



Disability and function after arthroscopic repair of ulnar avulsions of the triangular fibrocartilage complex of the wrist

Ilse DEGREEF, Hans WELTERS, Paul MILANTS, Hilde VAN RANSBEECK, Luc DE SMET

From U.Z. Pellenberg, Pellenberg, Belgium

Ulnar wrist pain due to a lesion of the triangular fibrocartilage complex (TFCC) is frequent. Based on studies of the vascularity, (traumatic) ulnar avulsions can be sutured. Arthroscopic techniques have been designed but results are scarcely published.

This is a follow-up study of 52 patients with an ulnar avulsion of the TFCC. All patients were treated with an arthroscopic technique. Evaluation was directed to the subjective outcome, functionality (using the DASH score) and objective parameters.

The mean DASH score was 17.3. Pain was absent or minimal in 47 patients. The grip force was 80% of the contralateral side.

Based on these findings, arthroscopic repair of the TFCC appears to be a reliable technique.

INTRODUCTION

Lesions of the triangular fibrocartilage complex (TFCC) have been described and classified by Palmer (26). The distinction between traumatic (type 1) and degenerative (type 2) ruptures however is not obvious, nor reproducible. Healing of repaired ulnar avulsions of the TFCC are thought to be possible because this part of the TFCC is well vascularised (2, 4, 19). The authors have reported in 1993 (32) an arthroscopic technique for suturing type 1-B TFCC tears. Preliminary reports were published in 1998 (8) and 2002 (20). The aim of this survey is to evaluate a more detailed subjective and objective outcome of this procedure in a larger population.

MATERIAL AND METHODS

Sixty six patients had undergone arthroscopic repair of an ulnar avulsion of the TFCC. Fourteen were excluded (6 could not be reached, 3 had a follow-up of less than 6 months, 5 were contacted by phone but denied to attend the follow-up clinic). The remaining 52 patients are the base of this survey. There were 25 males and 27 females with ages ranging from 16 to 56 years (mean : 32 years). The mean follow-up period was 16 months (range : 7 to 36). All patients had an arthroscopically proven type 1-B TFCC rupture. All had a traumatic event prior to their complaints. They all had been treated at least 6 months previously with immobilisation, physiotherapy, rehabilitation techniques and analgetics. Details on previous treatments were not available. In this retrospective review we could not evaluate the ulnar variance nor other radiographic parameters.

■ Ilse Degreef, MD, Consultant Orthopaedic Surgeon, Hand Unit.

■ Hans Welters, MD, Orthopaedic Registrar.

■ Paul Milants, MD, Orthopaedic Registrar.

■ Hilde Van Ransbeeck, MD, Consultant Orthopaedic Surgeon.

■ Luc De Smet, MD, PhD, Surgeon in Chief, Hand Unit.

Department of Orthopaedic Surgery, U.Z. Pellenberg, Pellenberg, Belgium.

Correspondence : Luc De Smet, Department of Orthopaedic Surgery, U.Z. Pellenberg, Weligerveld 1, B-3212 Pellenberg, Belgium.

E-mail : Luc.desmet@uz.kuleuven.ac.be.

© 2005, Acta Orthopædica Belgica.

