

INTERTROCHANTERIC FRACTURE COMPARISON BETWEEN DHS AND EXTERNAL FIXATION

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ABSTRACT

Background: Hip fractures, including intertrochanteric fractures due to falls, are one of the most common orthopedic problems in the elderly, Dynamic hip screw (DHS) fixation has been considered the gold standard for treating stable intertrochanteric fractures, the technique of closed reduction and external fixation offers an alternative. **Objective:** To find out the outcome of treating intertrochanteric femoral fractures and comparison between the uses of dynamic hip screw versus external fixation regarding operative time, number of x-ray shot, post-operative infection, deep vein thrombosis and the need of blood transfusion. **Material and methods:** A total of fifty patients, between 60 to 75 years with isolated intertrochanteric fracture neck of femur Evan's types I and II. Divided equally into group A treated by external fixation, group B treated by dynamic hip screw during the period from January 2020 to June 2021, at Al-Jumhoori teaching hospitals with follow up period of one year. **Results:** Of the fifty patients thirty two were female and eighteen patients were male, with an average age of sixty six years, the fracture were distributed thirty six on left and fourteen on the right side. In Group A the results were twenty two (88%) cases whose healing was achieved and no complications were encountered. Two (8%) of the cases developed deep pin-tract infection which needed redo operation by wounding excision and changing site of schanz. One (4%) developed DVT average operative time required for external fixation was 25 minutes with average radiation exposure of 23 shots. Only two (8%) patients needed blood transfusion. In Group B twenty one (84%) patients had no post-operative complication with two (8%) patients developing DVT and two (8%) developing infection at the site of operation. One of them ended by total hip replacement and the other needed multiple operation for wound cleaning. The average operative time was 40 minutes, and the average radiation exposure was 45 shots, ten (40%) patients needed blood transfusion. **Conclusion:** Both approaches are simple and effective with the external fixation being more suitable for patients requiring less stressful procedures.

KEYWORDS: intertrochanteric fractures, DHS, Hoffmann external fixation.

INTRODUCTION

Hip fractures, including intertrochanteric fractures due to falls, are one of the most common orthopedic problems in the elderly and inflict heavy financial tolls on orthopedic treatment centers.^[1] Such injuries are divided into three main categories femoral neck, intertrochanteric, and sub trochanteric. Femoral neck and intertrochanteric fractures account for over 90% of hip fractures, occurring in approximately equal proportions.^[2] An intertrochanteric fracture was

described by Cooper in his treatise in 1851. An intertrochanteric hip fracture occurs between the greater trochanter where the gluteus medius and minimus muscles (hip extensors and abductors) attach, and the lesser trochanter, where the iliopsoas muscle (hip flexor) attaches.^[3] Evans devised a classification system for intertrochanteric fractures. In this classification, fractures of the trochanteric region are subdivided into five types Fig. (1).

