Results of rheumatoid wrist surgery (arthrodesis excepted): 16 patients with more than 20 years follow-up


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ABSTRACT

Purpose of the study
The absence of a medical treatment capable of successfully arresting joint destruction due to rheumatoid arthritis (RA) leaves a large domain for surgical treatment. The purpose of our work was to determine whether a clinical benefit persists in the long term (more than 20 years) despite aggravation of the radiological lesions, after surgical treatment of rheumatoid arthritis of the wrist.

Material and methods
Sixteen patients (13 women and 3 men), mean age 65 years, with RA were reviewed a mean 24.8 years (range 20-33 years) after wrist surgery. Twenty-four wrists were operated for dorsal synovectomy (n = 18) and Swanson radiocarpal implant (n = 6). Total arthrodeses were excluded. Clinical, functional and standard and stress x-ray data were collected at last follow-up.

Results
Residual pain at last follow-up in wrists which had undergone dorsal synovectomy was scored 3.1/10 on the VAS versus 5.6 preoperatively. Three-quarters of the patients stated they were satisfied with the intervention despite very weak force. Revision surgery was required in eight patients after dorsal synovectomy including three which required resection of the ulnar head, left in place after the first surgery, and three for removal of a silicon implant of the ulnar head. This implant was rapidly abandoned in our unit (as in other units). The radiological status worsened in all wrists over time, despite synovectomy. For the Swanson radiocarpal implant, residual pain was only 0.5/10 versus 6.7 preoperatively. Four implants fractured and four developed radiological signs of siliconitis with not clinical expression. Despite these complications, five of the six patients felt favorably about their intervention and the mean Leclerc function score was 78/100. Flexion-extension was 56° on average. The main complaint was the lack of force.

Conclusion
There is a discordance between radiological and clinical results, a difference which widens with longer follow-up. A clear improvement in the pain score and the moderate functional demands of these patients are probably the reasons for their satisfaction despite radiological degradation. Many desire more wrist force. Our indications have evolved over time with the development after 1980 of the radiolunar arthrodesis procedures that we associate with dorsal synovectomy even in early-stage patients in order to limit radiological degradation and ulnar translation of the carpus. Swanson radiocarpal implants were complete abandoned in 1987 despite favorable clinical results due to the radiological degradation with bone loss and risk of siliconitis. For Simmen III wrists, total arthrodesis remains the only sure and definitive solution.

Key words: Wrist, rheumatoid arthritis, surgery, dorsal wrist, Swanson.

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INTRODUCTION

The wrist is a common localization of rheumatoid arthritis (RA), observed in up to 95% of patients after 12 years of disease course [Fourastier et al. (1)].

In order to restore normal wrist function despite the lack of a perfectly anatomic reconstruction, surgical treatment must yield a pain-free wrist with acceptable stability and motion. The purpose of the present work was to determine whether the early results after surgery for RA are sustained over time. We were particularly interested in synovectomy which is known to have no effect on radiological alterations but with a potentially sustained beneficial clinical effect [Fourastier et al. (1), Thirupathi et al. (2)]. With this aim, we reviewed, after a mean 24 years follow-up, 16 patients who underwent surgery in our unit between 1968 and 1981.

MATERIAL AND METHODS

Study population

The following inclusion criteria were retained: overt RA, surgery on at least one wrist, follow-up of at least 20 years. Total arthrodeses were excluded since only two wrists were reviewed.

From 1968 to 1981, 82 patients underwent wrist surgery for RA (129 wrists). Sixteen patients (13 women and 3 men) attended our outpatient clinic and were reviewed clinically and radiographically at minimum follow-up of 20 years (maximum 30 years) (fig. 1). Sixty-six patients (105 operated wrists) were not available for examination: 21 patients had died, incomplete or destroyed medical files, bedridden patients.

Mean age at onset of clinical expression of RA was 34 years (range 23-51). Time from discovery of RA to the first wrist procedure was 8 years 10 months on average (range 3 months, 26 years). Mean age at the first wrist procedure was 43 years (range 32-55). At the time of this review, patients were aged 67 years on average (range 50-78) (table I). The operated wrist was on the dominant side in 54% of cases. Bilateral operations (8 patients) accounted for half of the procedures. All patients had polyarticular involvement and on average patients had had eight orthopedic operations (range 2-14).

