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RESEARCH ARTICLE

Baseline and 1-Year Follow-Up Data of Patients with End-Stage Hallux Rigidus Treated with an Arthrodesis Reported to Swefoot

M C Cöster [a,b], I Osbeck[c], F Montgomery[a,], M E Cöster-Stoij[a]

[a]Department of Clinical Sciences Malmö - Orthopedics, Lund University, Lund, Sweden
[b]Department of Clinical surgeries, Uppsala University, Uppsala, Sweden
[c]Department of Clinical Sciences Lund – Orthopedics, Lund University, Lund, Sweden.

Corresponding author: Maria C Cöster, Department of Clinical Surgeries, Uppsala University, Uppsala Sweden; e-mail maria.coster@med.lu.se

ABSTRACT

Background: Hallux rigidus (HR) affects the first metatarsophalangeal joint and is the most common osteoarthritic condition in the foot. The most used surgical treatment for severe cases of HR is an arthrodesis. The aim of this study is to describe patient characteristics, surgical treatment and the patient-reported outcomes for patients treated with arthrodesis for HR using data from Swefoot, the Swedish quality register for foot and ankle surgery.

Methods: From Swefoot we extracted data on patients who underwent surgery for HR between January 2014 and December 2019. We included 419 patients with end-stage HR, who had not previously been treated surgically for HR on the same side.

The outcome was measured with the Self-reported Foot and Ankle Score (SEFAS) (summary score 0-48) and EuroQol 5 Dimensions (EQ5D) (index 0-1) together with questions regarding appearance, shoe wear and satisfaction. We extracted surgical and patient-reported data preoperatively and 1 year postoperatively.

Results: Our patient-population is predominantly female, around 61 years old, and

slightly overweight. The arthrodeses are most often fixated with screws and most of the patients are allowed to bear weight immediately after surgery. The mean SEFAS score is 22 preoperatively and 38 postoperatively, the corresponding values for EQ5D index are 0.56 and 0.81 which means that the health-related quality of life (HrQoL) improves significantly after surgery.

Conclusion: Patients with severe HR treated with an arthrodesis have reduced pain, improved function and HrQoL according to the patient-reported outcome measures SEFAS and EQ5D. The mean postoperative SEFAS value was close to the mean SEFAS value of the Swedish general population in the same age category. Fixation techniques and postoperative regimen differ among surgeons in the country. This is the first report from Swefoot regarding this patient population.

Keywords: hallux rigidus, arthrodesis, Swefoot, register, PROMs, SEFAS, EQ-5D

Introduction

Hallux Rigidus (HR) affects the first metatarsophalangeal joint (FMTPJ) and is the most common osteoarthritic condition of the foot. High age and female gender are risk factors for the condition. For the population aged 50 years and older, the prevalence of symptomatic and radiographic osteoarthritis in the FMTPJ has been estimated to 7,8 % and the prevalence of disabling symptomatic and radiographic osteoarthritis of the FMTPJ to 13 % [1-3].

Symptoms, including pain and stiffness, vary depending on the severity of the disease. In the early stages of HR patients often experience motion related pain in the FMTPJ, but during the progression of the disease the pain grows more and more constant.

Clinical findings include progressively diminished range of motion in the FMTPJ, foremost in dorsiflexion [1-4]. Radiographic findings are initially constituted of cartilage degeneration and osteophytes of the first metatarsal head [1,5]. There are several ways to evaluate and classify the condition. The most used classification is the one developed by Coughlin and Shurnas, which is based both on clinical examinations and on radiographic findings [6-8]. The grading consists of five severity stages numbered from 0-4 and patients with grades 3 and 4 have the most severe osteoarthritis, hereinafter referred to end-stage HR.

