"STUDY OF UNSTABLE INTERTROCHANTERIC FRACTURES TREATED BY CEMENTED BIPOLAR HEMIARTHROPLASTY IN ELDERLY PATIENTS"

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LIST OF ABBREVIATION USED

#	:	Fracture
GT	:	Greater trochanter
AP	:	Anteroposterior
DHS	:	Dynamic Hip Screw
FRS	:	Functional Recovery Score
IT	:	Intertrochanteric
IV	:	Intravenous
NSAID	:	Non-Steroidal Anti Inflammatory Drugs
PA	:	Posteroanterior
PE	:	Poly Ethylene
PFN	:	Proximal Femoral Nail
RTA	:	Road Traffic Accidents
SP	:	Smith Peterson
TBW	:	Tension Band Wiring
HDPE	:	High Density Poly Ethylene
UHMWPE		Ultra High Molecular Weight Poly Ethylene

ABSTRACT

AIMS AND OBJECTIVES

To study the functional outcome of unstable intertrochanteric fracture treated with bipolar cemented prosthesis and complications associated with it. Also to facilitate early mobilization, early weight bearing with rapid rehabilitation in elderly patient with unstable intertrochanteric fractures

MATERIAL AND METHODS

Prospective study of 31 cases presenting with unstable intertrochanteric fractures which satisfy inclusion and exclusion criteria admitted in shri B M Patil Medical College, Hospital,and Research center Viajayapura from year 2016- 2018 who are treated with Cemented Bipolar Prosthesis.

RESULTS

In our study of 31 cases, there were 13 male and 18 female patients with mean age of 73.4 years. 84% of the cases admitted were due to trivial trauma, 16% due to RTA with left side being more common side affected. Mean duration of hospital stay was 11.03 days and mean time of full weight bearing was 3.97 days in our patients.One patient died on Postoperative day 5. 29% excellent, 32.3% good, 25% fair results obtained in our study according to Harris Hip Score.

CONCLUSION

Our study concludes that Cemented Bipolar Hemiarthroplasty in elderly patient with unstable intertrochanteric fracture reduces complications of prolonged immobilization, prolonged rehabilitation which are associated with internal fixation. Also reduces need for secondary surgery which required in cases of malunited fractures, non-union and implant failure. The procedure offered rapid mobilization, rapid return to pre injury level and improved quality of life.

KEY WORDS: Unstable Intertrochanteric fractures, Hemiarthroplasty, Harris Hip Score

TABLE OF CONTENTS

LIST OF TABLES

LIST OF GRAPHS

LIST OF FIGURES

INTRODUCTION

Intertrochanteric fractures in elderly were a major cause of disability. Sedentary life and increased life span increased incidence of these fractures.

Trivial trauma in elderly is main cause for IT fracture where as high velocity trauma causes in younger patient.

Females are more prone to these fractures secondary to osteoporosis campared to males. “Approximately 15% to 20% of patients die within 1 year of fracture”. [1,2]

Unstability,osteoporosis and severe medical comorbidities in senile patient treatment is perilous. The spectra of treatment modalities starting from conservative to surgical intervention such as, advanced internal fixation have been employed since ages. But the problems remains an enigma unsolved till today. Before 1960 IT fractures treated conservatively, which resulted “As conservative methods resulted in advanced mortality rates and complications like decubitus ulcer, urinary tract infections, pneumonia, thromboembolic complications”. “Intertrochanteric fractures with severe displacement and communition are common in elderly patients. These patients have a poor bone quality and the fractures are often associated with complications such as nonunion, metal failure and femoral head perforation”.[3,4]

“The primary treatment goal is a stable fixation, early mobilization and immediate full-weight-bearing”[5].Osteosynthesis gives good results in stable intertrochanteric fractures where as in unstable intertrochanteric fracture is challenging, with predictable good results, whereas the management of unstable intertrochanteric fractures is challenging, due to poor bone quality.

“The comminuted intertrochanteric fractures being in cancellous area, fixation of all fragments is difficult. The posteromedial void is generally present which makes the fracture very unstable”.[6]

"Recent modality of fixation of these fractures is by 4th generation of intramedullary nails like the proximal femoral nails"[7] immobilisation is required even in this implants.

"Management of such cases with primary hemiarthroplasty permits early mobilization, thus avoiding most complications"[8] such patient are mobilised early.

Hemiarthroplasty has advantage of rapid return of function without pain.

"Hemiarthroplasty for intertrochanteric fractures has been described as early as 1973. Rosenfeld first introduced it by devising a prosthesis for head and neck replacement in trochanteric fractures, detailed the method of surgery and reported a good functional outcome. Studies have revealed that hemiarthroplasty in unstable IT fractures have given good results".[9,10]

AIMS AND OBJECTIVES OF STUDY:

- To study the functional outcome of unstable intertrochanteric fracture treated with bipolar cemented prosthesis and complications associated with it.
- To study functional outcome in patient treated with bipolar prosthesis for intertrochanteric femur fracture.
- To facilitate early weight bearing, mobilization and rapid rehabilitation after surgery.
- To avoid complications of internal fixation in elderly osteoporotic fractures.
- To study the associated complications.

REVIEW OF LITERATURE

French surgeon, **Ambroise Pare**[11] in 1564, first described hip fractures.

In 1851, Sir Astley Cooper, "divided fractures of the proximal femur into Intra capsular and Extra capsular"[(12)]

In 1924, Hamilton Russell[13,14] introduced the Russell's traction, which was widely used for conservative management of trochanteric fractures.

In 1931, Smith Peterson[15] invented his still used famous triflanged nail for intracapsular fractures.

In 1937, Thorton[16] described his technique for "open reduction and internal fixation using triflanged S-P nail with an attachable side plate". McLaughlin (1947) further modified this by using four-flanged nail to enable a secure fit of the nail to the plate.

In 1941, Jewett [17] first published a report of his "one-piece angle nail plate for trochanteric fractures".

In 1944, Taylor et al[18] analyzed both operated and conservatively treated cases of trochanteric fractures. They claimed better anatomical and functional results in those treated by operative means.

In 1949, E. Meryn Evans[19,20] treated 101 cases conservatively, 22 cases by internal fixation with Capener new field nail plate. He classified trochanteric fractures into stable and unstable types. He suggested operative treatment should be routine introchanteric fractures for early mobility, better comfort, and reduced mortality.

A classical article on, the use of external fixators for intertrochanteric fractures was written by Dr. Irwin H Scott[21] in 1957. He summarized 112 cases, demonstrated the pin construction for stable and unstable intertrochanteric fractures.

He introduced two pins into to neck at an angle of 130 to 140 degrees, and 2 to 3 pins into the proximal half of the femur.

In 1970, Augusto Sarmiento[22,23] and Edward Williams of Miami described a new method of valgus osteotomy and I-beam nail plate fixation for unstable trochanteric fractures. Failure to achieved good reduction or disruption of medial cortex resulted in complications, usually being the superior migration of the nail. "This technique makes the plane of unstable fractures more horizontal, approximates the cortical surface of the two major fragments, and places the neck of the femur in a valgus position".

In 1973, F. Colladao et al[24] introduced the condylocephalic nailing method, for unstable trochanteric fractures.

In 1975, Harrington[25] described his technique of using methylmethacrylate along with standard nail and plate in unstable trochanteric fractures.

In 1984, S.P. Mohanty and V. Chacko[26] of Manipal, India, reported a comparative analysis of operative and nonoperative management of trochanteric fractures in 135 cases and found that the simple nonoperative methods was less superior than operative treatment.

Stern et al[27] in 1977 published an report of 29 cases of intertrochanteric fractures of the femur that have been treated primarily or secondarily by insertion of a Leinbach prosthesis and in the same cases they used methyl methacrylate, they had only 7 complications. They concluded that the use of Leinbach bipolar prosthesis in elderly debilitating patients in an attempt to get the patient up and walk rapidly is an effective way of treating comminuted and unstable intertrochanteric fractures in the elderly.

Green S, Moore T, Proano et al[28], in 1987 performed "Bipolar prosthetic replacement for 20 elderly patients with intertrochanteric fractures to promote early full weight bearing and rapid rehabilitation. At the hospital discharge, 15 of the patients were ambulatory with full weight bearing on the operated limb (average time was 5.5 days). The average follow up time was 13.2 months (range 1-29 months). At that time, 12 patients were ambulatory, four were non-ambulatory. Of the 12 ambulators, three employed no aids, 7 used a walker and 2 used a cane. There were no infections and no dislocations in the series".

Hantjens P, Casteleyn PP, DeBoek Humerus, Handelberg F, and Opdecam P[29], in 1987 studied "thirty seven consecutive patients who were more than seventy five years old and had unstable intertrochanteric or sub trochanteric fractures who were treated by primary bipolar arthroplasty from 1983 through 1986. The functional results, according to the rating scale of Merle's Augigne, were rated as good or excellent in 75% of the patients and remained unchanged with time.

Roentgenographic follow-up showed early bone formation around the extra medullary part of the femoral component. The results were compared with those in a similar but retrospective control group of 42 patients, who were treated by internal fixation from 1979 through 1982 and in whom early full weight bearing was not possible. In the bipolar arthroplasty group, rehabilitation was easier and faster, and the incidence of pressure sores, pulmonary infection and atelectasis were significantly lower ($P<0.05$)".

Casey Chan K, Gurudev S.G[30], (2000) in a series of "55 consecutive hemiarthroplasties in 54 elderly patients with intertrochanteric fractures were reviewed. The mean age of the patients was 84.2 years. Standard cemented hemiarthroplasty was used and the fractured posteromedial fragment was retained.

Two patients were lost to follow up and 12 patients died within 6 months. Nineteen patients maintained the same walking category as before fracture and eight of those had no increase in the dependency on walking aides. There were few surgical complications. The authors of the study thing that the use of standard cemented hemiarthroplasty is a reasonable alternative to a sliding screw device for the treatment of intertrochanteric fractures in the elderly patients" .

George J, Haidukewych, Daniel J, Berry[31], in between 1985 and 1997, studied 60 patients with mean age of 70 years were treated with hip arthroplasty after failed treatment of an intertrochanteric fracture. 32 patients had a total hip arthroplasty, 27 had a bipolar hemiarthroplasty, and 1 had a unipolar hemiarthroplasty. 10 patients died within 2 years, the remaining 44 patients were followed for a mean of 5 years. 39 patients had no or mild pain and 5 had moderate or severe pain. 40 patients were able to walk, 26 with one-arm support or less. The authors conclude that hip arthroplasty is an effective salvage procedure after the failed treatment of an intertrochanteric fracture in an older patient. Most patients had good pain relief and functional improvement.

Rodop. O, Kiral A, Kaplan H., Akmaz[32], in between 1997 and 2001, in a series of 54 elderly patients with unstable intertrochanteric fractures who were treated by primary hemiarthroplasty using a cemented bipolar prosthesis. The mean patient age was 75.6 years and follow up was 22 months. 7 patients died, 3 patients were able to walk with a walker in the first postoperative week. There were no dislocations, infections, or aseptic loosening. Five patients experienced leg-length discrepancy. They had 17 excellent and 14 good results after 12 months according to Harris Hip scoring system.