At the time of review, RA had evolved for more than 30 years in 14 patients. Eleven were nearly or totally inde-

TABLE I. – General data on the reviewed series of rheumatoid arthritis wrists (n = 32).<tbl>

<table>
<thead>
<tr>
<th></th>
<th>Dorsal synovectomy (n = 18)</th>
<th>Swanson radiocarpal implant (n = 6)</th>
<th>Non-operated wrists (n = 8)</th>
</tr>
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<tr>
<td>Simmen classification</td>
<td>I (n = 7) II (n = 8) II (n = 1) Undetermined (n = 2)</td>
<td>I (n = 0) II (n = 4) II (n = 2)</td>
<td>I (n = 3) II (n = 3) II (n = 2)</td>
</tr>
<tr>
<td>Age at disease onset (yr)</td>
<td>36.5 (25-51)</td>
<td>31.8 (23-38)</td>
<td>36.9 (26-51)</td>
</tr>
<tr>
<td>Time from diagnosis to first wrist operation (yr)</td>
<td>7.9 (0.4-16)</td>
<td>11.8 (6-26)</td>
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<tr>
<td>Age at review (yr)</td>
<td>69.7 (60-78)</td>
<td>64.8 (53-73)</td>
<td>68.9 (61-78)</td>
</tr>
<tr>
<td>Postoperative follow-up (yr)</td>
<td>25.5 (20-33)</td>
<td>22.2 (20-31)</td>
<td>22.7 (20-31)</td>
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<td>Total number of operations</td>
<td>8.4 (2-14)</td>
<td>8 (4-14)</td>
<td>7.1 (2-14)</td>
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<td>Steinbrocker functional classification</td>
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<td>3 (2-4)</td>
<td>2.9 (2-4)</td>
</tr>
<tr>
<td>Larsen stage preoperatively</td>
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<td>3.2 (3-4)</td>
<td>1.8 (0-3)</td>
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<tr>
<td>Larsen stage at last follow-up</td>
<td>4.4 (2-5)</td>
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<tr>
<td>Preoperative pain score (VAS 0-10)</td>
<td>5.6 (2-8)</td>
<td>6.8 (6-7)</td>
<td>1 (0-8)</td>
</tr>
</tbody>
</table>
RESULTS OF RHEUMATOID WRIST SURGERY (ARTHRODESIS EXCEPTED): 16 PATIENTS WITH MORE THAN 20 YEARS FOLLOW-UP

Among the 32 wrists in the 16 patients reviewed, 18 had undergone dorsal synovectomy: simple dorsal synovectomy (n = 7), synovectomy associated with resection of the ulnar head (n = 5) and resection of the ulnar head then Swanson silicon implant (n = 6) [Allieu (3), Allieu and Brahim (4), Vainio (5)]. Radiocarpal implant for Swanson arthroplasty was performed on six wrists, one of which was implanted before 1974 (conventional silicon elastomer prosthesis) and the five others with a high performance 100 silicone implant (grommets were not used) [Swanson and De Groot-Swanson (6)].

Method

Subjective clinical criteria

Pain was evaluated with a visual analog scale (VAS) from 1 to 10 using the Maihlé and Allieu classification (table II). The patient’s subjective assessment of surgical outcome was determined according to Maihlé and Allieu (7) (table III).

Objective clinical criteria

Patient dependence was determined with the Steinbrocker classification (8): overall functional index. We also used the 100-point evaluation scale for function of the rheumatoid wrist described by Leclercq et al. (9). Elements considered were: pain (40 points), function (30 points), motion (20 points), force (10 points).

Radiological criteria

Plain x-rays of the hands and wrists (AP and lateral views) were obtained in the neutral position with measurement of the Larsen gravity index (11) as modified by Alnot and Leroux (12) and the Steinbrocker index (8) modified by Fourastier et al. (1). Stress films were also obtained in flexion, extension, and ulnar and radial inclination.