There are several surgical options for HR, divided into joint-sparing and joint-sacrificing alternatives [1,5,9-14]. The most common joint-sparing procedure, is Cheilectomy which is used mainly for HR grade 2 and 3 [15]. During this procedure 20-30 % of the dorsal metatarsal head is removed as well as osteophytes if present. It offers pain relief and fast return to daily activities [1,9]. Youngswick osteotomy is a chevron-shaped decompression osteotomy of the first metatarsal where a slice of bone is removed in the dorsal arm of the osteotomy to achieve plantar and proximal displacement of the metatarsal head [16,17]. It is, like cheilectomy, mostly used in early stages of HR and offers increased mobility as well as pain relief [15]. The joint-sacrificing technique with the best proven long-term outcome is an arthrodesis of the FMTPJ. The procedure involves a fusion of the metatarsal head with the proximal phalange of the hallux which sacrifices the remaining range of motion in the FMTPJ. Arthrodeses of the FMTPJ are the gold standard treatment option for patients with HR grade 4, is often also used for grade 3 and have been shown to improve activity level and reduce pain both long term and short term [1,4,9]. With reduced pain, the gait usually improves, and symptoms linked to an altered gait can become reduced. However, a disadvantage with an arthrodesis is that the mobility of the big toe is limited which results in a reduced ability to push off in walking affecting the biomechanics of the foot. Also, the possible wearable heel height becomes limited. Correct position of the fused big toe is therefore important, usually in 10-15 degrees of dorsiflexion and 10-15 degrees of valgus, to get the best surgical outcome [9].

There are many ways to carry out an arthrodesis, including different surgical and fixation techniques as well as different recommendations regarding type of immobilization, immobilization time and non-weight bearing time postoperatively. Different types of internal fixation are used, for example screws, plates, staples, and K-wires. The research is lacking in this area and there is currently no consensus on which surgical technique, type of internal fixation or postoperative recommendations that will result in the best outcome. Since 2014 data from patients with surgically treated HR in Sweden is collected in Swefoot, a population-based quality register that covers surgical procedures of the foot and ankle from both hospitals and other units performing foot and ankle surgery [18].

The epidemiology of HR, as well as the indications for arthrodesis as a treatment for HR, are well known, but the population who in fact gets this treatment in Sweden has, to our knowledge, not yet been described. Neither has the methods used in these surgeries nor to what extent. Furthermore, the outcome of arthrodesis as treatment for HR, using data from Swefoot has not yet been described. A clear picture of the patient population as well as pre-, intra-, and postoperative routines surrounding arthrodesis for HR is essential in developing the best possible treatment regimes.

The aim of this study is to describe the population treated with arthrodesis for HR out of the Swefoot registry and in detail report patient characteristics, used surgical methods, postoperative regimes, and patient-reported outcome before and 1 year after surgery for patients with end-stage hallux rigidus treated with an arthrodesis.

