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Comparison of Functional Outcome Like Range of Motion of Hip After Fixation of Trochanteric Fracture with Dynamic Hip Screw (DHS) and Proximal Femoral Locking Compression Plate (PF-LCP)

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Abstract **Original Research Article**

Trochanteric region of the femur is that part which connects the neck and shaft of femur. So head, neck, trochanter facilitates the movement at the hip joint causing the limbs to swing clear of the pelvis. Intertrochanteric fractures are divided into stable and unstable varieties. To assess the Comparison of functional outcome like range of motion of hip after fixation of trochanteric fracture with dynamic hip screw (DHS) and proximal femoral locking compression plate (PF-LCP) the present prospective randomized clinical trial was conducted in the Department of Orthopedic, National Institute of Traumatology and Orthopedic Rehabilitation (NITOR) between January 2009 to December 2010. A total of 20 patients with post traumatic trochanteric fractures and osteoporotic fractures within three weeks of incidence were included in the study. The age distribution of the patients was identical between the groups with mean age of the patients being 56.2 and 55.6 years in DHS and PF-LCP groups respectively (p=0.626). Males were predominant in both groups (each of 70%). In both groups fractures were primarily caused by RTA (60% in DHS and 50% in PF-LCP) (p=0.327) with all patients having closed type of injury. Sixty percent of the injuries in each group had right-sided involvement. (p = 0.675). All patients of either group required open surgical procedure. DHS required shorter operation time than that required by PF-LCP (72.5±5.4 min vs. 96.5±3.3 min. p<0.001). Immediate postoperative outcome demonstrates that all of the patients in both groups had intact cut-out of lag-screw and implant failure did not occur. Thirty percent patients in DHS group needed blood transfusion, while only 10% patient needed the same in PF-LCP group (p = 0.291). At 4 weeks Follow up 30% of DHS group had infection as opposed to none in the PFL-CP group. Ninety percent of the patients in the former group had pain as opposed to none in the latter group (p<0.001). Visible callus formation was significantly less in the former group (30%) than that in the latter group (100%) (0.002). At 12 weeks of follow up 80% patients in DHS group complained of no pain and at 20 weeks of follow up none had pain. Fractures were in a state of alignment, callus formation was visible and positioning of screw was intact in both the study groups. Sixty percent of patients in DHS group al 20 weeks of follow up exhibited fractures in a state of uniting, while all of the PF-LCP patients had their fractures united by. All the patients of PF-LCP group had excellent outcome in terms of Harris Hip Scale (HHS) compared to 40% in DHS group (P=0.014). Half of the DHS patients had good (89-80) and 10% fair score (79-70). The different movements of hip like flexion, internal rotation, external rotation, adduction and abduction were evaluated at 12 and 20 weeks. All the patients of PE-LCP group enjoyed wide range of hip movements as compared to the patients of DHS group at 20 weeks of follow up (p<0.05).

Keywords: Functional Outcome, Fixation of Trochanteric Fracture, Dynamic Hip Screw (DHS), (PF-LCP).

INTRODUCTION

Trochanteric region of the femur is that part which connects the neck and shaft of femur at an angle of about 125 degrees, the neck is about 5cm long [1]. So head, neck and trochanter facilitates the movement at the hip joint causing the limbs to swing clear of the pelvis. The term trochanteric fracture may be used to describe any fracture in the lies approximately between the greater trochanter and the lesser trochanter. Intertrochanteric fractures are divided into stable and unstable varieties. Unstable fractures are those where there is a poor contact between the fracture fragments, as in four part intertrochanteric types, or where the fracture pattern is such that weight bearing forces tend

to displace the fracture further. Instability may also arise if the posteromedial cortex is shattered displacing a large fragment that include the lesser trochanter. All over the world the hip fracture incidence are about two times higher in women than in men [2]. Women's over representation have been explained by women's lower bony mass and density and higher frequency of falling, Epidemiologic studies show that trochanteric fractures are increasing problems since compared with cervical fractures their relative number increases progressively with age in after the age of 60 years and since their incidence has been shown to increase in both sexes and all age groups during the recent decades [3]. This may have direct public health implication since mortality, morbidity cost caused by trochanter fractures are higher than those of cervical fractures. Reduced long density by age and over recent decades has been the most frequently mentioned reason for the increased rate of trochanter fractures.