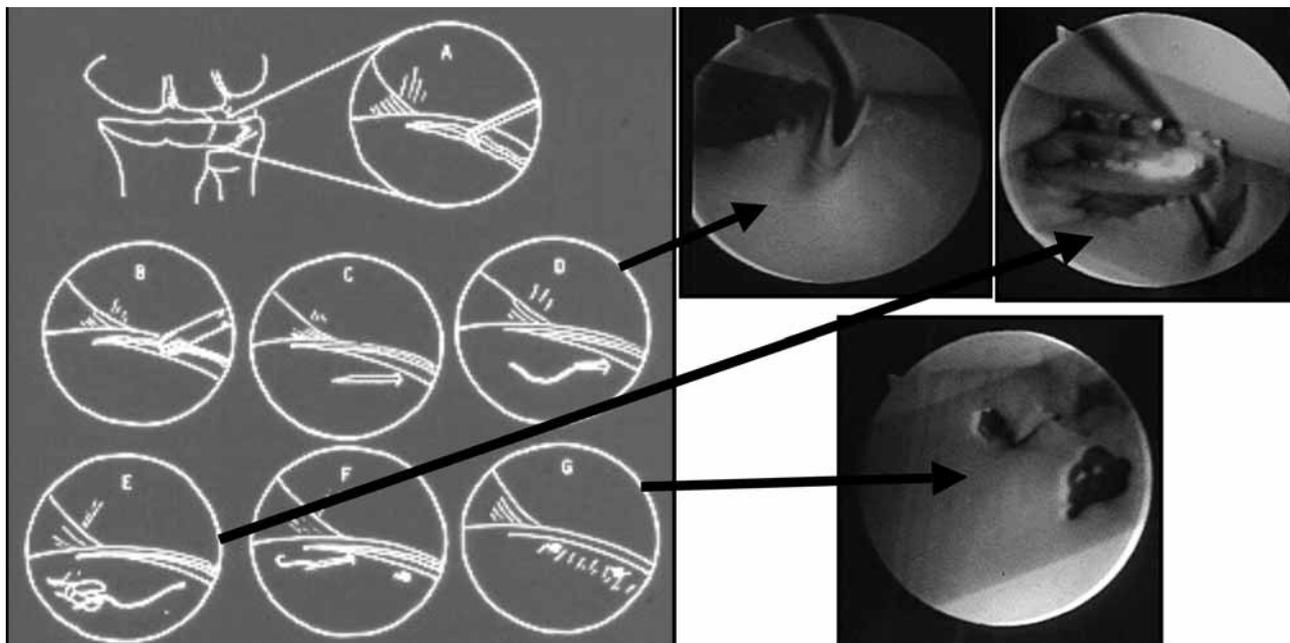


Fig. 1. — Schematic presentation of the technique. (A) Probing peripheral tear. (B) Shaving edges of tear. (C) Passing the needle through inner edge of the tear. (D) Passing 4/0 suture in needle. (E) Grasping suture with forceps from 6R portal. (F) Making a knot in suture and pulling it back from 6U portal. (G) Repeating C-F for second suture.

Technique (fig 1)

The procedure described by us was used in all patients (32). The 3-4 portal was used for vision and 6R for instrumentation. After diagnosis of a peripheral lesion at the margin of the meniscus-homologue is made, the same technique as for peripheral meniscal tears of the knee is used (30). The scar tissue is removed with a synovial shaver, allowing for a new bleeding surface for new scar tissue formation. Afterwards, two 26-gauge needles are inserted in the meniscal part of the TFCC from the 6U portal. Through each of these two needles, a 3/0 PDS Ethicon absorbable suture is passed into the joint. These two sutures are grasped with a grasping forceps from the 6R portal. A knot is tied and drawn back into the joint, pulling on the suture ends at the 6U portal. Under direct arthroscopic vision, the reduction of the meniscal part against the meniscus homologue can be seen. The two ends of the sutures are knotted subcutaneously at the 6U portal place. Only two sutures are placed, independently of the size of the tear. A K-wire is placed from ulna to radius for 6 weeks to protect the repair. An above-elbow cast was applied for 3 weeks in neutral prosupination. A below-elbow cast

was applied for another 3 weeks. After 6 weeks the K-wire is removed and rehabilitation is started.

Evaluation

The patients were evaluated by two independent observers (HW & PM). Different aspects of pain, function, satisfaction and dexterity, were evaluated on a visual analogue scale (VAS). The DASH score was used for evaluation of the disability (14). Instability of the DRUJ, range of motion of the wrist and forearm and gripping force were measured. Stability of the DRUJ was subjectively evaluated, anteroposterior mobility (“piano-key sign”) was compared to the contralateral side. A piano-key sign within 2 mm compared to the intact side was judged stable.

RESULTS

Forty-seven patients had a DASH score less than 20 points, 7 between 20 and 40, and 8 had a score higher than 40 (fig 2). The mean score was 17.3 (range : 0 to 74).

