ORIGINAL ARTICLE

Outcome of Delayed Treatment of Intertrochanteric Fractures of Femur Using Dynamic Hip Screw

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ABSTRACT

Aim: To determine the outcome of delayed treatment of intertrochanteric fractures of the femur using thedynamic hip screw.

Methods: This Cross-sectional survey was done using a consecutive sampling technique at the Department of Orthopedic Surgery, Mayo Hospital, LahorebetweenJuly 2nd, 2016 to January 1st, 2017. The study's sample size was 280 cases of intertrochanteric fractures of the femur with either gender and age range 40-80year was followed on the 14th and 30th postoperative day for outcome assessment.Primary outcomes were taken as urinary tract infection by culture sensitivity and pneumonia on chest radiographs with signs and symptoms of fever >100F and productive cough within 30 days postoperatively**.**

Results: Patients' mean age was 58.2893±12.8539 years with minimum and maximum age of 40 and 80 years. There were 143(51.1%) male and 137 (48.9%) female cases. The mean weight, height and body mass index of patients was 64.3571±7.5330 kg, 1.5430±0.0353 m and 27.2863±3.0723 respectively with 217(77.5%) well-nourished and 63(22.5%) malnourished patients.

Conclusion: Complications including (urinary tract infection, pneumonia and wound infection) were found with delayed treatment, preventing early surgery.

Keywords: Hip fracture, intertrochanteric fracture, DHS, delayed surgery, UTI, pneumonia

INTRODUCTION

Broken hips account for more than 250,000 fractures after fall from no more than standing height. According to the National Osteoporosis Foundation estimation, more than 500,000 hip fractures may occur by 2040, and it is alarming. Such fracture treatment requires a high cost for the patient. [1]Amongst hip fracture, inter-trochanteric fractures are extracapsular with fracture line passes from the greater trochanter to the lesser trochanter[2]. They commonly occur in old age, characteristically in frail patients with multiple co-morbidities and affect patient functional independence[3].

In most cases with a broken hip, surgical intervention is required with an effective treatment method and minimal complications[4]. The treatment goals include, predictable union, un-restricted early weight-bearing, and prevention of both fixation failure and development of deformity[5]. Careful judgement of fracture patterns is necessary for selectingthe fixation device, accurate reduction, and implant placement are vital. [7]Dynamic hip screw is the standard method of treatment[6].

Literature has reported the delay in the treatment, including medical clearance and operating room or surgeon availability[7]. Postoperatively there is a high risk of infection included Urinary tract infection, pneumonia and surgical site infection[8].

With this, the study's rationale is to find the outcome of delayed treatment of intertrochanteric fractures of the femur in terms of postoperative infectious complications like urinary tract infection and pneumonia using the dynamic hip screw. This study will help us get evidence about delayed surgery outcomes using the dynamic hip screw in intertrochanteric fracture. If we get more above mentioned postoperative urinary tract infection rate, then patients can be planned for possible early surgical fixation in emergency departments.

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METHODOLOGY

This cross-sectional surveywas done using a consecutive sampling technique at the Orthopedic Surgery Department, Mayo Hospital, Lahore, between July 2nd, 2016 to January 1st 2017. The study's sample size was 280 cases ofintertrochanteric fractures of the femur treated after 24 hours of injury. Patients who were delayed due to medical clearance for anaesthesia fitness or non-availability of the operation theatre and surgeon, of either gender with age range 40-80 years with intertrochanteric fractures classified by Evanclassification as type I stable and type II unstableof femurdiagnosed clinically (with pain around the hip area, inability to move hip joint and inability to bear weight on an affected limb after the history of trauma to the hip area) and confirmed on conventional radiographs were included. We excluded patients with history, clinical examination, radiological evidence and medical record of bone malignancy, immunocompromised patients, multiple fractures,skeletal dystrophy or congenital anomaly, patients with UTI as evident on pre-operative urine culture and pneumonia as evident on chest radiograph and patients in which Foley's catheter has been passed pre-operatively after admission in the hospital, pre-operatively or postoperatively within 30 days.

Approval from the institutional review board (IRB) and explaining study purpose, informed written consent was obtained. Patients were assessed clinically,and pre-operative anaesthesia fitness before the application of dynamic hip screws was obtained. Then surgery was done in all cases under spinal anaesthesia by a single surgical team. All patients were followed within 30days postoperative at 14th and 30th postoperative day for outcome assessment. Primary outcomes were taken as urinary tract infection by culture sensitivity and pneumonia on chest radiographs with signs and symptoms of fever >100F and productive cough within 30 days postoperatively**.** Other variable included wound infection within 30 days was also noted and radiological union till the last follow-up. Patients with wound infection, pneumonia and urinary tract infection (UTI) were treated accordingly.

