



Should a Urinary Tract Infection Be Treated before a Total Joint Arthroplasty?

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Periprosthetic joint infection (PJI) is one of the most serious complications after total joint arthroplasty (TJA). The prevalence of urinary tract infection (UTI) is common, particularly among elderly women, a group for whom TJA may be required. The association between preoperative UTI and increased risk of PJI after TJA is unclear. We reviewed key articles concerning the relationship between UTIs and PJI, and summarized recommendations of international consensus on PJI, which was established in Philadelphia in July of 2018. In addition, we distinguish between symptomatic UTI and asymptomatic bacteriuria, because their causative effects on PJI are quite different.

Key Words: Hip, Knee joint arthroplasty, Infection, Urinary tract

INTRODUCTION

A diagnosis of urinary tract infection (UTI) is made when more than 10^5 CFU/mL is observed in urine culture¹⁾. Women are significantly more prone to UTIs than men; the reported prevalence of preoperative UTI in female patients undergoing total joint arthroplasty (TJA) ranges from 5.1% to 36%²⁻⁷⁾.

Whether preoperative UTI increases the risk of periprosthetic joint infection (PJI) after TJA is a controversial issue. According to the literature, the incidence of PJI after TJA ranges from 0.3% to 1%^{8,9)}. Distant seeding is responsible for PJI in 10% to 20%, and UTIs account for 13% of PJIs due to distant seeding¹⁰⁾. By this calculation, UTIs are responsible for only 0.01% to 0.03% of total PJIs.

UTIs can be associated with myriad symptoms (e.g., fever, chill, pain, leukocytosis, and pyuria), or present as asymptomatic bacteriuria (ASB). ASB presents with varying frequencies according to age, sex, and other population characteristics. In women, the prevalence of ASB increases with age, and reaches up to 20%¹⁾. Assuming that the prevalence of ASB is 5%, approximately 200,000 PJI patients are required to conduct a powered and highly evidenced study determining the causality of UTI for PJI, a hardly feasible scenario. Therefore, whether to treat UTI before TJA may be better determined using literatures and expert opinions.

We reviewed articles highlighting the relationship between UTIs and PJI, and summarized recommendations of an international consensus on orthopedic infections, an

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event which was held in July 2018 in Philadelphia. We separately described symptomatic UTI and ASB, because their causative effects on PJI are quite different^{3,4,6,7,11,12}.

PREOPERATIVE SYMPTOMATIC URINARY TRACT INFECTION

To evaluate whether UTI is a risk factor for PJI, the American Urology Association and the American Academy of Orthopedic Surgeons conducted a case-control study in 2003. The study included 47 cases and 200 controls and identified UTIs as an important risk factor for PJIs¹³. Pulido et al.¹⁴ prospectively observed 9,245 patients undergoing TJAs to identify risk factors of PJI, and identified preoperative UTIs as an important modifiable risk factor for PJIs; in this study, PJIs developed in 63 patients (0.7%), and preoperative UTI was a risk factor for PJI. Yassa et al.¹² retrospectively reviewed 367 patients who underwent an emergency surgery within 24 hours for femoral neck fractures, and noted that 57 (12.4%) had a surgical site infection. Among these 57 patients, 23 (40.4%) had a preoperative UTI. Their study indicated that pre-operative UTI has a high prevalence among patients presenting with femoral neck fractures, and that UTI is a risk factor for surgical site infection.

On the other hand, Park et al.⁶ compared the incidence of PJI in a UTI group (13 patients) and non-UTI group (514 patients), and observed no significant association between preoperatively treated UTI and PJI. They treated UTI patients with antibiotics before THA if the urine culture was positive.

Thus, symptomatic preoperative UTIs should be treated before TJA. When adequately treated with appropriate antibiotics, UTI patients have similar outcomes to non-UTI patients.

PREOPERATIVE ASYMPTOMATIC BACTERIURIA

In 1984, Glynn and Sheehan⁷ retrospectively analyzed 299 patients who were admitted for TJA to determine the incidence of preoperative bacteriuria and its relationship to postoperative infection. The prevalence of preoperative bacteriuria was 19.1% (57/299), and the postoperative infection rate was 3.5% (2/57) in patients with bacteriuria and 0% (0/242) in those without bacteriuria. Although there was a high incidence of

ASB, they found no correlation between ASB and PJI in these patients. Ritter and Fechtman¹¹ studied 364 TJAs and identified 35 cases of preoperative ASB. During the follow-up period (which ranged from 1 to 16 years), they identified 3 cases of PJI in the ASB group and 2 in the non-ASB group; none of the PJIs were related to the preoperative ASB. In both studies, there were no significantly higher infection rate in the bacteriuria group, and the microorganisms isolated from surgical site infections and urine cultures were not identical.

In 2014, Sousa et al.³ reported a higher rate of PJI in the ASB group than in the non-ASB group in a multicenter cohort study involving 2,497 patients for TJI. In their study, the prevalence of ASB was 12.1% and the overall PJI rate was 1.7%. The PJI rate was higher in the ASB group than in the non-ASB group (4.3% vs. 1.4%). Other studies including randomized clinical trial and a large cohort study showed that detection and treatment of ASB has no benefit for patients undergoing TJI. Cordero-Ampuero et al.⁴ prospectively identified 45 patients with ASB from 471 patients undergoing a total hip arthroplasty or hemiarthroplasty. The 45 ASB patients were randomly assigned to receive specific antibiotics for cultured organisms (group A) or not (group B). Seven patients in group A and 6 patients in group B had wound infections after 3 months of follow-up. They identified no case of PJI from urinary origin in patients with ASB irrespective of whether treatment was or was not provided.

Similar findings were reported in other studies¹⁵⁻¹⁸ and systematic reviews also concluded that detection and treatment of ASB has no benefit for patients undergoing TJA¹⁹⁻²¹. All of these studies have cautioned against the adverse effects and economic burden of antibiotics.

CONCLUSION

Symptomatic UTI is a risk factor for PJI and should be treated before proceeding TJA. However, ASB is common in patients undergoing TJAs, and should not be considered as a cause for PJI. In these ASB patients, neither preoperative urine culture nor preoperative treatment is necessary before TJA.

In the 2018 International Consensus on Orthopedic Infections, the questionnaire "Symptomatic UTI must be treated with appropriate antibiotics before proceeding with the surgery. In ASB, treatment should be discontinued as it does not increase the risk of a subsequent surgical site

infection/PJI” was agreed upon by 96% of votes, a near unanimous consensus²²⁾.

CONFLICT OF INTEREST

The authors declare that there is no potential conflict of interest relevant to this article.

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