Surgical management of the rheumatoid hand and wrist

Feiran Wu

Sumedh Talwalkar

Abstract

Management of the patient with rheumatoid arthritis of the hand and wrist demands a methodical approach. Multidisciplinary assessment and treatment in conjunction with a rheumatologist and dedicated hand therapist are essential. Initial treatment should be conservative. However, when patients develop severe deformities refractory to medical treatment, or there is impending tendon rupture or nerve compression, surgical intervention is required. This article aims to provide a current review of the principles and common conditions in surgery for rheumatoid arthritis of the hand and wrist.

Keywords boutonierre deformity; distal radio-ulnar joint instability; rheumatoid arthritis; rheumatoid hand; rheumatoid wrist; swan neck deformity; tendon rupture; total wrist replacement

Introduction

The function of the hand can be considered in four categories: pinch, grasp, precise manipulation and activities of daily living.[1] In rheumatoid arthritis (RA) minor impairments in movement, strength, dexterity or sensation can combine to have a huge impact. Joint damage and tendon ruptures are common in these patients, leading to severe deformities that hinder the ability to grip, grasp and pinch.

RA is a progressive, systemic, inflammatory autoimmune condition that affects the synovial lining of mainly diarthrodial joints and tendon sheaths. Its estimated prevalence in the UK is 1.2% in women and 0.4% in men, with the hand affected in more than 70% of patients.[2]

Diagnosis

The American College of Rheumatology and European League Against Rheumatism collaborated to create new classification criteria for the diagnosis of RA in 2010.[3] The diagnostic features can be broken down into: number of joints involved, serology for rheumatoid factor and anti-citrullinated protein antibody (ACPA), elevated acute phase reactants and duration of symptoms (Table 1).

Feiran Wu **MA MB BChir (Cantab) FRCS (Tr & Orth)** *Training Interface Group Hand Fellow, Upper Limb Unit, Wrightington Hospital, Wigan, UK. Conflicts of interest: none declared.*

Sumedh Talwalkar **MBBS MCh(Orth) FRCS (Tr & Orth)** *Consultant Hand and Upper Limb Surgeon, Upper Limb Unit, Wrightington Hospital, Wigan, UK. Conflicts of interest: none declared.*

American College of Rheumatology criteria for the diagnosis of rheumatoid arthritis (RA)

A. Joint involvement	1 large joint	0
	2–10 large joints	1
	1–3 small joints	2
	4–10 small joints	3
	>10 joints (at least 1 small joint)	5
B. Serology	Negative RF and negative ACPA	0
	Low positive RF or low-positive ACPA	2
	High positive RF or high-positive ACPA	3
C. Acute-phase reactants	Normal CRP and normal ESR	0
	Abnormal CRP or abnormal ESR	1
D. Duration of symptoms	<6 weeks	0
	≥6 weeks	1

Patients should be tested if: 1. They have at least one joint with definite clinical synovitis. 2. The synovitis cannot be explained by another disease. Total score ≥6/10 is classified as RA.
Data from reference [3].
ACPA, anti-citrullinated protein factor; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; RF, rheumatoid factor.

Table 1

In contrast to the previous classification, the new criteria do not include presence of rheumatoid nodules or radiographic erosive changes, both of which are less likely in early RA. Symmetric arthritis is also not required in the 2010 criteria, allowing for early asymmetric presentation.

Non-operative management

Early recognition and diagnosis of RA can prevent irreversible joint damage through the appropriate commencement of medical interventions. This is now the focus of advice to primary care from the National Institute for Health and Clinical Excellence (NICE).[4] Three classes of drugs are used: non-steroidal anti-inflammatory agents (NSAIDs), corticosteroids, and disease-modifying antirheumatic drugs (DMARDs).[5] While NSAIDs help to reduce joint inflammation and corticosteroids can regulate immune system activity, neither are able to change the disease course or improve radiographic outcomes. DMARDs can be non-biological, of which the most common is methotrexate, or biological. Biological agents can be divided into tumour necrosis factor (TNF) inhibitors and interleukin-1 (IL-1) receptor antagonists. Only biological DMARDs have been shown reduce the activity of RA and improve radiographic outcomes.[5,6]

NICE recommends early combination therapy using DMARDs within 3 months of the onset of persistent symptoms.[4] Surgical intervention, however, should be considered when joint damage occurs, deformity develops or when patients are unresponsive to medical management. Early referral is also indicated for imminent or actual tendon rupture and nerve compression, to prevent irreversible damage.

