Anterior interosseous nerve palsy subsequent to proximal humerus fracture is rare compared with an axillary nerve injury. This article presents a case of anterior interosseous nerve palsy secondary to such a fracture in an 87-year-old woman after a simple fall onto her outstretched hand.

The patient had no sensory involvement but was unable to form an O with her thumb and index finger. She had a positive pointing index test on attempting to clasp her hand. The fracture and nerve palsy were treated conservatively. At 3-month follow-up, the patient had partial recovery; therefore, electromyography was not performed. By 6 months, she had complete recovery of anterior interosseous nerve palsy.

This case highlights the possibility of sustaining anterior interosseous nerve palsy with proximal humerus fracture with a classical clinical presentation. Because most nerve lesions after proximal humerus fracture are neurapraxia, symptoms usually resolve either partially or completely after a few months.

It is recommended that cases with proximal humerus fracture be evaluated carefully for median nerve and axillary nerve injury. In addition, it is recommended to perform electromyography if no signs of recovery are evident at 3-month follow-up.

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Figure 1: Anteroposterior radiograph of the right shoulder at injury showing a spiral fracture of the proximal humerus.

Figure 2: Anteroposterior radiograph of the right shoulder 6 months after injury showing bridging callus.
Proximal humeral fracture is a common injury with an incidence of approximately 5% of all fractures, with the majority being secondary to blunt trauma in elderly patients. The risk of neurological injury after proximal humerus fracture has been well documented in the literature. Stableforth reported a 6.2% incidence of brachial plexus injury after proximal humerus fracture. The axillary nerve is reportedly the most common injured nerve after proximal humerus fracture. To the current authors’ knowledge, no reports exist of proximal humerus fracture causing isolated anterior interosseous nerve palsy.

CASE REPORT

An 87-year-old right hand–dominant woman injured her right shoulder after falling onto her outstretched hand from a standing height. Initial examination revealed a subcutaneous hematoma and tenderness around the right shoulder. The patient was unable to move her shoulder due to pain. Axillary nerve function was recorded to be intact by the medical staff in the emergency department, and a full complement of pulses existed. Radiographs confirmed a proximal right humerus fracture (Figure 1).

The orthopedic on-call team assessed the patient. She had no sensory involvement but was unable to form an O with her thumb and index finger (Figure 2). She had a positive pointing index test when attempting to clasp her hand (Figure 3). The patient was noted to have no power in the right flexor pollicis longus and index flexor digitorum profundus. Pronator quadratus muscle testing was difficult to judge correctly. No tenderness existed at the distal arm or forearm to suggest nerve entrapment. No sensory or motor loss was noted in the median, radial, and ulnar nerve distributions, and she had a negative Tinel sign of the median and ulnar nerves at the elbow and wrist. The findings were consistent with an isolated palsy of the right anterior interosseous nerve.

Due to the patient’s physiological age, the decision was made to treat the fracture conservatively with a simple arm sling. The patient was reviewed 1 week later for follow-up radiography, which was satisfactory, and referred to physiotherapy to begin a rehabilitation program.

At 3-month follow-up, the patient had a Medical Research Council Scale strength score of 3 of 5 in her right flexor pollicis longus and 4 of 5 in her index flexor digitorum profundus. A nerve conduction study was unnecessary because of the spontaneous gradual recovery. By 3-month follow-up, 70% and 80% improvement was noted in glenohumeral range of motion and muscle strength.

On physical examination at 6-month follow-up, the patient had complete resolution of her anterior interosseous nerve palsy with full strength in her right flexor pollicis longus and index finger flexor digitorum profundus, and she was able to form an O with her thumb and index finger. The fracture was fully united (Figure 4), and glenohumeral motion was normal.

DISCUSSION

Palsy of the anterior interosseous nerve was first described by Tinel in 1918 as dissociated paralysis of the median nerve. In 1955, Lipscomb and Burleson described the condition in association with a supracondylar fracture, and in 1965, Fearn and Goodfellow first observed that an entrapment neuropathy was responsible for some examples of the anterior interosseous nerve. The anterior interosseous nerve is the largest branch of the median nerve and arises 5 to 8 cm distal to the level of the lateral epicondyle, usually immediately distal to the superior border of the superficial head of the pronator teres. It runs between the deep and superficial heads of the pronator teres accompanying the median nerve and passes beneath the arcade of the flexor digitorum superficialis to lie on the anterior interosseous membrane, terminating in the capsule of the wrist. The anterior interosseous nerve supplies the flexor pollicis longus, the flexor digitorum profundus to the index finger and occasionally to the middle finger, and the pronator quadratus. No superficial sensory branch exists.

According to Sunderland’s detailed anatomical studies of the median nerve, fibers destined to become the anterior interosseous nerve can be isolated from the main trunk of the median nerve as far proximal as the brachial plexus. The fasciculus destined to become the anterior interosseous nerve runs in the posterior part of the main trunk of the median nerve. Furthermore, according to a study on the influence of posture and motion on peripheral nerve tension by Kleinersink, a fall with the elbow and wrist extended.
produces traction of the median nerve and the medial cord.

The reported causes of anterior interosseous nerve palsy are divided into 2 categories: traumatic and nontraumatic. Traumatic causes are secondary to penetrating injuries, supracondylar fractures, or forearm fractures. Nontraumatic causes are entrapment neuropathy, Gantzer’s muscle, enlarged bicipital bursa, vascular abnormalities, Volkmann’s ischaemic contracture, and neuritis. Collens and Weber considered entrapment to be the most common cause by far.

To the current authors’ knowledge, this is the first report of traumatic proximal anterior interosseous nerve neuropraxia by a displaced proximal humerus fracture. They believe that this case was caused by traction of the median nerve by falling on an outstretched hand and contusion of anterior interosseous nerve fibers in the main median nerve trunk by the displaced fracture.

The authors propose that a neurologic deficit presenting immediately after a fracture suggests a nerve contusion, and the absence of sensory symptoms rules out a high median nerve injury. Furthermore, in view of the spontaneous recovery of the anterior interosseous nerve palsy, it is not necessary to perform electromyography routinely unless no signs of recovery are evident at the 3-month follow-up. The authors believe that with increased awareness of this condition, more cases will be recognized.

References