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# SYNOVECTOMY WITH RESECTION OF THE DISTAL ULNA IN RHEUMATOID ARTHRITIS OF THE WRIST

CLAUS MUNK JENSEN

Department of Orthopedic Surgery, University of Copenhagen,
Hvidovre Hospital, Denmark

Wrist synovectomy with resection of the distal ulna was performed in 47 cases, where rheumatoid affection in the wrist joint caused visible capsular swelling, pain and reduced range of motion. At follow-up after a mean observation time of 33 months, 31 cases had complete pain relief, eight cases had moderate pain relief. In eight cases pain during wrist motion was unchanged at follow-up and in five of these, recurrence of capsular swelling was noted. The range of motion (both supination/pronation and vola- and dorsiflection) was significantly improved, as was the subjective assessment of function. The radiographic findings showed progression in 41 cases. Deviation in the wrist was unchanged. In three cases reoperations were performed and one case had spontaneous rupture of the 4th and 5th extensor tendons 1 month postoperatively. In 15 cases dislocation of the extensor carpi ulnaris tendon in volar direction by rotational movement was noted. Stability was good in all cases and no serious postoperative complications occurred.
Wrist synovectomy with resection of the distal ulna is recommended in cases where regular medical treatment has been attempted for a minimum of 6 months without successful results.

*Key words:* distal ulna; rheumatoid arthritis; synovectomy; wrist joint

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The wrist joint is often affected in patients with rheumatoid arthritis (RA). The affection in the wrist joint usually starts with proliferative synovitis in the ulnar part, which causes destruction of the discus triangularis and laxity of the ulnar collateral ligaments. Further destruction may cause dorsal dislocation of the caput ulnae and affect the extensor tendons, especially the extensor carpi ulnaris tendon.

The clinical picture has been described by Bäckdahl (1963) under the name 'caput ulnae syndrome'. This includes:

1. Pain, weakness and limitation of movement in the wrist.
2. Dorsal prominence of the caput ulnae.
3. Capsular swelling and/or dorsal tenosynovitis.
4. In some cases extensor tendon rupture.

Resection of the distal ulna was first described by Moore (1880). In 1943 Smith-Petersen (1943) described nine resections performed on patients with RA located to the wrist joint. Since then synovectomy with resection of the distal ulna has been recommended by several authors (Cracchiolo & Marmor 1969, Clayton & Ferlic 1975, Kessler & Vainio 1966.

The present work reports the results of wrist synovectomy with resection of the distal ulna in 47 cases with 'caput ulnae syndrome'.

## PATIENTS AND METHODS

Forty-one patients were subjected to wrist synovectomy with resection of the distal ulna in 1976–80.

At follow-up three patients had died and two were not in the country, leaving 36 patients, 11 of whom had been operated on bilaterally. A total of 47 wrist synovectomies were therefore examined at follow-up (28 right, 19 left).

The average age was 61 (20–80) years. The male/female ratio was 11/36.

Forty-five cases had classical RA according to the criteria of ASA (Steinbrocker et al. 1949); 33 were seropositive. One case had juvenile RA and one had psoriatic arthritis. The average duration for the wrist affection was 7 (1–20) years.

The indications for surgery were:

1. Capsular swelling and/or dorsal tenosynovitis.
2. Pain during rest and/or during wrist motion.
3. Regular medical treatment for a minimum of 6 months, without successful results.

The preoperative medical treatment included: NSAID (used by 100 per cent), gold (90 per cent), steroids (50 per cent), penicillamine (33 per cent) and cytostatics (13 per cent).

The preoperative symptoms and objective findings are given in Table 1.

The procedure was carried out under general anaesthesia in 17 cases, 28 underwent axillaris block and two cases plexus brachialis block.

Under tourniquet control a longitudinal incision was made at the dorsum of the wrist joint. Subperiosteal resection of the distal ulna was performed. After resection as much diseased synovium as possible was removed.

Eight cases underwent tenosynovectomy of the extensor tendons. The extensor retinaculum was placed below the tendons and the wound was closed in layers and a light pressure dressing was applied.

