Research Article

Global Journal of Critical Care and Emergency Medicine

Prevalence of Urinary Tract Infection among Patients Underwent Elective Total Knee Arthroplasty

Ahmad S Alkhelaifi*, Mohammed Alshehri, Faisal Alzahrani, Turki A Althunayan, Mohammed Benmeakel and Fai Alhoshan

Orthopedic Surgery Department, King Abdulaziz Medical City (KAMC), Health Affairs-Ministry of National Guard, Riyadh, Saudi Arabia.

***Correspondence:**

Dr. Ahmad S Alkhelaifi, Consultant, Orthopedic Surgery Department, King Abdulaziz Medical City, Health Affairs, Ministry of National Guard, Riyadh, Saudi Arabia.

Received: 07 Aug 2024; **Accepted:** 21 Sep 2024; **Published:** 28 Sep 2024

Citation: Ahmad S Alkhelaifi, Mohammed Alshehri, Faisal Alzahrani, et al. Prevalence of Urinary Tract Infection among Patients Underwent Elective Total Knee Arthroplasty. Glob J Emerg Crit Care Med. 2024; 1(1); 1-4.

ABSTRACT

Objectives: *Urinary tract infections (UTIs) are one of the most common infections that can lead to a devastating complicated total knee arthroplasty (TKA). The main objective of this research was to investigate the prevalence of UTIs among patients who underwent elective TKA and to look for scientific correlation between co-morbidities, gender, and post-operative care. Our review provides an insight into the local characteristics among our population.*

Methods: *This is a retrospective chart review at a tertiary care hospital in Riyadh, Saudi Arabia. All patients from April 2006 to April 2018 undergoing TKA were included. We excluded patients with age less than 45 years, end-stage renal disease, and patients with history of oncological disease.*

Results: *A total of 311 had TKA. 217 patients (69.8%) were females. The most prevalent comorbidity was Hypertension (68.5%) followed by Diabetes (51.8%). The rate of positive preoperative urinalysis and urine culture was (9.6%, 5.1%) respectively. Postoperatively, 8% of patients had a positive urinalysis and 6.1% had a positive urine culture. Age > 65, BPH in males, >33 BMI were statistically significant correlation with positive preoperative and postoperative urine tests.*

Conclusion: *This study shows considerably high rates of UTI among TKA patients. It provides important correlations between the diagnosis UTIs and patients characteristics who underwent TKA.*

Keywords

Comorbidity, Hospital stay, Joint replacement, Knee Arthroplasty, Urinary Tract Infections.

Introduction

Urinary tract infection, refers to an inflammatory response to invasion of the urinary tract tissue, is most commonly by bacteria or fungi [1]. It is a common infection that creates a potential reservoir of resistant pathogens and increases patient morbidity [2]. A positive urinalysis is defined as presence of WBC 10/high power field, positive leukocyte estrase, and positive nitrate [3-5]. It is one of the most common bacterial infections, accounting for 0.9% of all ambulatory visit in the United State [6]. Moreover, it possess a significant problem encountered in routine clinical practice. Advancing age is one of the risk factors for Urinary infections, around 20% of the elderly have a significant bacteriuria, and the majority of elderly patients with bacteriuria are asymptomatic [5,7-10]. The horrible fact that Untreated urinary tract infections might leads to urosepsis, is the main reason to investigate it worldwide in order to decrease morbidity and mortality [11].

Total knee arthroplasty is one of the most common procedures performed for elderly patients [12,13]. It has an excellent outcome in term of function and cost effectiveness, and leads to improved

Health-Related Quality of Life (HRQoL) [14]. The high patient satisfaction rate lead to high demand among patients for total knee arthroplasty, due to high rate of osteoarthritis worldwide. The past and current demand had shined a light on more advancements in knee replacement surgeries.

Prosthetic joint infection is one of the most dreadful and feared complication. Postoperative urinary tract infections is a major risk for prosthetic joint infection [15]. However, trying to detect wether an asymptomatic preoperative urinary tract infection is a risk for prosthetic joint infection has been widely controversial in the orthopedic literature. The controversial part of such dilemma includes wether to screen for asymptomatic bacteria or not before proceeding for joint replacement [4], and the ethical part of treating it.

Methods

This is a retrospective chart review study in a tertiary center that included all patients who underwent TKA from April 2006 to April 2018. All surgeries were done by the same surgeon. Our study primarily aims to detect the prevalence of urinary tract infections among total knee arthroplasty patients. Our goal is to look for patients' characteristics that led to higher incidence of UTIs. We included all patients who underwent primary TKA with age of more than 45 years old at the time of primary surgery, who had a complete preoperative and postoperative urinalysis and urine culture. Our exclusion criteria included age less than 45 years, end-stage renal disease, patients with history of oncological diseases, and no follow up for at least 2 years.