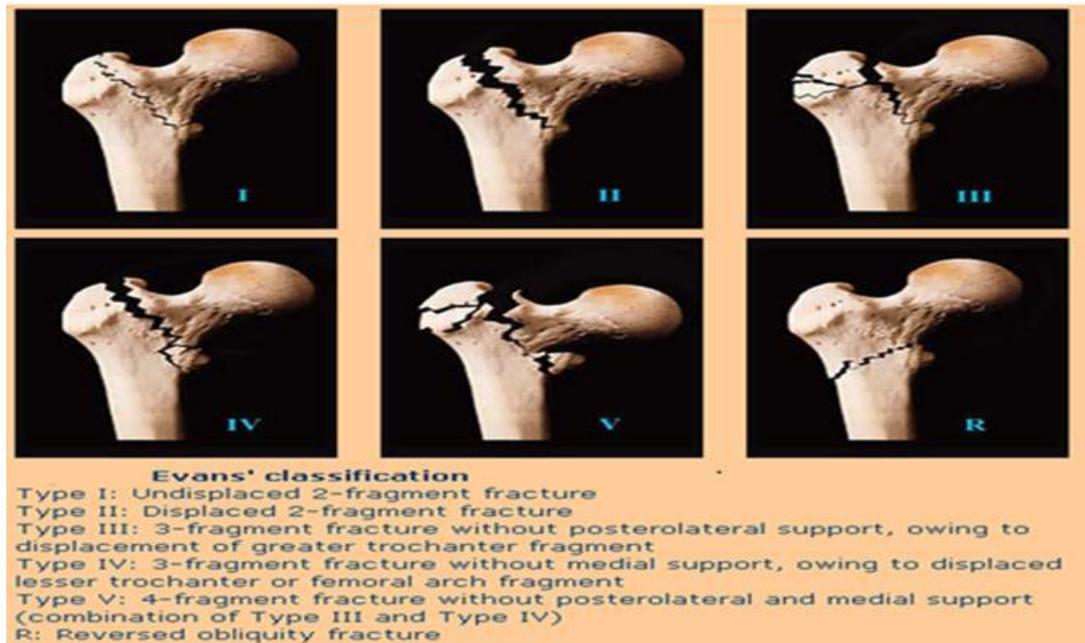


Figure (1): Evans' classification^[3]

Diagnosing of the intertrochanteric fracture depends on the Mechanism of injury which is fall from standing height, and plain x-ray.^[4] Intertrochanteric fractures are more common than femoral neck fracture in patients with preexisting hip arthritis. The indication of the operative management of the intertrochanteric fractures are displaced fractures and most of nondisplaced fractures. Many devices which were used in the fixation and had advantages and disadvantages, these devices are Sliding hip screw, Intramedullary Nail (gamma nail), trochanteric fixation nail, External Fixation and Hip Arthroplasty, if there is severe comminution of trochanteric area and failure of other fixation device.^[4] The reduction of intertrochanteric fractures poses great problems and challenges for orthopedic surgeons due to the special blood supply system of the femoral neck, its anatomic structure, and its functional and biomechanical characteristics. Due to the problems caused by these fractures and an increase in number of the elderly persons, which leads to a significant increase in the incidence of these fractures, it is absolutely necessary to use an effective and appropriate treatment modality for such patients.^[1] Union in a good position, low mortality, minimal discomfort for the patient, and minimal cost are essential in the surgical treatment of intertrochanteric fractures. Open reduction and internal fixation is the standard treatment. Over the last 40 years new materials, devices and techniques were developed in order to achieve rigid fixation and early weight bearing.^[5] Close reductions can be done under general anesthesia or nerve block. Reduction of the affected extremity is typically done with traction and internal rotation. The typical sagittal plane deformity and posterior sag, may require correction with an anterior applied force to the posterior distal fragment completing the reduction with traction and internal rotation.^[6] The external fixation can be applied using the AO principles and techniques. A 3-mm

guide wire was then introduced under fluoroscopy into the head with the appropriate neck-shaft angle and anteversion angle. The guide wire was introduced using a manual perforator. The first pin was inserted through a small incision at the base of the greater trochanter across the fracture site into the femoral neck. One more pins were inserted the tips of the pins were at a 10 mm distance from the joint line. The proximal shanz of the external fixator was at 135° angle to the bar of the fixator. Three pins were inserted into the middle third of the shaft femur In order to increase the range of motion, the knee was put into flexion at 90° during the insertion of the pins. A final check by fluoroscopy was made. If posterior sag of fracture occurs, fracture should be reduced with upward pressure applied to buttock or femur.^[7,8,9] Intertrochanteric hip fractures have significant complication rates: 20-30% in the first year, including a 5% nonunion rate, a 5% infection rate, and an 11% rate of device failure. Important approaches to prevent the complications are to follow a careful preoperative sterilization technique, do a careful preoperative study of radiographs, perform meticulous insertion of devices, to do careful postoperative monitoring with radiographs and a clinical examination to ensure healing of the fracture.^[3]

MATERIAL AND METHODS

This study is prospective Clinical trial study carried out in orthopedic unit in Al-Jumhoori Teaching Hospital in Mosul from January 2020 to June 2021. Fifty patients with intertrochanteric fracture of both sexes between aged 60 and 75 years presented to the casualty unit. After sustaining a fall on the ground resulting in isolated unilateral intertrochanteric fracture neck of femur diagnosed by clinical examination and conventional plain X-ray of the hip joint. Evan's types I and II type are only included in this study Fig. (1). Patients with