*Table 1. Preoperative symptomatology and objective findings in 47 wrist synovectomies*

| | No. of synovectomies |
|---|---|
| Subjective | |
| Pain during rest | 31 |
| Pain during motion | 46 |
| Objective | |
| Capsular swelling | 47 |
| Dorsal tenosynovitis | 8 |
| Prominence of caput ulna | 44 |
| Extensor tendon rupture | 1 |

On the first postoperative day finger movement started. After removal of the sutures wrist joint movements was started. Nine cases required training with an ergotherapist.

## RESULTS

The mean observation time was 33 (10–66) months. Pain was measured in a simple descriptive pain relief scale, graded as none, slight, moderate or complete pain relief (Table 2).

Preoperative and follow-up range of motion was graded as undisturbed, slightly disturbed and greatly disturbed. Preoperative measurements of

*Table 2. Pain relief at follow-up after 47 wrist synovectomies*

| Pain relief | Rest | Motion |
|---|---|---|
| None | 4 | 8 |
| Slight | 0 | 0 |
| Moderate | 0 | 8 |
| Complete | 27 | 30 |
| Total | 31 | 46 |

*Table 3. Volar and dorsiflexion preoperatively and at follow-up in 47 wrist synovectomies*

| Preoperatively | Follow-up | | | |
|---|---|---|---|---|
| Volar flexion | Normal | 45–20° | <20° | Total |
| Normal | 3 | 1 | 1 | 5 |
| 45–20° | 14 | 12 | 2 | 28 |
| <20° | 1 | 9 | 4 | 14 |
| Total | 18 | 22 | 7 | 47 |
| Dorsiflexion | | | | |
| Normal | 4 | 0 | 1 | 5 |
| 45–20° | 13 | 11 | 2 | 26 |
| <20° | 2 | 9 | 5 | 16 |
| Total | 19 | 20 | 8 | 47 |

Volar flection: $P<0.01$, $\chi^2$-test.
Dorsiflexion: $P<0.001$, $\chi^2$-test.

*Table 4. Supination-pronation preoperatively and at follow-up in 44 wrist synovectomies*

| Preoperatively | Follow-up | | | |
|---|---|---|---|---|
| Supination | Normal | 90–45° | <45° | Total |
| Normal | 11 | 0 | 0 | 11 |
| 90–45° | 22 | 3 | 0 | 25 |
| <45° | 8 | 0 | 0 | 8 |
| Total | 41 | 3 | 0 | 44 |
| Pronation | | | | |
| Normal | 11 | 0 | 0 | 11 |
| 90–45° | 27 | 2 | 0 | 29 |
| <45° | 4 | 0 | 0 | 4 |
| Total | 42 | 2 | 0 | 44 |

Supination: $P<0.001$, $\chi^2$-test.
Pronation: $P<0.001$, $\chi^2$-test.

supination and pronation were missing in three cases. The proximal radio-ulnar joint was affected in four cases. These patients showed no improvement in supination and pronation at follow-up. The results are shown in Tables 3 and 4.

The subjective assessment of wrist function was changed as shown in Table 5.

The radiographic examination was performed independent of the clinical examination. Pre- and postoperatively and at follow-up the hand and wrist were X-rayed in two projections. The radiographs were compared with standard series of radiographs according to the principles of Larsen et al. (1975). The results are shown in Table 6.

Any radiographic changes during the period of observation were recorded independent of the grading. Progression was noted in 41 cases, five cases showed no progression and one case showed regression.

Deviation in the wrist joint was assessed by using the angle between the axis of the radius and the second metacarpal bone as the indicator in

*Table 6. The radiographic changes according to standard series of radiographs, preoperatively and at follow-up in 47 wrist synovectomies*

| Preoperatively | Follow-up | | | | | | |
|---|---|---|---|---|---|---|---|
| Grading | 0 | 1 | 2 | 3 | 4 | 5 | Total |
| 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| 1 | 0 | 3 | 3 | 2 | 0 | 0 | 8 |
| 2 | 0 | 0 | 3 | 8 | 2 | 1 | 14 |
| 3 | 0 | 0 | 0 | 2 | 8 | 1 | 11 |
| 4 | 0 | 0 | 0 | 0 | 6 | 5 | 11 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 3 | 3 | 6 | 12 | 16 | 7 | 47 |

$P<0.05$, $\chi^2$-test.