All data were entered and analyzed through SPSS version 20. Quantitative variables like age were calculated as mean±SD. Qualitative variables like gender and outcomeincluded UTI, pneumonia and wound infection were calculated as frequencies and percentages. Data was stratified for age, gender, nutritional status, BMIto address effect modifiers. Post stratified Chi-square test was applied, the p-value of ≤ 0.05 was considered significant.

RESULTS

Out of the total 280 patients, there were 143(51.1%) male patients and 137(48.9%) female patients. Patients' mean age was 58.2893 ± 12.8539 years with minimum and maximum age of 40 and 80 years. The nutrition status, body mass index, mean body mass index, mean height and weight, UTI, pneumonia frequencies are given in table 01.There were 102 (36.4%) type-I and178 (63.6%) type-II fractures. When the data were stratified for ages, gender, nourishment status,and BMI.We found a significant association between UTI and Nutritional status, age,and BMI (Table 02). Pneumonia with gender (p-value < 0.05) (table 03) and nutritional status (p-value < 0.05). Chi-square test was applied to determine statisticalsignificance between the age of the patients in years, the gender of the patients, nutritional status and body mass index with wound infection. There was statistically non-significant association between age of the patients in years and wound infection (p-value=0.068) and body mass index (p-value 0.584) but we found significant of wound infection with gender (p-value < 0.05) and Nutritional status (p-value < 0.05) table 4.

Table 1: Frequency distribution of age, gender, nutritional status, body mass index, urinary tract infection and wound infection (n=280)

Variables	Frequency	%age
Gender of the patients		
Male	143	51.1
Female	137	48.9
Age in Years Mean±SD	58.2893±12.8539	
Union		
Primary Union	254	90.7%
Delayed Union	24	8.6%
Non-union	02	0.7%
Nutritional Status		
Well Nourished	217	77.5
Malnourished	63	22.5
Body Mass Index		
≤ 30	222	79.3
> 30	58	20.7
BMI kg/m²Mean±SD	27.2863±3.0723	
Urinary Tract Infection		
Yes	32	11.4
No	248	88.6
Pneumonia		
Yes	25	8.9
No	255	91.1
Wound Infection		
Yes	11	3.9
No	269	96.1
Height (m) Mean±SD	1.5430±0.0353	
Weight (kg) Mean±SD	64.3571±7.5330	

Table 2: Cross tab of the urinary tract infection with age, gender, nutritional status, body mass index and fracture union

Variables	Urinary Tract Infection		N=280 (%)	p-value
	Yes (n=32) (%)	No (n=248) (%)		
Age in years				
40 to 60-year	24 (75%)	145 (58.5%)	169 (60.4%)	0.001
61 to 80-years	08 (25%)	103 (41.5%)	111 (39.6%)	
Gender of the patients				
Male	19 (59.4%)	124 (50%)	143 (51.1%)	0.318
Female	13 (40.6%)	124 (50%)	137 (48.9%)	
Nutritional Status				
Well-nourished	17 (53.1%)	200 (80.6%)	217 (77.5%)	<0.001
Malnourished	15 (46.9%)	48 (19.4%)	63 (22.5%)	
Body Mass Index (kg/m²)				
≤30	20 (62.5%)	202 (81.5%)	222 (79.3%)	<0.001
>30	12 (37.5%)	46 (18.5%)	58 (20.7%)	

Table 3: Cross tab of pneumonia with the genderof the patient

Variables	Pneumonia		N=280 (%)	p-value
	Yes (n=11) (%)	No (n=269) (%)		
Gender of the patients				
Male	00 (59.4%)	143 (53.2%)	143 (51.1%)	<0.001
Female	11 (40.6%)	126 (46.8%)	137 (48.9%)	

Table 4: Cross tab of the age of the patient with wound infection

Variables	Wound Infection		N=280 (%)	p-value
	Yes (n=11) (%)	No (n=269) (%)		
Age in years				
40 to 60-year	06 (54.5%)	163 (60.6%)	169 (60.4%)	0.068
61 to 80-years	05 (45.5%)	106 (39.4%)	111 (39.6%)	
Gender of the patients				
Male	00 (00%)	143 (53.2%)	143 (51.1%)	0.001
Female	11 (100%)	126 (46.8%)	137 (48.9%)	
Nutritional Status				
Well nourished	05 (45.5%)	212 (78.8%)	217 (77.5%)	0.009
Malnourished	06 (54.5%)	57 (21.2%)	63 (22.5%)	
Body Mass Index (kg/m^2)				
≤30	08 (72.7%)	214 (79.6%)	222 (79.3%)	0.584
>30	03 (27.3%)	55 (20.4%)	58 (20.7%)	

