

Radioulnar Synostosis Complicated a Complex Open Fracture of the Forearm in an Adult: A Case Report and Literature Review

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Abstract

Case Report

Introduction: Post-traumatic radioulnar synostosis is a rare complication with disabling consequences for prognostic function. Several factors predictive of its occurrence should be taken into account when managing a fracture of the two bones of the forearm. We report a case of radioulnar synostosis complicating a complex open fracture of both forearm bones. The aim is to identify factors favouring the occurrence of synostosis after osteosynthesis of the two bones of the forearm. **Case report:** A 55-year-old female patient with no significant medical history, presenting with a complex open fracture of both forearm bones treated with intramedullary nailing, with postoperative radiography showing several bone fragments filling the interosseous membrane opposite the fracture sites. During the procedure, she developed radioulnar synostosis with repercussions on pronosupination function, which required surgery. The surgical procedure was performed under right supraclavicular block. The lesion was approached via a posterolateral approach of the forearm, and exploration revealed a significant bone bridge between the ulna and radius. A large bone fragment was excised using osteotomes, followed by curettage of the bone resection edges. No fibrous tissue was interposed between the resection borders. At the 12-month follow-up, there was good recovery of pronosupination function with no recurrence on follow-up X-rays. **Conclusion:** Post-traumatic radioulnar synostosis remains a complication with serious consequences for forearm function. Complex fractures with fragments in the interosseous limb, before or after surgery, are a risk factor for synostosis.

Keywords: open fracture, radius, ulna, synostosis, osteosynthesis, postoperative complication.

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INTRODUCTION

Post-traumatic radioulnar synostosis is a rare complication. It has invalidating consequences on the pronosupination function of the forearm, thereby compromising activities of daily living [1,2].

Several factors predictive of the occurrence of radioulnar synostosis have been identified and must be carefully considered in the treatment of forearm fractures [3]. Although the indication is often surgical, consisting of resection of the bone bridge, with or without the interposition of fibrous tissue. There is no consensus on the therapeutic approach to managing this complication [2, 4, 5]. We report the case of radioulnar synostosis complicating a complex open fracture of both forearm bones in a 55-year-old female patient. The aim of this

study was to identify the factors leading to post-traumatic radioulnar synostosis of the forearm bones.

CASE PRESENTATION

A 55-year-old female patient, a tradeswoman by profession, with no particular medical history. She reported being the victim of a road accident that sustained open trauma to both bones of the right forearm, causing total functional impairment of the right upper limb. Clinically, there was a posterolateral wound in the middle third of the forearm with muscle damage and bone exposure. There was no vascular or nerve damage to the limb. The X-ray revealed a complex fracture of the middle third of both forearm bones, classified as 2R2B3 and 2U2B3 according to the AO classification (fig.1a).

The management consisted of debridement of the wound in the operating room and stabilization of the fractures by osteosynthesis of the radius and ulna using 20/10 Kirschner wires. Postoperative radiography

showed good alignment of the radius and ulna, as well as the presence of bone fragments filling the interosseous space around the fracture sites (fig.1b).