*Table 5. The subjective assessment of wrist function preoperatively and at follow-up in 47 wrist synovectomies*

| Preoperatively | Follow-up | | | | |
|---|---|---|---|---|---|
| | Complete | Complete + pain | Limited + selfcare | Incapacitated | Total |
| Complete | 0 | 0 | 0 | 1 | 1 |
| Complete + pain | 14 | 2 | 1 | 0 | 17 |
| Limited + selfcare | 16 | 3 | 5 | 0 | 24 |
| Incapacitated | 1 | 0 | 4 | 0 | 5 |
| Total | 31 | 5 | 10 | 1 | 47 |

$P<0.001$, $\chi^2$-test.

*Table 7. The deviation in wrist joint preoperatively and at follow-up in 45 wrist synovectomies*

| Preoperatively | Follow-up | | | |
|---|---|---|---|---|
| | Radial deviation | Neutral | Ulnar deviation | Total |
| Radial deviation | 4 | 3 | 1 | 8 |
| Neutral | 1 | 24 | 7 | 32 |
| Ulnar deviation | 0 | 3 | 2 | 5 |
| Total | 5 | 30 | 10 | 45 |

$P>0.05$, $\chi^2$-test.

the frontal plane. Neutral position has been regarded as plus or minus 5 degrees. No preoperative measurements had been made in two cases. The results are shown in Table 7.

In the frontal projection the amount of the distal ulna excised was measured. The mean amount was 19 (10–40) mm.

New bone regeneration was found in 41 cases.

### *Complications*

Postoperative complications were seen in eight cases. Two cases had wound healing disturbed by superficial infection, defined as local redness and secretion from the wound, making antibiotic treatment necessary. However, none showed positive culture. In three other cases small areas of skin necrosis were noted, all of which healed spontaneously. A haematoma was seen in three cases.

During the period of operation seven cases were treated with corticosteroids. Skin necrosis was noted in one case; the other six cases had no postoperative complications.

During the period of observation three cases underwent reoperations. A Swanson prosthesis was implanted in one case because of persisting pain. One operation for carpal tunnel syndrome was carried out due to recurrence of volar capsular swelling. In one case a further resection of the distal ulna was necessary, because skin perforation was imminent.

Spontaneous rupture of the 4th and 5th extensor tendons was noted 1 month postoperatively in one case; operative repair was not performed.

Recurrent visible capsular swelling was noted in five cases at follow-up.

A snapping sensation was noted in 15 cases at follow-up. In these cases the extensor carpi ulnaris tendon was palpable, flicking over the ulnar stump during rotation, especially supination. There was no indication of discomfort or pain. The symptoms did not disappear during the period of observation.

## DISCUSSION

Pain is an essential indication for operation in patients with rheumatoid affection in the wrist joint resulting in the 'caput ulnae syndrome'.

Through the accumulation of joint fluid and proliferative synovitis intraarticular tension increases resulting in excessive tension in the fibrous capsules and joint ligaments, which are innervated with pain afferents. Synovectomy reduces the amount of joint fluid and removes the proliferative synovitis, thereby decreasing intraarticular tension which affects pain afferents in the fibrous capsules, joint ligaments and the synovial membrane. This may contribute to the pain relieving effect of synovectomy (Eiken et al. 1975).

In this series pain at follow-up was measured on a pain relief scale instead of pain scale, a method recommended by Huskinsson (1974).

There was no improvement in pain during wrist motion in eight cases. Five of these cases showed recurrence of capsular swelling at follow-up which might explain the lack of improvement in pain relief. Two other cases showed severe radiographic changes. In the remaining case the lack of pain relief could not be explained at the follow-up examination.

