Adverse outcomes following hand surgery in patients with rheumatoid arthritis

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BACKGROUND: Up to 70% of patients with long-standing rheumatoid arthritis (RA) may present with rheumatic hand disease and benefit from hand surgical procedures (HSPs).
OBJECTIVE: Through retrospective review, the present study aimed to report HSPs in RA patients at a tertiary care centre to identify patient adverse outcomes (AOs) and their predictors.
METHODS: From 1989 to 2013, 96 patients who underwent ≥1 HSP(s) were identified from two local registries; their clinical records were independently reviewed by two trained physicians (surgeon and clinical) who used a standardized format. AOs were defined by consensus; data abstracter agreement was found in 90% of cases. Descriptive statistics were used in addition to Kaplan-Meier curves to determine the time to each AO, while logistic regression models were used to determine predictors of AOs.
RESULTS: At first HSP, 89.6% of patients were female, had a mean (± SD) age of 49.1±12 years, a disease duration of 12.2±7.2 years, 93.6% were positive for rheumatoid factor and 24% were receiving intensive treatment. A total of 130 HSPs were performed: the most frequent interventions were arthrodesis (25.4%), resection of the ulnar head (15.4%) and tenorrhaphy (14.6%). During follow-up, 33 AOs were reported in 27 (28.1%) patients, 87% of which occurred after the first HSP. The most frequent AO subsets were impaired wound healing (18.2%) and exposed pin (15.2%). Longer disease duration at first HSP (OR 3.07 [95% CI 1.04 to 9.08]; P=0.04) and intensive treatment (OR 1.08 [95% CI 1.002 to 1.156]; P=0.045) were predictors of AOs. The optimal disease duration cut-off to predict AOs was 20.1 years.
CONCLUSION: Early referral of long-standing RA patients for hand surgery, along with less aggressive treatment, favoured improved surgical outcomes.

Key Words: *Rheumatoid arthritis; Hand surgery; Outcomes*

Les effets indésirables après une chirurgie de la main chez des patients atteints d'arthrite rhumatoïde

HISTORIQUE : Jusqu'à 70 % des patients atteints d'une arthrite rhumatoïde (AR) de longue date font du rhumatisme de la main et pourraient profiter d'interventions chirurgicales de la main (ICM).
OBJECTIF : Au moyen d'une analyse rétrospective, la présente étude visait à signaler les ICM chez les patients atteints d'AR dans un centre de soins tertiaires afin d'en déterminer les effets indésirables (EI) et les prédicteurs.
MÉTHODOLOGIE : De 1989 à 2013, les chercheurs ont extrait de deux registres locaux 96 patients qui ont subi une ICM ou plus. Deux médecins formés (un chirurgien et un clinicien) ont fait une analyse indépendante standardisée de leur dossier clinique. Les EI étaient définis par consensus, et l'extraction des données concordait dans 90 % des cas. Les chercheurs ont utilisé des statistiques descriptives en plus des courbes de Kaplan-Meier pour déterminer la période avant l'apparition de chaque EI, et les modèles de régression logistique pour déterminer les prédicteurs d'EI.
RÉSULTATS : À la première ICM, 89,6 % des patients étaient des femmes. Les patients avaient un âge moyen (± ÉT) de 49,1±12 ans, étaient atteints depuis 12,2±7,2 ans, 93,6 % étaient positifs au facteur rhumatoïde et 24 % étaient sous traitement intensif. Au total, 130 ICM ont été effectuées, notamment l'arthrodèse (25,4 %), la résection de la tête du cubitus (15,4 %) et la ténorrhaphie (14,6 %). Pendant le suivi, 33 EI ont été signalés chez 27 patients (28,1 %) dont 87 % après la première ICM. Un problème de cicatrisation (18,2 %) et l'exposition d'une broche (15,2 %) étaient les sous-groupes d'EI les plus fréquents. Une maladie de plus longue date à la première ICM (RC 3,07 [95 % IC 1,04 à 9,08]; P=0,04) et un traitement intensif (RC 1,08 [95 % IC 1,002 à 1,156]; P=0,045) étaient prédicteurs d'EI. Le seuil optimal de durée de la maladie pour prédire les EI était de 20,1 ans.
CONCLUSION : L'orientation rapide de patients atteints d'AR de longue date vers une chirurgie de la main, de même qu'un traitement moins énergique, favorisent de meilleurs résultats chirurgicaux.

