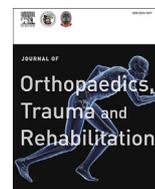




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Case Report

Post-traumatic Ossification of the Distal Radioulnar Joint 創傷後引起的遠端橈尺關節骨化



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ABSTRACT

A 41-year-old lady had a history of fall injury with her left hand landed outstretched. The initial radiographs showed no fracture. She complained of persistent wrist pain and stiffness. The subsequent follow-up radiographs showed progressive radio-opaque lesion over the volar aspect of the distal radioulnar joint. Surgical excision was performed and patient regained full wrist joint motion and grip power.

中文摘要

一個 41 歲的女士有跌倒並左手伸直著地的病歷。最初的 X 光片顯示沒有骨折。她抱怨持續的手腕疼痛和僵硬。隨訪的 X 光片顯示在遠端橈尺關節的掌側有一個白影不斷擴大。我們為病人進行手術切除，病人術後的全腕關節運動和握力都能完全恢復。

Introduction

Post-traumatic distal radioulnar joint (DRUJ) ossification is a troublesome condition; however, it has been rarely reported in the English literature. Ossification may cause limitations in wrist rotation and persistent wrist pain.

A middle-aged patient, who suffered from wrist injury on an outstretched hand, was found to have DRUJ ossification. Excision was performed, and the result was satisfactory.

Case Report

A 41-year-old Chinese woman presented with a minor history of slip-and-fall injury at her workplace, during which her left hand landed on the ground outstretched. She complained of wrist pain and swelling. On physical examination, there was a mild swelling of her left wrist both dorsally and volarly without any neurological symptoms such as median nerve palsy. Some limitations in wrist motion because of pain were noticed. The finger motion was normal. The initial X-rays showed no fracture or dislocation of the DRUJ. No abnormal calcification was seen. She was treated for wrist sprain by applying ice locally, a resting splint, and gentle active mobilization exercise.

During the subsequent follow-up in the out-patient clinic, she complained of persistent left wrist pain with increased stiffness of the wrist joint despite a course of physiotherapy and nonsteroid anti-inflammatory drugs. Physical examination showed a gradual increase in volar fullness of her wrist and a mild increase in temperature. The active and passive ranges of movement, including flexion/extension and supination/pronation over the left wrist, were impaired compared to the contralateral side. Only less than half of the motion range (including flexion/extension/rotation) could be obtained at 3 months post injury and was equally affected. The hand grip was also weak with 8 kgf in comparison to the right side (28 kgf). The serial radiographs at 2 weeks (Figure 1), 4 weeks (Figure 2), and 8 weeks (Figure 3) post injury revealed a progressive ossifying mass over the volar side of the DRUJ of the left wrist. It crossed over the volar and proximal area of the DRUJ. The mass seemed to be mature and ossified a around 12 weeks post injury. The ulnar head was displaced dorsally and ulnarly by the ossifying mass. The DRUJ was widened. Serum calcium and alkaline phosphatase levels were not elevated.

Owing to the limitation of wrist motion and impairment of function, surgical excision of the ossified mass was performed 5 months after the initial injury. Wrist arthroscopy was also performed and the findings were unremarkable. A 2-cm ossified mass was seen over the volar surface of the DRUJ without adhesion to the volar distal radioulnar ligament or surrounding muscles. Some fibrous tissue was attached the mass with the distal ulna. No direct bony union with the radius or ulna was noticed (Figure 4).

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Figure 1. The (A) anteroposterior and (B) lateral radiographs of the patient's left wrist at the 2nd week show no abnormality.

The ossifying mass was sent for histological analysis, which showed fibrous tissue with some mature lamellar bone. The patient had complete recovery of left wrist motion and function post-operatively. The wrist pain subsided. There was no recurrence at 2-year follow-up and no evidence of DRUJ instability (Figure 5).

Discussion

To the best of our knowledge, there is no report of post-traumatic DRUJ ossification in the English literature. In fact, it is also extremely rare that post-traumatic ossification occurs without a nearby fracture. Ilahi et al¹ published a series of reports on post-traumatic heterotopic ossification about the elbow, and they suggested that the fixation of the unstable elbow fractures within 48 hours of injury might reduce the formation of ectopic bone. Matsumoto et al² reported two cases of extensive post-traumatic ossification of the patellar tendon, and both cases needed surgery with patellar tendon reconstruction. Earwaker³ described eight cases of calcification over the annular ligament of the radius following the anterior dislocation of the head of radius. It was demonstrated as early as 2 weeks after the injury, which was frequently overlooked at initial examination and was often refractory to conservative management.

Calcium hydroxyapatite deposition predominantly affects soft tissues around the joints. Hydroxyapatite crystal is a common cause of periarticular disease. The pathologic findings of this entity include calcific material formed into psammoma-like bodies, together with exudates, including many neutrophil leukocytes. Electron



Figure 2. The (A) anteroposterior and (B) lateral radiographs of the patient's left wrist at the 4th week reveal a faint calcified lesion proximal to the distal radioulnar joint.



