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Anconeus interposition arthroplasty in an adolescent patient with osteogenesis imperfecta: a case report

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There are no suitable surgical techniques for treatment of a chronic radial head dislocation with secondary osteoarthritis in an adolescent patient. Prosthetic replacement after radial head resection is a treatment option in an adult patient with the osteoarthritis.[2] However, there are high removal and revision rates due to aseptic loosening, prosthesis dislocation, and protrusion as postoperative complications.[2] Interposition of the anconeus muscle at the radiocapitellar joint after resection of the radial head was first described by Morrey and Schneeberger[5] for the treatment of pathological conditions involving the radiocapitellar and proximal radioulnar joints. Previous studies demonstrated that anconeus interposition arthroplasty was an effective surgical method for the relief of pain and restoration of elbow function in patients with radial head dislocation, osteoarthritis, failed and radial head replacement.[1,7,8] Interposition of the anconeus muscle provides a soft tissue cushion to mitigate bone impingement and increased elbow stability due to tightening of the lateral collateral ligament complex after radial head resection.[1,8] However, there are few studies to perform anconeus interposition arthroplasty in a pediatric or adolescent patient. We reported a long-term postoperative outcome after anconeus interposition arthroplasty in an adolescent patient with osteogenesis imperfecta who revealed a chronic radial head dislocation with secondary osteoarthritis of the radiocapitellar joint.

Report of the case

A 14-year-old patient had suffered multiple pathological fractures of the extremities due to osteogenesis imperfecta during childhood. Malunion of multiple ulnar fractures had caused radial head dislocation, and the continuous malalignment of the radiocapitellar joint has caused the secondary osteoarthritis. The patient complained of intractable elbow pain and a projection of the lateral elbow joint, as well as marked impairment in activities of daily living due to pain on motion although there was no limitation of passive range of motion. Nonsteroidal anti-inflammatory agents had no significant effect on improving that pain. Radiographs and three-dimensional computed tomography demonstrated posterolateral dislocation of the radial head, severe bowing and rotation deformity of the ulna, and osteoarthritis findings involving the radiocapitellar joint (Fig. 1). We diagnosed a chronic radial head dislocation with secondary osteoarthritis of the radiocapitellar joint due to severe ulnar deformity after multiple pathological fractures. Based on those findings, anconeus interposition arthroplasty was performed with radial head resection despite the patient being a 14-year-old (Fig. 2).

The surgical technique was employed for the patient described in the previous study.[5] Briefly, a lateral approach was used, and the anconeus was mobilized from the distal to proximal side with preservation of the fascial attachment of the lateral epicondyle of the humerus and the lateral margin of the triceps. The radial head was resected with a 1.5-cm length, which should be less than 2 cm to prevent drifting of the proximal radial stump.[9] There was the elongated ligament-like fibrous tissue around the radial head without any intact annular ligament. The anconeus muscle was interposed between the radius and capitellum and the radius and ulna. The distal portion was tied to the proximal part of the radius

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

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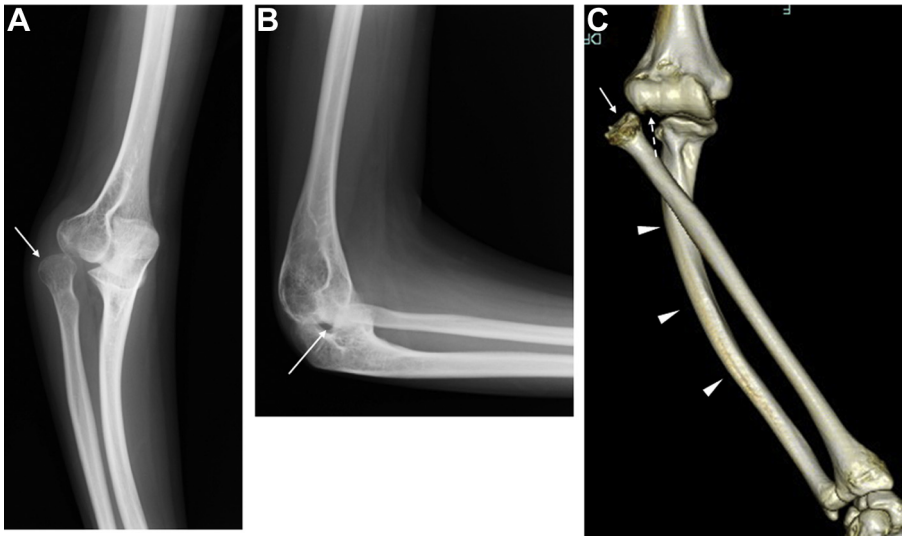

