Original Article

Comparison of External Fixation VS Dynamic Hip Screw in Treatment of Elderly Inter-Trochanteric Hip Fractures

External Fixation VS Dynamic Hip Screw in Hip Fractures

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ABSTRACT

Objective: To determine the outcome of external fixation compared with dynamic hip screw (DHS) for the treatment of high risk elderly inter-trochanteric hip fractures according to Boyd and Graffin classification.

Study Design: Randomized controlled trial

Place and Duration of Study: This study was conducted at the Department of Orthopedic Surgery, Fauji Foundation Hospital, Rawalpindi from May to Nov 2019.

Materials and Methods: Patients were randomly divided into two groups; patients in group A were given dynamic hip screw while patients in group B were given external fixation. The duration of surgery for each patient was recorded in minutes, starting from the time of incision till the time of closure in both groups. The study outcome was assessed in terms of surgical time

Results: Out of 60 patients, 25 (41.7%) were male and 35 (58.3%) were female. The outcome (surgical time) among patients in dynamic hip screw (DHS) and external fixation was 63.90±2.57 and 35.20±2.39, which was statistically significant (p-value 0.000).

Conclusion: The study concluded that external fixation has a better outcome as compared to dynamic hip screw in treatment in high-risk elderly patients with inter-trochanteric fractures.

Key Words: Hip fixators, inter-trochanteric fractures, Dynamic hip screw

Citation of article: Mobushir M, Ghazali U, Latif S, Farooqui F, Altaf HN. Comparison of External Fixation Vs Dynamic Hip Screw in Treatment of Elderly Inter-Trochanteric Hip Fractures. Med Forum 2020;31(11): 130-133.

INTRODUCTION

Hip fractures are a major public health problem. It is a leading cause of disability and fracture related mortality as high as 14 to 36%. The mortality after 1 month of hip surgery was estimated as 19% and after 1 year it approaches 20 to 30%. Globally, hip fractures affect almost 1.5 million people annually, with the highest rates in Scandinavia and the lowest in Africa. As the number of elderly people with co-morbidities is increasing due to better medical facilities, the number of elderly patients presenting with hip fractures are also rising. The estimated increase in the number of hip fractures will be 2.6 million by 2025 and to 6.25 million in 2050 worldwide.[1,2]

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Received: April, 2020
Accepted: August, 2020
Printed: November, 2020

Most of the patients presenting with trochanteric and sub trochanteric hip fracture are elderly who have a tendency to fall and they must be provided with suitable management. Sliding hip screw, compression plating, fixed angle blade-plate, intra-medullary nailing and external fixation (EF) are the different types of fixation for trochanteric fractures. Restoration of anatomical alignment, stable fixation, attaining high union rates, reducing blood loss, decreasing operative time and early rehabilitation are the main operative goals for these patients.[1,3]

Extra medullary fixations have been the standard in treating trochanteric fractures but it has a biomechanical disadvantage for unstable fractures when compared with the intramedullary nailing. Hence, intramedullary fixations became the most commonly employed device for inter-trochanteric fractures[4] but for elderly high risk patients, EF is still a valuable alternative method.[5]

EF was overshadowed by the use of DHS which had become the standard treatment due to a high prevalence of postoperative complications like pin-loosening, infection, and mechanical failure of the EF resulting in discontinuation of its use but surgeons have now started to reconsider EF as an alternative method for the treatment of intertrochanteric fractures in elderly high-

risk patients after the formation of new materials like the hydroxyapatite-coated pins.[6] Hence, better results were seen with EF than the effects of conventional internal fixations in these patients with reduced surgical time, quick and simple application, minimal blood loss, less radiation exposure, pain reduction, satisfactory stability and early weight-bearing. [7,8]

The aim of this study is to compare the use of external fixators versus dynamic hip screw in the treatment of elderly inter-trochanteric hip fractures in our local population as consensus regarding its use in such fractures is yet to be established.

