A Novel All-Inside Arthroscopic Technique for Radial-Sided Triangular Fibrocartilage Complex Tears: A Case Report and Review of Literature

HAND
2017, Vol. 12(5) NP166–NP169
© The Author(s) 2017
Reprints and permissions:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/1558944717715138
hand.sagepub.com

Michael T. Edgerton¹ and Robert C. Kollmorgen²

Abstract

Background: Triangular fibrocartilage complex (TFCC) injuries are a known cause of ulnar-sided wrist pain. Wrist arthroscopy is the gold standard for diagnosis of these lesions and is becoming a more frequent method of treatment. Isolated radial-sided tears are uncommon and treatment of these lesions is controversial. There are few reports on repair techniques. Here we report on a novel arthroscopic, all-inside technique for traumatic radial-sided TFCC tears that resulted in full range of motion, significant improvement in pain, and ultimately return to sport. **Methods:** This is a single case report describing an all-inside, arthroscopic repair of a radial-sided TFCC tear. The techniques and postoperative protocol are discussed. Clinical outcomes were reported at final follow-up of 3.5 months. **Results:** At final follow-up, our patient had full wrist range of motion, 95% strength, occasional 1/10 pain, and returned to sport at her previous level of play. There were no complications. **Conclusion:** Although just a single case report, our patient had an excellent result based on modified Mayo wrist score. When comparing our result and the previous literature, this technique seems to be a valid method for addressing radial-sided TFCC tears.

Keywords: arthroscopic, radial-sided, TFCC, tear, technique

Introduction

It is well known that triangular fibrocartilage complex (TFCC) injuries can lead to acute or chronic ulnar-sided wrist pain, instability, decreased grip strength, and ultimately ulnocarpal arthritis.^{6,10} The anatomy and function of the TFCC was first described in detail by Palmer and Werner in 1981. This homogeneous group of structures plays a key role in stabilizing the ulnar carpus and distal radioulnar joint (DRUJ).⁶ The TFCC is also responsible for cushioning the ulnar carpus and accepts approximately 20% of axial load in an ulnar neutral wrist.⁵ TFCC tears are classified into traumatic, class 1, and degenerative, class 2, lesions. Class 1D tears are described as traumatic avulsions of the attachment to the sigmoid notch of the radius.⁴ The radial aspect of the TFCC is avascular.¹ Despite this, there is clear evidence that suggests avascular collagenous structures can heal, and it is recommended to repair these lesions to restore the proper tension to the articular disc.⁹ Multiple arthroscopic-assisted techniques have been described for repair of class 1D injuries. All of the reported techniques involve drill tunnels though the radius.^{2,8-10} All-inside techniques are becoming more common as advances are made in wrist arthroscopy.

This report describes an arthroscopic all-inside knotless repair using a suture anchor into the sigmoid notch of the radius. To our knowledge, this technique has not been reported for radial-sided injuries.

Methods

A 17-year-old female presented to the clinic with dorsal and ulnar left wrist pain after a fall onto an outstretched hand during a softball game 1 month prior. She was diagnosed with an acute TFCC tear and mild DRUJ instability. The patient was placed into a wrist brace for 2 weeks with limited activity. A magnetic resonance imaging arthrogram was performed but did not show a definitive tear in the TFCC. Occupational therapy was then added for the next 4 weeks.

¹Mercy St. Vincent Medical Center, Toledo, OH, USA

²Duke University Medical Center, Durham, NC, USA

Corresponding Author:

Michael T. Edgerton, Mercy Street, Vincent Medical Center,
2213 Cherry Street, Toledo, OH 43608, USA.
Email: edgerto1@upike.edu

Figure 1. While viewing from 4-5 portal, a probe was placed from the 3-4 portal into the radial-sided triangular fibrocartilage complex tear.

Figure 2. View of the triangular fibrocartilage complex tear from the 3-4 portal after debridement.

