

ORIGINAL ARTICLE

Comparative Study of Results of Unstable Trochanteric Fracture Femur Treated by Bipolar Hemiarthroplasty versus Intra Medullary Nail Fixation.

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Submit Date 2019-07-12
Revise Date 2020-08-10
Accept Date 2020-12-15

ABSTRACT

Background: The fracture of Intertrochanteric region of femur which lies between the area of greater and lesser trochanters and may include lesser or greater trochanters. Inter trochanteric fracture of femur represent 45% of all the fractures of hip

Objectives: The main objective of our study is to assess the effectiveness of internal Fixation by Intra Medullary Nail versus Bipolar hemiarthroplasty for the treatment of unstable intertrochanteric fracture femur

Method: The study was done for (18) patients with unstable intertrochanteric fracture femur. The patients were classified into 9 patients treated by Intra Medullary Nail and 9 patients by bipolar hemiarthroplasty. The follow up period was one and half year.

Results 18 patients (12 females, 6 males) with closed unstable intertrochanteric Fracture Femur were included for analysis. the patients classified into 9 patients treated by Bipolar hemiarthroplasty and 9 patients fixed by Intra Medullary Nail Fixation from December 2016 to May 2018 with near follow up period of one and half year. There were similar results between the two groups according to age, complications(orthopedic), Harris Hip Score, revision surgery, and at one and half year follow-up. Significant difference were found between the two groups in blood loss, blood transfusion (intraoperatively), medical complications, time of surgery. Conclusion: These results indicate that Intra Medullary Nail has advantages than hemiarthroplasty in treatment of unstable intertrochanteric fractures. Hemiarthroplasty has greater surgical trauma and high incidence of medical complications.

Keywords: Unstable intertrochanteric fracture, Hemiarthroplasty, Intra Medullary Nail.



INTRODUCTION

The fracture of Intertrochanteric region of femur which lies between the area of greater and lesser trochanters and may include lesser or greater trochanters. Inter trochanteric fracture of femur represent 45% of all the fractures of hip [1]. This area contain trabeculae that share in weight bear and has a large amount of cancellous bone and high vascular supply and so decrease the risk of avascular necrosis and nonunion [2]. Intertrochanteric fractures have many classifications as Evan's, Jenson's, AO classifications which classify this fracture into stable and unstable fractures. Unstable fracture as, trans trochanteric, reverse oblique, split fractures, intertrochanteric with extension of subtrochanteric

region and comminution at posteromedial region [3].

Nailing of intertrochanteric fractures depends on the pattern of the fracture, patient age and medical problems. For treating Intertrochanteric fractures, many choices as dynamic hip screw (DHS), interlocking nails with lag screw in the femoral head as (Gamma nail, proximal femoral nail,) and bipolar or total hip endoprosthesis [4].

DHS fixation in fracture that contain comminution or absent lateral wall of femur there is high risk of failure of fixation. In these fractures use of proximal femoral locked plate or trochanteric stabilizing plate are better options. They prevent medialization of distal fragment of femur but technical experience are needed. There

is many studies favor using intramedullary nails in treating unstable fractures due to its biomechanical advantages as load bearing, shorter lever arm and prevent medial movement of distal femoral fragment [5,6].

In old age people unstable intertrochanteric fractures are more risky, mortality and morbidity rates are higher than young. This patients suffer from osteoporosis high comminution pattern of fracture which complicate fracture fixation and delay weight bearing. To overcome these problems surgeons consider arthroplasty are better options in elderly patients in treating unstable trochanteric fractures [7-9].

Geiger et al [10] in comparison the results of study of unstable trochanteric fractures fixed with internal fixation or arthroplasty, the results are similar in both groups of patients according to orthopedic outcome but medical as bleeding intraoperatively and blood transfusion with its complications and time of operation was higher in arthroplastypatients [10].

AIM OF THE WORK:

The aim of this work is to compare the results of bipolar hemiarthroplasty vs. Intra Medullary Nail fixation in treating unstable trochanteric fracture femur in one and half year follow up

PATIENTS AND METHODS:

Study done at Orthopedic surgery Department, Zagazig University Hospitals .The study was conducted on 18 patients with unstable intertrochanteric fracture femur 9 cases treated by hemiarthroplasty,9 cases with Intra Medullary Nail fixation.