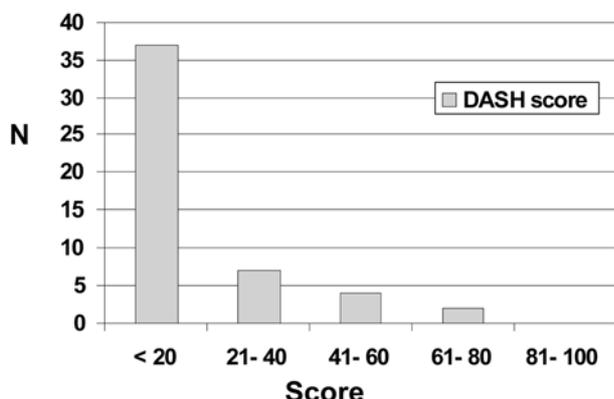


Fig. 2. — DASH score

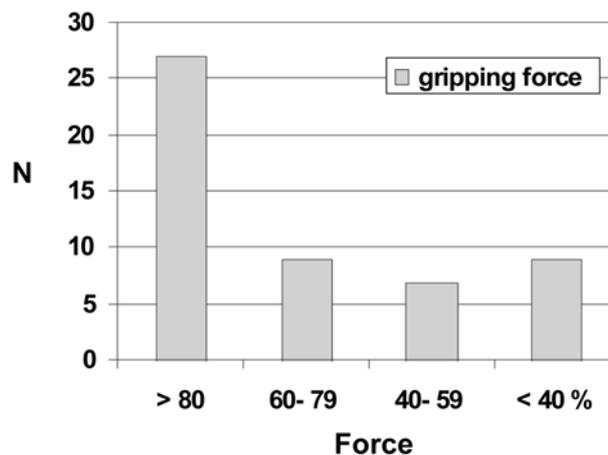


Fig. 4. — Grip force

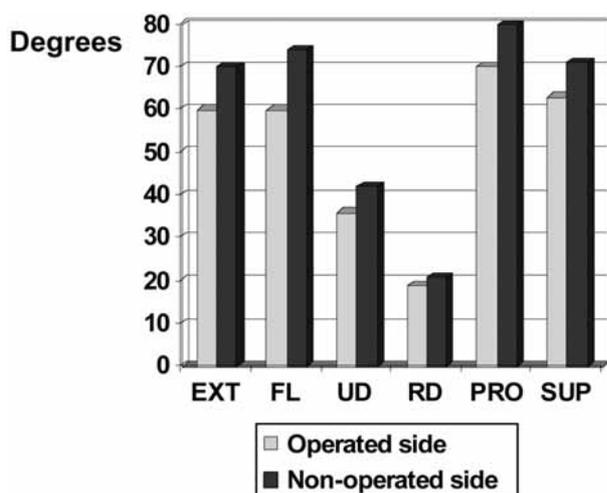


Fig. 3. — Range of motion of the wrist. (EXT extension, FL flexion, UD ulnar deviation, RD radial deviation, PRO pronation, SUP supination).

The VAS for pain was less than 4.0 (0 no pain, 10 maximal pain) in 47 patients. The mean value was 2.43 (range : 0 to 8).

The DRUJ was judged stable in 49 patients with disappearance of local tenderness, absent piano-key sign and no pain on forearm rotation.

The range of motion still remained somewhat limited compared to the non-operated side (fig 3).

The mean grip force was 80% of the contralateral side (range : 26 to 117) (fig 4). There were no significant correlations between DASH, gripping force and mobility.

DISCUSSION

The TFCC has been studied extensively (1, 5, 9, 10, 15-18, 23-25, 27, 29). In 1989, Palmer classified TFCC-lesions into 2 groups : traumatic (type I) and degenerative (Type II) (26). The vascularity of the TFCC has been studied with the purpose of predicting the healing capacity of TFCC lesions (2, 4, 19). Only the ulnar rim seems to be vascularised : sutures in the central or radial part are rather hazardous and only ulnar avulsions (Palmer Type I-B) should be good candidates for repair. However there is no scientific proof of real, biomechanically solid healing of the TFCC after suturing.

Following Warren's technique for meniscal sutures (30), we described in 1993 a similar arthroscopic TFCC suturing technique (32). A preliminary report in 1998 (8) could demonstrate that the results were similar to those of open procedures. Other techniques have been described since (3, 6, 11, 21, 22, 31), but without clinical results.

The DASH score with a focus on disability and subjective self-assessment of upper limb function (14) was used in this survey. This score and the VAS for pain gave satisfying results.

In 1991 a series of 13 patients with open reinsertions of the TFCC, resulted in a favourable outcome in ten (13). Only a few follow-up series of arthroscopic sutures of the TFCC are available for

comparison. Trumble *et al* (28) in 1997 reviewed 24 wrists and found a significant pain relief. A multicenter study reported by Corso *et al* (7) in 1997 found 93% excellent and good results. In 1999, Haugstvedt and Husly (12) reported 20 patients with a 70% satisfactory outcome. This study confirms these previous papers, as well as our preliminary report of 1998 (8). In a further series of 35 patients published in 2002, 29 had a good result (20). The technique is easy and the required equipment is available in all operating theaters. Some basic questions still remain unanswered.

At this moment it is not possible to demonstrate healing of the TFCC, with or without suturing. Even when healing is present, assuming that a second look arthroscopy should have been done, it is not sure that the scar tissue is solid enough to resist the forces generated during forearm rotation. The fact that there is a significant improvement of the preoperative symptoms and the fact that forearm rotation is slightly limited are an indirect indication that the repaired TFCC fulfills its function. A prospective setup, a standardised operative technique and rehabilitation and a blinded follow-up are the next steps into this confusing and difficult pathology.