Stages of disease

Four stages of clinical presentation have been described. In stage 1, the synovitis has been present for less than 6 months and medical treatment is recommended. In stage 2, the synovitis has

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been present for more than 6 months and surgery may be indicated as an adjunct to medical management. In stage 3, specific deformities have developed that are suitable for surgical reconstruction and in stage 4, arthritis mutilans, salvage procedures are indicated.[7] Typical treatments in stage 2 and 3 include synovectomy with or without soft-tissue reconstruction or realignment, tenosynovectomy and nerve decompression. Treatments in stage 3 and 4 includes arthroplasty and arthrodesis in addition to those already described to relieve pain, improve function and correct deformity.

Plain radiographs are routinely employed for diagnosis and monitoring. Larsen employed reference radiographs to score any synovial joint in the hand and foot on a scale from 0 to 5, based on joint space narrowing and erosions, to give a final score that ranged from 0 to 250 (Table 2).[8] Radiographs have their limitations, however. Changes occur slowly and radiographic joint space narrowing does not correlate with erosions.[9] These are more reliably detected using high-resolution B-mode ultrasound, although neither are as sensitive as clinical examination.[10] Magnetic resonance imaging is sensitive for the detection of erosions and has a role in diagnosis in those who are negative for ACPA antibodies.[11]

Surgical assessment

The progressive, multi-articular and systemic nature of RA increases its complexity in hand surgery. The patient may commonly require multi-stage surgery and a multidisciplinary approach in conjunction with rheumatologists and hand therapists can facilitate a helpful long-term relationship with the patient.

The severely affected rheumatoid hand may initially seem to present a multitude of complex problems and it can be difficult to know where to start. Assessment of hand function by experienced hand therapists can greatly assist with decision-making. Generally, the rheumatoid surgeon will address any lower limb problems before upper limb, to not compromise the outcome of any upper limb reconstructive procedures through the use of walking aids.

Larsen score for scoring rheumatoid arthritis of the hand	
Score	
0	Intact bony outlines and normal joint space
1	Erosion less than 1 mm in diameter or joint space narrowing
2	One or several small erosions, diameter more than 1 mm
3	Marked erosions
4	Severe erosions, where there is usually no joint space left and the original bony outlines are partly preserved
5	Mutilating changes, where the original bony outlines have been destroyed

Data from reference [8].

Table 2

In the upper limb, joints are addressed in a proximal to distal direction. The reasons are twofold: firstly, proximal deformity can result in distal imbalance and deformity that would result in early recurrence after reconstruction, if not addressed; secondly, there is limited value in a functioning hand if it cannot be moved in space to a position to perform the task. In the hand, the priority is to protect structures that are at risk of irretrievable functional loss, such as tendon rupture. The results of reconstruction can be less than perfect and a simpler tenosynovectomy will usually protect the tendons from rupture in the long term.[12] In general, surgery for the rheumatoid hand and wrist falls into one of six groups: nerve decompression, synovectomy, tenosynovectomy, tendon surgery, arthroplasty and arthrodesis. Judgement regarding the type and timing of surgical procedures for reconstruction requires experience. Better results are possible when reconstruction is performed before severe fixed contractures occur and before significant subluxation or dislocation develops. After the capsule and supporting ligamentous structures have stretched, the lack of adequate soft tissue support makes maintenance of joint alignment and function more difficult.

