

Asymptomatic urinary tract infection: Cause of postoperative wound infection

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Abstract

Objective: To determine the rate of urinary tract infection in patients given incomplete treatment before undergoing hip fracture surgery.

Methods: The descriptive case series was conducted at Aga Khan University Hospital, Karachi, From October 25, 2012 to April 24, 2013. 84 postmenopausal women having hip fracture along with asymptomatic urinary tract infection. The infection was treated incompletely and postoperatively wound infection rate was determined. The SPSS version 17 was used to analyze the data.

Results: The overall mean age of the 84 patients in the study was 63.57+10.34 years.

Overall, 14(16.7%) patients had wound infection after orthopaedic implant surgery for hip fracture.

Conclusion: There was a high occurrence of wound infection after hip implant surgery in patients having preoperative asymptomatic urinary tract infection who were treated incompletely.

Keywords: Wound infection, Urinary tract infection, Post-menopausal, Orthopaedic implant. (JPMA 64: S-34 (Suppl. 2); 2014)

Introduction

Urinary tract infection (UTI) is a common occurrence in elderly population. Among the elderly, females are more prone to UTI because of short urethra and deficiency of sex hormones oestrogen and progesterone.¹ Normal levels of these hormones are required for contraction of epithelial cells of urethra which reduces stasis of urine. Since the post-menopausal women are deficient in these hormones, they are prone to urinary stasis which increases UTI risk.² Elderly females also commonly have osteoarthritis, and are prone to osteoporotic hip fractures, for which orthopaedic implant surgery is the gold standard.³ In patients undergoing surgery, presence of infection in any other part of the body is likely to increase chances of surgical site infection (SSI) by transmission through bloodstream. Thus, patients with hip fractures who also have UTI may have higher SSI rate compared to those without SSI.⁴ In some institutes, screening for UTI in patients with hip fractures has become a routine part of pre-operative evaluation, and many times an infection is discovered incidentally.⁵ However, the management of UTI in such patients remains controversial because most of these patients are asymptomatic, and not all are given a complete course of antibiotics before surgery. Before the current study, a retrospective pilot study was conducted to know the rate of SSI in patients with asymptomatic UTI, who had received incomplete treatment (<3 days of antibiotics) before surgery. The SSI rate within 30 days of surgery was

found to be 16%, which was significantly high. The Incidence of SSI in elective orthopaedic surgery with asymptomatic UTI is reported to be around 38%.⁶ Since there are no studies available in literature which determined the rate of SSI in patients receiving incomplete treatment of asymptomatic UTI, we therefore planned to conduct the current prospective study.

Methods

The descriptive case series was performed in the Orthopedics, section of the Department of Surgery, Aga Khan University Hospital (AKUH), Karachi from October 25, 2012 to April, 24th 2013. The sample size was calculated from the pilot study conducted earlier at the same institution that showed 5 out of 30 cases of SSI following hip fracture surgery. As such, at p=16%, confidence interval (CI)=95% and d=8%, the sample size (n) was 84. The sampling technique used was non-probability consecutive. About sample selection, 84 post-menopausal women with pre-operative asymptomatic UTI (and incomplete treatment) undergoing hip fracture surgery were selected. The inclusion criteria comprised:

Post-menopausal women; 45-80 years of age; pre-operative asymptomatic UTI; inter-trochanteric (IT) fracture or fractured neck of femur; hip fracture surgery (Dynamic hip screw or Austin Moore hemiarthroplasty) within 2-3 days after the fracture.

Asymptomatic UTI was defined as having no dysuria, no fever, no supra-pubic tenderness, no costo-vertebral pain, no frequency, no urgency, urine D/R showing > 6 leukocytes or nitrite positive and confirmed with positive urine culture.

