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**Case Report**

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# Single staged rotational osteotomy for congenital radioulnar synostosis: a case report

**Sushant Nadkarni*, A. A. Hosangadi, Vinay Pawar**

Department Of Orthopaedics, Karnataka Medical College and Research Institute, Hubli, Karnataka, India

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***Correspondence:**
Dr. Sushant Nadkarni,
E-mail: sushantnadkarni22@gmail.com



## ABSTRACT

Congenital radioulnar synostosis is a rare congenital anomaly characterized by a failure of segmentation between the proximal radius and ulna during embryonic development, leading to restricted forearm rotation. The condition is often bilateral and may be associated with syndromic disorders. Management varies depending on severity, ranging from observation and physiotherapy to surgical correction. A six-year-old boy presented with bilateral limitation of forearm rotation interfering with daily activities. The right forearm was fixed in 60° pronation and the left in 20° pronation. Radiographs confirmed osseous fusion between the proximal radius and ulna without radial head dislocation, consistent with Cleary and Omer type II congenital radioulnar synostosis. A single-stage rotational osteotomy of the radius and ulna was performed on the right side under general anesthesia. The osteotomies were created distal to the synostosis, and the forearm was rotated to achieve 20-30° of supination without internal fixation. The limb was immobilized in an above-elbow cast for five weeks. Postoperative recovery was uneventful, and at four months, the patient demonstrated union at the osteotomy sites with significant improvement in functional activities such as feeding and self-care. Surgical correction is indicated in cases with significant functional limitation. Performing the osteotomy distal to the synostosis reduces the risk of neurovascular injury. The single-stage rotational osteotomy provided satisfactory correction and improved forearm function without complications. This case highlights the effectiveness and safety of distal single-stage rotational osteotomy in managing congenital radioulnar synostosis in children.

**Keywords:** Congenital, Radioulnar synostosis, Osteotomy, Single staged

## INTRODUCTION

Congenital radioulnar synostosis is a rare deformity of the proximal forearm characterized by a failure of segmentation between the proximal radius and ulna, which normally occurs around seventh week of embryonic development. The condition was first described by Sandifort in 1793.[1,2] It is marked by a limitation of forearm rotational movements, which can significantly affect activities of daily living in severe cases. The deformity is bilateral in approximately 60-80% of cases and exhibits a familial inheritance pattern in about 20%.[3] Congenital radioulnar synostosis may also be associated with syndromes such as arthrogryposis multiplex congenita, Apert syndrome, and Klinefelter's syndrome.

Various treatment modalities have been described, ranging from observation with physiotherapy to excision of the synostosis with interposition graft placement, rotational osteotomy, and the use of external fixators.[4-8] We report a case of a six-year-old boy with congenital radioulnar synostosis who was successfully managed with a single-stage rotational osteotomy of the radius and ulna.

## CASE REPORT

A six-year-old boy was brought to the outpatient department of Karnataka Medical College and Research Institute with the chief complaint of limited forearm movements interfering with activities of daily living. There was no history of trauma or other associated

anomalies. The prenatal, natal, and postnatal periods were uneventful. On physical examination, the right forearm was fixed in 60° of pronation, with further pronation possible up to 90° (Figure 1). The left forearm was fixed in 20° of pronation, with additional pronation possible up to 90°. Examination of the shoulder, elbow and wrist joints revealed no abnormalities, and the range of motion at these joints was normal. Distal neurovascular examination findings were normal. Functional assessment was performed using the Jebsen-Taylor Hand Function Test which includes seven components: writing, turning cards, picking up small objects, simulated feeding, stacking checkers, picking up large light objects, and picking up large heavy objects (Figure 2). Radiographic evaluation demonstrated osseous fusion between the proximal radius and ulna without radial head dislocation, consistent with Cleary and Omer Type II congenital radioulnar synostosis. After routine preoperative investigations and obtaining surgical fitness, the patient was scheduled for a single-stage rotational osteotomy on the right side.

