

Ulnar sided wrist pain and distal radioulnar joint osteoarthritis; is surgical arthroplasty enough?

Ronit Wollstein,¹ H. Kirk Watson,²
Jan Phillips,² Julio Clavijo,¹ Viral Patel,²
Lois Carlson²

¹Department of Surgery, Division of Plastic and Reconstructive Surgery, University of Pittsburgh Medical Center, Pittsburgh, PA; ²The Hand Center, Hartford, CT, USA

Abstract

Distal radioulnar joint (DRUJ) arthritis is a common cause of ulnar wrist pain in rheumatoid and osteoarthritis. Modified arthroplasty for the DRUJ is a minimally invasive procedure for the treatment of isolated DRUJ osteoarthritis. The purpose of this study was to evaluate the efficacy of the procedure and the incidence of related ulnar wrist pathology as well as the incidence of subsequent ulnar wrist surgeries. All patients having modified arthroplasty for the DRUJ between 1994-2008 were retrospectively reviewed. Measurements included range of motion, grip strength, and subjective status. Data regarding other wrist surgeries was recorded. There were 29 patients, 23 of which had a follow-up of over 8 weeks (average 16 months, SD=24). Fourteen patients had no to minimal pain, 6 had pain with heavier activities (2 severe), and 2 reported constant pain at the surgical site. Of the 4 more painful patients, three had additional surgery after the DRUJ arthroplasty. In all 96% of the patients had another procedure involving the ulnar-wrist complex either prior to surgery, at the time of surgery or following surgery for modified arthroplasty. We suggest that pathology involving the ulnar-wrist complex is often a syndrome consisting of multiple related diagnoses including but not limited to arthritis of the DRUJ. Multiple procedures may be needed, or a more aggressive approach such as ulnar head replacement may be indicated so that pathology at both the distal radioulnar and ulnocarpal joints is addressed concomitantly.

Introduction

The ulnar-wrist complex remains unclear and controversial in reference to its basic anatomy, clinical diagnosis and therefore its treatment.^{1,2} Clinical dysfunction in the distal

radioulnar joint (DRUJ) is especially common following distal radius and ulna fractures, in rheumatoid arthritis, and is still being investigated.³⁻⁸ Arthritis in this joint is often seen on radiographs, but the clinical correlation between the radiographic signs, and pain and dysfunction remains unknown.⁹ In addition, other ulnar sided wrist pathology may occur with DRUJ dysfunction such as ulnar styloid fracture, and tear of the triangular fibrocartilaginous complex (TFCC). In rheumatoid arthritis, attenuation of other ligaments can cause additional pathology further complicating the diagnosis. Treatment options include osteotomy, soft tissue repair, ulnar head excision and DRUJ arthroplasty.^{10,11}

Modified arthroplasty for the DRUJ was described by Watson *et al.* in 2002 for the treatment of limited DRUJ arthritis.¹² A minimal procedure consisting of osteophyte removal was attempted, based on the premise that limited surgery may bring relief to osteoarthritic joints.¹³ The results of eleven wrists were reported with an average follow-up period of 30 months. Following our clinical impression that the results of this procedure are limited, the purpose of this study was to evaluate the incidence of additional ulnar wrist procedures performed before, after or at the same time as the modified arthroplasty.

Materials and Methods

All patients having modified arthroplasty for the DRUJ between the years 1994-2008 were retrospectively reviewed. Surgery was performed by the same surgeon. Demographic information was collected, including age, gender, dominance, affected side, occupation, and history of injury, as well as any other wrist/hand diagnoses and surgery. The indications for surgery were prolonged pain on pronation, tenderness over the DRUJ, and discomfort with a piano-key test as well as radiographic findings of DRUJ arthritis.^{14,15} Wrist posteroanterior (PA) views were used to evaluate the existence of DRUJ arthritis and arthritis was defined by narrowing of the joint space with or without osteophytes.

