A STUDY OF SURGICAL MANAGEMENT OF INTERTROCHANTERIC FRACTURES OF THE FEMUR FIXED WITH DYNAMIC HIP SCREW

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ABSTRACT

BACKGROUND
This study is to analyse the surgical management of intertrochanteric fractures using dynamic hip screw and its outcomes regarding union of fracture and early mobilisation of the patient.

MATERIALS AND METHODS
A study of 30 cases of IT fracture in period of May 2014 to April 2016 was carried out to testify anatomical and functional outcomes of treatment with DHS and results were calculated by Kyle's criteria.

RESULTS
Out of 30 cases, 76.67% united in 12 to 14 weeks at an average of 13.51 weeks and analysis as per Kyle's criteria 16.67% excellent, 60% good and 20% fair results.

CONCLUSION
Internal fixation with DHS allows controlled collapse at fracture site and allows early mobilisation and DHS remains implant of choice for IT fracture.

KEYWORDS
Intertrochanteric Fracture, Dynamic Hip Screw, Kyle's Criteria.

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BACKGROUND

Intertrochanteric fractures of the femur are fractures involving the upper end of the femur through and in between both the trochanters.

One of the most common admissions in orthopaedic wards is that of intertrochanteric fractures of femur. These fractures occur in the young population due to high velocity trauma, whereas in the elderly population, it is often due to insignificant trauma. The advancement in medical sciences has led to the increased life span and osteoporosis and hence the incidence of intertrochanteric fractures has increased.[1]

Historically, osteoporosis and its sequelae were recognised by Sir Astley Cooper over 150 years ago, when he observed that hip fractures might result from an age-related reduction in bone mass or quality. He wrote "that regular decay of nature, which is called old age is attended with change, which are easily detected in the dead body; and one of these is found in the bones, which become thin in their shell and spongy in their texture.[2-3]

John Buchwald in 1923 said "we all come into this world under the brim of the pelvis, but quite a few of us will leave through the neck of femur." This statement, nearly 90 years later is an exaggeration, but nevertheless true, as proximal femoral fractures account 30 percent of all hospital admissions with mortality averaging 15-20% worldwide.[4]

The incidence of trochanteric fracture is more in female population as compared to males due to osteoporosis. In spite of the advances in anaesthesia, nursing care and surgical techniques, hip fractures remain a significant cause of mortality and morbidity in the elderly population.

Intertrochanteric fractures unite readily with conservative line of management as cancellous bone is involved and usually have a good blood supply. Unlike the fractures of neck of femur, there is no fear of complication like avascular necrosis of head and its sequelae of osteoarthritis.[5]

Though intertrochanteric fractures unite without surgical intervention, malunion with coxa vara deformity occur with conservative management. Shortening of limb and limp are commonly seen in these patients.

Until operative treatment involving the use of various implants was introduced in the 1960s, hip fractures were managed using conservative methods based on traction and bed rest. This usually led to secondary complication because

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of prolonged immobilisation like bed sores, deep vein thrombosis and respiratory infections.[1]

Various operative procedures with different implants have been described. The primary goal of treatment has to be early mobilisation to avoid secondary complications, which can be achieved by internal fixation. Of all the implants, the most commonly used device is the dynamic hip screw with side plate assemblies. This is a collapsible fixation device, which permits the proximal fragment to collapse or settle on the fixation device seeking its own position of stability.

In view of these considerations, this study is taken up to analyse the surgical management of intertrochanteric fracture using dynamic hip screw and its outcomes regarding the union of the fracture and early mobilisation of the patient.