She remained symptomatic; therefore, 2 weeks of short arm casting was trialed. Due to continued pain, the area of the TFCC was injected with a local anesthetic and corticosteroid mixture. This provided immediate, but not long-term relief. After failure of conservative treatment, the patient elected to undergo diagnostic wrist arthroscopy 6 months after the injury. Written informed consent was obtained prior to the procedure and for use of information in this case report.

The procedure was performed under general anesthesia with a scalene block. The patient was positioned supine with the left wrist in an Arthrex wrist distracter (Arthrex, Naples, Florida). Appropriate preoperative antibiotics were administered and standard sterile technique was used. The procedure was performed using a tourniquet for improved visualization. The procedure began by establishing standard 3-4, 4-5, 6-R, and 6-U outflow portals using standard technique. A standard diagnostic arthroscopy was performed, and a radial-sided TFCC avulsion was visualized (Figure 1). The edges of the tear were gently debrided with a shaver to stable tissue (Figure 2). The DRUJ was grossly unstable at this point. Using an arthroscopic burr, the sigmoid notch of the radius was debrided to bleeding subchondral bone (Figure 3). A horizontal mattress suture was then placed in the radial border of the TFCC using a bird-beak and crescent suture passer. An accessory 6-R portal was then created to place a 2.5-mm Arthrex push-lock anchor (Arthrex, Naples, Florida) under direct visualization. The trampoline effect of the TFCC was restored (Figure 4). The majority of DRUJ instability was stabilized at this point. Because mild laxity persisted and to protect our repair, a 0.062 in Kirschner wire (K-wire) was placed from ulnar to radial to pin the DRUJ in neutral position. Anatomic reduction of the

Figure 3. Burring of the sigmoid notch viewed from 4-5 portal.

DRUJ and appropriate hardware position were verified with fluoroscopy. Portals were closed with nylon suture and wounds dressed in standard fashion. The patient was placed in a sugar-tong splint in neutral position.

At first follow-up, 1 week, sutures were removed and the patient was placed in muenster cast. The cast was removed and the pin was pulled at 6 weeks. Patient was given a neutral wrist splint and started in formal occupational therapy for range of motion exercise and progressive strengthening. This postoperative protocol was based on that described by Short.⁹ Range of motion, pain level, functional status, and grip strength were evaluated at final follow-up of 3.5 months.

Figure 4. Trampoline test confirming restoration of triangular fibrocartilage complex tension after repair.

The findings were ultimately correlated to the modified Mayo wrist score.¹⁰

Results

At final follow-up, the patient had full pronation and supination equivalent to the contralateral side. Wrist flexion and extension were 90° and 80°, respectively. Grip strength was 95% of the contralateral side. Pain was rated at 1/10 on an occasional basis with activities requiring maximum supination. However, the pain was not reproducible on examination. There were no neurologic or wound complications. She was released without restrictions. She returned to softball at her preinjury level. These findings calculate to 95/100 and an excellent result based on the modified Mayo wrist score.

Discussion

Isolated 1D TFCC tears are uncommon, as only a few reports have been published. The indication for diagnostic arthroscopy and repair in this case was persistent ulnar-sided wrist pain and decreased grip strength that failed to improve with nonsurgical management. After a thorough review of literature, it seems that only a few techniques have been published. Although each have slight variations, the common trend is to use an arthroscopic-assisted technique with drill tunnels entering the sigmoid notch, exiting radially and tying suture over the bony bridge. Tang et al used a double barrel cannula to direct ulnar or radial suture tunnels.¹⁰ They reported on 10 wrists, 8 of which had a radial tear component. Based on the modified Mayo wrist score, they had 2 excellent, 3 good, and 5 fair results. The