Lin W.C, Chen C.H., Wong C.Y[33], studied 50 patients who underwent salvage procedure for failed compression hip screw fixation of intertrochanteric fractures from 8 January 1991 to July 2000. Among these, 16 patients underwent bipolar hemiarthroplasty, 5 underwent Austin Moore Hemiarthroplasty, and another 9 patients underwent total hip arthroplasty. The incidence of failed internal fixation was estimated at around 9.7%. There was better postoperative ambulation in the total hip and bipolar group (P=0.03). The author suggests multiple factors such as fracture geometry, bone quality, preservation of acetabular cartilage, and individual patient factors, is considered when performing salvage procedures.

Kesemenli C, Subasi M., Arslan H., Kirkgoz T., Nesmioglu S[34], in 2001 studied 27 patients with mean age of 78 of intertrochnatric fracture treated by Leinbach type endoprosthesis in period of 1995 to 1999. Results were decreased complications and early mobilisation was seen in 14 months of follow up.

A C Vahl, P B Dunki Jacobs, P Patka, H J Th M Haarman[35], studied 22 patients during 10 year period (1978-1987) with unstable trochanteric fractures with severe communition and osteoporosis, endoprosthesis was inserted. Five patients with sub trochanteric and 17 with per trochanteric fractures. Ten patients suffered from central nervous system diseases and in 10 patients cardiovascular or pulmonary disorders were diagnosed. Pre and postoperative ambulation levels were classified. Seventeen patients (17%) achieved full weight bearing mobilization. Five patients never walked again (23%). 2 patients died in first month (9%). It is concluded that for elderly and debilitated patients with an unstable trochanteric fracture, hemiarthroplasty is an acceptable alternative to osteosynthesis.

Chris Grimsrud, Raul J.Monzon, Jonathan Richman and Michael D.Ries[36] studied Thirty-nine consecutive patients with unstable three and four part intertrochanteric hip fractures, treated with cemented bipolar hip arthroplasty.

A standard length primary femoral component was used with a novel technique of cerclage fixation of the trochanteric bone fragments allowing retention of the femoral calcar. At one year minimum follow up, there was no loosening or subsidence of the femoral components. All trochanters healed. One dislocation and one deep infection occurred. Unstable three and four part hip fractures can be treated with a standard femoral stem and cerclage cabling of the trochanters. The technique allows safe early weight bearing on the injured hip and had a relatively low rate of complications.

Ibrahim et al[40] studied "10 patients treated with bipolar hemiarthroplasty, the average age at operation was 64.6 years (range, 60 to 85 years). There are 4 men and 6 women 2 patients had the A21 fracture type, 4 patients had A22 fracture type, 2 patients had A23 fracture type, and 2 patients had A33 fracture type, The mean operative time 120 (minutes) was lesser in the bipolar arthroplasty. The mean blood loss intraoperatively 250 (ml) was high in the bipolar arthroplasty. The mean blood transfusions (number of units) required during hospital stay was 2 units in the bipolar arthroplasty. Average length of hospital stay 7 (days) was less in the bipolar arthroplasty. Patients with bipolar arthroplasty had less postoperative complications; pressure sores 1 (10%), pulmonary complications (0%), cardiac complications (0%), superficial wound infection 1 (10%) urinary tract infection 3 (30%)".

Dr Milind Ingle , Dr Ulhas Sonar , Dr M R Koichade , Dr Avinash Yelne , Dr.Ashish Radke[41] studied "Thirty patients 65 years or older with unstable osteoporotic fractures of intertrochanteric femur were treated with cemented bipolar

hemiarthroplasty. Mean age of patients was 78.07 ± 6.16 years. There were 17 males and 13 females. 18 fractures were left sided and 12 were right sided.

Average trauma surgery interval for was 6.56 days (range 2 to 12 days). The average surgery time was 86.33 minutes (range 65 to 115 minutes). The type of fracture in 13 patients was A2.2 and in 17 patients it was A2.3. The average blood loss was 300 ml (range 150 to 550 ml). On an average partial weight bearing was achieved after 3 ± 1.05 days and full weight bearing was achieved on an average after 5.8 ± 1.45 days. Complications included two superficial and one deep infection. Less than two centimeters shortening seen in two patients. There were four death during study period. Results at one and half year showed excellent, good and fair results in 17, 8 and 1 patient each".

In 2006 Kulkarni G S, Rajiv Limaye, Milind Kulkarni, Sunil Kulkarni[42] found the following disadvantages with sliding hip screw, Sliding of more than 15mm leads to a higher prevalence of fixation failure, medialization of the femoral shaft by greater than one third of the diameter of the femur is associated with a seven fold increase in fixation failure, cut out of implant may occur in severe osteoporotic bone and wrong implant placement.

In 2014 Raghuram C, Reddy VK, Ramu C, Venu G, Sridhar K conducted study showed that Primary Hemiarthroplasty for unstable osteoporotic intertrochanteric fractures in elderly results in early ambulation, less hospital stay, provides stable and mobile hips and good functional results. Weight bearing can be started earlier than in other methods of treatment, which prevents any recumbency related complications; hence it is to be considered as one of the treatment options for comminuted intertrochanteric fractures in elderly.[(43)]

In 2014 Rao SS, Raju SD, Sagar SV conducted study showed that of 20 patients, 19 had excellent to fair outcomes with primary cemented bipolar hemiarthroplasty. The meticulous reconstruction of the posteromedial calcar area played a crucial role in the stable implantation of the bipolar prosthesis. Early mobilization, less hospital stay and excellent stability offered by this treatment modality makes it a promising method to deal with the challenging problem of comminuted intertrochanteric fractures in the elderly population.[44]

In 2015 Jayapalan JK, Pandian P,Sankaralingam Pandian, Rajendiran C, Duraisamy V conducted study, primary cemented bipolar hemiarthroplasty for unstable intertrochanteric fractures of femur in elderly does provide early ambulation, good functional outcome, pain free joint with minimal complications without the need for revision surgery. Early mobilization decreases the complication like deep vein thrombosis and pulmonary infections in elderly.[45]

In 2015 Srinath SR, Patil SG, Reddy M, Rao V, Karibasappa A concluded Cemented bipolar hemiarthroplasty has an important role to play in the management of unstable intertrochanteric fractures in elderly. It helps in early weight bearing and mobilization and prevention of many complications of prolonged recumbency. It has acceptable rate of complications and results in excellent-good outcome.[46]

In 2016 Abdelgadir AH, Awadelsied MH, Elbushra EM, Gashi YN conducted study in the elderly, unstable intertrochantric fractures with osteoporosis or comminution could be effectively managed by cemented bipolar hemiarthroplasty, allowing mobilization with a stable, pain free and mobile joint with acceptable complication rate.[47]

ANATOMY[48,49,50]

"ANATOMY OF THE HIP JOINT

The hip joint is a synovial joint of ball-and-socket (multiaxial spheroidal, cotyloid) type

1. ARTICULAR SURFACES:

The femoral head articulates with the cup-shaped (cotyloid) acetabulum, it's Centre lying a little below the middle third of the inguinal ligament. The articular surfaces are reciprocally curved but neither coextensive nor completely congruent. The close-packed position of the hip joint is one of full extension, with slight abduction and medial rotation.The femoral head is covered by articular cartilage, except over the rough pit where the ligamentum teres is attached. In front the cartilage extends laterally over a small area on the adjoining neck. Articular cartilage is, generally, thicker centrally than at the periphery. Cartilage thickness is maximal anteriosuperiorly in the acetabulum and anterolaterally on the femoral head, the two areas that correspond to the principal load-bearing areas within the joint .The acetabular articular surface, the lunate surface, is an incomplete ring, broadest anterosuperiorly where the pressure of body weight falls in the erect posture, and narrowest in its pubic region. It is deficient inferiorly opposite the acetabular notch. The lunate surface is covered by articular cartilage, which is thickest where the surface is broadest.

The acetabular fossa, the central non-articular area in the floor of the acetabulum, is devoid of cartilage but contains fibroelastic fat largely covered by synovial membrane.

The acetabular labrum, a fibrocartilaginous rim attached to the acetabular margin, serves to deepen the acetabulum and bridges the acetabular notch by attaching to the peripheral edge of the transverse acetabular ligament. The labrum is triangular in section; it is attached by its base to the acetabular margin and its acute free edge projects beyond the acetabular margin. The diameter of the acetabular cavity is constricted by the labral rim which embraces the femoral head, maintaining joint stability both as a static restraint and by providing proprioceptive information.

2. FIBROUS CAPSULE

The capsule is strong and dense. It is attached above to the acetabular margin 5–6 mm medial to the labral attachment, in front to the outer labral aspect and near the acetabular notch, to the transverse acetabular ligament and the adjacent rim of the obturator foramen.

From its acetabular attachment it extends laterally to surround the femoral head and neck, and is attached anteriorly to the intertrochanteric line, superiorly to the base of the femoral neck, posteriorly 1 cm superomedial to the intertrochanteric crest, and inferiorly to the femoral neck near the lesser trochanter. Anteriorly many fibres ascend along the neck as longitudinal retinacula, containing blood vessels for both the femoral head and neck.

The capsule is thicker anterosuperiorly, where maximal stress occurs, particularly in standing. Posteroinferiorly it is relatively thin and loosely attached.

It has two sets of fibres, circular and longitudinal. The circular fibres (zona orbicularis) are internal and form a collar round the femoral neck; although partly blended with the pubofemoral and ischiofemoral ligaments, these fibres are not directly attached to bone.

Externally, longitudinal fibres are most numerous in the anterosuperior region, where they are reinforced by the iliofemoral ligament. The capsule is also strengthened inferiorly by the pubofemoral ligament, and posteriorly by the ischiofemoral ligament. Externally it is rough, covered by muscles and tendons and separated anteriorly from psoas major and iliacus by a bursa.

The capsular attachment to the femur lies well distal to the growth plate of the femoral head both anteriorly and posteriorly. Thus the upper femoral epiphysis is entirely intracapsular. The capsular attachment intersects the growth plate of the greater trochanter on the upper surface of the base of the neck.

3. SYNOVIAL MEMBRANE

Starting from the femoral articular margin, the synovial membrane covers the intracapsular part of the femoral neck, then passes to the internal surface of the capsule to cover the acetabular labrum, ligamentum teres and fat in the acetabular fossa. It is thin on the deep surface of the iliofemoral ligament where it is compressed against the femoral head and sometimes is even absent here.

4. BURSAE

The hip joint may communicate with the subtendinous iliac (psoas) bursa through a circular aperture between the pubofemoral ligament and the vertical band of the iliofemoral ligament. More distant bursae are associated with the tendons of attachment of glutei medius and minimus at the greater trochanter, and between gluteus maximus and vastus lateralis".

5. LIGAMENTS[49]

- Iliofemoral Ligament (Ligament of Bigelow)

"This ligament lies in front of the joint. It is the thickest and most powerful part of the articular capsule. Proximally, it is attached to the inferior part of the anterior inferior

iliac spine and to the surface of the ilium immediately lateral to the spine. Distally it widens to be attached to the intertrochanteric line of femur. It is thicker at the sides than in the middle. This gives the ligament the appearance of the inverted Y. The iliofemoral ligament is more than 0.5 cm thick. It is the strongest ligament in the body (its only rival being the interosseous, sacroiliac ligament). A stress varying from 250-750 lb. is required to rupture it. Thus it is rarely torn in dislocation of the hip joint and the surgeon may use it as a stay in levering the head of the femur back into the acetabulum.

In erect posture, a vertical line though the center of gravity of the body falls slightly behind a line, joining the center to the two hip joints. The tendency of the body to fall backwards on the hip joints is resisted by the iliofemoral ligaments, which maintain the erect posture without muscular activity at these joints.