Rheumatoid arthritis (RA) is a systemic inflammatory and autoimmune disease characterized by inflammation in the synovial joints. It typically causes a symmetrical small-joint polyarthropathy that affects the proximal interphalangeal and metacarpophalangeal joints of the hands, wrists and feet (1). The wrist joint is often involved early in the disease course, and is regarded as one of the primary therapeutic targets because appropriate treatment prevents patient disability at work and preserves independent self-care (2). Currently, there is good evidence that early recognition of the disease and intensive treatment using disease-modifying antirheumatic drugs (DMARDs) favours improved outcomes and delays disability in RA patients (3). Nevertheless, when synovial inflammation persists over the follow-up period, joint destruction appears early and leads to rheumatic hand disease, which is characterized by deformity, dysfunction and, frequently, pain (4). Patient responses to DMARDs may be highly variable and it is currently exceedingly difficult to predict which patients will respond to which medication regimen, although current research to identify patient-specific disease signatures via genetic and proteomic approaches is ongoing.

Functional and aesthetic compromise, and symptomatic complaints are the most common manifestations of the rheumatoid hand and may affect up to 70% of patients with longstanding disease (5). In such a clinical context, indications for surgery, in order of priority are: impending tendon rupture or severe nerve compression, pain relief, improved function and to correct deformity (5). Although there are clear recommendations from the National Institute for Health and Clinical Excellence (NICE) regarding early surgical referral (6), the systemic, progressive and polyarticular nature of RA elevates the complexity involved in decision-making to higher levels than is found in other areas of hand surgery. The definition of successful surgical intervention according to rheumatologists and hand surgeons varies, and has been a matter of debate for generations of physicians (7-9). Generally, rheumatologists underestimate the benefits of HSPs, while the converse is true for hand surgeons. Moreover,

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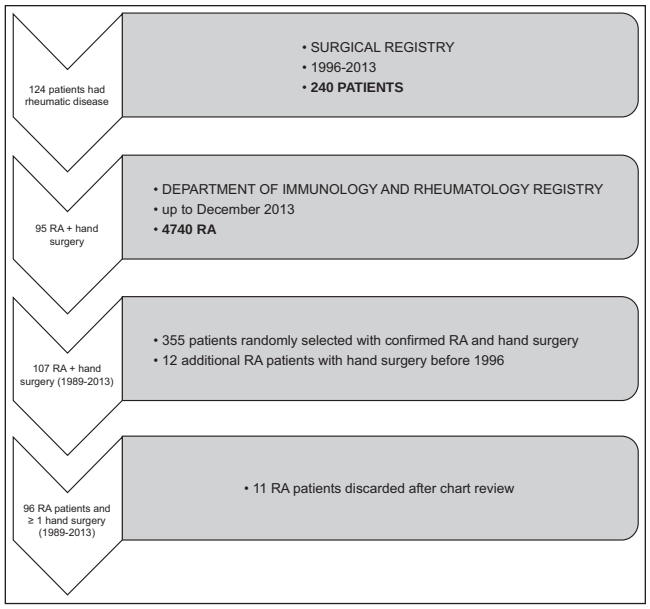

Figure 1) *Distribution of the number of hand surgical procedures performed between 1989 and 2013. *Identified after a second strategy was implemented. RA Rheumatoid arthritis*

major differences have been described regarding referral patterns: rheumatologists tend to refer patients later in their disease course, while surgeons frequently lament that RA patients are referred infrequently and late.

It is now generally accepted that decisions regarding HSPs should be made in an interdisciplinary medical/surgical clinic so that all individuals responsible for a patient's management can contribute. Surgeons need to understand the nature and natural history of the disease in addition to its medical management. Furthermore, knowledge of the likely outcome of any surgical procedure needs to be considered, and expectations of HSPs need to be realistic not only to patients, but to the physicians treating them.