Operative technique: The operative technique has been described and consists of a dorsal approach to the joint with synovectomy and removal of the (usually) proximal osteophytes. No additional soft tissue repair is performed.¹² Following surgery, patients are instructed to start active range of motion within 2-3 days and are followed in hand therapy for an average of 6 weeks.

Measurements at last followup were reviewed, including active and passive range of motion, grip strength, and subjective status. The occurrence of additional surgical proce-

Correspondence: Ronit Wollstein, Department of Surgery, Division of Plastic and Reconstructive Surgery, University of Pittsburgh Medical Center, 3550 Terrace St., Pittsburgh, PA, 15261, USA. Tel. +1.412.624.2924 - Fax: +1.412.648.1987. E-mail: wollst1@verizon.net

Key words: distal radioulnar joint, ulnar wrist pain, arthroplasty, osteoarthritis.

Contributions: RW, conceptualized the study and wrote the manuscript; HKW, treated the patients; JP, evaluated the patients and collected the data; JC, performed the statistical analysis, helped in writing the manuscript; VP, helped in data collection; LC, helped with data collection and writing of the manuscript.

Conflict of interest: the authors declare no conflict of interests.

Received for publication: 21 July 2011.

Revision received: 8 December 2011.

Accepted for publication: 7 February 2012.

This work is licensed under a Creative Commons Attribution NonCommercial 3.0 License (CC BY-NC 3.0).

©Copyright R. Wollstein *et al.*, 2012

Licensee PAGEPress, Italy

Rheumatology Reports 2012; 4:e3

doi:10.4081/rr.2012.e3

dures before, at the same time as, or after the DRUJ arthroplasty were examined, especially those related to pathology of the DRUJ and ulnar wrist. We distinguished between procedures performed on the ulnar wrist and those addressing pathology on the radial wrist. Those that addressed the ulnar wrist were essentially treating the same pathology as our minimal arthroplasty (basically a failure of the minimal DRUJ arthroplasty), while a procedure such as four corner fusion addressed arthritis between the scaphoid and radius and would require a separate surgery to address the DRUJ if painful.

Paired t-test was used for normally distributed differences and Wilcoxon Sign-Rank test for skewed differences. There were 29 patients in all. Average age was 44.2 years (SD=14.2); there were 17 males and 12 females. The characteristics of the population are presented in Table 1.

Results

The average follow up period for the whole group was 21 months (SD 29) with a range of 7 days (one patient not lost to follow-up but unavailable for evaluation) to 8.9 years.

Longer-term data included follow-up prior to any additional surgical procedures. Patients from the originally published series¹² were also included, using the most recently available information. Twenty-three patients had a minimum follow-up period of 8 weeks. These 23 patients had an average followup of 16 months (SD 24), and a range from 8 weeks to 8.9 years.

Functionally, two patients noted problems with activities of daily living and two with heavier activities. Fourteen patients had no to minimal pain, 6 had pain with heavier activities (2 severe), and 2 reported constant pain at the surgical site. Of the 4 more painful patients, three had additional surgery on the ulnar wrist after the DRUJ arthroplasty. One had an anterior transposition of the ulnar nerve at the elbow, one had an extraarticular ulnar wrist procedure performed: triquetral impingement (TILT), and one had a matched ulna arthroplasty, all reporting good function after surgery. The fourth patient was scheduled for a matched ulna arthroplasty, but opted not to have the surgery.

Ten patients (34%) had surgery involving the ulnar side of the wrist and/or DRUJ prior to DRUJ arthroplasty. Prior to surgery, 9 patients (31%) had a diagnosis of ulnar sided wrist pathology other than DRUJ arthritis, and had surgery involving the ulnar wrist complex. These included 5 TFCC repairs, 2 ulnar shortening procedures, 1 DRUJ reconstruction and 1 TILT procedure. Four patients had additional radial wrist procedures, including 1 dorsal wrist arthroplasty, 1 four corner fusion, 1 scapholunate ligament reconstruction and 1 wrist fusion. Two patients had surgery for both the radial and ulnar wrist.

