The Journal of Rheumatology 2023;xx:xxxx
doi:10.3899/jrheum.220908
First Release February 1 2023

The Journal of Rheumatology

Musculoskeletal Surgery in Psoriatic Arthritis: Prevalence and Risk Factors

Timothy S.H. Kwok[1], Mitchell Sutton[2], Richard J. Cook[3], Daniel Pereira[2], Vinod Chandran[4], and Dafna D. Gladman[4]

ABSTRACT. ***Objective.*** Despite medical therapy, damage occurs in patients with psoriatic arthritis (PsA) requiring musculoskeletal (MSK) surgery. We aimed to describe MSK surgery in patients with PsA and identify risk factors for undergoing first MSK surgery attributable to PsA.

Methods. A single-center cohort identified patients with PsA fulfilling Classification Criteria for Psoriatic Arthritis who had MSK surgery between January 1978 and December 2019 inclusive. Charts were reviewed to confirm surgeries were MSK-related and attributable to PsA. Descriptive statistics determined MSK surgery prevalence and types. Cox proportional hazards models evaluated clinical variables for undergoing first MSK surgery using time-dependent covariates. Using a dataset with 1-to-1 matching on markers of PsA disease severity, a Cox proportional hazards model evaluated the effect of targeted therapies, namely biologics on time to first MSK surgery.

Results. Of 1574 patients, 185 patients had 379 MSK surgeries related to PsA. The total number of damaged joints (hazard ratio [HR] 1.03, $P < 0.001$), tender/swollen joints (HR 1.04, $P = 0.01$), presence of nail lesions (HR 2.08, $P < 0.01$), higher Health Assessment Questionnaire scores (HR 2.01, $P < 0.001$), elevated erythrocyte sedimentation rate (HR 2.37, $P = 0.02$), and HLA-B27 positivity (HR 2.22, $P = 0.048$) were associated with increased risk of surgery, whereas higher Psoriasis Area Severity Index (HR 0.88, $P < 0.002$) conferred a protective effect in a multivariate model. The effect of biologics did not reach statistical significance.

Conclusion. MSK surgery attributable to PsA is not rare, affecting 11.8% of patients. Markers of cumulative disease activity and damage are associated with a greater risk of requiring surgery.

Key Indexing Terms: orthopedics, psoriatic arthritis, spondyloarthritis, surgery

Psoriatic arthritis (PsA) is a disease characterized by inflammatory arthritis and psoriasis, occurring in approximately 0.3% to 1% of the population.[1] Peripheral joint disease is progressive in many patients with PsA, with radiographical erosions seen in up to 68% of patients in the hands and wrists within 5 years of follow-up.[2] Large joint and axial skeleton involvement is also prevalent, with 6.3% of patients requiring hip arthropathy over approximately 5 years and 81% having sacroiliitis or spondyloarthritis.[3] This is significant, because of the 6.3% of patients who develop radiographical hip involvement, half of them require arthroplasty within 5 years after the onset of hip pain.[3]

Treatments in PsA aim toward symptom management, reducing systemic inflammation to obtain clinical remission and prevent further articular structural damage, and to prevent the development of comorbid conditions.[4] Approaches to therapy rely on a combination of treatments aimed at symptom relief such as nonsteroidal antiinflammatory drugs (NSAIDs) and intraarticular injections, in addition to immunomodulatory therapies including conventional synthetic disease-modifying antirheumatic drugs (cDMARDs) and targeted synthetic and biologic agents.[5-7]

Even with cDMARDs aimed at controlling systemic inflammation in PsA, joint space disease and skeletal damage persists in a significant number of patients.[8] No cDMARD to date has been proven to slow down radiographical disease in PsA.[9] When cDMARDs fail, clinicians often turn to targeted synthetic and biologic therapies. In particular, tumor necrosis factor inhibitors, interleukin (IL)-12/23, IL-23, IL-17, and Janus kinase

This work was supported by a grant from the Krembil Foundation.

[1]T.S.H. Kwok, MD, Division of Rheumatology, Department of Medicine, Temerty Faculty of Medicine, University of Toronto, Toronto; [2]M. Sutton, MSc, D. Pereira, BSc, Centre for Prognosis Studies in the Rheumatic Diseases, Krembil Research Institute, Toronto Western Hospital, University Health Network, Toronto; [3]R.J. Cook, PhD, Department of Statistics and Actuarial Sciences, University of Waterloo, Waterloo; [4]V. Chandran, MBBS, MD, DM, PhD, D.D. Gladman, MD, Division of Rheumatology, Department of Medicine, Temerty Faculty of Medicine, University of Toronto, Toronto, and Centre for Prognosis Studies in the Rheumatic Diseases, Krembil Research Institute, Toronto Western Hospital, University Health Network, Toronto, and Schroeder Arthritis Institute, Krembil Research Institute, Toronto Western Hospital, University Health Network, Toronto, and Institute of Medical Science, University of Toronto, Toronto, Ontario, Canada.