REFERENCES

1. Af Ekenstam F. Anatomy of the distal radioulnar joint. *Clin Orthop* 1992 ; 275 : 14-18.
2. Bednar M, Arnocsky S, Weiland A. The microvasculature of the triangular fibrocartilage complex : Its clinical significance. *J Hand Surg* 1991 ; 16-A : 1101-1105.
3. Bohringer G, Schadel-Hopfner M, Petermann J, Gotzen L. A method for all-inside arthroscopic repair of Palmer 1B triangular fibrocartilage complex tears. *Arthroscopy* 2002 ; 18 : 211-213.
4. Chidgey L, Paul C, Bittar E, Spanier S. Histological anatomy of the triangular fibrocartilage. *J Hand Surg* 1991 ; 16-A : 1084-1100.
5. Coleman H. Injuries of the articular disc at the wrist. *J Bone Joint Surg* 1960 ; 42-B : 522-529.
6. Conca M, Conca R, Dalla Pria A. Preliminary experience of fully arthroscopic repair of triangular fibrocartilage complex lesions. *Arthroscopy* 2004 ; 20 : E79-82.
7. Corso S, Savoie F, Geissler W *et al*. Arthroscopic repair of peripheral avulsions of the triangular fibrocartilage complex of the wrist : a multicenter study. *Arthroscopy* 1997 ; 13 : 78-84.
8. De Smet L, Van De Meulebroucke B, Van Ransbeeck H *et al*. Arthroscopic suturing of ulnar avulsions (type 1-B) of the triangular fibrocartilage complex. *Hand Surg* 1998 ; 3 : 35-39.
9. Garcia-Elias M, Domenech-Mateu JM. The articular disc of the wrist. Limits and relations. *Acta Anat* 1987 ; 128 : 51-54.
10. Hagert C. The distal radioulnar joint in relation of the whole forearm. *Clin Orthop* 1992 ; 275 : 56-74.
11. Hanker G. Diagnostic and operative arthroscopy of the wrist. *Clin Orthop* 1991 ; 263 : 165-174.
12. Haugstvedt J, Husby T. Results of repair of peripheral tears in the triangular fibrocartilage complex using an arthroscopic suture technique. *Scan J Plast Rec Surg* 1999 ; 33 : 439-447.
13. Hermansdorfer J, Kleinman W. Management of chronic peripheral tears of the triangular fibrocartilage complex. *J Hand Surg* 1991 ; 16-A : 340-346.
14. Hudak P, Amadio P, Bombardini C. Development of an upper extremity outcome measure : the DASH. *Am J Industr Med* 1996 ; 29 : 602-608.
15. Kauer J. The distal radioulnar joint : Anatomic and functional considerations. *Clin Orthop* 1992 ; 275 : 37-45.
16. Linscheid D. Biomechanics of the distal radioulnar joint. *Clin Orthop* 1992 ; 275 : 46-55.
17. Melone C, Nathan R. Traumatic disruption of the triangular fibrocartilage complex : Pathoanatomy. *Clin Orthop* 1992 ; 275 : 65-73.
18. Mikic Z. Detailed anatomy of the articular disc of the distal radioulnar joint. *Clin Orthop* 1989 ; 245 : 123-132.
19. Mikic Z. The blood supply of the human distal radioulnar joint and the microvasculature of its articular disk. *Clin Orthop* 1992 ; 275 : 19-28.
20. Milants P, De Smet L, Van Ransbeeck H. Outcome study of arthroscopy suturing of ulnar avulsions of the triangular fibrocartilage complex of the wrist. *Chir Main* 2002 ; 21 : 298-300.
21. Nagle D, Benson L. Wrist arthroscopy : Indications and results. *Arthroscopy* 1992 ; 8 (Suppl 2) : 198-203.
22. Osterman A, Terrill R. Arthroscopic treatment of TFCC lesions. *Hand Clin* 1991 ; 7 : 277-281.
23. Palmer A, Werner F. Biomechanics of the distal radioulnar joint. *Clin Orthop* 1984 ; 187 : 26-35.
24. Palmer A, Werner F. The triangular fibrocartilage complex of the wrist. Anatomy and Function. *J Hand Surg* 1981 ; 6-A : 153-162.
25. Palmer A. The distal radioulnar joint. *Hand Clinics* 1987 ; 3 : 31-40.
26. Palmer A. Triangular fibrocartilage complex lesions : A classification. *J Hand Surg* 1989 ; 14-A : 594-606.
27. Palmer A. Triangular fibrocartilage disorders : Injury patterns and treatment. *Arthroscopy* 1990 ; 6 : 125-132.
28. Trumble T, Gilbert M, Vedder N. Isolated tears of the triangular fibrocartilage : management of early arthroscopic repair. *J Hand Surg* 1997 ; 22-A : 57-65.

- 29. Van Der Linden A.** Disk lesion of the wrist joint. *J Hand Surg* 1986 ; 11-A : 490-497.
- 30. Warren R.** Arthroscopic meniscus repair. *Arthroscopy* 1985 ; 1 : 170-172.
- 31. Whipple T, Marotta J, Powell J, Powell J.** Techniques of wrist arthroscopy. *Arthroscopy* 1986 ; 2 : 244-252.
- 32. Zachee B, De Smet L, Fabry G.** Arthroscopic suturing of TFCC lesions. *Arthroscopy* 1993 ; 9 : 242-243.