The Professional Medical Journal
www.theprofesional.com

DOI: 10.29309/TPMJ/2019.26.03.3307

ORIGINAL PROF-0-3307

INTER-TROCHANTERIC FRACTURES;

SURGICAL OUTCOME OF PATIENTS WITH TRAUMATIC STABLE AND UNSTABLE INTER-TROCHANTERIC FRACTURES TREATED WITH DYNAMIC HIP SCREW.

Farhad Alam[1], Mudassar Jabeen[2]

1. FCPS (Orthopedic)
Assistant Professor
Department of Orthopedic
University Medical & Dental College,
Madina Teaching Hospital,
Faisalabad.
2. MBBS, FCPS (General Surgery)
Assistant Professor
Department of Surgery
Independent University Hospital,
Faisalabad.

Correspondence Address:
Dr. Mudassar Jabeen
Department of Surgery
Independent University Hospital,
Faisalabad.
mudaser4farhad@yahoo.com

Article received on:
05/07/2018
Accepted for publication:
22/01/2019
Received after proof reading:
23/02/2019

A*BSTRACT*... **Introduction:** Hip fractures are a leading cause of death and disability among elderly. Approximately half of these injuries are intertrochanteric fractures and the incidence is continuously increasing. These fractures are the most common injuries around the hip region and are more common in elderly people. Different types of implants were tried at different times for internal fixation of these fractures, of which dynamic hip screw has remained the most popular one. But with the advent of some newer implants, the efficacy of dynamic hip screw is being questioned. **Objectives:** To determine the results of dynamic hip screw as a method of internal fixation in closed stable as well as unstable intertrochanteric fractures of femur in adults. **Design:** Descriptive case series. **Setting:** The study was conducted in orthopedic department Allied Hospital Faisalabad. **Period:** 11months (from 26th, march, 2015 to 25th Feb, 2016). **Subjects and Methods:** Sixty cases of intertrochanteric fractures were included and operated for internal fixation with dynamic hip screw under fluoroscopic guidance. Pre, per and post-operative findings during hospital stay and follow-up period were recorded. **Results:** We had a total 60 cases, 20 patients in group A stable intertrochanteric fractures and 40 patients in group B unstable intertrochanteric fractures. We have reported the follow up study up to 20 weeks. There were 10 (50%) male and 10 (50%) female in group A. In group B 27 (67.5%) males and 13 (32.5%) females. The youngest pt was 25 years in group A and 16 years in group B. The mean age in group A was 59.10 and st/deviation 16.942. In group B mean age was 54.85 and st/deviation 14.123. Infection rate in group A was 5%. In group B superficial infection was 5% and deep infection was 2.5%. Nonunion in both groups was 5%. The failure rate was 5% in group A and 20% in group B. **Conclusion:** The use of Dynamic hip screw with aside plate is associated with good results and acceptable complication rate. Dynamic hip screw is implant of choice in both stable and unstable intertrochanteric fractures.

Key words: Dynamic Hip Screw, Intertrochanteric Fracture, Outcome.

Article Citation: Alam F, Jabeen M. Inter-trochanteric fractures; surgical outcome of patients with traumatic stable and unstable inter-trochanteric fractures treated with dynamic hip screw. Professional Med J 2019; 26(3):513-519.
DOI: 10.29309/TPMJ/2019.26.03.3307

INTRODUCTION

The intertrochanteric fractures are generally referred as extra capsular fractures of proximal femur in the trochanteric region. The incidence of these fractures, particularly comminuted unstable type, is increasing.[1] These fractures are very common in elderly patients (60-70% of hip fractures). there is about 15-20% mortality rate within a year of having this type of fracture in elderly patient.[2]

Closed methods of treatment of these fractures have largely been abandoned due to high rate of complications with increased morbidity and mortality. There are only a few indications for non operative treatment of intertrochanteric fractures. Medically unstable patients, already immobile patients and the patients with bad skin condition are the candidates for conservative management.[1] Healing with conservative treatment usually resulted in malunion with varus, external rotation deformity and shortening of limb.[3] Now a day's these fractures are treated by surgery(internal fixation) however poor bone quality and neck screw instability can adversely affect the results with currently available fixation devices.[4] The dynamic hip screw (DHS) may be a better option in elderly patients.[5] However because of the various kinds of implants the selection of implant for these fractures remains controversial.[6]

The goal of surgical treatment is the restoration of the patient to his pre-injury status as soon as possible.[3]