In the case group will include the patients with unstable inter trochanteric fracture fixed with hemiarthroplasty. In control group will include patients with unstable intertrochanteric fracture treated with Intra Medullary Nail. Exclusion criteria are stable intertrochanteric fracture femur and Patients with other fracture femur as neck femur or sub trochanteric.

Written informed consent was obtained from all subjects. The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Steps of the study

Data collection: patient age, type of Fracture, operative Data, result of fixation, complications
Investigations include: bone examination by x-ray

Administrative design. Approval will be taken from the Institutional Review Board (IRB) Of Zagazig University, Faculty of Medicine.

Technique:

The patients treated with Intra Medullary Nail intraoperative position is supine and the patient on traction table. The fractured lower limb position in straight and low grade abduction and foot fixation in the boot at the traction table. Then after traction, the limb adducted 10–15° and rotations neutral, then we assess reduction by C-arm fluoroscopy, and maintain the traction. Reduction usually occur by this method. If the fracture not reduced closely, attempt of open reduction with small incision, and try to reduce the fracture by surgical tools. After closed reduction, an about 5 cm incision above greater trochanter to reach it as entry point.

At the greater trochanter, laterally a wire was introduced to reach the medullary canal, then we insert the nail through the guide wire. The lag screw should introduced centrally anteroposteriorly and laterally with considering tip apex distance not proceed 25 mm from subcondral bone of femoral head. A static distal locking screws was inserted.

Hemiarthroplasty was done through lateral or posterolateral approach and the patient at lateral position. The femoral head and neck remnants was extracted after cutting the neck by the saw. The medulla was reamed to the convenient size. A properiate stem and a bipolar head sizes used.

The hip center of prosthesis should at the level of the greater trochanter tip. Prosthesis should be placed with Anteversion of 15° to inter condylar axis of femur .may use circlage wire for placing fractured greater or lesser trochanters. The external rotators or the abductors according approach sutured to their anatomical positions.

Follow up: clinical and radiological assessment after operation. Follow up Plain x ray to evaluate fracture healing and complications of the implant. Follow up postoperative complications, reoperation rate and functions of hip. Complications are orthopedic or medical (occurred in hospital). The Harris Hip Score good functional evaluation of hip function. The Harris Hip Score grades is four grades: 90–100 were excellent; 80–89 good; 70–79 medium; and ≤69 was poor function. Intraoperatively we assess blood loss, blood transfusion, time of surgery, hemoglobin postoperatively, hospital stay.

Statistical analysis: Data analysis was done using IBM SPSS Statistics Version 22. Quantitative data presented as mean, standard deviation. Qualitative data was presented as number and percentage. Comparing Results of Unstable Trochanteric Fracture Femur Bipolar Hemiarthroplasty Versus Intra Medullary Nail Fixation was done by using chi-square test or fissure exact as appropriate. Comparing quantitative variables using independent sample t test .P value was set significant at 0.05 levels. All tests were two tailed.

RESULTS

Eighteen patients (12 females, 6 males) have closed Unstable intertrochanteric Fracture Femur were studied for analysis of results. The patients

divided into 9 patients fixed with bipolar hemiarthroplasty and 9 patients fixed by Intra Medullary Nail Fixation from December 2016 to May 2018 with near follow up period of 18 month. The age of patients between 54 to 83 years old. The differences not significant between the two groups according to age, complications (orthopedically), reoperation for revision, and function of hip evaluated by Harris Hip Score (Table 2, Figure 4) at one and half year follow-up. The differences significantly recorded between IMN and hemiarthroplasty groups is intraoperative loss of blood, blood transfusion, medical problems, and time at surgery (Table 1, Figure 3)

Table 1: Differences in time of surgery in both surgical procedures, their value and significance:

| Variable | group | | T test | P value |
|---------------------|----------|------------------|--------|------------|
| | IMN | Hemiarthroplasty | | |
| | Mean± SD | Mean±SD | | |
| Time of surgery/min | 61.1±8.2 | 99.4±14.7 | -4.419 | <0.001 (S) |

Table 2: Differences in Harris hip score in both surgical procedures, their value and significance:

| Variable | group | | T test | P value |
|------------------|-----------|------------------|--------|------------|
| | IMN | Hemiarthroplasty | | |
| | Mean±sd | Mean±sd | | |
| Harris hip score | 78.4±10.4 | 78.3±11.1 | 0.002 | 0.983 (NS) |