- **Pubofemoral ligament**

This ligament is triangular in shape with its base attached to the superior ramus of the pubis, iliopectineal eminence and its apex attached below to the lower part of the intertrochanteric line. This ligament limits extension and abduction.

- **Ischiofemoral ligament**

It is a spiral shaped ligament attached to the body of ischium near acetabular margin. The fibres of the ligament pass upwards and laterally and are attached to the greater trochanter. This ligament limits extension.

- **Transverse acetabular ligament**

It is formed by the acetabular labrum and is attached to the edge of either side of labrum inferiorly as it bridges the acetabular notch. The ligament converts the notch into a tunnel through which the blood vessels and nerve enter the joint.

- **Ligamentum teres or ligament of the head of the femur**

This is relatively weak band of connective tissue surrounded by Synovial membrane. Its narrow cylindrical end is implanted into the pit on the head of the femur. Its broad flattened end is attached to the transverse ligament and the adjacent margins of the acetabular fossa. It carries blood vessels in it to supply head and neck of femur"[49]

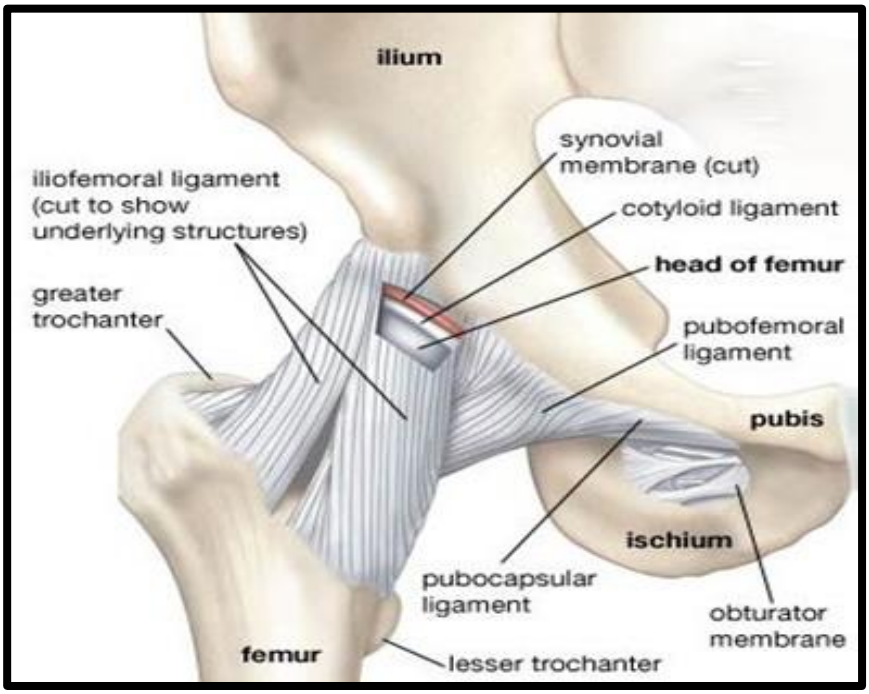


Fig 1 HIP CAPSULE ANTERIORLY

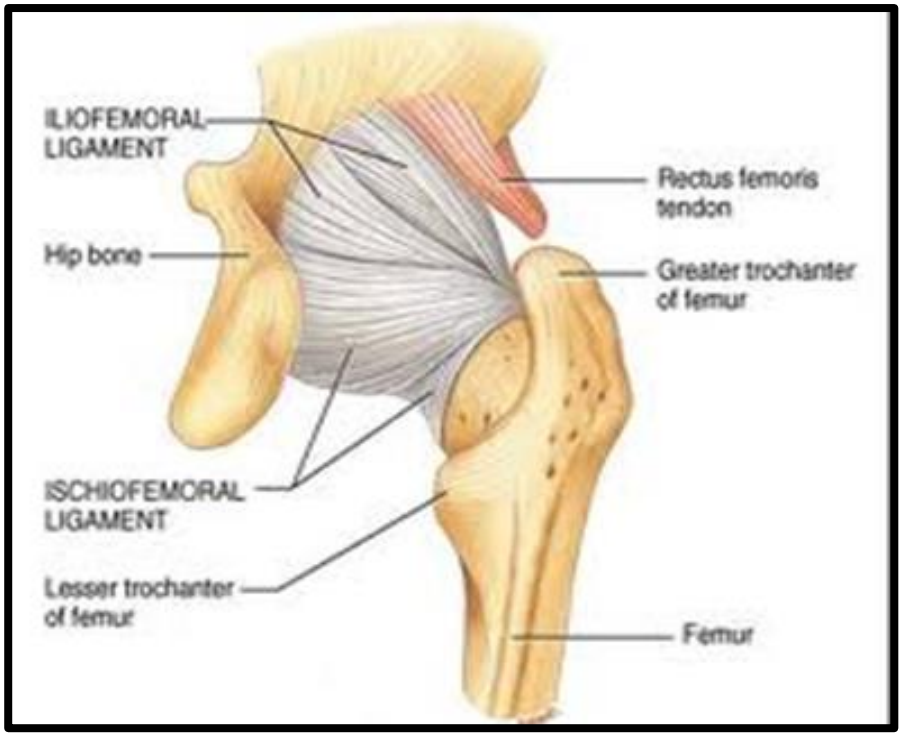


Fig 2 HIP CAPSULE POSTERIORLY

RELATIONS:

Anterior:

From medial to lateral are:

i) Pectineus, which intervenes between the most medial part of the hip and the femoral vein.

ii) Tendon of psoas major separated from the joint by a bursa and the iliacus muscle lateral to it.

iii) The formal nerve is in the groove between iliacus and psoas major with the femoral artery anterior to the psoas tendon.

iv) The straight head of rectus femoris crosses the joint laterally with a deep layer of the fascial iliotibial tract.

- **Superior:**

  The reflected heads of rectus femoris contacts the capsule medially and Superolaterally, the capsule blends with the gluteus minimus.

- **Inferior:**

  It is related to the lateral fibres of pectineus and obturator externus

  tendon.

- **Posterior:**

  The obturator externus tendon with an ascending branch of medial circumflex femoral artery, which separate the joint from the quadratus femoris. Tendon of Obturator internus and the gemelli separate the sciatic nerve from the joint and the nerve to quadratus femoris lies deep to the obturator internus. It is also related to the piriformis muscle.

RELATIONS OF HIP JOINT

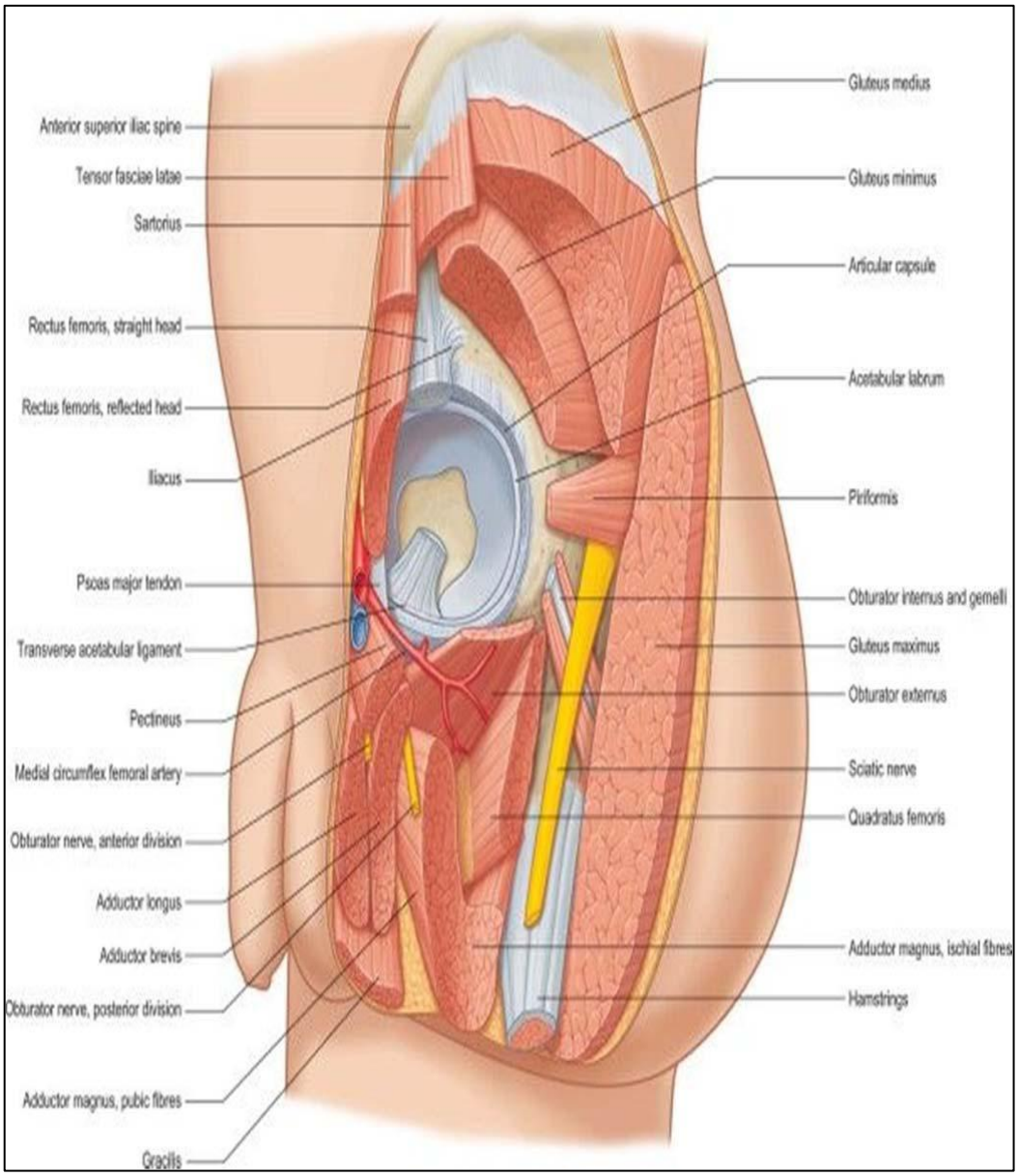


Fig 3 RELATIONS OF HIP JOINT

7. VASCULAR SUPPLY TO THE JOINT:

- Obturator artery.
- Medial circumflex femoral artery.
- Superior and inferior gluteal arteries.

8. NERVE SUPPLY:

- Femoral nerve and its muscular branches.
- Obturator nerve.
- Accessory obturator nerve.
- Nerve to Quadratus femoris.
- Superior gluteal nerve.

Table 1 Normal range of hip movements

Flexion	120°to130°
Extension	10° to 20°
Abduction	40°to 50°
Adduction	30°to 40°
Internal rotation	30°to 40°
External rotation	40°to 50°

ANATOMY OF PROXIMAL FEMUR

"The femur is the longest and strongest bone in the human body. The proximal end of the femur comprises of the head, neck, a greater and a lesser trochanter.

The head of the femur is more than half a sphere directed upwards, medially, and slightly forwards to articulate with the acetabulum. The neck connects the head and the shaft with which it forms an angle of 120 to 130 degrees, the neck is a stout bar of bone, roughly pyramidal in shape, flattened anteriorly and at its junction of the

shaft is marked by a prominent rough ridge termed the intertrochanteric line. A rounded ridge termed the intertrochanteric crest, which joins the posterior aspect of the greater trochanter to the lesser trochanter, marks the posterior surface at its junction with the shaft.