compound fractures, those with multiple injuries, Evan’s type III, IV, V and diabetic patient were excluded from the study. The Local Scientific Council of Arab Board of Health Specializations of orthopedic Surgery in Iraq, and Mosul Ethical Research. In the emergency unit and after initial resuscitation, a thorough clinical examination of the patients done to exclude other injuries and to evaluate the local injury. The injured limb immobilized by skin traction, the patient received analgesia then conventional two view (AP & Lateral) X-ray imaging done for the hip joint to confirm the diagnosis. An informed consent

taken from patients to be included in the study. Patients were randomly assigned into two groups, Group A 25 patients were managed by external fixation, Group B 25 patients were managed using dynamic hip screw. In Group A they operated under general anesthesia on average 4 days (1-6) days following admission. The used fixator was Hoffman type Fig. (2), and the number of schanz was five, two proximal and three distal .The average operative time was 25 (20-45) minutes. The patient placed on the orthopedic table and reduction checked by fluoroscopy Fig. (3).

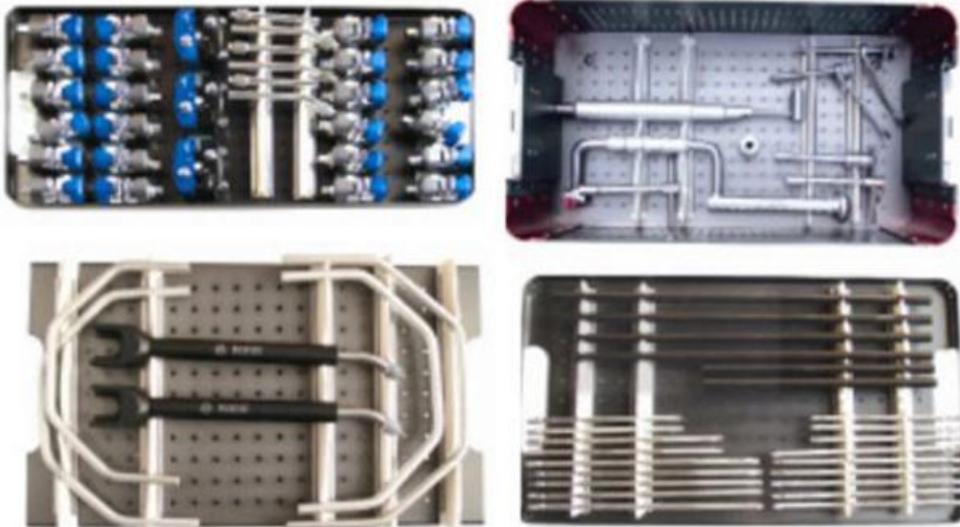


Figure (2): Hoffmann external fixation.^[10]



Figure (3): Fracture fixation by Hoffmann external fixator.

Active hip and knee exercises started on the first post-operative day. They mobilized on the second or third day (toe touch on ground) by assistances. Patients discharged on average seven days after operation. Outpatient evaluation done every 2 weeks and knee movement, pin-tract infection and consolidation of the fracture were evaluated by radiography. The fixation removed after an average of 80 days (70-95) days. In Group B 25 patients were managed by dynamic hip screw Fig. (4), they operated under general anesthesia on average 3 days after admission (2-6) days. The reduction done on the

orthopedic table under fluoroscopy check then the classic steps of dynamic hip screw.

