

Patients with inflammatory arthropathies undergo foot surgery later in the disease course than hand surgery

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Abstract Objective

Inflammatory arthropathies often results in functional impairment and joint damage and deformity. Hand and foot are frequent locations for surgical interventions. Our objective is to compare disease duration, patient reported health status measures and use of medication in patients with inflammatory arthropathies referred for hand or foot surgery.

Methods

Patients referred for hand or foot surgery at the Diakonhjemmet Hospital responded to mail surveys preoperatively, including AIMS2, HAQ, SF-36, EQ-5, and visual analogue scales addressing patient global assessment of disease activity, fatigue, general pain and pain in the actual joint. Data on disease duration, surgical treatment and medication were collected from the hospital records.

Results

116 patients (mean (SD) age 57 (13) years, 76% female) with inflammatory arthropathies underwent hand (n=52, mean (SD) age 55 (13) years) or foot (n=64, mean (SD) age 58 (13) years) surgery. Disease duration at the time of surgery was significantly longer for patients referred for foot vs. hand surgery (19 (13) vs. 13 (10) years, p=0.04). Patients undergoing foot surgery used more frequently biological or conventional disease-modifying antirheumatic drug at the time of surgery than patients having hand surgery (50% vs. 71%, respectively, p=0.02). Baseline values for the patient-reported health status measures were mainly similar for the two patient groups.

Conclusions

Patients undergoing surgical procedures in the foot had significantly longer disease duration and were more frequently on potent medication at the time of surgery than patients undergoing hand surgery. The observation may indicate that the impact of foot damage in inflammatory arthropathies is underestimated.

Key words

Inflammatory arthropathies, surgery, hand, foot, disease duration.

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Introduction

The goal for the treatment of patients with inflammatory arthropathies is to achieve and maintain a state of remission or, at the very least, a state of low disease activity, in order to prevent joint damage and disability (1). The recommendations for management of inflammatory diseases have changed during recent years with access to new biological treatment options (2). However, despite promising results of the new generation of medical treatments, there will still be a proportion of patients (20–40%) who do not tolerate or respond adequately to the available medication (3). Therefore, surgery will still be an important option. Besides, patients with longstanding rheumatoid arthritis (RA), with onset before biological drugs were available, might need surgical treatment. It has been estimated that about 25–30% of patients with RA during their lifetime will be in need of arthroplastic surgical procedures because of their disease (4, 5), and a previous study observed that about 67% of patients with RA had undergone surgical interventions of different kinds because of their disease (6). Inflammatory arthritis, and especially RA, is still a severe disease, particularly in less afflicted countries with less availabilities of modern medications (7), and in this context priorities and timing of surgical interventions are of special interest.

RA is the most common form of inflammatory arthropathies. The disease typically involves the small joints of the hands and feet. Although knowledge of the disease course of inflammatory arthropathies considering hand and foot involvement separately seems to be scarce, the items of the current criteria for diagnosing RA seem to focus more on hand than on foot involvement. The revised criteria for the classification of RA arthritis since 1987 comprise of 7 items. Two of these items include hand or wrist involvement and two items involve possible hand or foot involvement (8). The abbreviated joint counts with assessment of 28 joints, which is included in the most widely used composite index (Disease Activity Scale (DAS 28)), also exclude the joints of the foot (9).

In a recent study of the disease characteristics in RA, it was underlined that the foot is involved at the onset of RA almost as frequently as the hand (10). Another study focused on the radiographic damage in patients with RA and showed that the joints of the feet were damaged more often and earlier than the joints of the hand (11). These findings are in accordance with a previous study revealing that lower limb function deteriorated more than the upper limb function over a 10-year period in patients with established RA (6). It is questionable if this inequality in development is due to disease characteristics or to differences in the disease management. The objective of this study was therefore to explore disease characteristics in terms of disease duration, pain, physical function and medication in patients referred for hand surgery compared to those referred for foot surgery.