The authors declare no conflicts of interest relevant to this article.

Address correspondence to Dr. D.D. Gladman, Centre for Prognosis Studies in the Rheumatic Diseases, Schroeder Arthritis Institute, University Health Network, Toronto Western Hospital, 399 Bathurst St, 1E-410B, Toronto, ON M5T 2S8, Canada. Email: dafna.gladman@utoronto.ca.

Accepted for publication October 27, 2022.

© 2023 The Journal of Rheumatology

Downloaded on April 19, 2024 from www.jrheum.org

inhibitors (JAKi) have been shown to be effective in slowing radiographic progression of PsA.[1,9]

Despite optimal medical therapy to control systemic inflammation and preserve joint function, a subset of patients with PsA still require musculoskeletal (MSK) surgery for disease-related morbidity.[10] However, data on the prevalence and associated risk factors for MSK surgery for patients with PsA are lacking. In existing epidemiological studies, the prevalence of orthopedic surgical intervention in patients with PsA has ranged from 7% to 48%.[11-16] Risk factors that increased the likelihood of surgery included: female sex, age ≥ 70 years at diagnosis, increasing number of inflamed joints, articular damage in initial radiographs, higher Health Assessment Questionnaire (HAQ) scores, and elevated inflammatory markers.[11-13]

Previous studies have cited widely varying prevalence for orthopedic surgical interventions in the PsA population as well as inconsistent risk factors. Those studies were limited either in the number of patients analyzed, or their extensive use of population-level health administrative databases lacking clinical detail. Further, previous studies did not clearly differentiate surgeries attributable to PsA vs other coexisting MSK disease entities in patients. Moreover, prior studies did not specifically analyze the effect of conventional and targeted DMARDs on the prevalence of MSK surgery. Therefore, the objective of this study was to describe MSK surgery in patients with PsA, in addition to determining associated factors that influence the likelihood of surgery, through the analysis of a longitudinal observational cohort of patients at a specialized PsA clinical setting.

METHODS

Setting. This study was conducted at the University of Toronto PsA Clinic, which in 1978 established a longitudinal observational cohort of adult (≥ 18 years old) patients with PsA. Patients with PsA are followed prospectively at 6- to 12-month intervals by a rheumatologist at the clinic according to a standard protocol. All patients included in this study fulfilled the 2006 Classification Criteria for Psoriatic Arthritis.[17] The protocol prescribes the collection of clinical, laboratory and radiographic variables at prespecified time intervals including, but not limited to, information on demographics, disease characteristics, comorbidities, pharmacological therapies, nonpharmacological therapies, interval surgical procedures, physical examination findings, radiographical studies, and bloodwork results at initial consultation and at each follow-up visit. At the time of this study, 1574 patients with PsA were enrolled into the cohort.

Informed consent was obtained for the patients who participated in the cohort and the study was approved by the University Health Network Research Ethics Board (REB 08-0630-AE).

Patient selection. Patients with PsA who had self-identified either at time of consultation or at follow-up visits, to have had MSK surgery from January 1978 to December 2019 inclusive were included in the study. Patients in the cohort who did not undergo MSK surgery related to PsA during the entire follow-up period were right censored at their last clinical visit.

Data collection. The chart of each individual patient with PsA who self-identified to have undergone MSK surgical intervention was reviewed. Data from all MSK surgical interventions were collected, regardless of clinical indication for surgery, including date of surgery, type of surgery, indication for surgery, joint sacrificing vs nonjoint sacrificing nature, and anatomical location. Subsequently, each individual surgical procedure was then cross-referenced to the patient's clinical records by physician researchers (TSHK, DDG) to determine if the intervention was related to the patient's underlying PsA. MSK surgeries completed prior to the diagnosis of PsA were excluded from survival analyses, as they were deemed to be not secondary to the patient's underlying PsA.

Statistical analysis. Descriptive statistics determined the prevalence of MSK surgeries attributable to PsA, in addition to categories, indications, and anatomical locations for surgery. *T* tests and the chi-squared tests were used for continuous and categorical variables, respectively, to compare differences between patients who had MSK surgeries attributable to PsA vs those without. Univariate and multivariate Cox proportional hazards models using time-dependent covariates evaluated the cumulative effect of PsA disease activity and damage on risk of requiring MSK surgery. Biologic DMARDs were not included in the initial model as they were not available prior to the year 2000, and following the year 2000, their use is associated with confounding by indication.[18] It is important to recognize the possible effects of biologic therapy however, so subanalyses were conducted to investigate this. Thus, the dataset was stratified according to whether surgeries took place after the year 2000, including biologic use in the model. The final Cox proportional hazards models used backward stepwise selection at $P < 0.10$ to improve model generalizability and reproducibility. All models were adjusted for sex and age at baseline. To further investigate the role of biologics on time to first MSK surgery related to PsA, a time-dependent Cox proportional hazards model was constructed with patients on biologics after the year 2000, 1-to-1 matched to those not on biologics prior to the year 2000, based on the match variables of sex, baseline age ± 5 years, PsA disease duration ± 5 years, and ± 1 damaged joint on the outcome measure of time to first MSK surgery related to PsA.