Von Langenbeck in 1850 was the first person to attempt fixation of proximal femoral fractures in form of hip nail.[6-7] Hamilton Russell in 1924 made a major breakthrough in history of conservative treatment by a new method of skin traction.[8] Smith Peterson in 1925 began the modern era of internal fixation of hip fractures by triflange nail, which controlled rotational stability.[9]

Lawson Thornton in 1937 developed a bolt with late to SP nail called Thornton plate.[10] In 1941, E.L. Jewett devised a single piece angled nail plate called Jewett nail.[11] McLaughlin devised a variable angled nail plate.[12] Boyd and Griffin in 1949 classified trochanteric fractures, which is still followed all over.[13] Kuntscher in 1964 developed retrograde nailing of pertrochanteric fractures.[14]

In 1964, Clawson reported the treatment of trochanteric fractures using sliding compression screw and Jewett. In 39 stable fractures treated with sliding screws, there were only 5.2% failure rate. In the 26 unstable fractures treated with sliding screws, there was a failure rate of 11.5%. In the fractures stabilised with Jewett nail plate device, most of which were stable fractures, the failure rate was about 32%. The Richards manufacturing company and Mr. Ian McKenzie of the Royal National Orthopaedic Hospital developed the sliding compression screw used for this series. Clawson made several modifications and in its current form, the device is known as the Richard compression screw.[15]

Kulkarni GS in 1984 reported 140 cases of trochanteric fractures treated with a modified Richards compression screw.

AIMS AND OBJECTIVES

To analyse the union of the fracture trochanter, internally fixed with dynamic hip screw and study the outcome of the procedure with respect to early mobilisation and return to prefracture ambulatory status. Assessment of results based on subjective parameters (like pain, ability to squat or sit cross-legged and walking), objective parameters (like deformity, range of movements of the hip and limb length) and radiological findings (like fractures union, consolidation, neck shaft angle and position of the implant), after clinical and radiological union.

MATERIALS AND METHODS

This study was collected from 30 patients having intertrochanteric fracture in period of May 2014 to April 2016. This study was carried to find out age, sex, side of intertrochanteric fracture and testify anatomical function outcome with DHS.

The age group of 41-50 years with mean average of 53.2 yrs.

Age	No. of Males	No. of Females	Total	Percentage
>21-30	2	0	2	6.67%
>31-40	3	2	5	16.67%
>41-50	9	0	9	30%
>51-60	2	4	6	20%
>61-70	2	0	2	6.67%
>71-80	2	3	5	16.67%
>81-90	0	1	1	3.33%
Total	**20**	**10**	**30**	**100%**

Majority were type 2, 46.67 according to Boyd and Griffin classification.

Class of Fracture	No. of Patients	Percentage
Type 1	9	30%
Type 2	14	46.67%
Type 3	4	13.33%
Type 4	3	10%
Total	**30**	**100%**

-16 cases, 53.33% Singh's index gr. 3 and 14 cases 46.67 of gr. 4 5 6, which suggest intertrochanteric fracture occur in osteoporotic bone.

Singh's Index	No. of Patients	Percentage
Grade 6	8	26.67%
Grade 5	3	10%
Grade 4	3	10%
Grade 3	12	40%
Grade 2	4	13.33%
Grade 1	0	0%
Total	**30**	**100%**

Out of 30- 18 left and 12 right side.

Time of union-

Time of Union (Weeks)	No. of Patients	Percentage
12	9	30%
13	5	16.67%
14	9	30%
15	3	10%
16	3	10%
Not united	1	3.33%
Total	**30**	**100%**

Majority 76.67% united in 12-14 wks.
The average was 13.51 wks.

Result	No. of Patients	Percentage
Excellent	5	16.67%
Good	18	60%
Fair	6	20%
Poor	1	3.33%
Total	**30**	**100%**

Study was analysed by Kyle's criteria, 5 patients 16.67% had excellent result, 18 (60%) had good result and 6 patient 20% had fair results.

Operative Procedure

Preoperative planning for DHS

Length of Richard's screw: Length is measured from tip of head to base of greater trochanter on AP view x-ray subtracting magnification. Neck-shaft angle: Neck shaft angle is determined using goniometer on x-ray AP on unaffected side. Length of side plate: Length of side plate is determined to allow purchase of at least 8 cortices to shaft distal to fracture.

