Brief Report

Anatomical Variation of the Posterior Interosseous Nerve: A Cadaver Dissection Study

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ABSTRACT

An anatomical variation of the posterior interosseous nerve was found in a cadaver. The posterior interosseous nerve entered the supinator muscle 3 cm distal to the radiohumeral joint, but exited from two sites. Fifty percent of the nerve exited under the distal edge of the supinator muscle. The other 50% of the nerve pierced through the supinator muscle, 4.2 cm distal to the articular surface of the radial head and then joined the remaining posterior interosseous nerve as it emerged from the supinator muscle distally. Variations were not found concerning the order and the manner of branches to the muscles. This variation in the posterior interosseous nerve could be an additional compression site for this nerve and therefore responsible for some of the atypical presentations of symptoms and for partial recovery after surgical decompression. Careful surgical dissection is recommended to avoid injury to this branch.

Knowledge of the anatomical variations of the posterior interosseous nerve is vital to avoid iatrogenic nerve injury, explain unknown reasons for poor surgical results, and locate possible compression sites. Some anatomical variations of the posterior interosseous nerve have been reported in the literature. This article reports an anatomical variation of the posterior interosseous nerve found during cadaveric dissection.

ANATOMICAL DISSECTION

A fresh-frozen left arm of an 80-year-old woman was dissected in our anatomical laboratory. The dissection started in the distal arm where the radial nerve branches off to the brachioradialis and extensor carpi radialis longus. The radial nerve then divided into the posterior interosseous nerve and the superficial radial nerve 2 cm proximal to the radial head. The superficial radial nerve descended under the cover of the brachioradialis and continued its usual course to the wrist.

The posterior interosseous nerve passed anterior to the radiohumeral joint and diverged laterally and posteriorly. It branched off to the extensor carpi radialis brevis 1.5 cm distal to the articular surface of the radial head and then passed under the arcade of Frohse. The arcade was tendinous and formed the proximal edge of the superficial portion of the supinator muscle. The distal edge of the supinator was identified.

The posterior interosseous nerve exited from under the supinator 7.2 cm distal to the radiohumeral joint and was joined by a branch traveling superficial to the supinator muscle. Further dissection proximally revealed the posterior interosseous nerve had divided into two equal branches under the supinator muscle. One branch continued to emerge on the distal end of the supinator. The other branch penetrated through the supinator muscle 4.2 cm distal to the radiohumeral joint level (Figure 1). This branch traveled superficial to the supinator muscle and joined the remaining posterior interosseous nerve after it emerged from...
under the supinator muscle distally. The two exit sites were 3 cm apart. At both exit sites, the edges of the supinator muscle were tendinous (Figures 1 and 2). As branches of the posterior interosseous nerve emerged from the muscle, they were connected by several communications and branched off to the superficial and deep extensor muscles. No variation in order or manner of branches to the extensor muscles was found.

**Discussion**

The radial nerve normally divides into the superficial and the posterior interosseous nerve 1.3 cm proximal to the elbow joint. It then enters the supinator muscle through the arcade of Frosho. After emerging from the distal border of the supinator muscle, the posterior interosseous nerve branches off to the superficial and deep extensor muscles. The number and arrangement of these branches varies.

Harburger described a variable branch of the posterior interosseous nerve that penetrated the superficial head of the supinator muscle close to its distal end. Krause and Von Luschka described the motor branch to the abductor pollicis longus, extensor pollicis brevis and longus, and extensor indicis proprius passing superficial to the superficial head of the supinator muscle. In our dissection, the variable branch of the posterior interosseous nerve penetrated to the supinator muscle almost at its mid-portion. A nerve branch at this location is likely to be overlooked and injured during a surgical dissection through a limited incision.

Lister et al. and Ritts et al. presented evidence that the radial tunnel is a common area for radial nerve compression in the upper extremity. Lister et al. found four potential anatomic causes for radial nerve compression: the fibrous bands in front of the radial head, the 'radial recurrent fan' of vessels, the sharp, tendonous margins of the extensor carpi radialis brevis, and the arcade of Frosho.

The fibrous distal edge of the supinator has been considered a possible site of compression for the posterior interosseous nerve. Fibrous bands encircling the branch of the posterior interosseous nerve exiting through the supinator muscle is an additional site for potential compression resulting in variations of typical posterior interosseous nerve compression symptoms. Furthermore, its presence poses a potential site for iatrogenic injuries during surgical procedures. Blind division of the supinator could be dangerous and would injure the nerve. Accidental division of such a branch may lead to atypical clinical presentation.

**References**

3. Luschka H. Die Anatomie des Menschenlichen Körper Tübingen, Germany; H. Laupp; 1862.