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Special Issue

## Update on the surgical treatment for rheumatoid arthritis of the wrist and hand

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### ABSTRACT

Surgical procedures for the treatment of rheumatoid arthritis are aimed at restoring function and decreasing pain. Over the past four decades multiple procedures have been described in the management of early and late disease. This article will review the most common forms of surgery used in the treatment of rheumatoid arthritis.

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### Introduction

Rheumatoid arthritis (RA) is a systemic inflammatory polyarthropathy that results in detrimental functional and esthetic changes to the joints of the body. Through an autoimmune mediated mechanism, RA causes synovial inflammation and hyperplasia, autoantibody production, bone and cartilage destruction and other systemic complications.<sup>1</sup> In the upper extremity, the wrist and joints of the hand are often affected. Wrist involvement is seen in up to 50% of patients within 2 years of diagnosis and in up to 90% of patients 10 years following diagnosis.<sup>2</sup> RA affecting the hand and wrist can impair the patient's ability to work and perform activities of daily living.<sup>3,4</sup> Unfortunately, RA is characterized by its lack of spontaneous remission<sup>5</sup>; thus without medical management, the disease usually leads to progressive deterioration of hand function.

Surgery for RA is aimed at restoring function, relieving pain, and correcting and preventing future deformity.<sup>6</sup> While the timing and

indications for surgery remain an issue of controversy, in general, continued pain and refractory synovitis of 3–6 months duration are indications for surgery.<sup>7,8</sup>

Surgical intervention for RA can be divided into *prophylactic* and *therapeutic* procedures.<sup>9</sup> Prophylactic surgeries remove inflamed synovial or tenosynovial tissue (with procedures termed synovectomy or tenosynovectomy respectively) in an attempt to improve joint function or prevent tendon rupture.<sup>10,11</sup> Therapeutic surgeries focus on improving function and relieving pain in situations where joint destruction and tendon rupture are already present; such procedures include joint fusions and joint replacements.

In general, surgery is staged to address more proximal joints before distal joints. Treatment of the lower extremity is usually performed prior to surgery on the hands or wrists. Surgery is not reserved for patients with quiescent disease, but it is important to coordinate with the rheumatologist how one is going to manage the patient's medications during surgery and the recovery period. Disease modifying medications, particularly the TNF-alpha blocking medications, may compromise healing and place the patient at risk of post-operative infection.<sup>12–15</sup> Collaboration between surgeon and rheumatologist is a key for successful management in these situations.

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Recent articles have focused on the timing of surgical referral for patients with RA, as many patients are referred to the hand surgeon late in their disease course. Patients with longstanding disease often have signs of joint destruction; in such cases many prophylactic surgeries are no longer an option. Delayed surgical referrals have been attributed to poor communication between rheumatologists and hand surgeons, but also to a lack of level one outcome studies to justify surgical intervention over standard medical management.<sup>9,16,17</sup> Despite these shortcomings in outcomes based research, surgery still remains a mainstay for many patients to improve hand function. This article will review the most common forms of surgery currently utilized for the management of RA within the wrist and hand.

### Surgery for the wrist

#### Synovectomy and tenosynovectomy

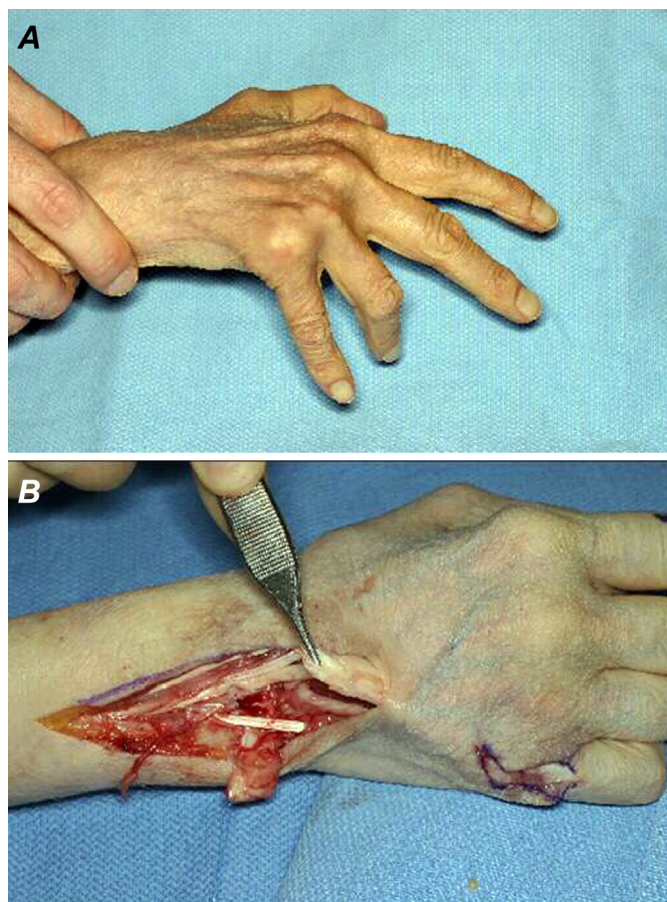
Proliferative synovium and tenosynovium are one of the early hallmarks of rheumatoid disease. Diseased synovium and tenosynovium contains increased amounts of collagenases, cytokines and metalloproteinases which contribute to pain and ligament and tendon rupture.<sup>9,10</sup> Synovectomy of the joint and tenosynovectomy of the tendon is most appropriate in those patients with early disease, relatively well preserved joint motion and moderate swelling.<sup>18</sup> Pain relief following synovectomy is fairly predictable and is related to sensory denervation.<sup>19</sup> It has been presumed that tenosynovectomy can prevent impending tendon rupture and that early joint synovectomy may preserve articular cartilage and ligament function. Unfortunately isolated wrist synovectomy and tenosynovectomy does not correlate with disease remission and at present there is no clear evidence that it produces long-term joint preservation; however publications have suggested that multiple large joint synovectomy can decrease systemic level of inflammatory mediators.<sup>20–25</sup>