MATERIALS AND METHODS

This randomized controlled trial was conducted on 60 consecutive patients of inter-trochanteric fractures of hip reporting to department of Orthopedic Surgery at Fauji Foundation Hospital, Rawalpindi from 1st May to 1st Nov 2019. All adult patients, both male and female, with inter-trochanteric fractures of hip (Boyd and Griffin per trochanteric fractures type 1 and 2 diagnosed on X-Rays) of less than two weeks duration between 60-90 years of age were included. Those patients were taken in the study that had American Society of Anesthesiology (ASA) physical status category three or four (ASA-III or ASA-IV). Patients were classified as ASA-I if they were normal healthy patients, ASA-II & ASA-III if they had mild & severe systemic disease respectively, ASA-IV if severe systemic disease that is a constant threat to life, ASA-V moribund patients not expected to survive without operation, and ASA-VI brain dead patients whose organs are removed for donor purposes. Patients with polytrauma, fracture time > 2 weeks, pathological fractures and those patients who had coagulation profile abnormalities were excluded. Study was started after approval from the ethical committee of hospital. Patients with operable (type 1 and 2 inter trochanteric) fractures admitted through outpatient and emergency department were included in the study. Selected patients were given written informed consent. Patients were divided in two groups randomly on basis of lottery method. Patients in Group A were operated by the senior orthopedic surgeon. Incision was started from vastus ridge and carried distally. Dissection was done through iliotibial band and vastus lateralis fascia longitudinally. Fixation was done with a dynamic hip screw. Hemostasis was secured and wound closure was done. In group B, patient was operated by the senior orthopedic surgeon. Fixation was done with external fixator and small stab incisions were made for all pins. 2 pins were inserted along the femoral neck and 2 pins was inserted perpendicular to the femoral shaft. Fixating rods was applied. Hemostasis was secured. The duration of surgery for each patient was recorded in minutes, starting from the time of incision till the time of closure in both groups. All this data was recorded on a specially designed proforma.

Statistical Data Analysis: Data was analyzed with SPSS version 23. Qualitative variables like gender, type of fractures (type I/ type II), mode of trauma was presented as frequency and proportion while quantitative variables like age and duration of surgery was presented as mean and standard deviation. Independent sample t-test was applied to determine difference between the two groups in terms of surgical time. Stratification with age, gender and type of fracture was done in order to control effect modifiers. P-value <0.05 were considered significant. Post-stratification independent sample t-test was applied.

RESULTS

A total of 60 patients were included in the study out of which 25 (41.7%) were male and 35 (58.3%) were female patients. Patients were randomly divided into two groups; patients in group A were given Dynamic Hip Screw while patients in group B were given External Fixation. In Group A, 13(43.3%) patients were male and 17 (56.7%) patients were female. In Group B, 12(40.0%) patients were male and 18 (60.0%) were female. Mean age of the patients at presentation was (years) 74.27±8.43. Mean age of patients in group A (DHS) was 74.17±9.10 and 74.73±7.86 in group B (external fixation).

Among group A patients, 13 (43.3%) had type 1 fracture and 17 (56.7%) had type 2 fracture whereas patients in groups B, 12 (40%) had fractures of type 1 and majority were of type 2 fractures i.e.18 (60%).

Among patients in group A, majority of the cases 22 (73.3%) had presented with fall trauma than road traffic accidents (RTA) 08 (26.7%), while in group B, 23 (76.7%) presented with fall trauma and RTA cases were only 7 (23.3%).

Table No. 1: Comparison of Surgical Time (mins) between two groups

	Two groups	N	Mean	Standard Deviation	p-value
Outcome (surgical time in minutes)	Group A (DHS)	30	63.90	2.57	0.000
	Group B (External Fixators)	30	35.20	2.39	

Table No. 2: Effect modifier i.e. Age, Gender, and Fracture type stratification and comparison of Outcome (surgical time) among both the groups

Effect modifiers		Two Groups		p value
		Group A (DHS)	Group B (External Fixator)	
Age group	60-70 years	64.23 ± 3.11	35.00 ± 2.32	0.000
	71-90 years	63.65 ± 2.14	35.38 ± 2.52	0.000
	Male	63.23±2.12	35.75±2.80	0.000

Gender	Female	64.41±2.83	34.83±2.09	0.000
Fracture type	I	62.85±1.95	35.42±2.23	0.000
	II	64.71±2.75	35.06±2.55	0.000

The outcome (surgical time in minutes) among patients in dynamic hip screw (DHS) and external fixation was 63.90±2.57 and 35.20±2.39, which was statistically significant (p-value 0.000). Comparison of surgical time in minutes between two groups is shown in Table 1. Effect modifiers i.e. age, gender and fracture type are shown in Table 2.