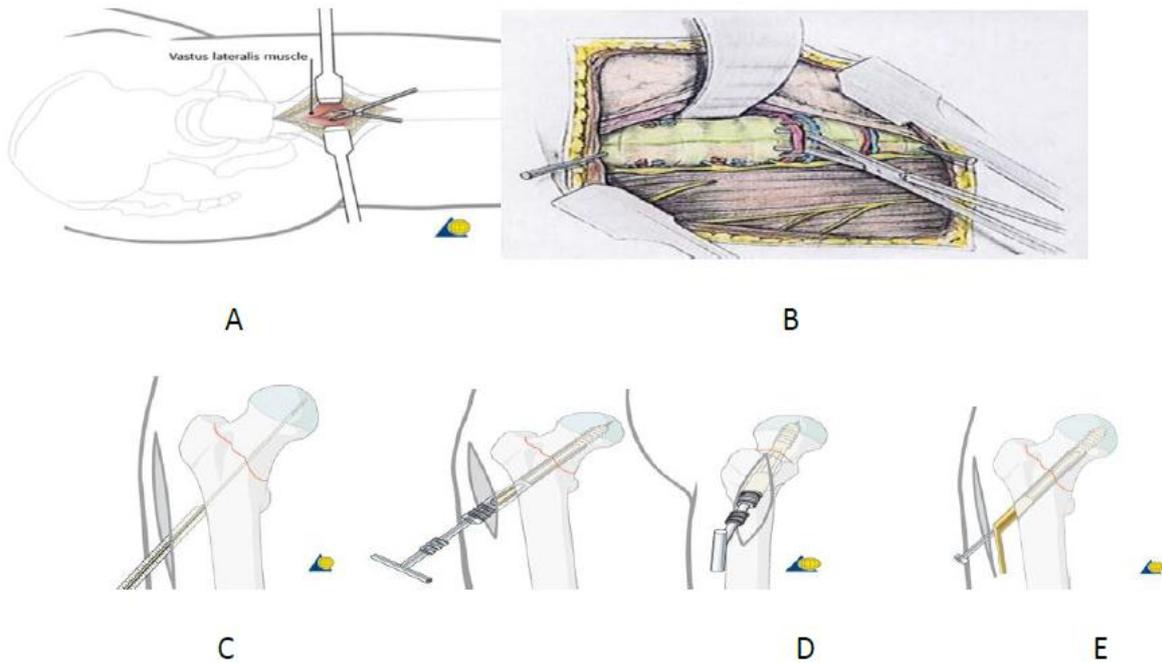


Figure (4): DHS approach.^[10]

Average operative time was 40 (25-55) minutes. For assessing the reduction and fixation, Post-operative radiographs were taken Fig. (5). Patients were mobilized on the third post-operative day with partial weight-bearing; they were discharged home after (5-9) days on an average (7) days. Outpatient follow-up was conducted

twice weekly with clinical examination and X-ray to assess healing. Data from both groups were collected in a formula and a comparison was done regarding the operative time, radiate exposure, and the post-operative outcome (DVT& infection).



Figure (5): Fracture fixation by DHS.

RESULTS

The study involved 50 patients (32 females & 18 males) with an average age of 66 years (60-75) years Fig. (6), Fractures were distributed between the two sides (36 on the left and 14 on the right) table (1).

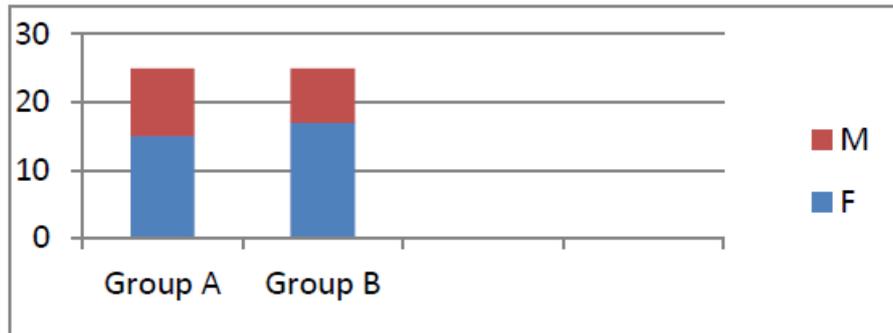


Figure (6): Sex Distribution.

Table (1): Patients Data.

Variable	Group A	Group B	Total
No.	25	25	50
Sex - Male	10	8	18
- Female	15	17	32
Side of # - Right	7	7	14

In Group A, the results were 22 (88%) cases whose healing was achieved and no complications were encountered. Two (8%) Fig. (7) of the cases developed deep pin-tract infection which needed redo operation by

wounding excision and changing site of schanz . The infection and loosening were in the proximal schanz. One (4%) developed DVT Fig. (8).