The data was collected after obtaining approval from King Abdullah International Medical Research Center, Riyadh, Saudi Arabia. We looked at many variables including (age, gender, BMI, comorbidities, history of UTIs, number of joints replaced by patient, preoperative and post-operative urinalysis and urine cultures, organism causing UTIs).

Data was entered using Excel and analysis was performed using Statistical Packages for Social Sciences (SPSS) version 26 Armonk, NY: IBM Corporation. Quantitative variables were presented using mean and standard deviation (SD) while qualitative variables were presented using numbers and percentages. The relationship between preoperative urinalysis, preoperative urine culture, postoperative urinalysis and postoperative urine culture in regards to the baseline characteristics of the patients were performed using Chi-square test and independent sample t-test. A P-value of 0.05 was considered statistically significant.

Results

This study analyzed 311 patients who underwent total knee arthroplasty. The mean age of the patients was 65.9 (SD 8.86) years with nearly 70% were females. The most commonly known comorbidity was hypertension (68.5%), followed by diabetes (51.8%). The prevalence of patients with history of UTI was 23.8%, all were treated retrospectively to surgery 3-6 months. Furthermore, majority of the patients had underwent unilateral TKA (87.8%) and the rest were bilateral (12.2%). The proportion of patients who were diagnosed with positive preoperative urinalysis was 9.6% while those with positive preoperative urine culture was 5.1%. Likewise, patients with positive postoperative urinalysis constitutes 8% while those with positive postoperative urine culture was 6.1%. In addition, the mean BMI, length of hospital in days and days of foley were 33.9, 12.6 and 3.74, respectively.

In figure 1, the most commonly detected preoperative urine culture organism was group B streptococcus (37.5%), followed by *E. Coli* (31.3%) and *Klebsiella pneumonia* (12.5%). However, the most commonly diagnosed postoperative urine culture organism was *E. Coli* (54.4%), followed by *Pseudomonas aeruginosa* (36.4%) and *fungus* (9.1%) as shown in figure 2. Moreover, we observed that males had more comorbidities than females most specifically, hypertension (males: 71.3% vs females: 67.3%) and diabetes (males: 60.6% vs females: 47.9%).

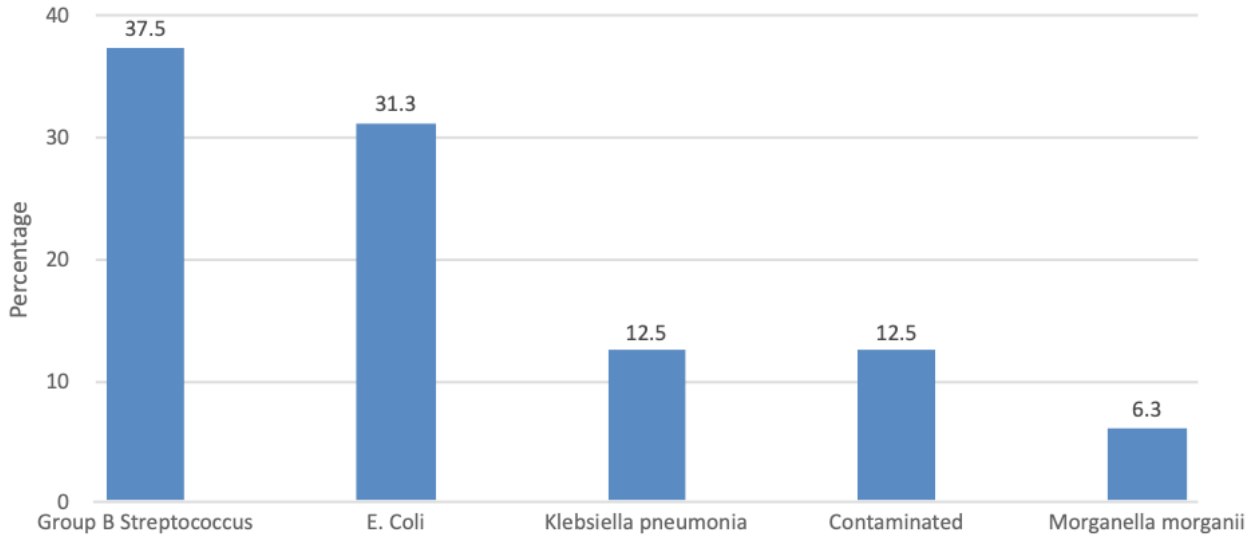

Figure 1: Pre-operative positive urine culture organism.

