



## The Scheker distal radioulnar joint arthroplasty to unravel a virtually unsolvable problem

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**Failure of the distal radioulnar joint leads to significant dysfunction of the upper limb. Numerous surgical procedures have been suggested to address this problem. In degenerative arthritis, joint instability and ulnar stump dislocation after salvage procedures such as Darrach distal resection or Sauvé-Kapandji distal fusion, an ideal solution may not be available. The ultimate option to restore distal ulna stability in these cases is to fuse the ulna and radius. Obviously, the morbidity of one bone forearm with complete loss of pronation - supination is very high and such a decision is never taken lightly. We present a challenging case series of gross radioulnar arthritis and instability with an acceptable medium-term outcome after semiconstrained Scheker arthroplasty of the distal radioulnar joint. We conclude that in selected cases with unsolvable distal radio-ulnar instability and loss of the DRUJ joint, the Scheker arthroplasty may offer a valuable solution.**

**Keywords :** distal radioulnar joint ; Scheker arthroplasty.

degenerative arthritis and ulnar wrist impingement are known to result in ulnar wrist pain and limited motion of the wrist. Ulnar wrist pain often coexists with an ulna plus configuration which may generate an ulnar abutment syndrome.

Many procedures have been used to treat degenerative disease of the DRUJ. Common surgical treatment options are partial (1) or complete resection of the distal ulna as introduced by Darach (3), fusion of the distal ulna with proximal diaphysis interruption (7), ulnar head replacement with ligamentous reconstruction of the DRUJ (4,10) and Achilles tendon interposition (9). However, the DRUJ may remain painful after these procedures, with persistent lack of mobility or more often with joint instability. However, DRUJ or ulna stump instability is not always obvious on plain radiographs and lateral stress views are required to demonstrate the ulnar stump impingement with an impression on the radial diaphysis (6,8). In these cases of residual

### INTRODUCTION

An intact distal radioulnar joint (DRUJ) is imperative for normal forearm kinematics requiring both a good stability and full range of motion to allow for pronation and supination. The DRUJ itself has a very small articular surface. Therefore, the stability of the joint is assured by a complex ligament structure which is prone to injury. Furthermore,

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arthritic pain and instability of the distal ulna after surgery, treatment options remain limited.

The Scheker distal radio-ulnar joint arthroplasty is a semi-constrained total joint arthroplasty, in which a ball-in-socket on the radius is combined with an axis within the ulnar diaphysis (5,8). Both the radial and ulnar components are made of cobalt chrome. The ulnar part is fixed in the ulnar diaphysis and comprises a high-density polyethylene ball on a central pivot which is linked within the socket on the radial plate. This technique allows full wrist motion, with a stable DRUJ joint that avoids impingement between the radius and distal ulna. The Scheker arthroplasty was recently introduced in Europe and accepted for reimbursement in Belgium after CE approval in 2010.

Here, we present a challenging case series of failed DRUJ surgery, successfully treated with the Scheker implant (APTIS Medical, Louisville, KY, USA) and have a minimum 2 year follow-up.

### SURGICAL TECHNIQUE

The dorsal-ulnar approach technique as described by Scheker was used (8). An ulnar based rectangular flap of the extensor retinaculum is preserved to cover the implant and protect the extensor carpi ulnaris tendon. The DRUJ is approached between the 5th and 6th extensor compartments, with division of the posterior interosseous nerve. If present, the distal ulna is removed as required and the interosseous membrane is sufficiently released to visualize the sigmoid notch and to align the radial plate. After correct sizing, the trial is fixed on the radius under fluoroscopic control and the distal radial peg is inserted. The distal end of the plate should be at least 3mm proximal to the sigmoid notch. The definitive plate is then inserted and fixed. Then, diaphysis sizing of the ulna stem and proper resection is estimated with a trial ball-in-socket and the ulnar shaft is drilled for 11 cm over a centralizing guide wire. After the stem is placed, the polyethylene ball is inserted and reduced on the hemi-socket of the radial plate, which is closed and fixed with 2 small screws. Motion is tested with fluoroscopy before closure. The retinacular flap is positioned under the ECU and fixed onto the radius. The wrist is placed in a

padded bandage, and immediate full range of motion is allowed.