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Other sources of active infection like sore throat, chest infection, diarrhea, etc were excluded. Besides, according to the Infectious Disease Society of America (IDSA) guideline,⁷ the duration of antibiotics for the treatment of asymptomatic bacteriuria should be 3-5 days. As such, treatment less than 3 days was considered as incomplete treatment. Hip fracture included both IT fracture and fractured neck of femur⁸ which were confirmed on X-rays with the radiolucent line passing through IT area or neck of femur area. After informed consent was obtained from all the participants, urine detailed report (D/R) and culture sensitivity (C/S) were sent from the emergency department. Those in whom urine D/R showed >6 leukocytes or nitrite positive, antibiotics were started prophylactically and surgery was performed within 3 days of the administration of antibiotics. The choice of procedure depended on type of fracture. Dynamic hip screw was carried out for IT fracture, whereas Austin Moore hemiarthroplasty was performed for fractured neck of femur. Post-operative course included analgesia and antibiotics. Wound was assessed by consultant orthopaedic surgeon on post-operative days 2, 7, 14, and 30 to look for signs of infection. Presence of any one or more of the following within 30-days of procedure was considered surgical site infection (SSI) that was confirmed by swab culture and sensitivity:

Purulent discharge from the wound; pain or tenderness over the wound; swelling over the wound; abscess in the wound. Data were entered on a proforma that included patient's demographics, type of fracture, procedure, duration of surgery in minutes, diabetes (yes/no), hypertension (yes/no), and final outcome (SSI - yes/no). Confounding variables were controlled by exclusion of those who had other causes of infection. Moreover, stratification was performed to control the confounders as well. In order to control bias, all urine samples were sent to hospital laboratory for D/R and C/S. Furthermore, wound was assessed by consultant orthopaedic surgeon and all data was entered by independent observer. Data was analyzed using SPSS 17. Results for continuous variables (age and duration of surgery) were analysed as means ± standard deviation (SD). For categorical data like type of fracture, procedure, diabetes, hypertension, and final outcome; results were presented as frequencies and percentages. Effect modifiers were controlled through stratification of age, type of fracture, procedure, duration of surgery, diabetes and hypertension. To demonstrate the effect of these on outcome, chi square test was applied and p < 0.05 was considered significant.

Results

The overall mean age of the 84 patients in the study was 63.57±10.34 years (range: 45-80 years). There were 50 (59.5%) women in the 61-80 years age. 34 (40.5%) in the 45- 60 years (Table-1). In terms of type of fracture, 53

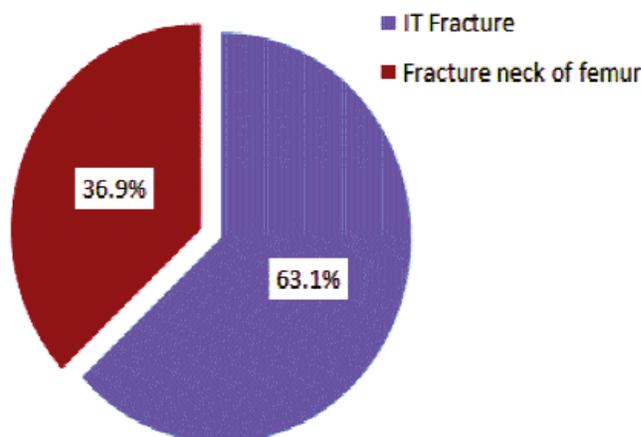


Figure-1: Type of fracture (n=84).

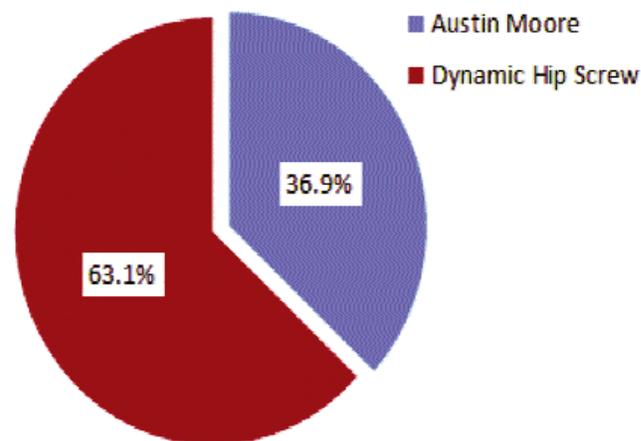


Figure-2: Procedure (n=84).

