Case Report

Rare complication of open reduction and internal fixation of fracture distal radius
A case report of distal radioulnar synostosis

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A R T I C L E   I N F O
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A B S T R A C T

Case: A 57-years old man who sustained left distal radius fracture. We performed distal radius ORIF. At follow up visit, he could not achieve any supination-pronation movements. Radiographs showed radioulnar synostosis. Four months later, we performed excision of synostosis with interposition of fat graft in the left forearm. A year later, the patient showed good forearm pronation and supination.

Conclusion: This a rare case of radioulnar synostosis after ORIF distal radius fracture. Surgical intervention will help to improve the outcomes.

Distal radius fracture is very common among adults. Several surgical modalities, including external fixator, K-wires percutaneous fixation, bridging plate and ORIF can be used to fix distal radius fracture.

Various complications can occur following non-operative or operative treatments. These could be stiffness, nerve & tendon injury and infection.

Although, post-traumatic radioulnar synostosis is a rare complication after fractures of the forearm. The synostosis can occur anywhere along the forearm leading to loss of forearm rotation and functional impairment. It can occur after both nonsurgical and surgical treatment. Reports have estimated the incidence to be from 0 to 9.4% of patients after treatment of one or both bone fractures of the forearm with open reduction and internal fixation with plating [1].

Risk factors include a high degree of soft tissue injury, comminuted fractures, both bones at the same level, Monteggia fractures, surgical delay, traumatic brain injury, and prolonged immobilization with late rehabilitation [1]. There may be an association with open fractures; however, this could simply just reflect the degree of soft tissue injury. Surgery can also increase the likelihood of a synostosis. This is mostly due to surgical technique that causes disruption of the interosseous membrane, bone graft or hardware in the interosseous space, and iatrogenic trauma to the soft tissues [1].

An initial classification was proposed by Vince and Miller, who used the anatomic location of the synostosis along the length of the forearm (Fig. 1) [2].
Type I consisted of a synostosis within the distal intra-articular portion of the radius and ulna. Type II occurred in the middle third and type III in the proximal third of the forearm. This classification was later modified by Jupiter and Ring by sub-classifying the proximal third synostosis into different types. Type IIIA is at the level of or distal to the bicipital tuberosity and type IIIB is present at the radial head. Type IIIC is a continuation of heterotopic bone from the elbow or distal humerus. These classifications are useful to help guide surgical approaches [3].

In this case report, we present a patient with distal radial fractures who developed distal radioulnar synostosis.

Case report

A 57-year-old gentle man, who has background of Asthma, IDDM and essential hypertension, sustained a left distal radius fracture in January 2018 after fall on ice. Distal radius fracture was diagnosed based on radiographic findings (Fig. 2). The distal radius fracture was closed with motor-sensory examination findings were normal, and no head injury was evident. He was admitted for ORIF of distal radius of the left wrist. Operation was done with no acute post-op complications (Fig. 3).

The patient was followed up in the clinic at 6 and 12 weeks postoperatively. Initially, he achieved good wrist flexion and extension however at 12 weeks postoperatively, he developed limitations of the supination and pronation of the forearm. The radiographs demonstrated distal radial synostosis (Fig. 4) and the CT scan confirmed the radiographic findings (Fig. 5).

Because the patient could not achieve any range of motion with physiotherapy, senior hand surgeon decided to address the synostosis via surgical intervention to restore pronation-supination was considered.

Surgical technique

Volar approach was utilised to remove the plate and median nerve neurolysis. Dermal fat graft was harvested from the medial arm. Dorsal approach was utilised to excise the synostosis, release the interosseous ligament, posterior interosseous nerve was excised, and fat graft was inserted in between the radius and the ulna dorsally and volarly.

The supination and pronation were assessed intraoperatively and full range of motion was achieved. The patient was given an arm sling and started physiotherapy immediately to achieve full supination and pronation from day one.

The patient was seen in the clinic postoperatively for one year and achieved very satisfactory ROM of the wrist which could be described as full pronation and nearly full supination with less than 10 degrees deformity compared to the other wrist (Fig. 6). The radiographies showed satisfactory results (Fig. 7).
Fig. 2. Demonstrates AP and lateral radiographic views of left wrist.
Fig. 3. Shows AP and Lateral radiographic views 6 weeks postop.
Fig. 4. Shows AP view of distal radius synostosis 12 weeks postop.
(caption on next page)
Fig. 5. Shows CT scan findings.

Fig. 6. Photographs of the patient demonstrating the arc of movement.
Fig. 7. Shows follow up x ray after removal of the plate and excision of the synostosis.
Discussion

Post-traumatic synostosis can occur along the interosseous membrane in the forearm. Risk factors include a high degree of soft tissue injury, comminuted fractures, both bones at the same level, Monteggia fractures, surgical delay, traumatic brain injury, and prolonged immobilization with late rehabilitation. Garland et al. detected 18% synostosis among 50 patients with brain lesions and fractures of the forearm.

Bayram et al., fixed the distal radius fracture via external fixator and percutaneous K-wires. In their case report, they treated it surgically via ulnar osteotomy so the synostosis can be treated by the resection of the distal ulna as an alternative to the direct resection of the heterotopic bone [4].

In our case report, we performed fat graft interposition after excision of the synostosis combined with release of the interosseous ligament and median nerve neurolysis.

References

[1] A.L. Ostermn, S.A. Melissa, Optimal management of post-traumatic radioulnar synostosis, Orthop. Res. Rev. 9 (2017) 101–106.
[2] K.G. Vince, J.E. Miller, Cross-union complicating fracture of the forearm. Part II: children, J. Bone Joint Surg. Am. 69 (5) (1987) 654–661.
[3] J.B. Jupiter, D. Ring, Operative treatment of post-traumatic proximal radioulnar synostosis, J. Bone Joint Surg. Am. 80 (2) (1998) 248–257.
[4] S. Bayram, et al., Rare complication of distal radius and ulnar styloid fractures with percutaneous fixation, JBJS Case Connect 10 (2020), e0179.