To assess the potential disease progression in each wrist, we used the classification system described by Simmen and Huber (13). This system is based on the analysis of two x-rays of the wrist taken 6 months apart; three forms are described: type I (ankylosing), type II (arthrosic), type III (destabilizing). Potential disease progression could be assessed in 15/16 patients (30 wrists): 10 Simmen I, 14 Simmen II, 6 Simmen III (table I). Certain classification of the wrists (15/16 patients) required radiographic follow-up for 5 years.

Several indexes and angles were measured. The index of carpal height (ICH) provides an assessment of cartilage involvement on the different joint surfaces as well as bone destruction and volar subluxation of the carpus. It was calculated using the Yourn et al. criteria (14) (normal value: 0.54 ± 0.03).

Ulnar translation of the carpus (ULC) was measured with the Di Benedetto method (15) using the axis of the radial shaft as the reference (normal value: 0.10 ± 0.03).

Radial inclination of the carpus (A1) was measured according to Shapiro (16) (normal value < 125°).

Correct measurement of the carpal deviation in relation to the radial glenoid surface is impossible when this surface has been destroyed. This angle was therefore measured between the axis of the 2nd metacarpus and the axis of the distal fourth of the radius (A1, normal value < 15°).

RESULTS

Among the 32 rheumatoid wrists reviewed, 24 were treated surgically (fig. 2). For 15/16 patients, the operation was the first for RA.

Revision and complications of first operation

Revision after dorsal synovectomy

Eight of the 18 wrists treated by synovectomy underwent revision during the course of the disease. The revisions came early in six cases (within three years of first operation) (fig. 2). Revision for resection of the ulnar head was performed for three of the seven dorsal synovectomies without resection of the ulnar head initially, with implantation of a Swanson ulnar head prosthesis in one. Repeated synovectomy was performed in one wrist. One dorsal synovectomy was measured and compared with standardized forces for age and sex [Mathiowetz et al. (10)].

Grasp force and pinch force were measured and compared with standardized forces for age and sex [Mathiowetz et al. (10)].

TABLE II. – Maihlé and Allieu pain classification.

| Group 0: persistent pain day and night preventing function |
| Group 1: very painful, hindering function. Function possible only with a major effort. |
| Group 2: pain appears only for certain movements or at the end of an activity |
| Group 3: episodic or barometric pain |
| Group 4: pain free |

TABLE III. – Patient assessment of operative result using the Allieu and Maihlé classification.

| Group 0: worse |
| Group 1: not improved |
| Group 2: slightly improved |
| Group 3: well improved |
| Group 4: very much improved |
Objective clinical criteria

Vitis. Synovitis was present in 5/8 non-operated wrists.

Complications of Swanson radiocarpal implants

Four of the six Swanson radiocarpal implants fractured, all more than three years after implantation. None of these four fractures involved revised implants. There was one early infection after necrosis of the dorsal skin. The implant was removed at three weeks followed by arthrodesis of the wrist with an external fixator. The wrist progressed to mildly painful pseudarthrosis (2/10 on the VAS) with little motion (flexion-extension, 13°/5°). At more than 20 years follow-up, the x-ray showed radiological siliconitis in four wrists with no significant impact on the function and pain scores. There were no clinical signs.

Results of dorsal synovectomies

Subjective clinical criteria

At the time of this review, 13 of the 18 dorsal synovectomies were considered satisfactory by the patients (groups 3 and 4). There were also three fair results (group 2) and two poor results (group 1 and 0).

The pain score (VAS), which was 5.6/10 preoperatively, worsened with time. Loss of force was considerable, with remaining force only 15% of reference values for the same age and sex [Mathiowetz et al. (10)].

Function scores

Twelve of the 16 patients were in groups 3 and 4 of the overall Steinbrocker index. They had limited independence. In order to better evaluate wrist function, we used the function score for the rheumatoid wrist established by C. Leclercq et al. (9). There was no significant difference at the time of review. Loss of force was considerable, with remaining force only 15% of reference values for the same age and sex [Mathiowetz et al. (10)].

