

## CASE REPORT

# ANTERIOR INTEROSSEOUS NERVE INJURY ASSOCIATED WITH A MONTEGGIA FRACTURE-DISLOCATION

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**A case of an anterior interosseous nerve palsy associated with a Monteggia fracture-dislocation is presented. The fracture of the ulna was reduced and stabilized with a plate, and the proximal radioulnar dislocation was also reduced. The nerve recovery was spontaneous and complete. A satisfactory result was obtained, without pain or functional sequelae.**

**Key words :** anterior interosseous nerve ; nerve palsy ; Monteggia fracture-dislocation ; surgical treatment.

**Mots-clés :** nerf interosseux antérieur ; lésion nerveuse ; fracture de Monteggia ; traitement chirurgical.

## INTRODUCTION

The anterior interosseous nerve is a branch of the median nerve which provides the motor supply to the flexor pollicis longus, to the index and sometimes to the middle finger sections of the flexor digitorum profundus and to the pronator quadratus. Injuries of this nerve are rare. They appear as a consequence of fractures or dislocations in the upper limb ; these include supracondylar fractures of the humerus, forearm fractures (1, 4, 5), acromioclavicular dislocations and fractures of the lateral end of the clavicle treated with a Robert Jones type bandage (6). These lesions are still much rarer in association with another traumatic lesion as the isolated fracture of the proximal portion of the ulna, dislocation of the elbow, and Monteggia fracture-dislocation (two cases reported in the literature) (1, 2). This latter injury may be associated with different nerve lesions : posterior interosseous nerve (branch of the radial nerve), ulnar nerve, anterior

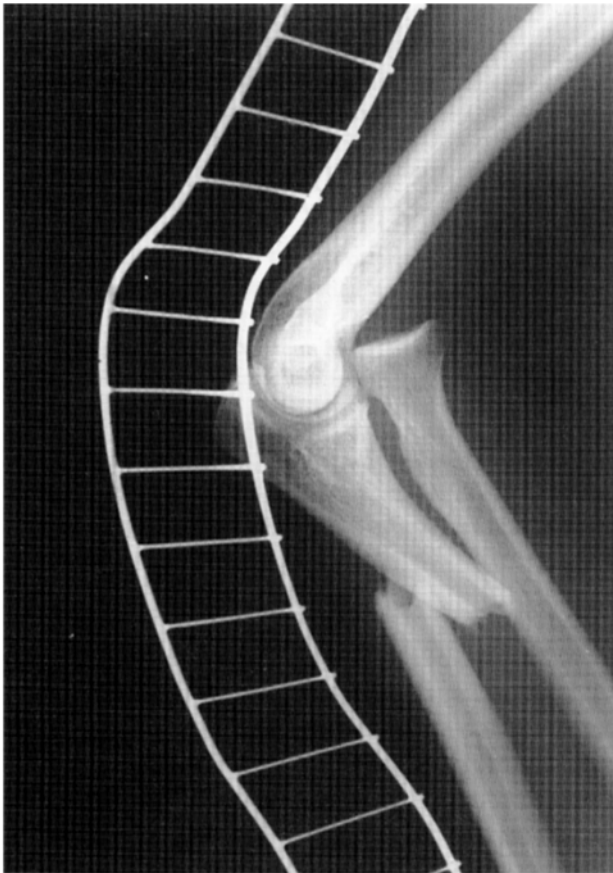
interosseous nerve (1, 2), or even the three main nerves of the upper limb (radial, ulnar and median nerves), as in a case described by Fowles *et al.* (3).

## CASE REPORT

A 36-year-old man, who suffered an occupational accident, sustained a trauma to the left forearm by a torsion mechanism. He complained of pain and disability in the left elbow. On clinical exploration, reduced power of flexion of the distal phalanges of the thumb and index finger was noted. The xray study showed a fracture of the proximal left ulna with anterior dislocation of the head of the radius (fig. 1). The lesion was diagnosed as a Monteggia fracture-dislocation type I of Bado, associated with neurapraxia of the anterior interosseous nerve. At surgery, the fracture of the ulna was reduced and stabilized with a plate, and the proximal radioulnar dislocation was also reduced (fig. 2). The left upper limb was immobilized in a plaster cast. A nerve conduction study was performed in the postoperative period, which confirmed the nerve lesion. The plaster cast was removed after three weeks, and an exercise program was started. On revision after 6 months, full symmetric motion of the elbow was noted, there were no neurologic sequelae, and the patient was able to lead a normal life.

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**Fig. 1.** — Xray study shows the Monteggia lesion of the right elbow of the reported patient.

### DISCUSSION

The anterior interosseous nerve arises from the median nerve five centimeters distal to the lateral humeral epicondyle and passes with the main trunk of this nerve between the two heads of the pronator teres muscle. It continues along the volar surface of the flexor digitorum profundus and then passes between this muscle and the flexor pollicis longus to run along the anterior aspect of the interosseous membrane and enters the pronator quadratus (1, 5). Injuries to the anterior interosseous nerve cause paralysis of the flexor pollicis longus, the flexor digitorum profundus to the index finger and the pronator quadratus, and provoke weakness on flexion of the interphalangeal joint of the thumb and the distal interphalangeal joint of the index finger,



**Fig. 2.** — Postoperative radiograph of the elbow of the patient.

giving a characteristic “square pinch” sign (5). This nerve palsy develops within the first hours or days after injury, and is usually, but not always, transient (1, 5).