Time-to-event results were measured from PsA diagnosis. Only protocol visits after the diagnosis of PsA were included. All statistically significant thresholds were set at $P < 0.05$. Statistical analysis was performed using R version 4.0.5 (R Foundation for Statistical Computing).

RESULTS

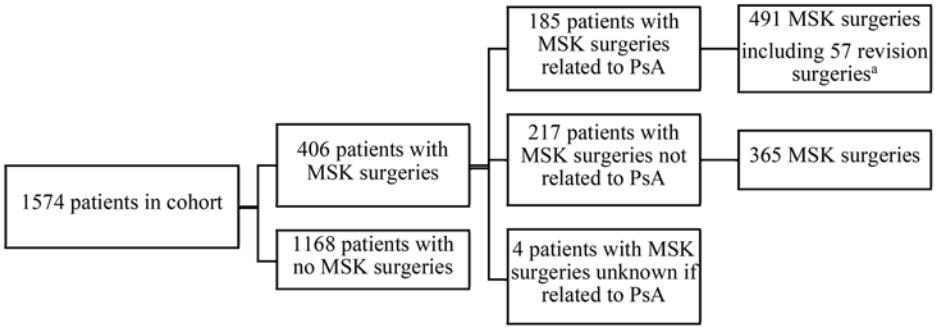
Of the 1574 patients with PsA in the cohort, 406 patients underwent at least 1 MSK surgery, of which 185 patients underwent at least 1 MSK surgery attributable to PsA, comprising 11.8% of the cohort. These 185 patients underwent a total of 491 MSK surgeries, 379 of which were related to PsA (Figure).

Clinical variables were compared between patients who had MSK surgery related to PsA vs those without at baseline visit. Patients with MSK surgery had higher HAQ scores (mean 0.92 [SD 0.62] vs 0.65 [SD 0.57], $P < 0.001$), a greater number of actively inflamed (tender or swollen) joints (mean 10.77 [SD 10.18] vs 8.96 [SD 9.74], $P = 0.02$), damaged joints (mean 6.51 [SD 10.87] vs 1.97 [SD 5.42], $P < 0.001$), a higher percentage of axial involvement (46.5% vs 29.7%, $P < 0.001$), NSAID use (74.1% vs 64.1%, $P = 0.01$), DMARD use (44.9% vs 33.6%, $P = 0.003$), and biologic use (12.4% vs 7.3%, $P = 0.01$) at baseline visit (Table 1).

Common surgeries were arthrodesis (27%) and arthroplasty (27%). Common anatomical locations included the knee (28%) and fingers (21%), with surgical indications representing deformities (42%) and inflammation/synovitis (42%). Fifty-nine percent of surgeries were joint sacrificing, whereas 41% were joint retaining (Table 2). Of note, there were a total of 57 revision surgeries attributable to the primary surgery.

Covariate data for the Cox proportional hazards model was complete for 1018 patients, of which 71 had the event of surgery attributable to PsA. A greater number of damaged joints (hazards ratio [HR] 1.03, 95% CI 1.02-1.05, $P < 0.001$), the presence of

Downloaded on April 19, 2024 from www.jrheum.org



[a] Revision surgeries deemed to be secondary to primary surgery (eg, due to infected hardware).

Figure. Flow diagram of patients with PsA with MSK surgeries in the cohort. MSK: musculoskeletal; PsA: psoriatic arthritis.

Table 1. Clinical variables at baseline visit between patients with and without MSK surgeries related to PsA (n = 1574).