Materials and methods

Patients

The patients in this study were part of a group of 255 patients (mean (SD) age 58 (13) years, 77% female) with inflammatory arthropathies, consecutively admitted, who underwent elective orthopaedic surgical treatment and responded to mail surveys at baseline and during follow up (3, 6, 9 and 12 months) (response rate about two thirds), previously reported (5). This study included 116 (mean (SD) age 57 (13) years, 76% female) consecutively admitted patients with inflammatory arthropathies who during the period from February 2005 to May 2006, underwent hand (n=52, age 55 years) or foot (n=64, age 58 years) surgery related to their rheumatic disease at Diakonhjemmet Hospital (Table I). The patients were included in the current study if they were referred for hand surgery and had not previously undergone foot surgery and if referred for foot surgery without previous hand surgery. We did not include patients with the diagnosis of osteoarthritis, patients who had undergone revision surgery, fracture surgery or surgery because of secondary infection. Each patient was only included once, *i.e.* when they were referred for their first intervention during

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the inclusion period. The diagnoses of the patients were RA (61%), juvenile arthritis (2%), ankylosing spondylitis (3%), psoriatic arthritis (8%) and other arthritides (18%) (Table I).

Seven of the patients referred for hand surgery had previously undergone surgical procedures of the hand, and previous foot surgery had been performed in 12 of the patients referred for foot surgery. The mean time from the first surgical procedure was 4 years for patients who underwent hand surgery and 2 years for patients who underwent foot surgery.

Data collection

Details about the design and data collection have been reported previously (5). The data used in this study were collected preoperatively by mail surveys. The patient-reported outcome measures included Arthritis Impact Measurement Scales 2 (AIMS2), Health Assessment Questionnaire (HAQ), Short form 36 (SF-36), EuroQol (EQ-5D) and visual analogue scales (VAS) addressing patient global assessment of disease activity, fatigue, general pain and pain in the actual joint. Further, patients also reported their current pharmacological treatment. Data on disease duration and previous surgical treatment were collected from the hospital records.

Instruments

AIMS2 is a multidimensional disease-specific measure which has been translated into many languages including Norwegian (12, 13). The first 57 items of AIMS2 are categorised into 12 subscales: mobility (five items), walking and bending (five items), hand and finger function (five items), arm function (five items), self-care tasks (four items), household tasks (four items), social activity (five items), support from family and friends (five items), arthritis pain (five items), work (four items), level of tension (five items) and mood (five items). The scales may be combined into a five-component model reflecting the physical dimension, affect, symptoms, social interaction and role. The score of each scale ranges from 0–10 (10 represents worst health). AIMS2 was scored according to the AIMS2

Table I. Demographic data for a cohort of patients with inflammatory arthropathies referred for elective hand or foot surgery.

	Hand surgery (n=52)	Foot surgery (n=64)
Age (years) mean (sd)	55 (13)	58 (13)
Gender (% female)	77	75
Diagnosis % (n)		
Rheumatoid arthritis	65% (34)	58% (37)
Juvenile arthritis	2% (1)	2% (1)
Ankylosing spondylitis	2% (1)	3% (2)
Psoriatic arthritis	25% (13)	22% (14)
Other arthritides	6% (3)	16% (10)

user's guide issued by the Boston University Arthritis Centre.

The HAQ addresses the patients' ability to perform activities of daily living (14). The HAQ includes questions assessing difficulty over the past week in 20 specific functions, grouped into 8 categories: dressing and grooming, rising, eating, walking, personal hygiene, reaching, gripping, and other activities. The responses to "are you able to do..." were scored 0-3 (without any difficulty=0, unable to do=3). The total HAQ scores is the mean of the scores for the eight categories. Scores were adjusted for use of assistive devices.

Short Form-36 (SF-36) is a generic 8 multi-item measure of general health status and has been used in a variety of conditions including RA, musculoskeletal disorders and patients who have undergone replacement surgery (15-17). The 8 multi-item scales are as follows: physical functioning (ten items), role limitations due to physical health (four items), bodily pain (two items), general health (five items), vitality/energy/fatigue (four items), social functioning (two items), role limitations due to emotional problems (three items), and mental health (five items). SF-36 scales were scored according to published scoring procedures, each expressed with values from 0 to 100 (0=poor health). EQ-5D is a standardised utility instrument with 3-level 5-dimensional format (18, 19). The EQ-5D includes the following dimensions: mobility, self care, usual activities, pain/discomfort and anxiety/depression (20).

Visual Analogue Scales (VAS) were also used to record patients' health status. The four different VAS included were as follows: patient global assessment of disease activity, fatigue, gen-

eral pain and pain in the actual joint (the joint where the surgical intervention was performed). The score was recorded on a 100 mm scale and patients were asked to mark the score that best represented their pain or fatigue during the last week (100 worst).