### CASE REPORTS

#### Case 1

A 54-year-old female with degenerative DRUJ arthritis in the right wrist was treated with a hemiarthroplasty (4). However, the DRUJ remained painful with limited motion one year after surgery ; it was therefore converted to a DRUJ resection arthroplasty (8). The joint still remained painful and unstable. Finally, the patient consented to undergo a Scheker arthroplasty. The postoperative course was uneventful and she regained a full range of motion within 6 weeks. With a follow-up of 2 years and 7 months, she is now satisfied with the arthroplasty with however some residual pain on the ulnar side of her hand, not influenced by activity. She has a DASH score of 26 and a slightly limited range of motion.

#### Case 2

A 53-year-old female presented with distal ulnar stump instability after a Sauvé-Kapandji procedure on the left wrist 10 years earlier. She had a shoulder arthrodesis in child age and she had developed lateral elbow instability, which was addressed with a semitendinosus autograft 2 years earlier. The distal ulnar stump instability caused a painful click whenever she attempted to raise her arm or to lift minimal weight. Radiological evaluation revealed a distal ulnar conflict with the radius diaphysis (Fig. 1). The patient was offered a Scheker arthroplasty ; the postoperative course was uneventful with full range of motion regained within 6 weeks ; the clicking immediately disappeared. As seen in the previous case, she also mentioned some residual ulnar pain at one-year follow-up, possibly caused by irritation of the distal insertion of the extensor carpi ulnaris. At 2 years and 9 months follow-up, the patient is now satisfied with the arthroplasty without pain in hand or wrist and with a full range of motion. Due to her shoulder arthrodesis and possible prevailing workers' compensation, she still



**Fig. 1.** — (a) lateral view of the wrist under stress (holding a bottle) to demonstrate the radioulnar impingement after a Sauvé-Kapandji procedure (case 2) with a (b) postoperative view of the Scheker arthroplasty.

mentions a high DASH score of 66, although she is very happy with her hand and wrist.

### Case 3

A 33-year-old female presented with a painful right DRUJ, due to joint instability after a fall. She had an ulna plus, and extra-articular ulna shortening was performed. Six months later, a joint stabilization procedure with a palmaris longus sling was performed (Adams procedure). However, pain persisted with progressing joint degeneration. The

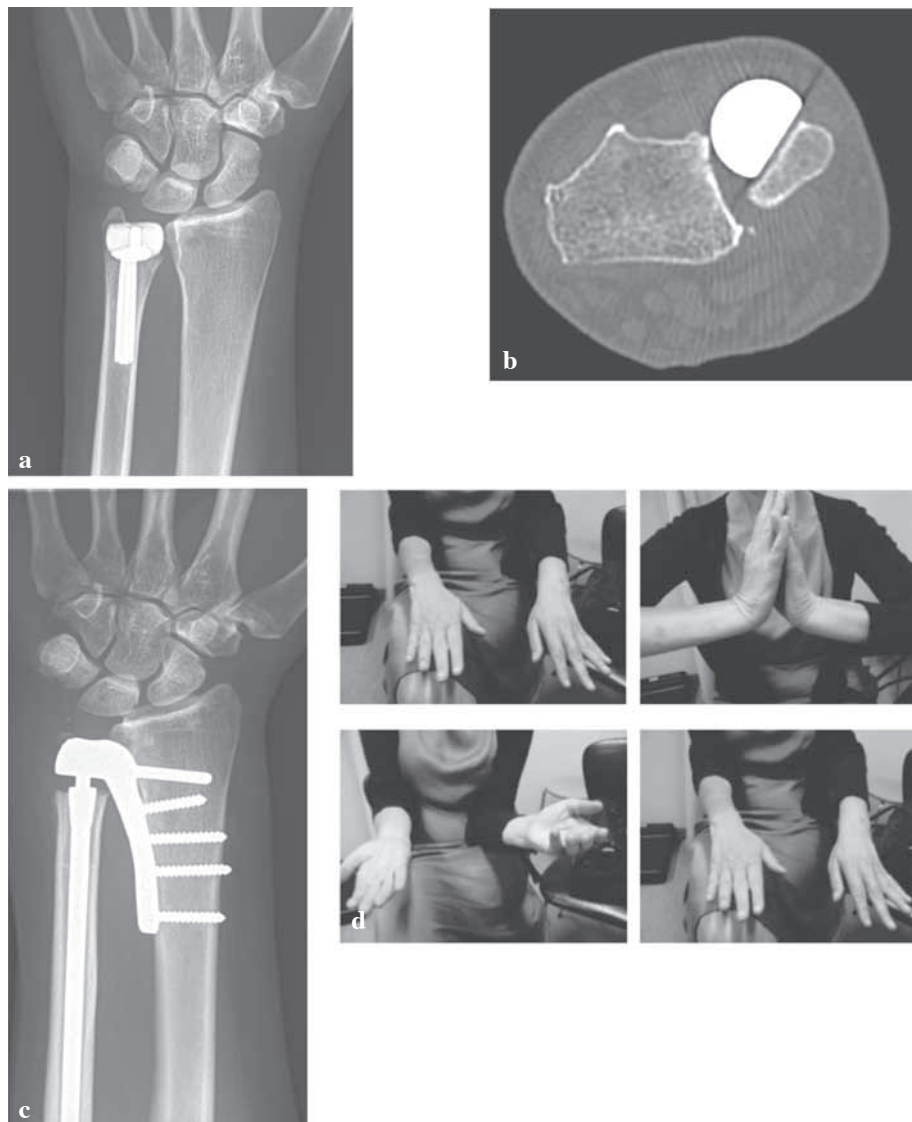
option of Scheker arthroplasty was chosen. The postoperative course was uneventful with a full range of motion, without any pain regained within 3 months. However, she mentioned increasing wrist pain related to flexion and extension movements at 1 year follow-up. This was attributed to a progressing radio-carpal arthritis due to the history of wrist trauma. Nevertheless, pronation-supination remained painless and stable with a full range of motion. A radio-carpal arthrodesis was added which limited her flexion-extension excursion, but pronation and supination remained intact and painless at a follow-up of 2 years and 9 months.

