Arthroscopic resection of an osteochondral loose body in the distal radioulnar joint: A case report
Koichi Yano, Yasunori Kaneshiro, Hideki Sakanaka
Department of Orthopaedic Surgery, Seikeikai Hospital, Sakai City, Osaka, Japan

Abstract
We report a 34-year-old man who presented with ulnar wrist pain, painful click, and locking during forearm rotation following a motorcycle accident. Plain radiographs showed a loose body in the distal radioulnar joint (DRUJ), deformity of the sigmoid notch and ulnar head, and ulnar minus variant. The DRUJ deformity was assumed to be associated with physeal injury of the distal ulna during childhood. Conservative treatment with a splint and oral analgesics for 3 months failed. During DRUJ arthroscopy, osteoarthritic changes were found, and the loose body was resected using DRUJ arthroscopy. Histological examination showed an osteochondral loose body. The patient remained asymptomatic without recurrence or DRUJ instability 2 years postoperatively.

Introduction
Osteochondral loose body is a common cause of clicking, locking, and pain affecting large joints. Loose body of the wrist joint is rare, and we only found 16 cases of loose bodies in the distal radioulnar joint (DRUJ) after reviewing the relevant literature. All cases underwent open resection of the loose bodies.

Herein, we present a case with a loose body in the DRUJ diagnosed after a traffic accident, where the patient underwent arthroscopic resection with DRUJ arthroscopy. To our knowledge, this is the first report of a patient undergoing resection of a loose body in the DRUJ under DRUJ arthroscopy.

Case report
A 34-year-old right-handed man fell off his motorcycle and landed on his right wrist. He worked as a nurse, and had no relevant past medical history, including a previous trauma. He complained of ulnar wrist pain, painful clicking and locking during forearm rotation 2 days following the trauma. Initial examination showed tenderness on the volar side of the ulnar head and painful active movement. Plain radiographs of the right wrist showed a deformity of the sigmoid notch and ulnar head, and a rounded small bone between the sigmoid notch and ulnar head (Fig. 1a-c). Comparison with the uninjured side led us to assume that the physeal injury of the distal ulna occurred during his childhood because of the shortening of the ulna and the deformity of the sigmoid notch adapting to the distal ulna. After we explained to him that the traumatic event might have destabilized the loose body, and that this was an acute-on-chronic condition, he selected conservative treatment with the hope of spontaneous resolution. Conservative treatment with a splint and oral analgesics were pursued for 3 months, but without improvement. Serial radiographs showed a change in the position of the small bone (Fig. 2a). Computed tomography (CT) also revealed osteoarthritic change of the sigmoid notch and a loose body volar to the ulnar head (Fig. 2b-d).

He was diagnosed with a symptomatic unstable loose body in the DRUJ. Preoperative grip strength for the right and left hands, measured with a digital dynamometer (Takei Scientific Instrument Co., Ltd., Niigata, Japan), were 28.1 and 40.1 kg, respectively. The respective range of motion for right and left extremities, measured...
with a standard goniometer, was as follows: wrist dorsiflexion, 70° with click and 95°; wrist palmar flexion, 90° and 95°; forearm pronation, 75° with click and 90°; and forearm supination, 80° and 90°. DRUJ was stable based on the DRUJ ballottement test. Surgical treatment under regional anesthesia was performed. A 1.9 mm arthroscope (Stryker K. K., Tokyo, Japan) was used. The triangular fibrocartilage complex (TFCC) was intact, and the loose body was invisible via 3e and 6R portals in the radiocarpal joint (RCJ) (Fig. 3a). Stability of the foveal fibers was confirmed by a negative Hook test for TFCC. DRUJ arthroscopy using distal and proximal DRUJ portals showed articular fibrillation of the sigmoid notch and ulnar head, and cartilage subsidence was observed in the ulnar head (Fig. 3b). The loose body became visible from the dorsal portal during making of the volar DRUJ portal (Fig. 3c). The distal DRUJ portal was extended to about 1 cm to remove the loose body, followed by its resection. The size of the loose body was 3 × 7 × 3 mm (Fig. 3d). Histological examination showed an osteochondral loose body.

The patient was allowed to use his extremity freely 2 days postoperatively, and he returned to his job 2 weeks postoperatively. At the final follow-up after 2 years, he was asymptomatic without
recurrence or DRUJ instability (Fig. 4). The grip strength was 46.7 and 47.9 kg for the right and left hands, respectively. The range of motion of the right extremity was as follows: wrist dorsal flexion, 80°; wrist palmar flexion, 90°; forearm pronation, 80°; and forearm supination, 90°.

Discussion

Loose bodies in the wrist joint are rare, and involve the RCJ, pisotriquetral joint, and DRUJ. We searched for literature published in the English language on PubMed and found that loose bodies in DRUJ were reported in 15 cases and in the RCJ and DRUJ through the torn TFCC in 1 case (Table 1).

Symptoms in patients with loose body in DRUJ were pain (n = 16), locking (n = 5), and click (n = 4). DRUJ is a small joint, and therefore, the larger size of the loose body may cause locking as a symptom, as in our case. Symptoms resolved in all cases after open surgical treatment except in 2 cases where recurrence with synovial chondromatosis occurred. Especially in our case, early return to work was possible because...
arthroscopic treatment did not damage the capsular or ligamentous tissue grossly.

