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Bilateral Collateral Ligament Reconstruction for Chronic Elbow Dislocation

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We report the case of a 37-year-old male with autism spectrum disorder who was hospitalized for chronic elbow dislocation. He had suffered a posterior elbow dislocation 5 months ago. His elbow dislocation was easily reduced, but the reduction position could not be maintained. Severe varus and valgus instabilities were observed in his right elbow. He was diagnosed with chronic elbow dislocation due to bilateral collateral ligament dysfunction and was surgically treated. Bilateral ligament reconstruction using the bilateral palmaris longus (PL) tendon combined with a temporary ulnohumeral joint fixation was performed. Cast immobilization was applied for 6 weeks. One year after surgery, his range of motion was −15° in extension, 140° in flexion, 80° in pronation, and 90° in supination. He did not face any problems in daily activities.

INTRODUCTION

Elbow dislocation is a common traumatic injury, with an incidence of approximately 20% in all articular dislocations. The elbow joint is the second most frequently dislocated major joint in adults following the shoulder.[4, 5] Approximately 80% of elbow dislocations are posterior or posterolateral and are caused by falling on the outstretched hand with the forearm pronated. In contrast, lateral, posteromedial, medial, or anterior and divergent dislocations are rare.[3, 7] Acute conditions can be treated by closed reduction. However, on becoming chronic, the subsequent treatment for a dislocation becomes challenging.[2, 8] Chronic elbow dislocation is generally associated with severe instability, elbow function limitation, significant pain, and arthritic changes.[6] So far, there have been very few reports on bilateral ligament reconstruction for chronic elbow joint dislocation. We report the case of a 37-year-old male who suffered from chronic lateral elbow dislocation. He was successfully treated with open reduction, and both medial and lateral collateral ligaments (LCLs) were reconstructed.

CLINICAL CASE

A 37-year-old male who had been diagnosed with autism spectrum disorder at the age of 5 years and experienced difficulty in communication fell in a nursing home. He experienced pain in the right elbow and was diagnosed with posterior right elbow dislocation, which was successfully treated with closed reduction and cast immobilization for 5 weeks at a local hospital.

After 5 months from the initial dislocation, he was diagnosed with a second elbow dislocation after a fall. Closed reduction and casting were performed. However, the dislocation easily recurred due to gross elbow instability, and he was referred to our institution 2 months after the second elbow dislocation.

The elbow had a valgus deformity. The passive range of motion was −45° in extension and 130° in flexion. Elbow dislocation was easily reduced, but the reduction position could not be maintained. Severe varus and valgus instabilities were observed in his right elbow. Plain radiography and computed tomography showed a laterally dislocated right elbow joint with a bony fragment on the medial side and an ectopic bone formation at the lateral humeral epicondyle (Figure 1).

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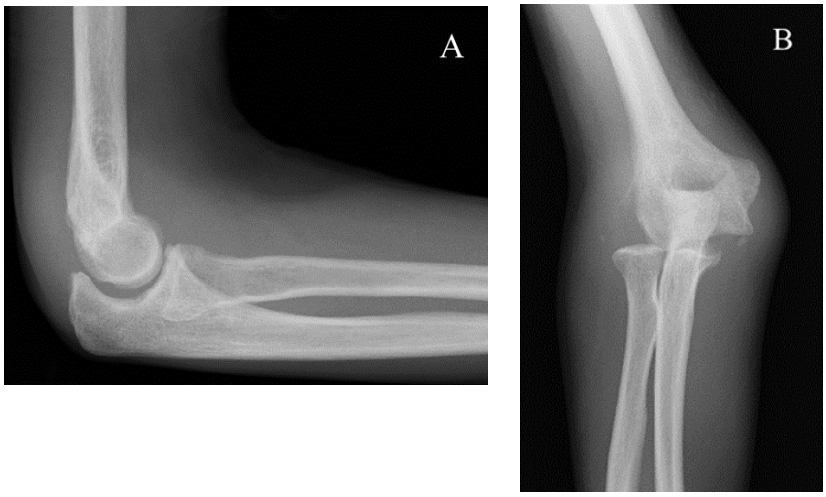

Figure 1.
Plain radiograph (lateral (A) and anteroposterior (B) views) showing lateral dislocation and a bony fragment on the medial side as well as an ectopic bone formation at the lateral humeral epicondyle.