DISCUSSION

Inter-trochanter (IT) fracture occurs between the lesser and greater trochanter region[2,9]. It is the most important health problem in the older age with associated femoral neck fractures. [10,]and internal fixation has replaced the conservative method of immobilization[11]. These fractures unite quite easily without avascular necrosisof the femoral head as compared to intra-capsular fractures[12]. About 75% of inter-trochanteric fracture occurs due to simply fall on the ground during walking and standing. **[10]**It results in an inability to stand up and carry a normal gait. IT is recommended to evaluate such injury to confirm the fracture[14].

The inter-trochanteric fractures are fixed according to patient age, health status and bone quality. [15]Such fractures are reported in older age between 66 to 76year. Women present 2-8 times more than men in fractures of the intertrochanteric region[14]. In the current study the mean age of patients was 58.2893±12.8539 years with minimum and maximum age of 40 and 80 years with 143(51.1%) male and 137(48.9%) female cases. The age distribution in this study may be lower,which is due to the inclusion of the case. The male to female ratio was almost the same in this study, which is a comparable finding in this study.

The patient can present with a history of direct and indirect force that result in intertrochanteric fracture. [16]During an indirect force, the iliopsoas muscle is pulled between proximal and distal cortical region during a simple fall. The causes a sudden pull on the lesser trochanter or can involve abductor muscles attached to the greater trochanter with the femur in an abducted position. [13]this mechanism is augmented with low bone quality and associated systemic problems [10].

Treatment of such injuries with the associated systemic problem has changed the treatment method. Pre fracture, the patient's condition is important for the treatment and rehabilitation status. The activity level can be decreased with associated comorbid factors and time after bone fracture till fixation**[17].**

Stable fixation and anatomical reduction are much required in IT fractures that dictates the success story of the treatment in terms of early rehabilitation and fracture union.[18]various treatment has been used including intra-medullary devices, trochanteric plate application, calcium-based absorbable ceramic and treatment with osteotomies for good outcomes[10,19].

The choice of the implant with the type of the fractures is highly important for fracture protected early weight-bearing and union. Fractures are classified as stable and unstable can guide device selection. [5]Dynamic hips screw (DHS) is the implant of choice for stable inter-trochanteric fractures[20].

A study in four hospitals in the New York City Metropolitan area revealed causes of delay in intertrochanteric fractures' surgical treatment. The major cause was a delay in medical clearance (52%) followed by unavailability of operating room or surgeon (29%)[7]. A study reported an increased risk of postoperative infectious complications in patients with delayed surgery in intertrochanteric fractures[8]. Up to our knowledge, there is no local study available in the literature addressing the outcome of delayed treatment of intertrochanteric fractures of the femur using dynamic hip screws. A study reported 10% UTI, 3 % pneumonia and 1 % wound infection in patients with a delay of more than 24 hours in the surgical treatment of extracapsular hip fracture, i.e. intertrochanteric fractures.[8] We in this study found that UTI developed in 32(11.4%), pneumonia was diagnosed in 25(8.9%), and 11(3.9%) cases had wound infection. The frequency of pneumonia and wound infection was higher in the current study, but UTI was consistent with the above study.

A study, which reported the association between operation with time since injury reported postoperative complications, length of stay in hospital and one-year mortality. The was an association with postoperative complication ($P = 0.064$) and shorter LOS ($P = 0.088$) in patients with a delay of less than one day to surgery. However, there was no association between surgical delay and one-year mortality was observed. ($P = 0.632$). while delay in surgical times was associated with more risk of infection ($P = 0.004$).[21]

When data was stratified for age, gender, nourishment status and BMI we found statisticallysignificance association between UTI and Nutritional status and BMI (p-value < 0.05), Pneumonia with gender (p-value < 0.05) and nutritional status (p-value < 0.05). We also found statistical significance of wound infection with gender (p-value < 0.05) and Nutritional status (p-value < 0.05)

CONCLUSION

Through this study's findings, we found that UTI, pneumonia and wound infection were found in patients with delayed treatment of intertrochanteric fractures that require

additional treatment in terms of antibiotics, medical consultation, and increase hospital stay. This poses an economic burden on patient, hospital and society. Therefore, it is concluded that these patients should be planned for possible early surgical fixation in emergency departments to avoid such complications causing an extra burden on the health care system and patient's pocket.

Conflict of Interest: The authors do not have a conflict of interest to declare. There are no external and internal funding sources provided in this study.

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