### Case 4

A 48-year-old female presented with a painful right sided degenerative DRUJ. She was treated with a hemiarthroplasty of the ulna (Fig. 2). However, due to painful dislocation of the joint, it was converted to a Scheker arthroplasty after 10 months. The postoperative course was uneventful, with full range of motion and hardly any pain after a 6 month follow-up. With a follow-up of 2 years and 3 months, she now has no residual pain, a DASH score of 18 and a full range of motion.

## DISCUSSION

The semi-constrained arthroplasty developed by Scheker is meant to address painful degenerative instability of the DRUJ. At this moment, it is the only linked total DRUJ joint arthroplasty available. The experience with the Scheker prosthesis is limited but is gradually increasing. Coffey *et al* (2) recently reported a series of 3 adults with Madelung deformity, successfully treated with this technique. In the case series we present here, we suggest that the Scheker arthroplasty is a valuable option in unsolvable problems of the DRUJ, to address pain and instability and regain motion. The reconstruction of the DRUJ was successful in 2 cases after failure of a hemiarthroplasty due to residual arthritic pain and gross instability. A failed Sauvé-Kapandji wrist was effectively restored with the Scheker arthroplasty. In the case with persisting unstable degenerative DRUJ, for which few solutions exist, the DRUJ



**Fig. 2.** — (a) In case 4, gross instability (b) of the DRUJ joint after hemiarthroplasty was addressed with a Scheker arthroplasty (c) and full range of motion was regained within 6 months (d).

functioned normally after the arthroplasty but a progressive radiocarpal arthritis required partial fusion afterwards. In the near future, a combined wrist arthroplasty including DRUJ replacement and radiocarpal resurfacing, may well prevent such two-stage arthroplasty and arthrodesis.

In this medium-term case series, the Scheker arthroplasty provided a stable distal radioulnar joint with a semiconstrained system, allowing early post-

operative mobilization. A full range of motion was achieved rapidly after surgery with normal pronation – supination without further conflict between radius and ulna. Obviously, longer follow-up in larger series is needed to evaluate long term outcome, loosening and possible wear. However, the results are promising and the reports of Scheker, the developer, show good results in series of 31 and more patients with a follow-up as long as

10 years (8). The future and long term follow-up of more orthopaedic centers will provide the required insights into possible risks and benefits, but may also lower the threshold to the decision and indications of this innovative implant.

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