Given the above considerations, the purpose of the present study was to perform a retrospective chart review and report the results of HSPs in RA patients at a tertiary care centre between 1989 and 2013. We were especially interested in identifying patient adverse outcomes (AOs) and their potential predictors, to better select and orchestrate surgical hand interventions in our population of RA patients with unique characteristics (10).

METHODS

Patient identification

The *Instituto Nacional de Ciencias y Nutrición Salvador Zubirán* is a national referral centre for rheumatic diseases, including RA, located in Mexico City, Mexico. Patients described in the present report were identified from two local registries, the first of which was initiated in 1996 at the Department of Plastic Surgery. A total of 240 patients had undergone at least one HSP between January 1996 and December 2013, of whom 124 had a diagnosis of a rheumatic disease. The specific diagnosis was determined to be RA in 95 patients based on a different local registry created in March 2003 at the Department of Immunology and Rheumatology. This registry identifies patients currently attending the rheumatologic outpatient clinic and their diagnosis (according to the rheumatologist attending to the patient). Patient data are updated weekly in electronic records and, up to December 2013, 4740 patients had RA and attended the outpatient clinic of rheumatic diseases at least once since 1957 (Figure 1).

To confirm that all patients with RA who underwent at least one HSP were identified, the following strategy was used: first, the prevalence of HSP in the population was estimated to be 8%; accordingly, 380 RA patients were randomly selected, and their records reviewed to confirm the RA diagnosis and to investigate whether they had undergone ≥1 HSP(s); subsequently, it was confirmed that patients who underwent ≥1 HSP(s) had been correctly identified. Twelve additional RA patients were identified and had their charts reviewed and data abstracted. In all cases, the HSP(s) was performed before 1996 (one patient in 1989, six in 1994 and five in 1995). Among the 107 patients for whom charts were reviewed, 11 were excluded due to the following reason(s): two did not have an HSP recorded; three had duplicate information; five had no confirmed RA diagnosis; and one had no HSP information available on the chart. Accordingly, the data presented correspond to 96 patients with RA who underwent at least one HSP (Figure 1).

Data collection

The clinical records of all cases were retrospectively reviewed by one hand surgeon trained in data abstraction. A standardized format was previously developed and included the following information: sociodemographic characteristics (age at RA diagnosis and at HSP, sex, years of education, socioeconomic status); disease characteristics (presence and type of rheumatoid factor [RF]); disease duration at first surgery; length of follow-up; detailed RA treatment at surgery; erosive disease; history of previous orthopedic surgery and location; number of visits to the rheumatologist within the year before surgery and presence of atlantoaxial luxation; HSP information (date, hand-surgical indication, surgeon identification, description of hand deformities and movement limitations, previous surgical evaluation[s], description of surgical procedure performed and description of surgery-related events); presence of comorbid conditions (according to chart diagnosis and Charlson score [11]); laboratory results at HSP (cytology, serum creatinine level and acute reactant phase determinations); and follow-up variables (hand surgical visits, physiotherapy indication and AOs as described below).

Clinical data ascertainment was confirmed by a second trained data abstracter and included comorbidities, RA treatment (type, dose and specific DMARD[s]), other treatment and laboratory information.

Ascertainment of AOs

A list of AOs was defined a priori. A literature review (12-15) identified 17 potential AOs to be included: wound infection, wound healing failure (or wound dehiscence), hematoma, seroma, instability, tendon rupture, edema/swelling, pain, bleeding (uncontrolled and/or excessive), failed consolidation, epidermolysis necrosis, sloughing, postoperative adhesions, loss of motion, fracture of the healed fusion/nonhealed fusion, fistula and exposed hardware. Items to be included in the list were discussed between surgical and clinical physicians until consensus was reached. Pain was excluded from the list because it was not objectively assessed at follow-up (eg, using a visual analogue scale). Edema was also excluded because there was no consensus regarding the lag time since surgical procedure up to when edema was considered to be a 'normal finding'. Loss of motion was not considered to be a complication if it was described after a surgical procedure with expected reduced range of motion (eg, arthrodesis). Finally, there were no reports of hematoma, instability or uncontrolled postsurgical bleeding. AOs were extracted from the charts independently by surgical and clinical physicians: agreement was found in 90% of the cases and, for the remaining 10%, consensus was reached.