OBJECTIVES

General Objective:

1. To evaluate functional outcomes and acceptability between DHS and PF-LCP.

Specific objective:

2. Comparison of functional outcomes like range of motion of Hip after fixation of trochanteric fracture with dynamic Hip screw (DHS) and proximal femoral Locking compression plate (PF- LCP).

METHODS AND MATERIALS

The following methods and materials were used to conduct the study.

Study design: The present study was a prospective randomized clinical trial.

Place and period of Study: The study was conducted in the Department of Orthopedic, National Institute of Traumatology and Orthopedic Rehabilitation (NITOR) over a period 2 years from January 2009 to December 2010.

Study population: Patients with post traumatic trochanteric fractures and osteoporotic fractures within three weeks of incidence were the study population. The eligibility criteria of the study population were given below.

Eligibility criteria:

Inclusion criteria:

Patients with following characteristics were eligible for study:

- Eighteen years and above for male patients.
- Sixteen years and above for female patients.

Exclusion criteria:

Patients with following characteristics were excluded from the study:

- Open fractures.
- Pathological fractures other than osteoporotic fracture.
- Physiological lives not permit operative treatment.
- Non united fractures.

Sample size & sampling procedure: A total of 20 patients (10 in DHS group and another 10 in PF-LCP group) were consecutively included in the study.

Variables studied: The demographic variables included in the study were age, sex and occupation. The injury profile, management of injury fracture in the hospital and postoperative complications were studied. Infection, pain, fracture alignment, visible callus, position of screw and range of motion measured at 4.12 and 20 weeks.

Institutional approval: Prior permission was taken tromp Ethical Review Committee, National Institute of Traumatology and Orthopedic Rehabilitation (NITOR), Dhaka, Bangladesh to conduct this study.

Addressing ethical issues: Keeping compliance with Helsinki Declaration for Medical Research Involving Human Subjects 1964, the study subjects were informed verbally about the study design, the purpose of the study and right for withdrawing themselves from the project at any time, for any reason, what so ever patients who gave informed consent to allow them to participate in the study were included as study sample.

Data collection: A structured data collection form was developed containing all the variables of interest which was finalized following protesting. Data were collected by interview, observation and clinical examination.

Procedural details:

Anaesthesia: Subarachnoid block (Spinal anaesthesia)/General anaesthesia.

Exposure: Lateral approach / Anterolateral approach.

Fixation: Closed reduction followed by internal fixation by dynamic hip screw (DHS) or proximal femoral locking compression plate (PF-LCP).

Closure: The wound were closed accordingly after proper haemostasis and keeping drain in situ.

Antibiotic prophylaxis: Pre-operative and post-operative antibiotic coverage provided to all cases.

Post-operative management:

- ❖ Isometric quadriceps exercise from 1st post-operative day.
- ❖ After 48 hours-drain off.

- On 14-15th post-operative day-stich off
- Then quadriceps exercise by hanging the lower limb at the side of the bed. Stich off to 6 weeks-Non weight bearing walking by crutch.
- Next 6 weeks - 12 weeks - Toe touch walking.
- After -12 weeks- Radiological evaluation of fractures union. If healing occurs weight bearing walking is permitted.

Follow up: At OPD as per following schedule from the time of operation. 1st follow up (at week 4), 2nd follow up (at week 12) and 3rd follow up (at week 20). The cases evaluated both clinically and radiologically.

Data processing Statistical analysis: Data were processed and analyzed using SPSS (Statistical Package for Social Sciences). The test statistics used to analyses the data were Student's t-Test, Chi-square Test. For all analytical tests, the level of significance was set at 0.05 and $p < 0.05$ was considered significant. The summarized data were presented in the form tables and charts.

RESULTS

20 patients were included in our study. Range of motion at different follow up. The different movement of hip like flexion, internal rotation, external rotation, adduction and abduction were evaluated at 12 and 20 weeks. All the hip movements were significantly better in PF-LCP group than that in DHS group at week 12 and improved further at 20 weeks of follow up ($p<0.05$) (Table 1).