Table 3: Differences in Postoperative complications in both surgical procedures:

| Variable | Group | Group | | | | X2 | P value |
|-----------------------------|-------|-------|-------|------------------|-------|-------|------------|
| | | IMN | | Hemiarthroplasty | | | |
| | | N | % | N | % | | |
| Postoperative complications | No | 7 | 77.8% | 7 | 77.8% | 0.001 | 0.772 (NS) |
| | Yes | 2 | 22.2% | 2 | 22.2% | | |

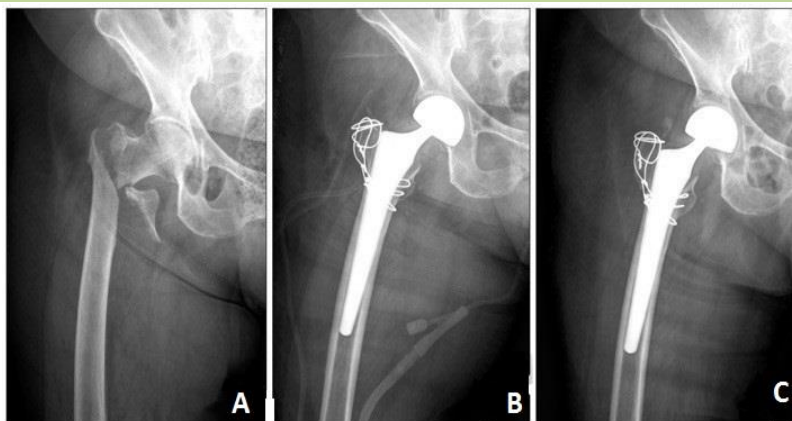


Figure 1 (A) a 70-year-old female patient had an unstable intertrochanteric fracture. (B) The postoperative radiograph shows a good proximal canal fit and wiring. (C) At postoperative 12 months, the radiograph shows stable fixation of the femoral stem.

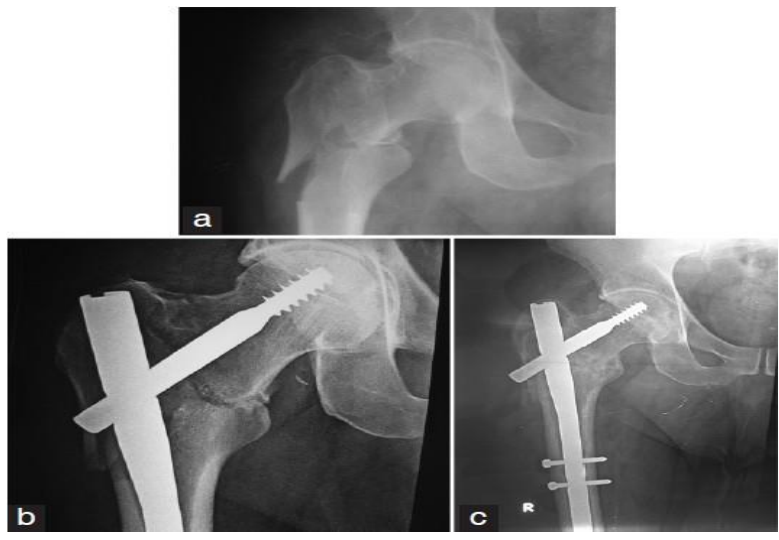


Figure 2 75 years female patient (a) Preoperative unstable fracture. (B) Immediate postoperative fixed by gamma nail and (c) after 11 months with healed fracture.

