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Anterior transolecranon fracture dislocation with an associated avulsion fracture of coronoid process of ulna in a child: a case report

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An anterior elbow dislocation is relatively uncommon compared with posterior dislocation and is mostly associated with a transolecranon fracture dislocation. Although anterior transolecranon fracture dislocations are well recognized in adults,¹³ they have been reported in only a small series of children.⁸ To our knowledge, only 11 cases of transolecranon fracture variants have been reported in literature.^{2,3,8,13,15,17} Transolecranon fracture dislocation resembles an anterior Monteggia lesion because the radial head dislocates anterior to the capitellum. However, the proximal radioulnar joint remains aligned and intact in transolecranon fracture dislocations, which differ from Monteggia-type fracture dislocations.⁸

In this case report, we report a child diagnosed with an anterior transolecranon fracture dislocation with an associated avulsion fracture of the coronoid process of the ulna. Unlike the 11 previously reported cases, this report contains the first case with an associated avulsion fracture of the coronoid process.

A 7-year-old boy fell from a height of 2 meters and was admitted to the emergency department with pain, swelling, and deformity in the right elbow. While the right elbow's range of motion was

restricted due to pain, the patient presented no neurovascular disorders. Plane X-ray and computed tomography scan showed an anterior and lateral transolecranon fracture dislocation with an avulsion fracture of the coracoid process (Figs. 1 and 2). Computed tomography scan showed the size of the coracoid fracture was 2 mm, the location was at the tip, and the fracture of the coracoid fracture was classified as type 1, in accordance with the classifications of Modified Regan and Morrey.^{1,12}

The patient had no ossification of the secondary ossification center in the olecranon, and the olecranon fracture occurred distal to the olecranon apophysis. The anterior olecranon fracture dislocation was classified as 21-B1.3, in accordance with the Working Group for Osteosynthesis Questions (Arbeitsgemeinschaft für Osteosynthesefragen) type.

On the day of the injury, the patient underwent closed reduction under general anesthesia and with an X-ray image intensifier, but the procedure was unsuccessful. The patient therefore underwent surgery. A small posterior skin incision, measuring approximately 2 cm, was made at the fractured ulna bone segment to reduce the olecranon. After the olecranon fractures were reduced, we performed percutaneous pinning fixation of the olecranon with a 1.6-mm Kirschner wire (Fig. 3). Given the absence of instability and laxity of the elbow joint for valgus and varus stress and redislocation after the pinning of the olecranon under an X-ray image intensifier, we did not perform internal fixation of the avulsion fracture of the coracoid process.

Institutional review board approval was not required for this case report.

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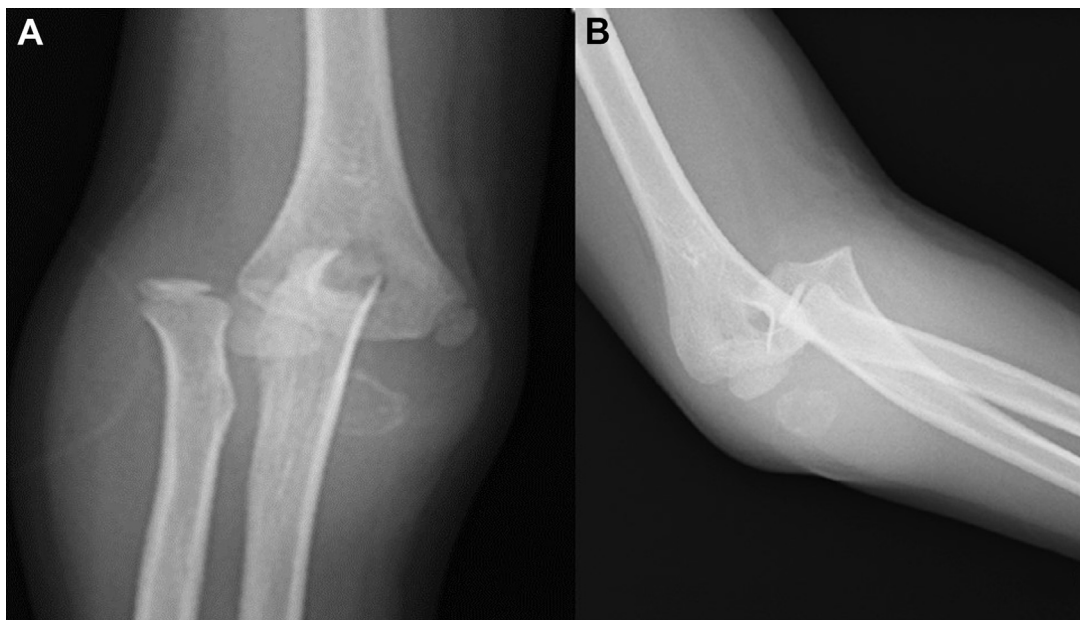


Figure 1 Radiographs of the elbows showing an anterior and lateral transolecranon fracture dislocation. **A:** Anterior-posterior view, **B:** lateral view.