DISCUSSION

Hip fractures are a leading cause of mortality and dependency among the elderly. Older age, female gender and osteoporosis are major risk factors for hip fractures. Different factors like several co-morbidities, poly-pharmacy, and decreased functional ability make elderly population particularly prone to increase risk of fall. Fractures are found to be the most serious injury due to falls. Surgery has become the standard of care for most elderly patients with fractures.[9,10]

External fixation was firstly introduced for intertrochanteric fractures in 1950s at about the same time as DHS was used, however, since the early results of external fixations were not so encouraging, DHS remains the gold standard for management. It provides both the dynamic and static pressure to stabilize the fracture.[7,11]

But due to the presence of co-morbidities in elderly patients, they may not be the most suitable candidates for definitive internal fixation. Moreover; these patients may need prolonged hospital admission after internal fixation. In order to achieve early mobilization and reduce hospital stay, external fixation has been suggested as an alternative treatment method for elderly high-risk patients.[3]

The majority of these fractures occur in an older population with an average age of around 80 years.[12] In our study, the mean age of the patients at presentation was (years) 74.27±8.43 while the mean age of patients in group A (DHS) was 74.17±9.10 and 74.73±7.86 in group B (external fixation). Study conducted by Kazemian et al in 2014 showed that average age of the patients was 78 years.[13]

A higher number of fractures was found among female patients in most of the previous studies largely association with osteoporosis. Females to males ratio was about four to one. In our study, we have seen the similar trend with 35 (58.3%) were female patients and 25 (41.7%) were males. In an another study by Mattison et al, female patients were 69.4% which was consistent with our study.[2,12]

In our study, frequency and percentage of fracture type (I / II) in patients among group A was 13 (43.3%) and 17 (56.7%) whereas patients in groups B majority 18 (60.0%) of the cases were of fracture type-II than type-I 12 (40.0%) whereas study conducted in 2014 showed that in Group A, eleven patients had an AO/OTA type-A1 fracture and nineteen patients had a type-A2 fracture. In Group B, thirteen patients had a type-A1 fracture and seventeen patients had a type- A2 fracture.

In our study, we compared the outcome (surgical time) of external fixation compared with dynamic hip screw (DHS) for the treatment of high-risk elderly intertrochanteric hip fractures according to Boyd and Griffin classification. The outcome (surgical time) among patients in dynamic hip screw (DHS) and external fixation was 63.90±2.57 and 35.20±2.39 respectively, which was statistically significant (p-value 0.000); showing that external fixation as a better treatment option than the dynamic hip screw in treatment in high-risk elderly patients with intertrochanteric fractures. This is in contrast to a study by Moroni et.al who found lesser mean intra-operative time (34±5 minutes) in external fixator group than in DHS group (64±6 minutes) which was also significant ($P<0.005$) .[14]

There remains a persistent controversy regarding the choice of treatment for hip fractures. Four randomized controlled trials confirmed the effect of external fixation better than DHS which were conducted in Greece, Italy, Nepal and Iran over 260 patients. External fixation had benefits in terms of simple application in local anesthesia, decreased time of surgery, minimal blood loss intra-operatively and less need of blood transfusion, pain reduction post-operatively with shorter hospital stay, satisfactory stability and early weight-bearing.[5,15]

It could be considered as an alternative for elderly high risk patients, especially in those who had multiple injuries, those who refuse transfusion on religious grounds and those who could not tolerate routine spinal or general anesthesia and open surgery. [13,16].

CONCLUSION

The study concluded that external fixation has a better outcome than dynamic hip screw in treatment of elderly patients with intertrochanteric fractures. In order to establish it further, such studies must be conducted at multiple setups as consensus is required about the use of external fixator in the management of high-risk intertrochanteric fractures in our local population.

Author's Contribution:

Concept & Design of Study:	Muhammad Mobushir
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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