	Patients Without MSK Surgery Related to PsA, n = 1389	Patients With MSK Surgery Related to PsA, n = 185	*P*
Male sex, %	56.3	51.9	0.26
Age, yrs	44.58 (13.25)	44.90 (13.19)	0.76
BMI	28.91 (6.55)	28.30 (5.25)	0.36
PASI score	5.51 (7.63)	5.17 (8.23)	0.64
HAQ score	0.65 (0.57)	0.92 (0.62)	< 0.001
Total active joints	8.96 (9.74)	10.77 (10.18)	0.02
Total damaged joints	1.97 (5.42)	6.51 (10.87)	< 0.001
Total enthesitis sites	0.38 (1.14)	0.28 (0.86)	0.21
Presence of dactylitis, %	27.8	23.8	0.25
Presence of nail lesions, %	66.2	68.8	0.54
Axial disease, %	29.7	46.5	< 0.001
HLA-B27, %	15.7	20.6	0.12
NSAIDs, %	64.1	74.1	0.01
DMARDs, %	33.6	44.9	0.003
Biologics, %	7.3	12.4	0.01

Values are expressed as mean (SD) unless indicated otherwise. Where applicable, *t* tests and chi-square tests were used for continuous and categorical variables, respectively. DMARD: disease-modifying antirheumatic drug; HAQ: Health Assessment Questionnaire; MSK: musculoskeletal; NSAID: nonsteroidal antiinflammatory drug; PASI: Psoriasis Area Severity Index; PsA: psoriatic arthritis.

nail lesions (HR 2.08, 95% CI 1.24-3.50, $P < 0.01$), and higher HAQ scores (HR 2.01, 95% CI 1.35-3.01, $P < 0.001$) were associated with a higher chance of undergoing first MSK surgery related to PsA, whereas higher Psoriasis Area Severity Index (PASI) scores (HR 0.88, 95% CI 0.82-0.95, $P < 0.002$) yielded a protective effect in the multivariate model (Table 3).

When MSK surgeries after the year 2000 were analyzed with the addition of biologic use in the time-dependent Cox proportional hazards model, complete covariate data were available for a total of 698 patients, of which 35 had the event of surgery attributable to PsA. Elevated erythrocyte sedimentation rate (ESR; HR 2.37, 95% CI 1.17-4.79, $P = 0.02$), a greater number of actively inflamed joints (HR 1.04, 95% CI 1.01-1.06, $P = 0.01$), and HLA-B27 positivity (HR 2.22, 95% CI 1.01-4.88, $P = 0.048$) were associated with a higher chance of undergoing first MSK surgery related to PsA (Table 4).

The effect of biologic use on first MSK surgery was further investigated by creating a subsample of patients using 1-to-1 matching on markers of PsA damage including sex, age, PsA disease duration, and damaged joints at baseline. This led to a sample of 199 patients not on biologics, matched with 199 patients on biologics. In a Cox proportional hazards model adjusting for all the matching variables, the effect of biologic use was estimated to yield a HR of 0.59 (95% CI 0.21-1.61, $P = 0.30$) on time to first MSK surgery attributable to PsA (Table 5).

Downloaded on April 19, 2024 from www.jrheum.org

Table 2. Distribution and descriptions of MSK surgeries performed attributable to PsA (n = 379).

Type of Surgery[a]	Arthrodesis, 102 (27)	Arthroplasty, 102 (27)	Arthroscopic synovectomy, 59 (16)	Tendon/ ligament repair, 28 (7)	Osteotomy, 18 (5)	Arthroscopic Debridement/ Meniscectomy, 17 (4)	Revision arthroplasty, 14 (4)	Diagnostic arthroscopy, 12 (3)	Implant removal, 10 (3)	Amputation, 5 (1)
Anatomic Location[b]	Knee, 106 (28)	Finger, 80 (21)	Foot, 70 (18)	Hip, 37 (10)	Wrist, 26 (7)	Hand, 17 (4)	Shoulder, 12 (3)	Ankle, 12 (3)	Elbow, 7 (2)	Jaw, 8 (2)
Surgical indication	Deformities, 161 (42)	Inflammation/ synovitis, 160 (42)	Failed implant, 24 (6)	Infection, 9 (2)	Pain, 9 (2)	Avascular necrosis from corticosteroids, 5 (1)	Secondary degenerative disease, 5 (1)	Ankylosis, 3 (1)	Carpal tunnel syndrome, 3 (1)	
Joint retaining/ Sacrificing	Joint sacrificing, 224 (59)	Joint retaining, 155 (41)								

All values are n (%). [a] Other types of surgeries included the following [n (%)]: carpal tunnel release, 4 (1); irrigation and debridement, 3 (1); laminectomy/ discectomy, 2 (1); soft tissue excision/debridement, 2 (1); and revision arthrodesis, 1 (1). [b] Other anatomic locations included: the spine, 3 (1); and pelvis, 1 (1). MSK: musculoskeletal; PsA: psoriatic arthritis.

Table 3. Time-dependent Cox proportional hazards models for undergoing first MSK surgery among patients with PsA, adjusted for sex and age at baseline (n = 1018).

