

# Minimally Invasive Stabilization of an Isolated Dorsal Distal Radioulnar Joint Dislocation using a Suture Button Suspension System

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## Abstract

Isolated dislocation of distal radioulnar joint (DRUJ) is rare. The first choice of treatment is closed reduction and casting. If it is unsuccessful, operative intervention is the next step. In this report, we present a patient suffering from an unstable DRUJ dorsal dislocation after attempting closed reduction under general anesthesia. The instability was confirmed clinically and radiologically. The surgical treatment included a minimally invasive stabilization technique in which a suture button suspension system was applied to the extra-articular part of a DRUJ. At a 6-month follow-up, a pain-free full range of motion of forearm and stable DRUJ were achieved.

**Level of evidence:** 4.

**Keywords:** Distal radioulnar joint dislocation, minimally invasive surgery, suture button

## INTRODUCTION

Distal radioulnar joint (DRUJ) stability relies on both bony and soft-tissue structures including dorsal and palmar radioulnar ligaments (main stabilizers), pronator quadratus, triangular fibrocartilage complex (TFCC), and interosseous membrane.<sup>[1]</sup> DRUJ instability commonly results from traumatic disruption of both intrinsic stabilizers (e.g., TFCC) and extrinsic stabilizers, such as volar radioulnar ligaments.<sup>[2]</sup> DRUJ dislocation is usually accompanied by radius and/or ulna fractures. Isolated dislocation of DRUJ is rare.<sup>[3]</sup> This injury occurs after a fall onto the outstretched hyperpronated hand or an unexpected forcible rotation of the wrist. There are two main types of isolated DRUJ dislocation including dorsal and volar.

In case of unstable DRUJ dislocation in which closed reduction is unsuccessful, one of the ways of treatment

would be open reduction and stabilization. The methods of fixation consist of two general groups including intra-articular and extra-articular fixations.<sup>[4]</sup> In order to avoid joint injury, some authors suggest performing the extra-articular fixation.<sup>[5,6]</sup>

We present a case of unstable DRUJ dislocation treated with a suture button suspension system to make extra-articular stabilization.

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## CASE REPORT

An 18-year-old motorcyclist male presented to the emergency room suffering pain in his right wrist after a motor vehicle accident. The patient had no medical or surgical history that was relevant to the injury. On physical examination, the wrist was swollen and its range of motion was restricted particularly in supination. The neurovascular examination was normal. Postero-anterior and true lateral views of his right forearm and wrist showed an isolated posterior DRUJ dislocation without any fracture [Figure 1].

Additional imaging of the forearm and elbow to rule out Galeazzi fracture-dislocation and Essex-Lopresti injury was done, which was normal. X-ray from the opposite side was taken for comparison, which was also normal. According to the working classification proposed by Thomas and Sreekanth, dislocation was categorized with A1.<sup>[7]</sup>

After getting informed consent, under general anesthesia, an attempt of closed reduction was performed by direct pressure on the distal ulna and gentle supination, but the dislocation remained unstable in both supination and pronation. The reduction was lost even with applying a long-arm cast in supination. Pain and deformity still remained in place and postoperative X-rays showed a persistent posterior DRUJ dislocation [Figure 2].

Therefore, decision was made to do a minimally invasive stabilization using the suture button suspension system named tightrope syndesmosis (Arthrex Inc.).

After confirmation of an anatomic reduction under fluoroscopy, using a 1 cm medial incision on the DRUJ, a bony tunnel perpendicular to the longitudinal axis of the radius was made using a 4 mm cannulated drill bit.

The suture button system was implanted on both sides of the distal ulna and radius through the previously described bony tunnel. The suture was tightened with the forearm in a neutral position. The skin was closed and a long-arm splint was applied postoperatively [Figure 3].

Immediately after the operation, active and passive motion exercises of the fingers were started. At 2 weeks, the wrist was placed in a removable splint. The tightrope system was removed at 6 weeks postoperatively under IV sedation. At 6 months' follow-up, a pain-free range of motion including 70° extension, 80° flexion, full supination, and 75° pronation was achieved.

