CASE REPORT

# ONE BONE FOREARM: A VALID OPTION FOR TREATING POST INFECTION BONE DEFICIENCIES

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Surgical fixation of radius to ulna has been described in the literature at various instances when deficiencies of either of the bones are encountered. The main concept of one bone forearm relies on an intact elbow and wrist articulations so a stable functioning limb can be achieved after union of radius to the ulna. This case report elaborates post infection loss of proximal ulna treated with fixation to radius.

**Keywords:** Forearm/surgery; Radius/abnormalities; Ulna/abnormalities; Osteomyelitis; Complications

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## INTRODUCTION

Forearm has been described as a ring[1] due to its complex articulations which allows it to perform its unique function of supination and pronation. Pathology of any of the two bones can lead to loss of this important function, and also cause instability and deformity at the elbow or wrist.

Bone loss of the radius or ulna can be encountered in variety of conditions such as congenital deficiency, post tumour resection, post infection treatment and traumatic loss.[2–4] The recommended treatment in such cases is autologous bone grafting with fixation in order to achieve maximum restoration of function and stability.[5] However there are circumstances where either there is so much bone deficiency that the defect cannot be reconstructed via grafting or one of the adjacent joint (mostly the elbow) is affected due to longstanding nature of the condition. In such cases, the creation of one bone forearm is a valid salvage option. It provides a stable and cosmetically acceptable extremity at the expense of mild limitation of function. The following case is also an example of one bone forearm created in post sequestrectomy bone loss.

## CASE REPORT

14-year-old boy presented to our clinic with deformity and loss of function of right arm. History revealed that he had suffered osteomyelitis of right ulna 8 years back which was treated by antibiotics and sequestrectomy. Examination concluded a varus and unstable elbow with resultant weak musculature and power. X-rays revealed that proximal shaft of the ulna was deficient though the olecranon and ulnohumeral joint was present and appeared normal (Figure-1a). The radial head was dislocated and its articular surface was non-congruent. On the basis of these findings the decision of constructing a single bone forearm was made. The radial head was resected along with its proximal part of the shaft. The distal shaft was then transferred to the ulnar compartment via an opening in the interosseous membrane and fixed to the proximal ulna via rush nail and a cerclage wire. Cancellous bone grafting was also done to ensure good healing (Figure-1b). Post operatively the extremity was immobilized with a long arm splint for 4 weeks. Union was achieved at 8 weeks (Figure-1c). Patient achieved a range of motion of 25–125° at the elbow with no varus or valgus instability (Figure-2). Power and grip strength returned to normal. Supination was complete but there was loss of pronation which was being compensated from the shoulder movements by the patient. The cosmetic appearance of the arm was restored to near normal. He visited the clinic on his 8 months follow up recently and was quite satisfied with the treatment.

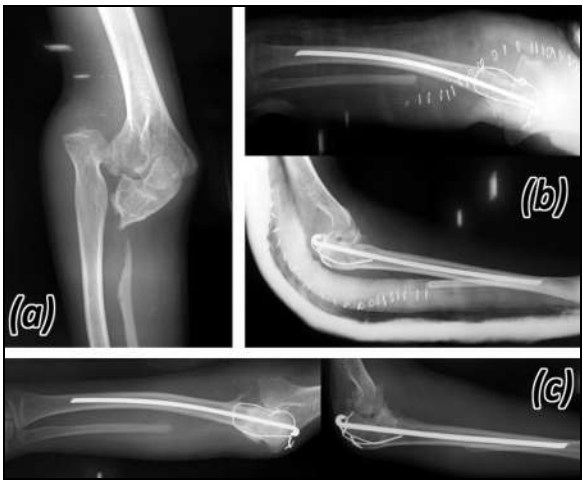


**Figure-1: (a) Pre-operative radiograph of the patient, (b) immediate post-operative x-rays, (c) X-rays at 8 weeks demonstrating radiological union**


**Figure-2: Clinical outcome of the case**

## DISCUSSION

Peterson has given the name "ulnius" to this unique procedure.[6] In his series he elaborated four cases in which one bone forearm was constructed either due to congenital deficiencies or post tumour resection. Peterson performed side to side fixation with screws in all cases whereas end to end stabilization with plates[7], and intramedullary nails[4,8] have been frequently described in the literature. The principal requirement for this procedure is an intact proximal ulna along with its humero-ulnar articulation, a normal distal radius with functioning radio-carpal joint and intact distal radial physis to ensure adequate longitudinal growth.[2] This provides a stable and growing forearm with a good range of elbow flexion and extension but loss of supination and pronation. Involvement of bone either via bloodstream (Haematogenous route) or via direct inoculation through an open traumatic wound, chronic osteomyelitis is still a large health burden in the developing countries.[9] The post treatment bone defects encountered are often large and are result of either extensive involvement or injudicious large sequestrectomies.[10] Rasool M proposed that these defects can either be treated by replacement grafting, vascularised grafting, bone lengthening procedures or by fusion of radius to ulna thus creating a one bone forearm.[4] Since in our case the radio-capitellar joint was affected by the longstanding nature of the disease, fixation and bone grafting was not an option. There has been ample number of cases reported in the literature where one bone forearm has provided satisfactory results in young individuals because children tolerate the loss of supination and pronation significantly well by compensating these movements through internal and external rotation of shoulder. Another reason for preference over grafting is also due to the important fact that one bone forearm continues to provide longitudinal growth. This salvage procedure has mostly been described in the developing nations as there is lack of facilities, limited financial resources yielding lengthening procedures burdensome, and possible loss of follow up. Distal radial physis is the major contributor of the bone growth in this regard and chiefly it was preserved and functioning in our case as well as other cases available in literature. However, case described by Haque IU had absence of distal radius due to previous sequestrectomy and the wrist was reconstructed by centralization of ulna over carpus along with proximal row carpectomy.[10]

## CONCLUSION

One bone forearm provides a stable upper limb with a good range of motion in younger patients. However, it must be considered only as a salvage procedure if other methods of treatment are not applicable.

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