Table-1: Duration of surgery.

| Duration (minutes) | Frequency (n=84) | Percentage (%) |
|--------------------|------------------|----------------|
| ≤ 45 | 38 | 45.2 |
| > 45 | 46 | 54.8 |

Mean duration ± (SD) = 47.74 ± (7.19) minutes.

Table-2: Diabetes mellitus.

| Diabetes Mellitus | Frequency (n=84) | Percentage (%) |
|-------------------|------------------|----------------|
| Yes | 47 | 56 |
| No | 37 | 44 |

(63.1%) women had IT fracture and 31 (36.9%) women had fractured neck of the femur (Figure-1). Austin Moore hemiarthroplasty was carried out in 31(36.9%) women and in 53 (63.1%), Dynamic Hip Screw was employed

Table-3: Hypertension.

| Hypertension | Frequency (n=84) | Percentage (%) |
|--------------|------------------|----------------|
| Yes | 48 | 57.1 |
| No | 36 | 42.9 |

Table-4: Final outcome (Surgical Site Infection).

| Surgical Site Infection | Frequency (n=84) | Percentage (%) |
|-------------------------|------------------|----------------|
| Yes | 14 | 16.7 |
| No | 70 | 83.3 |

Table-5: Age with regard to final outcome (n=84).

| Age (Years) | Surgical Site Infection | | *P-value |
|-------------|-------------------------|-----------|----------|
| | Yes | No | |
| 45-60 | 06 (17.6) | 28 (82.4) | 0.843 |
| 61-80 | 08 (16) | 42 (84) | |

*Using chi-square test.

Data is shown in numbers followed by row percentages in parentheses.

Table-6: Type of fracture with regard to final outcome (n=84).

| Type of fracture | Surgical Site Infection | | *P-value |
|------------------------|-------------------------|-----------|----------|
| | Yes | No | |
| IT Fracture | 10 (18.9) | 43 (81.1) | 0.557 |
| Fracture neck of femur | 04 (12.9) | 27 (87.1) | |

*Using chi-square test.

Data is shown in numbers followed by row percentages in parentheses.

Table-7: Procedure with regard to final outcome (n=84).

| Procedure | Surgical Site Infection | | *P-value |
|-------------------|-------------------------|-----------|----------|
| | Yes | No | |
| Austin Moore | 04 (12.9) | 27 (87.1) | 0.557 |
| Dynamic Hip Screw | 10 (18.9) | 43 (81.1) | |

*Using chi-square test.

Data is shown in numbers followed by row percentages in parentheses.

(Figure-2).The duration of surgery ranged from 32 to 61 minutes; 46 (54.8%) had >45 minutes and 38(45.2%) had <45 minutes. The mean duration of surgery was 47.74±7.19 minutes (Table-2). Overall, 47 (56%) women had diabetes mellitus (Table-3) and 48 (57.1%) had hypertension (Table-4).Of the total, 14 (16.7%) had SSI postoperatively whereas, 70 (83.3%) did not have them (Table-5). Stratification of the outcome was also done with regards to age, type of fracture, procedure, duration of surgery, diabetes, and hypertension (Table 6-11).

Table-8: Duration of surgery with regard to final outcome (n=84).

| Duration | Surgical Site Infection | | *P-value |
|--------------|-------------------------|-----------|----------|
| | Yes | No | |
| ≤ 45 minutes | 07 (18.4) | 31 (81.6) | 0.773 |
| > 45 minutes | 07 (15.2) | 39 (84.8) | |

*Using chi-square test.

Data is shown in numbers followed by row percentages in parentheses.

Table-9: Diabetes Mellitus With Regard To Final Outcome (n=84).

| Diabetes | Surgical Site Infection | | *P-value |
|----------|-------------------------|-----------|----------|
| | Yes | No | |
| Yes | 10 (21.3) | 37 (78.7) | 0.248 |
| No | 04 (10.8) | 33 (89.2) | |

*Using chi-square test.

