

(i) The principles of surgery in the rheumatoid hand and wrist

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Abstract

The indications for surgery to the rheumatoid hand and wrist are relief of pain, improvement or preservation of function, correction of deformity, and cosmesis. The systemic, progressive and multi-articular nature of the disease gives decision-making a greater degree of complexity than is found in other areas of hand surgery. There are strong arguments for making decisions about surgery in a combined medical/surgical clinic at which all those responsible for the patient's management contribute. Operative procedures include nerve decompression, synovectomy, tenosynovectomy, tendon surgery, arthroplasty and arthrodesis. Severe nerve compression and impending tendon rupture are indications for urgent operation. Stable internal fixation with buried implants is the preferred method for arthrodesis in the arthritic hand. The results of arthroplasty depend on appropriate function and balance in the soft tissues, which may be sub-optimal in rheumatoid disease.

Keywords hand surgery; principles; rheumatoid arthritis; wrist surgery

Rheumatoid arthritis is a chronic progressive autoimmune disorder characterized by inflammation in synovial joints. It causes a distal symmetrical small-joint polyarthropathy that typically affects the proximal interphalangeal (PIP) and metacarpophalangeal (MP) joints of the hands, wrists, ankles, metatarsophalangeal joints, knees and cervical spine. The elbows, shoulders and hips are less frequently affected but can cause severe disability.

The prevalence of rheumatoid arthritis in Great Britain and in most other populations worldwide is about 1%. Although it is primarily a disease of synovial tissue, its systemic manifestations alter the tissue's response to surgical injury and the patient's response to anaesthesia and surgery. The surgeon needs to understand the nature and natural history of the disease as well as something of its medical management.

Diagnosis of rheumatoid arthritis

Rheumatoid arthritis is defined by the presence of four of the seven diagnostic criteria established by the American College of Rheumatology.¹

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- Morning stiffness lasting at least one hour
 - Arthritis of three or more joint areas
 - Arthritis of hand joints
 - Symmetrical arthritis
 - Rheumatoid nodules
 - Serum rheumatoid factor positive
 - Typical radiological changes in the hands and feet
- Criteria 1–4 must be present for at least 6 weeks. Arthritis means, in this context, soft-tissue swelling or fluid in a joint, observed by a physician.

Although these criteria identify patients at risk of a poor prognosis, they perform poorly in the crucial recognition of early disease.

Seropositivity for rheumatoid factor does not, on its own, make the diagnosis of rheumatoid disease, but the disease tends to be more severe in seropositive individuals.

Anticyclic citrullinated peptide antibody (anti-CCP) is highly specific for the disease and is particularly useful diagnostically and prognostically in patients who are seronegative for rheumatoid factor.² It has been shown to have a similar specificity but a higher sensitivity than rheumatoid factor and may be able to provide prognostic information.

Rheumatoid nodules affect 25% of patients with rheumatoid arthritis. They are associated with positive serum rheumatoid factor and may become worse on methotrexate therapy. Histological examination shows central fibrinoid necrosis surrounded by palisades of fibroblasts and chronic inflammatory cells. Nodules are very occasionally seen in the absence of arthritis in seropositive individuals.

Mechanisms of tissue damage

Rheumatoid synovium produces matrix metalloproteinases (MMPs), a family of enzymes that collectively degrade all components of connective tissue. Cytokines secreted from macrophages or synoviocytes in rheumatoid synovium, such as tumour necrosis factor alpha α (TNF α) and several interleukins, induce the expression of MMPs that degrade the matrix components of bone, cartilage, ligaments and tendon. These processes are susceptible to biological therapies such as those targeted at tumour necrosis factor alpha (TNF α). Synovitis typically erodes bone at the origin and insertion of collateral ligaments.

Early diagnosis of rheumatoid disease

There is good evidence that early recognition and treatment of persistent inflammatory arthritis can prevent irreversible joint damage; during this "window of opportunity", disease-modifying treatment can have long-term benefits. Early recognition and treatment is now the focus of advice to GPs in guidance from the National Institute for Health and Clinical Excellence (NICE),³ and surgeons should also be alert to the possibility of this diagnosis. Assessments such as the Disease Activity Score (DAS28) (<http://www.das-score.nl/www.das-score.nl/>) are helpful in monitoring the response to treatment.

Stages of rheumatoid disease

It is conventional to divide rheumatoid disease into three stages:

- 1 **Early:** acute or subacute synovitis without destruction of soft tissues or articular surfaces. The management is largely

medical but surgery may be required to relieve nerve compression. Rarely, a single joint or synovial tendon sheath that is unresponsive to medical treatment requires synovectomy.