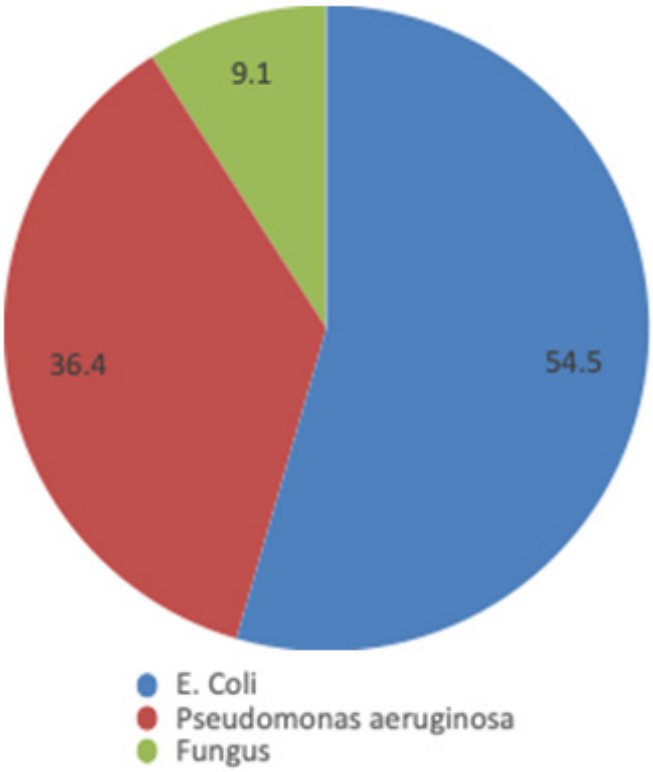

Figure 2: Postoperative positive urine culture organism.

The relationship between postoperative urinalysis and the baseline characteristics of the patients showed that the prevalence of positive postoperative urinalysis was statistically significantly higher among those patients who had BPH (p=0.030) while the prevalence of patients with positive postoperative urinalysis was statistically significantly lower among those patients with positive preoperative urinalysis (p<0.001). Similarly, the mean BMI of those patients with positive postoperative urinalysis was statistically significantly higher (p=0.040). Moreover, the mean age of the patients with positive postoperative urine culture was statistically significantly lower (p=0.050) while the mean BMI of patients with positive postoperative urine culture was statistically significantly higher (p=0.027).

Discussion

Our study showed a comparable Prevalence of Urinary track infection among total knee arthroplasty patients when compared to international data (an approximation of 3.26%) [13]. In United States, Rasouli and his colleagues, studied the rate of infections among arthroplasty patients including pneumonia, UTI, SSI, sepsis, and severe sepsis. Their data found an incidence of 0.74% pneumonia, 3.26% UTI, 0.31% SSI, 0.25% sepsis, and 0.15% severe sepsis. The patients' factors that influenced such an outcome in arthroplasty correlated with many patients' comorbidities [13].

The different characteristics among human beings does indeed have an effect on medical practice, and the of incidence urinary tract infections. Alvarez et al. [14] studied the risk factors for postoperative urinary tract infections among total joint arthroplasty patients in USA and found female patients to have a higher rate the incidence of developing urinary track infection in the perioperative period of joint replacement surgeries. This represents resemblance to our study's significant correlation; moreover, their sample size was higher in comparison.

We believe UTIs rate is related to multiple factors, which can be categorized into patient, cultural differences, local medical practice and environmental factors. Increased BMI was found to be highly linked to developing UTIs among our study sample; the rate of patients who had a BMI > 33 was 56%. This was reflected in the results; a statistically significant relationship was identified between high rate of UTIs and patients who were obese. However, it contradicted a study done by Singh and his colleagues on Indian population, which showed obesity to be less statistically correlated with asymptomatic UTI [15]. Questioning the fact of being obese as an independent factor to develop UTI in TKA can be related to the high likelihood of developing osteoarthritis of the knee and overweight.

One of the noticeable observations among our study group is their comorbidities characteristics. Most of the study subjects who developed UTIs were diagnosed with hypertension (68.5%); however, the dilemma resides in looking at diabetes mellitus to be the second in line and not the first, which constituted 51% of our population. We were not able to find a statistically significant relation between those comorbidities and developing UTIs, which in fact is similar to what other studies found [14,15].