	Univariate Model		Multivariate Model		Multivariate Backwards Selection Model[a]	
	HR (95% CI)	*P*	HR (95% CI)	*P*	HR (95% CI)	*P*
Male sex			0.79 (0.48-1.31)	0.36	0.81 (0.49-1.33)	0.41
Age at baseline visit (by 1 yr)			0.99 (0.97-1.01)	0.29	0.99 (0.97-1.01)	0.24
DMARDs	1.62 (1.09-2.43)	0.02	0.80 (0.49-1.31)	0.38		
NSAIDs	1.60 (1.03-2.47)	0.04	1.11 (0.66-1.87)	0.70		
Elevated ESR	1.33 (0.89-2.00)	0.17	1.30 (0.78-2.18)	0.32		
Damaged joint count (by 1 joint)	1.04 (1.03-1.05)	< 0.001	1.03 (1.02-1.05)	< 0.001	1.03 (1.02-1.05)	< 0.001
Active joint count (by 1 joint)	1.04 (1.02-1.06)	< 0.001	1.03 (0.997-1.05)	0.08		
Dactylitis count (by 1 digit)	0.94 (0.74-1.18)	0.58	0.93 (0.72-1.20)	0.58		
Nail lesions	1.37 (0.87-2.15)	0.17	1.96 (1.15-3.32)	0.01	2.08 (1.24-3.50)	< 0.01
HAQ (by 1 point)	2.06 (1.42-2.99)	< 0.001	1.69 (1.07-2.67)	0.02	2.01 (1.35-3.01)	< 0.001
PASI (by 1 point)	0.95 (0.90-0.997)	0.04	0.88 (0.81-0.95)	< 0.002	0.88 (0.82-0.95)	< 0.002

[a] Backward selection model derived using $P < 0.1$. DMARD: disease-modifying antirheumatic drug; ESR: erythrocyte sedimentation rate; HAQ: Health Assessment Questionnaire; HR: hazard ratio; MSK: musculoskeletal; NSAID: nonsteroidal antiinflammatory drug; PASI: Psoriasis Area Severity Index; PsA: psoriatic arthritis.

DISCUSSION

In our cohort, 11.8% of patients underwent at least 1 MSK surgery attributable to PsA, with most surgeries being joint sacrificing in nature (59%), suggesting a significant burden of MSK operative interventions in this patient population. Further, the vast majority of surgeries were localized to the lower extremity. In all, the results of our descriptive analysis are in line with previous studies and expert opinions.[11-16,19] Our descriptive analysis suggests that MSK surgery as a sequela to PsA is not uncommon and highlights potential limitations in our medical treatment paradigm and subsequent areas for improvement. Moreover, our data also revealed 57 revision surgeries, such as infected hardware, among 491 total MSK surgeries. Previous literature has demonstrated increased rates of postoperative complications including the need for revision surgery among patients with inflammatory arthritis, whereas another study has demonstrated no higher risk for poor outcomes after total hip arthroplasty in patients with PsA compared to those with osteoarthritis.[20,21] By contrast, total knee arthroplasty revision rates among the general population are cited at approximately 2.8% through 5 years.[22] Whether our data represent a marked difference compared to patients without PsA vs other forms of inflammatory arthritis is unknown but warrants further study.

Further, we found that a greater number of damaged joints, the presence of nail lesions, and higher HAQ scores were associated with a higher chance of undergoing MSK surgery attributable to PsA. Damaged joints are the sequelae of longstanding and persistent articular inflammation and are one of the most

Downloaded on April 19, 2024 from www.jrheum.org

Table 4. Time-dependent Cox proportional hazards models for undergoing first MSK surgery after the year 2000 among patients with PsA, adjusted for sex and age at baseline (n = 698).

	Univariate Model		Multivariate Model		Multivariate Backwards Selection Model	
	HR (95% CI)	*P*	HR (95% CI)	*P*	HR (95% CI)	*P*
Male sex			0.79 (0.35-1.79)	0.56	0.71 (0.36-1.41)	0.33
Age at baseline visit (by 1 yr)			1.02 (0.99-1.05)	0.26	1.02 (0.995-1.05)	0.12
DMARDs	1.05 (0.54-2.05)	0.88	0.69 (0.31-1.52)	0.35		
NSAIDs	2.002 (0.97-4.12)	0.06	1.30 (0.57-2.98)	0.53		
Biologics	2.04 (1.03–4.04)	0.04	1.91 (0.84-4.30)	0.12	1.99 (0.99-3.99)	0.05
Elevated ESR	2.48 (1.25-4.91)	0.01	2.24 (0.99-5.08)	0.05	2.37 (1.17-4.79)	0.02
Damaged joint count (by 1 joint)	1.03 (0.99-1.07)	0.10	1.01 (0.96-1.05)	0.79		
Active joint count (by 1 joint)	1.04 (1.01–1.06)	0.01	1.02 (0.99-1.06)	0.24	1.04 (1.01-1.06)	0.01
Dactylitis count (by 1 digit)	1.17 (0.92-1.49)	0.22	0.99 (0.73-1.34)	0.94		
Nail lesions	0.96 (0.48-1.89)	0.90	1.45 (0.65-3.27)	0.37		
HAQ (by 1 point)	2.45 (1.38-4.36)	0.002	1.55 (0.72-3.34)	0.27		
PASI (by 1 point)	0.91 (0.81-1.03)	0.14	0.89 (0.76-1.03)	0.11		
HLA-B27	2.59 (1.19-5.63)	0.02	1.99 (0.77-5.13)	0.15	2.22 (1.01-4.88)	0.048