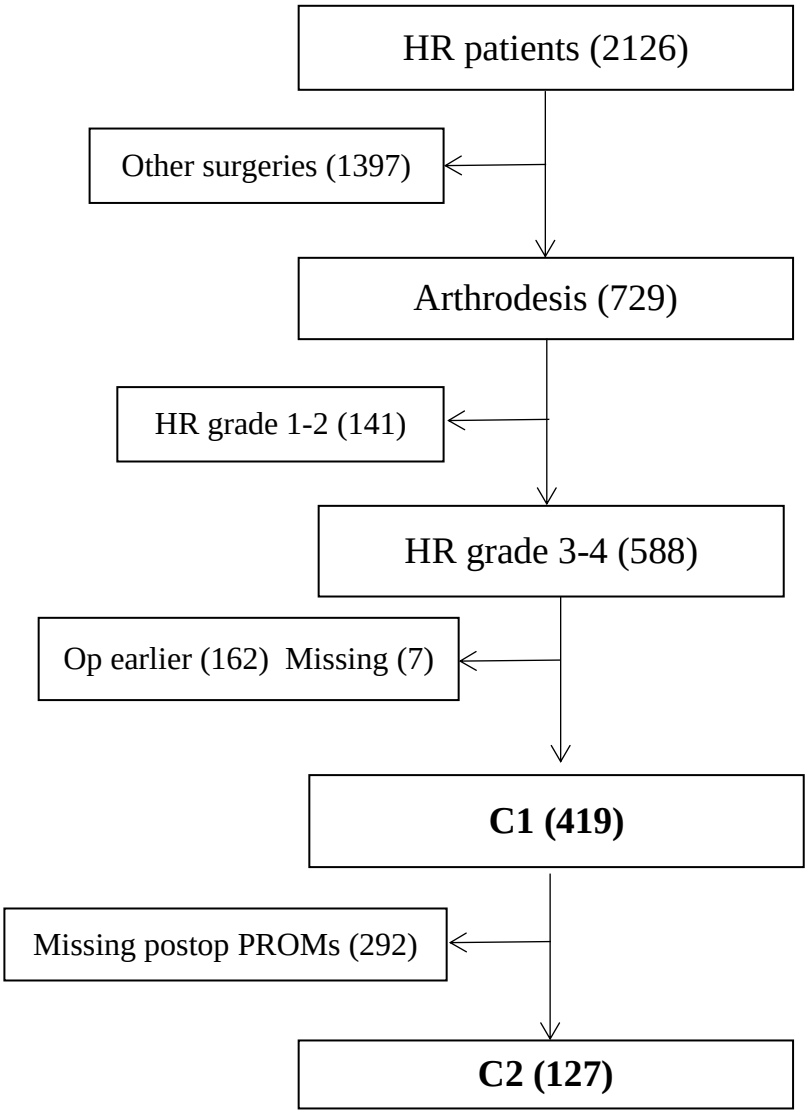
Methods

Patients

We extracted data from Swefoot for patients who underwent surgery for HR between the years 2014−2019. Out of these patients, 729 patients were treated with an arthrodesis. Out of these 729 patients, 588 patients were classified as HR grade 3 or 4. In this group of patients (n=588) 149 were excluded due to previous surgery for HR in the same foot and 7 were excluded because we lacked information about this matter leaving a cohort of

419 patients, named Cohort 1 (C1). For the outcome analysis we excluded 292 patients, who had not completed the PROMs 1 year postoperatively. These inclusion criteria resulted in 127 patients, Cohort 2 (C2). The selection process and creation of cohorts are visualized in a flowchart (figure 1).

Figure 1: The selection process with excluded patients to the left and included patients in the middle. Patients were excluded for having other surgeries than arthrodesis as treatment, hallux rigidus (HR) grade 1-2, being operated on the same side earlier for HR or not answering that question or not completing postoperative PROMs.



Swefoot and patient-reported outcome measures

Swefoot is a national quality register for foot and ankle surgery collecting data regarding 20 different diagnoses, including HR [18]. The register contains two main aspects with questions for the operating surgeon and the patient, respectively. The surgeon completes questions in connection with the surgery about diagnosis, radiographic findings, disease severity and their own competence level, but also which surgical method, type of anesthesia, internal fixation and postoperative regimes that are used. The patients are asked to complete questionnaires before surgery as well as 1 and 2 years after surgery. The patient-reported questionnaires contain two different patient-reported outcome measurements (PROMs); the 3-level version of EuroQol 5 Dimensions (EQ5D-3L) [19] and the Self-reported Foot and Ankle Score (SEFAS) [20,21]. In addition to the PROMs, there are 4 complementary questions regarding pain, strength, appearance, and shoes. The postoperative questionnaires also include questions regarding how satisfied the patients are with the surgery as well as if there were any adverse events (figure 2) [17].

Figure 2. Additional questions for the patients to complete together with the PROMs SEFAS and EQ-5D.

Survey questions	**Response options**
1. How satisfied are you with the appearance of your foot/ toe?	Very satisfied – Satisfied – Somewhat satisfied Neither satisfied nor dissatisfied – Dissatisfied
2. How satisfied are you with the shoes you can wear?	Very satisfied – Satisfied – Somewhat satisfied Neither satisfied nor dissatisfied – Dissatisfied
3. How satisfied are you with the strength of your foot/ankle?	Very satisfied – Satisfied – Somewhat satisfied Neither satisfied nor dissatisfied – Dissatisfied
4. How much pain/trouble do you have in your forefoot?	None – Mild – Moderate – Rather strong – Severe
4 items added in the post-surgery questionnaires	
1. What do you think about the result of your surgery in the foot/ankle 1(2) years ago?	Very satisfied – Satisfied – Somewhat satisfied Neither satisfied nor dissatisfied – Dissatisfied
2a. Do you still have the same kind of problems in your foot/ankle as before surgery? 2b. If yes, have the problems ever subsided after the surgery?	Yes or No
3. Do you by now have other types of foot/ankle problems than the ones you were operated on for?	Yes or No
4. Did you get any complication after the surgery that required contact with healthcare (for example infection, healing disturbances, thrombosis)?	Yes or No