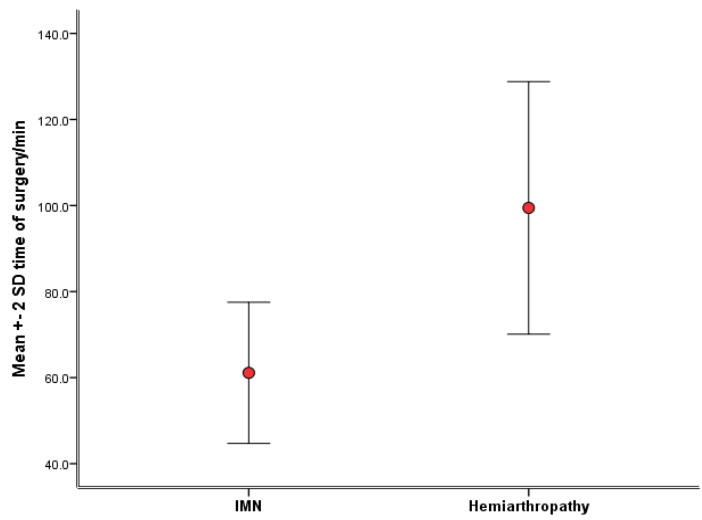


Figure 3: Differences in time of surgery in both surgical procedures

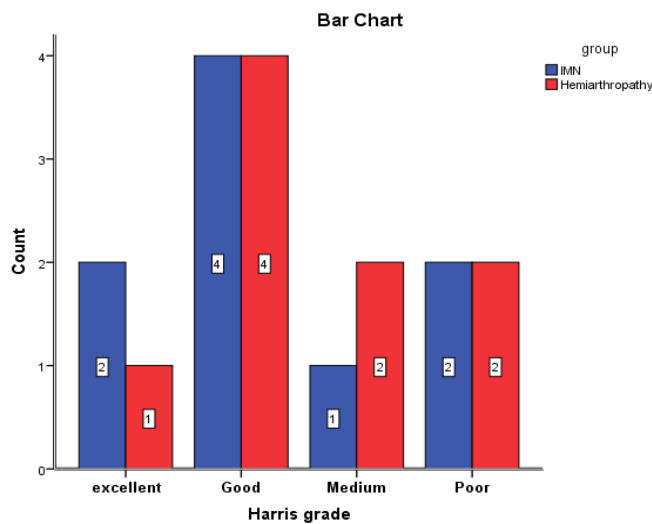


Figure 4: Differences in Harris grade in both surgical procedures

DISCUSSION

Treatment of unstable fractures of femur, represent difficult issue .there are literatures prefer arthroplasty in treatment of unstable fractures of femur and consider it has superiority than internal fixations [12, 15–18]. However, the results of the present study did not support hemiarthroplasty as the definitive method of fixation in comparison of intra medullary nailing. Arthroplasty may be a good choice in treatment of these fractures to overcome complications which occur postoperatively because of internal fixation failure [13].

However, in our study, the differences not significant between the two groups according to age, complications (orthopedically), reoperation for revision, and function of hip evaluated by Harris Hip Score (Table 2, Figure 4). In other studies retrospectively, Tang et al [19].reveal that the complications of hemiarthroplasty group was more than in femoral nailing group (14.1% vs. PFN 8.96%), without difference regarding statistics. medullary nailing is a good option in treatment unstable trochanteric fracture femur with less failure and therefore less revision reoperations [20,21].

The outcomes of our literature also support this outcome. However a lot of literatures prefer hemiarthroplasty for treatment of these fractures and consider it with less postoperative complications [11, 15, 16, 22, 23], as dislocation, loosening and hypersensitivity of the cement, but these complications depend on the experience and technical skills of the surgeon. Hemiarthroplasty option differ in the treatment of fracture neck femur than in treatment trochanteric one which consider more difficult as in comminution of the fracture that need complicated techniques to perform accurate insertion of the endoprosthesis. The choice of hemiarthroplasty primarily in treatment of these fractures not good option compared with less complications of nailing . Although early mobility cause less occurrence of bed sores, pneumonia and better functional results. However, medically caused complications occur with patients with arthroplasty are high than patients with femoral nailing.

These complications usually are blood lost intraoperatively blood transfusion because of the great surgical trauma and increased surgical time the invasive technique that make the patients liable to infection than the less invasive technique of intra medullary nailing which end in less complications . Although arthroplasty produce early mobility, but not as expected as it usually happen in elderly patients with weak fragile tissues preventing them from early mobility. As Pho RW

et al [24].and SiwachR et al [25]. Found that only 75–88% of the patients with hemiarthroplasty can mobilize effectively.

Treatment of patients with hemiarthroplasty can offer good functions than patients treated by femoral medullary nailing but theoretically in early follow up after surgery.

But, there are other factors cause effects on the outcome as age, sex, medical condition, social dependency and activity before fracture, and complications postoperatively [25].