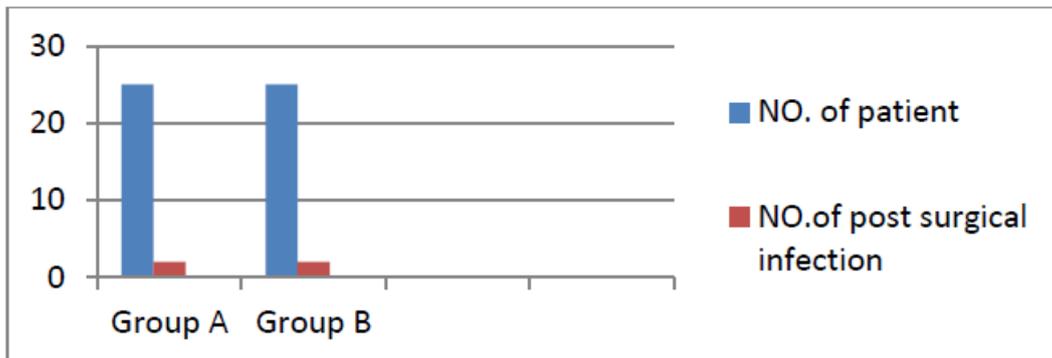


Figure (7): An Average NO. Of Patient Develop Post-Operative Infection.

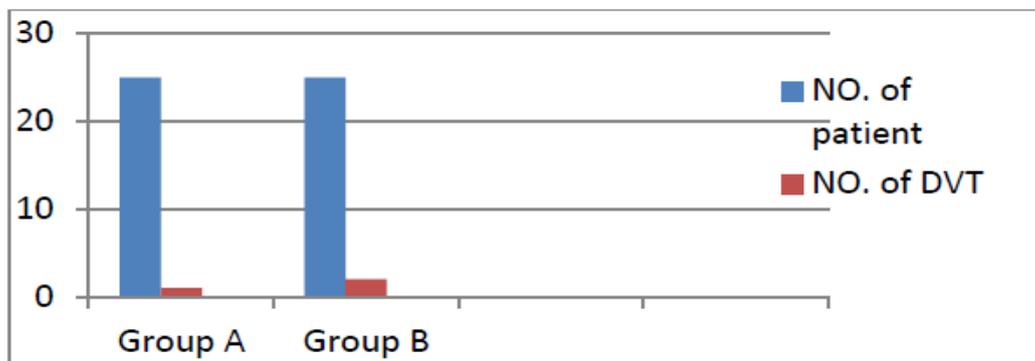


Figure (8): Number of Post-Operative DVT.

The average operative time required for external fixation was 25minutes (20-45) with average radiation exposure of 23 shots Fig. (9), Only 2(8%) patients needed blood transfusion Fig. (10).