Radiographic aspects

At the time of review, the Steinbrocker classification (8) as modified by Fourastier (1) of the dorsal synovectomies was stage II (n = 1), stage III (n = 7), stage IV (n = 10). Using the Larsen (11) radiographic classification, radiographic aggravation had occurred in 17 wrists among the 18 synovectomies (1.4 preoperatively and 4.4 at last follow-up). Worsening occurred in all non-operated wrists (fig. 3). Two spontaneous radiolunate fusions were observed after dorsal synovectomy. The height of the carpus decreased progressively in the two groups (non-operated and dorsal synovectomy). Loss of carpal height was greater with higher Simmen grade (table IV). Loss of height tended to stabilize about 15 years after surgery (fig. 4). Dorsal synovectomy correctly stabilized the radial deviation of the carpus in relation to the radial axis in type I and II wrists. In type III however, the deviation continued to worsen with time.

It was difficult to measure changes in ulnar translation in relation to the radial shaft in wrists with advanced disease. In the group of dorsal synovectomy with resection of the ulnar head, ulnar translation stabilized at about 15 years. In Simmen type I wrists it changed from 0.09 preoperatively to 0.13 twenty years after surgery. In type II wrists, the results were 0.10 and 0.15.

Results of Swanson radiocarpal implants

At review, five out of six Swanson radiocarpal implants were considered favorably by the patients (groups 3 and 4). There was one fair outcome (group 2). Pain improved from 6.7/10 preoperatively to 0.5/10 at last follow-up (fig. 5).

Objective clinical criteria

Motion in patients with a Swanson implant was 56° (flexion 17°-extension 39°). Ulnar inclination was well preserved (25°). Loss of radial inclination was considerable (-2° versus 7° in the non-operated group). There was no significant dif-
ference in pronosupination between the Swanson implant group (75°/78°) and the non-operated group (77°/68°).

Functional scores

The functional score for the rheumatoid wrist [Leclercq et al. (9)] did not reveal any significant difference at last follow-up. The median was however higher for the Swan-son implant group (78/100) than for the non-operated group (64/100).

Radiographic aspects

The modified Steinbrocker classification and the Larsen classification were not used for Swanson implants. Loss of carpal height was greater with higher Simmen type (table IV, fig. 4). It was also greater than for non-operated wrists: 40% loss at more than 20 years for type II wrists and 68% for type III wrists.

Swanson radiocarpal implants did not control radial deviation of the carpus in relation to the radial axis which continued to worsen in type II and III wrists.

DISCUSSION

Population

There is no data in the literature on the postoperative course of rheumatoid wrists followed for more than 15 years. Our retrospective study provides information on wrists followed for more than 20 years. It is difficult to determine how representative our sample is since only 20% of wrists were reviewed and 26% of patient had died at the time of this analysis.

Prediction of outcome and types of evolution

Inevitably, rheumatoid wrists worsen despite surgery, but not in a linear fashion and with many variants from one patient to another. In some patients, a fibrotic reaction leads to ankylosis, which if the position is favorable, can allow satisfactory function and a relatively pain-free wrist for a long period. Unfortunately, the usual course leads to destabilization and carpal instability, greatly compromising wrist and hand function. The problem is to be able to predict from an early stage the future outcome. Adequate surgical treatment is very difficult, whatever the future evolution. In 1992, Simmen and Huber (13) developed a prognostic radiographic classification taking into account not only bone-cartilage-ligament destructions presented by Larsen et al. (11), but also attempting to predict the long-term outcome. Using two wrist x-rays taken more than six months apart, it is possible to predict future evolution. In 1965, Clayton (17) distinguished “stiffner” wrists (stiff wrists corresponding to Simmen type I and II) and “lossener” wrists (corresponding to Simmen type III). It is difficult to distinguish type I and II early in the disease course, and 16 of the wrists in this study could not be classified. To identify with certainty the type of rheumatoid wrist, we had to follow wrists for five years on average. The six months between two radiographs thus appears to us to be insufficient since only 50% of the wrists could be classified.