National registries often contain both generic- and region-specific PROMs. Swefoot uses the generic PROM EQ5D-3L, and the foot- and ankle-specific SEFAS. The EuroQol 5-dimension is a generic PROM that evaluates health-related quality of life (HrQoL) [19]. It can be used for a wide range of conditions and treatment option. It consists of two parts: the EQ5D descriptive system and the EQ visual analog scale (EQ-VAS). The descriptive system of EQ5D comprises the five dimensions mobility, self-care, usual activities, pain /discomfort, and anxiety/depression. Each dimension has three levels: no problems, some problems, and extreme problems. The EQ5D index is a weighted total value of the score that is calculated after being adjusted for cultural differences in the response pattern. In the present study, the UK (United Kingdom) EQ5D Tariff for transformation of the results to a single summary index, ranging from 0 to 1 is used. The highest possible EQ5D index, 1, represents a completely healthy individual and the lowest value, 0, represents dead. In the EQ5D, the patient can also estimate their general health on a so-called EQ-VAS scale from 0 to 100 [22,23].

In Swefoot the foot and ankle specific PROM used was SEFAS, which contains different dimensions including pain, function, and activity limitations. The different dimensions are summarized into a score where 0 represents most severe disability and 48 represents normal function. The Self-reported Foot and Ankle score has been thoroughly evaluated and is considered a high-quality PROM for foot- and ankle disorders [20,21]. Gender- and age-specific normative values have been collected for the Swedish population and there are also minimal important change (MIC) values available [24,25].

Statistical analysis

Data are reported as numbers (n), proportions (%), means (SD), or medians (range). We considered a probability of less than 5% as statistically significant and used 95% confidence intervals (CI) to describe uncertainty. Outcome is in the registry reported as the summary score for SEFAS and index for EQ-5D before and after surgery. Delta score and index is calculated as postoperative value minus preoperative value. The delta score, i.e. the absolute difference could be without clinical relevance. Due to this we related the absolute difference to the minimally important change (MIC) for the PROMs, which reflects the smallest measured change in score that patients perceive as being important and defines a threshold when a treatment should be regarded as clinically relevant. The calculated MIC value for the SEFAS in patients with forefoot disorders is 5 score points [25]. For the EQ-5D the MIC value in patients with foot and ankle disorders it is not defined, but there are estimated

values between 0.1-0.3 for patients with different types of musculoskeletal disorders [26-29]. Group comparisons were performed using Independent-samples t-test for parametric data and Mann-Whitney U-test or Chi Squared test for non-parametric data. We used IBM SPSS Statistics® version 28 (IBM Corp, Armonk, NY, USA) to perform the statistical analyses.

Ethics

The study protocol was approved by the Ethical Review Board (Etikprövningsmyndigheten) in Sweden (reference number 2019-02733). The study was conducted in accordance with the Helsinki Protocol and according to Swedish and EU data protection rules. The study involves data that exist in pseudo anonymized structured format, and it is not possible for the researchers to connect personal patient information to specific research subjects. Data have been requested and approved from Centre of Registers Västra Götaland. The study population was treated according to clinical practice at the time of surgery and no intervention was made. Informed consent was not requested from individual study participants in this register-based study, but they can at any time opt out of being recorded in the registries and demand that existing data will be removed. Data may be accessible upon application to the registries.

Results

Descriptive cohort 1

Cohort 1 (C1) includes 419 patients, who all had been surgical treated for HR and have been reported to the register by the surgeon. 314 of the 419 (75%) surgeries entered to the register were performed in 4 of the 21 official regions in Sweden. Surgical base-line data are presented in table 1.

Table 1. Surgical routines and data for patients in Cohort 1 (419 patients) with end-stage HR treated with an arthrodesis and reported to Swefoot by the surgeon. Data is presented as numbers with percentages.

Surgical data		**n (%)**
Surgeon's competence level		
n=409	Resident physician	21 (5)
	Orthopedic surgeon*	7 (2)
	Foot and ankle surgeon**	381 (93)
Type of surgical fixation		
n=419	No fixation	6 (1)
	Screws	252 (60)
	Plate and screws	161 (38)
n=150	Locking screws***	142 (95)
Postoperative regimen		
n=417	No rigid immobilization	103 (25)
	Rigid immobilization	314 (75)
Immobilization time (weeks)	1 to 6	173 (61)
n=286	7 to 9	95 (33)
	>9	18 (6)
Non weight bearing time (weeks)	0 to 2	282 (74)
n=380	3 to 6	61(16)
	> 6	37(10)

* performs <5 surgical procedures in hindfoot ,<15 in forefoot per year
** performs > 5 surgical procedures in hindfoot, >15 in forefoot per year
*** locking screws used and reported in arthrodeses fixated with plate and screws