He was diagnosed with chronic elbow dislocation due to bilateral collateral ligament dysfunction and was surgically treated.

Under general anesthesia, a medial and lateral skin incision was used to approach the elbow joint. On the medial side, ligamentous tissue was absent, and synovial tissue hyperplasia was observed at the olecranon fossa and the humeroulnar joint (Figure 2A). The dislocated joint could be maintained in an anatomical position after synovial tissue removal. On the lateral side, the LCL was absent (Figure 2B).

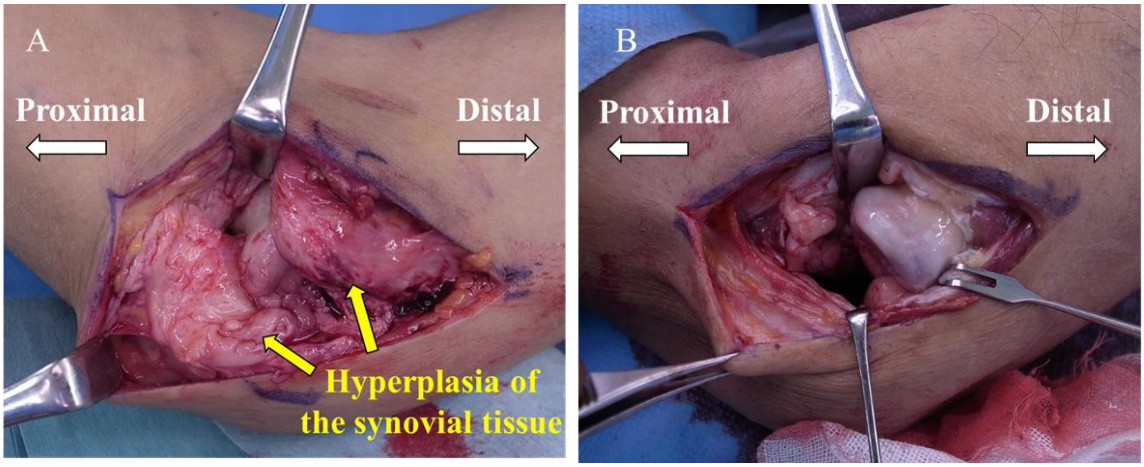

Figure 2.
(A) and (B): A: On the medial side, ligamentous tissue was absent, and synovial tissue hyperplasia was observed at the olecranon fossa and the humeroulnar joint. B: At the lateral epicondyle, the lateral collateral ligament was absent and was replaced by the scar tissue.

Bilateral ligament reconstruction was performed using the bilateral palmaris longus (PL) tendon. On the medial side, bone holes were created at the medial epicondyle and the coronoid process. A double-bundle tendon graft was then fixed using an interference screw (TJ screw; Meira, Nagoya, Japan) (Figures 3A, B). On the lateral side, bone tunnels were created at the rotation center of the lateral epicondyle; the ulnar supinator crest and grafts were also fixed in the same manner (Figure 3C).