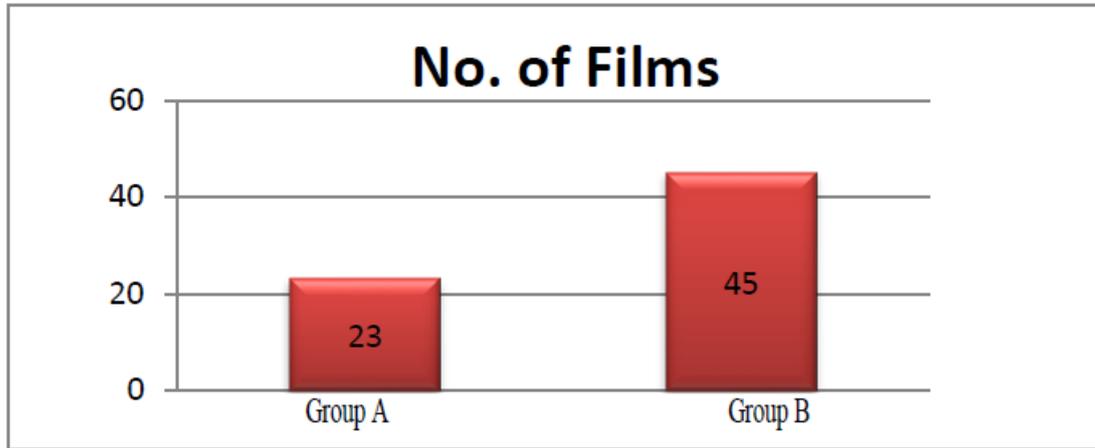


Figure (9): an Average Radiation Exposure

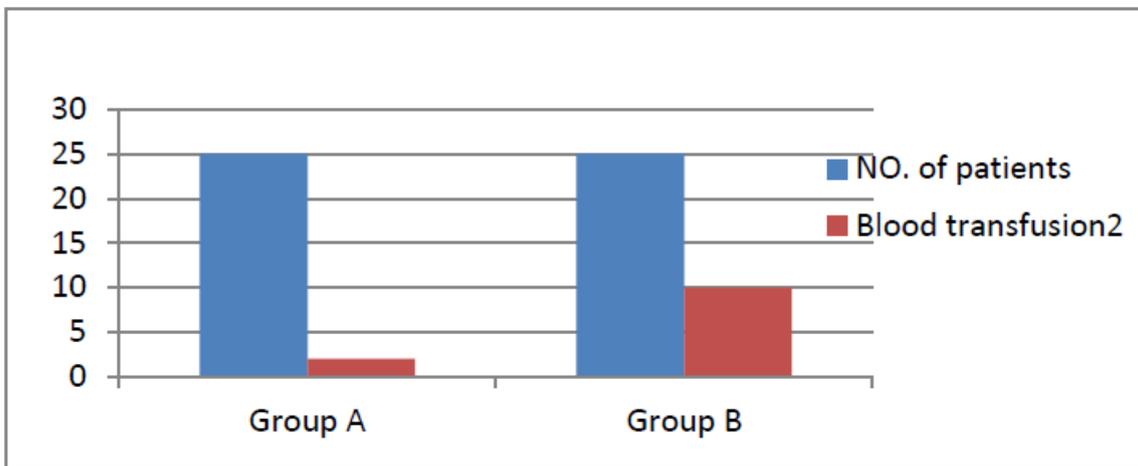


Figure (10): average No. of patient need blood transfusion.

Partial weight bearing was initiated on day 2 post-operatively and, the fixation was removed after on

average of 80 (70-95 days). The results of Group A can be summarized in Table 2 below,

Table (2) Results of Group A.

Results of External fixation	Group A
Patient has no Post-Operative Complication	88%
Postoperative DVT	4%
Post-Operative Infection that needed redo Operation	8%
Average Radiation Exposure	23 shots
Average Operative Time	25 minutes
Number of Patient need Blood Transfusion	8%
Average Time for Removing the Fixation	80 days

Among patients in Group B 21 (84%) patients had no post-operative complication with 2 (8%) patients developing DVT Fig. (7), and 2 others (8%) developing infection at the site of operation Fig. (6), one of them ended by total hip replacement and the other needed multiple operation for wound cleaning. The average operative time was 40 minutes. (25-55minutes.) and the average radiation exposure was 45 shots Fig. (8), 10 (40%). patients needed blood transfusion Fig. (9), Partial weight bearing was initiated on the third post-operative

days. The results of Group B can be summarized in table (3), and the Comparison between External Fixation and DHS in Table (4).

Table (3) Result of Group B.

Results of DHS	Group B
Patient has no Post-Operative Complication	84%
Post-operative DVT	8%
Post-operative Infection that needed redo Operation	8%
Average Radiation exposure	45shots
Average Operative Time	40 minutes
Number of Patient need Blood Transfusion	40%

Table (4) Comparison between External Fixation and DHS.

Results	External fixation	DHS
Patient has no Post-Operative Complication	88%	84%
Postoperative DVT	4%	8%
Post-Operative infection that needed redo operation	8%	8%
Average Radiation Exposure	23 shot	45shot
Average Operative Time	25 minute	40 minute
Number of Patient needed blood Transfusion	8%	40%

DISCUSSION

In the course of aging, there is a reduction of the bone volume (osteoporosis), and an increase of the number in patients with fracture at the hip area.^[10] To avoid classic open surgery, many mini-invasive techniques have been introduced for treatment of such fractures, arguing that they offer better clinical outcome and no extra expense and with minimal complications.^[11,12,13] Previous reports on external fixation showed short operating and hospitalization time, high fracture union rates, and minimal surgical blood loss.^[8,14,15] Many modifications concerning the external fixation technique have been introduced (Orthofix intertrochanteric external fixation, Mitkovic's dynamic external fixation).^[16,17,18,19] For the developing countries, most of these types of fixations are expensive and cannot be afforded by patients or hospitals. For its reasonable cost, availability, and familiarity, Hoffmann external fixation was used in the present study. The average operative time of external fixation in this study was 25 minutes which was similar to the times recorded by Tomak *et al.*^[18] and Christodoulou *et al.*^[14], it is more than those recorded by Kourtzis *et al.*^[12] and Vossinakis *et al.*^[20] which was 22 minutes. This is very important point to stabilize the general medical condition in such old patient. The average increasing time in DHS in this study was 15 minutes which is less than study reported by Antonio Moroni, which was 25 minutes. The intraoperative time for insertion of the DHS was double than for application of the external fixator.^[7] Two (8%) patients developed a deep pin tract infection that necessitated removal of the pin and changed their site. Union which was delayed to 13 weeks with varus of 15° and shortening of 2.5 cm. These patients walked with difficulty despite assisted means. However, the rate of deep infection occurring in the present study was more than reported by other studies^[18,20,21] which was 7% and in our study 8%. Probably the nutritional stage of patient, general health, the sterilization of the theater and postoperative care of the site of external fixation play role in increased

