Decrease of RA-related orthopaedic surgery of the upper limbs between 1998 and 2004: data from 54579 Swedish RA inpatients

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Methods. Data for all inpatient visits during 1998–2004 for patients older than 18 yrs with RA-related diagnoses were extracted from the Swedish National Hospital Discharge Registry (SNHDR). The SNHDR prospectively collects data on all hospital admissions in Sweden according to the International Classification of Diseases (ICD). Data were analysed with respect to orthopaedic surgery of the hand, elbow and shoulder.

Results. During the study period, 54579 individual RA patients were admitted to a Swedish hospital and 9% of these underwent RA-related surgery of the upper limbs. The RA patient cohort underwent a total of 8251 RA-related upper limb surgical procedures. The hand (77%) was most frequently operated on, followed by the shoulder (13%) and the elbow (10%). There was a statistically significant decrease of 31% for all admissions associated with RA-related upper limb surgery during 1998–2004 (P = 0.001). Some 10% of all RA-related upper limb surgery was due to total joint arthroplasties (TJAs), mostly for the elbow (59%). During 1998–2004, all TJAs, elbow-TJAs and shoulder-TJAs had a stable occurrence. In contrast, the overall numbers of hand-TJAs significantly increased (P = 0.009).

Conclusions. Rates of RA-related upper limb surgery decreased and TJAs had a stable occurrence in Sweden during 1998–2004. The findings of this study may reflect trends in disease management and health outcomes of RA patients in Sweden.

Key words: Epidemiology, Orthopaedic surgery, Rheumatoid arthritis, Upper limbs.

Introduction

Two major aspects of RA are polyarticular synovial inflammation and progressive destruction of cartilage and subchondral bone [1]. Inflammatory changes often affect small joints of the hands and feet. Early referral of individuals with suspected RA [2] and early administration of novel treatments have improved substantially long-term outcomes. However, there is no cure and high numbers of patients fail to respond to medicinal treatment, leading to disability, irreversible deformities and finally to loss of function: many patients suffering from pain, stiffness and disability seek relief through orthopaedic surgery as a last option after anti-rheumatic therapy failure. The use of orthopaedic surgery, although often with satisfactory results [3], can be considered as a surrogate marker of disease severity and as an outcome measure, reflecting the unfavourable course of RA. Large joint replacement in RA can be predicted by risk factors at presentation such as disease activity score (DAS) and radiological erosion score, still there seems to be a lack of a consistent association of minor RA surgery with disease severity [4].

We recently described that the use of lower limb orthopaedic surgery in a large RA cohort constantly decreased during 1987–2001 [5]. Many RA patients, in addition to weight-bearing foot involvement, have some form of hand disabilities, and also of elbows [6] or glenohumeral joints [7]. The use of RA-related orthopaedic procedures due to disability of the upper limbs has not yet been analysed systematically. Therefore, we investigated the overall use and temporal trends in RA-related upper limb surgery on a nation-wide basis in Sweden.

Materials and methods

Data source

As previously described [5], data were obtained from the Swedish National Hospital Discharge Registry (SNHDR), which uses codes according to the 10th revision of the International Classification of Diseases (ICD-10) and covers more than 98% of all hospital admissions in Sweden. The registry allows the study of patients on the basis of their diagnoses, operation codes, age, sex, date of admission and discharge.

The study period comprised from 1 January 1998 to 31 December 2004. All inpatient visits of patients older than 18 yrs with RA-related diagnoses (codes M05.-, M06.0, M06.8, M06.9, M08.0) were identified. Unlike our analysis of lower limb surgery [5], where RA was the primary diagnosis at first admission, here RA did not have to be the primary diagnosis for any admission.

