Elbow nerves: normal sonographic anatomy and identification of the structures potentially associated with nerve compression. A short pictorial-video article

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Abstract

Purpose To demonstrate usefulness of ultrasonography evaluation of the nerves of the elbow and of the structures that more frequently might cause its compression.

Materials and methods Anatomic course of nerves, muscles, tendons, fibrous structures and bursae potentially associated with nerve compression syndromes were evaluated. Informed consent was obtained from each volunteer. **Results** Ulnar, median and radial nerves are always evaluable with ultrasonography as well as muscles and tendons potentially associated with nerve compression. The bursae cannot be sonographically explored unless distended by fluid.

Conclusion Ultrasonography is a reliable method for the evaluation of the nerves of the elbow and of the structures that might cause its compression.

Keywords Elbow · Nerves · Sonography

Riassunto

Scopo del lavoro Dimostrare l'utilità dell'ecografia nella valutazione dei nervi del gomito e delle strutture che più frequentemente possono causarne la compressione.

Materiali e Metodi Sono stati valutati il decorso dei nervi del gomito e muscoli, tendini, strutture fibrose e borse sierose potenzialmente associati a sindromi da compressione. E' stato ottenuto il consenso informato da ciascun volontario.

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Risultati I nervi ulnare, mediano e radiale sono sempre valutabili con l'ecografia come i muscoli e i tendini potenzialmente associati a compressione del nervo, le borse non possono essere valutate se non distese da liquido.

Conclusione L'ecografia è una metodica affidabile per la valutazione dei nervi del gomito e delle strutture che potrebbero causare la loro compressione.

Objective

To demonstrate usefulness of ultrasonography in the evaluation of nerves of the elbow [1–3] and of the structures that more frequently might cause its compression [4–6].

Ultrasound examination

Ultrasound imaging is performed with commercially available equipment, broadband (frequency band: 5–17 MHz) and multifrequency signal processing small parts linear array transducers on axial and sagittal planes respect to the nerve, also during flexion and pronation—supination of the elbow.

Elbow nerve

The radial nerve is situated in a fat plane between the brachial muscle (or brachialis muscle) and the long radial extensor muscle (or extensor carpi radialis longus muscle) of the wrist, subsequently dividing below the elbow joint into the superficial and the posterior interosseous branches (Fig. 1).

The median nerve travels between the brachial and pronator teres muscles, coursing between the ulnar and radial heads of the latter (Fig. 2).

The ulnar nerve is positioned superficially in the elbow. It runs posterior to the medial humeral epicondyle and

medial to the medial collateral ligament (MCL), along with the posterior recurrent (or superior collateral) ulnar artery and vein. These elements occupy the cubital tunnel, which is covered by a thin arcuate ligament (Fig. 3).

Structures potentially associated with nerve compression

The superficial radial nerve may be subject to chronic compression by bicipitoradial bursa [7] (Fig. 4).

Fig. 1 Radial nerve. The radial nerve is situated in a fat plane between the brachial muscle and the long radial extensor muscle of the wrist, subsequently dividing below the elbow joint into the superficial and the posterior interosseous branches

Fig. 2 Median nerve. The median nerve travels between the brachial and pronator teres muscles, positioned on the medial side of the brachial artery

Fig. 3 Ulnar nerve. The ulnar nerve is positioned superficially in the elbow. It runs posterior to the medial humeral epicondyle and medial to the MCL, along with the posterior recurrent ulnar artery and vein

Fig. 4 Radial nerve (superficial branch). The superficial radial nerve may be subject to chronic compression by bicipitoradial bursa that lies between the distal tendon of the biceps brachii and the radial tuberosity

Fig. 5 Posterior interosseous nerve. The posterior interosseous nerve may be compressed between the superficial and deep portions of the supinator muscle during pronation—supination of the elbow

Fig. 6 Median nerve. Median nerve may be compressed by thickened lacertus fibrosus, the bicipital aponeurosis which descends medially, across the brachial artery and median nerve, to fuse with the fascia of flexor muscles of the forearm

The bicipitoradial bursa lies between the distal tendon of the biceps brachii and the radial tuberosity. It is a fairly large bursa. The bursitis may clinically manifest itself with sensorial and/or motor symptoms related to compression of the radial nerve.

The posterior interosseous nerve may be compressed between the superficial and deep portions of the supinator muscle during pronation—supination of the elbow [8] (Fig. 5).

Median nerve may be compressed by thickened lacertus fibrosus, the bicipital aponeurosis which descends medially, across the brachial artery and median nerve, to fuse with fascia of flexor muscles of the forearm [6] (Fig. 6).

Physiologic compression of the nerve in the cubital tunnel occurs during elbow flexion [6], but compression may also be caused by bursae, effusion, and anconeus epitrochlearis muscle.

Conclusion

Ultrasonography is a reliable method for the evaluation of the nerves of the elbow [1–3] and of the structures that may cause its compression [4–8].

Conflict of interest Gregoli Bettina, Bortolotto Chandra and Draghi Ferdinando declare that they have no conflict of interest.

Informed consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). All patients provided written informed consent to enrolment in the study and to the inclusion in this article of information that could potentially lead to their identification.

Human and animal studies The study was conducted in accordance with all institutional and national guidelines for the care and use of laboratory animals.

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