incidence of infection in our study. The need of blood transfusion post operatively was very low 8% and this more than that recorded by Milenković, M. Mitković, M. Radenković, where no patient fixed by external fixation need blood transfusion post operatively.^[7] While the need of postoperative blood transfusion is very high in DHS technique about 40%, this result is less than study reported by Antonio Moroni, Cesare Faldini, Francesco Pegreffì where all patient treated by DHS needed blood transfusion.^[7] The average time to complete union was 80 days in this study. M. Subasi *et al.*^[22] conducted a study assessing the effectiveness of external fixation used for intertrochanteric fracture and found that it was an effective method with good results and less complications. They stated that it is especially useful with elderly patients who usually have associated medical co-morbidities (heart failure, uncontrolled hypertension, diabetes, renal disease liver disease) and who the common age group are affected by this fracture and had average time of union of 80 days. Our results agree with this.^[23] Naseem ul Coani *et al.*,^[24] also used the external fixation method. They concluded that it is an effective method to use especially in the developing countries and in the presence of co morbidities. They also concluded that it can be performed under local anesthesia.^[25] Taker A. Aly *et al.*,^[26] concluded that most patients with intertrochanteric fractures are elderly who require a rapid and a minimally invasive intervention which is, at the same time, more financially accepted. They used the external fixation method and DHS, they found same results in postoperative infection and post-operative DVT and success.^[14] This is in agreement with the results in the current study. The radiation exposure increased in DHS in about twice in comparison with the external fixation in our study. Which is very important to doctor, staff and patient's safety this was also reported by Desimir Mladenović, Zoran Golubović, Miloš Stanojlović^[7] and get 2.5 average increase of shots number in DHS method. Dynamic hip screw (DHS) on the other hand, was also

successful in our study. In spite of the longer operative time and the higher radiation exposure, the results were satisfactory. However, blood loss was more than the external fixation method. Probably this approach is more suitable for younger patients with fewer commodities as they stand stress more. Yeh-shiunn Lee *et al.*^[27] adopted the DHS method and found it a very useful method for management especially regarding the interfragmental compression effect, which gave a high union rate.^[12] They concluded that the use of DHS was effective, simple and safe method especially the mini invasive DHS as it resulted in smaller wound size, lower pain level, and less blood loss.^[28] Khan N *et al.*^[29] concluded that the use of DHS is save, suitable reliable method of fixation . Recent evidence supports that intertrochanteric fractures treated with newly developed external fixators have better results than those reported in previous studies of external fixation Christodoulou NA, Sdrenias CV *et al.*^[30,31] According to the same authors mentioned, external fixation can provide results that are similar to, or even better than, the results obtained with conventional internal fixation techniques. All these studies reported the advantages of external fixation including quick ,simple application, minimal blood loss, less radiation exposure, pain reduction, satisfactory stability, and early weight-bearing. Intertrochanteric fracture fixed by external fixation has been mainly used in elderly patients of high-risk.^[32,33,34]

CONCLUSION

Both external fixation and dynamic hip screw are simple, and effective methods of managing intertrochanteric fracture neck femur with good results. The advantages of external fixation include quick and simple application, minimal blood loss, less radiation exposure, adequate fixation, easily applied. Thus, it may be more suitable for patients with associated medical co –morbidity (heart failure, uncontrolled hypertension, diabetes, renal disease liver disease) in whom the least possible stress should be applied. On the other hand, dynamic hip screw provides a high degree of fragmental compression with good results and may be useful for more medically fit patients.

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