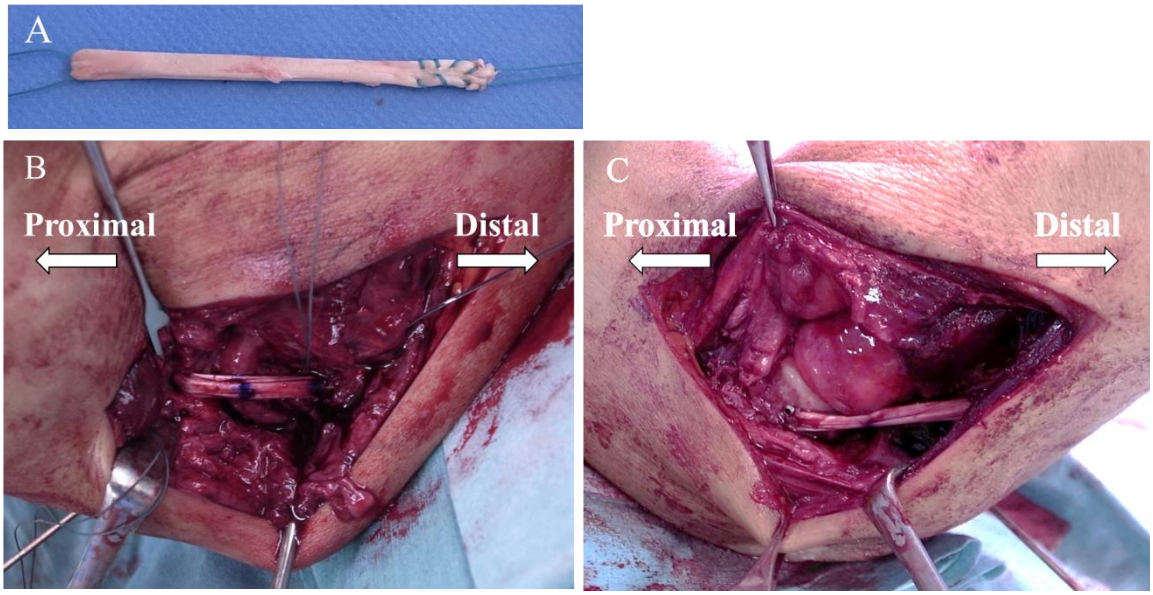

Figure 3.
A: Double-bundle graft using the palmaris longus tendon. B: The medial collateral ligament (MCL) was reconstructed using two PL tendons. C: The lateral collateral ligament (LCL) was reconstructed using two PL tendons.

Finally, the elbow joint was temporarily fixed with a Kirschner-wire and immobilized with a long arm cast. The k-wire was removed 6 weeks after surgery, and the cast was removed 8 weeks after surgery. One year after surgery, Plain radiography showed good reduction and the range of motion was −15° in extension, 140° in flexion, 80° in pronation, and 90° in supination (Figure 4). There were slight varus and valgus instabilities in his right elbow, but he did not face any problems in daily activities.

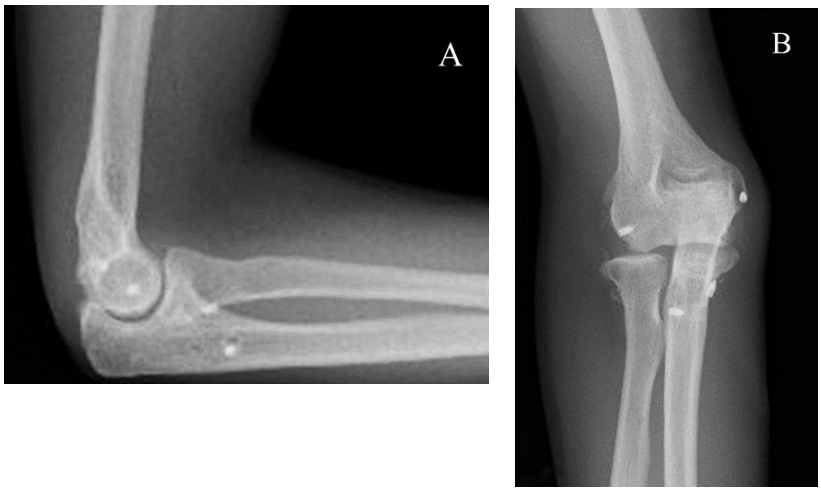

Figure 4.
Preoperative radiographs (lateral (A) and anteroposterior (B) views) after bilateral ligament reconstruction with interference screws.

DISCUSSION

After reduction of the elbow dislocation, it is necessary to evaluate instability by stress testing. Surgical treatment is required in unstable case.

In this case, stress testing was not conducted after the first elbow dislocation reduction due to autism spectrum disorder. Instability of the elbow joint was ignored which lead to chronic dislocation.

It is reported that radiographic and physical assessment of instability is essential after manual reduction of elbow dislocation[8].