For union of these fractures, maintenance of stable reduction is the most important factor. To determine the type of fixation, each fracture pattern must be meticulously evaluated by roentgenograms before surgery. Whether the intertrochanteric fracture is stable or unstable, is based on fracture geometry and possibility of restoration of cortical contact medially and posteriorly. Unreduced medial cortex may collapse into varus. Stable reduction, therefore, provides sufficient medial and posterior cortical contact to effectively resist varus and posterior displacement of major proximal and distal fragments.[7]

Implant failure in these fractures has been related to type of fracture particularly its stability, inadequate reduction, osteoporosis and incorrect placement of device within the femoral head.[8] The commonest mode of failure is cutting out of the screw from femoral head.

In orthopedics, surgical site infection after implant surgery is disaster both for patients and surgeon. This may lead to increased use of antibiotic, prolonged hospital stay, repeated debridements, and prolong rehabilitation, morbidity and mortality.[9]

Recently some newer implants have been advocated for the treatment of intertrochanteric fractures. Intramedullary devices like Gamma nail and proximal femoral nail are gaining popularity due to described theoretical advantages of being placed in the line of weight bearing axis and having shorter lever arm, which reduces the risk of mechanical failure.[1]

AIMS AND OBJECTIVES

To determine the results of dynamic hip screw as the method of internal fixation in closed stable as well as unstable inter trochanteric fractures of femur in adults.

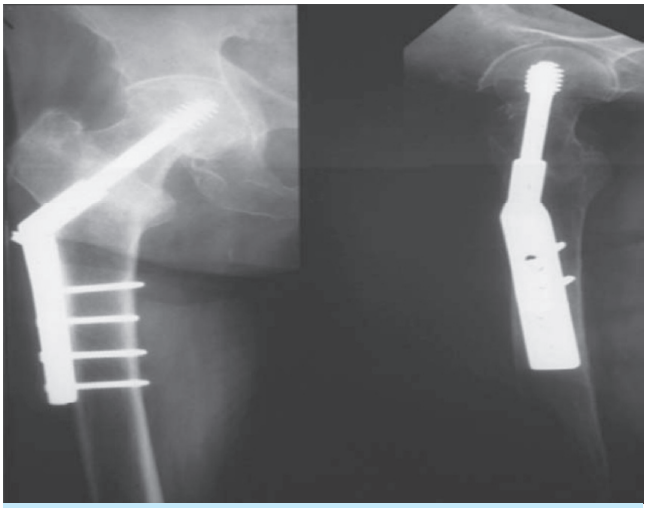


Figure-1. X-ray of dynamic hip screw fixation

MATERIAL AND METHODS

Study Design

Descriptive case series.

Settings

Orthopedic department Allied Hospital, Faisalabad.

Duration of Study

11 months from 26th, march, 2015 to 25th Feb., 2016.

Sample Size

60 patients. Cases with closed stable and unstable intertrochanteric femoral fractures will be included in this study.

Confidence level (%)	95
Anticipated population proportion	0.6
Absolute precision required (d)	0.05
Relative precision (a)	0.08333333333
Population size (N)	72
Sample size (n)	60

$$\text{Sample size (n)} = \frac{Z^2\ 1\text{-}\alpha/2\ P(1\text{-}P)\ N}{d^2\ (N\text{-}1) + Z^2\ 1\text{-}\alpha/2\ P(1\text{-}P)}$$

Sample Technique

Non-probability, purposive.

SAMPLE COLLECTION

Inclusion Criteria

All patients between the age of 15 to 60 years presenting in accident and emergency department of Allied Hospital, Faisalabad with

stable and unstable closed intertrochanteric fracture of femur.

Exclusion Criteria

(1) Patients suffering from polytrauma.
(2) Patients unfit for anesthesia.
(3) Pathological fractures.
(4) Fracture more than 4 weeks old.
(5) Non unions

Parameters of Infections

(1) Fever >99f
(2) Rise in local temperature
(3) Local redness
(4) Discharging sinus

Implant Failure Includes

Broken dynamic hip screw (DHS), side plate and cortical screws and Cut out of neck and head of femur by dynamic hip screw (DHS).

