

Recurrent anterior dislocation of radial head treated with ulnar distraction osteotomy and reconstruction of annular ligament using palmaris longus tendon with bioabsorbable screw anchoring: A case report

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Abstract

Introduction: Radial head dislocation in children may be either congenital, an isolated injury or more commonly part of a complex injury to the elbow. Isolated traumatic radial head dislocation in children is a rare and easily missed condition. The reported case shows various treatment and intervention with ulnar osteotomy and annular ligament reconstruction in order to reach the definitive reduction of recurrent dislocation of radial head. **Case Presentation:** Male 9 years old with anterior dislocation of the radial head, came with difficulty on flexing his elbow due to bony prominence on his anterior elbow. He had recurrent radial head dislocation with redundant annular ligament. From the physical examination there was a prominent radial head on anterior region of elbow. From x-ray examination we found anterior dislocation of ulnar head without any fracture or deformity of ulna. Patient underwent ulnar distraction osteotomy to achieve radial traction and allow stable reduction of radial head. After 5 months he had reconstruction of annular ligament with palmaris longus tendon graft and anchoring with bioabsorbable screw in order to reduce and stabilize the radial head. **Conclusion:** In this case we found ulnar osteotomy may gave improvement for the reduction of the radial head. But additional annular ligament reconstruction give stability of the radial head which will held in place with full range of motion of the elbow. So this combined procedures hopefully can gave best achievement and satisfactory results of the children and last a lifetime.

Keywords: radial head dislocation, ulnar osteotomy, annular ligament repair

Introduction

Isolated dislocation of the radial head is an uncommon injury in children. In most of the cases, it is associated with an ulnar fracture or deformation as a part of the spectrum of Monteggia lesions.² Radial head dislocations are easily missed on radiographs and, therefore, require a high index of suspicion. Undiagnosed chronic radial dislocations can result in poor outcomes with limited function and chronic pain. Elbow joint stability depends upon joint congruity and reduction of the radial head is very important for normal elbow function.¹

Dislocation of the head of the radius in children may be either congenital, an isolated injury or more commonly part of a complex injury to the elbow such as the Monteggia fracture dislocation.^{1,6} It may also sometimes be compatible with useful function, but as the child continues to grow, the carrying angle increases and the radial head becomes deformed.⁶ Isolated dislocation of the radial head in children is frequently described as part of a congenital dislocation.⁴ Often, anterior radiocapitellar dislocations may occur as the result of combined axial, torsional, and/or extension forces, and associated injury such as

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fracture, ulno-humeral dislocation, and ligamentous disruption.⁷ Isolated traumatic radial head dislocation without associated injuries in children is a rare and easily missed condition.^{1,5}

A complete dislocation of the radial head can't occur without complete rupture of the annular ligament, which is the main factor in the stability of the proximal radioulnar joint. The other ligaments structures like interosseous membrane, the square ligament and the oblique cord have a secondary role in the stability of the elbow. Three types of isolated luxation are described: posterior, anterior and lateral. Anterior dislocation is the most common form.⁴

Restoration and maintaining the length and alignment of the ulna by closed reduction or surgery usually results in stable reduction of the radiocapitellar joint. However, missing or delayed recognition of radial head dislocation is the most common (16% - 50%) and resulting in a far more complex injury with often unpredictable surgical outcome. Unreduced dislocation of the radiocapitellar joint that is still present more than four weeks after the injury is considered chronic.²

Treatment of chronic radial head dislocation is much more complicated and challenging. Treatment options and the proposed surgical procedures are multiple and variable. They have included no treatment, resection of the radial head at the end of the growth, open reduction with or without transcapsular pinning, annular ligament repair or reconstruction, osteotomy of the ulna or the radius, or both, combined ulnar osteotomy and ligament reconstruction, gradual lengthening of the ulna etc.²

In this case report we present the clinical outcomes after treatment of recurrent dislocated radial head in children by ulnar distraction osteotomy and reconstruction of annular ligament using palmaris longus tendon with bio absorbable screw anchoring.

