



The distal radioulnar joint in rheumatoid arthritis

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Rheumatoid arthritis (RA) involves the wrist in up to 80% of cases ; up to 95% of patients have signs of wrist arthritis after 12 years of disease. The distal radioulnar joint (DRUJ) is involved in 31% to 75% of these patients and is often the first compartment of the wrist involved. The inflammatory sequence of events leads to the “*caput ulnae syndrome*” described by Backdahl in 1963. Extensor tendon ruptures are frequently associated. The presence of the “scallop” sign on radiographs is an alerting sign for tendon attrition. The gold standard in treatment remains resection of the distal ulnar head, known as Darrach’s procedure. The most frequent complication is instability of the proximal ulnar stump. In order to restore stability or to prevent instability, several stabilisation techniques have been reported with free tendon grafts, the extensor carpi ulnaris, the flexor carpi ulnaris, the joint capsule and the pronator quadratus muscle. There is no evidence that stabilisation of the proximal ulnar stump during the initial operation gives better results.

Another drawback of ulnar head resection is the progression of ulnar translation of the carpus. There are however several surveys showing that this ulnar translocation is the consequence of the disease rather than the result of the Darrach procedure.

Several features such as an increased radial slope ($> 23^\circ$) and/or destruction of the ulnar corner of the distal radial epiphysis have been mentioned as predictive elements for further ulnar slide of the carpus. The Sauvé Kapandji procedure is in these cases a useful alternative choice. Another advantage of this technique is that it provides a larger surface so that other (radial) procedures can be more easily com-

bined (Chamay partial radiocarpal fusion, wrist prosthesis).

Keywords : distal radioulnar joint ; rheumatoid arthritis.

INTRODUCTION

Rheumatoid arthritis (RA) involves the wrist in up to 80% of cases ; up to 95% of the patients have signs of wrist arthritis after 12 years of disease (34).

The distal radioulnar joint (DRUJ) is involved in 31% of these patients in early rheumatoid arthritis and in 75% in late presentations (18). It is often the first compartment of the wrist involved.

Only a few papers discuss the DRUJ problem in RA separately ; usually the whole wrist complex is discussed or described (3, 5, 6, 9, 10, 15, 19, 24-26, 36, 39). The reason for this is that it is practically impossible to distinguish the DRUJ problem from other arthritic changes in other compartments of the wrist or to ignore associated tendon involvement.

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Fig. 1a. — Clinical aspect of the wrist with dorsal prominence of the ulnar head and rupture of extensor tendons of the fourth and fifth finger.

PATHOGENESIS

The DRUJ is a complex and phylogenetically relatively young joint, which makes it vulnerable to injury, synovitis etc. The stability is assured by the triangular fibrocartilaginous complex (TFCC) and more particularly by the extensor carpi ulnaris (ECU). Additional stabilisers are the interosseous membrane and the pronator quadratus muscle.

The pathological events affect the bony architecture, with loss of cartilage and osseous erosions which cause shortening of the bony links. The proliferating synovium also weakens the ligaments. The inflamed synovium causes rupture and/or dislocation of the tendons, more particularly the ECU.

The other extrinsic stabilisers are not strong enough to resist the natural collapse pattern with ventral dislocation of the radius and supination of the carpus ; this sequence of events leads to the “*caput ulnae syndrome*” described by Backdahl in 1963 (1).

CLINICAL PRESENTATION

The caput ulnae syndrome (fig 1) as previously reported by Backdahl (1) in 1963 consists of :

- 1) weakness of the hand and wrist,
- 2) pain on rotation of the forearm,
- 3) reduced range of motion of the DRUJ,

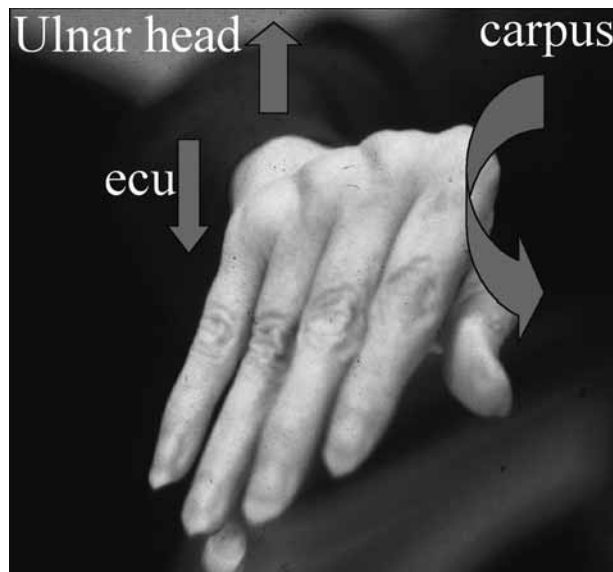


Fig. 1b. — Increased supination of the carpus

- 4) dorsal prominence of the ulnar head, reducible with painful crepitations, also called the piano key sign,
- 5) bulging of the synovial bursae of the ECU and other extensor compartments,
- 6) rupture of extensor tendons.

