

Pisiform Impingement After Total Wrist Arthroplasty

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We present a 64-year-old woman with rheumatoid arthritis who developed increasing pain 3 years after a total wrist arthroplasty. The pain was localized over the ulnar side of the wrist secondary to erosion of the pisiform. Pisiform excision resulted in a resolution of the symptoms. When placing a carpal component, which includes a base plate as part of its design, care should be taken to avoid any overhang of the implant edge into the pisotriquetral joint. (*J Hand Surg* 2007;32A:334–336. Copyright © 2007 by the American Society for Surgery of the Hand.)

Key words: Pisiform, rheumatoid, wrist arthroplasty complication, impingement.

Total wrist arthroplasty has evolved to become a reasonable treatment option for the severely degenerative rheumatoid wrist. Several different designs of total wrist implants currently are available, each with specific advantages and disadvantages. Outcomes using these systems have been encouraging, with Menon¹ reporting 88% excellent pain relief using the original design. Dislocations complicated the early wrist implant designs; however, the newest versions include modifications to maximize joint stability and implant fixation.² A painful wrist arthroplasty may result from distal ulnar instability, implant loosening, dislocation, fracture, or infection. We report a patient with postoperative impingement of the pisiform on the volar aspect of the implant at the carpal component edge.

Case Report

A 64-year-old woman presented to our institution with long-standing, progressively worsening pain and deformity in the left nondominant wrist secondary to rheumatoid arthritis. In August 2003, she had an uncemented total wrist arthroplasty and a Darrach procedure using an implant (Universal 2 implant; KMI, Carlsbad, CA). After surgery she had symptomatic distal ulna instability for which she had an eventual transfer of half of the flexor carpi ulnaris, followed by allograft dermis (AlloDerm, LifeCell Corp., Branchburg, NJ) wrapping to her distal ulna stump with resolution of symptoms.

At the 2-year follow-up examination, the patient's wrist range of motion was 55° of extension, 15° of flexion, 15° of ulnar deviation, 10° of radial deviation, 90° of pronation, and 85° of supination. Grip strength reached 60% of the nonoperated side. Subjectively, she had no pain with the left wrist and was very satisfied with its function.

Approximately 3 years after the index procedure she presented with worsening pain (8 of 10) localized on the volar, ulnar aspect of the wrist. A posteroanterior radiograph showed a well-positioned total wrist implant (Fig. 1). The lateral radiograph showed excellent implant alignment, but some shape change to the pisiform along the volar edge of the carpal base plate (Fig. 2). An oblique, fluoroscopic examination confirmed pisiform impingement on the implant carpal component edge. A diagnostic injection of 1% lidocaine adjacent to the pisiform provided temporary relief.

The pisiform was excised surgically through a curvilinear, longitudinal volar incision. During surgery the pisiform was noted to have a groove and erosion on the articular surface opposite the edge of the carpal component base plate (Fig. 3). The pisiform appeared to impinge directly onto the edge of the carpal component. No histologic examination was performed, despite the presence of metallic wear debris. At the first 2-week postoperative follow-up examination, the patient noted complete resolution of pain at the ulnar side of the wrist and maintained the preoperative range of motion.

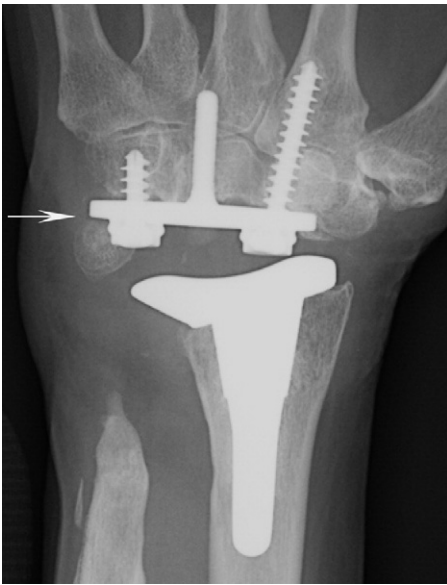


Figure 1. Postoperative, posteroanterior radiograph showing excellent position of a total wrist arthroplasty implant. A white arrow highlights the area of potential pisiform/carpal base plate impingement.

Discussion

Treating the symptomatic rheumatoid wrist presents many challenges. In the advanced disease state, the surgeon may offer either arthrodesis or arthroplasty. Until recently, arthrodesis offered the most reliable treatment for pain relief because of the high complication rate for older wrist arthroplasty implant de-



Figure 2. Postoperative lateral radiograph shows a well-aligned implant and suggests some contour change of the pisiform opposite the carpal base plate (white arrow).