- 2 **Intermediate:** involvement of synovial-lined tendon sheaths impairs tendon excursion and may lead to rupture. Erosions appear in articular surfaces. Synovectomy with or without soft-tissue reconstruction or realignment, tenosynovectomy and nerve compression are typical of procedures performed during this stage.
- 3 **Late:** reconstructive procedures such as arthroplasty and arthrodesis are required to relieve pain, improve function and correct deformity of joints whose articular surfaces have been destroyed.

Medical management

Advances in the medical management of rheumatoid arthritis have reduced the number and altered the spectrum of cases presented to hand surgeons. Early combination therapy with disease-modifying therapy anti-rheumatic drugs (DMARDs) (including methotrexate and at least one other DMARD) within 3 months of the onset of persistent symptoms is recommended by NICE.³ Glucocorticoids can be used for short-term treatment of disease flares but long-term treatment is not recommended unless all other treatment options have been offered. Biological agents such as TNF α inhibitors, which are used when standard DMARD therapy has failed, can be dramatically effective. Uncontrolled synovitis is a less common indication for surgery than previously, although surgery is still frequently required for joints damaged by disease in the past.

Advice from a therapist on joint protection strategies can help to reduce pain and local inflammation, preserve the integrity of joint structures and improve function in the short term, and possibly also in the long term.

Timing of referral for surgery

The perception of successful surgical intervention between rheumatologists and hand surgeons varies⁴; rheumatologists may underestimate and surgeons may overestimate the benefits of surgery. The variation is deep seated and research shows that it has persisted through generations of doctors. NICE recommends early surgical referral when, in spite of optimal medical management, there is worsening joint function, progressive deformity, persistent localized synovitis or persistent pain resulting from joint or soft-tissue damage. Early referral is also indicated for imminent or actual tendon rupture and nerve compression, to prevent irreversible damage.³

Decision-making

The systemic, progressive and multi-articular nature of the disease gives decision-making a greater degree of complexity than is found in other areas of hand surgery. It requires knowledge not only of the likely outcome of any surgical procedure but also of the effects of continuing disease on the operated area over time. Operative treatment may be required in stages over many years. The rheumatologist, therapists and others involved in the long-term care of the patient have knowledge of the individual's

disease, response to treatment, functional impairment and adjustment to disability that cannot be acquired by the surgeon in an ordinary outpatient consultation. There are strong arguments for making decisions about surgery in a combined medical/surgical clinic at which all those responsible for the patient's management can contribute. This approach also integrates the surgeon into the team of management and facilitates the long-term relationship with the patient in what is often a long-term campaign against the disease.

Expectations of hand surgery need to be realistic. Hand surgery cannot restore full function in rheumatoid arthritis. It can be very effective in relieving pain, correcting deformity and improving function but less effective in improving the range of motion (except for tendon reconstruction) or grip strength, which is often very low in patients with rheumatoid arthritis. Surgery is generally not advisable for patients with early disease who, understandably, wish to regain full hand function. Appropriate medical therapy, modification of activity, advice on joint protection and an understanding of the disease are needed at that stage.

Some patients function well and have little pain despite multiple joint damage. Often these are older individuals who have adjusted to the disease and place low demands on the hands. Extensive reconstructive surgery is unlikely to be of benefit, though simple procedures such as thumb MP joint fusion can be useful in selected cases.

A low revision rate is a desirable property of reconstructive procedures in the rheumatoid hand, bearing in mind that these patients may require many operations during the course of the disease. Procedures that often require revision, or which create situations where salvage is difficult, are best avoided.

Functional assessment

The severely affected rheumatoid hand may present a bewildering set of deformities; it can be hard to know where to start, or indeed whether to start at all. The effect of hand deformity on the function of the individual is influenced by pain, stiffness and deformity at more proximal joints, as well as by age, occupation, handedness and social circumstances. Assessment of hand function by an experienced occupational therapist can greatly assist the decisions on treatment, as well as providing advice on mechanical aids to activities of daily living. For example, flexion and ulnar deviation deformity of the MP joints of the fingers may be compatible with good function overall if pain is mild and interphalangeal joint flexion is good. MP joint replacement, which can diminish the range of flexion, might be contra-indicated if finger flexion was severely limited in the opposite hand. Conversely, fusion of an unstable thumb MP joint is likely to improve the function of the hand almost regardless of its other problems.

Sequence

The first priority in the hand and wrist is to protect structures that are at risk of irretrievable functional loss. The prime example is tendon rupture, for the results of reconstruction are far from perfect and a simple extensor tenosynovectomy will usually protect the tendons from rupture over the long term. Leaving this consideration aside, a good principle in rheumatoid surgery is to deal first with the joint that is giving the patient the

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