Course of non-operated wrists

Without surgery, pain declined over the years. This evolution may have been related to a decreased functional demand and decreased wrist mobility. It has been noted that certain wrists progress towards fibrosis and stabilization

<table>
<thead>
<tr>
<th>Simmen I</th>
<th>Non-operated</th>
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<tr>
<td></td>
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<table>
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<td>43%</td>
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<table>
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<tr>
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<tr>
<td></td>
<td>62%</td>
<td>16%</td>
<td>68%</td>
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(Clayton stiffer wrists or Simmen type I and II). Radiographic degradation continues over time. Loss of carpal height is the same as after dorsal synovectomy in Simmen type I wrists. For types II and III, not performing surgery favored a greater loss of carpal height.

Dorsal synovectomy

Initially, there are two goals with dorsal synovectomy: to influence the overall immunological process by limiting the self-aggressiveness, and to prevent progressive destruction of the injured joint. In 1988, Gschwend (18) recognized that these two goals are only theoretical, noting the important pain relieving effect and the significant diminution of synovitis. Conversely, radiological destruction continues to progress. Three secondary resections of the ulnar head were necessary in our series. It would appear that this resection should be systematic. It would not increase the risk of ulnar translation of the carpus and would allow complete synovectomy [Allieu (19)].

Pain and synovitis

Our 20-year follow-up enabled us to examine the effect of synovectomy on pain. In the different series presenting results at around five years, the majority of the patients had little or no wrist pain, but with a diminishing effect over time [Alno and Leroux (12), Obry et al. (20)]. For Allieu et al. (21) 67% of the wrists were pain free at eight years. At more than 20 years, only 44% of the wrists were free from pain and only episodically (groups 3 and 4). The anti-pain effect of synovectomy fades away with time. This could be related to the progressive recurrence of synovitis which we found in 36% of our patients after dorsal synovectomy. Others have reported 4% after five years [Fourastier et al. (1)], 5% after four years [Dumontier (22)], and 20% after eight

years [Allieu (3)]. Certain authors have noted more rapid recurrence and higher rates up to 23% at three years [Obry et al. (20)].

Patient assessment of the efficacy of dorsal synovectomy

Despite progressive clinical and radiographic degradation, 69% of our patients felt their wrists were improved or very improved 20 years after dorsal synovectomy. This efficacy declined with time. The same observation has been reported in the literature: 76% patient satisfaction at four years and 71% at eight years [Fourastier et al. (1), Allieu et al. (21), Allieu (23)]. Gschwend (18) found better results at more than ten years: 90% excellent and good results for pain.

Joint motion after synovectomy

Postoperative deterioration of joint motion occurs very slowly: the flexion-extension range was 70° at three years for Obry et al. (20), 58.4° at more than ten years for Gschwen et al. (24). Our series confirms this progressive degradation: at more than 20 years, the flexion-extension range was no more than 47°, with motion basically in the mediocarpus. Conversely, pronation-supination appeared to be improved in our patients after dorsal synovectomy with resection of the ulnar head; with hardly any degradation over time. This type of evolution has been described by many authors [Gschwend et al. (24)].

Wrist function

It is almost impossible to assess wrist function alone. The wrist participates in the overall function of the hand. The functional capacity of the upper limb declines over time so that it is not the wrist which is the problem for daily life activities, but the hands, the elbows and the shoulders [Allieu et al (21)]. But the functional gain observed in our patients was still considerable 24 years after dorsal synovectomy.

Short-term wrist force is improved 30-40% due to better stability of the well-aligned pain-free wrist [Dumontier (22)], but declines progressively with time to about half of the normal wrist force at eight years [Allieu (23)]. In our patients with the longest follow-up, wrist force was only 15% of the standardized level for age and sex matched subjects [Mathiowetz et al (10)] versus 11% in non-operated wrists.

Ideally, grasp force is a specific measurement of wrist force [Allieu (19)], but most of our patients were unable to maintain the measurement instrument correctly. We measured lateral pinch forces between the thumb and first and third fingers, although it is known that finger lesions can modify this force. Nevertheless, force accounted for only 10% of the overall function score we used as described by Leclercq et al. (9). In the very long term, synovectomy had very little impact on force. This was also noted by Faivre (25) eight years after synovectomy.