DMARD: disease-modifying antirheumatic drug; ESR: erythrocyte sedimentation rate; HAQ: Health Assessment Questionnaire; HR: hazard ratio; MSK: musculoskeletal; NSAID: nonsteroidal antiinflammatory drug; PASI: Psoriasis Area Severity Index; PsA: psoriatic arthritis.

Table 5. Estimates from a Cox proportional hazards model on the effect of biologic use on undergoing first MSK surgery using a 1-to-1 match of sex, baseline age, PsA disease duration and damaged joints (n = 398).

	HR (95% CI)	*P*
Male sex	0.37 (0.13-1.04)	0.06
Baseline age (by 1 yr)	0.97 (0.93-1.01)	0.13
Baseline PsA disease duration (by 1 yr)	1.04 (0.96-1.13)	0.36
Baseline total damaged joint count (by 1 joint)	1.04 (0.95-1.14)	0.35
Biologics	0.59 (0.21-1.61)	0.30

HR: hazard ratio; MSK: musculoskeletal; PsA: psoriatic arthritis.

common indications for surgery in patients with PsA.[23,24] In addition, nail lesions have been cited as a potential marker of increased PsA disease activity, whereas the HAQ score is a commonly used questionnaire validated in PsA for disease severity, to detail functional abilities and assess pain.[25-27] Therefore, our results suggest that patients with markers of higher cumulative disease activity and/or damage are those ultimately requiring MSK surgical interventions, despite medical therapy. Although higher PASI scores were associated with a protective effect, its implications and underlying mechanisms require further study.

When the data were analyzed after the year 2000, after the advent of biologics, elevated ESR, a greater number of actively inflamed joints, and HLA-B27 positivity were shown to be associated with MSK surgery. Akin to the aforementioned variables, elevated ESR and actively inflamed joints are also markers of uncontrolled inflammation in PsA and have been associated with MSK surgery in prior studies.[11-13] HLA-B27 is associated with axial involvement in PsA, and prior registry data have revealed higher disease activity and lower quality of life among patients with PsA with axial disease, potentially linking HLA-B27 as another proxy of severe PsA disease.[28]

Although there was a signal toward biologic use being associated with MSK surgery in our subanalysis for MSK surgeries after the year 2000, our model was confounded by disease severity, as biologics are reserved for patients with persistently high disease activity despite other therapies.[5-7] Hence, we performed a matched analysis stratified by markers of PsA disease severity which showed that biologics were not significantly associated with undergoing first MSK surgery. By doing so, our sample size decreased and the resultant loss in statistical power may have partially explained the lack of statistical significance regarding the effect of biologics on first MSK surgery. Despite evidence toward halting radiographic damage in PsA, to our knowledge, there are no studies to date evaluating the association of biologic use on MSK surgery in PsA.[9,29] However, data in rheumatoid arthritis have remained conflicting, with some studies suggesting no significant difference in the need for orthopedic interventions and others demonstrating a potential protective effect.[30-32]

The limitations of our study lie in that our cohort is situated in a quaternary center for MSK health, thereby potentially overestimating the number of surgeries compared to a community site as a result of a referral bias of complex cases.[33] However, this risk of bias is likely minimal, as our cohort has been shown previously to be similar in regards to disease severity to a community cohort.[34] Moreover, although attempts were made to differentiate surgeries specifically related to PsA vs those secondary to other concomitant conditions, the inherent difficulty and similarities between PsA and degenerative disease raises the possibility of the overestimation of surgeries. This is because PsA and

Downloaded on April 19, 2024 from www.jrheum.org

degenerative arthritis both share immunopathological similarities, risk factors such as obesity, and secondary osteoarthritis can develop from longstanding PsA joint damage.[35-37]

This is one of the largest studies evaluating the prevalence and risk factors for MSK surgery in PsA using detailed protocol data within a longitudinal cohort setting. Compared with other similar studies on MSK surgery and PsA, the advantages of our study include the large number of patients included in our analysis (n = 1574), long-term follow-up data enabling time-varying covariate analysis, the thoroughness of MSK surgery descriptions, as well as the comprehensiveness of clinical variables collected in our research protocol. Importantly, our study specifically identified, through physician input, surgeries directly attributable to PsA, unlike several other epidemiological studies in the literature, which either relied on administrative databases or did not distinguish between surgeries related to PsA vs those due to other concomitant MSK conditions.[11-16] Last, our study inclusion period was specifically designed to end prior to the coronavirus disease 2019 (COVID-19) pandemic's resultant disruption of surgical services in Ontario, Canada, thereby enhancing the external validity of the results.[38]

