Lower Extremity Acute Bacterial Skin and Soft Tissue Infection Following Total Knee Arthroplasty

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ABSTRACT

Background: Although total knee arthroplasty (TKA) is one of the most common orthopedic procedures, its association with subsequent acute bacterial skin and soft tissue infections (ABSSTIs) in the ipsilateral limb has not been studied.

Methods: This was a retrospective study of patients with prior unilateral TKA who were diagnosed with ABSSTI 4 weeks or more postoperatively in the absence of surgical site infection. The odds of ABSSTI in the TKA limb was compared to that of the contralateral "control" limb in the same patient in the presence or absence of local predisposing factors for ABSSTI in the lower extremities (e.g., chronic venous insufficiency).

Results: Of 94 patients studied, 58 (62%) were women; mean age was 74.5 years. The mean body mass index was 33.1 kg/m^2. One or more local predisposing factors were present in 53 (56.4%) patients. The mean interval between TKA and ABSSTI was 65.1 months (range: 1-239 months), with cellulitis alone diagnosed in 88 (94%) patients. ABSSTI involved the TKA limb of 68 (72.3%) patients and was significantly more likely to be diagnosed in the same limb in the absence of local predisposing factors (36 of 41 patients, odds ratio = 7.2, 95% CI: 2.8-23.5); the odds of TKA limb involvement was also higher in the presence of such factors but did not quite reach statistical significance (odds ratio = 1.5, 95% CI: 0.8-2.8).

Conclusions: TKA appears to predispose to ABSSTIs in the ipsilateral lower extremity often years after the procedure, particularly in the absence of other local factors.

Key Indexing Terms: Cellulitis; Knee; Arthroplasty; Infection. **[Am J Med Sci 2016;352(2):154–158.]**

INTRODUCTION

Total knee arthroplasty (TKA) is one of the most common orthopedic procedures in the United States, with its yearly number doubling in the past decade.[1] Of particular interest is the rapid growth of this procedure among the nonelderly, with an estimated 1.5 million persons in the 50-59–year age group having undergone TKA.[1] This observation, coupled with an increase in life expectancy in the general population, suggests that a sizeable number of people will remain at risk of long-term complications of TKA, such as prosthetic joint infections.[2] We hypothesized that, in addition to prosthetic joint infections, due to the potentially irreversible injury to the local lymphatic and venous systems as a result of the procedure itself,[3,4] TKA may predispose to long-term risk of acute bacterial skin and soft tissue infections (ABSSTIs) in the ipsilateral lower extremity.

METHODS

This was a retrospective study performed at an academic tertiary healthcare institution (Massachusetts General Hospital [MGH]) and its affiliated outpatient facilities in Boston. The computerized Research Patient Data Registry, a central clinical data repository containing health records of patients enrolled at MGH, was used to screen for potentially eligible adult patients (age $\geq$ 18 years) seen during the years 2000 through 2013. The following search terms were used: TKA/replacement (Current Procedural Terminology [CPT] codes 01402, 27447, 27487 and 27486) and cellulitis and abscess of leg except foot (International Classification of Diseases [ICD] 9 code 682.6), unspecified sites (ICD9 code 682.9), toe (ICD9 code 681.1), other specified sites (ICD9 682.8), foot, except toes (ICD9 682.7) or unspecified digit (ICD9 code 68.1.9). Diagnosis of ABSSTI was based on the providing physicians' assessment and requirement of treatment with antimicrobial agents commonly used for such condition (e.g., cephalexin, cefazolin and vancomycin). Fever was defined as a documented body temperature $\geq$ 38°C based on patient history or physical examination. Obesity was defined as a recorded body mass index $\geq$ 30 kg/m^2 within 6 months of the diagnosis of ABSSTI.

Owing to the multitude of risk factors for ABSSTIs in the lower extremities (e.g., obesity, diabetes, immunocompromised state, warmer months and homelessness[5-8]), we compared the odds of ABSSTI occurring in the TKA and non-TKA limb of the same patient, with the contralateral limb serving as a "control."