Statistical analysis

Distribution of each variable was analyzed. Student's *t* and χ^2 tests were used for normally distributed variables, and the Mann-Whitney U test for non-normally distributed variables. The time to each AO was assessed using Kaplan-Meier curves. Logistic regression models were used to identify predictors of AO(s) at first HSP. The selection of variables to be included was based on their statistical significance in the bivariate analysis; $P \leq 0.10$ was established based on the number of variables a priori included to avoid over-fitting the models; based on the number of outcomes of interest (n=26), three variables were included: disease duration, RA intensive treatment (defined as ≥2 DMARDs +

TABLE 1
Patients, disease characteristics and treatment in the rheumatoid arthritis (RA) population, and in RA patients with and without adverse outcomes

Patients	RA population (n=96)	Adverse outcome(s) Yes (n=27)	Adverse outcome(s) No (n=69)	P
Sociodemographic characteristics				
Female sex, n (%)	86 (89.6)	25 (92.6)	61 (88.4)	0.72
Middle to low socioeconomic status, n (%)	77 (80.2)	21 (77.8)	56 (81.4)	0.78
Age at disease diagnosis, years	36.9±11	34.5±9.7	37.9±11.3	0.17
Age at hand surgical procedure, years	49.1±12	48.9±12	49.2±12.1	0.90
Disease duration at hand surgical procedure, years	12.2±7.2	14.4±6.9	11.3±7.2	0.05
Follow-up after hand surgical procedure, months	16.9±33.8	19±38.6	16.1±32	0.71
Serology results at surgery				
Rheumatoid factor positive	75 (92.6)*	19 (95)	56 (91.8)	1
Erythrocyte sedimentation rate, mm/h	26 (15–39)	29 (16–37.3)	25.5 (12.8–40)	0.86
Hemoglobin, mg/dL	13.4 (12.6–14.2)	13.1 (12.6–13.6)	13.5 (12.6–14.5)	0.19
Creatinine, mg/dL	0.7 (0.6–0.9)	0.73 (0.68–0.9)	0.7 (0.6–0.9)	0.26
Comorbidities				
≥1, n (%)	43 (44.8)	13 (48.1)	30 (43.5)	0.82
Comorbidity/patient	1 (1–3)	1 (1–2.5)	2 (1–3)	0.15
Previous visits to the outpatient clinic	2 (1–3)	2 (1–4)	2 (1–3)	0.90
RA-specific treatment at HSP, n (%)				
Untreated	4 (4.2)	0 (0)	4 (5.8)	NA
Corticosteroids	2 (2.1)	0 (0)	2 (2.9)	NA
1 DMARD	20 (20.8)	4 (14.8)	16 (23.2)	0.42
≥2 DMARDs	47 (49)	12 (44.4)	35 (50.7)	0.65
≥2 DMARDs + corticosteroids	23 (24)	11 (40.7)	12 (17.4)	0.03

*Data presented as mean ± SD or median (range) unless otherwise indicated. *Data missing for 15 patients. DMARD Disease-modifying antirheumatic drug(s); NA Not applicable*

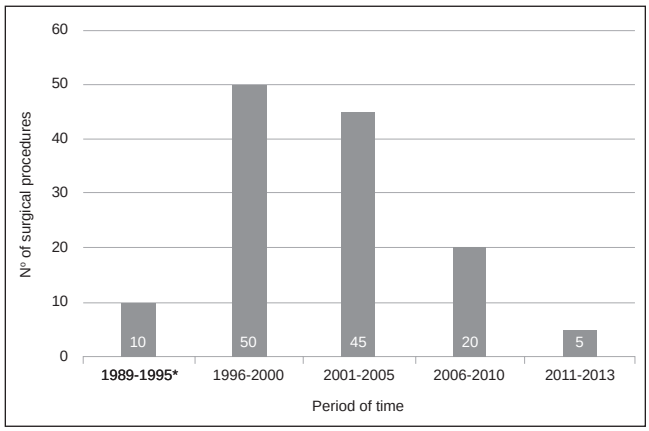

Figure 2) *Distribution of the number of hand surgical procedures performed between 1989 and 2013*