Medical treatment

Data on medical treatment were retrieved from the self-reported questionnaires and the hospital records. Anti-rheumatic medication was categorised as follows: biological disease-modifying antirheumatic drugs (DMARDs) (tumour necrosis factor inhibitors and B and T cell targeted therapies), conventional (synthetic) DMARDs, prednisolone, non-steroidal anti-inflammatory drugs (NSAIDs) and analgesics. Most patients used a combination of different pharmaceutical preparations. The most potent drug the patients used was the one counted in this study for the comparison of different pharmaceutical interventions.

Surgical procedures

The distribution of different surgical procedures used for hand and feet in this study are listed in Table II.

Statistical analyses

Demographic and disease variables are presented as counts, percentages or mean values (SD) in Table I. Cross-tables and Chi-square test were used to examine the associations between diagnosis and the use of medication. An independent sample *t*-test was used to compare differences in patient reported health status measures between patients undergoing hand vs. foot surgery. *P*-values equal to or below 0.05 were considered to be statistically signifi-

Table II. Preoperative scores of disease related variables for a cohort of patients with inflammatory arthropathies referred for elective hand or foot surgery (mean (SD)).

	Hand (n=52)	Foot (n=64)	p-value
Disease duration at baseline (years)	13.4 (9.6)	19.1 (13.4)	<i>p</i> =0.04
HAQ* (0–3)	0.6 (0.5)	0.6 (0.5)	<i>p</i> =0.60
AIMS2* (0–10)			
Mobility	1.4 (1.9)	1.8 (2.3)	<i>p</i> =0.27
Walking and bending	4.0 (2.7)	5.2 (2.3)	<i>p</i> =0.01
Hand and finger function	3.3 (2.3)	2.5 (2.4)	<i>p</i> =0.06
Arm function	1.2 (1.5)	1.1 (1.8)	<i>p</i> =0.70
Self-care	0.3 (0.9)	0.5 (1.2)	<i>p</i> =0.49
Household	1.2 (1.5)	1.4 (1.8)	<i>p</i> =0.54
Pain	6.0 (2.2)	5.6 (2.3)	<i>p</i> =0.38
Physical	1.9 (1.3)	2.1 (1.3)	<i>p</i> =0.16
SF-36* (0–100)			
Physical function	57.0 (24.6)	44.8 (21.7)	<i>p</i> =0.01
Bodily pain	36.1 (18.7)	37.2 (17.6)	<i>p</i> =0.74
General health	52.0 (21.2)	47.5 (20.3)	<i>p</i> =0.25
EQ-5D* (0–1)	0.5 (0.3)	0.5 (0.3)	<i>p</i> =0.24
VAS*			
General pain	47.7 (20.4)	43.7 (23.6)	<i>p</i> =0.86
Pain in actual joint	54.4 (23.6)	55.3 (25.9)	<i>p</i> =0.35
Fatigue	45.0 (28.1)	40.7 (29.7)	<i>p</i> =0.43
Disease activity	51.9 (23.2)	48.0 (23.7)	<i>p</i> =0.37
Number and type of surgical procedures in hands and feet (n)	52	64	
Swanson silicone arthroplasty	8	9	
Arthrodesis	17	24	
Synovectomy, nerve decompression, tendonplastics	27	14	
Dissection arthroplasty	0	17	

*HAQ: Health Assessment Questionnaire; AIMS2: Arthritis Impact Measurement Scales 2; SF-36: Short form 36; EQ-5D: EuroQol; VAS: Visual Analogue Scales.

Table III. Medical treatment of patients with inflammatory arthropathies referred for elective hand or foot surgery (n (%)).

	Hand surgery (n=52)	Foot surgery (n=64)
Biological DMARDs	4 (7.7 %)	19 (29.7 %)
Conventional DMARDs	22 (42.3 %)	26 (40.6 %)
Prednisolone	9 (17.3 %)	4 (6.3 %)
NSAIDs	10 (19.2 %)	11 (17.2%)
Analgesics	6 (11.5 %)	3 (4.7 %)
No medication	1 (1.9 %)	1 (1.6 %)
Total	52 (100%)	64 (100%)

cant. The Statistical Packages for the Social Sciences version 14.0 (SPSS 14.0) and 15.0 (SPSS15.0) were used in the analyses.