On the upper part of the crest, there is a rounded protuberance called the quadrate tubercle.

The greater trochanter is a large quadrangular projection, laterally positioned at the upper part of the junction of the neck with the shaft, its medial surface presents a roughened depressed area, the trochanteric fossa.

Most of the gluteal muscles are inserted on the greater trochanter. The gluteus minimus is inserted in to the rough impression on its anterior surface.

Gluteus medius is inserted into the oblique strip, which runs downwards and forwards across its lateral surface.

The intertrochanteric fossa received into the rough impression on the anterior surface with gluteus maximus with the trochanteric bursa interpose. Pyriformis is inserted into the upper border of the trochanter. Obturator internus, gemelli superior and inferior are inserted by a common tendon into the medial surface of the upper border of the trochanter. Obturator externus is inserted into the trochanteric fossa.

The lesser trochanter is conical shaped, projects medially off the posteromedial surface of the femur. Psoas major , and iliacus are attached to its summit and its base respectively. The upper fibers of adductor Magnus insert on its posterior surface".

TRABECULAR ANATOMY:

If the femur is sectioned in the frontal plane, the orientation of trabeculae can be visualized.

There are 2 principle trabecular systems.

1. **Principle compressive trabeculae:** These arise from the medial cortex of femoral shaft, rise superiorly into the weight bearing dome of the femoral head. These are the most dense and strongest of all the trabecular systems. They form an angle of 160 degrees with the medial cortex of the shaft (trabecular angle).
2. **Principle tensile trabeculae:** These extend from the interior region of the foveal area across the head and superior portion of the femoral neck into the trochanter and hence to the lateral femoral cortex. These are produced as a result of shearing forces to which the upper end of femur is subjected. Only a small portion of the body weight is transmitted along these trabeculae.

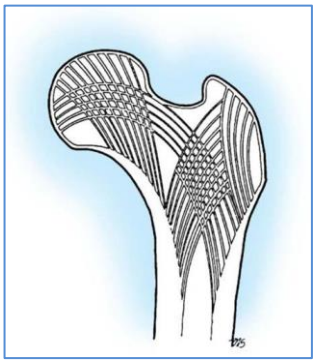


Fig 4 Trabecular Anatomy

In addition, there are secondary trabecular systems in the trochanteric region, they are:

3. **Secondary compressive group:** These extend from the medial femoral cortex to the greater trochanter.
4. **Secondary tensile group:** These extend from the lateral femoral cortex into the middle of the neck.
5. **Trochanteric group:** These are arranged vertically within the greater trochanter.

CALCAR FEMORALE:

According to Harty and Griffin (1957), the calcar femorale is a dense vertical plate of bone, extending from the posteromedial portion of the upper femoral shaft under the lesser trochanter to reach the posterior aspect of the neck medially and to blend into the spongy bone of the greater trochanter laterally. It represents upward elongation of the diaphyseal cortex into the inferior of the neck through the lesser trochanter.

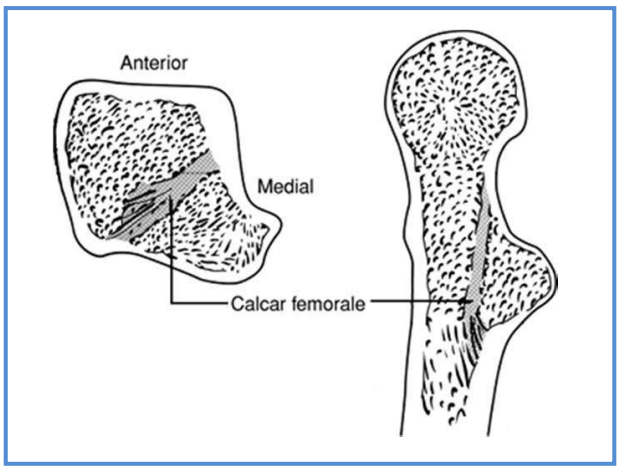


Fig 5 CALCAR FEMORALE

VASCULAR ANATOMY OF PROXIMAL FEMUR:

"Corck described the blood supply to the proximal end of femur which he divided into 3 major groups.

1. An extra capsular arterial ring located at the base of the femoral neck.
2. Ascending cervical branch of the arterial ring on the surface of the femoral neck.
3. Arteries of the ligamentum teres or foveolar artery.

The extra capsular arterial ring is formed posteriorly by a large branch of medial femoral circumflex artery and anteriorly by a branch from lateral femoral circumflex artery.

The ascending cervical branches of retinacular vessels ascend on the surface of the femoral neck in anterior, posterior, medial and lateral groups. The lateral vessels are

most important. Their proximity to the surface of the femoral neck makes them vulnerable to injury in femoral neck fractures.

As the articular margin of the femoral head is approached by these ascending cervical muscles, a second less distinct ring of vessels is formed commonly referred to by Chung as the sub synovial intraarticular arterial ring. It is from this ring of vessels that vessels penetrate the head and are referred to as epiphyseal arteries. The most important being the lateral epiphyseal arterial group supplying the lateral weight bearing portion of the femoral head. These epiphyseal vessels are joined by inferior metaphyseal vessels and vessels from the ligamentum teres.

Artery of the ligamentum teres is a branch of the obturator or medial circumflex femoral artery. It supplies the head around fovea and many authors have reported its variable functional importance. According to Howe et al., it is inadequate to sustain the demand of the whole head in displaced fractures. According to Wertheimer and Lopes, only 1/3 of patients have large artery of ligamentum teres that supply a substantial portion of femoral head. Anastomosis between the artery of ligamentum teres and the other arteries of the head and neck is variable".

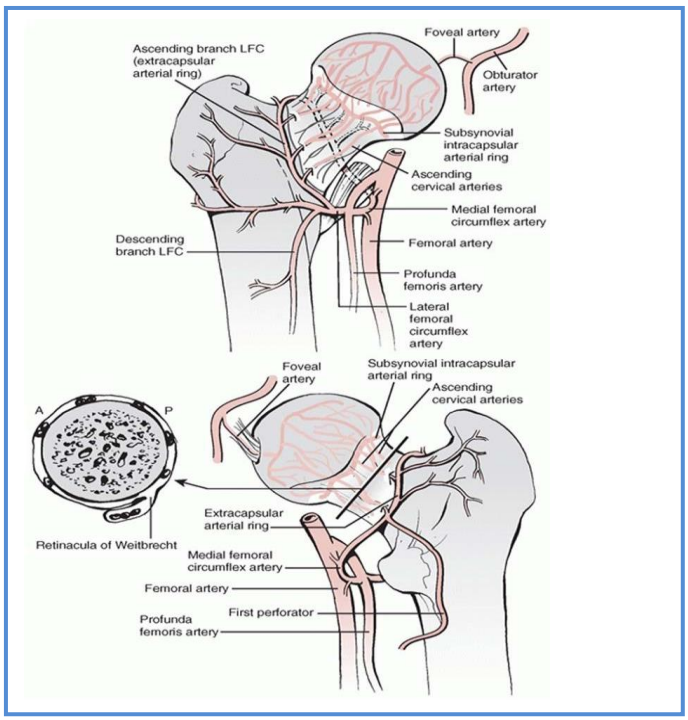


Fig 6 VASCULAR ANATOMY OF PROXIMAL FEMUR

BLOOD SUPPLY OF THE GREATER TROCHANTER:

Arterial vessels enter the greater trochanter from its medial, lateral and superior surfaces. Very free anastomosis between these penetrating arteries provide a rich vascular network within the cancellous bone of the trochanter. From branches of the circumflex femoral vessels, which encircle the trochanter, penetrating vessels enter it on its anterior, lateral and posterior surfaces. The medial circumflex femoral artery also supplies branches, which enter the trochanter medially in the trochanteric fossa. Branches of the gluteal vessels enter the bone at the insertion of gluteus medius.

"Blood supply to the femur, is by the way of metaphyseal periosteal and endosteal supply. The periosteal supply is from the multiple muscle origin from shaft to the femur. The nutrient arteries perforate the femoral shaft along with linea aspera. The arteries are derived from perforating branches of profunda femoral artery".

VENOUS DRAINAGE:

The venous outflow from the proximal femur has been described by Phillips. Lamino-capsular veins consisting of a double or a sing channel arise inferomedially and drain into the obturator vein. The circumflex group are found as a diffuse plexus in the basal portion of the femoral neck and greater trochanter, close to the plexus in the region of the ischial tuberosity.

NERVE SUPPLY:

"The main nerve supply is from the femoral nerve directly or indirectly through its muscular branches, the obturator, the accessory obturator nerve to quadratus femoris and gluteal nerve".

CLASSIFICATION OF TROCHANTERIC FRACTURES:

BOYD & GRIFFIN (1949) CLASSIFICATION[51]:

"This classification includes all the fractures from extra capsular part of the neck to a point 5cm distal to lesser trochanter.

Type I: Fractures that extend along the intertrochanteric line. Reduction usually is simple and is maintained with little difficulty.

Type II: Comminuted fracture, the main fracture being along intertrochanteric line but with multiple fractures in the medial cortex. Reduction of these fractures is difficult.

Type III: Fractures that are basically sub trochanteric with at least one fracture passing the proximal end of the shaft, just distal to or at the lesser trochanter. Varying degree of communition, is more difficult to reduce and results in more complications.

Type IV: Fractures of the trochanteric region and the proximal shaft, with fracture in at least two planes, with one fracture along sagittal plane. Open reduction and internal fixation is used, two plane fixation is required"[(51)].