Historically radiocarpal synovectomy has been performed through a dorsal wrist incision; however recent advances have allowed the procedure to be performed through an arthroscopic approach.<sup>26</sup> Arthroscopic joint synovectomy has been shown to result in improved function and reduced pain, with increased grip strength and range of motion on short and intermediate follow-up.<sup>27–29</sup> Compared to open synovectomy, arthroscopic synovectomy has been reported to result in similar pain relief, but can result in higher recurrence rates of synovitis and radiographic progression of RA.<sup>30</sup>

Tenosynovitis and joint synovitis in the volar wrist can result in increasing pressure within the carpal canal leading to carpal tunnel syndrome. Median nerve compression through this mechanism can occur in up to 80% of patients with RA.<sup>31</sup> Longstanding median nerve compression can contribute to hand weakness. Volar osteophyte formation in conjunction with tenosynovitis can contribute to tendon rupture, with the most common flexor tendon to rupture being the flexor pollicis longus, followed by the flexor digitorum profundus to the index finger.<sup>32</sup> Pain with resisted flexion of the fingers is suggestive of impending flexor tendon rupture and gross loss of flexor function should be viewed as a sign of tendon rupture and an indication for surgery.

#### Distal radioulnar joint

RA often affects the distal radioulnar joint (DRUJ) early, causing instability and dorsal subluxation of the distal ulna. Tenosynovitis results in subluxation and dysfunction of the extensor carpi ulnaris (ECU) tendon contributing to radial deviation of the wrist. Dorsal migration of the ulna can lead the caput ulnae syndrome and rupture of the extensor tendons producing the Vaughan Jackson lesion (Fig. 1).<sup>33,34</sup>



**Fig. 1.** (A, B) A 73 year old woman who has an inability to extend her small and ring fingers at the MCP joints. There is decreased extension at the long finger MCP joint as well. Physical exam (A) shows a loss of the tenodesis effect during passive flexion of the wrist. Exploration in the operating room shows rupture of the ulnar extensors (B).

The most established surgical option for DRUJ disease in RA is resection of the distal ulnar head (Darrach procedure).<sup>35</sup> Good outcomes have been reported following this procedure.<sup>36,37</sup> Unfortunately, complications are common with the two most common being ulnar translation of the carpus and radio-ulnar impingement. An alternative to the Darrach procedure is the Sauve–Kapandji procedure.<sup>38</sup> This procedure removes a segment of ulna proximal to the ulnar head, and creates a radioulnar arthrodesis between the distal radius and ulnar head at neutral or slightly negative ulnar variance. The ulnar head provides support to the carpus preventing ulnar translation.<sup>39</sup> A variation of this technique is the Masada's shelf arthroplasty procedure,<sup>39</sup> where the ulnar head is instead turned 90° and plugged into the distal radius to provide improved bone-to-bone contact for radiolunate fusion.

Ulnar head arthroplasty may also be considered in some cases of RA. Advantages of arthroplasty include elimination of radio-ulnar impingement, improved function and enhanced stability of the DRUJ compared with the Darrach or Sauve–Kapandji procedures (Fig. 2). Arthroplasty was initially found to have reasonable results in the salvage of failed Darrach procedures.<sup>40–42</sup> Many different designs of the ulnar head prosthesis exist including hemi and complete DRUJ replacement designs, as well as constrained and unconstrained implants.<sup>18</sup> Good results have been reported in the literature in small series but further study is required to determine the best indications for this procedure in the RA population.<sup>41–44</sup>

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