Whether a urinary tract infection would lead to complex prosthetic joint infection is still to be cleared by further researches. The difficulty in identifying the risk factors of UTIs needs to be worked on before deciding about its relation to prosthetic infections. Different population does show different result as shown in our middle eastern population. Alsheikh et al. [16] studied recently the relationship between superficial site infection (SSI) in TKA and many comorbidities among similar population; high BMI and hypertension were the most prevalent associations of SSI after total knee arthroplasty, however, UTI was excluded from the study and no correlation was investigated between positive urine tests and superficial site infection.

The study limitations were noted on the subject of having unequally male and female percentages who received total knee surgery, since the asymptomatic positive cultures were identified among females more commonly [17]. Conclusions cannot be drawn from this study regarding developing UTIs and their effect on total knee arthroplasty. Moreover, a retrospective chart review would not ensure the proper selection of patients and tools used to diagnose urinary tract infection or other patients comorbidities.

Conclusion

This study shows considerably high rates of UTI among TKA patients. Significant relationships were identified between positive pre/post operative urinalysis and urine cultures and advanced age, high BMI, and BPH among male patients. Further researches are needed to accurately represent measurable surgical outcomes and the true correlation between UTIs and prosthetic joint infections.

References

1. Parida S, Mishra SK. Urinary tract infections in the critical care unit: A brief review. Indian J Crit Care Med. 2013;17: 370-374.
2. Koulouvaris P, Sculco P, Finerty E, et al. Relationship between perioperative urinary tract infection and deep infection after joint arthroplasty. Clin Orthop Relat Res. 2009; 467: 1859-1867.
3. Stovall RT, Haenal JB, Jenkins TC, et al. A negative urinalysis rules out catheter-associated urinary tract infection in trauma patients in the intensive care unit. J Am Coll Surg. 2013; 217: 162-166.
4. Rajamanickam A, Noor S, Usmani A. Should an asymptomatic patient with an abnormal urinalysis (bacteriuria or pyuria) be treated with antibiotics prior to major joint replacement surgery? Cleve Clin J Med. 2007; 74 Suppl 1: S17-8.
5. Singh D, Roberts C, Bentley G. Urinalysis before joint arthroplasty. To dipstick or not? That is the question. Ann R Coll Surg Engl. 1998; 80: 300.
6. Foxman B. Urinary tract infection syndromes: occurrence, recurrence, bacteriology, risk factors, and disease burden. Infect Dis Clin North Am. 2014; 28: 1-13.
7. Wagenlehner FM, Hoyme U, Kaase M, et al. Uncomplicated urinary tract infections. Dtsch Arztebl Int. 2011; 108: 415-423.
8. Schmiemann G, Kniehl E, Gebhardt K, et al. The diagnosis of urinary tract infection: a systematic review. Dtsch Arztebl Int. 2010; 107: 361-367.
9. Kaye D, Boscia JA, Abrutyn E, et al. Asymptomatic bacteriuria in the elderly. Trans Am Clin Climatol Assoc. 1989; 100: 155-162.
10. Evans PJ, Leaker BR, McNabb WR, et al. Accuracy of reagent strip testing for urinary tract infection in the elderly. J R Soc Med. 1991; 84: 598-599.
11. Shigemura K, Tanaka K, Osawa K, et al. Clinical factors associated with shock in bacteremic UTI. Int Urol Nephrol. 2013; 45:653-657.
12. Dao Trong ML, Helmy N. Neues aus der Knie-Endoprothetik [What's new about total knee arthroplasty]. Praxis (Bern 1994). 2013; 102: 1371-1376.
13. Rasouli MR, Maltenfort MG, Purtill JJ, et al. Has the rate of in-hospital infections after total joint arthroplasty decreased? Clin Orthop Relat Res. 2013; 471: 3102-11.
14. Alvarez AP, Demzik AL, Alvi HM, et al. Risk Factors for Postoperative Urinary Tract Infections in Patients Undergoing Total Joint Arthroplasty. Adv Orthop. 2016; 2016: 7268985.
15. Singh H, Thomas S, Agarwal S, et al. Total knee arthroplasty in women with asymptomatic urinary tract infection. J Orthop Surg (Hong Kong). 2015; 23: 298-300.
16. Alsheikh KA, Basham KM, Alazaz RN, et al. Evaluation of surgical site infections and their incidence in patients after total knee arthroplasty at a tertiary care hospital in Riyadh, Saudi Arabia. J Musculoskelet Surg Res. 2020; 4: 152-155.
17. Nicolle LE. Asymptomatic bacteriuria: when to screen and when to treat. Infect Dis Clin North Am. 2003; 17: 367-394.