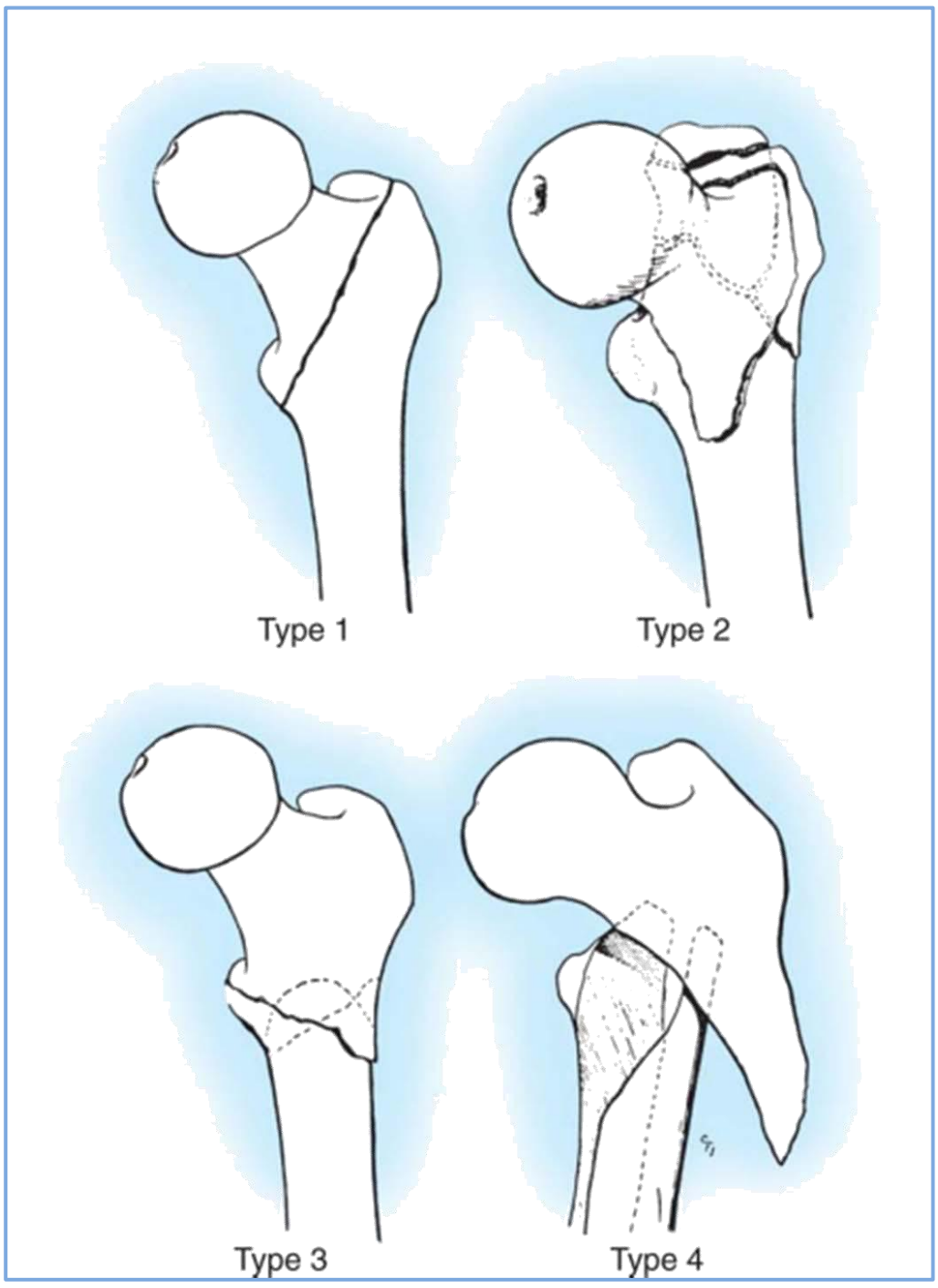


Fig 7 BOYD & GRIFFIN CLASSIFICATION

EVAN'S CLASSIFICATION[51]:-

A widely used classification system based on stability of fracture pattern and the potential to convert an unstable fracture pattern to a stable reduction. Evan observed that the key to a stable reduction is restoration of posteromedial cortical continuity.

Type I: The fracture line extends upwards & outwards from the lesser trochanter.

Type II: The fracture line is reversed obliquely. The fracture line extends outward & downward from trochanter and is unstable.

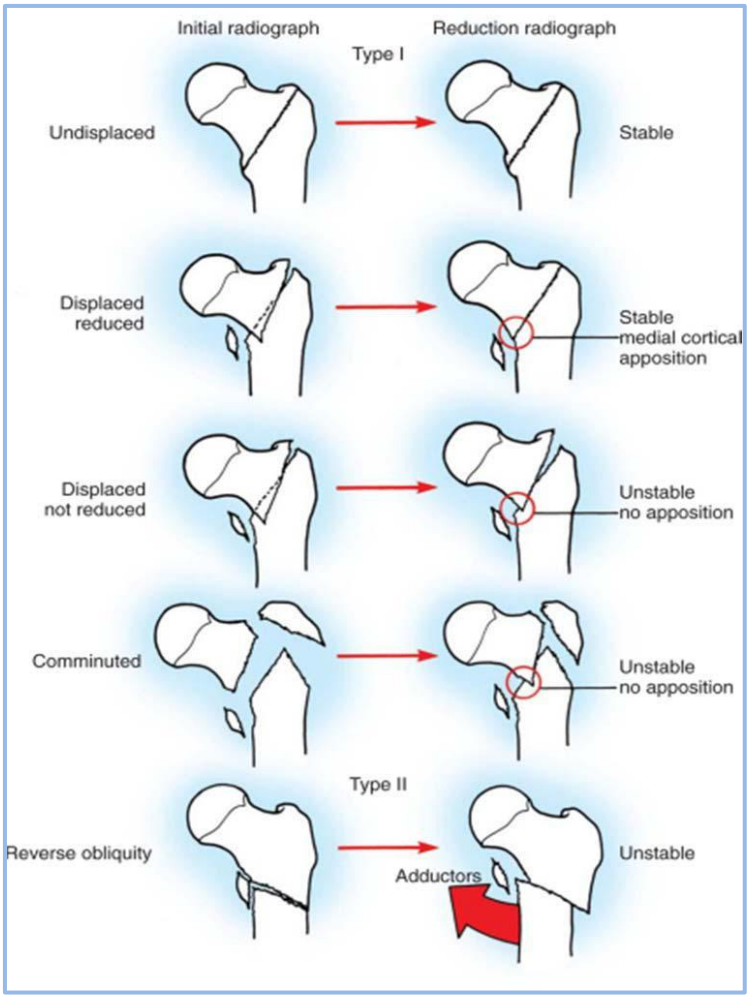


Fig 8 EVAN'S CLASSIFICATION

"ORTHOPEDIC TRAUMA ASSOCIATION (OTA) ALPHANEUMERIC FRACTURE CLASSIFICATION"[52]:

"31 A: - Proximal femur trochanteric fractures.

"A1: Per trochanteric simple

A1.1: Along intertrochanteric line

A1.2: Through greater trochanter

A1.3: Below lesser trochanter.

A2: Per trochanteric multi fragmentary

A2.1: With one intermediate fragment

A2.2: With several intermediate fragments

A2.3: Extending more than 1cm below lesser trochanter.

A3: Fracture line extending into lateral cortex (reverse oblique fracture)

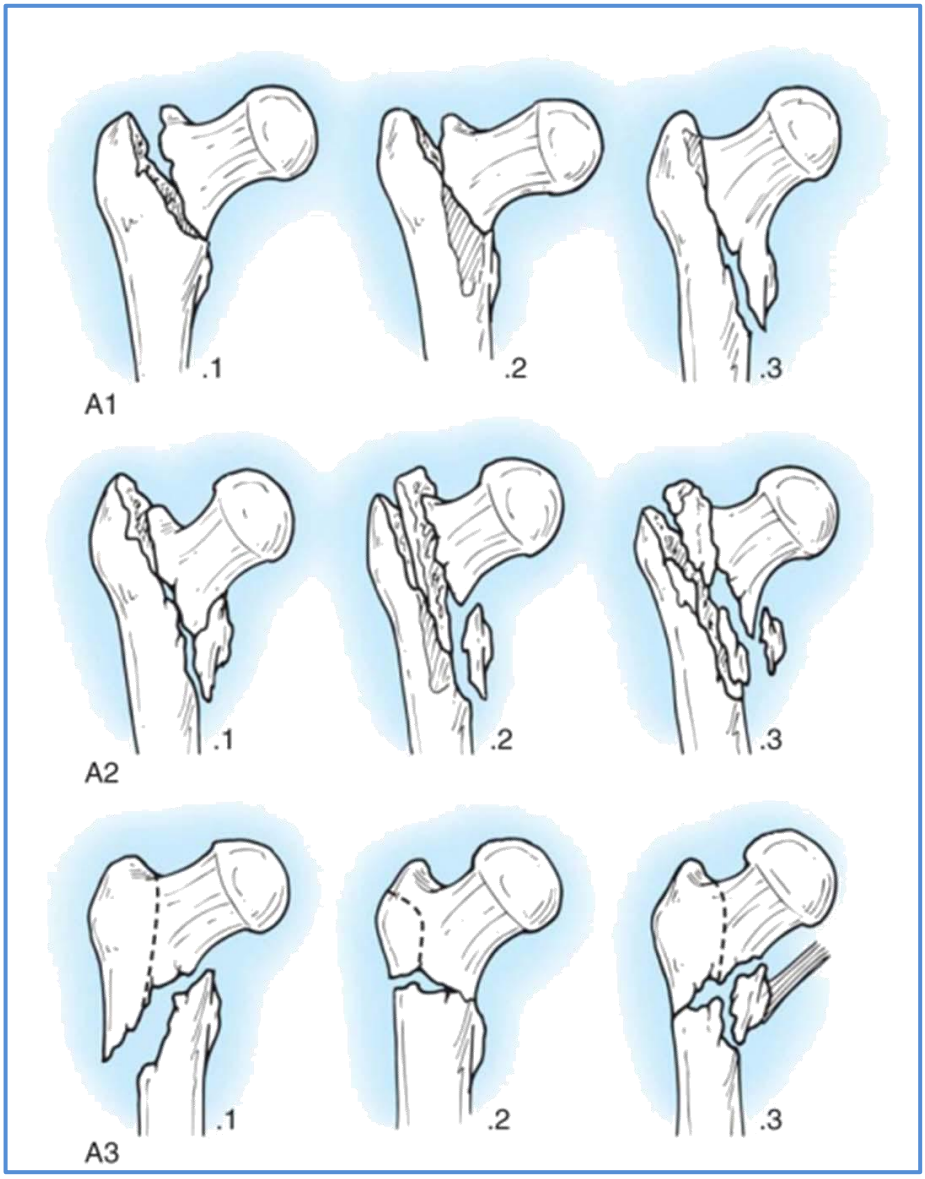


Fig 9 ORTHOPEDIC TRAUMA ASSOCIATION (OTA) ALPHANEUMERIC FRACTURE CLASSIFICATION

A3.1: Simple oblique

A3.2: Simple transverse

A3.3: Multi fragmentary"

MANAGEMENT OF INTERTROCHANTERIC FRACTURES:

The main aim, more than to achieve union of the fractured bones (as it usually unites), is that the union should be solid with almost no residual deformity and functionally patient should be as normal as possible. By 12 weeks, usually trochanteric fractures unite.

"Trochanteric fractures can be managed in two ways,

Conservative .

Operative"

CONSERVATIVE MANAGEMENT:

"The indications for non-operative treatment of intertrochanteric fractures are:

- In elderly patient who has medical risk for anaesthesia and surgery
- Non ambulatory patient with least uneasiness following fractures. Conservative treatment include:
- Support with pillows
- Splinting
- BUCK'S traction
- Skeletal traction through the lower femur or upper tibia
- WELL leg traction
- RUSSELL'S balanced traction
- Plaster Spica immobilization".

DEROTATION BOOT:

A plaster of paris below knee cast is applied just from below the tibial tuberosity up to the base of the toes. A wooden bar is attached to the heel to prevent lateral rotation, hence termed as the derotation boot.

After clinical and radiological union, i.e., 10-12 weeks, it is removed and physiotherapy is begun. This was the old form of treatment.

BUCK'S EXTENSION SKIN TRACTION:

Adhesive plaster is applied to skin, below the knee of the affected limb with a spreader bar and light weight. This is useful only in surgically unfit patients with undisplaced fractures and gives rise to many complications.