Along with pain, reduction in range of motion is a frequent objective finding at the preoperative examination (Table 1). Both factors reduce the function of the wrist, especially when supination and pronation are affected. Jackson et al. (1974) performed resection of both the ulnar and the radial heads in cases with limited preoperative supination and pronation. In this series four

cases had affection in the proximal radio-ulnar joint and there was no improvement in supination and pronation at follow-up. Contrary to this observation there was great improvement in supination and pronation in cases where the proximal radio-ulnar joint was not affected.

These findings are in keeping with Rasker et al. (1980). It does not appear to be necessary to combine the operation with radial head resection to obtain improvement in supination and pronation when the proximal radio-ulnar joint is not affected.

The volar and dorsiflexion showed improvement at follow-up. This is in good agreement with Cracchiolo & Marmor (1969), but in several other studies volar and dorsiflexion showed no improvement after the operation.

Grip strength is examined in several studies; the results show great variation (Cracchiolo & Marmor 1969, Eiken et al. 1975, Møller 1974). In this series grip strength was not studied because preoperative measurements were not available and the MCP and PIP joints were affected in many of the patients, which might have biased the results.

The radiological findings showed significant progression. Destruction was classified as progression in 41 cases, and in 30 cases the changes had increased in grading. This is in good agreement with Rane & Taylor (1973), Rasker et al. (1980), Eiken et al. (1975) and Edström et al. (1976). Synovectomy cannot prevent radiographic progression in a joint affected with RA. The fascinating question of whether early synovectomy can prevent radiographic progression must be answered by future investigations.

Shapiro (1968) has suggested that ulnar phalangeal drift is part of a zig-zag pattern. He showed that ulnar deviation in MCP joints is conditioned by radial deviation in the wrist. Pahle & Raunio (1969) have shown that wrist arthrodesis of more than 5 degrees of radial deviation results in ulnar deviation in the MCP joints measured at follow-up after 3–4 years. Contrary to this, the ulnar deviation in MCP joints showed no further progression at follow-up when the wrist was fused in 5–10 degrees of ulnar deviation. Thus a slight ulnar deviation in the wrist joint after resection of the distal ulna is desirable.

In this series there was no significant improvement in ulnar deviation in the wrist joint at follow-up. Deviation in the MCP joints was not studied and there were no preoperative X-rays of the hand in 30 degrees of flexion in MCP joints. Clayton & Ferlic (1975) recommend a transfer of the extensor carpi radialis longus to the extensor carpi ulnaris in patients who do not have the ability to deviate the wrist in an ulnar direction. At present, no confirmed studies exist which describe the zig-zag pattern in relation to wrist synovectomy with resection of the distal ulna.

Stability was good after the operation; no ulnar dislocation of the carpus or dorsal dislocation of the ulna stump was noted. In order to prevent instability Cracchiolo & Marmor (1969) and Jackson et al. (1974) removed only 1–1.5 cm of the distal ulna. Møller (1973) and Rasker et al. (1980) did not observe any instability though they removed 3–4 cm of the distal ulna, in good agreement with the observations in this series.

In 15 cases the extensor carpi ulnaris tendon was noted as flicking over the ulnar stump during rotation described by the patients as a snapping sensation. In no case was this sensation painful. There was no difference in the length of the resected part of the distal ulna between cases with and those without the sensation. Møller (1973) found that the snapping sensation disappeared in all the cases in the course of the first year. This was not the case in the present study.

Jackson et al. (1974) recommend a fixation of the extensor carpi ulnaris tendon to the ulna by means of the extensor reticulum, preventing it from dislocation in a volar direction and becoming a wrist flexor. Rasker et al. (1980) noted only rarely a dislocation of the extensor carpi ulnaris tendon, and they did not perform any fixation of the tendon to the ulnar stump.

## CONCLUSION

In cases of rheumatoid affection in the wrist joint causing synovitis and pain, wrist synovectomy with resection of the distal ulna can be recommended where regular medical treatment has been attempted for a minumum of 6 months without successful results.

The operation gives great pain relief and improvement in range of motion and in the subjective assessment of function.

Stability in the wrist joint remains good, and deviation is unchanged.

The operation cannot prevent radiographic progression.

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Correspondence to: Claus Munk Jensen, M.D., Jagtvej 11, 4.th., DK-2200 Copenhagen N, Denmark.