The patient's expectations should match the surgeon's goals and anticipated results. Hand surgery can lead to disappointing results in those with significant destruction of multiple joints but who have minimal pain and functional deficit. The disease should be under good medical control prior to any surgical procedures, except perhaps in the case of severe nerve entrapment or impending tendon rupture. If the disease is active, the result of any operative reconstruction may be jeopardized. Moreover, the indication for surgery may diminish (e.g. joint pain) once the disease is brought under control medically. The priorities for surgery in descending order are: 1. Treat impending tendon rupture or severe nerve compression; 2. Alleviate pain; 3. Prevent loss of or improve function; 4. Improve cosmesis.

Preoperative assessment

RA is a systemic disease and a careful preoperative evaluation is necessary before surgery. Cervical spine involvement is common and may be subtle. Stability should be assessed clinically as well as radiographically and a history of numbness or paraesthesia with cervical motion must be noted. Pulmonary involvement from the disease itself (rheumatoid nodules or interstitial fibrosis) or as a consequence of antirheumatic therapy can compromise lung function. Felty's syndrome (splenomegaly and neutropenia) is rare but can cause a profound decrease in the white blood cell count and thereby increase susceptibility to infection.

Patients with RA suffer higher rates of infection at baseline compared to other patients without RA.[13] Optimizing the use of immunosuppressants in the perioperative period is essential. Methotrexate is a cornerstone of antirheumatic therapy. The majority of studies demonstrate safety of methotrexate use in the perioperative period, although conflicting results are shown in randomized controlled trials, with one small study demonstrating an increased risk of infection.[14] The American College of Rheumatology does not provide recommendations on the perioperative management of non-biological DMARDs due to the conflicting data.[15] Medication management requires a risk-

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benefit discussion between patients, surgeons, and rheumatologists.

Multiple studies evaluating the perioperative risk of TNF inhibitors as compared to non-biological DMARDs have shown differing results in the association of drug cessation in the perioperative period and infection. American College of Rheumatology guidelines recommend withholding biological therapy for at least 1 week before and after surgery with further adjustment to that time-frame depending on the pharmacokinetics of the individual agent.[15] The British Society for Rheumatology guidelines recommend balancing the potential risk of infection from stopping treatment with the risk of a perioperative flare in RA activity. If TNF inhibitors are to be stopped, it should be for three to five half-lives of the relevant drug before surgery.[16]

Common conditions

Nerve compression

Carpal and cubital tunnel syndromes are common in RA. The indications for decompression are persisting symptoms in the presence of adequate medical treatment or the onset of a neurological deficit. Regional or general anaesthesia and a tourniquet should be considered in carpal tunnel decompression in RA, as additional procedures such as tenosynovectomy may be required.[12]

Tenosynovectomy and tendon rupture

Approximately 50% of patients with RA will have tendon involvement.[17] Proliferation of the synovial lining of the tendon sheath predominantly affects the extensor tendons under the extensor retinaculum. The resulting swelling is not usually painful but can be unsightly and is often the first presentation of the disease. If left untreated, the synovial proliferation can invade the substance of the tendon leading to adhesion and ultimately to tendon rupture. Tenosynovectomy is safe and effective in restoring function in patients with RA.[5]

The risk factors for extensor tendon rupture include volar subluxation of the radius at the distal radio-ulnar joint (DRUJ) resulting in a prominent ulna head dorsally, radiographical identification of scalloping of the sigmoid notch of the radius and duration of symptoms of greater than 6 months.[18] Rupture of the finger extensor tendons is often sequential. The first tendon to suffer rupture is generally extensor digiti minimi (EDM), probably because the majority of finger extensor ruptures are caused by attrition over the roughened ulnar head which has protruded through a perforation in the dorsal capsule of the distal radio-ulnar joint. As each extensor tendon ruptures, its neighbour on the radial side comes into contact with the ulnar head and undergoes rupture in turn. Vaughan-Jackson was the first to describe this condition and it continues to bear his eponymous name.[19] However, roughened spurs are not always found in cases of tendon rupture, and a microvascular response to tissue hypoxia may also play a contributory role.[20]