In 1948 Vaughan-Jackson (38) already reported on extensor tendon rupture due to the dorsally displaced ulnar head. The loss of supination is often more important than the loss of pronation.

RADIOLOGY

The first radiological signs are minimal, sometimes even unapparent. In the first stages only soft tissue swelling due to synovitis can be seen. Later on the erosions – the scallop sign – and the diastasis of the bones is obvious. The last stages show severe osteopenia, destruction of the DRUJ and articular dissociation. The scallop sign is when the sigmoid notch of the distal radius has an erosive scalloping concavity ; this is correlated with rupture of extensor tendons (13).

Besides the specific radiological signs of RA involvement of the DRUJ, it is also important to

evaluate the ulnar length, the possibility of loss of the ulnar corner of the distal radial epiphysis, the slope of the distal radial epiphysis, the radioulnar dislocation, the ulnar translation of the carpus.

Evaluation of the radiocarpal involvement is also important in order to propose the most adequate treatment.

TREATMENT

The goals of surgical treatment of the DRUJ are the same as those for other parts of the wrist and hand : reduction of pain, improvement of function, prevention of complications (e.g. tendon ruptures) and cosmetic improvement. It is imperative that the treatment is done in collaboration with and under the supervision of the rheumatologist. An important step in the treatment of wrist arthritis is patient education and joint economy. Adaptations of work and activities of daily living can cope for a lot of symptoms. Intra-articular steroids can decrease pain in the involved joint, and permanent or intermittent splinting can resolve a lot of pain problems.

However surgical treatment is indicated when conservative measures have not been successful for 4 to 6 months or when (extensor) tendon ruptures have occurred. Several options have been reported, most of them in combination (3).

Simple synovectomy of the DRUJ is a possibility but as an isolated procedure no series are available. The ideal indication is DRUJ pain without radiological alterations. It is of course an essential step in combination with other procedures. The same is true for ECU synovectomy with or without relocation of the tendon.

Bony procedures around the distal ulna can be grouped in three categories (fig 2) :

- Resection of the distal ulna : transverse, oblique, hemi or matched, with or without stabilisation (4, 7, 40).
- Arthrodesis of the DRUJ with proximal pseudarthrosis (Sauvé Kapandji operation) (16, 30, 32).
- Prosthesis.

The gold standard remains resection of the distal ulnar head. Although already described in



Fig. 2. — Radiograph with typical scallop sign

the 19th century, this operation is often called Darrach's procedure. Resections ranging between one and four centimetres of the distal ulna have been described. Unanswered questions are about the preservation or not of the styloid process, transverse or oblique osteotomy and extra- or subperiosteal resection.

The most frequent complication is instability of the proximal ulnar stump. In order to restore stability or to prevent instability, several stabilisation techniques have been reported with free tendon grafts, the ECU, the flexor carpi ulnaris, the joint capsule and the pronator quadratus muscle. None however have stood the test of time and there is no evidence that stabilisation of the proximal ulnar stump during the initial operation gives better results.