These lesions may occur by direct nerve damage related to the fracture. Geissler *et al.* (4) reported a case of closed fracture of both forearm bones complicated by anterior interosseous nerve palsy. Surgical exploration showed that a bone spike from the proximal fragment was perforating the nerve. The fractured radius was reduced and inspection of the nerve under the microscope showed no fascicular disruption. Nerve injury could also have resulted from stretching by the displaced fracture of the ulna or by the radial head dislocation (5). Engber and Keene (2) reported one case of palsy following a Monteggia lesion and considered that the most

probable mechanism was traction neuropathy, caused by stretching the tethered anterior interosseous nerve over the anteriorly angulated ulnar fracture.

Direct compression by posttraumatic hematoma or soft-tissue swelling may be another mechanism of injury (1, 5). In the four cases reported by Casey and Moed (1), the usual finding was a tight strip of cotton padding stretched across the antecubital fossa. The cotton was wedged into the antecubital fossa, provoking compression of the anterior interosseous nerve.

It has been postulated that hypertrophy of the volar muscles of the forearm and increased compartmental pressures may contribute to syndromes involving entrapment of the proximal median nerve. O'Neill *et al.* (6) describe the cases of two patients in whom the muscles innervated by the anterior interosseous nerve became paralyzed when a Kenny Howard type sling was used for the treatment of an acromioclavicular dislocation. In both patients, the marked pronation of the forearm in the sling may have contributed to pressure of volar muscles on the anterior interosseous nerve.

Iatrogenic injury to the anterior interosseous nerve may occur by direct compression related to improper use of bone forceps (5). Some authors have reported cases of incomplete palsy of this nerve following plating of fractures of the forearm bones, and Spinner (7) suggested that damage could occur if dissection around the proximal or middle thirds of the radius is extraperiosteal. Fowles *et al.* (3) described a case of a patient who suffered a postoperative tourniquet paralysis of the ulnar, median and radial nerves. In this patient, the tourniquet had been inflated for only fifty minutes, but it may not have been sufficiently padded.

Spontaneous improvement of nerve function in reported cases suggests to most authors that surgical exploration of the nerve is not required (1-3, 5, 6). If the nerve lesion is produced by a constrictive bandage, early diagnosis and prompt release of the offending constrictive dressing may result in rapid and complete nerve recovery (1, 2). If nerve recovery does not occur, the wisest course may be late tendon transfer (5). Spinner (7) recommends transfer of the superficialis tendon from the ring finger

to the flexor pollicis longus, and suture at the wrist of the profundus tendon of the index finger to that of the middle one.

## REFERENCES

1. Casey P. J., Moed B. R. Fractures of the forearm complicated by palsy of the anterior interosseous nerve caused by a constrictive dressing. A report of four cases. *J. Bone Joint Surg.*, 1997, 79-A, 122-124.
2. Engber W. D., Keene J. S. Anterior interosseous nerve palsy associated with a Monteggia fracture. A case report. *Clin. Orthop.*, 1983, 174, 133-137.
3. Fowles J. V., Sliman N., Kassab M. T. The Monteggia lesion in children. Fracture of the ulna and dislocation of the radial head. *J. Bone Joint Surg.*, 1983, 65-A, 1276-1283.
4. Geissler W. B., Fernandez D. L., Graca R. Anterior interosseous nerve palsy complicating a forearm fracture in a child. *J. Hand Surg.*, 1990, 15-A, 44-47.
5. Hope P. G. Anterior interosseous nerve palsy following internal fixation of the proximal radius. *J. Bone Joint Surg.*, 1988, 70-B, 280-282.
6. O'Neill D. B., Zarins B., Gelberman R. H., Keating T. M., Louis D. Compression of the anterior interosseous nerve after use of a sling for dislocation of the acromio-clavicular joint. A report of two cases. *J. Bone Joint Surg.*, 1990, 72-A, 1100-1102.
7. Spinner M. The anterior interosseous nerve syndrome: With special attention to its variations. *J. Bone Joint Surg.*, 1970, 52-A, 84-94.

## SAMENVATTING

A. J. ARENAS, F. J. ARTÁZCOZ, A. TEJERO, C. ARIAS.  
*Letsel van n. interosseus anterior tengevolge van Monteggia-fractuur.*

De auteurs beschrijven een geval van letsel van n. interosseus anterior tengevolge van Monteggia-fractuur. Voor de ulnafractuur gebeurde een osteosynthese (plaat en schroeven), terwijl de radiuskopluxatie gereduceerd werd. Op neurologisch gebied bekam men een spontane volledige recuperatie en een perfecte functie.

## RÉSUMÉ

A. J. ARENAS, F. J. ARTÁZCOZ, A. TEJERO, C. ARIAS.  
*Lésion du nerf interosseus antérieur associé à une fracture-luxation de Monteggia.*

Les auteurs rapportent un cas de lésion du nerf interosseus antérieur associé à une fracture-luxation de

Monteggia. La fracture de l'ulna a été réduite et stabilisée par une plaque vissée, la luxation radio-ulnaire proximale a été réduite également. Sur le plan neurologique, la récupération s'est faite spontanément et a été totale, avec un excellent résultat fonctionnel.