Isolated EDM rupture produces little functional loss and is often unnoticed. When suspected, the diagnosis can be confirmed by firstly asking the patient to make a fist, to defunction the extensor digitorum communis (EDC), and then to extend the little finger in isolation. If EDM is ruptured, there will be a lag of approximately 40°. End-to-side repair of the distal EDM tendon stump to EDC of the little or ring finger will produce a satisfactory result. More commonly, the patient will present with rupture of both EDM and EDC to the little finger. This will result in significant extensor lag and is most commonly reconstructed by transferring extensor indicis proprius (EIP) to EDM and EDC of the little finger. If more than one finger is involved, then other transfer options must be considered, and end-to-side reconstructions can be helpful. Rupture of EDC and EDM to ring and little finger can be reconstructed by transfer of EIP to EDM and EDC (little) and end-to-side repair of EDC (ring) to EDC (middle). If no donor muscle is available on the dorsal surface, flexor digitorum superficialis (FDS) of the middle or ring finger may be used. If the rupture is recent and the muscle has retained its power and excursion, tendon grafting is feasible. Attention must be paid to eliminate the underlying cause of the tendon rupture otherwise it will recur. Extensive tenosynovitis must be removed and any prominence of the ulna head must be addressed.

Rupture of the extensor pollicis longus (EPL) tendon is also common in RA and is best demonstrated by asking the patient to place their palm flat on a table and to lift the thumb towards the ceiling. An isolated EPL rupture produces variable functional loss, depending on the state of the extensor pollicis brevis (EPB) tendon and the joints of the thumb, but significant functional deficits can be satisfactorily managed by transferring the EIP tendon. Nalebuff advocated this transfer, as it resulted in no loss of function in the index finger and reproducibly restores EPL function.[21] Extensor carpi radialis longus, or extensor digiti minimi (EDM) may be used where EIP is required or has been used for reconstruction on the ulna side of the hand.

Flexor tenosynovitis is less common than extensor tenosynovitis and is often associated with carpal tunnel compression. Flexor tenosynovectomy can improve the range of active movement and reduce the risk of tendon rupture. If the bulk of the affected tendons prevents smooth gliding after tenosynovectomy in the finger, excision of one slip of the FDS tendon may provide more space and improve the tendons' excursion.[12]

Flexor tendons ruptures can also occur in patients with RA. Isolated flexor pollicis longus tendon rupture is the most common presentation. The aim of surgery is of course to restore function, but also to prevent further ruptures by surgical treatment of the tenosynovitis and any bony spurs. Reconstruction may be performed, using either a graft (palmaris longus or flexi carpi radialis) or with tendon transfer using the ring finger FDS. Ruptures of the FDS can be managed by excising the FDS and carrying out a tenosynovectomy of the FDP. Rupture of the FDP distal to the FDS insertion may be managed by advancement and repair as the proximal end is usually caught at the FDS chiasm. However, when the rupture occurs proximally to the FDS insertion, the best treatment option remains tenodesis of the tendon or arthrodesis of the distal IP joint.[5]

Metacarpophalangeal joints

The development of deformity at the metacarpophalangeal joint (MCPJ) joint in RA is multifactorial and due to both intrinsic and extrinsic factors. The fingers tend to drift into ulnar deviation with volar subluxation of the proximal phalanx. The intrinsic factors include anatomical predisposition — the ulna condyle of the metacarpal is smaller than the radial; and pathological causation

− joint erosion and synovitis resulting in attenuation of the collateral ligaments, volar plate and preferentially the radial sagittal bands. The extrinsic factors include radial deviation of the rheumatoid wrist that alters the line of pull of the long flexors and extensors into a more ulna position at the MCPJ; contraction of the ulnar intrinsic muscle; and subluxation of the central slip into the ulna gutter.[22] Patients presenting with this deformity often report inability to extend the fingers. Moreover, the deformity limits the ability to cup the fingers around larger objects, and fine pinch is obstructed because the index and middle fingers can no longer oppose the thumb in a tip-to-tip pinch.