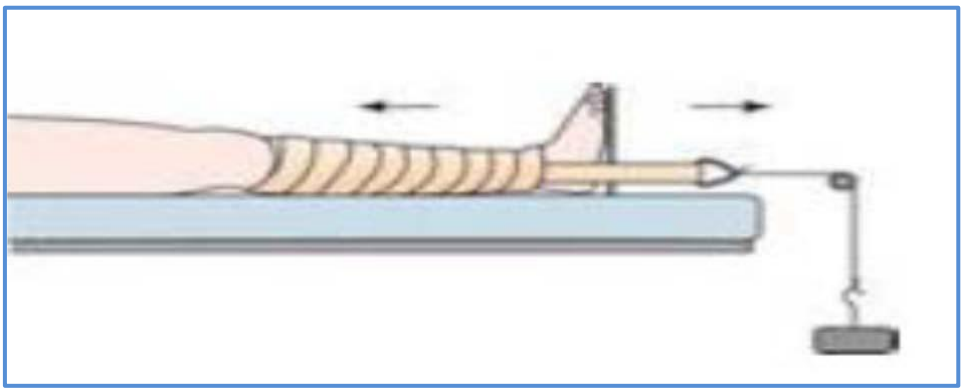


Fig 10 BUCK'S EXTENSION SKIN TRACTION

SKELETAL TRACTION:

This is the commonest method used in conservatively treated cases. Heavy skeletal traction is used through the upper tibial skeletal pin over a Bohler Braun splint. About 10% of the body weight is used for the traction. Patient is advised to do the quadriceps exercises for five minutes in every hour of all walking hours. After 10-12 weeks, traction is removed and patient is gradually mobilized and waling aids are used initially, till consolidation of the fracture.

HAMILTON RUSSEL TRACTION:

Continuous traction is obtained in the line of the femur, the traction weight suspended giving traction through several pulleys. The knee is flexed over a pillow and the limb is also supported and along with the traction, it is claimed that this controls both angulatory and rotational deformity.

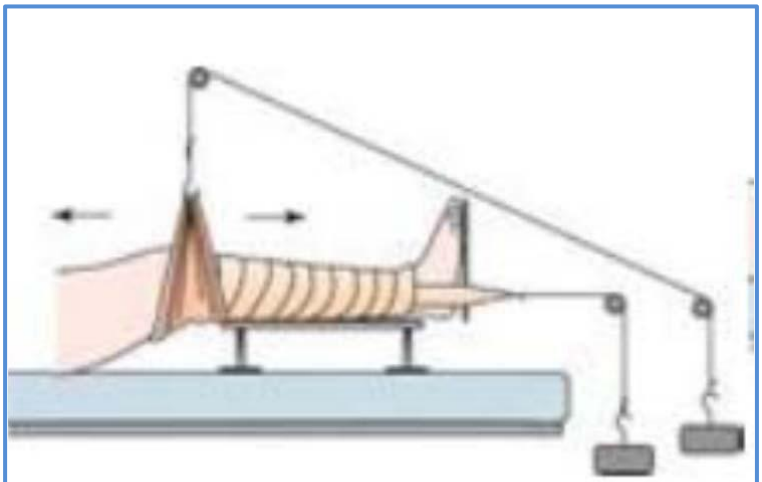


Fig 11 HAMILTON RUSSEL TRACTION

HAMILTON RUSSEL TRACTION

But there are many disadvantages of the conservative method of treatment. They are mainly knee joint stiffness, pin tract infections, deep vein thrombosis, hypostatic pneumonia, and p rolonged hospital stay in the bed, bedsores, urinary calculus formation, etc. Coxa vara deformity, shortening, limitation of hip movements are complications encountered around the hip. The mortality and morbidity rates are very high in conservative line of treatment.

SURGICAL MANAGEMENT[51]:

"The goals of operative treatment are;

- Strong and stable fixation of the fracture fragments
- Early mobilization of the patient
- Restoration of the patient to his or her preoperative status at the earliest"[51].

"Kaufer, Matthew & Sonstegard have listed the variables that determine the strength of fracture fragment-implant assembly"[53]

"The variables are:

- Bone quality
- Fracture geometry

- Reduction
- Implant design
- Implant placement.

Bone quality and fracture pattern are beyond the control of the surgeon. Therefore the surgeon has within his control the reduction quality, the implant choice and the placement".

1. BONE QUALITY:

Quality of bone (hardness, elasticity and strength) varies considerably depending upon age, sex, race, general state of health, muscle mass, level of activity. Bone strength varies in the same individual as well as different areas in the same bone. Intertrochanteric fractures occurring in elderly, in osteoporotic bones, are relatively low energy injuries. SINGH et al, have developed a roetgenographic method for determining the bone strength that is based on the trabecular pattern of the proximal femur. The method is simple, readily available, requires no special equipment, correlates well with histological control, and is sufficiently sensitive and prognostically useful. Loss of continuity of primary tension trabeculae (i.e. grade III) marks the transition between bone capable of holding an internal fixation device and bone so weak that these devices become ineffective. Clinical studies confirm that regardless of other variables internal fixation failed in 80% of fracture of the bone grade III or less.

SINGH INDEX:

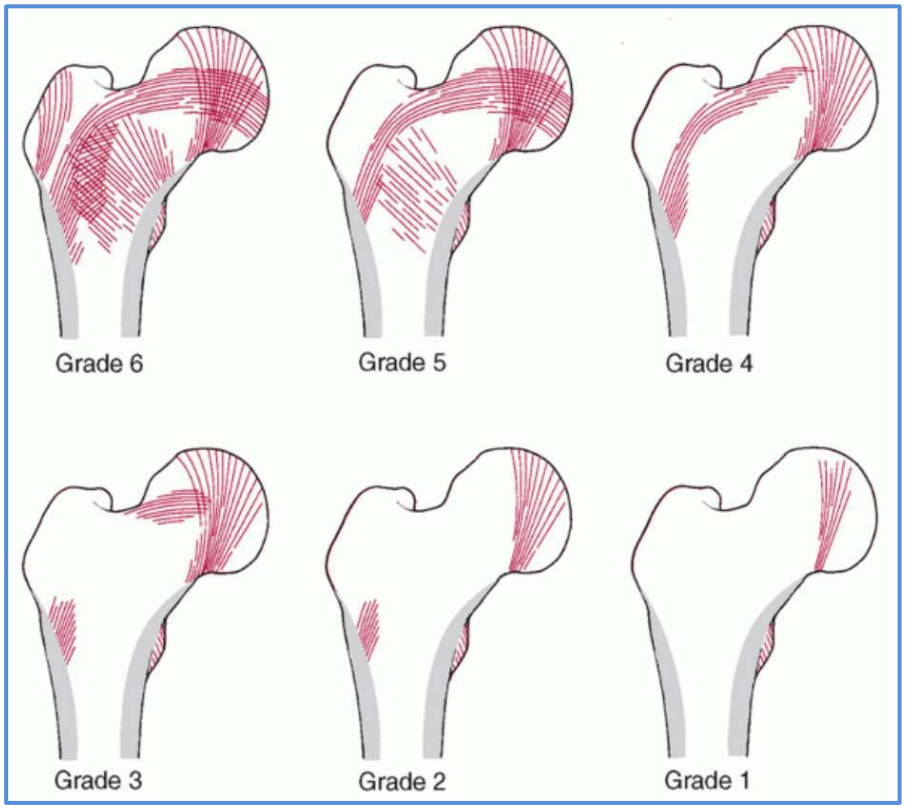


Fig 12 SINGH INDEX

2 .FRACTURE GEOMETRY:

"Much clinical importance has been given on the number, shape, size, location and displacement of trochanteric fracture fragments. Evan's used concepts of stable and unstable fractures.In Stable fracture it is possible to re-establish posteriomedial femoral cortex anatomically with an internal fixation device will act as a tension band on the lateral femoral cortex and impaction and weight bearing can occur directly on the medial cortex. (Frankel & Brustein 1997; Muller1970; Scinsheimer 1978)".

"In unstable fractures medial cortical opposition is not possible due to communition or obliquity of fracture. Bending stress and the load will concentrate in one area of the Intra medullary device in this type of fracture . This results in implant failure or loss of fixation".

3. IMPLANT PLACEMENT:

For effective fixation implant should be placed across Ward's triangle into strongest portion of the bone in the inferomedial part of neck. In lateral view it should be neither anterior nor posterior but in center[54].

4. IMPLANT DESIGN:

Devices used for fixation of intertrochanteric fracture can be classified into,

" **A. Extramedullary devices.**

Fixed angle nail plate devices.

JEWETT nail

HOLT nail

SMITH PETERSON nail".

Sliding devices.

Dynamic hip screw

Variable angle hip screw

TALON compression hip screw

MEDOFF plate

Percutaneous compression plate.

B. Intramedullary devices.

Condylocephalic nails.

ENDER'S pin.

Cephalomedullary nail.

GAMMA nail

Intramedullary hip screw

Proximal hip screw

Trochanter fixation nail.

The surgeon has in his control only the reduction quality , implant choice, and placement. Quality of the reduction is the single vital factor that ultimately decides the prognosis.

DIMON AND HUGHSTON'S TECHNIQUE[55]

Briefly, it consists of osteotomy in the trochanter transversely, insertion of the guide pin in the proximal fragment in the required position, to place the displaced beak of the neck fragment into medullary cavity of the displaced fragment, insertion of the fixed angle Jewett nail plate and then securing the plate to the cortex of the shaft. Thus, the unstable fracture is stabilized.

SARMIENTO'S TECHNIQUE[22,23]

Here, an oblique osteotomy of the distal fragment is made, the angle being 45 degrees, a guide pin is inserted into the proximal fragment exactly at 90 degrees i.e. perpendicular to it fixed angle nail plate is inserted over the guide pin and then plate part secured to the lateral aspect of the shaft, thus stabilizing the fracture.

CONDYLOCEPHALIC NAILING BY ENDER'S METHOD[56]:

Here flexible medullary nails are used. From an incision on the medial aspect of the knee joint over the medial femoral condyle, nails are passed proximally through the medullary part of the shaft of femur, through the fracture site into the neck and head of the femur, under x-ray controls, after reduction of the fracture on a traction table. This has its own difficulties and complications.

ZICKEL'S TECHNIQUE:

"For sub trochanteric fractures, Zickel devised a special medullary nail with a tunnel through its proximal part for the triflanged nail to be inserted through it into the head and neck of the femur. This fixed securely both the proximal and distal

fragments. The basic procedure is similar, only modified accordingly for the fixation of the device".

EXTERNAL FIXATORS:

A classical article on, the use of external fixators for intertrochanteric fractures was written by Dr.Irwin H Scott in 1957. He summarized 112 cases, demonstrated the pin construction for stable and unstable intertrochanteric fractures. He introduced two pins into to neck at an angle of 120-130 degrees and 2 to 3 pins into the proximal half of the femur.

Dhal A et al, in 1991, operated 154 patients with intertrochanteric fractures with external fixators over a period of 8 years, only those patients considered to be risk for surgery were include in the study.

METHODOLOGY

SOURCE OF DATA:

Data collected from patients presenting with unstable intertrochanteric fractures satisfying inclusion and exclusion criteria in B L D E University's shri B.M. PATIL MEDICAL COLLEGE AND RESEARCH CENTER from year 2016-2018 who are treated with Cemented Bipolar Hemiarthroplasty.

INCLUSION CRITERIA:

1. Patient with age group >60 years of either sexes.
2. Intertrochanteric fracture classified as unstable fracture according to Boyd and Griffin classification.

EXCLUSION CRITERIA:

1. Polytrauma patients.
2. Patient <60 years of age.
3. Compound intertrochantric fractures.
4. Patients medically unfit for surgery.
5. Patients with immunocompromised status.

THE IMPLANT:

The Bipolar prosthesis was first introduced by JAMES. E. BATEMAN[50] and GILIBERTY in 1974. The commonly known versions of bipolar prosthesis are Monkduo pleet, Monk (1976), Hastings Bipolar prosthesis, Devas et al (1983), Modular Bipolar prosthesis (Biotechnic France) and Talwalkar's bipolar endo prosthesis (Inor, India)

Bipolar Hip Prosthesis:

Bipolar hip prosthesis has the great advantage of a second joint below the acetabulum, it has an outer head of metal which articulates with the acetabulum and a

second in a metallic head which articulates with the high density polyethylene (HDPE), lining the inner surface of the outer head. This prosthesis proved to be very useful and results were encouraging.