## DISCUSSION

Isolated dislocation of the DRUJ is a rare condition, which could happen in dorsal or volar directions. From the anatomical point of view, DRUJ is the rotational articulation of the forearm and the distal ulna fovea is the center of rotation.<sup>[8]</sup>

In addition to the bony architecture and the joint capsule, ligaments and TFCC, the extensor carpi ulnaris muscle helps



**Figure 1:** Left: A widening of the distance between ulna and radius can be seen on the anterior-posterior X-ray of the right wrist, the lateral X-ray shows a dorsally displaced distal ulna. Right: The left wrist X-ray made for comparison



**Figure 2:** X-rays of the right wrist indicating distal radioulnar joint luxation despite direct reduction under general anesthesia



**Figure 3:** X-ray of the right wrist showing complete reduction of ulnar head in relation with radius after using the suture button system (Tight Rope Syndesmosis, Arthrex)

the pronator quadratus muscle to provide the DRUJ with more stability. Proprioception through ulnar, anterior interosseous, and posterior interosseous nerves is provided by the mechanical receptors located inside the ligaments, which helps the DRUJ stability.<sup>[9]</sup>

The first DRUJ dislocation was reported in 1777 by Dameron<sup>[3]</sup> proposed a working classification for the DRUJ injuries, which is useful to understand and organize the spectrum of this injury.<sup>[7]</sup> The presentation of the dorsal A1 cases (acute dislocation), which usually happens after a trauma, is acute wrist pain and a restricted range of motion in rotation.<sup>[10]</sup>

Clinically, wrist pain is the most common and sometimes the only finding and this is the reason why the diagnosis is sometimes difficult.<sup>[11]</sup> The conventional X-ray would show

no dislocation in some patients suffering DRUJ dislocation. Imaging of the opposite wrist and the ipsilateral elbow to rule out the Essex-Lopresti injury should be brought into consideration, too.<sup>[12]</sup>

The treatment of acute dorsal dislocation of DRUJ is closed reduction and above elbow cast in supination for 6 weeks and in case of irreducible dislocation, open reduction and TFCC repair are mandatory.<sup>[3]</sup>

Interestingly, Tarallo *et al.* reported the case of acute volar dislocation of the DRUJ treated by closed reduction and casting who had a complete pain-free range of motion after 1 month.<sup>[10]</sup>

If the closed reduction is unsuccessful and ends up to an unstable DRUJ, another method to stabilize the joint should be considered. Some techniques have been reported in the literature to stabilize the DRUJ. In the technique described by Adams, dorsal and volar ligament reconstruction was performed using a palmaris longus tendon graft.<sup>[13]</sup>

Some other authors also used tendon grafts to stabilize the DRUJ, which is a fairly invasive procedure.<sup>[14-17]</sup>

Using the suture button suspension system was previously evaluated in a cadaveric study to provide stability to the distal ulna; however, they actually used it as a substitution for the distal oblique bundle of the distal interosseous membrane.<sup>[18]</sup>

In this study, the suspension system was used in the joint stabilization surgery has been applied in some other joint reconstructions, including tibiofibular syndesmosis, acromioclavicular joint, Lisfranc joint, and stabilization of the distal part of the interosseous ligament in the forearm.<sup>[19]</sup>

The suture button system has been also used successfully in the treatment of first carpometacarpal joint osteoarthritis for stabilization of the joint after removal of the trapezium bone.<sup>[20]</sup>

In our minimally invasive technique, the suture button system was inserted just proximal to the DRUJ to produce stability. There was no issue attributable to the surgical technique. Potential complications of our technique could be an inaccurate location of drilling, which can cause iatrogenic damage to the ulnar nerve branches or superficial branch of radial nerve, fracture of the ulna or radius, radioulnar synostosis, suture rupture, and troublesome prominent knot.<sup>[18]</sup>

The selection of the surgical approach is important because it may affect the nerve endings responsible for proprioception of the DRUJ. The medical approach that we used is associated with a lesser possibility of nerve damage.<sup>[21]</sup>

## CONCLUSION

We recommend this simple, minimally invasive technique using the suture button suspension system to produce robust stability in acute unstable DRUJ dislocations. This technique can be utilized in more unstable DRUJ cases to assess the results and compare it to the other surgical techniques.