All relevant RA-related surgical intervention codes indicated orthopaedic upper limb surgery, excluding fracture- or infection-related codes. Thus, RA-related operations were disease-related joint surgery including arthroplasty by endoprosthesis or interposition-arthroplasty, arthrosynovectomy, tenosynovectomy, arthrodesis, resection, soft tissue surgery, neurolysis, tendon reconstruction procedure and removal of rheumatic nodules (Appendix on reader’s request). All codes were analysed in three groups indicating anatomical regions; hand, elbow and shoulder. The length of admission was divided into a short (0–2 days), medium (3–7 days) and long duration (8+ days). The study was approved by the Stockholm North Ethics Committee.

Statistical analysis

Descriptive analysis investigated the frequency of admissions, number of patients and operations. Logistic regression analysis was used to investigate the length of admission. The two longer duration categories were compared with the shortest stay category in two separate models. The odds ratios (ORs) were calculated together with their 95% CIs. All independent measures were modelled as a series of dummy variables, but year of admission
was also modelled continuously to estimate trend. A summary variable recorded how many RA-related operations had been undertaken each year. This variable was the dependent variable in linear regression analysis, with the year of discharge as the independent variable. A similar summary variable was created for admissions. No adjustments for sex or age were performed, as our previous analysis [5] showed that this did not alter the temporal trends. The level of significance was $P \leq 0.05$. All statistical analyses were performed using SPSS 11.5 for Windows (SPSS Inc., Chicago, IL, USA).

## Results

### RA patients and admissions

During the entire study period, 54,579 individual patients were admitted to a Swedish hospital with an RA-related diagnosis and 9% of these underwent upper limb RA surgery. The median ages (s.d.) of patients at surgery of the hand, elbow and shoulder were 60 (14), 63 (14) and 62 (13) yrs. A hand operation was most likely to be the first operation, followed by shoulder and elbow surgery (data not included) (Table 1).

In all, this RA cohort generated 88,151 hospital admissions, with female admissions (75%) predominating. Some 32% of all admissions were for some kind of surgical procedure and 6% were for RA-related upper limb surgery. Accounting for 81% of all admissions were for some kind of surgical procedure and 6% were for RA-related upper limb surgery. Some 32% of all admissions were for some kind of surgical procedure and 6% were for RA-related upper limb surgery. Accounting for 81% of all admissions (Table 1).

We found a non-statistically significant decline (7%) of overall RA admissions ($B = -102.6; 95\% \text{ CI} -286.6, 81.4; P = 0.21$) and a statistically significant decline (31%) of all admissions due to RA-related upper limb surgery during 1998–2004 ($B = -43.8; 95\% \text{ CI} -58.0, -29.7; P = 0.001$).

### Surgical procedures

The RA cohort underwent a total of 8251 RA-related upper limb surgical procedures. The hand was most frequently (77%) operated on, followed by the shoulder (13%) and the elbow (10%). On average, each patient underwent 1.6 RA-related surgical procedures. The hand was most frequently (77%) operated on, followed by the shoulder (13%) and the elbow (10%).

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### Total joint arthroplasties

Some 801 (10%) of all RA-related upper limb surgical interventions were due to total joint arthroplasties (TJAs) (primary and revision), mostly for the elbow (59%). During 1998–2004, all TJAs ($B = 0.14; 95\% \text{ CI} -5.1, 5.4; P = 0.947$), elbow-TJAs ($B = -4.0; 95\% \text{ CI} -8.1, 0.1; P = 0.055$) and shoulder-TJAs ($B = 0.18; 95\% \text{ CI} -1.5, 1.8; P = 0.793$) had a stable occurrence. The overall numbers of hand-TJAs increased significantly between 1998 and 2004 ($B = 4.0; 95\% \text{ CI} 1.5, 6.5; P = 0.009$) (Table 1, Fig. 2).