corticosteroids) and hemoglobin level (switched to age at diagnosis and to comorbidities/patient). In addition, the correlation between variables was examined. Receiver operating characteristic (ROC) curves were plotted to determine the optimal disease duration cut-off to predict AO(s). All statistical tests were two-sided and evaluated at the 0.05 significance level. Statistical analysis was performed using SPSS version 17 (IBM Corporation, USA).

RESULTS

Population characteristics (Table 1)

At first HSP, the 96 RA patients identified were predominantly middle-age ([mean±SD] 49.1±12 years), female (89.6%) and had a disease duration of 12.2±7.2 years. Most (93.6%) of the patients were positive for RF and the median erythrocyte sedimentation rate was 26 mm/h (range 15 mm/h to 39 mm/h). Almost one-half (45%) of the patients had at least one comorbid condition and the median number of visits to the outpatient clinic within the year before HSP was 2 (range 1 to 3). Finally, 47 patients were receiving ≥2 DMARDs, 20 one DMARD, 23 combined DMARD(s) and low doses of corticosteroids, two received corticosteroids as the sole RA therapy and four patients were not taking any RA-specific medication (Table 1).

TABLE 2
Hand surgical procedures (HSP)

Procedure	Specific HSP (n=130), n (%)	Disease duration up to HSP*, years, mean ± SD
Arthrodesis	33 (25.4)	11.3±6.1
Resection of ulnar head	20 (15.4)	12.5±7.4
Tenorrhaphy	19 (14.6)	13.6±7.2
Synovectomy	18 (13.9)	11.7±6.8
Resection of rheumatoid nodules	14 (10.8)	16.6±7
Tenosynovectomy/tenolysis	10 (7.7)	9.4±7.2
Other hand surgical procedures	16 (12.3)	12.6±8.5

**P=0.23 when specific HSP were compared*

HSPs

A total of 130 HSPs were performed in the 96 RA patients: 71 (74%) underwent one surgical intervention, 17 (18%) underwent two, seven (7%) underwent three and one (1%) underwent four. Most of the procedures were performed between 1995 and 2005; there was a decline in the number of interventions from 2006 onwards (Figure 2). All patients received a single dose of intravenous antibiotic as induction, were assigned to standard postoperative rehabilitation and continued taking their RA medication throughout the perioperative period. At the time of surgery, disease activity was not assessed using validated tools, although all patients underwent at least one rheumatic evaluation. Finally, patients underwent a median of 2 (range 1 to 3) rheumatic evaluations within the year before their HSP.

TABLE 3
Adverse outcome (AO) subset distribution and time to detection in the 33 patients identified

AO subset	Patients with an AO subset, n (%)	Days to AO subset, mean ± SD
Wound healing failure	6 (18.2)	138.3±210.6
Exposed pin/nail in fingers	5 (15.2)	132.2±119.9
Tendon rupture	4 (12.1)	365±359
Postoperative adhesions	4 (12.1)	257±230.8
Loss of motion	3 (9.1)	210.3±63.5
Seroma	3 (9.1)	48±38.3
Wound infection	3 (9.1)	35±38.2
Sloughing	2 (6.1)	8±0
Epidermolysis/necrosis	1 (3)	8
Failed consolidation	1 (3)	88
Fistula	1 (3)	102