The large contact surface area and the two planes of rotation reduce the wear at acetabular surface and preserve the native acetabular cartilage. The device is easy and therefore safe to use.

Self-centering action:

The positive eccentricity of the centers of rotation corrects alignment.

Biomechanical fixation:

The biological component is the self-locking action while the mechanical component is represented by 3 point fixation in the femoral shaft.

Preservation of the acetabulum:

Since the main articulation is between the head and the cup.

Fully congruous PE insert:

Firmly fixed in the metal shell, to prevent micro motion and PE wear debris production.

Easy insertion:

Means short surgical time.

Highly polished metal surface:

To minimize friction between the implant and the acetabulum for use in combination with ceramic heads and metal heads.

The range comprises:

i) Sizes (dia.39-53mm, in 2 mm increments).

ii) Outer shell made of stainless steel 3.16L.

iii) Insert made of UHMWPE.

iv) To accept metal or ceramic femoral heads.

Sterilized by Gamma irradiation.

Recent modifications:

Axis of metallic and polyethylene cups are now eccentric so that with loading of hip, metallic cup rotates laterally rather than medially, and thus avoids fixations in varus position and avoids impingement of head on the edge of cup, which causes friction of polyethylene bearings insert and dislocation.

Dr. Della Pria introduced an Alumina Ceramic Bipolar Prosthesis, the advance of which is very low wear rate (2 microns/year compared to 200 microns of polyethylene per year). However, polyethylene has an effect of protecting the subchondral bone from fractures. Therefore, the ceramic bipolar should have a Poly ethylene jacket between the ceramic bearing surface and the outer head. A finite element analysis showed that such a jacket is effective at reducing the prosthesis stiffness.

PREOPERATIVE MANAGEMENT

Patients were admitted and detailed history was taken with particular emphasize on mode of injury and associated medical illness. In depth, clinical assessment was carried out in each case. In all patients preoperatively Buck's skin traction with appropriate weight was applied, to the fractured lower limb, with the aim of relieving pain, preventing shortening and to reduce unnecessary movement of injured limb. Oral or parental NSAIDs were given to relieve the pain.

The following investigations were done on all these patients before operating.

X-ray of antero-posterior view of pelvis with both hips will be taken.

BLOOD:

Complete Hemogram

Blood grouping and Rh typing

Random blood sugar

Blood urea

Serum creatinine

HIV rapid test

HbsAg spot test

HCV

URINE Albumin

Sugar

ECG

CHEST X RAY - AP view

Other specific investigations whichever needed.

Patients were evaluated for other medical problems and were referred to respective department and treated accordingly.

The patients were operated on elective basis after overcoming the avoidable anaesthetic risks.

Preoperative medical fitness was taken in all cases. Preanesthetic examination was carried out a day prior to the surgery.

Patients as well as the attenders were explained about the surgery and the risk factors; a written consent for the surgery was taken for all patients.

Intravenous antibiotics were given an hour before the surgery. The affected limb was prepared from umbilicus down to ankle joint

SURGICAL PROCEDURE[51]:

All surgeries were performed in the elective theater using standard aseptic precautions. Surgery was performed under spinal or general anesthesia.

Position of the patient[51]:

Straight lateral position with the patient lying on the unaffected side. The skin over the hip was prepared with a scrub and application of povidone-iodine and surgical spirit. The lower extremity from the groin to the toes was encased in sterile towels and sterile pillow case. These in turn were surrounded by sterile roller bandages. The operative field was outlined by 4 sterile towels held in place by clips through the skin at frequent intervals.

Approach: Posterior approach (southern approach)

From a point 10 cm distal to posterior superior iliac spine and extended distally and laterally parallel to the fibres of gluteus maximus to the posterior margin of the greater trochanter and then directed about 6cm parallel to the femoral shaft. Deep fascia was exposed and divided in line with the skin incision as also was the fascia over gluteus maximus, which was then split in the direction of its fibres using blunt dissection. By retracting the proximal fibres of the muscle proximally, the greater trochanter is exposed. Distal fibres are retracted distally. The trochanteric Bursa excised. In cases with fractured greater trochanter, the trochanter is reflected anteriorly. The sciatic nerve was usually not exposed, and if it was, it was gently retracted out of the way. The gemelli, obturator internus and the piriformis tendons were divided at their insertions after tagging them for easier identification and reattachment. The posterior part of the capsule thus exposed is incised from distal to proximal along the line of neck of femur and at right angle to it, thus making a ‘T’ shaped opening. The thigh and knee are flexed to 90° and the limb is rotated

internally to expose the neck of the femur, osteotomy was done at the level of the neck, then the hip was dislocated posteriorly. The head of the femur was levered out of the acetabulum and head size measured using template, the size was confirmed using a trial prosthesis.

The acetabulum was prepared, the remnant ligamentum teres was completely excised and the remaining soft tissue from the region of pulvinar region was curetted. The femoral shaft was rasped using a broach (rasp) and prepared for the insertion of the prosthesis.

Bipolar stem was cemented in place in 10-15° of anteversion using standard cementing techniques – lavage, cleaning, drying and plugging of the canal. Before cementing in some cases calcar reconstruction done using bone taken from the excised head. Fractured lesser trochanter and the greater trochanter was put back in place, in case of communition they were fixed using a SS wire. Reduction of joint carried out. On table movements of the joint carried out for checking the stability of prosthesis. After suturing the capsule the external rotators were sutured, the wound was closed in layers over a suction drain, which is removed at the first change of dressing after 48 hours.