Case Report

A 9 years old boy came with complain of difficulty in flexing his elbow due to the prominence of the radial head on his anterior elbow. His parents was concerned with he recurrent dislocation of the elbow. He also had history of difficult pervaginam delivery by a midwife. The parents also noticed that the right arm was relatively inactive compared to the left arm (Figure 1).

This condition suggesting a birth injury of traction force with same mechanism as pulled elbow. This injury was thought to be corelated with the radial head dislocation. On physical examination there was a prominent radial head on the anterior side of the elbow that easily palpated and reduced in supination. The neurovascular status of the distal portion was within normal limit. There were no deficits in the ranges of motion of the elbow and forearm. No general joint laxity was found. Radiographic examination revealed that he had isolated anterior dislocation of radial head. There was no deformity of the radius and ulna (Figure 2).

A tourniquet was applied and the arm was positioned on an arm table. Kocher's approach was used to expose both the radiocapitellar joint and the proximal third of the ulna with the same incision. On operation it was observed that there was redundant annular ligament (Figure 3).

A subperiosteal transverse osteotomy of the ulna was performed 3 cm distal of the olecranon to achieve radial traction on purpose to reduce the radial head. And we made temporary fixation of the radial head with transcapsular wire pinning (Figure 4).

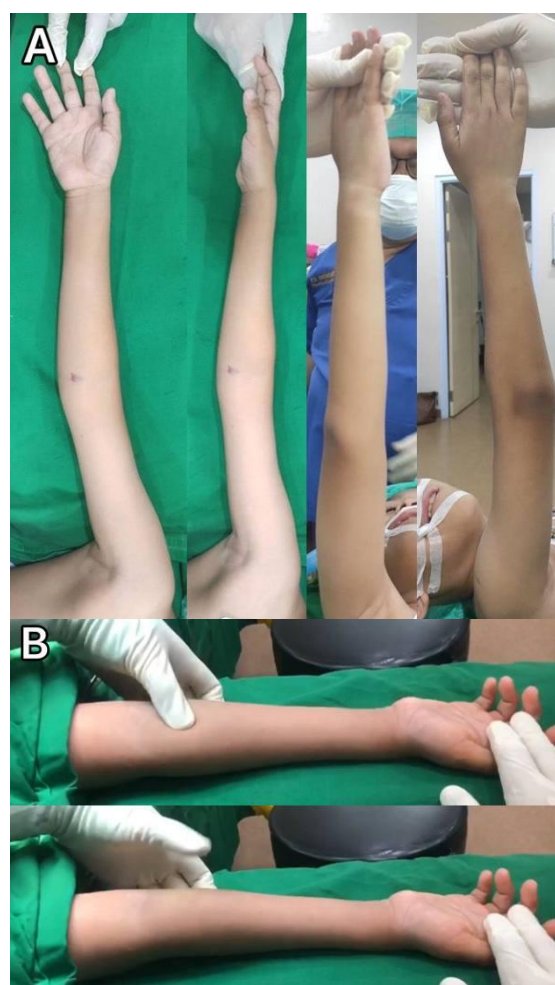


Figure.1 Physical examination of the left arm; (A) Slight bony prominence of radial head on anterior portion of the elbow; (B) Radial head that easily palpated and reducible



Figure 2. Radiographic examination revealed anterior dislocation of radial head



Figure 3. Clinical view on operation shows dislocatable radial head (white arrow)

The reduction was performed under image intensifier to confirmed the position of the radial head, we made about 2mm distraction of the ulna to achieve radial traction and applied one-third tubular plate fixation on the ulna (Figure 5).

Approximately within five month the patient had recurrent dislocation of the radial head, so we planned to do the permanent fixation of the radial head using graft that could replace the role of annular ligament as stabilizer, on this case we took the palmaris longus tendon as allograft that anchored with absorbable bio-screw.