The patient was placed in the supine position with the arm abducted to 90°. Under general anesthesia, the limb was prepared and draped in a sterile manner; no tourniquet was applied. Using C-arm guidance, a 2-cm posterior incision was made over the ulna distal to the level of the synostosis, and the periosteum was reflected. An ulnar osteotomy was performed approximately 1 cm distal to the synostosis using an oscillating saw. A similar osteotomy was made at the distal radial diaphyseal-metaphyseal junction through a 2-cm dorsal incision (Figure 3). The forearm was then rotated to achieve 20-30° of supination. No implants were used for fixation of the osteotomy sites. The wounds were closed with the fascia left open. Distal vascular status was reassessed and found to be normal. A sterile dressing and cotton pad roll were applied, followed by an above-elbow cast with the elbow flexed at 90° and the forearm maintained in 20-30° of supination.

Postoperatively, the limb was kept elevated, and active finger movements were encouraged. The patient was closely monitored for signs of compartment syndrome. Wound inspection was performed through a window created in the cast. The postoperative period was uneventful, and the patient was discharged on the fourth postoperative day. Radiological assessment was done to confirm union at the osteotomy site and the cast was maintained for five weeks. At four months follow-up (Figure 4), the child demonstrated significant functional improvement in activities of daily living such as feeding, holding plates and cups, accepting small objects on an open palm, and combing hair. These improvements were attributed to the increased forearm supination of the 20-30°.

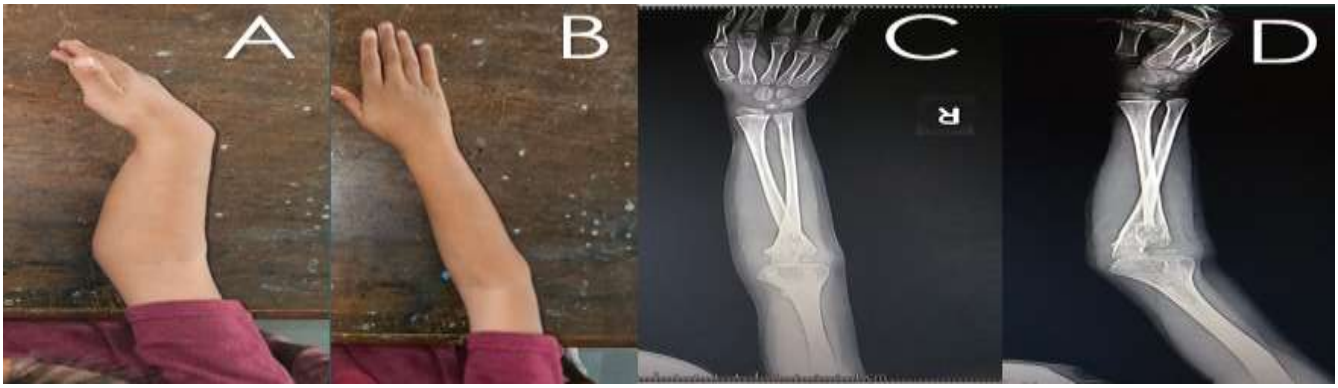


**Figure 1 (A-D): A-restriction of supination. B-pronation possible upto 90°. C and D-preoperative radiograph showing osseous fusion between proximal radius and ulna.**


**Figure 2 (A-G): Illustrating Jebson-Taylor hand function test. A-picking up light object. B-stacking. C-writing. D-simulated feeding. E-pouring water. F-turning cards. G-picking up large heavy objects (shoulder and elbow compensation).**