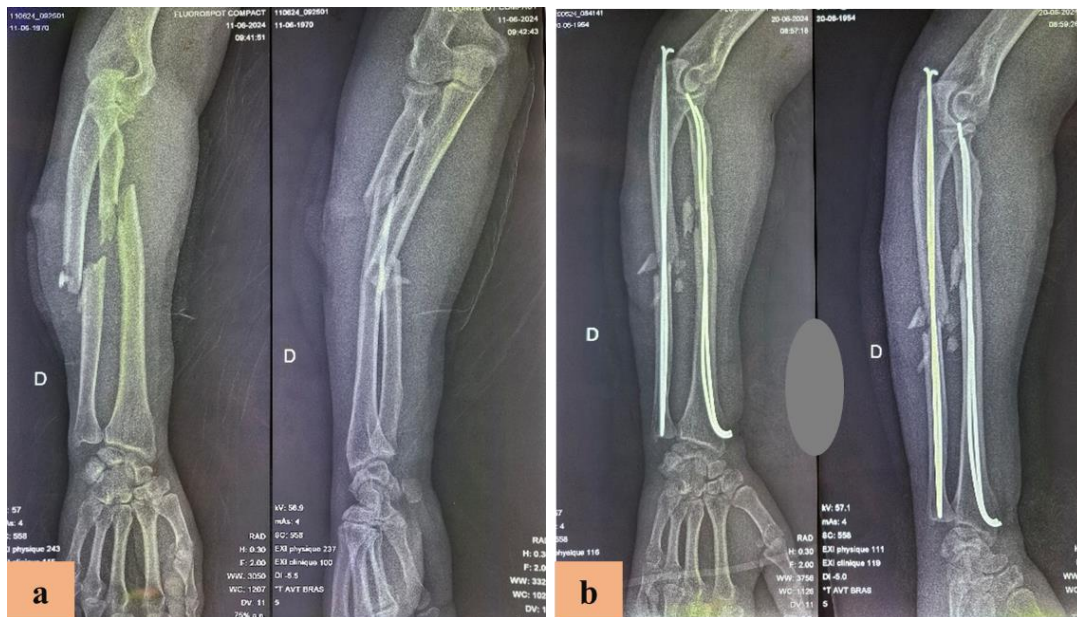


Figure 1: a. Complex fracture of both bones of the right forearm, involving the middle diaphysis of the radius and the proximal third of the ulna.
b. Presence of three fragments of bone in the interosseous space after debridement and osteosynthesis.

The 3-month postoperative follow-up showed good wound healing. Bone consolidation of the fractures and the formation of a radioulnar bone bridge developed from the free intermediate fragments omitted during surgery. The 9-month postoperative assessment, following physiotherapy sessions, noted that the patient

was unable to use her limb properly. The right forearm was painless, fixed in 10° supination with an inability to perform pronation movements and slight forearm muscle atrophy. Flexion and extension movements of the wrist, hand, and elbow remained normal. The X-ray showed type 2 radioulnar synostosis (fig.2).

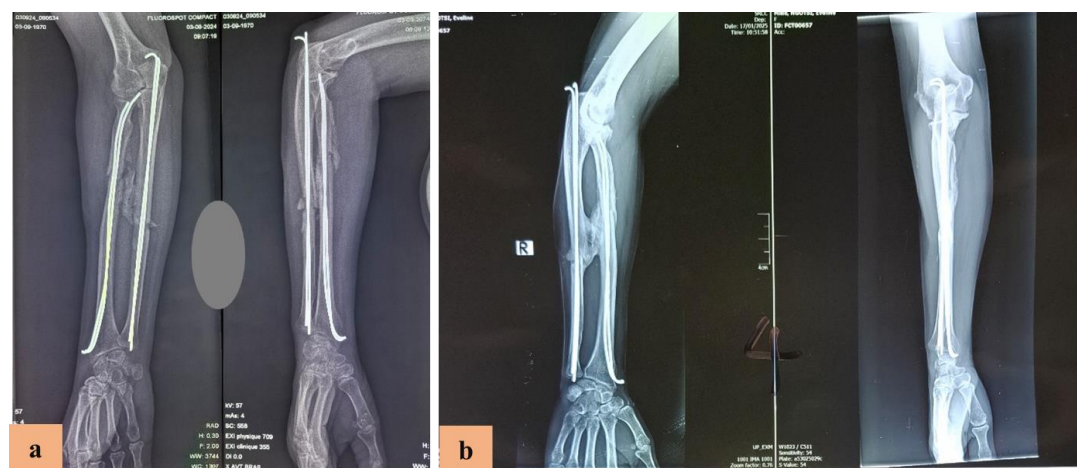
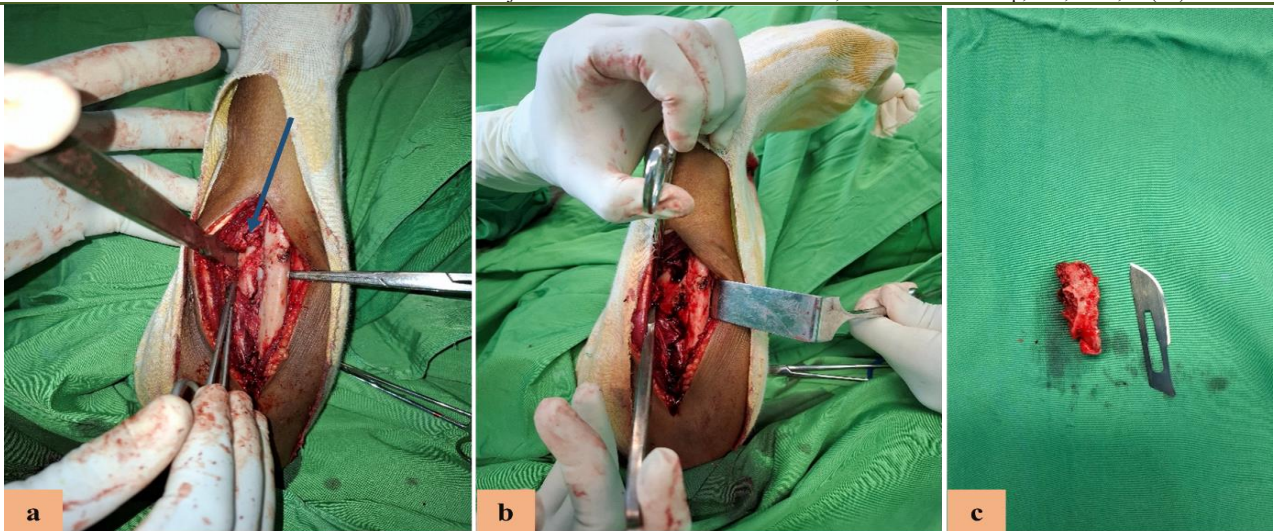


Figure 2: a. Beginning of bone bridge formation from intermediate fragments at 3 months postoperatively.
b. Presence of radioulnar synostosis formed at 9 months follow-up.

