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Greater Wound and Renal Complications in Gout Patients Undergoing Total Joint Arthroplasty

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ABSTRACT

Background: Little is known about total joint arthroplasty (TJA) outcomes in gout patients. The purpose of this study was to compare adverse events between gout and nongout patients who underwent primary TJA.
Methods: Using our institutional database and medical records review, a retrospective case-control study was conducted. From 2000 to 2012, a total of 482 gout TJA patients were matched with nongout TJA patients in a 1:1 ratio. Length of stay, complications, 90-day emergency room visits, and 90-day readmissions in these patients were compared.
Results: Gout patients had greater wound healing problems (12.2% vs 5.0%, $P = .001$) and renal complications (8.9% vs 3.1%, $P = .0003$) compared with nongout patients. There were no significant differences between gout and nongout patients in terms of mean length of hospital stay (3.82 vs 3.17 days, $P = .11$) and 90-day emergency room visits (5.6% vs 3.5%, $P = 1.00$). Subgroup analysis showed that 90-day readmission rates were higher in gout patients who underwent total hip arthroplasty compared with those in nongout THA patients (6.8% vs 2.1%, $P = .02$).
Conclusion: Gout patients undergoing TJA have greater wound healing problems and renal complications. Surgeons should be cognizant of fluid management, renal monitoring and wound issues and should be cautious when treating TJA gout patients.

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Gout is a common metabolic and arthritic condition that continues to increase in prevalence [1]. It is characterized by monosodium urate deposits in the soft tissues of hyperuricemic patients [2]. Clinical symptoms involve recurrent flares of acute arthritis, chronic arthropathy, tophi, uric acid urolithiasis, and renal impairment [2]. Recent literature has focused on its association with cardiovascular diseases, peripheral vascular diseases and metabolic syndrome [3-7]. Metabolic syndrome and its components, such as diabetes and obesity, have been shown to have an impact on perioperative complications and wound infection after total joint arthroplasty (TJA) [8-11]. Peripheral vascular diseases reduce tissue perfusion and cause tissue hypoxia, which may compromise wound healing [12]. In addition, gout patients frequently use of antiplatelets or anticoagulants for treatment of cardiovascular diseases [4], which may result in increased wound complications in patients undergoing TJA surgery [11]. Thus, the inflammatory nature of gout, tophi deposition, and its associated comorbidities, such as cardiovascular diseases and metabolic syndrome, may have detrimental effects on soft tissue and wound healing and might potentially predispose gout patients to complications after surgery.

According to a recent study, gout has increased dramatically in the past 20 years, affecting approximately 3.9% (8.3 million) Americans [13]. Although there is a high prevalence of gout, there have been very few studies investigating TJA outcomes in gout patients. A few studies have reported on acute gouty arthritis attacks after total knee arthroplasty (TKA) or total hip arthroplasty (THA) mimicking or coexisting with periprosthetic joint infection (PJI) [14-28]. However, little is known about TJA outcomes in gout

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patients. A better understanding of the impact of gout on perioperative outcomes after TJA may allow us to better counsel these patients and their families regarding their risks associated with TJA surgery.

Therefore, the purposes of this study were to compare complications and length of hospital stay between (1) gout and nongout patients who underwent TJA, (2) gout and nongout patients who underwent THA and TKA, (3) THA and TKA in gout patients, and (4) gout patients with and without preoperative treatments. We hypothesized that TJA patients with gout have higher rates of perioperative complications than nongout patients but that complications are similar in THA and TKA patients with gout.

Materials and Methods

Institutional review board approval was obtained before initiation of this case-control study. From 2000 to 2012, 25,800 patients underwent primary TJA (13,652 primary THA and 12,148 primary TKA) at a single institution. Using our prospectively collected institutional database, we retrospectively identified 587 gout patients who underwent primary TJA using International Classification of Diseases (ICD)-9 codes (274.0, 274.1, 274.8, 247.9). Exclusion criteria included patients diagnosed with rheumatoid arthritis, connective tissue diseases, ankylosing spondylitis, psoriasis, inflammatory bowel diseases, Reiter syndrome, pigmented villonodular synovitis, previous septic arthritis, and pseudogout. Based on these exclusion criteria, 54 patients were removed. The diagnosis of gout was confirmed by chart review. Gout was confirmed if the diagnosis was determined by their internist on preoperative assessments or the patient received urate-lowering agents or colchicine. Twenty-five patients were excluded because this information could not be clearly identified. The gout group was matched with a nongout control group in a 1:1 ratio. The matching criteria included age within 5 years, same gender, body mass index (BMI) within 2 kg/m^2, Charlson comorbidity index score within 1, same type of surgery (THA/TKA), date of surgery within 1 year, and surgery counts (unilateral or simultaneous bilateral procedures) at the same admission. Twenty-six patients who could not be matched with a control patient from our database were also excluded. A total of 482 gout patients who underwent TJA (237 THA and 245 TKA) were finally included in this study. Gout patients were further stratified into 2 subgroups: (1) treated gout group—those who received urate-lowering agents or colchicine before surgery and (2) untreated gout group—patients who were not on these medications preoperatively. There were 347 gout patients in the treated group and 135 gout patients in the untreated group. The medical records of the patients in the nongout group were also reviewed to ensure that these patients were not diagnosed with gout and the aforementioned exclusion criteria.