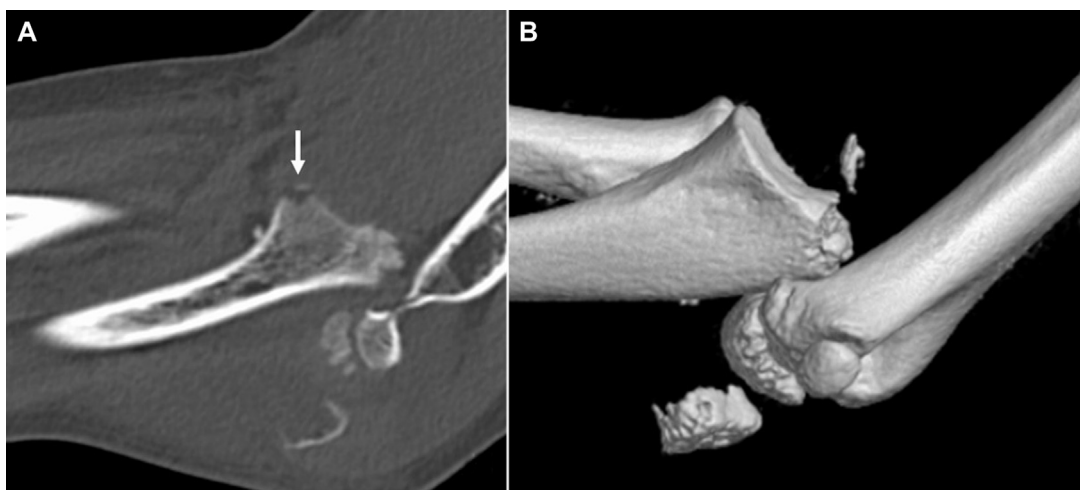


Figure 2 Computerized tomography scan of the elbow. **A:** Sagittal view (↓: an associated avulsion fracture of the coracoid process of the ulna.), **B:** three-dimensional imaging.

Immediately after the surgery, the patient's arm was immobilized in a posterior splint at 90° of flexion in neutral rotation for 6 weeks. Four weeks after the surgery, the Kirschner wire was removed. After 6 weeks of immobilization, the patient was allowed to perform passive and active elbow range-of-motion exercises. Radiographic union was achieved 3 months after the surgery. During the last follow-ups 4 years after the surgery, there was no deformity of the elbow joint. X-rays showed no abnormal change in the olecranon compared with the other side (Fig. 4). There was a small residual bony fragment which has not led to bone union in front of the coronoid process; however, there was no impingement on the radioulnar joint. The patient had full range of motion, 0 degrees in flexion to 140 degrees in extension of the elbow joint, and 90 degrees in pronation and supination of the forearm. The patient had no laxity in valgus and varus stress, and was able to return to their previous level of activity. The elbow's Mayo Elbow Performance Score 4 years after the surgery was 100 points.

Discussion

While the anterior transolecranon fracture dislocation pattern is well described in adults, this injury has been rarely reported in children. Therefore, there are few data regarding the optimum treatment and outcome. Furthermore, the ages at which the ossification centers appeared in the olecranon is reported to be about 10 years old.⁹ The physicians need to be aware of the possibility of an occult fracture in young children.