In our study, at 18 month follow-up, the statistics show no significant differences in comparison of the two groups according the hip function assessed by Harris Hip Score (78.4 ± 10.4 for the Intra Medullary Nail group and 78.3 ± 11.1 for the hemiarthroplasty group, $P = 0.983$) (Table 2). Tang et al [19].noted that through three years follow-up, no significant differences in comparison of the two groups according the hip function assessed by Harris Hip Score (83.0 ± 12.2 for the PFN group and $80.2.1 \pm 10.9$ for the hemiarthroplasty group, $P = 0.09$), but differences in the rate of the excellent-to-good functional results (Intra Medullary Nail 90.2% and hemiarthroplasty 79.6%).

Özkayın N et al [26].reported a prospective randomized study compare Nailing with hemiarthroplasty for per trochanteric fractures in the elderly patients, and noted that after three months, hip function by Harris Hip Score range was 45.24 in Intra Medullary Nailing patients and 63.38 in hemiarthroplasty group respectively, so there is with significantly different but after 12 months, average was 75.95 in Nailing patients and 68.44 in hemiarthroplasty group

respectively, so is it significant . So at mid and long term of follow up reveal good functional results in inter medullary fixation than hemiarthroplasty, but we need more studies at longer period of follow up to be more accurate results . Intertrochanteric fractures of femur in elderly patients has high mortality and morbidity rates. Some other studies compared the mortality between hemiarthroplasty and internal fixations with no significant differences.

Mortality average at trochanteric fractures treated with hemiarthroplasty in elderly at one year from 12.2 to 35% [14, 27]. Kim SY et al [28].in a prospective randomized study with a small sample size compare cementless hemiarthroplasty with femoral Nail for unstable trochanteric fractures of femur found mortality at 1-year was 27.6% in hemiarthroplasty group and 13.8% in IMN group, and there is no significant difference statistically.

However, Tang et al [19].recorded higher mortality rates in arthroplasty than with proximal femoral

nailing at different follow up at 1-year (23.1% vs. 13.1%) and at 3-years (34.0% vs. 20.1%). In our study. The main cause of high rates of mortality in patients underwent hemiarthroplasty was the more invasive procedures of hemiarthroplasty at these patients. This study has many limitations. As the mobility before trauma was impossible to assess, which make the comparison of postoperative functional results are unclear compared with preoperatively. Relatively short time follow-up. The complications of IMN appears in the first year follow up usually, but need more time in patients with hemiarthroplasty treatment.

In comparison of complications implant-related of the two procedures studies need long term follow-up, but high mortality rates in the elderly patients exposed to this type of fracture interfere with that, and need large sample size.

There is higher postoperative 1-year mortality rates in hemiarthroplasty group of patients than nailing group, statistics did not find significant differences between the two groups. Based on a difference mortality rate of 10 percent in a previous study [21].

In summary, the results of this study reported that The differences not significant between the two groups according to age, complications (orthopedically), reoperation for revision, and function of hip evaluated by Harris Hip Score at one and half year follow-up. Intra Medullary Nail has obvious advantages over hemiarthroplasty in the treatment of intertrochanteric fractures. Hemiarthroplasty in treating these fractures is associated with great invasive procedure, medical problems and great trauma.

CONCLUSION:

Classification of Intertrochanteric fracture femur into stable and unstable. Unstable intertrochanteric fracture femur accompanied with comminution of the posteromedial cortex that need specific type of fixation .intra medullary nails and hemiarthroplasty two types of fixation for treatment this fracture type.

The differences not significant between the two groups according to age, complications (orthopedically), reoperation for revision, and function of hip evaluated by Harris Hip Score at one at 18 month follow-up. Intra Medullary Nail has more advantages than hemiarthroplasty in the treatment of intertrochanteric fractures.

Intra Medullary Nail minimally invasive technique and less trauma that lead to less physiological problems on the patients. Hemiarthroplasty in treating these fractures is associated with great surgical trauma, more

invasive technique and higher rates of postoperative medical complications.

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How to cite

Elbermawy, A., Hefny, A., khira, Y., Mohammed, A. Comparative Study Of Results Of Unstable Trochanteric Fracture Femur Bipolar Hemiarthroplasty Versus Intra Medullary Nail Fixation. *Zagazig University Medical Journal*, 2023; (294-300): -. doi: 10.21608/zumj.2020.13903.1268