Considering the socio-professional repercussions, synostosectomy was indicated. The surgical procedure was performed under right supraclavicular block, with a pneumatic tourniquet at the root of the limb. The lesion was approached via a

posterolateral approach of the forearm, and exploration revealed a significant bone bridge between the ulna and radius. A large bone fragment was excised using osteotomes, followed by curettage of the bone resection edges (fig.3).



**Figure 3: a. Bone bridge and healing of radial and ulnar fractures identified;
b. Bone bridge removed with osteotomes;
c. Complete removal of bone formation from synostosis.**

No fibrous tissue was interposed between the resection borders. Postoperative X-rays showed a

complete absence of the bone bridge between the radius and ulna (fig.4).



**Figure 4: a. X-ray of the forearm at 3 months, showing no fusion between the radius and ulna.
b. No recurrence of the bone bridge at 9 months**

At the 12-month follow-up after bone resection, good recovery of pronation and supination ranges of motion was observed. There were no signs of bone reappearance in the radioulnar bridge that could indicate recurrence on the follow-up X-rays.

DISCUSSION

Radioulnar synostosis is characterized by the appearance of a bony or fibrous bridge between the two bones of the forearm. It is a disabling condition due to its impact on the prono-supination function of the forearm, which is essential for everyday activities. This condition follows trauma to the forearm, except in a few rare congenital cases described in the context of a polymalformative syndrome [6,7]. There are two types of factors that contribute to the occurrence of post-traumatic radioulnar synostosis: factors related to the fracture and factors related to treatment. Complex fractures located in the middle third of the two bones of the forearm, with bone fragments in the interosseous membrane of the forearm, have a high potential for synostosis to occur [3,8]. Distal radius fractures rarely complicate with synostosis, except when an external fixator has been applied [9,10]. In such situations, the pins of the external fixator are inserted over the radius, piercing the ulna and creating an iatrogenic bridge through which bone callus can form, leading to synostosis. Another treatment-related radioulnar synostosis may be observed in cases of damage to the interosseous membrane of the forearm or omission of bone fragments between the two adjacent bones [4]. In our patient, the complex character of the fractures, on the one hand, and the existence of bone fragments left around the interosseous membrane of the forearm after initial treatment on the other, were predictive factors in the occurrence of radioulnar synostosis.

Early management of synostosis, 9 months postoperatively, may explain the excellent postoperative results noted in our observation. It is reported in the literature that early resection of the radioulnar bone bridge, before the first year, is associated with better functional recovery and a lower risk of recurrence [1,2].

As regards the treatment of synostosis, some authors suggest, in addition to the removal of the bone bridge, the interposition of fibrous tissue, such as fascia, capsule, or ligament [3,11–13]. However, none of them has proven to be superior to simple resection without fibrous interposition. The therapeutic approach chosen for the management of synostosis in our patient provided good functional results and no recurrence. Apart from early postoperative mobilization through physiotherapy treatment, no other adjuvant treatment was administered. There are studies reporting adjuvant treatment, particularly with nonsteroidal anti-inflammatory drugs (indomethacin specifically) or low-dose ionizing radiation, in the postoperative management of heterotopic ossification of the hip [4,8]. We believe that

their use in radioulnar synostosis can enhance the positive results of surgical and physiotherapy treatments and further minimize the risk of recurrence. Several authors emphasize the role and advantages of adjuvant therapies such as the use of indomethacin or ionizing radiation in the prevention of heterotopic bone formation in the hip [2, 10, 14]. Unfortunately, the effectiveness of these treatments in preventing recurrence of radioulnar synostosis remains limited.

CONCLUSION

Post-traumatic radioulnar synostosis remains a rare complication in adults and has serious consequences due to its functional repercussions. Complex fractures of both forearms with free fragments in the interosseous membrane of the forearm, before or after surgery, are a factor that predisposes to the development of radioulnar synostosis. Early resection of the bone bridge, with or without adjuvant treatment, allows pronation and supination functions of the forearm to be restored in the vast majority of cases.

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Consent: Written informed consent was obtained from all patients for publication of this case report and accompanying images.

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