

Tendon Transfers in the Rheumatoid Hand for Reconstruction



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KEYWORDS

• Rheumatoid arthritis • Tendon rupture • Tendon transfer • Hand

KEY POINTS

- Patients with rheumatoid arthritis–induced tendon rupture frequently present in a delayed fashion. Tendinous invasion by inflammatory tissue is common. As such, primary tendon repair is not often possible.
- Tendon transfers are the first-line treatment of patients with rheumatoid arthritis–induced tendon ruptures. However, if a transfer is not possible, tendon grafting may serve a role.
- At the time of surgery, the underlying cause of the rupture should be addressed to prevent future additional tendon ruptures.
- Patients presenting with multiple ruptures typically experience worse outcomes and may require multiple different surgical procedures to restore function.

INTRODUCTION

Rheumatoid arthritis is an autoimmune disease that affects approximately 2% of people more than 60 years of age in the United States.¹ The disease is caused by the so-called rheumatoid factor, a circulating immunoglobulin M molecule with affinity for self-immunoglobulin G molecules. Depositions of rheumatoid factor stimulate macrophage activity, resulting in a cascade of inflammation. Increased levels of proinflammatory cytokines and cells lead to local destruction of the synovial contents. Pannus formation, or synovial hyperplasia, results from this chronic inflammatory response. Over time, chronic erosive changes of the joints lead to soft tissue and bony deformity with formation of bony prominences or spicules, which may cause tendon attrition and later rupture. In addition, synovitis can infiltrate the substance of the tendons, which weakens them. With

compromised tendon integrity caused by this chronic inflammation as well as local tendon irritation secondary to bony prominences, rheumatoid patients frequently develop tendon ruptures.

In the past 15 years there have been significant advances in the medical treatment of rheumatoid arthritis. The increased use of disease-modifying antirheumatic drugs (DMARDs) and the introduction of biologic DMARDs have resulted in a greater proportion of patients experiencing remission or lower disease activity status.^{2,3} The increasing use of these agents has resulted in lower rates of progression of radiographic disease in a prospective observational study following patients for 10 years.²

At present, it is not known whether the improvements in medical management of this disease can influence the rates of tendon rupture. In an observational series of patients who experienced a

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rheumatoid-induced tendon rupture from 2005 to 2010, Gong and colleagues⁴ noted no difference in the number of tendons ruptured, radiographic rheumatoid arthritis severity, and disease duration between 24 patients who were treated for their disease medically and 14 patients who were not. Tendon rupture is a late complication of the disease often presenting a decade or later after diagnosis.⁵ Given that medical treatment has been shown to reduce disease activity and that the rates of radiographic rheumatoid arthritis severity were similar between groups in this study, the initiation of medical treatment of the patients in this series likely occurred too late in the disease process to affect the incidence of tendon rupture. With the advances in the medical management of these patients, the incidence of tendon rupture may significantly decrease in the future.

DIAGNOSIS

Tendon ruptures present when a patient notes a sudden inability to flex or extend a finger or thumb. In a rheumatoid population, these ruptures are often painless and occur during routine use. These ruptures frequently go unnoticed for some time because of the patients' baseline functional limitations, causing a delayed presentation for medical evaluation.⁵⁻⁸

Diagnosis of a tendon rupture in a rheumatoid population requires a thorough history and physical examination. Preexisting deformity and concomitant disorders, including limitations in joint range of motion, can make the diagnosis a challenge. When a patient presents with the inability to flex or extend a digit, alternative diagnoses must first be excluded based on physical examination. Such diagnoses include:

- Tenosynovitis
- Sagittal band rupture
- Metacarpophalangeal (MCP) joint dislocation
- Posterior interosseous nerve (PIN) palsy

Sagittal band rupture is typically a radial-sided tear manifested by ulnar dislocation of the extensor tendon. Patients with either a sagittal band rupture or an extensor tendon rupture lose the ability to actively extend the digit. However, patients with a sagittal band rupture maintain the ability to hold their digits extended against gravity after passive extension, and those with extensor tendon rupture cannot. Patients presenting with MCP joint dislocation have negligible passive range of motion of the joint, in contrast with patients with a tendon rupture. These dislocations can also be identified on standard radiographic images. In addition, patients with rheumatoid arthritis may

also present with elbow synovitis causing a PIN palsy.⁹ This diagnosis should be suspected, as opposed to multiple extensor tendon ruptures, when passive tenodesis, or passive finger extension with passive wrist flexion, shows symmetric extension and flexion.^{7,9}

TENDON GRAFTING VERSUS TENDON TRANSFER

In certain scenarios, tendon grafting may be appropriate for reconstruction following an extensor or flexor tendon rupture. With chronic ruptures, the proximal motor unit becomes contracted and develops adhesions rendering it nonfunctional. However, the literature regarding the optimal timing for tendon grafting in a rheumatoid population is not well defined. Magnell and colleagues¹⁰ reported on a series of 21 patients who underwent tendon grafting for extensor pollicis longus (EPL) reconstruction. They stated that acceptable results were obtained up to 21 weeks post-rupture. However, this series included only 2 patients with rheumatoid arthritis who underwent surgical intervention at 1 and 4 weeks post-rupture. Chung and colleagues⁵ showed good results in a series of 28 rheumatoid patients treated with tendon grafting at an average of 18 weeks post-rupture. In contrast, Nakamura and Katsuki¹¹ noted an unacceptable loss of finger flexion with an average postoperative fingertip-to-palm distance of 1.6 cm when performing tendon grafting on 14 patients with rheumatoid arthritis-induced extensor tendon ruptures at an average of 12 weeks. These investigators noted that intraoperative tendon excursion of the proximal motor unit was greater than 2 cm in all cases and their grafts were sewn with greater tension than those of previous investigators, suggesting that graft over-tensioning rather than muscle contracture may have caused the suboptimal clinical outcomes. Taken together, these findings suggest that tendon grafting may be possible up to 20 weeks post-rupture in rheumatoid patients.

Some investigators have suggested that tendon grafts are prone to adhesion formation in rheumatoid tissue and should be avoided.^{7,8,12} However, this recommendation consists of expert opinion and primary literature is lacking. Meanwhile, others have shown good functional results and improved biomechanical properties using tendon grafting for the repair of extensor tendon ruptures in this patient population.^{13,14}

Comparative studies between tendon grafting and tendon transfer for the repair of extensor tendon ruptures in rheumatoid patients are lacking in the literature. One retrospective review

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