At surgery 14 (48%) patients had one or more concomitant ulnar wrist surgical procedures including the following: 11 triquetral impingement (TILT syndrome), 3 ulnar styloid excisions, 1 pisiformectomy, and 2 co-compart-

ment releases. Four patients had additional wrist procedures, including 2 dorsal wrist arthroplasties, 1 four-corner fusion, and 2 radial styloidectomies.

Seventeen percent (5 patients) had additional surgery after the DRUJ arthroplasty specific to the ulno-carpal/DRUJ complex (4 patients matched ulna arthroplasty, 1 patient TILT and ulna styloidectomy). Two additional patients (7%) had more global wrist procedures after DRUJ arthroplasty: 1 wrist arthroplasty following a 4-corner fusion, and 1 radiolunate limited wrist arthrodesis. Additional soft tissue procedures included 1 anterior transposition, and 1 carpal tunnel release. The average time between the surgeries (modified arthroplasty and additional procedures) was 11 months (SD=21.7).

In all, 96% of patients had another ulnar wrist/DRUJ related procedure prior to, during or after the DRUJ arthroplasty. (Table 2)

Discussion

In this study we found that the majority of patients had an additional ulnar wrist procedure before, during or after the DRUJ arthroplasty (96% of patients). This supports our clinical impression that the results of this procedure are limited. We believe the reason for these results is that most pathologies of the distal radioulnar joint do not occur as isolated problems but rather that they are often accompanied by other related ulnar wrist problems. We suggest that a global approach to ulnar wrist pathology should be practiced, with careful evaluation of the DRUJ as well as ulnocarpal complex.

This *syndrome* approach is supported by the anatomy of the ulnar wrist in which it is difficult to distinguish between anatomic struc-

tures, such as the ligaments surrounding the ulnar head, or extraarticular wrist pathology, such as ulnar styloid impaction syndrome.¹⁶⁻¹⁸ Our clinical examination of the ulnar wrist is not always sensitive enough to distinguish between many of these diagnoses.¹⁷ It is also reasonable that DRUJ pathology is often accompanied by problems in ulnar length and impaction because the pathology affects all aspects of the ulnar wrist. This occurs, for example, in distal radius fractures, where tears of the extensor carpi ulnaris or TFCC and DRUJ disruption can occur concomitantly at the time of injury, or in rheumatoid arthritis where there can be generalized ligamentous attenuation and tears.

The analysis of the results of the surgery was limited by the fact that this is a retrospective review of a small group of patients, but mostly because of the extremely high frequency of concurrent surgeries performed. These results may indicate that the modified DRUJ arthroplasty addresses only one component of the pathology that commonly exists.

At this time we suggest that the indications for modified/minimal DRUJ arthroplasty are limited to early stage, isolated, DRUJ arthritis where synovectomy and minimal osteophyte removal may be helpful, but even then the patient should be counseled that further surgery addressing the ulnar side of the wrist may become necessary. Dysfunction at the DRUJ is frequently accompanied by pathology involving the ulnocarpal wrist. Surgical intervention must address all aspects of the DRUJ and ulnocarpal complex for optimum results (e.g. ulna head excision/replacement, TILT, etc.). Further study is required to more fully evaluate and compare the long term results of procedures aimed at the DRUJ/ulnocarpal wrist complex.

Table 1. Population characteristics.

	Number	Percent
Right handed	23	79.3
Dominant wrist=Involved wrist	20	69
Heavy labor	14	48
Sedentary occupation	13	45
Not working	2	6
History of wrist injury	17	59
History of distal radius fractures	4	14
Rheumatoid arthritis	2	7
Radial sided wrist pain	9	31

Table 2. Treatment of concomitant ulnar wrist pathology.