DATA COLLECTION PROCEDURE

All patients included in this study were either be assigned group A or group B by permission of hospital ethical committee. Groups made according to fracture stability. All the patients in either group were explained the nature of intervention and written informed consent was obtained. All patients were managed initially in the accident and emergency department. Patients were assessed thoroughly for any evidence of other injuries. X- Ray pelvis was done to confirm inter trochanteric fractures of femur and to exclude other injuries. Patients were investigated for complete blood count, random blood sugar, blood urea and electrocardiography. Patients were resuscitated by intravenous fluids or blood. Patients were given strong analgesia to relieve pain. Patients were put on skeletal traction till the definitive surgery.

Open reduction and internal fixation of stable (31A1 in AO classification) and unstable inter trochanteric fractures (31A2 A3 in AO classification) of femur was done with dynamic hip screw with aside plate.

Patient underwent spinal anesthesia and antibiotics were administered at the time of induction. Patient position were made on traction table with 15 degree limb adduction. A longitudinal lateral incision given 2-3cm below the greater trochanter of about 8-10cm length. A guide pin was inserted after fracture reduction and confirmed by C-arm. Then a hole was made and insert the screw with aside plate. Screw fixation applied at external position of femur shaft. Screw cap installed, hemostasis secured, drain placed and wound closed in layers.

Postoperatively broad-spectrum antibiotic was given for ten days, for the first three days intravenously and for the rest 7 days orally. Skin stitches were removed on 12th postoperative day. Further follow up was at 6, 12, 20, and after 24 weeks to see infection, union and implant failure. At each visit clinical examination was done to assess for clinical union and infection and radiographs were taken to see evidence of infection and union, both radiological and clinical. Presence of infection was assessed by fever, rise in local temperature, local redness and any discharging sinus and by CBC and ESR. The patient with evidence of infections, appropriate antibiotics was prescribed according to culture and sensitivity report. Partial weight bearing was advised when there was an evidence of radiological union.

Data Analysis Procedure

All the data was presented in figures and tables and were statistically analyzed by the software SPSS version 10.

In this study gender, fever, rise in local temperature, infection, union and implant failure were qualitative variables. Frequency and percentage were presented for all qualitative variables. Mean and standard deviation was calculated for quantitative variables I.e. Age.

Intertrochanteric fractures					
		Fre-quency	Percent	Valid Percent	Cumulative Percent
Valid	Stable	20	33.3	33.3	33.3
	Unstable	40	66.7	66.7	100.0
	Total	60	100.0	100.0	

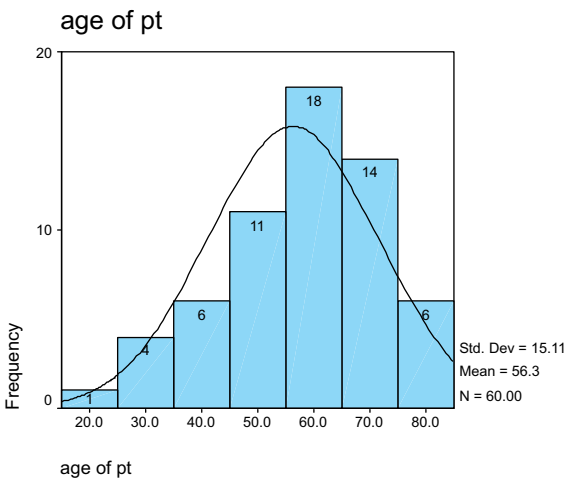
Table-I. Distribution of patients according to fracture pattern on X-ray

Intertro-chanteric Fractures		Frequency	Percentage
Stable	Male	10	50.0%
	Female	10	50.0%
	Total	20	100.0%
Unstable	Male	27	67.5%
	Female	13	32.5%
	Total	40	100.0%

Table-II. Sex Distribution of patients in both groups

	N	Minimum	Maximum	Mean	Std. Deviation
Age of pt	60	16	83	56.27	15.112

Table-III. Age distribution of patient (n=60)



Histogram

Intertro-chanteric fractures		Frequency	Percentage
Stable (n=20)	Yes No	1 19	5.0% 95.0%
Unstable (n=40)	Yes N0	3 37	7.5% 92.5%

Table-IV. Distribution of patient according to rise in temperature

Intertro-chanteric Fracture		Frequency	Percentage
Stable (n=20)	Yes No	1 19	5.0% 95.0%
Unstable (n=40)	Yes No	3 37	7.5% 92.5%

Table-5. Distribution 0f patient according to local redness

Intertro-chanteric Fracture		Frequency	Percentage
Stable (n=20)	Yes No	1 19	5.0 95.0
Unstable (n=40)	Yes No	1 39	2.5 97.0