Radiographic aspects

All of the wrists were already altered preoperatively. Synovectomy was not performed early as propose by Alnot (26). In our series, it did not prevent radiographic degradation. Synovectomy did not prevent osteocartilaginous destruction as has also been noted by most authors [Fourastier et al.(1), Larsen et al (11), Simmen and Huber (13), Allieu et al. (19, 21), Dumontier (22), Chantelot et al. (27), Lopitaux (28), Vincent et al. (29)].

For Simmen type I wrists, the carpal height decreased in parallel for wrists with and without dorsal synovectomy. Loss of carpal height was less severe in type II and III wrists treated by dorsal synovectomy. The question is whether synovectomy offers partial protection against bone destruction in type II and III wrists. For most authors, synovectomy does not change the linear loss of carpal height [Simmen and Huber (13), Gschwend (18), Allieu et al. (21), Tubiana (30)]. Nevertheless, Alnot (26) proposes early surgery to avoid radiographic aggravation.

There were no wrists with a modified angle of the radial deviation of the carpus at last follow-up, for both Simmen types I and II. Correction of the radial deviation of the carpus cannot be achieved without tendon transfers of the extensor carpi radialis brevis onto the extensor carpi ulnaris or the extensor radialis longus onto the extensor carpi radialis brevis [Fourastier et al. (1), Alnot and Leroux (12)].

Aggravation of the ulnar translation was observed at about 15 years then generally remained stable. It was not modified by dorsal synovectomy. As we have demonstrated previously Allieu et al. (21), resection of the ulnar head did not change the evolution of ulnar translation. This can be explained by the spontaneous development of a medial block on the medial aspect of the radial epiphysis. The fortunate formation of this bony block prevents the carpus from slipping anteriorly and medially. We only had two cases of spontaneous radioulnar fusion among our 18 cases of dorsal synovectomy. In the literature, the rate has been 10% to 26% of wrists after dorsal synovectomy [Alnot and Leroux (12), Dumontier (22), Chamay (31), Davis et al. (32)].

Early in our experience, we used the silicon Swanson implant in association with dorsal synovectomy [Allieu et al. (21, 23)], then rapidly abandoned it because of numerous cases of early complications (three dislocations and one fracture among six implants). According to its promoter, this implant increases wrist force and motion [Swanson (33)]. At last review, we did not observe any change in wrist force and motion compared with simple resection of the ulnar head. For certain authors, the improved stability of the distal radioulnar joint would not be due to the prosthesis itself, but rather to better reconstruction of the joint capsule [Davis et al. (32)].

Swanson radiocarpal implant

Total arthrodesis is generally proposed for painful Larsen stage IV or V wrists. This alleviates the pain but also pro-
hibits motion. It can be poorly tolerated, particularly in patients with severe lesions involving several levels of the upper limb. Arthroplasty is an interesting alternative to preserve joint motion and achieve pain relief and stability.

Clinical results

The long-term efficacy is very satisfactory for pain relief, even after implant fracture. Despite four fractures of six implants, four patients were pain free or only experienced episodic pain. Sustained pain relief could in part be due to complete synovectomy and local denervation [Alnot and Leroux (12), Allieu (19), Haoula et al.(34), Fatti et al. (35)]. At last follow-up, our patients reported improved function and pain relief. The diagnosis of implant fracture was radiographic and not clinical, as has been reported for 72% of fractures in another series [Haloua et al. (34)]. Implant fracture does not appear to affect patient satisfaction. Late implant fracture (one at three years and three more than ten years after implantation) and the minimal functional demands of these patients could explain this discordance. When the fracture occurs early, patients do experience pain with instability and loss of force [Brase and Millender (36)]. The rate of fracture in the different series has varied from 10% to 73% at five years. It does not appear to be significantly decreased by use of plastic grommets [Allieu (19), Gschwend et al. (24), Haoula et al. (34), Fatti et al. (35), Brase and Millender (36), Capone (37), Lluch (38), Jolly et al. (39)]. Different factors could favor fractures [Gschwend et al. (24), Haoula et al. (34), Fatti et al. (35), Brase and Millender (36), Lluch (38)]: excessive stress (young patient, heavy work); excessive postoperative mobility; poor tendon balance with postoperative ulnar or radial inclination; very significant preoperative ulnar or radial inclination; very significant preoperative destruction; significant implant impaction with development of a bony block with a sharp edge causing progressive implant wear.