MCPJ activity is crucial in the arc of motion of the finger, which is initiated at the MCPJ. For this reason, fusion of the finger at the MCPJ is rarely performed. Rebalancing of the MCPJ, in which the articular surface remains healthy and passive correction is possible, may improve function. Transverse or longitudinal incisions can be used to approach the joint through the attenuated radial sagittal band. The ulna intrinsic tendon should be released from the base of the proximal phalanx, which can then be transferred to the radial intrinsic of the adjacent digit.[23] The radial sagittal band can be double-breasted to centralize the extensor tendon.

When MCPJ destruction or chronic subluxation is present, arthroplasty procedures may be necessary to relieve pain and restore function. Swanson introduced the concept of fixation by fibrous encapsulation, whereby the inert silicone implant provides enough initial stability to allow early protected mobilization, while a functionally adapted fibrous capsule forms around the joint with maintenance of the space between the bones.[24] Several studies showed good short-term functional and aesthetic outcomes of the silicone MCPJ arthroplasty (SMPA) procedures.[5] Despite these encouraging results, high rate of breakage of SMPA has been reported at long-term follow-up, associated with osteolysis with shortening and an increase in ulnar deviation and extensor lag.[5] Revision arthroplasty is complicated by deficiencies in bone stock and difficult reconstruction of the soft tissues. Although subjectively patients were pleased with the results of revision surgery, objective results for range of movement was poor.[25]

More recently, unlinked two-piece pyrolytic carbon anatomical joint resurfacing arthroplasty has increased in popularity. These have shown reduced pain scores and increased range of movement in the short term, but complications including subluxation or dislocation, implant loosening, fracture and joint stiffness have all been described.[26,27]

Digital deformities

Digital deformities occur secondary to synovitis, joint destruction, ligament incompetence, muscle imbalance and proximal joint deformity. The success of reconstructive interventions depends on the mobility of the deformity. When the deformity becomes fixed, the options for treatment are limited, with joint fusion providing the most reliable outcome.

The swan neck deformity is characterized by flexion of both the MCPJ and distal interphalangeal joint (DIPJ) associated with hyperextension of the proximal interphalangeal joint (PIPJ). In order to manage this deformity, it is important to identify which joint is primarily responsible for its development.[28] Factors that contribute include volar subluxation of the MCPJ, intrinsic tightness, erosion of the PIP volar plate, weakening of FDS action and extensor tendon disruption at the DIPJ. Frequently more than one factor contributes. The principle aims of treating swan-neck deformity is to correct the deforming forces and prevent PIPJ hyperextension.[12]

Nalebuff's classification categorizes this condition according to the clinical findings, which then provides a guide to management (Table 3).[28] The aim of treating Type I deformities is prevention of PIP joint hyperextension, restoring DIPJ extension, or both. Useful surgical procedures include DIPJ fusion, flexor tenodesis of the PIPJ or reconstruction of the retinacular ligament. Type II deformities can be treated in a similar manner but also require the addition of an intrinsic release procedure. In Type III, PIP joint mobilization or lateral band relocation is required to restore motion. In Type IV, arthroplasty or arthrodesis is required.

The boutonnière deformity is characterized by a flexion deformity of the PIPJ and hyperextension at the DIPJ. It is caused by synovitis at the PIPJ which stretches the extensor mechanism. The central slip is unable to maintain full extension of the joint, and when the triangular ligament undergoes attrition, the lateral bands displace volar-ward and become fixed in this position. Shortening of the oblique retinacular ligaments results in hyperextension and limited active flexion of the DIPJ. As the flexion deformity of the PIPJ increase, the patient compensates by hyperextending the MCPJ. Secondary contractures of the volar plate, check rein ligaments, joint capsule and collateral ligaments occur eventually leading to a fixed boutonnière deformity in which passive correction is not possible.