Results

Disease duration at the time of surgery was significantly longer for patients referred for foot surgery compared to those referred for hand surgery (19 and 13 years respectively *p*=0.04). (Table II). Patients undergoing foot

surgery were using significantly more DMARDs than patients undergoing hand surgery (*p*=0.02) (Table III). More than two thirds (71%) of the patients undergoing foot surgery used biological and/or conventional DMARDs on the time of surgical treatment compared to about 50% of the patients undergoing hand surgery. At time of surgery, biological DMARDs were reported as the most potent medication for 30% of the patients undergoing foot

surgery versus 8 % of the patients undergoing hand surgery, whereas use of conventional DMARDs were similarly distributed between the patient groups (41% vs.42% (*p*>0.05)) (Table III).

No significant differences were found comparing the baseline values for pain, fatigue and patient global assessment of disease activity (*p*>0.05 for all measures) (Table II). For instruments measuring physical function and general health status (HAQ, AIMS2, SF-36 and EQ-5D) there were no significant differences except for scales reflecting mainly foot function (SF-36 physical (57.02 vs. 44.84 *p*<0.01) and AIMS2 walking and bending (3.96 vs. 5.16 *p*=0.01)). No significant differences were found between the patients undergoing hand and foot surgery regarding the distribution of the diagnosis, age and gender (Table I).

Discussion

Patients undergoing surgical procedures in the foot had significantly longer disease duration and were more frequently on biological or conventional DMARDs at the time of surgery compared to patients undergoing hand surgery. No significant differences in patient reported outcome measures like pain, fatigue, patient global assessment of disease activity, physical function and general health status were found. However, the increased use of biological and conventional DMARDs among patients referred for foot surgery may reflect a more severe disease.

Surgical intervention can be regarded as an outcome measure in the treatment of patients with inflammatory arthropathies. The increased use of DMARDs may also to some extent be explained by the increased disease duration for patients undergoing foot surgery. However, this is less likely to explain the differences since previous studies have shown that the joints of the feet were damaged more often and earlier than the joints of the hand (11) and radiographic damage in RA correlates with functional disability (21). Despite the findings that the foot seems to be involved at the disease onset to at least the same degree as the hand (22) we found that surgery occurs later in the

foot compared to the hand. Surgery later in the disease course could pretend a milder disease in the feet compared to the hands, or that involvement of the joints in the feet is considered to affect patients' function and quality of life to a lesser degree than involvement of hands. A possible explanation may also be that treatment of the foot has a lower priority and that hand surgery possibly may be regarded as more "prestigious" than foot surgery among surgeons.

A limitation of this study is the lack of information about the non-responders. Another limitation may be the heterogeneity of the study population, with a variety of inflammatory arthropathies, types of surgical procedures and disease duration. However, the majority of the patients had RA (61%), and no significant differences were found between the patients undergoing hand and foot surgery regarding the distribution of diagnoses, which support the extended validity of the results (Table I).

To what degree the disease strikes the hand or the foot and how this influences the patients' functioning and quality of life is individual. Decision-making and timing for orthopaedic intervention are complex issues because of the polyarticular involvement and the systemic and potential progressive disease (23). Patients with rheumatic diseases frequently have multiple joint involvements and may need multiple surgical procedures during their disease course. The patients' general health status is of importance and should be optimised before surgical intervention to achieve the best possible result, the focus should include both exercise and medical treatment pre-, per- and postoperatively (24, 25). Timing and planning of the different surgical procedures are therefore important to optimise the health benefits, e.g. it is important to take into account that the neighbour joint might need surgical treatment in the years to come. This might affect both the choice of surgical treatment and also the order of the different procedures. Patients will probably achieve a better result when surgery is performed in a logical order and also when the patients' priorities are taken into account (26).

During recent years, there has been a

tremendous increase in the costs concerning the consumption of medication in patients with inflammatory diseases (27). The new biological DMARDs have shown positive effects in several studies, and has been characterised as a revolution (28). However, results of recent studies of effects of biological treatment are not unambiguous, the treatment is not effective in all patients (primary failure or inefficacy or secondary failure or acquired therapeutic resistance) and several and serious adverse effects have also been reported (3, 27, 29-31). Therefore, despite mainly promising results from studies evaluating effects of medical treatment, surgical interventions should be considered both as a cost effective treatment and as a good supplement to the medical treatment.

The findings in this study indicate that the impact of foot damage in inflammatory arthropathies is underestimated. An enhanced focus on timing and planning of surgical interventions for patients with rheumatic diseases involving multiple joint damage is probably needed.

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