The average age of the gout group was 66.1 ± 10.6 years, and the average age of the nongout group was 65.6 ± 10.4 years. The average BMI of the gout group was 31.6 ± 5.3 kg/m^2, and the average BMI of the nongout group was 31.6 ± 5.4 kg/m^2. There were 99 females and 383 males in both groups. Table 1 lists the study demographics. There were no significant differences between the gout group and nongout group in terms of demographic criteria (Table 1).

Complications were identified using a prospectively maintained complication database and were confirmed by reviewing all inpatient and outpatient medical records. The demographic characteristics of the patients, details of the operative procedure, and intraoperative and postoperative complications, including medical complications (neurologic, pulmonary, venous thromboembolic events [VTE], cardiovascular, gastrointestinal, renal, urinary, sepsis, and wound healing problems) and surgical complications (PJI, periprosthetic fracture, instability, stiffness, aseptic loosening, reoperations, and revisions), were studied in detail. PJI was defined by the International Consensus Group definition [29]. The complications that were investigated are listed in Table 2. Acute kidney injury (AKI) was defined by Kidney Disease: Improving Global Outcomes [30].

Length of stay, medical complications, surgical complications, 90-day emergency room visits, and 90-day readmissions for medical or surgical complications were compared between (1) gout and nongout patients who underwent TJA, (2) gout and nongout patients who underwent THA and TKA, (3) THA and TKA in gout patients, and (4) treated and untreated gout patients.

Statistical analysis on continuous variables was performed using Student t test, and categorical variables were analyzed using chi-square test or Fisher exact test, when appropriate. Adjusted P values were used for multiple tests. Statistical significance was set at $P < .05$. All statistical analyses were performed using the R 3.0.2 statistical software (R Foundation for Statistical Computing, Vienna, Austria).

Results

Gout vs Nongout Patients

Medical complications were significant higher in gout patients than nongout patients in terms of wound healing problems (12.2% vs 5.0%; $P = .001$) and renal complications (8.9% vs 3.1%; $P = .0003$). The rate of cardiovascular complication was higher in gout patients (4.8%) than that in nongout patients (2.3%), but the difference was not statistically significant ($P = .59$). There were also no significant differences in other medical complications between gout and nongout patients (Table 3).

Fifty-nine gout patients developed wound complications, and 24 patients in the nongout group had wound complications. The wound complications in the gout group were as follows: (1) 33 patients had wound drainage that required oral antibiotics, (2) 13

Table 1
Patient Demographics.

Patient Characteristics	Gout Group	Nongout Group	*P* Value
Patients, n (%)	482 (100)	482 (100)	
Age, mean ± SD (y)	66.1 ± 10.6	65.6 ± 10.4	.53
Gender, n (%)			1.00
Male	383 (79.5)	383 (79.5)	
Female	99 (20.5)	99 (20.5)	
BMI, mean ± SD (kg/m^2)	31.6 ± 5.3	31.6 ± 5.4	.87
CCI, n (%)			.41
0	286 (59.3)	289 (59.9)	.84
1-2	161 (33.4)	160 (33.2)	.95
3-4	32 (6.6)	31 (6.4)	.90
≥5	3 (0.6)	2 (0.4)	.65
Surgery type, n (%)			1.00
THA	237 (49.2)	237 (49.2)	
TKA	245 (50.8)	245 (50.8)	
Count of surgery, n (%)			1.00
Unilateral	436 (90.5)	436 (90.5)	
Simultaneous bilateral	46 (9.5)	46 (9.5)	
THA	8 (1.7)	8 (1.7)	
TKA	38 (7.9)	38 (7.9)	
Anesthesia type, n (%)			.34
Neuraxial	471 (97.7)	475 (98.5)	
General	11 (2.3)	7 (1.5)	
Peripheral vascular disease, n (%)	14 (2.9)	9 (1.9)	.40
VTE prophylaxis, n (%)			.16
Warfarin	449 (93.2)	436 (90.5)	
Aspirin	33 (6.8)	46 (9.5)	

SD, standard deviation; BMI, body mass index; CCI, Charlson comorbidity index; THA, total hip arthroplasty; TKA, total knee arthroplasty; VTE, venous thromboembolic events.

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