Orthopedic surgeons subspecialized in foot and ankle surgery performed 93 % of the surgical procedures. In 60% (252/419) of the cases the surgeon used screws to fixate the arthrodesis and in 38% (161/419) plate and screws were used. In the fusions fixated with plate and screws most of the surgeons [95% (142/145)] reported that they had used locking screws in the plates. 75% (314/417) of the patients were immobilized postoperatively in a plaster, but 25 % (103/417) of the patients were not immobilized at all. 61% (173/286) were immobilized for 6 weeks or less, 6% (18/286) more than 9 weeks. Most patients were allowed to bear weight after surgery, but 16 % (61/380) of the patients were not allowed to bear weight for 3-6 weeks and 10% (37/380) >6 weeks after surgery. Patients in C1 reported patient-reported data including demographics at baseline, which is presented in table 2.

Table 2. Patient characteristics and patient-reported data in 419 patients reported to Swefoot 2014-2019 at baseline (Cohort 1). Data is presented as mean with standard deviations (SD), median with ranges and numbers with percentages (%). For each parameter numbers are presented showing the amount of patient-reported missing data.

Demographic and patient-reported data at baseline		
Age n=419	mean ± SD	61 ± 9.6
	median (range)	61 (31; 84)
Gender n=419		
Female	n (%)	285 (68%)
Male	n (%)	134 (32%)
BMI, kg/m²		
n=291	mean ± SD	26.5 ± 4.3
Diabetes mellitus		
n=308	n (%)	10 (3 %)
Rheumatoid arthritis		
n=292	n (%)	39 (13 %)
Smoking habits n=300		
Non-smoker		276 (92%)
Smoker		14 (5 %)
Quit smoking before surgery		10 (3 %)
SEFAS summary score		
n=301	mean ± SD	24 ± 8.0
EQ-5D-3L index		
n=298	mean ± SD	0.56 ± 0.28
EQ-VAS		
n= 285	mean ± SD	70 ± 22

The median age was 61 (range 31-84) years and 68% of the patients were female. The mean body mass index (BMI) was 26.5 ± 4.3 (n= 291) kg/m², 13.4 % (39/292) of the patients had a rheumatic disease and 3% (10/308) reported that they had a diabetic disease. Only 5% (14/300) of the patients were smokers in connection with the surgery. The mean summary score for SEFAS was 24 ± 8.0 (n=301) and EQ-5D index 0.56 ± 0.28, i.e., the patients had low scores preoperatively.

Outcome analysis (cohort 2)

The demographics in cohort 2 (C2) differ slightly from C1; the median age was 62 (range 35-81), 70% of the patients were female and BMI was 26.2 ± 4.2 kg/m^2. In table 3 we present pre- and postoperative patient-reported results from cohort 2, i.e., patient who have answered questions including PROM both pre-and postoperatively. The mean SEFAS summary score for patients in cohort 2 was 22 (SD 7,8) points preoperatively and 38 (SD 9.6) points postoperatively. The corresponding values for EQ-5D index were 0.56 (SD 0.28), 0.82 (SD 0.21) and for EQ-VAS 70 (SD 21) and 77 (SD 22). The delta score was 15.5 for SEFAS ($p<0.0001$) and 0.26 for EQ-5D index ($p< 0.004$), higher than the MIC value for both scores.

Table 3. Preoperative, postoperative, and mean increase in SEFAS score, EQ-5D index, and EQ-VAS from before surgery until the 1-year follow-up for patients in Cohort 2. Only fully completed PROMs are used for comparison. Values are mean (SD) (95 % CI). Delta score and index is calculated as postoperative value minus preoperative value.

PROM		mean ± SD (95% CI)	p-value
SEFAS score pre*	n=101	22 ± 7.8	
SEFAS score post**		38 ± 9.6	
SEFAS delta score		15.5 ± 9.6 (13.6-17.4)	<0.0001
EQ-5D index pre	n=98	0.56 ± 0.28	
EQ-5D index post		0.82 ± 0.21	
EQ-5D delta index		0.26 ± 0.30 (0.195, 0.315)	0.004
EQ-5D VAS pre	n=94	71 ± 21	
EQ-5D VAS post		77 ± 22	
EQ-5D delta VAS		6.2 ± 26.4 (0.78-11.6)	0.024