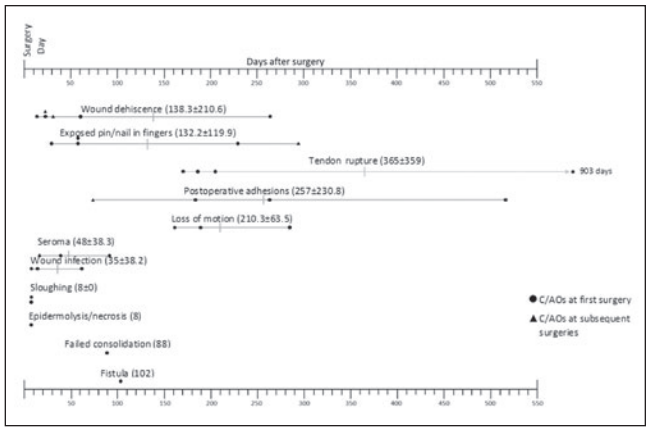

Figure 3) *Time (days, mean ± SD) from hand surgical procedure to adverse outcomes (AOs). Each • and ▲ represents one AO*

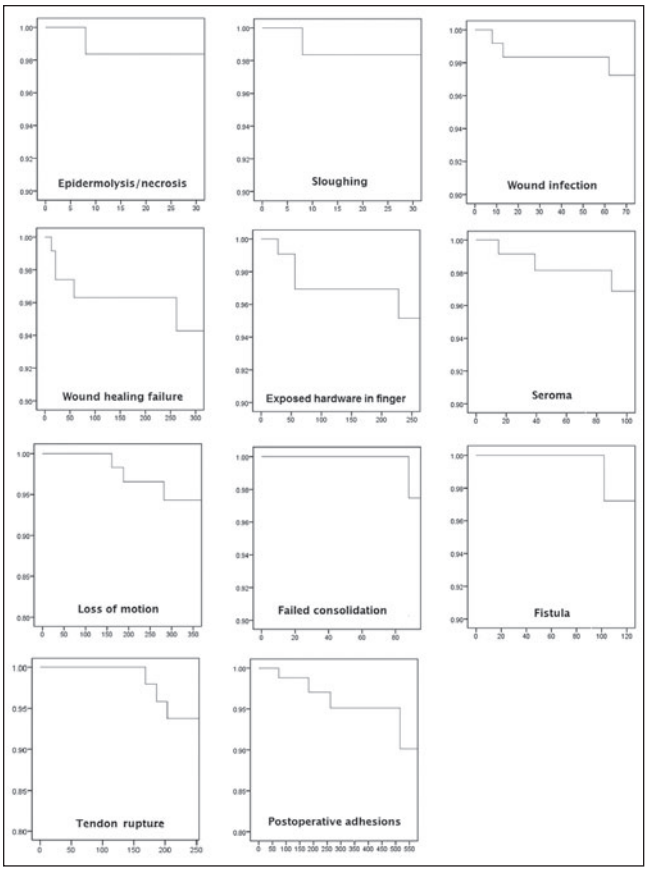

Figure 4) *Kaplan-Meier curves depicting adverse outcome survival*

The most frequent surgical procedures were arthrodesis (25.4%), resection of ulnar head (15.4%) and tenorrhaphy (14.6%) (Table 2). Sixteen HSPs were performed in 15 patients and distributed as follows: mass resection (n=5), carpal tunnel release (n=4), pin fixation (n=3), capsuloplasty (n=1), trigger finger release (n=1), compartment syndrome release (n=1) and removal of osteosynthesis material (n=1). Due to the limited number of procedures within each category, they were included in Table 2 under 'other hand surgical procedures'. Years of disease duration up to hand surgery were similar when compared according to specific HSP (Table 2).

AOs

Among 130 hand surgeries performed in the 96 RA patients, 33 AOs were reported in 27 patients (28.1% of the RA patients with an AO) (Table 3). Most (87%) AOs occurred after the first surgery. Furthermore, 29 of the 33 (87.9%) AOs presented as isolated, while four presented as clusters (impaired wound healing + postsurgical adhesions and wound infection + impaired wound healing). Among the 27 patients with AOs, 22 (81.5%) had one AO recorded, while four (14.8%) experienced two AOs and one (3.7%) patient experienced three AOs. The most frequent AO subsets were impaired wound healing and exposed pin (Table 3). Time to AO was highly variable among and within specific subsets, as shown in Table 3, and Figures 3 and 4.