Table-VI. Distribution of patients according to discharging sinus

Intertro-chanteric Fracture		Frequency	Percentage
Stable (n=20)	Yes No	19 1	95 5
Unstable (n=40)	Yes No	38 2	95 5

Table-VII. Distribution of patient according to radiological union

Intertro-chanteric Fractures		Frequency	Percentage
Stable (n=20)	Yes No	0 20	0.0 100.0
Unstable (n=40)	Yes No	1 39	2.5 97.5

Table-VIII. Distribution of patient according to broken Lag screw

Intertro-chanteric Fracture		Frequency	Percentage
Stable (n=20)	Yes No	1 19	5.0 95.0
Unstable (n=40)	Yes No	5 35	12.5 87.5

Table-IX. Distribution of patients according to broken plate

Intertro-chanteric Fractures		Frequency	Percentage
Stable (n=20)	Yes No	1 19	5.0 95.0
Unstable (n=40)	Yes No	2 38	5.0 95.0

Table-X. Distribution of patients according to broken cortical screw

RESULTS

We had total 60 cases, 20 patients in group A; stable intertrochanteric fractures and 40 patients in group B; unstable intertrochanteric fractures.

We have reported the follow up study up to 20 weeks. (Figure-1 and Table-I). There were 10(50%) male and 10(50%) female in group A. In group B 27(67.5%) males and 13(32.5%) females. (Figure-2 and Table-II) The youngest pt was 16 years in group B. The mean age in group A was 59.10 and st/deviation 16.942. In group B mean age was 54.85 and st/ deviation 14.123. (Histogram and Table#3)

UNION

In group A 19(95%) patients the fracture united in 20 weeks. Only 01 (5%) patients went non union for which implant has to be removed and treat infection, later on fracture fixed with bone graft. In group B 38(95%) patients the fracture also united. 2 (5%) patients went non union due to deep infection and implant breakage. (Table-VII)

INFECTIONS

Superficial Infections

In group A, 1(5%) patient had rise in temperature and local redness (superficial infection), which were treated with appropriate antibiotics, according to the culture and sensitivity report. In group B 3 (7.5%) patients had rise in temperature and local redness (superficial infections) were treated with appropriate antibiotics. Table-IV and V.

Deep Infections

In group A 1 patient (5%) had discharging sinus (deep infections) but get united after treating infection with antibiotics. In group B only one (2.5%) had discharging sinus (deep infection) and went non-union due to infection despite treatment with antibiotics. Table-VI

IMPLANT FAILURE

In group A 0 patient with broken lag screw, 01(5%) patient present with broken of cortical screw and 01(0.5%) patient with broken barrel plate.

In group B 5(12.5%) patients presented with broken barrel plate. 2 (5%) patients presented with broken cortical screw and 1 (2.5%) patient presented with broken lag screw. Table-VIII,IX and X

DISCUSSION

Intertrochanteric fractures, particularly the unstable ones, also poses challenging problem for the orthopaedic surgeons regarding their management. Several methods and techniques have been advocated for treating these difficult fractures but each one is associated with its own complications. That is why it is still an “unsolved fracture”.[1]

To achieve early ambulation of patients with an intertrochanteric fracture, two conditions must be met: the implant used for fixation must be strong enough to withstand loading exerted upon it during fracture healing, and the fracture itself must be rendered stable in suitably reduced position.[10]

The key to intertrochanteric fracture surgery is to prevent the varus malunion and to reduce the mortality rate. Presently, the surgical methods have extramedullary and intramedullary internal fixation approaches.[11] DHS with aside plate is extramedullary fixation system. It was first used in 1967 in clinical practice. It is a major treatment for intertrochanteric fractures.[12-15] The proximal end and binding position of the plate have strong bending resistance so create strong fixation, better sliding function. It also has static and dynamic characteristics of pressurizing action and applies pressure on fracture ends. A sliding screw connects the plate flexibly and allows convenient operation. However large incision, broad exposure, lack effective internal support and poor antitorsional strength especially for unstable fracture are some disadvantages of DHS.[14,16] Some clinical studies have shown that DHS is good for stable fractures but is not an ideal method for unstable fractures treatment.[17-20]

The Intertrochanteric fractures are fractures of elderly. Moran et al[21] in a mega study of 2903 cases, reported the mean age of 80 years for hip fractures. In my study, the mean age was found to be 59.10 years in group A and 54.85 in group B. The reason for less mean age in our study as compared to the international data may be the increased incidence of osteoporosis at younger age, comparatively, due to less active life style.