Table-1: Range of motion at different follow up between two groups (N=20)

Range of motion	Group		P-value
	DHS (N=10)	PF-LCP (N=10)	
2nd follow up (at week 12)			
Flexion (degree)	118.0±5.8	131.0±4.5	<0.001
Internal rotation (degree)	42.5±7.1	62.5±3.5	<0.001
External rotation (degree)	68.0±6.7	82.0±3.5	<0.001
Adduction (degree)	17.0±4.2	21.0±2.1	0.019
Abduction (degree)	21.5±3.3	26.0±2.1	0.002
3rd follow up (at week 20)			
Flexion (degree)	133.0±4.8	139.0±2.1	0.002
Internal rotation (degree)	65.0±4.0	69.5±6.1	0.004
External rotation (degree)	83.5±4.7	89.0±2.1	0.004
Adduction rotation (degree)	22.0±2.5	25.0±1.5	0.005
Adduction (degree)	27.0±2.6	30.0±2.1	0.005

Student's t-Test was employed to analyse the data.

Harris Hip Score: Harris Hip Score shows that all of the patients of PF-LCP group had excellent outcome in terms of Harris Hip score compared to 40% in DHS group ($P = 0.014$). Half of the DHS patients had good (89-80) and 10% fair score (79-70) (Table 2).

Table-2: Comparison of Harris Hip Score between two groups (N=20)

Harris Hip Score	Group		P-value
	DHS (N=10)	PF-LCP (N=10)	
100-90 (Excellent)	4(40.0)	10(100.0)	0.014
89-80 (Good)	5(50.0)	00	
79-70 (Fair)	1(10.0)	00	

Chi-square Test was employed to analyse the data.

DISCUSSION

Some of the findings of the study presented in the earlier section needs to compared to come to conclusion. The age distribution of the patients was identical between the groups with mean age of the patients being 56.2 and 55.6 years in DHS and PF-LCP groups respectively ($P=0.626$). Males were predominant in both groups (each of 70%). In Zha GC et al [4], studied a total of 110 patients (72 females and 38 males) with per-trochanteric femoral fractures who were subjected to PF-LCP treatment. Business was the prime occupation. All other occupations were almost identically distributed between PE-LCP and DHS groups. In both groups fractures were primarily caused by RTA (60%, in DHS and 50%, in PF-LCP) ($p=0.327$) with all patients having closed type of injury. Sixty percent of the injuries in each group had right-sided involvement ($p=0.675$). The average time interval between injury and operation was bit higher in the PF-LCP group compared to DHS group (15.3±4.7 vs. 13.9±6.5 days, $p = 0.558$). All patients of either group required open surgical procedure and received transfusion of blood during operation DHS required

shorter operation time than that required by PF-LCP (72.5±5.4 min vs. 96.5±3.3, p<0.001). Luo XP, et al intertrochanteric hip fractures treated with locking plate and DHS were retrospective analysed [5]. Immediate postoperative outcome demonstrates that all of the patients in both groups had intact cut-out of lag-screw and implant failure did not occur. The majority of those who survive are disabled with only 25% able to resume normal activities [6, 7, 8]. At 12 weeks of follow up 80% patients in DHS group complained of no pain and at 20 weeks of follow up none had pain. Fractures were in a state of alignment, callus formation was visible and positioning of screw was intact in both the study groups. Sixty percent of patients in DHS group at 20 weeks of follow up exhibited fractures in a state of uniting, while all of the PF-LCP patients had their fractures united by. All the patients of PF-LCP group had excellent outcome in terms of Harris Hip score compared to 40% in DHS group (P=0.014) had excellent half of the DHS patients had good (89-80) and 10% fair score (79-70). The different movements of hip like flexion, internal rotation, external rotation, adduction and abduction were evaluated at 12 and 20 weeks. All the patients of PF-LCP group enjoyed wide range of hip movements as compared to the patients of DHS group at 20 weeks of follow up (p<0.05).

CONCLUSION

Fractures were in a state of alignment, callus formation was visible and positioning of screw was intact in both the study groups. Sixty percent of patients in DHS group at 20 weeks of follow up exhibited fractures in a state of uniting, while all of the PF-LCP patients had their fractures united by. All the patients of PF-LCP group had excellent outcome in terms of *Harris Hip* Scale (HHS) compared to 40% in DHS group (P=0.014). Half of the DHS patients had good (89-80) and 10% fair score (79-70). The different movements of hip like flexion, internal rotation, external rotation, adduction and abduction were evaluated at 12 and 20 weeks. All the patients of PE-LCP group enjoyed wide range of hip movements as compared to the patients of DHS group at 20 weeks of follow up (p<0.05).

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