Previous reports have shown that the fracture of the coronoid occurs in half of adult patients with this injury.¹³ However, coronoid process fractures have not been observed in children with this injury pattern in 11 cases in previous reports.^{2,3,5,8,15,17} In the previous 11 cases of this injury, 1 case was associated with an avulsion fracture of the medial epicondyle, and 1 case was associated with radial neck fracture. The other 7 cases were isolated anterior transolecranon fracture dislocations. Our patient involves the first reported case of an anterior transolecranon fracture dislocation

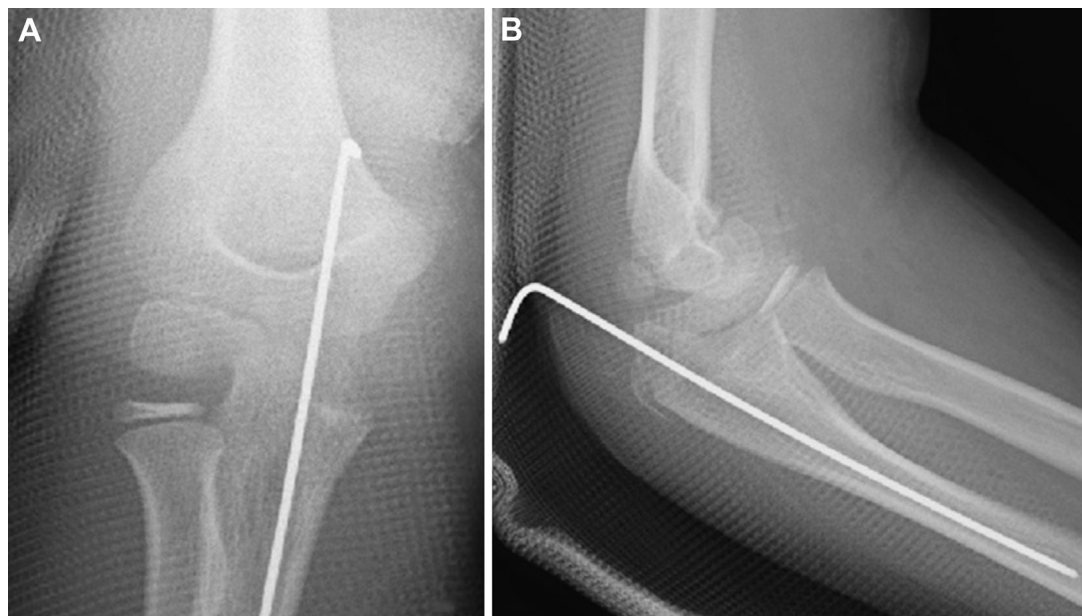


Figure 3 Postoperative radiographs of the elbow having undergone percutaneous pinning fixation with a Kirschner wire immediately after surgery. **A:** Anterior-posterior view, **B:** lateral view.



Figure 4 Postoperative radiographs of the elbow 4 years after the surgery. **A:** Lateral view of the affected elbow. **B:** Comparison view of the unaffected elbow.

with an associated avulsion fracture of the coronoid process of the ulna.

Previous cases of pediatric transolecranon fracture dislocations have been treated with either a tension band wiring using Kirschner wires or plate fixation.^{5,8,17} Arain et al² and Tiendio et al¹⁵ reported treating this injury with nonoperative management in a cast after closed reduction. Bouaziz et al³ reported that open reduction was required because the radial head had buttonholed via the joint capsule. Internal fixation was not performed in this case. In the present case, reduction via a small incision and internal fixation with Kirshner wire could achieve good radiographic and clinical results.

Coronoid fractures are most commonly associated with other elbow injuries, such as severe triad injuries, varus posteromedial rotatory instability, and transolecranon fracture dislocations.^{4,10,14} In adults, transolecranon fracture dislocations can cause

O'Driscoll type III coronoid process fractures that involve 50% or more of the coronoid height.¹⁴ The coronoid fracture in our case was classified as a type I fracture, which is a transverse fracture of the coronoid tip. Smaller fragments of the coronoid tip in children have been reported to be repaired by lasso-type suture.⁶ Furthermore, the osteochondral flap fracture of the coronoid is a very rare fracture in pediatric patients. Most cases of pediatric osteochondral flap fracture of the coronoid were associated with elbow posterior dislocations and spontaneous relocation.¹⁶ Quick et al reported that the coronoid fragment was fixed with a transosseous suture.¹¹ On the other hands, previous reports have suggested that a fractured coronoid height of up to 50% in isolated coronoid fractures can be treated without surgery.⁷ Our case was treated without internal fixation of the avulsion coronoid tip fracture because there was no instability after pinning the olecranon. This case suggests that percutaneous pinning with a Kirschner wire could be a good

treatment option for anterior transolecranon fracture dislocations in children.

Conclusion

We report the first case of an anterior transolecranon fracture dislocation with an associated avulsion fracture of the coronoid process of the ulna in a child. The patient was successfully treated using percutaneous pinning with a Kirschner wire.

Disclaimer

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