Anaesthesia

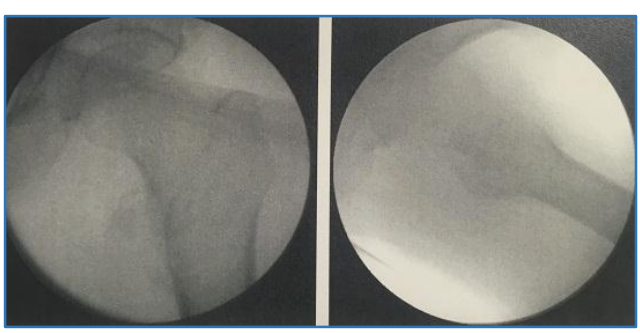
The patients are taken up for surgery under Spinal, Epidural or General Anaesthesia.

Patient Positioning

The patient are positioned supine on fracture table with a radiolucent padded counter traction post placed between patients legs. The injured leg is held in slight abduction by a boot attached to other leg extension of fracture table.

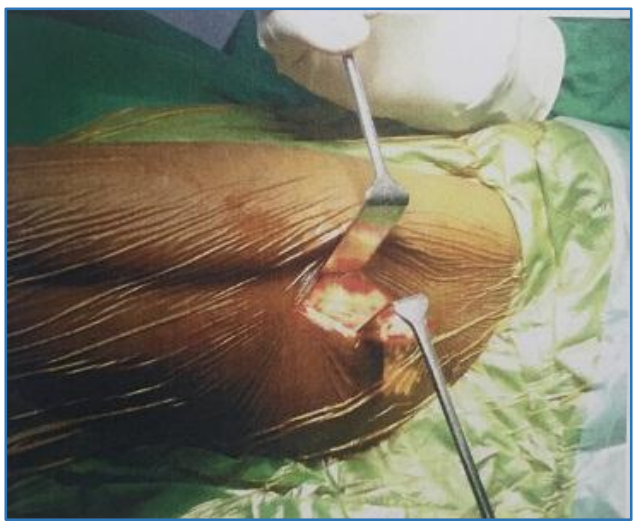
Reduction Techniques

Closed reduction of fracture by manipulation is performed. After positioning the patient, traction is exerted longitudinally on slightly abducted injured leg until reduction is achieved. In non-comminuted fractures without displacement, limb was fixed in neutral or slight internal rotation. The comminuted fractures, 15-20 degrees of external rotation is required to close defect posterolaterally. Reduction is checked in anteroposterior and lateral views in an image intensifier.



Incision

The incision begins 5 cms proximal and anterior to greater trochanter curving distally and posteriorly over posterolateral aspect of trochanter and then distally along lateral surface of thigh parallel with femur for about 10 cms. Fascia, vastus lateralis muscle is dissected on elevation with a periosteal elevator and the lateral and anterolateral surface of femoral shaft is exposed along with proximal part of vastus lateralis and intermedius, intertrochanteric line and anterior surface of femur. Alternately, vastus lateralis is divided at its origin from greater trochanter transversely and then divided longitudinally with scissors 0.5 cm from its attachment to linea aspera.



Reaming

The reamer is slided over guidepin and femur is reamed coaxial to guidepin. Spot image intensification is used to know advancement of reamer. The reaming is stopped when short barrel notch indicator on barrel reamer reaches lateral cortex.

Tapping

Tapping is done to avoid excessive torque on insertion wrench and to minimise risk of inadvertent malrotation of femoral head fragment during final seating of screw. The T handle is connected to lag screw tap and inserted into reamed portion over guidewire. Tapping is done until advancing portion of positive stops rest against cortex guide.

