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Case Report

A rare anatomical variation between the radial and ulnar nerves in the arm

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Abstract

A routine dissection of an 85-year-old cadaver demonstrated a rare communicating branch between the radial and the ulnar nerve in the arm. The communicating branch began at the radial nerve after it exited the triangular space and joined the ulnar nerve distally. With little data of this variation it is difficult to estimate the frequency of this variation in the normal population and it reveals a need for further research into quantifying it. The only other documented case of a communicating branch of this nature has been reported by Sarikcioglu et al., making this the second documented case to date.

Key words [radial nerve] [ulnar nerve] [variation] [surgery] [arm]

Introduction

During a routine dissection of an 85-year-old cadaver we noted an anatomical variation of the radial and ulnar nerve within the arm. The variation was a communication between the radial and ulnar nerves in the arm. Ozguner et al. have described communicating branches between the radial and ulnar nerve in the arm [1] and to the best of our knowledge, there is only one other case in the literature denoting a communication between the ulnar and radial nerves [2] similar to the variation in the present case.

The radial nerve arises as a continuation of the posterior cord of the brachial plexus. It exits the triangular space with the profunda brachii artery and gives branches to the long and medial heads of triceps and the posterior cutaneous nerve of the arm. The radial nerve travels in the radial groove where it supplies the lateral and medial head again. A lower lateral cutaneous nerve of the arm and the posterior cutaneous nerve of the forearm are also given off. It then pierces the lateral intermuscular septum and enters the anterior compartment of the forearm. It supplies extensor carpi radialis longus and brachioradialis prior to dividing into the terminal superficial branch and the posterior interosseous nerve. The superficial branch of the radial nerve travels under cover of brachioradialis down the lateral forearm, then crosses over the tendons of the anatomical snuffbox and provides cutaneous branches to the lateral three and a half fingers of the dorsum of the hand [3].

The posterior interosseous nerve is the nerve of the extensor compartment of the forearm. It is the motor supply to muscles which arises from the common extensor origin and the deep muscles of the extensor compartment [3].

The ulnar nerve originates from the medial cord of the brachial plexus and lies most medial to the axillary artery. As it enters the elbow joint it grooves the posterior aspect of the medial epicondyle (sublime tubercle) of the humerus. It enters the forearm between the two heads of flexor carpi ulnaris and runs on flexor digitorum profundus under cover of flexor carpi ulnaris. The dorsal cutaneous nerve is given off proximal to the wrist and supplies the medial skin of dorsum of the hand and the ulnar one and a half digits. The ulnar nerve also gives off a small palmar cutaneous branch above the flexor retinaculum, which supplies the skin over the hypothenar muscles. The ulnar nerve then descends on flexor digitorum profundus and runs lateral to the hook of the hamate. It then gives off its superficial branch that supplies one and a half digits on the ulnar and palmar aspect, as well as palmaris brevis. It then runs between flexor digiti minimi and abductor digiti minimi as the deep branch of the ulnar nerve. The deep branch follows the deep carpal arch and supplies all the interossei and the two lumbricals on the ulnar aspect of

the wrist. The deep branch then ends by supplying adductor pollicis [1, 3].

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As depicted in our image there is a communicating branch from the radial nerve as it exits the triangular space with the ulnar nerve. There is only one branch noted and no other cutaneous or motor branches to any other muscles. No further communications on routine dissection of the radial and ulnar nerve were further identified (Figure 1). The communication is 8.5 cm in length and 3 mm in diameter.

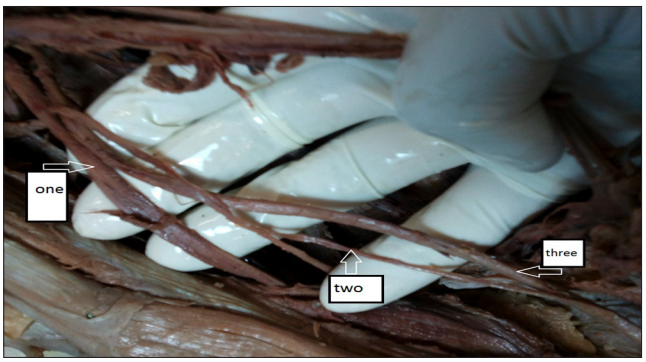

Figure 1. Diagrammatic representation of variant brachial plexus on the right side. *(**U**: upper trunk; **M**: middle trunk; **L**: lower trunk; **D**: dorsal divisions; **V**: ventral divisions; **LC**: lateral cord; **MC**: medial cord; **1**: radial nerve; **2**: axillary nerve; **3**: lower subscapular nerve; **4**: upper subscapular nerve; **5**: thoracodorsal nerve; **6**: long thoracic nerve; **7**: branch of dorsal division of upper trunk; **8**: median nerve; **9**: ulnar nerve; **10**: musculocutaneous nerve)*

Discussion

In literature there are variations noted in the brachial plexus [4]. Variations are known to exist between the median and ulnar nerves ('Martin Gruber' anastomosis) in approximately 20% of the population. Variations are also known to exist between the musculocutaneous nerves and median nerves in approximately 46% of subjects [1, 2].

There have been proposed communications but without clear percentage or documentation in relation to communication between the radial and ulnar nerves in the arm. It is noted that approximately 15% of the population may have a communication between the superficial branch of the radial nerve and the ulnar nerve [5]. In the dorsum of the hand, Loukas et al. described a communicating branch between the radial and ulnar nerves [6]. In 200 cadavers dissected 60 percent of cadavers had a communication. They described both proximal and distal communications in the dorsum of the hand, particularly over the fourth digit [7].

Conclusion

The communication between the radial and ulnar nerve in the arm is rare [2]. In surgeries, for clinical assessment and for anatomists it is important to be aware of these variations. To our knowledge this is the second reported case therefore it is difficult to ascertain the clinical significance of having a communicating branch. Understanding this variation will help in navigation of anatomy, where times of diagnosis and treatment are of importance to the patient's safety and outcome. Is this communicating branch vestigial? Does it supplement the innervations of the ulnar nerve and if so, would a severed ulnar nerve before the communication have any effects on movement of the flexors and sensations on the hand? We are limited by our methods of discovering the variation, and if it were possible a retrospective analysis of the cadaver's medical history or performing nerve conduction studies on live subjects with this variation would be of benefit in answering our questions.

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