	Prior to surgery	During surgery	Following surgery	Combined
Patients	9	14	5	28
Percent	31%	48%	17%	96%

References

1. Tham SK, Bain GI. Sigmoid notch osseous reconstruction. *Tech Hand Up Extrem Surg* 2007;11:93-7.
2. Kopylov P, Tagil M. Distal radioulnar joint replacement. *Tech Hand Up Extrem Surg* 2007;11:109-14.
3. Johnston K, Durand D, Hildebrand KA. Chronic volar distal radioulnar joint instability: joint capsular plication to restore function. *Can J Surg* 2009;52:112-8.
4. Villamor A, Rios-Luna A, Villanueva-Martinez M, Fahandezh-Saddi H. Non-union of distal radius fracture and distal radioulnar joint injury: a modified Sauve-Kapandji procedure with a cubitus pro-radius transposition as autograft. *Arch Orthop Trauma Surg* 2008;128:1407-11.
5. Fraser GS, Ferreira LM, Johnson JA, King GJ. The effect of multiplanar distal radius

- fractures on forearm rotation: in vitro biomechanical study. *J Hand Surg [Am]* 2009;34:838-48.
6. Mirarchi AJ, Hoyen HA, Knutson J, Lewis S. Cadaveric biomechanical analysis of the distal radioulnar joint: influence of wrist isolation on accurate measurement and the effect of ulnar styloid fracture on stability. *J Hand Surg [Am]* 2008;33:683-90.
 7. Lisy M, Pink M, Skladal M, Vano M. [Tenodesis for the treatment of chronic instability of the radioulnar joint]. *Acta Chir Orthop Traumatol Cech* 2009;76:34-40. [Article in Czech]
 8. Coffey MJ, Schecker LR, Thirkannad SM. Total distal radioulnar joint arthroplasty in adults with symptomatic Madelung's deformity. *Hand (NY)* 2009;4:427-31.
 9. Kim JP, Park MJ. Assessment of distal radioulnar joint instability after distal radius fracture: comparison of computed tomography and clinical examination results. *J Hand Surg [Am]* 2008;33:1486-92.
 10. Adams BD. Anatomic reconstruction of the distal radioulnar ligaments for DRUJ instability. *Tech Hand Up Extrem Surg* 2000;4:154-60.
 11. Willis AA, Berger RA, Cooney WP 3rd. Arthroplasty of the distal radioulnar joint using a new ulnar head endoprosthesis: preliminary report. *J Hand Surg [Am]*. 2007;32:177-89.
 12. Watson HK, Manzo RL. Modified arthroplasty of the distal radio-ulnar joint. *J Hand Surg [Br]* 2002;27:322-5.
 13. Shannon FJ, Devitt AT, Poynton AR, et al. Short-term benefit of arthroscopic wash-out in degenerative arthritis of the knee. *Int Orthop* 2001;25:242-5.
 14. Moriya T, Aoki M, Iba K, et al. 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.
 15. Tanaka T, Yoshioka H, Ueno T, et al. Comparison between high-resolution MRI with a microscopy coil and arthroscopy in triangular fibrocartilage complex injury. *J Hand Surg [Am]*. 2006;31:1308-14.
 16. Infanger M, Grimm D. Meniscus and disc lesions of triangular fibrocartilage complex (TFCC): treatment by laser-assisted wrist arthroscopy. *J Plast Reconstr Aesthet Surg* 2009;62:466-71.
 17. Vezeridis PS, Yoshioka H, Han R, Blazar P. Ulnar-sided wrist pain. Part I: anatomy and physical examination. *Skeletal Radiol* 2010;39:733-45.
 18. Hagert E, Persson JK, Werner M, Ljung BO. Evidence of wrist proprioceptive reflexes elicited after stimulation of the scapholunate interosseous ligament. *J Hand Surg Am* 2009;34:642-51.