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## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Cannon DL. Wrist disorders. In: Azar FM, Canale ST, Beaty JH, editors. *Campbell's Operative Orthopaedics E-Book*. 13<sup>th</sup> ed., Ch. 69. Philadelphia: Elsevier; 2017. p. 3525-53.
2. Adams BD, Leversedge FJ. In: Wolf SW, Pederson WC, Kozin SH, Cohen MS, editors. *Green's Operative Hand Surgery*. 7<sup>th</sup> ed., Ch. 4. Philadelphia: Elsevier; 2017. p. 457-515.
3. Dameron TB Jr. Traumatic dislocation of the distal radio-ulnar joint. *Clin Orthop Relat Res* 1972;83:55-63.
4. Moriya T, Aoki M, Iba K, Ozasa Y, Wada T, Yamashita T. Effect of triangular ligament tears on distal radioulnar joint instability and evaluation of three clinical tests: A biomechanical study. *J Hand Surg Eur Vol* 2009;34:219-23.
5. Adams BD, Lawler E. Chronic instability of the distal radioulnar joint. *J Am Acad Orthop Surg* 2007;15:571-5.
6. Sang L, Liu H, Liu J, Chen B, Xu S. A case report of distal radioulnar joint dislocation fixed by using mini-plate-button. *Int J Surg Case Rep* 2017;34:69-73.
7. Thomas BP, Sreekanth R. Distal radioulnar joint injuries. *Indian J Orthop* 2012;46:493-504.
8. Garrigues GE, Aldridge JM 3<sup>rd</sup>. Acute irreducible distal radioulnar joint dislocation. A case report. *J Bone Joint Surg Am* 2007;89:1594-7.
9. Garcia-Elias M. Soft-tissue anatomy and relationships about the distal ulna. *Hand Clin* 1998;14:165-76.
10. Tarallo L, Adani R, Catani F. Closed reduction of acute volar dislocation of the distal radioulnar joint. *J Hand Surg Eur Vol* 2013;38:572-4.
11. Thiru RG, Ferlic DC, Clayton ML, McClure DC. Arterial anatomy of the triangular fibrocartilage of the wrist and its surgical significance. *J Hand Surg Am* 1986;11:258-63.
12. Tay SC, Berger RA, Tomita K, Tan ET, Amrami KK, An KN. *In vivo* three-dimensional displacement of the distal radioulnar joint during resisted forearm rotation. *J Hand Surg Am* 2007;32:450-8.
13. Adams BD. Anatomic reconstruction of the distal radioulnar ligaments for DRUJ instability. *Tech Hand Up Extrem Surg* 2000;4:154-60.
14. Moritomo H, Kataoka T. Palmar reconstruction of the triangular fibrocartilage complex for static instability of the distal radioulnar joint. *Tech Hand Up Extrem Surg* 2014;18:110-5.
15. Stein AJ, Adabi K, Schofield JL, Marsh M, Paulo J. Anatomic dorsal and volar radioulnar ligament reconstruction with Mersilene augmentation for distal radioulnar joint instability. *Tech Hand Up Extrem Surg* 2015;19:27-31.
16. Brink PR, Hannemann PF. Distal oblique bundle reinforcement for treatment of DRUJ instability. *J Wrist Surg* 2015;4:221-8.
17. Riggerbach MD, Conrad BP, Wright TW, Dell PC. Distal oblique bundle reconstruction and distal radioulnar joint instability. *J Wrist Surg* 2013;2:330-6.
18. de Vries EN, Walenkamp MM, Mulders MA, Dijkman CD, Strackee SD, Schep NW. Minimally invasive stabilization of the distal radioulnar joint: A cadaveric study. *J Hand Surg Eur Vol* 2017;42:363-9.
19. Zooker CC, Parks BG, White KL, Hinton RY. TightRope versus fiber mesh tape augmentation of acromioclavicular joint reconstruction: A biomechanical study. *Am J Sports Med* 2010;38:1204-8.
20. Assiotis A, Giannakakis N, Hacker A. Trapeziectomy and mini tightrope stabilization of the first metacarpal for thumb carpometacarpal osteoarthritis: A prospective case series. *Acta Orthop Belg* 2017;83:473-9.
21. Garcia-Elias M, Hagert E. Surgical approaches to the distal radioulnar joint. *Hand Clin* 2010;26:477-83.