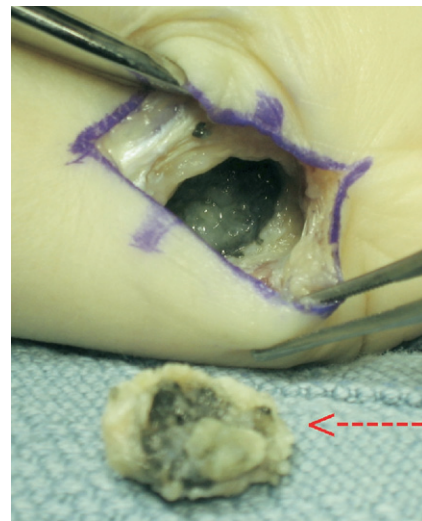


Figure 3. Intraoperative photograph shows a groove worn in the pisiform articular surface and surrounding wear debris.

signs; however, the literature now indicates higher patient-rated outcomes after arthroplasty using fourth-generation implants in the rheumatoid population.³ Rheumatoid patients also perform activities of daily living with more ease after arthroplasty when compared with those treated with wrist arthrodesis.⁴

The 2 primary complications after total wrist arthroplasty are soft-tissue imbalance and loosening of the distal portion of the prosthesis.⁵ Early metal and polyethylene arthroplasty designs were fraught with complications, with rates ranging from 15% to 53% across series.⁶ Second- and third-generation wrist implants were designed specifically to minimize loosening and to provide a more stable, anatomically shaped articulation; however, these designs still experienced a 9% to 14% dislocation rate.^{1,7} In 2002, the fourth generation of wrist implants was introduced (Universal 2 implant), which offered further improvement on initial designs with emphasis on limiting bony resection, implant stability, and more accurate restoration of radial tilt.² Other manufacturers have followed with similar design parameters using a carpal component that contains fixation screws and a base plate (Small Bone Innovations, Morrisville, PA). Any total wrist implant that uses a resection plane in the carpus through the capitate head region and a base plate on the carpal component appears to have a risk for pisiform impingement on the base plate if the base plate is sized incorrectly (uncovered by bone) or malaligned (shifted ulnarly within the remaining carpus).

Total wrist arthroplasty complications include infection, hematoma, soft-tissue imbalance, disloca-

tion, implant loosening, implant failure (silicone implants), and distal radius fracture.^{8,9} We found no mention of pisiform-derived complications in the literature. In 2004, Adams² published a review of wrist arthroplasties that included early results with a redesigned implant (Universal 2, KMI, Carlsbad, CA). In a series of 25 patients, he reported excellent fixation, functional range of motion, and pain relief in all patients; however, 5 patients experienced mild ulnar-sided wrist discomfort. There was no further explanation or specific diagnosis given for this pain.

Ulnar-sided wrist pain after complete distal ulnar excision in conjunction with total wrist arthroplasty should not be expected unless distal ulnar stump instability develops. The patient presented in this article shows another potential source of ulnar-sided pain related to pisiform impingement on the carpal base plate. Surgeons should take care to examine the carpal base plate size and alignment during total wrist arthroplasty to ensure that pisiform impingement does not occur. If intraoperative evidence of potential impingement exists, concomitant excision of the pisiform at the index procedure seems warranted.

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References

1. Menon J. Universal Total Wrist Implant: experience with a carpal component fixed with three screws. *J Arthroplasty* 1998;13:515–523.
2. Adams BD. Total wrist arthroplasty. *Orthopedics* 2004;27:278–284.
3. Vicar AJ, Burton RI. Surgical management of the rheumatoid wrist—fusion or arthroplasty. *J Hand Surg* 1986;11A:790–797.
4. Murphy DM, Khoury JG, Imbriglia JE, Adams BD. Comparison of arthroplasty and arthrodesis for the rheumatoid wrist [erratum appears in *J Hand Surg* 2003;28A:875]. *J Hand Surg* 2003;28A:570–576.
5. Lorei MP, Figgie MP, Ranawat CS, Inglis AE. Failed total wrist arthroplasty. Analysis of failures and results of operative management. *Clin Orthop* 1997;342:84–93.
6. Vogelien E, Nagy L. Fate of failed Meuli total wrist arthroplasty. *J Hand Surg* 2003;28B:61–68.
7. Divelbiss BJ, Sollerman C, Adams BD. Early results of the Universal total wrist arthroplasty in rheumatoid arthritis. *J Hand Surg* 2002;27A:195–204.
8. Jolly SL, Ferlic DC, Clayton ML, Dennis DA, Stringer EA. Swanson silicone arthroplasty of the wrist in rheumatoid arthritis: a long-term follow-up. *J Hand Surg* 1992;17A:142–149.
9. Dawson WJ. Radius fracture after total wrist arthroplasty. *J Hand Surg* 1989;14A:630–634.