Data is shown in numbers followed by row percentages in parentheses.

Table-10: Hypertension with regard to final outcome (n=84).

| Hypertension | Surgical Site Infection | | *P-value |
|--------------|-------------------------|-----------|----------|
| | Yes | No | |
| Yes | 09 (18.8) | 39 (81.3) | 0.768 |
| No | 05 (13.9) | 31 (86.1) | |

*Using chi-square test.

Data is shown in numbers followed by row percentages in parentheses.

Table-11: Age distribution.

| Age of Patients (Years) | Frequency (n=84) | Percentage (%) |
|-------------------------|------------------|----------------|
| 45 - 60 | 34 | 40.5 |
| 61 - 80 | 50 | 59.5 |

Mean age ± (SD) = 63.57 ± (10.34) years.

Discussion

The results of the study demonstrated that the frequency of wound infection after orthopaedic implant hip fracture surgery among post-menopausal women with asymptomatic UTI (treated incompletely) was 16.7%. Hip fractures are common among elderly females. This is attributable to osteoporosis associated with menopause along with other contributory factors like low body mass index (BMI), poor socioeconomic conditions, illiteracy, lack of calcium supplements, and injudicious use of steroids.⁹The majority of these fractures were IT, followed by neck of femur fractures. A study¹⁰ found 50% of IT fractures and 40% of neck of femur fractures. In this study, 63.1% women had IT fractures, whereas 36.9% had fractured neck of the femur. These fractures are major cause of morbidity in this age group and require surgical intervention. Austin

Moore hemiarthroplasty and Dynamic Hip Screw are two widely used methods for such management. SSI is the major complication after surgical management of these fractures. Numerous authors have proposed theories and risk factors regarding the pathogenesis of infection after joint replacement to prevent and control this condition. UTI is a common nosocomial infection creating potential bacteria. The presence of a urinary catheter is the main risk factor for UTI and can precipitate bacteraemia. In orthopaedic implant surgery, asymptomatic bacteriuria is considered to be important factor in the development of wound infection.⁶ Glyn and Sheehan¹¹ found a prevalence of 28% in female and 8% in male patients undergoing hip or knee replacement. Otermin et al¹² referred positive leukocytes in 162 of 895 (18%) preoperative urinalysis in patients undergoing replacement (407 hips), but they did not obtain urine cultures. It is unclear whether it is important to detect pre-operative asymptomatic bacteriuria. David and Vrahas¹³ proposed pyuria (more than 1000 white blood cells/ml in urinalysis) as a preliminary screening criterion for urine culture. Pre-operative urine screening is commonly viewed as an essential investigation included in the pre-operative assessment protocols of many hospitals throughout the UK. It has been well established that urinary sepsis may cause septic arthritis both in the presence¹⁴ and absence¹⁵ of surgical intervention and the benefits surrounding treatment of symptomatic urinary UTIs is established. There is however little data surrounding the consequences of asymptomatic urinary tract colonisation. UTIs have been established as a cause for prolonged post-surgical hospitalization and as a cause for post-operative wound infections. Glyn and Sheehan¹¹ reported pre-, intra-, and/or postoperative treatment with a specific antibiotic according to the sensitivity of the cultured organisms, but they did not postpone surgery in their symptomatic patients. The reviews (expert opinions with Level V of Evidence) recommend proceeding with total joint replacement and treating those patients for asymptomatic bacteriuria (ASB) with an 8 to 10-day postoperative course of an appropriate oral antibiotic, with perioperative specific antibiotics, or with cefuroxime if preoperative pyuria is detected.

In this study, 84 women having incompletely treated ASB, underwent hip fracture surgery. Post-operatively wound infection was found in 16.7% cases which demonstrated a high incidence.

Conclusion

The frequency of wound infection after orthopaedic implant

hip surgery was higher among post-menopausal women who had asymptomatic UTI which was treated incompletely in the pre-operative period.

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