Also increased incidence of road traffic accident especially in motorbike riders is another cause as most of them are young people.

Intertrochanteric fractures are more common in females due to the low bone mass and post menopausal osteoporoses which are evident in most of the studies conducted in other countries. Moran et al[21] reported 76% females with male to female ratio of 1:3.1. But in our study male to female ratio was 1.6:1. This sex distribution is against most of the international data but is in accordance with different local studies. The reason for the high incidence of these fractures among male population in our study is their more active lifestyle, which is more prone to traumas.

Saudan et al[22] had average 13 weeks healing time and Schipper et al[23] reported union time of 16 weeks after fixation of intertrochanteric fractures. In the present study, union time of 20 weeks after fixation of intertrochanteric fractures with dynamic hip screw and non union is 5%. which is comparable with international as will as local studies and even less than non union reported by Riyaz N.N et al[24] of about 12% in 2015.

In orthopaedic, the surgical site infection after implant surgery is disaster both for the patients and surgeon.[10] The rate of infection in the present study is 7.5% superficial infection in stable and unstable intertrochanteric fractures, and 2.5% deep infection in unstable which is although much higher than accepted standard for postoperative wound infection, which should be less than 1% but comparable to study by Venamali et al[25] of 3.3%. It is even less than infection rate reported by Riyaz et al[24] of 8% and Gill SPS et al[26] of 10% in their studies.

Failure of fixation has been reported in 10% to 20%. The main problem has been cutting out of femoral head, plate breakage and pulling off the shaft.[27] Implant failure rate of 5%, 8% and 13.3% reported by Gill SPS et al[26], Riyaz et al[24] and Venamali et al[25] respectively. In present study total 10 implants had broken, 1 lag screw, 6 barrel plates and 3 cortical screws which is 16.7%.

CONCLUSION

The use of this implant (DHS) for treatment intertrochanteric fractures gives good functional result with acceptably low complication rate in both stable and unstable fractures.

REFERENCES

1. Koval KJ, Zukerman JD. **Intertrochanteric fractures. In: Bucholz RW, Heckman JD. Rockwood and Green's fractures in adults.** 5th ed. Philadelphia: Lipponcott Williams & Wilkins, 2001; 1636-64.

2. Herman A, Landau Y, Gutman G, Ougortsin V, Chechick A. **Radiological evaluation of intertrochanteric fracture fixation by the proximal femoral nail.** Injury 2012; 43:856-863.

3. Suman SK, Kumar singh SK and Manjhi LB. **Proximal femoral nailing versus dynamic hip screw device for tronchanteric fractures.** A comparative study. IJOS 2017; 3(2):738-740.

4. Soucanye de Landevoisin E, Bertani A, Candoni P, Charpail C, Demortiere E. **Proximal femoral nail antirotation (PFN-ATM) fixation of extra-capsular proximal femoral fractures in the elderly: Retrospective study in 102 patients.** Orthop Traumatol Surg Res 2012; 98: 288-295.

5. Siavashi B, Aalirezaei A, Moosavi M, Golbakhsh MR, Savadkoohi D. **A comparative study between multiple cannulated screws and dynamic hip screw for fixation of femoral neck fracture in adults.** Int Orthop 2015; 39: 2069-2071.

6. Matre K, Havelin LI, Gjertsen JE, Espehaug B, Fevang JM. **Intramedullary nails result in more reoperations than sliding hip screws in two-part intertrochanteric fractures.** Clin Orthop Relat Res 2013; 471: 1379-1386.

7. Kesmezacar H, Ogut T, Bilgli MG, Gökay S, Tenekecioğlu Y. **Treatment of intertrochanteric femur fractures in elderly patients: Internal fixation or hemiarthroplasty.** Acta Orthop Traumatol Turc 2005; 39: 287-94.

8. Gotfried Y. **The lateral trochanteric wall: A key element in the reconstruction of unstable pertrochanteric hip fractures.** Clin Orthop Relat Res 2004; 425: 82-6.

9. Edwards C,Counsell C,Moran G. **Early infection after hip fracture b surgery, risk factor, cost and outcome.** J Bone joint Surg 2008; 90-B:770-7.

10. Lorich DG, Geller DS, Nielson JH. **Osteoporotic pertrochanteric hip fractures: Management and current controversies.** J Bone Joint Surg 2004; 86:398-410.