The treatment of the boutonnière deformity is a challenge. Early disease with a slight lag (up to 15°) that is correctible can be treated with dynamic splinting or an extensor tenotomy. If active PIPJ synovitis is present, a local corticosteroid injection or synovectomy should be considered. Moderate disease (when the PIPJ contracture reaches 40°) can be treated by central slip repair, mobilizing the lateral bands dorsally combined with an extensor tenotomy. However, this procedure can limit PIPJ flexion and

Nalebuff classification of swan neck deformity

Nalebuff classification	Clinical signs	Patho-aetiology
Type I	Flexible hyperextension deformity PIPJ	Extensor tendon rupture Volar plate attenuation MCPJ subluxation Wrist subluxation
Type II	Tight PIPJ flexion with MCPJ in extension	Intrinsic tightness
Type III	Limited PIPJ flexion in all MCPJ positions	Fixed dorsal subluxation of lateral bands
Type IV	Immobile PIPJ Destruction of joint surface	Adhesion and joint erosion

Data from reference [28].
MCPJ, metacarpophalangeal joint; PIPJ, proximal interphalangeal joint.

Table 3

cause stiffness.[29] Patients with no passive motion of the PIPJ have irreversible soft tissue contractures and erosions of articular surface. Surgical options in these cases are joint arthrodesis or arthroplasty. However, the use of arthroplasty for the management of boutonnière deformity is limited because it is necessary to significantly resect the proximal phalanx, leading to collateral ligaments instability. Moreover, the reconstruction of the extensor tendon is necessary, delaying mobilization of the PIPJ and can result in stiffness.[29] For these reasons, fusion should be preferred to arthroplasty to manage patients with RA affected by the boutonnière deformity.

Similar to the MPCJ, PIPJ arthroplasty options include the silicone flexible implant, pyrolytic carbon implants and surface replacement metal-on-polyethylene implants. Silicone implants offer good pain relief, but the range of motion is not improved.[30] They are also vulnerable to coronal plane deformity if the soft tissues are in poor condition and provide a poorer outcome in RA compared to degenerative or post-traumatic arthritis of the hand.[30] Pyrolytic carbon and surface replacement implants are in general not recommended as the necessary soft tissue support is likely to be insufficient in RA.[31]

Rheumatoid thumb

The surgical management of RA thumb deformity can be challenging (Table 4).[32] In general, soft tissue reconstruction alone is likely to fail in the thumb and will often be combined with a fusion procedure. Fusion of both the MPCJ and interphalangeal joint should be avoided.

Passively correctable boutonnière deformity (Type I) is the most common thumb deformity in RA and can be addressed with MCPJ synovectomy and EPL re-routing to the dorsal capsule of the MCPJ, but recurrence rates are high.[33] Fusion of the MCPJ produces a more reliable and robust solution.[34]

Type II deformities involving the carpometacarpal joint (CMCJ) is rare. As the MCPJ and PIPJ frequently show limited motion in rheumatoid disease, it is desirable to conserve motion at the basal joint. Therefore, silicone MCPJ arthroplasty with balanced reconstruction of the extensor apparatus may be preferred to maintain motion.[35]

For swan neck deformity, the second most commonly encountered thumb deformity in RA, MCPJ fusion is usually indicated, but where the CMCJ is painful, excision arthroplasty with or without tendon autograft may be required and produce excellent long-term outcomes.[36] For patients with Type V deformity, capsulodesis to address the volar plate insufficiency has been reported to produce good outcomes.[37]

Rheumatoid wrist

Distinct patterns of change occur in the RA patient with wrist disease. These are summarized as carpal supination, translocation and translation, carpal collapse, volar subluxation and distal radio-ulnar instability. Synovectomy is reserved for patients with mild disease, in whom the joint spaces are well preserved. In those with severe disease, treatment options include total wrist arthroplasty (TWA) or wrist arthrodesis.

The primary advantage of TWA is its ability to preserve a functional arc of wrist motion. The initial enthusiasm for TWA was offset by limited outcomes and the burden of complications. The first generation of components had a high incidence of breakage and osteolysis. The second-generation components like the Meuli and Volz TWAs had a high incidence of malalignment, loosening and dislocation.[38] Initial studies with the third-generation Universal TWA had similar problems as those seen with the second-generation arthroplasties. However, with subsequent modifications and improved surgical techniques, the complications have been markedly reduced in the Universal-2 TWA with medium-term survival of 91% at 7.8 years.[38] In this series, movements were preserved with a mean flexion-extension arc of 50° and an improvement in QuickDASH from 61 to 46. Further long-term prospective studies, however, are still necessary to ascertain the role of TWA in the management of RA of the wrist.