Figure 1 Preoperative radiographic findings, radiographs (**A** and **B**) showed posterolateral dislocation of the radial head (*white arrow*), and 3D-CT findings (**C**) demonstrated severe bowing and rotation deformity of the ulna (*white arrow heads*) and osteoarthritic changes to the radiocapitellar joint (*white arrows*, *dashed white arrow*). *3D-CT*, three-dimensional computed tomography.

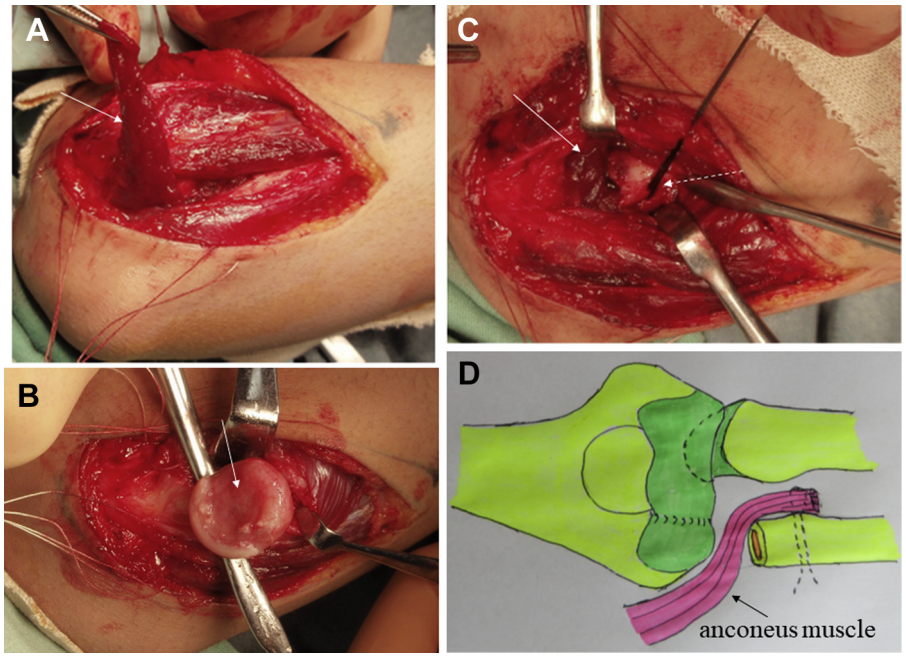

Figure 2 Intraoperative findings, the anconeus muscle flap (*white arrow*) was mobilized from the distal to proximal side with preservation of the proximal attachment (**A**). The radial head with no articular cartilage (*white arrow*) was resected (**B**). The anconeus muscle (*white arrow*) was interposed between the radius and capitellum and between the radius and ulna. The distal portion was tied to the proximal part of the radius through drill holes (*dashed white arrow*) (**C** and **D**).

through drill holes by modified Morrey's technique for type II interposition.[5] After surgery, a long arm splint was applied with the elbow at 90° of flexion and the forearm and wrist in neutral. The splint was removed at 3 weeks postoperatively, and active and passive motion exercises were started immediately. The patient was able to return any activities with no symptom at 12 weeks after surgery.

According to the postoperative outcomes at 12 years after surgery, the patient did not show any symptoms including pain or instability of the elbow and wrist joint and any proximal migration of the radius and the ulnar plus variance. Favorable elbow and wrist extension/flexion and forearm pronation/supination were preserved. The postoperative Mayo Elbow Performance Score[4] and the Disabilities of the Arm, Shoulder, and Hand score[3] were 90 and 1.7 points, respectively, which were regarded as excellent, and the subjective evaluation was "very satisfied." The favorable alignment between the proximal end of the radius and the capitulum of the humerus was preserved without progression of capitellar arthritis over the 12 years after surgery (Fig. 3). Currently, the patient engages in the work as a nurse without any difficulty.