Primary elbow joint stabilizers are the ulnotrochlear articulation, the medial collateral ligament (MCL) complex, and LCL complex.[9]

The LCL complex originates from the lateral epicondyle and inserts into the tubercle of the supinator crest of the ulna. It comprises four components, namely, the lateral ulnar collateral ligament (LUCL), lateral radial collateral ligament, accessory LCL, and annular ligament. The LUCL is the primary restraint against ulnar supination. The MCL complex comprises three bands, namely, anterior, posterior, and transverse bands. The anterior band originates from the anteroinferior aspect of the medial epicondyle. The anterior band is the most important valgus restraint and inserts into the sublime tubercle on the medial side of the coronoid process.[9]

There are only few reports on the treatment of chronic elbow dislocation. The first key step is removing the thickened joint capsule and synovial scar tissue that has filled the olecranon, coronoid fossa, and space in the radiohumeral joint.[1] The second step is reconstructing the anterior MCL and LUCL bands. A circumferential graft technique that addresses both medial and lateral instabilities with a single tendon graft has been reported.[9] In circumferential graft technique, the humerus was drilled through the isometric points that make up the rotational axis, and the ulna was drilled from the sublime tubercle on the medial side to the supinator crest on the lateral side. A hamstring tendon graft was passed through the humeral drill hole and secured with an interference fit screw at each end;[9] however, this procedure is technically demanding. In the present case, we separately reconstructed the MCL and LCL using two PL tendons. It was possible to independently determine the degree of elbow tension by separately reconstructing the MCL and LCL. Furthermore, harvesting two PL tendons makes it possible to create a double-bundle graft, which can provide better stability.

For postoperative treatment, the use of hinged external fixation after osseous and ligamentous reconstruction has also been reported for the treatment of recurrent or chronic elbow dislocations.[8] In the present case, the patient was suffering from autism spectrum disorder and may have experienced difficulty remaining at rest after surgery. Elbow immobilization with a cast was performed to overcome this difficulty. As a result, he gained elbow stability and a moderate range of motion. Our findings indicate that bilateral ligament reconstruction using a bilateral PL tendon can be considered as a treatment option for chronic elbow dislocation.

REFERENCES

1. **Bruce, C., Laing, P., Dorgan, J., and Klenerman, L.** 1993. Unreduced dislocation of the elbow: case report and review of the literature. J Trauma. **35**: 962-965.
2. **Exarchou, E.J.** 1977. Lateral dislocation of the elbow. Acta Orthop Scand. **48**: 161-163.
3. **Fotiadis, E., Svarnas, T., Iliopoulos, E., Papadopoulos, A., Gantsos, A., and Chalidis, B.** 2010. Acute reconstruction of the medial collateral ligament of the elbow for severe valgus instability after anterior elbow dislocation. J Orthop Sci. **15**: 594-597.
4. **Ivo, R., Mader, K., Dargel, J., and Pennig, D.** 2009. Treatment of chronically unreduced complex dislocations of the elbow. Strategies Trauma Limb Reconstr. **4**: 49-55.
5. **Josefsson, P.O., Gentz, C.F., Johnell, O., and Wendeberg, B.** 1987. Surgical versus non-surgical treatment of ligamentous injuries following dislocation of the elbow joint. A prospective randomized study. J Bone Joint Surg Am. **69**: 605-608.
6. **Jupiter, J.B., and Ring, D.** 2002. Treatment of unreduced elbow dislocations with hinged external fixation. J Bone Joint Surg Am. **84-A**: 1630-1635.
7. **Linscheid, R.L., and Wheeler, D.K.** 1965. Elbow dislocations. JAMA. **194**: 1171-1176.
8. **Majima, M., Horii, E., and Nakamura, R.** 2007. Treatment of chronically dislocated elbows: a report of three cases. J Shoulder Elbow Surg. **16**: e1-4.
9. **McGuire, D., and Bain, G.I.** 2013. Medial and Lateral Collateral Ligament Repair or Reconstruction of the Elbow. Operative Techniques in Orthopaedics. **23**: 205-214.