Cubital tunnel syndrome due to heterotrophic ossification caused by radial head fracture: A case report

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ABSTRACT

Compression of the ulnar nerve in the cubital tunnel is the second most common nerve entrapment syndrome in the upper extremity after carpal tunnel syndrome. Although various etiologies have been described, heterotrophic ossification is rarely seen. Heterotrophic ossification should be kept in mind as a cause of ulnar nerve entrapment after elbow trauma. Early diagnosis and surgical intervention are important in such cases before completion of the maturation phase. We report a case of heterotrophic ossification due to elbow trauma that caused cubital tunnel syndrome.

Key words: Cubital tunnel syndrome, elbow trauma, heterotrophic ossification

Introduction

Compression of the ulnar nerve in the cubital tunnel is the second most common nerve entrapment syndrome in the upper extremity after carpal tunnel syndrome [1,2]. Various etiologies and pathological conditions have been described, including contracted fascial bands, bony spurs, and subluxation of the ulnar nerve over the medial epicondyle, degenerative or inflammatory diseases, and ganglia, cubitus valgus and direct compression. However, anatomic compression without specific pathology is the most commonly seen cause [1-4].

The damage of nerve may occur either by direct mechanical compression or compression of the intrinsic blood supply to the nerve, which is associated with local ischemia [2].

Cubital tunnel syndrome due to heterotrophic ossification is very rarely seen [3]. It may be misdiagnosed, and it is difficult to treat without recurrence [4]. We report a case of heterotrophic ossification due to radial head fracture that caused cubital tunnel syndrome.

Case Report

A 20-year-old male patient had a non-displaced left radial head fracture, which had been treated non-surgically 3 months before he presented to our clinical with elbow pain and numbness in his 4th and 5th fingers. The range of motion of the affected elbow was limited (30° flexion and 20° extension limitation). A solid, hard and immobile mass was identified with palpation on the medial epicondyle. Radiological assessment revealed a mass in the cubital tunnel (Figure 1). Electromyography (EMG) study confirmed the findings of the ulnar nerve entrapment. Prolonged distal motor latency and sensory conduction velocity decrease was detected. However, the two-point discrimination test was found normal before treatment.

We have observed that a large osseous lesion caused compression of the ulnar nerve in the cubital tunnel during surgery. The mass was excised under general anesthesia, and decompression of the ulnar nerve was performed without neurolysis (Figure 2). Closed manipulation was applied for the elbow joint stiffness.
and a full range of motion was obtained. Compressive elastic bandage was applied after the wound closed. Range of motion exercises were started at the 2nd day after surgery and physical therapy was performed throughout 20 days. Indomethacin was given orally three times a day in 25mg doses for 6 weeks after surgery. Ulnar nerve compression symptoms regressed at the early postoperative period. At the last examination, the range of motion of the elbow was full (Figure 3), and no clinical signs of compression of the ulnar nerve were seen. Clinical outcome was evaluated according to a modified Bishop scoring system [5]. An excellent functional result was obtained, and the patient’s satisfaction was excellent. Nerve distal motor latency was improved and the sensory nerve conduction velocity was increased.

Discussion

Cubital tunnel syndrome is a well-recognized condition [2], and the most common presenting symptoms include pain, paresthesia, weakness in the fifth finger and ulnar side of the fourth finger, and numbness in the dorsal ulnar aspect of the hand and fingers [6]. Chronic compression may lead to claw deformities of the fourth hand fifth fingers and to loss of grip [7].

Several points of potential compression exist along the course of the ulnar nerve at the elbow. These include the fascial arcade of Struthers, the medial intermuscular septum, the cubital tunnel, Osborne’s ligament, the two heads of the flexor carpi ulnaris, and the flexor pronator aponeurosis [1]. However, the presence of a
mass trapping the ulnar nerve in the cubital groove is extremely rare [8]. In the literature, ganglion cyst [9], synovial chondromatosis [10], giant cell tumor of the tendon sheath [3], and hemangioma [11] as causing compression of the ulnar nerve in the cubital tunnel have been reported.