*preoperatively
**postoperatively

More than 80% of the patients were satisfied (very satisfied, satisfied or somewhat satisfied) with the result of their surgery 1 year postoperatively, see table 4. In table 4 we also present the patients satisfaction, preoperatively and 1 year postoperatively, with the appearance of the foot, the shoes they can wear and the strength of the foot. We find an improvement in these satisfaction parameters from before surgery to 1 year postoperatively. 38.5% were satisfied with the appearance before surgery, 82.5% after 1 year. The corresponding values for shoe wear were 43.3% and 80.2% and for strength 60.6% and 84.2%. 72 % of the patients reported no or minor problems with forefoot pain postoperatively. Before surgery the corresponding value was 20 %, indicating that an arthrodesis in the big toe additionally reduce the forefoot pain in this group of patients.

Discussion

In this register study on national basis, we found that an arthrodesis of the FMTPJ resulted in improved foot-related pain, function and HrQoL for patients with end-stage HR. This is consistent with earlier research describing fusions as the best treatment for more severe grades of HR[30-32]. However, what is usually not described in other studies, and thereby unique in our study, is how the change in PROM score should be interpreted for that specific population. Both the SEFAS score and EQ5D index increased more than their identified thresholds for clinical relevance. The improvement of mean SEFAS score was 16 and the improvement of mean EQ5D index was 0,26. We know from earlier publications that the MIC for SEFAS is 5 units, which means that a change of SEFAS by 16 units is a noticeable clinically important change [25].

Table 4. Patients' answers to questions separated from the PROMs in Cohort 2 (=127 patients). Data is presented as percentages, i.e. how many of the patients in C2 who answered i) very satisfied, ii) satisfied, iii) somewhat satisfied, iv) neither satisfied nor dissatisfied or v) dissatisfied on the questions regarding appearance, shoe wear and strength before surgery and 1 year after surgery. The questions are presented in Figure 2.

Satisfaction issues	Very satisfied	Satisfied	Somewhat satisfied	Neither satisfied nor dissatisfied	Dissatisfied
	%	%	%	%	%
Satisfaction with surgery*	45.7	30.7	8.7	3.1	11.8
Appearance preop	5.5	16.5	16.5	22.8	20.5
Appearance 1 year postop	35.7	32.5	14.3	11.9	5.6
Shoewear preop	5.8	18.3	19.2	17.3	39.4
Shoewear 1 year postop	26.2	37.3	16.7	5.6	11.1
Strength preop	4.8	29.8	26.0	17.3	22.1
Strength 1 year postop	36.2	31.5	16.5	7.1	8.7

*Satisfaction with the result of surgery after 1 year

Additionally, the improvement in SEFAS score from before to after surgery is greater than we found when we compared patient-reported outcome for osteotomies or cheilectomies in patients with moderate HR [17]. In that study the delta SEFAS score was 12 units for osteotomy and 10 units for cheilectomy. Regarding MIC values for EQ-5D we also find that the improvement is clinically relevant in our group of patients [27-29,33]. A greater improvement in SEFAS score, compared to EQ5D, was expected since SEFAS is a region-specific PROM created to be more responsive to changes in the foot- and ankle region compared to a generic PROM like EQ5D.

Furthermore, age- and gender-specific normative values for the SEFAS in the Swedish population was described by Cöster et al. in 2018 [24]. The mean postoperative SEFAS score in our study is 38, which is surprisingly close to the mean SEFAS score of the general population in the same age group considering that their mobility in the FMTPJ is limited. The difference in postoperative SEFAS compared to the general population in their age group is 4 or 2 units, less than the MIC of 5 units. Additionally, the mean postoperative SEFAS score was 36 after cheilectomy and 38 after osteotomy in the study by Cöster et al. [17], indicating that the arthrodesis patients rate their function to be equally good or better than patients surgically treated with cheilectomy or osteotomy. These findings are not what we expected because with a fused joint the mobility of the joint is eliminated which change the biomechanics for the whole foot and ankle and the gait pattern. In future studies it will be of interest to compare the different surgical methods in all grades of hallux rigidus using a prospective or experimental study design.

Satisfaction regarding outcome of surgery, appearance of the foot, wearable shoes, and strength, but also symptoms of forefoot pain are parameters not specifically measured in the PROMs, but often important problems for the patients. In our study we find that this group of patients are more satisfied after surgery and less dissatisfied after surgery. These findings reinforce our other results that an arthrodesis is an efficient surgical method with good results in patients with end-stage HR.