Comparison of patients with/without AO(s) and predictors

As mentioned, 27 patients had 33 AOs recorded in their charts. Patient characteristics (demographic, disease-related, serological, comorbid conditions and treatment) at first AO were compared with those from patients without AOs and are summarized in Table 2. Patients who experienced AO(s) were more frequently indicated ≥2 DMARDs combined with corticosteroids, had longer disease duration at HSP, and tended to be older at diagnosis, have more comorbidities per patient and have lower hemoglobin levels.

Different models were tested to investigate possible predictors of first AO. Longer disease duration at first HSP (OR 3.07 [95% CI 1.04 to 9.08]; P=0.04) and more intensive treatment (OR 1.08 [95% CI 1.002 to 1.156]; P=0.045) predicted first AO.

Mild, yet significant, correlations were found between RA disease duration at surgery and hemoglobin level at surgery (r=−0.18; P=0.087) and comorbidities (r=0.28; P=0.006).

Finally, according to ROC curve analysis, the best cut-off for RA disease duration at first HSP to predict AO was found to be 20.13 years (sensitivity 20%, specificity 90%, area under the curve 0.63 [95% CI 0.51 to 0.74]).

DISCUSSION

Surgical hand therapy is eventually considered in RA patients, especially those with long-standing disease. It requires knowledge, not only of the likely outcome of any surgical procedure but of the effects of continuing disease activity on the operated area over time. Furthermore, due to the nature of their disease, RA patients have many features that affect perioperative management and outcomes. Rheumatologists are not only in a leading position to decide when a patient should be referred to a hand surgeon, but also to identify unique patient risk factors to prevent surgery-related morbidity. However, patients may approach hand surgery with considerable apprehension; therefore, a successful first procedure (ie, 'start with a winner operation') can do much to build confidence in hand surgery and the relationship with the hand surgeon (16).

In the present study, 130 interventions were performed in 96 RA patients at a single centre. Arthrodesis accounted for 25.4% of the procedures, followed by resection of the ulnar head and tenorrhaphy. There was a decline in the number of procedures performed after 2005. During follow-up, 28.1% of patients presented with significant variability in AO(s): the most frequently reported were impaired wound healing (18.2%) and exposed pin (15.2%). Two major prognosticators of AO(s) were found: longer disease duration at first surgery; and more intensive treatment, which was defined by a combination of at least two DMARDs and low daily doses of oral corticosteroids.

In the literature, there are conflicting results among studies that examined risk for complications after orthopedic surgery in patients with RA. Few have specifically investigated hand surgery (15, 17-22), and most have focused on infections and wound dehiscence, which have been detected in up to 10% of patients. Jain et al (17) documented all wound complications after elective hand surgery in 80 RA patients. Immunosuppressive therapy, particularly methotrexate and steroids, were not found to increase risk. Similarly, Kasdan et al (18) reported no complications in 15 RA patients undergoing hand surgery and treated with methotrexate. Grennan et al (19) performed a prospective randomized study involving 388 RA patients, among whom 38 were taking methotrexate at the time of hand/wrist surgery. Patients continuing methotrexate not only had a lower complication and infection rate within the first year after surgery, but also had a reduced incidence of disease flare after intervention than patients who discontinued the medication before surgery. Den Broeder et al (20) showed that continuation or interruption of established anti-tumour necrosis factor therapy did not influence the risk for surgical site infection in 768 RA patients undergoing elective orthopedic surgery, among whom 26 underwent wrist/hand procedures. Nonetheless, wound dehiscence and bleeding occurred significantly more frequently in patients who had continued the biologic. Barnard et al (21) supported a policy of continuing DMARDs (except biologic drugs) in RA patients undergoing joint replacement. Nonetheless, and in accordance with the present study, Scherrer et al (22) found that the risk for postoperative infection after orthopedic surgery in 2472 patients with inflammatory rheumatic diseases was higher in patients taking ≥2 conventional DMARDs or tumour necrosis factor-alpha inhibitors. In up to 23% of the patients included, the anatomical site of surgery was the hand.