fair results were secondary to decreased grip strength. They did not report on which scores were isolated radial tears but 1 patient with a radial tear had an excellent result. One patient sustained a transient injury to the superficial branch of the radial nerve. Three patients had post-op magnetic resonance arthrography with no leakage from the joint. Short treated 26 patients with 1D tears with 24- to 60-month follow-up.⁹ He performed a similar technique using K-wires to drill tunnels to pass suture through the radius. They passed at least 2 sutures. The DRUJ was pinned with a 0.062 K-wire in neutral rotation for 3 to 4 weeks and the arm was immobilized in a Muenster cast for 8 weeks. After cast removal, a volar splint was placed and progressive therapy was started with full return to sport or activity at 4 months. Preoperative arthrograms were positive in 90% of cases. Twelve patients had postoperative arthrograms, which were normal in 75%. Modified Mayo wrist scores were 67% excellent, 12% good, 12% fair, and 8% poor. Sixty-six percent of patients were asymptomatic and all returned to work. Sagerman and Short treated 14 class 1D lesions with a similar technique.⁸ They reported 67% good to excellent results in 12 patients at 17 months. Arthrograms were negative in 3 of 5 patients postoperatively. Fellinger et al reported on using a meniscal T-fix device passed through a radial tunnel to secure radial-sided tears.² In their report of 3 patients, follow-up arthrography at 6 weeks showed no leakage into the DRUJ. They did not report on postoperative function or pain.

All-inside arthroscopic repairs of peripheral ulnar-sided tears have been reported with promising results.⁷ As in our case, Geissler used a mini push-lock anchor (Arthrex, Naples, Florida) to perform a knotless repair in ulnar-sided tears.³ The described advantage is no knot irritation and in our case, no incisions over the radius or bone tunnels.

Conclusion

This report suggests that an arthroscopic, all-inside repair with suture anchors can be successful in restoring stability to the TFCC. Although just a single case report, our patient had an excellent result based on modified Mayo wrist score and was able to return to her previous level of sport. This technique eliminates the potential complication of injury to the superficial radial nerve or other radial structures when drilling bone tunnels through the radius. The number of good to excellent results and the reports of postoperative arthrogram findings suggests that the radial aspect of the TFCC has the capacity to heal. When comparing our result and the previous literature, this technique seems to be a reproducible and valid method for addressing radial-sided tears.

Ethical Approval

This study was approved by our institutional review board.

Statement of Human and Animal Rights

This article does not contain any studies with human or animal subjects.

Statement of Informed Consent

Informed consent was obtained from all individual participants included in the study.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. Bednar MS, Arnoczky SP, Weiland AJ. The microvasculature of the triangular fibrocartilage complex: its clinical significance. *J Hand Surg Am.* 1991;16A:1101-1105.
2. Fellingner M, Peicha G, Seibert FJ, Grechenig W. Radial avulsion of the triangular fibrocartilage complex in acute wrist trauma: a new technique for arthroscopic repair. *Arthroscopy.* 1997;13(3):370-374.
3. Geissler WB. Arthroscopic knotless peripheral triangular fibrocartilage repair. *J Hand Surg Am.* 2012;37A:350-355.
4. Palmer AK. Triangular fibrocartilage complex lesions. *J Hand Surg Am.* 1989;14A:594-606.
5. Palmer AK, Werner FW. Biomechanics of the distal radioulnar joint. *Clin Orthop Relat Res.* 1984;187:26-35.
6. Palmer AK, Werner FW. The triangular fibrocartilage complex of the wrist—anatomy and function. *J Hand Surg Am.* 1981;6(2):153-162.
7. Pederzini LA, Tosi M, Prandini M, Botticella C. All-inside suture technique for Palmer class 1B triangular fibrocartilage repair. *Arthroscopy.* 2007;23(10):1130.e1-1130.e4.
8. Sagerman SD, Short W. Arthroscopic repair of radial-sided triangular fibrocartilage complex tears. *Arthroscopy.* 1996;12(3):339-342.
9. Short WH. Arthroscopic repair of radial-sided triangular fibrocartilage complex tears. *J Hand Surg Am.* 2001;1(4):258-266.
10. Tang, Chris YK, Fung B, Chang R, Lung CP. Another light in the dark: review of a new method for the arthroscopic repair of triangular fibrocartilage complex. *J Hand Surg Am.* 2012;37A:1263-1268.