Despite medical therapy, a significant number of patients still require MSK surgical interventions mainly for deformities or inflammation/synovitis. We were able to delineate markers of increased PsA disease severity and cumulative damage that were associated with a higher chance of undergoing first MSK surgery attributable to PsA. More research is needed to identify other modifiable protective predictors that decrease the chance for MSK surgery in the PsA patient population, in order to decrease associated morbidity. Moreover, the role of biologic use in influencing MSK surgery in PsA is a particular area of future interest, especially given existing literature indicating its protective effects in halting radiographic damage.[1,9] Although it was not the specific focus of this study, to address potential confounding by indication for biologics and disease severity associated with undergoing MSK surgery in PsA, further studies that may include the use of propensity score matching methodology are required.

REFERENCES

1. Ritchlin CT, Colbert RA, Gladman DD. Psoriatic arthritis. N Engl J Med 2017;376:957-70.
2. McHugh NJ, Balachrishnan C, Jones SM. Progression of peripheral joint disease in psoriatic arthritis: a 5-yr prospective study. Rheumatology 2003;42:778-83.
3. Michet CJ, Mason TG, Mazlumzadeh M. Hip joint disease in psoriatic arthritis: risk factors and natural history. Ann Rheum Dis 2005;64:1068-70.
4. Smolen JS, Braun J, Dougados M, et al. Treating spondyloarthritis, including ankylosing spondylitis and psoriatic arthritis, to target: recommendations of an international task force. Ann Rheum Dis 2014;73:6-16.
5. Singh JA, Guyatt G, Ogdie A, et al. Special article: 2018 American College of Rheumatology/National Psoriasis Foundation Guideline for the treatment of psoriatic arthritis. Arthritis Rheumatol 2019;71:5-32.
6. Gossec L, Smolen JS, Ramiro S, et al. European League Against Rheumatism (EULAR) recommendations for the management of psoriatic arthritis with pharmacological therapies: 2015 update. Ann Rheum Dis 2016;75:499-510.
7. Coates LC, Kavanaugh A, Mease PJ, et al. Group for Research and Assessment of Psoriasis and Psoriatic Arthritis 2015 treatment recommendations for psoriatic arthritis. Arthritis Rheumatol 2016;68:1060-71.
8. Acosta Felquer ML, Coates LC, Soriano ER, et al. Drug therapies for peripheral joint disease in psoriatic arthritis: a systematic review. J Rheumatol 2014;41:2277-85.
9. Goulabchand R, Mouterde G, Barnetche T, Lukas C, Morel J, Combe B. Effect of tumour necrosis factor blockers on radiographic progression of psoriatic arthritis: a systematic review and meta-analysis of randomised controlled trials. Ann Rheum Dis 2014;73:414-9.
10. Zangger P, Esufali ZH, Gladman DD, Bogoch ER. Type and outcome of reconstructive surgery for different patterns of psoriatic arthritis. J Rheumatol 2000;27:967-74.
11. Zangger P, Gladman DD, Bogoch ER. Musculoskeletal surgery in psoriatic arthritis. J Rheumatol 1998;25:725-9.
12. Haque N, Lories RJ, de Vlam K. Orthopaedic interventions in patients with psoriatic arthritis: a descriptive report from the SPAR cohort. RMD Open 2016;2:e000293.
13. Nystad TW, Husum YS, Furnes ON, Fevang BS. Incidence and predictive factors for orthopedic surgery in patients with psoriatic arthritis. J Rheumatol 2018;45:1532-40.
14. Lewinson RT, Vallerand IA, LaMothe JM, et al. Increasing rates of arthroplasty for psoriatic arthritis in the United Kingdom between 1995 and 2010. Arthritis Care Res 2019;71:1525-9.
15. Guldberg-Møller J, Cordtz RL, Kristensen LE, Dreyer L. Incidence and time trends of joint surgery in patients with psoriatic arthritis: a register-based time series and cohort study from Denmark. Ann Rheum Dis 2019;78:1517-23.
16. Nystad TW, Fenstad AM, Fevang BT. Major differences in medical and surgical treatment of psoriatic arthritis and rheumatoid arthritis: a comparison of two historic cohorts. Scand J Rheumatol 2020;49:267-70.
17. Taylor W, Gladman D, Helliwell P, Marchesoni A, Mease P, Mielants H; CASPAR Study Group. Classification criteria for psoriatic arthritis: development of new criteria from a large international study. Arthritis Rheum 2006;54:2665-73.
18. Mease P. A short history of biological therapy for psoriatic arthritis. Clin Exp Rheumatol 2015;33:S104-8.
19. Strauss EJ, Alfonso D, Baidwan G, Di Cesare PE. Orthopedic manifestations and management of psoriatic arthritis. Am J Orthop 2008;37:138-47.
20. Cancienne JM, Werner BC, Browne JA. Complications of primary total knee arthroplasty among patients with rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, and osteoarthritis. J Am Acad Orthop Surg 2016;24:567-74.
21. Mandl LA, Zhu R, Huang W, et al. Short-term total hip arthroplasty outcomes in patients with psoriatic arthritis or psoriatic skin disease compared to patients with osteoarthritis. Arthritis Rheumatol 2016;68:410-7.
22. Ong KL, Lau E, Suggs J, Kurtz SM, Manley MT. Risk of subsequent revision after primary and revision total joint arthroplasty. Clin Orthop Relat Res 2010;468:3070-6.
23. Beyer CA, Hanssen AD, Lewallen DG, Pittelkow MR. Primary total knee arthroplasty in patients with psoriasis. J Bone Joint Surg Br 1991;73:258-9.
24. Krakowski P, Gerkowicz A, Pietrzak A, et al. Psoriatic arthritis - new perspectives. Arch Med Sci 2019;15:580-9.
25. Mease PJ, Liu M, Rebello S, et al. Association of nail psoriasis with disease activity measures and impact in psoriatic arthritis: data from the Corrona Psoriatic Arthritis/Spondyloarthritis Registry. J Rheumatol 2021;48:520-6.