We harvested the palmaris longus tendon from the ipsilateral forearm. A bony tunnel was created with a 3.5mm cannulated drill at the radial aspect of the proximal ulna, and the loop was advanced through the tunnel (Figure 6).

The graft complex composed of the autograft tendon were shuttled through the loop. After completing double-bundled reconstruction of the annular ligament, the graft complex was fixed to the tunnel using a bio-absorbable screw (3.5mm) (Figure 7).

We examine the radial head post reconstruction, found in stable position in full range of motion of elbow.

Approximately 5 months after last operation, the wound had fully healed, patient was able to full range of motion and has returned to activity. During this case we found that reduction of radial head was well stable and did not interfere the range of motion of the elbow.

Discussion

Undiagnosed chronic radial dislocations can result in poor outcomes with limited function and chronic pain. Elbow joint stability depends upon joint congruity and reduction of the radial head is very important for normal elbow function. Patients with radial head dislocation often have minimal pain and

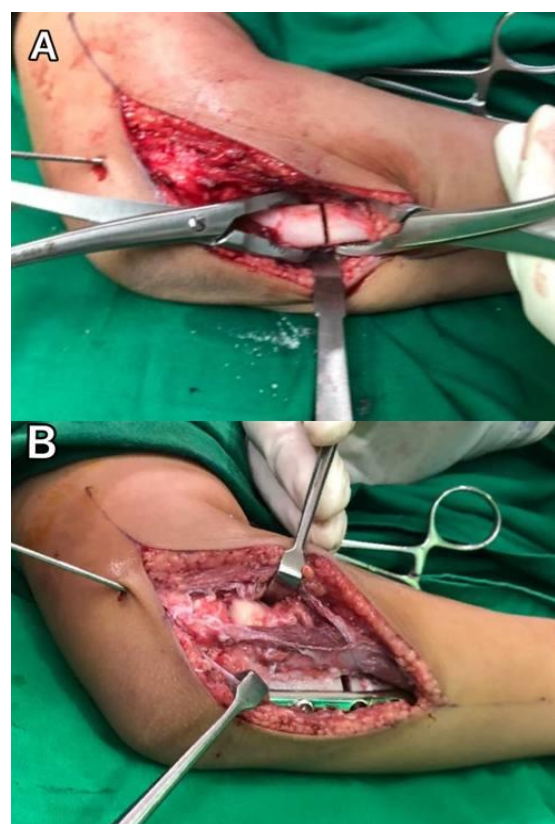


Figure 4. Radial head was reduced and fixated with wire pinning, distraction osteotomy of the proximal shaft ulna was performed (A); Ulna was fixated with one-third tubular plate fixation (B)



Figure 5. Post-operative radiograph shows radial head was held in place with k-wire fixation and plate and screw fixation was applied on ulnar shaft



Figure 6. Palmaris Longus graft was taken from ipsilateral forearm to replace the function of annular ligament

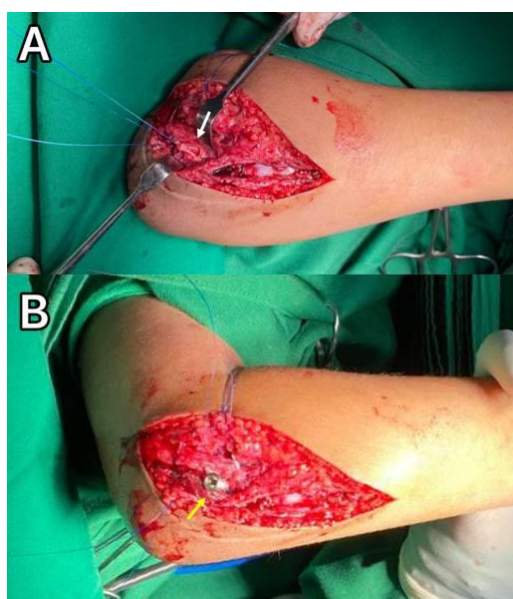


Figure 7. The autograft tendon were shuttled through the loop of proximal ulna (white arrow) (A); Bio-absorbable screw was fixed the graft complex (yellow arrow) (B)