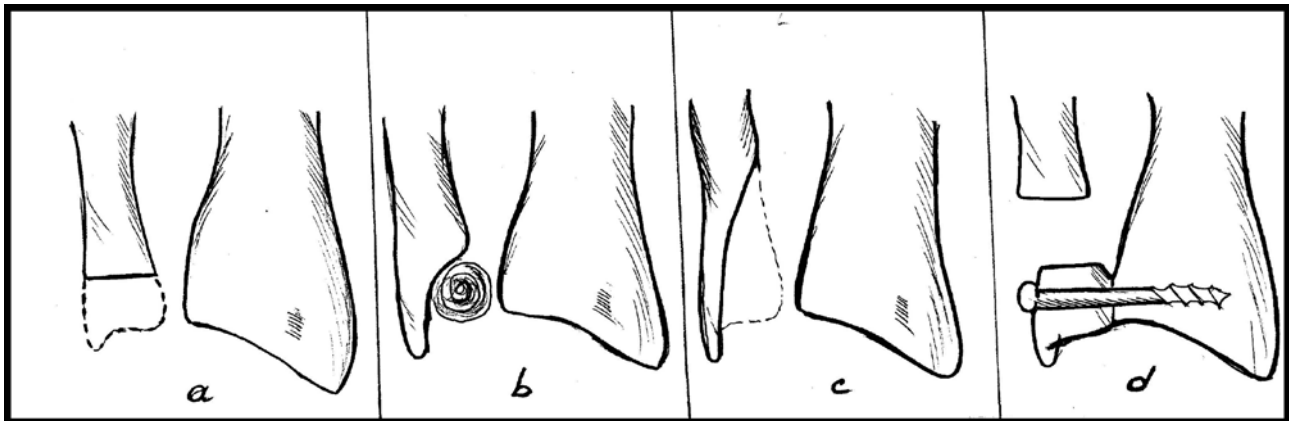


Fig. 3. — Different surgical procedures : resection (Darrach) (a), Bowers (b), Watson matched resection (c), Sauvé Kapandji (d)

The results of Darrach and modified procedures are favourable with 60 to 95% of good results.

Rana and Taylor (26) had in 93% of their 86 patients good pain relief with 87% of them obtaining a full range of motion. O'Donovan and Ruby (24) with a modified technique had 85% of good results. Melone and Tarras (22) in their 50 cases had 86% of good outcome with a progression of the ulnar shift in 8% of the wrists. Leslie *et al* (20) also had 85% of their patients relieved of ulnar wrist pain. Fraser *et al* (12) had better outcomes in 23 rheumatoid wrists compared to 27 posttraumatic wrists : 86% versus 36% good outcomes. Other series reported similar outcomes (17, 23, 29, 31, 33).

Alternatives to the Darrach operation are the matched resection of Watson and the hemiresection of Bowers (fig 3).

The Bowers operation requires an intact or repairable TFCC (4). He obtained a favorable outcome in 27 patients. The Watson procedure is often used in combination with radiocarpal fusions ; Watson reported on 34 RA patients with a good result in all of them (40).

Silicone capping of the distal ulna has no added value and has been abandoned due to the risk of silicone synovitis (35, 41).

Another inconvenience of distal ulnar resection is the progression of ulnar translation of the carpus. It seems evident that when the ulnar support of the carpus disappears, further sliding of the carpus is inevitable. Rana and Taylor (28) observed it in 10%

of the wrists. Posner and Ambrose (26) correlated the ulnar shift with the integrity of the extrinsic ligaments. Cracchiolo and Marmor (6) did not observe further ulnar shift in a series of 42 wrists. There are however several surveys showing that this ulnar translocation is the consequence of the disease rather than the result of the Darrach procedure (2, 11, 25, 27, 37). Thirupathy *et al* (36) found ulnar translation in 44% of cases in their series of 38 wrists and also found a linear correlation with the duration of follow-up. Gainor and Schaberg (15) reported that resection of more than 2 centimeters of the distal ulna could contribute to ulnar shifting of the carpus. Fourastier *et al* (11) found an ulnar translation of 2 mm in their survey of 44 wrists ; the difference with the unoperated side was minimal (but significant). Instability preoperatively resulted in further progression, but stable wrists remained stable postoperatively (21).

Several predisposing features such as an increased radial slope ($> 23^\circ$) and/or destruction of the ulnar corner of the distal radial epiphysis have been mentioned to alert the surgeon and to propose another procedure (25).

The Sauvé Kapandji (30) is in these cases a useful alternative choice. The value of this procedure has been established for post-traumatic as well as for rheumatoid disorders of the distal radioulnar joint (8, 39). The ulnar post of the wrist is preserved, preventing further ulnar translation of the carpus and stabilising the ECU tendon, the insertions of the ulnocarpal ligaments and TFCC are maintained

and the normal load pattern between carpus and distal forearm is not altered.

Another advantage of this technique is that it provides a larger surface so that other (radial) procedures can be more easily combined (partial radiocarpal fusion, wrist prosthesis)

Vincent *et al* (35) reported, in a group of 21 wrists in 17 patients, better results with the Sauvé Kapandji procedure compared to the Darrach. In patients with a poor bone stock, Fujita *et al* (14) (66 wrists in 56 patients) reported a modified technique with a 100% good outcome concerning bony union, pain reduction, and increased pronation, without ulnar translation of the carpus.

The experience with a prosthesis for RA is still limited to case histories.

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