type pain at the dorsum of the hand and radial side of the thumb, etc. [12].

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