Downloaded on April 19, 2024 from www.jrheum.org

26. Husted JA, Gladman DD, Long JA, Farewell VT. A modified version of the Health Assessment Questionnaire (HAQ) for psoriatic arthritis. Clin Exp Rheumatol 1995;13:439-43.
27. Blackmore MG, Gladman DD, Husted J, Long JA, Farewell VT. Measuring health status in psoriatic arthritis: the Health Assessment Questionnaire and its modification. J Rheumatol 1995;22:886-93.
28. Mease PJ, Palmer JB, Liu M, et al. Influence of axial involvement on clinical characteristics of psoriatic arthritis: analysis from the Corrona Psoriatic Arthritis/Spondyloarthritis Registry. J Rheumatol 2018;45:1389-96.
29. Wu D, Li C, Zhang S, et al. Effect of biologics on radiographic progression of peripheral joint in patients with psoriatic arthritis: meta-analysis. Rheumatology 2020;59:3172-80.
30. Chen YC, Chiu WC, Cheng TT, et al. Delayed anti-TNF therapy increases the risk of total knee replacement in patients with severe rheumatoid arthritis. BMC Musculoskelet Disord 2017;18:326.
31. Hawley S, Ali MS, Cordtz R, et al. Impact of TNF inhibitor therapy on joint replacement rates in rheumatoid arthritis: a matched cohort analysis of BSRBR-RA UK registry data. Rheumatology 2019;58:1168-75.
32. Aaltonen KJ, Virkki LM, Jämsen E, et al. Do biologic drugs affect the need for and outcome of joint replacements in patients with rheumatoid arthritis? A register-based study. Semin Arthritis Rheum 2013;43:55-62.
33. Dubiel MJ, Kolz JM, Tagliero AJ, et al. Analysis of patient characteristics and outcomes related to distance traveled to a tertiary center for primary reverse shoulder arthroplasty. Arch Orthop Trauma Surg 2022;142:1421-8.
34. Gladman DD, Chandran V, Thavaneswaran A, Zummer M. Psoriatic arthritis in Canadian clinical practice: the PsA assessment in rheumatology. J Rheumatol 2012;39:1850-3.
35. McGonagle D, Hermann KG, Tan AL. Differentiation between osteoarthritis and psoriatic arthritis: implications for pathogenesis and treatment in the biologic therapy era. Rheumatology 2015;54:29-38.
36. Love TJ, Zhu Y, Zhang Y, et al. Obesity and the risk of psoriatic arthritis: a population-based study. Ann Rheum Dis 2012; 71:1273-7.
37. Reyes C, Leyland KM, Peat G, Cooper C, Arden NK, Prieto-Alhambra D. Association between overweight and obesity and risk of clinically diagnosed knee, hip, and hand osteoarthritis: a population-based cohort study. Arthritis Rheumatol 2016; 68:1869-75.
38. Wang J, Vahid S, Eberg M, et al. Clearing the surgical backlog caused by COVID-19 in Ontario: a time series modelling study. CMAJ 2020;192:E1347-56.

Downloaded on April 19, 2024 from www.jrheum.org