Figure 8. Post-operative, the radial head was in stable position and not palpated on examination of anterior elbow

reasonable function, but are affected by increasing deformity and decreasing range of motion, eventually necessitating treatment.¹

Treatment options and the proposed surgical procedures are multiple and variable.² Subluxation and dislocation of the radial head is associated with bone dysplasias in which the ulna is disproportionately shortened. It usually causes little disability, but if it becomes too troublesome the radial head can be excised after all growth has ceased.⁵ Principles of surgical reconstruction include correction of the ulnar deformity with an ulnar osteotomy and annular ligament reconstruction. The ulnar osteotomy should be stabilized in the position of maximal stability of the radio-capitellar joint.⁶ As in this case, we performed distraction osteotomy of ulna with annular ligament reconstruction. We choose palmaris longus tendon graft as suitable replacement of annular ligament.

A similar case was reported by Kosev et al, they review 4 children with chronic radial head dislocation. The surgical strategy in all patients included proximal ulnar osteotomy with angulation and distraction and open reduction of the dislocated radial head without annular ligament reconstruction or pinning. Osteotomy was fixed with a prebent one-third tubular plate and a tricortical bone graft. Radial head remained reduced and stable in all cases. The postoperative range of motion was improved in all of the patients.² In this case we also performed ulnar osteotomy and with recurrent of radial head dislocation we decided to performed annular ligament reconstruction for stability of the radial head reduction.

Gupta et al treated similar case, with isolated post-traumatic radial head dislocation. A 7-year-old male child fell on the outstretched left hand. Six weeks after the injury, this patient was referred for persistent pain and restricted movement in the left elbow. Closed reduction was not successful in this 6-week-old neglected dislocation. Open reduction under general anaesthesia was planned without further delay. Meniscus-shaped scar tissue around the radio-humeral and proximal radio-ulnar joints was completely excised to facilitate repositioning of the radial head using direct digital pressure. They dissected a 6-7 cm strip of the lateral border of triceps aponeurosis distally, carefully elevating the periosteum from the proximal ulna down to the level of the radial neck, taking care to preserve its attachment to the olecranon. The strip of tendon was then passed around the radial neck, brought back and sutured to itself to reconstruct the annular ligament using a modification of the Bell-Tawse technique. At the one-year follow up, the patient had returned to most normal activities, showing only slight terminal restriction of pronation.¹

A similar treatment was performed in recurrent radial head dislocation in 13-years old girl from Japan. We adapted our annular ligament reconstruction from Hatta et al. Surgical treatment was performed under a diagnosis of recurrent radial head dislocation due to insufficiency of the lateral collateral ligament complex. They harvested the plantaris tendon from the ipsilateral leg. They decided to harvest the tendon because the palmaris longus tendon had been found to be of insufficient width and length for grafting according to preoperative sonographic examination. At a 12-month follow-up examination, the patient had no pain or elbow limitation. The patient successfully returned to sports.³

In this case, we adopted a surgical technique for ligament reconstruction. At first we considered this radial head will held in place with ulnar distraction osteotomy without any reconstruction of annular ligament. But a few month after the operation, clinically the recurrent dislocation of the radial head necessitate the reconstruction of annular ligament for additional stability.

Conclusion

Some conditions gave variable options for isolated dislocation of the radial head based on the pattern. In this case we found ulnar osteotomy may gave improvement for the reduction of the radial head. But annular ligament reconstruction give stability of the radial head which will held in place with full range of motion of the elbow. So this combined procedures hopefully can gave best achievement and satisfactory results of the children and last a lifetime.

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