Preoperative plain radiographs showed loose body in 14 of the 17 cases (previous reported 16 cases and our case). When the bony proportion of the loose body is small, plain radiography is undiagnostic. In these cases, arthroscopy is essential for diagnosis and treatment. Recent technology advances enables the observation of small joints using small diameter arthroscopy. DRUJ arthroscopy is now used for arthroscopic repair of TFCC and arthroscopic resection of ulnar head for ulnar abutment syndrome.\(^{13,14}\) Arthroscopic resection for loose body in DRUJ is, therefore, a potential treatment.

Generally, loose bodies in joints originate from osteochondral fractures, osteochondritis dissecans, osteoarthritis, or synovial osteochondromatosis. In this case, the predisposing factor for loose body was considered to be osteoarthritis based on the CT and arthroscopic findings. The predisposing factors for loose body in DRUJ were osteoarthritis in 2 cases, synovial osteochondromatosis in 11 cases, and were undi described in 4 cases. In 9 of 15 cases, loose bodies were caused by a traumatic episode or repetitive minor trauma. Traumatic episodes may affect the symptoms by changing stable loose bodies to unstable. Deformities of the sigmoid notch and ulnar head were found in this case. Similar wrist deformity was reported by Ray et al, where they described symmetric shortening of the ulna caused by traumatic ulnar physeal arrest; therefore we assumed that the physeal injury occurred during his childhood.\(^{12}\) Hollevoet et al described three morphological types of the DRUJ, and found that the oblique proximally facing type, as in this case, is more frequently affected by osteoarthritis.\(^{10}\) The articular morphology of the DRUJ may affect the development of osteoarthritis. We did not perform any procedure for the deformed DRUJ, because the patient had no symptoms relating to his wrist before the trauma and at 2 postoperatively. When synovial osteochondromatosis is suspected as a diagnosis, open or arthroscopic radical synovectomy is needed to prevent recurrence.

Declaration of interest.

Nothing to declare.

Acknowledgement

Nothing to declare.

References

1. Ballet FL, Watson HK, Ryu J. Synovial chondromatosis of the distal radioulnar joint. J Hand Surg Am. 1984;9:590–592.
2. De Smet L, Van Wetter P. Synovial chondromatosis of the distal radial-ulnar joint. Acta Orthop Belg. 1987;53:106–108.
3. Inada Y, Fukui A, Maeda M, Tama S, Inada M. Reconstruction of the triangular fibrocartilage complex after surgery for treatment of synovial osteochondromatosis of the distal radioulnar joint. J Hand Surg Am. 1990;15:921–924.
4. Koh S, Nakamura R, Horii E, Nakao E, Shionoya K, Yajima H. Loose body in the wrist: diagnosis and treatment. Arthroscopy. 2003;19:820–824.
5. Lyritis G. Synovial chondromatosis of the inferior radio-ulnar joint. Acta Orthop Scand. 1976;47:373–374.
6. Mitsionis G, Gavriilidis I, Pakos EE. Synovial chondromatosis of the distal radioulnar joint. J Hand Surg Br. 2006;31:345–347.
7. Ono H, Yajima H, Fukui A, Tama S. Locking wrist with synovial chondromatosis: report of two cases. J Hand Surg Am. 1994;19:797–799.
8. Pope Jr TL, Keats TE, de Lange EE, Fechner RE, Harvey JW. Idiopathic synovial chondromatosis in two unusual sites: inferior radioulnar joint and ischial bursa. Skeletal Radiol. 1987;16:205–208.
9. Reverte Vinaixa MM, Singh R, Monyart JM, et al. Wrist synovial chondromatosis: case report and literature review. Hand Surg. 2012;17:233–238.
10. Rogachevsky RA, Zlatkin MB, Greene TL. Synovial chondromatosis of the distal radioulnar joint: a case report. J Hand Surg Am. 1997;22:1093–1097.
11. Slesarenko YA, Hurst LC, Dagum AB. Synovial chondromatosis of the distal radioulnar joint. Hand Surg. 2004;9:241–245.
12. von Schroeder HP, Axelrod TS. Synovial osteochondromatosis of the distal radio-ulnar joint. J Hand Surg Br. 1996;21:30–32.
13. Slutsky DJ. Distal radioulnar joint arthroscopy and the volar ulnar portal. Tech Hand Up Extrem Surg. 2007;11:38–44.
14. Atzei A, Luchetti R, Braidotti F. Arthroscopic foveal repair of the triangular fibrocartilage complex. J Wrist Surg. 2015;4:22–30.
15. Ray TD, Tessier RH, Dell PC. Traumatic ulnar physeal arrest after distal forearm fractures in children. J Pediatr Orthop. 1996;16:195–200.
16. Hollevoet N, Verdonk R, Van Maelg. The influence of articular morphology on non-traumatic degenerative changes of the distal radioulnar joint. A radiographic study. J Hand Surg Br. 2006;31:221–225.