### Length of hospitalization

On average, defined by the median duration (s.d.), patients were hospitalized 2 (4), 4 (7) and 5 (5) days for RA surgery of the hand, elbow and shoulder, respectively. Figure 3 shows the change of hospitalization produced as ORs for each year. A significant and continuous reduction of duration from 3 to 7 compared with 0–2 days was seen from 2002 to 2003 and from 8+ compared with 0–2 days from 2001 to 2002. On average, RA patients were less likely to be hospitalized from 3 to 7 compared with 0–2 days (OR = 0.93; 95% CI 0.91, 0.96; $P < 0.001$) and 8+ compared with 0–2 days (OR = 0.86; 95% CI 0.83, 0.89; $P < 0.001$) over the study period (Table 1, Fig. 3).

## Discussion

In Sweden, the rates of upper limb surgical interventions in patients with RA have decreased significantly during 1998–2004, consistent with our previous findings of less lower limb joint surgery over the same period [5]. There have been neither large demographic changes nor changes in the prevalence of RA during the study period that could account for these trends [8, 9]. Functional disability in RA can predict unfavourable outcomes and joint surgery [4]. RA disease progression has effectively been slowed by modern therapeutic drug regimens, delaying disability onset and improving quality of life [11, 12].
CI 1.5; 6.5,

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P/C0

4.1;

study by Sokka

arthroplasties in RA during 1976–97 [14]. Similarly, a Finnish

increased, there has been no increase in incidence of knee

Moreover, while arthroplasties in knee osteoarthrosis constantly

had been offered to an increasingly wider selection of patients [14].

osteoarthrosis during 1976–97 had been caused as new treatments

indicated that a large increase of knee arthroplasties due to

newer treatments may have improved long-term outcomes 

improvements in medicinal treatment may partly explain the

decrease in hospitalization for severe RA manifestations [16] and

the reduction in orthopaedic joint surgery [17] suggesting a world-

wide trend towards better long-term outcomes. Differences in

management relevant to hospital admission and duration of

admission are also likely to have contributed to our findings. In

general, it may be expected that the effects of therapy on joint

surgery will be even more pronounced for some novel treatments,

including biologicals, as it has already been shown that radio-

graphic progression is partially altered or even stopped by

intensive therapy.

Our findings indicate that an increasingly shorter admission

among RA upper limb surgery patients may reflect the general

effort to cut costs by reducing the length of hospital stay.

Compared with our previous findings [5], the overall higher

numbers and the insignificant decrease of all RA admissions are

because of alterations in the data extraction criteria. In contrast

with our previous analysis of lower limb RA surgery, here, RA did

not have to be the primary diagnosis, resulting in higher patient

numbers. Thus, we do not underestimate procedures or admis-

sions associated with RA, providing us with a higher sensitivity

but somewhat lower specificity. Temporal trends towards fewer

admissions for RA surgery and fewer RA surgical procedures

were found consistently by both studies.

One limitation of our study is that the SNHDR does not

contain information about disease onset, disease duration or

medicinal treatment. During the study period, clinical practice

affecting admissions may have changed and diagnostic routines

may have altered. As elsewhere, hospital care has shifted from

inpatient to outpatient settings in Sweden in recent years, which

is not recorded in the SNHDR. However, we systematically

analysed all RA hospital admissions over a 7-yr period, producing

a highly representative RA cohort, as we virtually cover the entire

population of RA patients in Sweden. Moreover, the SNHDR

contains prospectively collected data, reducing the risk of

systematic bias.

In conclusion, our study demonstrates a decreasing trend in

orthopaedic surgical interventions of the upper limbs in RA,
suggesting that new treatments may have improved long-term

health outcomes or that changes in clinical practice have reduced

the likelihood and duration of admission. However, further

studies including analyses of RA databases that collect long-
term data on a variety of surgical interventions, and outcome

measures such as ACR and DAS scores, quality of life scores,

medications, drug side-effects and development of comorbidities

are warranted.
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References


Rheumatology key message

- RA-related upper limb surgery decreased in Sweden between 1998 and 2004. During this period the occurrence of RA-related TJAs of the elbow and shoulder remained stable but that of hand TJAs increased.