We did not find any evidence of siliconitis in our patients despite the presence of radiographic signs and we cannot conclude as to whether implant fracture increases the risk of siliconitis. For Haloua et al. (34), siliconitis appears in 28% of the fracture cases, with 29% in his entire series, so that implant fractures would not increase the risk of siliconitis.

Displacement of the range of motion towards dorsal flexion was observed in our series (58° flexion-extension with two-thirds by extension). Capone (37) had previously observed this displacement which could be due to closure of the posterior capsule.

At last follow-up, we observed a diminution of radial inclination with a tilt towards the ulnar aspect. This tilt resulted from the implant fracture causing ulnar deviation and flexion deformation of the wrist [Brase and Millender (36)]. Pronosupination acquired early after surgery persisted over time.

Immediate postoperative force increases 30-40%, as a consequence of pain relief. This increase does not persist and tends to decline towards the preoperative level five years after surgery [Capone (37)]. At last follow-up, we did not observe any gain in force. This was mainly due to less than satisfactory reconstruction of the lever arm of the thumb and long finger muscles. Progressive impaction of the prosthesis into the bone further deteriorates the biomechanical conditions [Gschwend et al. (24), Lluch (38)]. Activities requiring heavy force or precise movements are difficult. Most authors note a satisfactory functional outcome (70% on average) during the first three years [Alnot and Leroux (12), Fatti et al. (35)]. This result rapidly declines during the following years. Our good functional results and the very good patient satisfaction can be explained by the progressive decline in functional demands, well-preserved joint motion, the lack of pain, and the lack of clinical consequences of late implant fractures.

The radiological aspect continues to worsen, with rarification of bone tissue and impaction of the prosthesis, phenomena largely due to reaction to silicone particles, but also to the bony reaction to progressive impaction of the implant [Haloua et al. (34)]. There is considerable loss of carpal height during the first ten years, followed a certain stabilization. For Haloua, the wrist stabilizes at five years. This loss of carpal height is largely responsible for lost wrist and hand force [Gschwend et al. (24)].

Authors who continue to implant the Swanson prosthesis have modified their technique to reduce the risk of fracture and siliconitis [Gschwend et al. (24), Lluch (38)]. These authors propose using a Swanson prosthesis in older patients who do not need major wrist force. To avoid massive bone resorption due to the mechanical friction between the prosthesis and the bone (piston effect) and the degradation of the plastic material, Gschwend proposes using a titanium sheath positioned within the bone. Swanson proposes plastic grommets [Swanson and De Groot-Swanson (6)]. Lluch (38) uses a bone graft on the carpus, associated with carciological synovectomy and lesser flexion-extension range decreased to about 40°.

CONCLUSION

Twenty to 33 years after surgery, two-thirds of our rheumatoid arthritis patients (16/24 operated wrists) remained pain free. The progressive loss of wrist motion was not a real problem for these patients with a decreased functional demand after their long disease course. Their main complaint was the lack of force. Radiographic aggravation continued despite the surgical treatment. Considering the observed complications and the satisfactory long-term functional result, many authors continue to implant the Swanson radiocarpal prosthesis in selected patients using a specific and rigorous technique [Gschwend et al. (24), Lluch (38)]. We have modified our indications over time, considering the advent of radiolucent arthrodesis in the 1980s. We use this arthrodesis in association with dorsal synovectomy for early stage disease beginning with ulnar
translation of the carpus [Allieu (19)]. We no longer consider there are indications for the ulnar head implant. We completely abandoned Swanson implants in 1987. Total arthrodesis is used alone for Simmen III wrists and provides a sure and definitive treatment, dorsal synovectomy not yielding stable results over time.

References