The patient was informed that data from the case would be submitted for publication and gave the consent. The study was

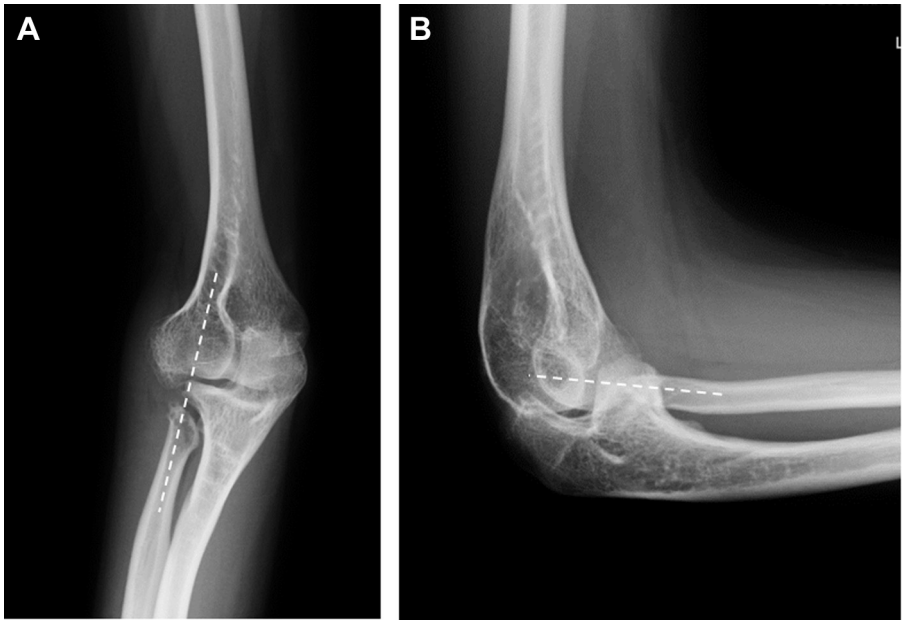

Figure 3 Postoperative radiograph findings. Favorable alignment between the proximal end of the radius and capitellum of the humerus was preserved (*white dashed line*) without progression of capitellar arthritis at 12 years after surgery (**A** and **B**). Posteroanterior (**A**) and lateral (**B**) radiographs.

approved by the institutional review board of our university hospital and was performed in compliance with the Declaration of Helsinki.

Discussion

Anconeus interposition arthroplasty has been reported as a surgical option for the treatment of pathological conditions affecting the radiocapitellar joint, particularly for those after radial head resection.[1,5-8] However, there are few reports to perform this surgical procedure for a pediatric and adolescent patient because little is known about recommended restrictions or long-term postoperative outcomes of anconeus interposition arthroplasty after radial head resection in the young and active patients.[1,5] In the present cases, anconeus interposition arthroplasty was performed with radial head resection despite the patient being a 14-year-old based on the findings, including intractable lateral elbow pain, prior radial head dislocation with the secondary osteoarthritis of the radiocapitellar joint, and severe ulnar bone deformity after multiple pathological ulnar fractures due to osteogenesis imperfecta which appeared unsuited for corrective osteotomy. In the present case, we did not restrict any load-bearing on the upper extremity postoperatively, and after 12 years, the patient has preserved a high level of activity working as a nurse without any complaints of symptoms including pain, instability, and impairment of elbow function.

Prosthetic replacement is another option which is reported after radial head resection in adult cases.[2] However, the previous studies indicated that achieving radiocapitellar joint congruity with radial head prostheses remains difficult, with high removal and revision rates due to complications including aseptic loosening, prosthesis dislocation, and protrusion.[1,2] Additionally, the present case revealed osteoarthritis of the capitellar articular surface in association with prior dislocations of the radial head. These pathological changes were deemed not amenable to prosthetic replacement of the radial head for improvement of elbow pain.

We believe that anconeus interposition arthroplasty might be an option of the surgical treatment for a chronic radial head dislocation even in an adolescent patient.

Conclusion

We demonstrated a favorable long-term postoperative outcome over the 12 years after anconeus interposition arthroplasty in an adolescent patient with radial head dislocation and arthritis due to ulnar deformity secondary to osteogenesis imperfecta. Anconeus interposition arthroplasty might be an option of the surgical treatment for a chronic radial head dislocation even in an adolescent patient.

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