We report an overall AO prevalence of 28%, and a causal association with intensive treatment and longer disease duration. There are arguments to be addressed to explain some differences with the existing literature. First, all potential AOs were considered a priori and based on a literature review; all were identified by the surgeon reviewer and confirmed by the clinical reviewer. In fact, our prevalence of wound infection (9.1%) was low and similar to that previously published (18-20,21). Second, we did not intentionally limit follow-up; therefore, late-onset AO(s) could be identified. Third, we categorized RA treatment into regimens that are used in the 'real-word', such as combined DMARDs and corticosteroids, instead of analyzing individual drugs. As such, we reported results similar to those reported by Sherrer et al (22). Finally, our population had particular characteristics that included a high prevalence of comorbid conditions, RF-positivity and middle-to-low socioeconomic status, all of which are known to negatively impact outcomes (10,17,19,22,23). A longer disease duration at surgery also emerged as a risk factor for AOs, and the disease duration cut-off to predict AOs was 20 years. However, we were unable to find studies involving RA populations with surgical hand intervention to corroborate these data, although this finding appears intuitive. Miyamoto et al (24) reported long-term outcomes after surgical intervention for rheumatoid cervical spine in 118 RA patients: patients with subaxial subluxation had longer disease duration and a higher postoperative mortality rate than patients with reducible atlantoaxial subluxation (37.2% versus 26.5%; $P \leq 0.05$). Nonetheless, in the multivariate analysis, disease duration did not reach statistical significance relating postoperative mortality. Burke et al (25) confirmed significant differences in perceptions about rheumatoid hand surgery among rheumatologists, hand surgeons and hand therapists in the United Kingdom (UK), where patients were less likely to have medical insurance (similar to our population) and proposed that it could have resulted in delayed presentation to hand surgery clinics. Interestingly, UK surgeons were more conservative in their estimations of success regarding hand function recovery (49%) compared with their American colleagues (82.5%) or UK rheumatologists (24%). It may be relevant to emphasize that poor hand function recovery or pain control may be considered to be surrogates of AOs.

Finally, although published rates of orthopedic surgery for RA vary greatly among countries, regardless of whether the health care system is different or similar (26), we confirmed recent literature reports that showed a decline in surgical hand procedures in the past decade (27,28). Although there are several possible explanations, the introduction in recent years of more effective first-line DMARDs and drug combinations appear to be essential contributors.

Study limitations

The present study was retrospective in nature, and studies examining the associations between RA disease activity and previous surgical intervention and AOs at follow-up are scarce. Accordingly, it is difficult to establish the potential impact of previous and/or continuing disease activity in the operated joint on adverse surgical outcomes. Nonetheless, the number of previous visits to the outpatient clinic was similar in patients with/without AOs. In addition, validated indexes used to measure disease activity were not available when most of the surgeries were performed. There was also no available information regarding individual surgeon experience and his/her specialty designation, both of which have been established to influence postoperative complication rates (29,30). Immobilization and physical therapy were indicated for all patients; however, compliance was not objectively assessed, and variability in the duration of immobilization can cause a delay in wound healing (31). We did not assess smoking, which has been associated with an increased infection risk due to impairments in wound healing and decreased immune response (32). Radiographic follow-up was not routinely assessed in the patients; accordingly, some AOs, such as radiographic loosening, could not be assessed (15). Finally, we could not ascertain compliance with RA treatment during patient follow-up; however, it is questionable whether this would have significantly biased the results toward those who experienced AOs.

CONCLUSIONS

RA patients with longer disease duration and intensive treatment had a higher risk for AOs after HSP. Rheumatologists should refer patients for potential hand interventions early during their disease course and select them when disease activity is under control using the most conservative treatment. If not possible, surgeons should be aware that patients who have undergone intensive treatment may have a higher risk for AOs. A multidisciplinary approach including hand surgeons, rheumatologists and occupational therapists is more convenient for patients and more successful in targeted disease management (33-35). Long-term follow-up of outcomes and complications need to be assessed in RA patients undergoing HSP to facilitate evidence-based decision making. There is a clear need for more unrestricted interdisciplinary training (and communication) between rheumatologists and hand surgeons.

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