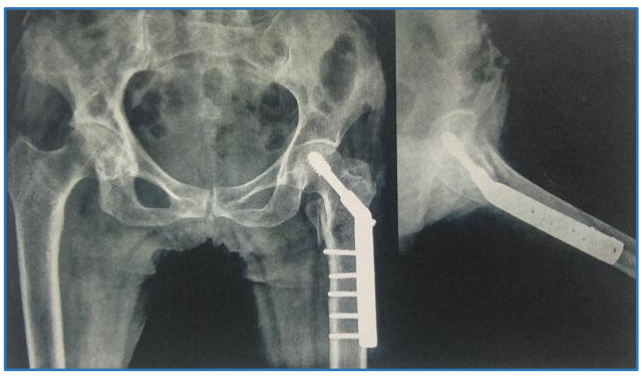
Insertion of Lag Screw

The appropriate lag screw and plate are assembled onto insertion wrench. The lag screw is advanced into femoral head to predetermined level and its position is verified with image intensifier. After complete insertion, the handle of insertion wrench is perpendicular to axis of femoral shaft, which allows proper keying of lag screw to plate barrel. Then, the lag screw retaining rod is unscrewed and insertion wrench is removed from back of lag screw, then guidepin is removed.

Attachment of Side Plate

The plate is secured to shaft of femur with a plate clamp. With a 3.2 mm drill, holes are drilled into lateral cortex through the bone screw holes of side plate.

The holes are tapped with a 4.5 mm tap. The appropriate cortical screw length is measured with a bone screw length gauge.



Postop protocol- Patients were discharged in 7-8 days. They were called in the OPD for suture removal on 10-12th postoperative day for follow up every month for first 6 months and were advised to partial or complete weight bearing according to their fracture pattern and sign of union on follow up radiographs.

RESULTS

For evaluation of results, Kyle's criteria was used.

Excellent Results

1. Fracture united.
2. No pain.
3. No infection.
4. Full range of motion at hip.
5. No shortening.
6. Patient able to sit crossed-legged and squat.
7. Independent gait.

Good Results

1. Fracture united.
2. Occasional pain.
3. No infection.
4. Terminal restriction of hip movements.
5. Shortening up to half inch.
6. Patient able to sit crossed-legged and squat.
7. Use of cane back to full normal activity.

Fair Results

1. Fracture united.
2. Moderate pain in hip.
3. No infection.
4. Flexion restricted beyond eighty degrees.
5. Noticeable limp shortening up to one inch.
6. Patient not able to sit crossed-legged.
7. Patient walks with support of walker.
8. Back to normal activities with minimal adjustments.

Poor Results

1. Fracture not united.
2. Pain even with slightest movement at hip or rest pain.
3. Infection.
4. Range of movement at hip restricted flexion restricted beyond 60 degrees.
5. Shortening more than one inch.
6. Patient not able to sit crossed-legged or squat.
7. Patient cannot walk without walking aid. Normal activities not resumed.

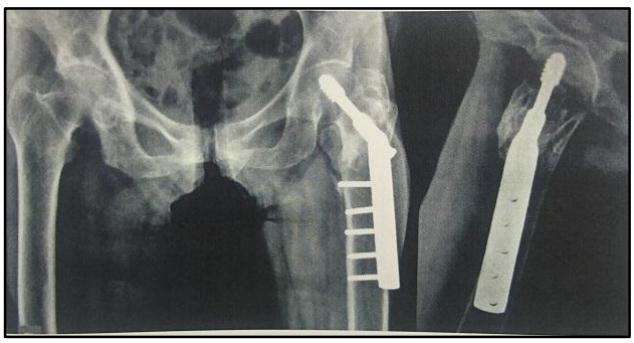
RESULTS

In present study, 30 cases of intertrochanteric fracture were managed by DHS and barrel plate. Our aim was to obtain a stable, united hip with minimal complication and excellent functional outcome. Age- in the present study, the mean age for intertrochanteric fracture was 53.2 years ranging from 23 to 85 years. Maximum number of patients, i.e. 9 (30%) were seen in the 41-50 years of age group.

Results of Other Studies Were as Follows

Author	Age Incidence
Boyd and Griffin	69.7
R C Gupta	51.2
Richard Kyle	72
Mohanty and Chacko	61.7
G. S. Kulkarni	62
Present study	53.2

Surgery- 20 males 66.67% and 10 females 33.33%.
Classification- Singh's index



CONCLUSION

Internal fixation with DHS allows controlled collapse at fracture site and allows early mobilisation and DHS remains implant of choice for IT fracture.

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