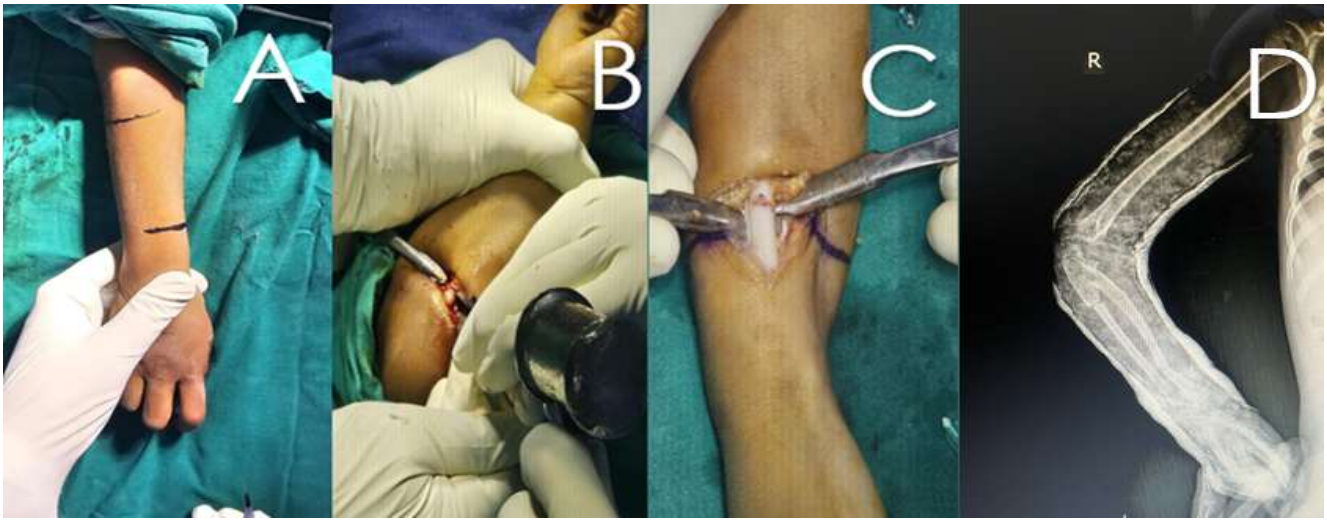


**Figure 3 (A-D): Illustrating surgical procedure. A-marking of osteotomy site under C-arm. B-osteotomy of proximal ulna distal to the synostosis level. C-osteotomy at diaphyseal-metaphyseal junction of the distal radius. D-Postoperative radiograph showing osteotomy of proximal ulna and distal radius.**


**Figure 4 (A-C): Follow up at 4 months showing A-functional improvement in the form of simulated feeding. B-after surgery of the right side, with compensatory movements at the shoulder and wrist, almost full supination was possible compared to left side [ non operated]. C-radiograph showing new bone formation at the osteotomy site.**

## DISCUSSION

Radioulnar synostosis may be either congenital or post-traumatic. Post-traumatic radioulnar synostosis can occur at any level of the forearm, depending on the site of injury. In contrast, congenital radioulnar synostosis involves varying degrees of fusion between the proximal radius and ulna, with or without involvement of the radial head. It may occur in isolation or in association with other skeletal abnormalities such as developmental dysplasia of the hip, knee anomalies, clubfoot, polydactyly, syndactyly, Madelung deformity, ligamentous laxity, thumb hypoplasia, and tarsal coalition. In the present case, no associated anomalies were identified. The Cleary and Omer classification is widely used to categorize congenital radioulnar synostosis based on radiographic findings.[11] Type I, Fibrous union between the radius and ulna; type II, Osseous union with the radial head reduced; type III, Osseous union with a hypoplastic and posteriorly dislocated radial head; type IV, Osseous union with an anteriorly dislocated, mushroom-shaped radial head.

In mild cases, the limitation of forearm rotation can be compensated by shoulder and elbow movements, allowing conservative management. However, as deformity progresses, functional impairment-particularly difficulty in feeding and maintaining perineal hygiene often necessitates surgical correction.[7] Historically, excision of the synostosis with interposition of soft tissue grafts has been attempted to prevent recurrence. However, this approach carries a higher risk of neurovascular injury and soft-tissue complications due to extensive surgical

exposure. Various osteotomy techniques have been described at different levels of the radius and ulna. Osteotomies performed at or proximal to the synostosis level, as described by Cleary et al, Simmons et al and Hankin et al were associated with a higher incidence of posterior interosseous nerve injury.[11-13] In our case, the osteotomy was performed distal to the synostosis as described by Shingade et al and no neurovascular complications were observed. Similar outcomes were reported with two-stage double-level rotational osteotomy by El-Adl et al.[7,14] The single-stage procedure used in our case yielded comparable results to these more complex two-stage method.

## CONCLUSION

Single-stage rotational osteotomy of the radius and ulna is a simple, safe, and effective procedure for the management of congenital radioulnar synostosis in children with functional impairment. Positioning the forearm in a functional range of supination resulted in significant improvement in activities of daily living without neurovascular complications. This technique offers a reliable alternative to more extensive or staged procedures in appropriately selected cases.

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