The patient search schema and exclusion criteria are shown (Figure). Specifically, patients with existing bilateral TKA prostheses, prior lower limb amputation, ABSSTI less than 4 weeks from TKA, concurrent or eventual prosthetic knee infection, prior malignancy involving TKA

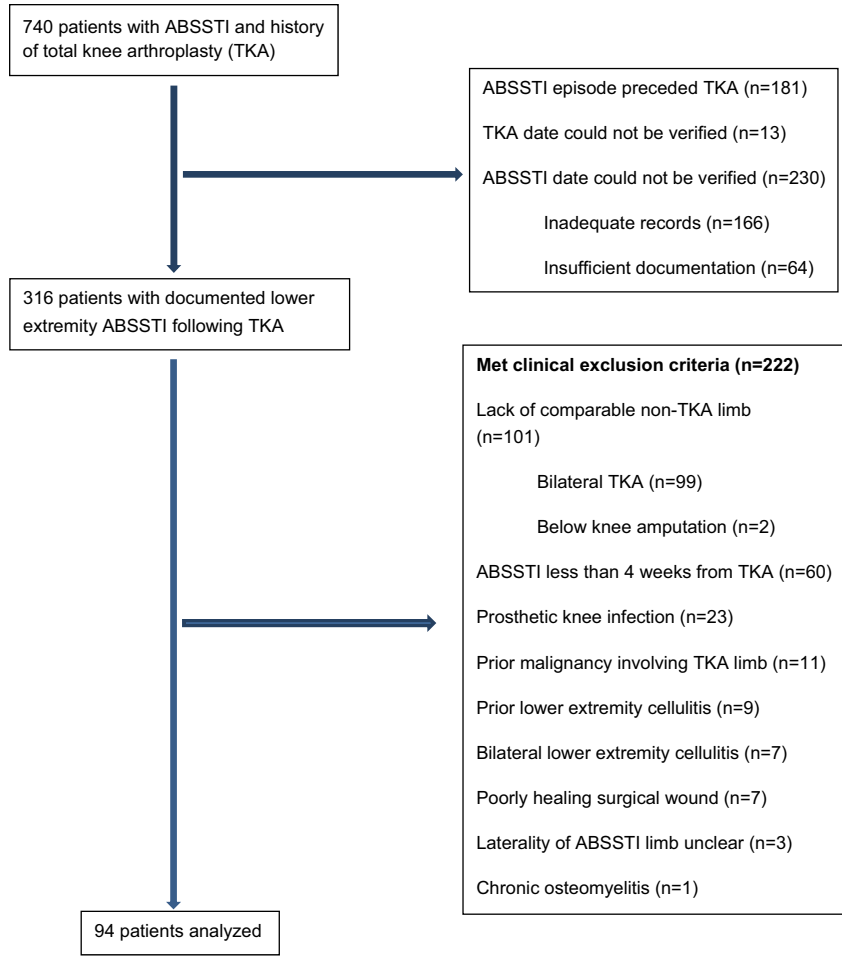

FIGURE. Patient search schema and exclusion criteria.

limb, prior lower extremity cellulitis, bilateral lower extremity cellulitis, poorly healing surgical wounds and unclear laterality of ABSSTI in relation to the TKA limb were excluded.

Relevant demographics, clinical data and settings of care associated with the first documented episode of ABSSTI following TKA were recorded. Local predisposing factors, hereafter referred to as "local factors," were defined as coexisting conditions that may increase susceptibility to ABSSTIs in the lower extremities, including chronic venous insufficiency, chronic lymphedema, laceration, contusion, chronic wounds and superficial ulcers or injuries (e.g., abrasion, bites or scratches).[4] As most of these conditions are likely to involve both lower extremities, no attempt was made to determine which limb was affected the most. "Acknowledgment" of prior TKA was based on providing clinicians' notes in patient medical records within 48 hours of the diagnosis of ABSSTI.

The study was approved by the Institutional Review Board of MGH. McNemar test of paired proportions was used to calculate the comparative odds of ABSSTI in the TKA and non-TKA limbs. Fisher's exact and Student's *t* tests were used to compare categorical and continuous data, respectively. Statistical analysis was performed using Statistica (StatSoft Inc., Tulsa, OK) and Instat (GraphPad Software Inc., San Diego, CA) softwares, with $P < 0.05$ considered statistically significant.

RESULTS

Of a total of 740 patients initially identified based on ICD-9 codes, 94 met the eligibility criteria for inclusion in the study (Figure). All patients were at least 1-year post-TKA at the time of medical record review. Patient demographics are shown (Table 1). In all, 59 (62%) patients were women and 84 (88.4%) patients were white. The mean age was 74.5 years. The mean body mass index was 33.1 kg/m^2; 49 (62%) patients were considered obese. Cellulitis alone accounted for 88 (94%) cases, whereas soft tissue abscesses with or without cellulitis (without evidence of tracking to the knee joint) were documented in 6 (6%) patients; 2 cases