When we analyzed our results, we found an unequal distribution across the country of registered arthrodeses of the FMTPJ in Swefoot, which indicate that the care for patients with HR differ in the country. However, the reason could also be that the surgeons in these parts of the country are more likely to register in Swefoot.

In our study we found that the surgeon-reported postoperative regimen in the register differ among surgeons and in the country. The patients in most of the cases were immobilized either 1-6 or 7-9 weeks. We also found out that 26% of the patients were not allowed to bear weight for 3 weeks or more. Time of immobilization and weight-bearing affect both the patients' QoL and possibly the hospitals follow-up time and, thereby, economy. There is a great difference in these aspects from 6 to 9 weeks, hence the chosen regime should

naturally be based on evidence. Some previous studies have shown that it is possible to bear weight immediately with low non-union rate, but evidence is still low [34,35]. In this study, we have not been able to investigate if there is a difference in outcome for these two regimes. However, evaluating this nation-based material we become aware of the lack of clear recommendations or guidelines regarding an adequate and safe postoperative regimen.

During the last decades several types of plate fixation systems have been available to use fusing the FMTPJ. Several authors have declared that plating techniques are superior to other fixation techniques including patient-reported outcome, union rate, early ambulation, and reduced complication incidence [36-40]. It is important to find out if this specific internal fixation technique significantly can reduce the cost of health services and increase the patient satisfaction. Plates are more expensive to use, but if the complication incidence reduces and the union rate improves plates and screws should be the recommended. The advantages must also be set in relation to the drawbacks of plating techniques including metalwork prominence and discomfort and longer incisions. For most of the surgeries in this study, a screw fixation was used. Since the outcome was generally good, this could indicate that the use of other, possibly more expensive, material is not the best option from a cost-effectiveness point of view. When we compared the satisfaction of outcome after surgery 68/84 (81%) of the patients were satisfied surgically treated with a screw-fixated arthrodesis, and 40/43 (93%) with plates and screws, but the differences were not significant (p-value 0.113). Our cohort was too small to do these important comparisons and we must add more patients from the register to get power for these analyzes. A randomized register study can be a possibility in the future.

We did not present adverse events in detail, revision rate or secondary surgery because the registry is too young, and we do not have enough data yet. However, we have noticed that 13.5 % of the patients reported that they have had some type of complications after the surgery and even more patients who had additional problems after the surgery. In future studies with more data in the register, it will be possible to evaluate what complications and what possible additional problems patients experience postoperatively.

The strengths of this study are the multicenter register design on national basis, and that we prospectively examine data collected in routine clinical practice. The vast number of patients give the study power, and the role of the operating surgeon is reduced by the many different clinics and surgeons involved. Another strength is that we have used both a generic PROM (EQ5D) and a region-specific PROM (SEFAS), which both are thoroughly evaluated in patients with foot and ankle disorders. There are some limitations with this study. As this is a multicenter register study data reporting could vary between centers and surgeons. Another limitation is the large number of missing patient-reported data, which naturally affects the generalizability and interpretation of the results. Swefoot is still a relatively new register, and, with time, more patients will be registered. For patients registered between December 2018 and 2019 1 year had not passed since they were operated, which means that they had not had the chance to complete the 1-year questionnaire when the data was extracted. These patients should not be considered as dropouts since we can assume that they have completed the questionnaires after we extracted data from the register.

Conclusion

Register studies are important for evaluation of surgical outcome on a national level, developing national guidelines and equal care, non-dependent on where in a country the patient lives.

In this register-based study with data from the Swedish quality register for foot and ankle surgery, Swefoot, we found that patients with end-stage HR treated with an arthrodesis of the FMTPJ are overall satisfied and have a great clinically relevant improvement of pain, function, and HrQoL according to patient-reported outcome measures 1 year after surgery. Surgical methods including internal fixation and postoperative regimes differ significantly throughout the country, which ought to be evaluated further in future comparative studies.

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Disclosure statement

The authors declare no conflict of interest.

Author Contribution

The manuscript is based on an unpublished essay by I. Osbeck from 2021. It has been modified to fit within the framework of an article and additional analysis and interpretation have been conducted by M.C. Cöster and M Cöster-Stoij. All authors were equally involved in the preparation and revision of the manuscript.

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