Total wrist fusion is indicated in patients with pan-carpal disease, or in those with significant bone destruction incapable of taking the stems of a TWA. In many cases, the loss of what little movement remains is hardly noticed and the relief of pain dramatic. Fusion can be performed with a longitudinal Steinmann pin or contoured dorsal wrist fusion plate. The optimal position of the fusion remains a matter for debate. Some authors suggest moderate extension and ulnar deviation, while others prefer the neutral position, which maintains finger balance and allows for better pronation and supination, thereby preserving muscle strength.[39] For bilateral fusions, fixing one side in slight extension and the other in slight flexion has been suggested.[40] A systematic review comparing total wrist fusion with TWA showed outcomes for fusion were comparable and possibly better than those for TWA in rheumatoid patients.[41] The authors recommended future randomized multicentre studies to settle this debate.

Distal radio-ulnar joint

Dorsal subluxation of the distal ulna, with supination of the carpus, can cause significant pain and instability. Excision of the distal ulna (Darrach's procedure) has been the traditional

Nalebuff classification of rheumatoid thumb deformity

	Clinical signs	Patho-aetiology
Type I	Boutonnière deformity (CMCJ not involved)	MCPJ synovitis
		EPB attenuation
		Volar and ulnar subluxation of EPL
Type II	Fixed boutonnière (CMCJ dislocation or subluxation)	As above with involvement of CMCJ
Type III	Swan neck deformity with CMCJ subluxation	CMCJ subluxation
		Compensatory MCPJ hyperextension
		Metacarpal adduction
		Interphalangeal joint flexion
Type IV	Gamekeeper's thumb	Ulnar collateral ligament attenuation
Type V	Swan neck with stable CMCJ	Volar plate laxity of MCPJ

Data from reference [32].
CMCJ, carpometacarpal joint; EPB, extensor pollicis brevis; EPL, extensor pollicis longus; MCPJ, metacarpophalangeal joint.

Table 4

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solution in these patients, which gives better results than the same procedure in post-traumatic or osteoarthritic patients.[42] Variants of ulnar head excision such as the hemiresection inter-position arthroplasty and the matched resection arthroplasty are also used.[12]

The Sauvé—Kapandji procedure involves an arthrodesis of the head of the ulna to the radius, followed by an excision of a segment of the distal ulnar shaft, in order to aid prono-supination. Several studies report excellent results with the Sauvé—Kapandji procedure,[43] but complications include prox-imal ulnar stump instability and convergence, as well as non-union of the fusion.[44] The treatment of a failed Sauvé—Kapandji procedure is more challenging than a failed Darrach, with the only options being either further proximal stump resection or custom-made ulnar head arthroplasty.[45]

Prosthetic replacement of the ulna head as a primary pro-cedure is controversial. It has the theoretical advantage of providing stability to the forearm, with the elimination of convergence and stump instability. Sabo and colleagues demonstrated excellent intermediate-term outcome with 90% implant survival at 5 and 15 years in 47 patients (mean follow-up duration 7 years), with 14 suffering from inflammatory arthritis.[46] Overall patient satisfaction was acceptable, but sub-stantial patient disability remained in all groups. Schoonhoven demonstrated satisfactory long-term results of ulnar head arthroplasty following failed ulnar head resection in a small se-ries of 16 patients, but there is a lack of other long-term follow-up of this procedure in the literature.[47]

Conclusion

Management of the patient with RA of the hand and wrist de-mand a methodical approach. Multidisciplinary assessment and treatment in conjunction with a rheumatologist and dedicated hand therapist are essential. Initial treatment should be conser-vative. However, when patients develop severe deformities re-fractory to medical treatment, or there is impending tendon rupture or nerve compression, surgical intervention is required. Careful functional assessment is required and the patient's ex-pectations should match the surgeon's goals and anticipated results. ◆

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