Figure 3. The (A) anteroposterior and (B) lateral radiographs of the patient's left wrist at the 8th week show maturity of the ossification mass, which displaces the ulnar head dorsally and ulnarly with the widening of the distal radioulnar joint.

microscopy showed that the calcific material was composed of hydroxyapatite crystals. The process of psammoma body formation is not fully understood. Gravanis et al⁴ postulated that it may be related to the inspissated secretion from hyperplastic synovial cells. The so-called type B synovial intimal cells with increased secretory activity may lead to psammoma body formation. Although any joint can be involved, the shoulder is by far the most commonly affected joint. Sometimes, it can resolve spontaneously like calcific supraspinatus tendonitis. Although most cases are idiopathic, trauma is believed to play an important role in a proportion of these cases. The diagnosis of periarticular ossifications relies on imaging techniques such as X-ray, computed tomography (CT) scanning, ultrasound, or magnetic resonance imaging (MRI). The treatment is mostly conservative, including analgesics or nonsteroidal anti-inflammatory drug, rest, ice therapy, elastic compression, and exercise. Intralesion steroid injection is often used. The surgical excision of the lesion may occasionally be considered in patients with chronic pain and severe impairment of function, particularly at the shoulder.

Doumas et al⁵ introduced the term “acute calcific peri-arthritis” (ACP) which is a distinct clinical subset of hydroxyapatite deposition diseases. The study suggested that up to a third of these cases may present with antecedent trauma, monoarticular pain, and swelling that tended to improve over 4–7 days with conservative treatment.⁵ Radiographically, most of periarticular mineralization usually resolves or markedly decreases within 2–3 weeks.

Karthik et al⁶ described a case of spontaneous resolution of post-traumatic calcification over the first metatarsal region and suggested that trauma would result in an acute inflammatory

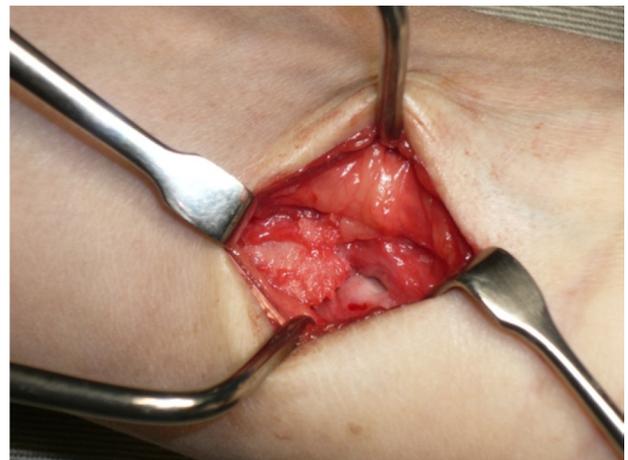


Figure 4. Intraoperative photograph shows a 2-cm ossifying mass over the volar aspect of the distal radioulnar joint (arrow).



Figure 5. The (A) anteroposterior and (B) lateral radiographs of the left wrist taken 2 years after the operation show no recurrence of the ossified mass and good alignment of the distal radioulnar joint.

reaction with hydroxyapatite deposition followed by resorption within a week as the inflammatory process subsided. Most of these cases would not undergo ossification with the formation of structural lamellar bones.

In our patient, some interesting observations were made: there was no spontaneous resorption of the calcified lesion, but it became ossified gradually. The normal alkaline phosphatase level is also uncommon in cases of post-traumatic heterogeneous ossification. The mechanical blockage of the wrist motion and displacement of the DRUJ were also unreported. The mechanism may be due to an acute traumatic event, which initiated the inflammatory reaction of the soft tissue around the joint. The deposition of calcium hydroxyapatite then followed as the inflammation set in. As the inflammatory process subsided, the ossification of the lesion took place. The formation of large ossifying mass, which displaced the ulnar head, had hindered all the active and passive ranges of wrist movement. As suggested by the literature for similar lesions in other regions, we adopted a conservative treatment with physiotherapy and nonsteroid anti-inflammatory drugs. However no evidence of resorption was observed. Since there are many important structures, including median and ulnar nerves in the region, and no literature comment on its

value in DRUJ ossification, we did not try steroid injection. The excision of this ossifying mass was finally performed for functional recovery, and the clinical result was satisfactory.

Kim et al⁷ reported that post-traumatic ossification frequently occurs in association with systemic diseases, such as thyroidism and diabetes mellitus. In our patient, the screening test for endocrinopathy was essentially negative.

Acute hydroxyapatite deposition disease may also simulate infection, and the associated periarticular calcifications may be mistaken for gout, pseudogout, or other entities.^{5,6} Most of these cases affect the upper limbs. Our case demonstrated the importance of bearing this differential diagnosis in mind while dealing with ill-defined ossifying mass over the wrist joint in the setting of the post-traumatic scenario. Most of these cases can be treated conservatively and closely followed up for progress. Serial imaging is very important to detect the evidence of resorption. When the lesion persists with delayed return to normal function, we may consider surgery for better functional outcomes.

Conflicts of interest

The authors declare that they have no financial or non-financial conflicts of interest related to the subject matter or materials discussed in the manuscript.

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