

Suspensory Fixation of Proximal and Distal Radioulnar Joints in the Treatment of Congenital Ulnar Pseudarthrosis

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INTRODUCTION: Suspensory fixation has become widely accepted as an alternative to rigid fixation for a variety of applications, including the treatment of Galeazzi type fractures for reapproximation of the distal radioulnar joint (DRUJ). We describe a novel application of suspensory fixation for stabilizing the proximal and distal radioulnar joints (PRUJ and DRUJ) in a pediatric patient with Neurofibromatosis Type 1 (NF1), and congenital ulnar pseudarthrosis with progressive radioulnar instability. The theoretical advantage of suspensory fixation over rigid fixation is that suspensory fixation allows for forearm rotation range of motion without the need for hardware removal.

METHODS: A 36 month old female with NF1 presented with progressive deformity of the left upper extremity, and x-rays demonstrated congenital ulnar pseudarthrosis. Surveillance x-rays demonstrated progressive growth of the radius, with accentuated radial bowing, and disproportionately slow growth of the ulna, leading to proximal radioulnar instability and eventual anterior dislocation of the radial head (Figure 1). Treatment included vascularized osteocutaneous fibular grafting to the distal ulna after pseudarthrosis takedown, and temporary pinning of the PRUJ and DRUJ (Figure 2). She was casted in a long arm cast for 6 weeks postoperatively. The patient healed her graft radiographically and clinically, but 4 months postoperatively she developed progressive instability for the radiocapitellar joint requiring revision (Figure 3). Revision surgery included biplanar radial shortening osteotomy with guided growth of the distal radius, closed reduction of the radiocapitellar joint, non-vascularized fibular epiphyseal transfer to the distal ulna, and suspensory fixation of the PRUJ and DRUJ (Figure 4). The fibular transfer was non-vascularized due to concern regarding potential steal from the radial artery anastomosis from previous vascularized fibular grafting. The patient was casting in a long arm cast for 6 weeks following the procedure to allow the fibular epiphyseal graft to heal. She has been followed for 9 months postoperatively, and has participated in physical therapy for range of motion at the forearm, wrist, and elbow, and has been using Muenster style brace to maintain alignment.

RESULTS: Following the initial surgery in which the DRUJ and PRUJ were pinned, the patient had pins removed at 6 weeks postoperatively. Her motion was restored temporarily, but over several months her radial head dislocated anteriorly again, and she developed worsening of her radial bowing. This necessitated revision surgery with fibular epiphyseal transfer to the distal ulna, and we employed suspensory fixation of the PRUJ and DRUJ. She recovered uneventfully after surgery. The patient healed her vascularized and nonvascularized fibular grafts with obvious periosteal new bone formation on x-ray and no evidence of osteonecrosis. Interestingly, she regenerated her Left proximal fibular epiphysis spontaneously. Her PRUJ and DRUJ remain reduced on latest follow up of 9 months with mild anterior subluxation, stable over several months (Figure 5). She has normalized her range of motion at the elbow and wrist, and maintains a 40 degree arc of pronation and supination motion. She will require removal of her epiphyseal distal radius screw after adequate radial bow deformity has been ameliorated.

DISCUSSION AND CONCLUSION: This case describes a novel application of suspensory fixation for stabilization of the DRUJ and PRUJ in the treatment of congenital pseudarthrosis of the ulna in a child with NF1. Suspensory fixation was used to accomplish the goal of creating and maintaining the relationship between the radius and ulna, distally and proximally, to allow for forearm rotation, and to promote normal alignment at the wrist without ulnar deviation in a skeletally immature patient with significant growth remaining. Our follow up is currently 9 months, though the patient will require follow up until skeletal maturity. The single case report limits generalization of our results, however we feel that this is an important technique which has the potential to be helpful in maintaining stability of the wrist and elbow in pediatric patients with congenital ulnar pseudarthrosis.