It has been reported that there is a close correlation between elbow trauma and cubital tunnel syndrome in the literature [12]. Regional hemorrhages, edema, fibrosis or displacement of bone fracture fragments into the cubital tunnel may be caused cubital tunnel syndrome as a result of trauma [13]. High-risk injuries involving complex fracture or dislocation of the elbow should be carefully followed-up for the development of heterotopic ossification [14]. Heterotopic ossification can occur after neurologic disorders, burns, musculoskeletal trauma, and metabolic disorders [4]. If the cellular environment in the traumatized area is conducive to heterotopic ossification formation, mesenchymal stem cells are induced to differentiate into chondroblasts and osteoblasts that are localized into osteoid matrix deposit [15]. The osteoid matrix is subsequently mineralized and matures to become identical to heterotrophic bone [16].

Rates of HO formation range from up to 30% in elbow fracture-dislocations to 75-90% in cases of simultaneous elbow trauma and head injury [17]. Thompson and Garcia [18] reported that approximately 3% of their patients with elbow injury (fracture, dislocation, or both) developed HO. This variety of heterotopic ossification was related to the nature of the injury, and most olecranon and isolated radial head fractures complicated by heterotopic ossification had a less extensive ossification with limited clinical implications.

Foruria et al. [19] reported that heterotopic ossification was seen in 48 of 142 cases (37%) who underwent surgery for a broken elbow. Excision of heterotopic ossification was applied in 13 of the cases and in one case recurrence was developed. There were 8 isolated radial head fractures in their series and only 2 heterotopic ossifications were reported. None of these patients was given non-steroidal anti-inflammatory drug (NSAID) or radiotherapy (RT) in the postoperative period. The most common location was the posterior aspect of the ulna, and cubital tunnel placement was not seen in any case.

Nerve entrapment due to heterotopic ossification may be misdiagnosed, and it is difficult to evaluate and treat without recurrence [4]. Clinicians should be aware of this complication and the potential rapid nerve injury. If heterotopic ossification is causing clinically significant peripheral nerve entrapment, early surgical treatment may be indicated, and may be successful [4].

Yang et al. [20] reported eight cases of posttraumatic heterotrophic ossification with ulnar neuropathy and limitation of elbow motion, of which only one was due to radial neck fracture. Early surgery, adequate decompression, careful hemostasis and drain applications are important in reducing recurrence.

Prophylactic measures can be taken to prevent the formation of heterotrophic ossification at the elbow, including pharmacologic and radiation interventions. Prophylactic treatment is recommended for patients with a massive elbow injury or an elbow injury combined with one or more additional risk factors (neurologic injury, burns, a previous history of HO, etc.) [14,21]. There are two forms of prophylactic treatments currently available [14,22]. First, nonsteroidal anti-inflammatory drugs (NSAIDs) such as indomethacin are recommended, because they cause a reduction in prostaglandin production and inactivation of mesenchymal stem cells [22]. Second, low-dose radiation is recommended at a dosage of 600 cGy given within 72 hours of elbow trauma or elbow surgery, but should be given preoperatively on the day of surgery for elective procedures [14]. Prevention strategies of recurrence or current treatment for HO include various combinations of surgical, radio-therapeutic, psychiatric, and pharmacological regimens, but an appropriate standard of care for specific subsets of patients remains ill-defined [23]. The optimal time for resection is difficult to determine. Recent reports have documented good results with early intervention from 4 to 8 months after injury [21].

Standard surgical intervention is an indication for patients with neurovascular compression and with restricted range of elbow motion due to heterotrophic ossification [11]. A postoperative physical therapeutic program should be initiated as early as
possible and preferably should be started 24-72 hours after surgery [10,14].

The remaining options involve transposition of the ulnar nerve, in which the surgeon moves the nerve anteriorly. This requires complete freeing of the nerve, and some surgeons consider this unnecessary, as damage to the blood supply (the vasa vasorum) may lead to a secondary ischemic neuritis [2]. Simple decompression provides good or excellent results for postoperative relief of symptoms in most of the cases [24, 25]. Nabhan et al. [24] compared transposition of the ulnar nerve with simple decompression, and found no difference in outcome.

The results of revision surgery are often disappointing in cubital tunnel syndrome, particularly worse in patients over 50 years of age. Evidence of denervation in the preoperative electromyogram is a bad prognostic index [2].

As a result, heterotrophic ossification should be kept in mind as a cause of ulnar nerve entrapment after elbow trauma. Early diagnosis and surgical intervention are important in such cases before completion of the maturation phase. Total excision of HO and simple decompression of the ulnar nerve is sufficient treatment and use of oral indomethacin (75 mg / day) along with postoperative 6 weeks is sufficient to prevent recurrence.

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