11. Fensky F, Nüchtern JV, Kolb JP, Huber S, Rupprecht M, Jauch SY, Sellenschloh K, Püschel K, Morlock MM, Rueger JM, Lehmann W. **Cement augmentation of the proximal femoral nail antirotation for the treatment of osteoporotic pertrochanteric fractures--a biomechanical cadaver study.** Injury 2013; 44: 802-807.

12. Inal S, Taspinar F, Gulbandilar E, Gok K. **Comparison of the biomechanical effects of pertrochanteric fixator and dynamic hip screw on an intertrochanteric femoral fracture using the finite element method.** Int J Med Robot 2015; 11: 95-103.

13. He W, Zhang W. **The curative effect comparison between prolonged third generation of gamma nail and prolonged dynamic hip screw internal fixation in treating femoral intertrochanteric fracture and the effect on infection.** Cell Biochem Biophys 2015; 71: 695-699.

14. Zhao W, Liu L, Zhang H, Fang Y, Pei F. **Effect of dynamic hip screw on the treatment of femoral neck fracture in the elderly.** Chin J Traumatol 2014; 17: 69-72.

15. Zhang K, Zhang S, Yang J, Dong W, Wang S. **Proximal femoral nail vs. dynamic hip screw in treatment of intertrochanteric fractures: A meta-analysis.** Med Sci Monit 2014; 20: 1628-1633.

16. Kazemian GH, Manafi AR, Najafi F, Najafi MA. **Treatment of intertrochanteric fractures in elderly highrisk patients: Dynamic hip screw vs.** external fixation. Injury 2014; 45: 568-572.

17. Zhang L, Shen J, Yu S, Huang Q, Xie Z. **Percutaneous compression plate versus dynamic hip screw for treatment of intertrochanteric Hip fractures: A meta-analyse of five randomized controlled trials.** Scientific World Journal 2014; 2014: 512512.

18. Wang Q, Yang X, He HZ, Dong LJ, Huang DG. **Comparative study of InterTAN and Dynamic Hip Screw in treatment of femoral intertrochanteric injury and wound.** Int J Clin Exp Med 2014; 7: 5578-5582.

19. Upadhyay S, Raza HK. **Letter to the editor: Proximal femoral locking plate versus dynamic hip screw for unstable intertrochanteric femoral fractures.** J Orthop Surg (Hong Kong) 2014; 22: 130-131.

20. Schwartsmann CR, Jacobus LS, Spinelli Lde F, Boschin LC, Gonçalves RZ. **Dynamic hip screw for the treatment of femoral neck fractures: A prospective study with 96 patients.** ISRN Orthop 2014; 2014: 257871.

21. Moran CG, Wennrt, Sikand M. **Early mortality after hip fracture: Is delay before surgery important.** J Bone Joint Surg 2005; 87: 483-9.

22. Saudan M, Leubbeke A, Sadowski C. **Pertrochanteric fractures: Is there an advantage to an intramedullary nail?: A randomized, prospective study of 206 patients comparing the Dynamic Hip Screw and proximal femoral nail.** J Orthop Trauma 2002; 16: 386-93.

23. Schipper IB, Steyerberg EW, Castelein RM. **Treatment of unstable intertrochanteric fractures: Randomized comparison of the Gamma nail and proximal femoral nail.** J Bone Joint Surg 2004; 86: 86-94.

24. Riyaz N.N, Nithin S. **Aprospective study to evaluate the outcome of operative treatment of patients with intertrochanteric fracture of femur with cephalomedullary nail and DHS.** Edorium J orthop 2015; 1:1-7.

25. Venamali B, seetharamaiah, SUNIL B et al. **A comparative study of clinic-radiological outcome: DHS versus PFLCP in intertrochanteric fracture of femur.** JEBMH 2015; 2:8565-8570.

26. Gill SPS, Mittal A, Raj M, Singh P, Kumar S, Kumar D. **Dynamic hip screw with locked plate VRS proximal femoral nail for the management of intertrochanteric fracture. A comparative study.** International journal of orthopedic sciences 2017; 3(2):173-180.

27. Bridle S H, Patel A D, Bercher M, Calvert P T. **A randomized prospective comparison of the gamma nails and the dynamic hip screw.** J Bone Joint Surj 1991; 73-B: 330-4.

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Farhad Alam	Writing the article, Data collection, Data analysis.	
2	Mudassar Jabeen	Proof reading, references, Data analysis.	