INSTRUMENTS

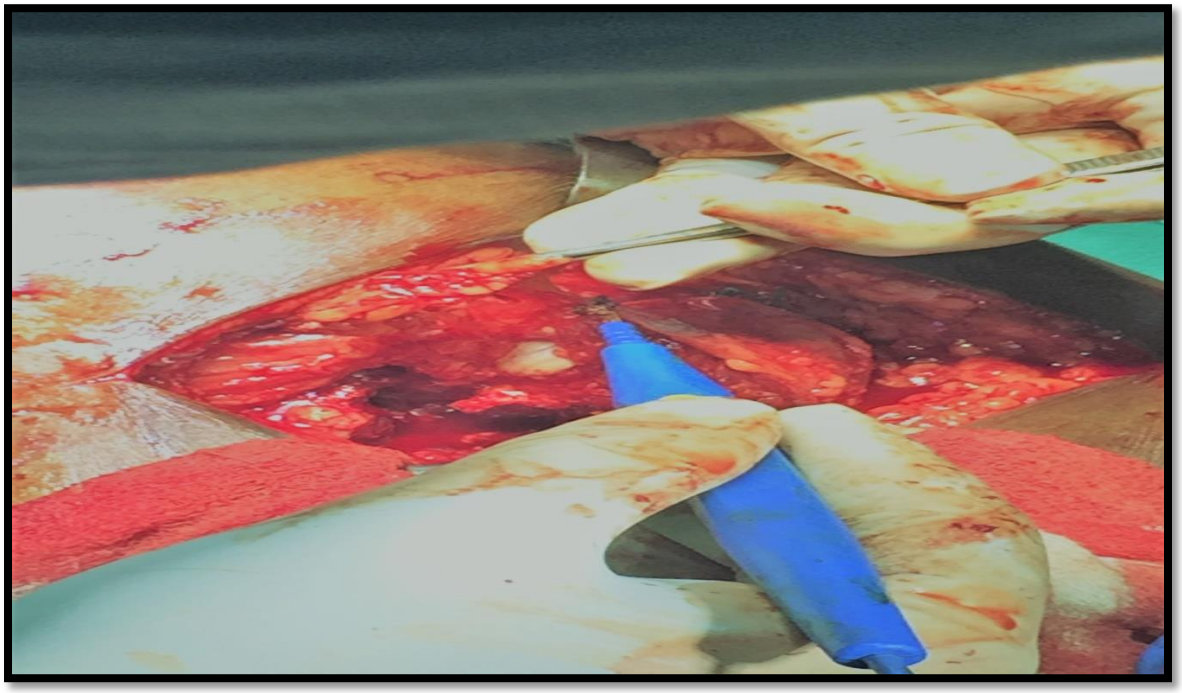
FIG. 13 INTRA OPERATIVE PHOTOGRAPHS

BIPOLAR PROSTHESIS

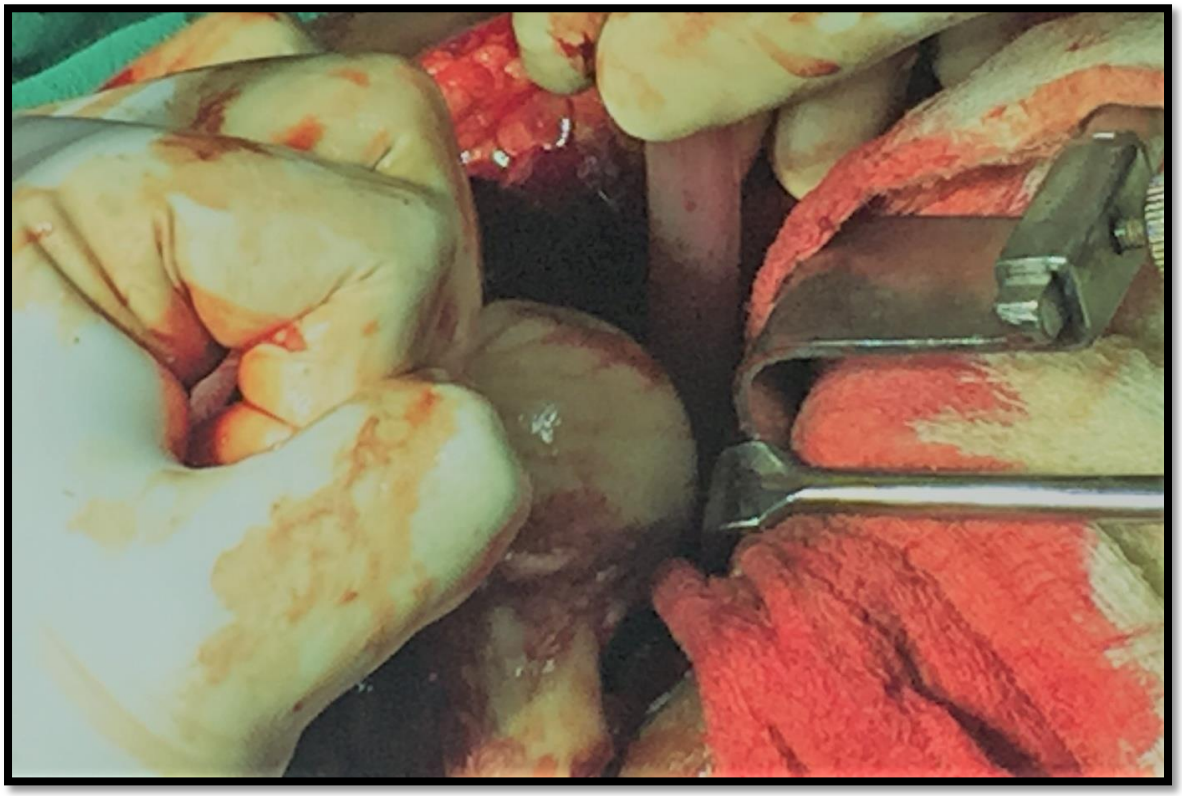
POSITION OF THE PATIENT

INCISION

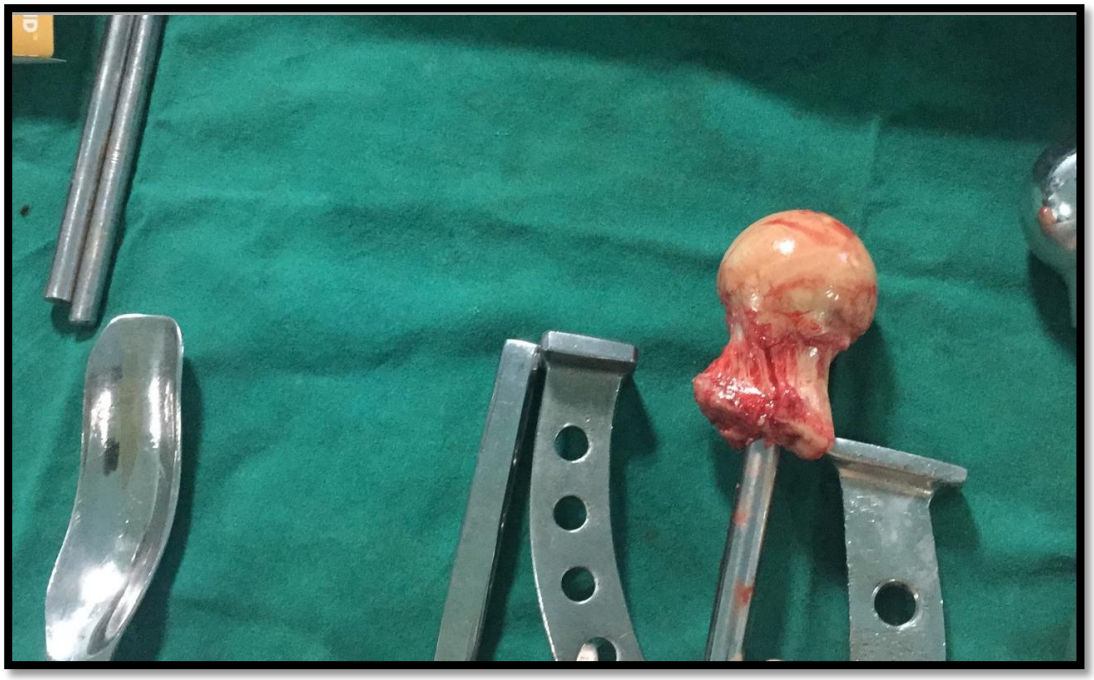
EXPOSURE OF FEMORAL HEAD



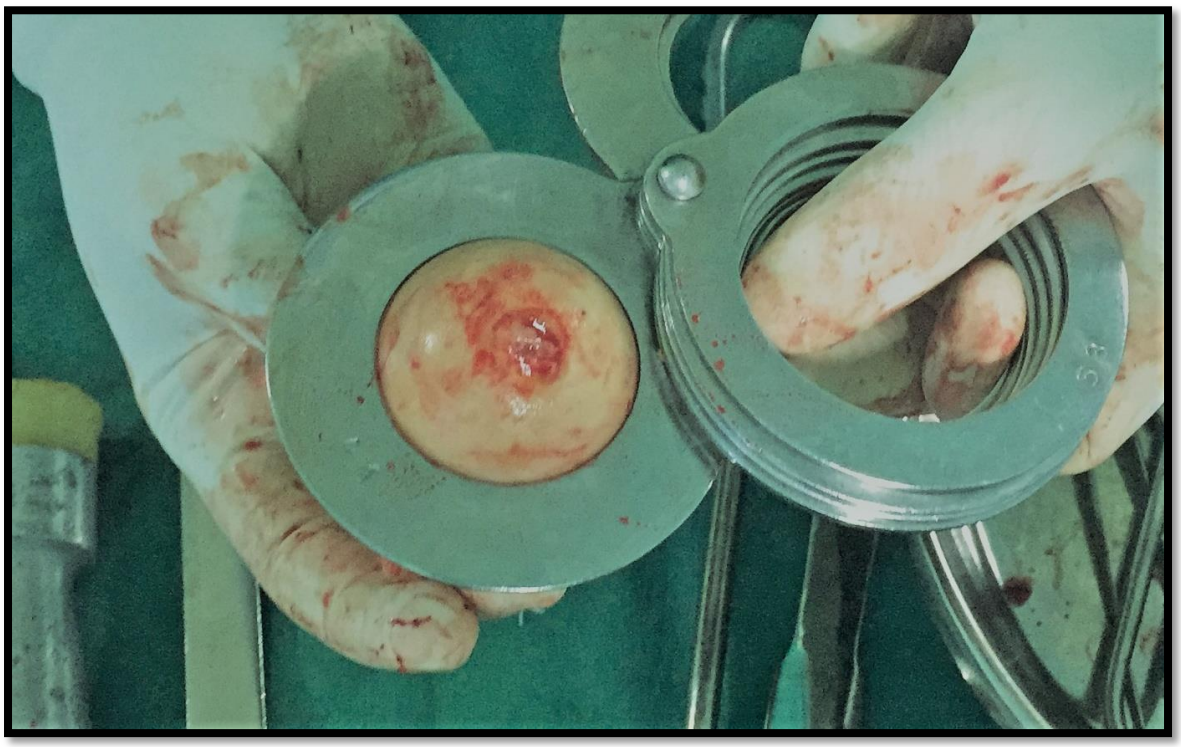
EXTRACTION OF FEMORAL HEAD



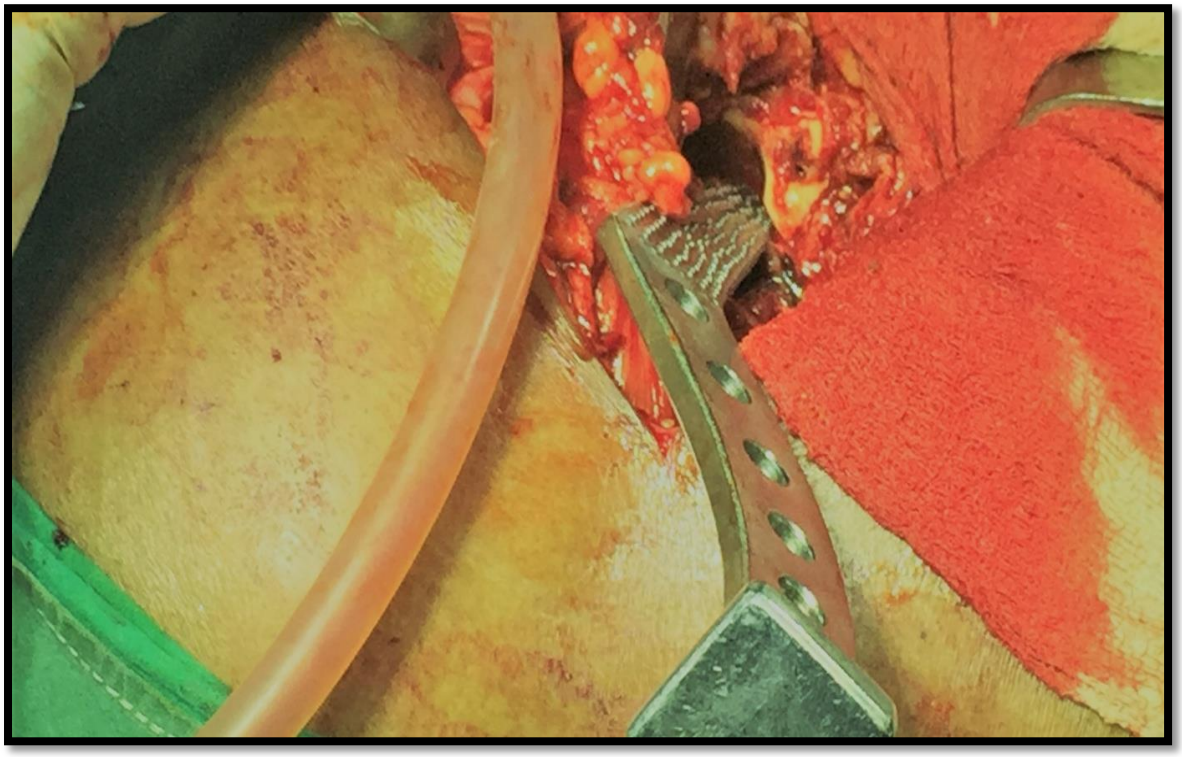
EXTRACTED FEMORAL HEAD



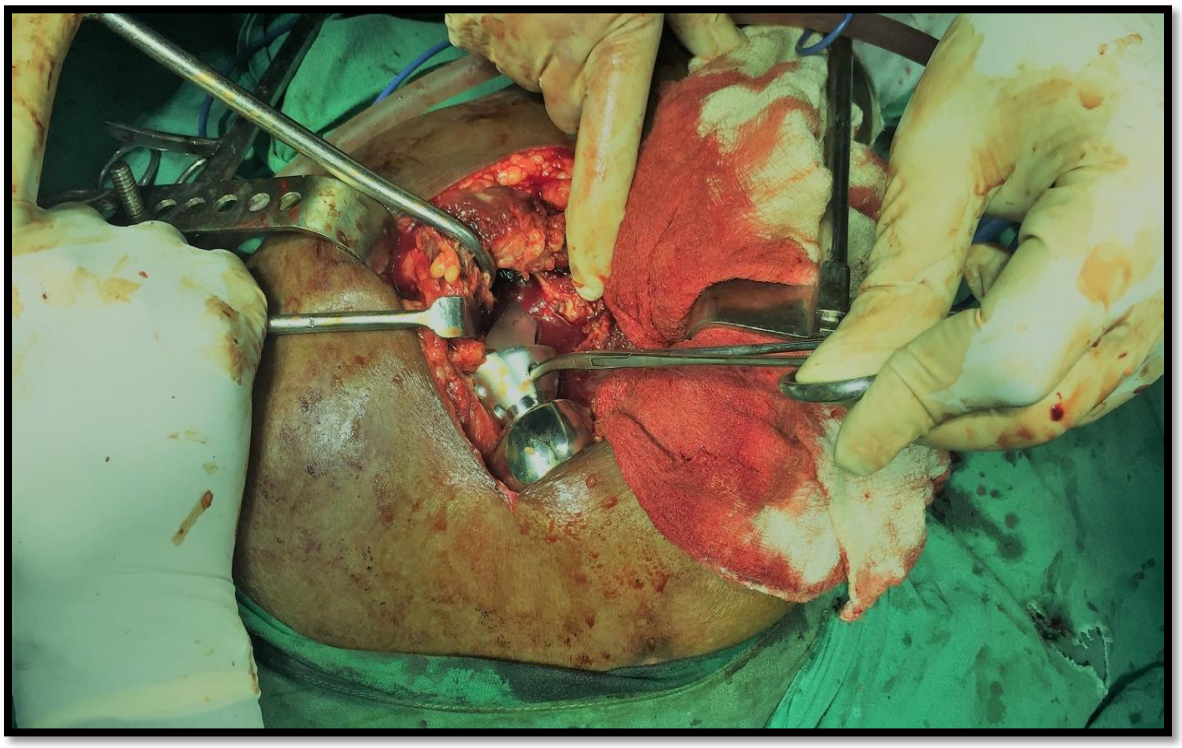
MEASURING SIZE OF FEMORAL HEAD



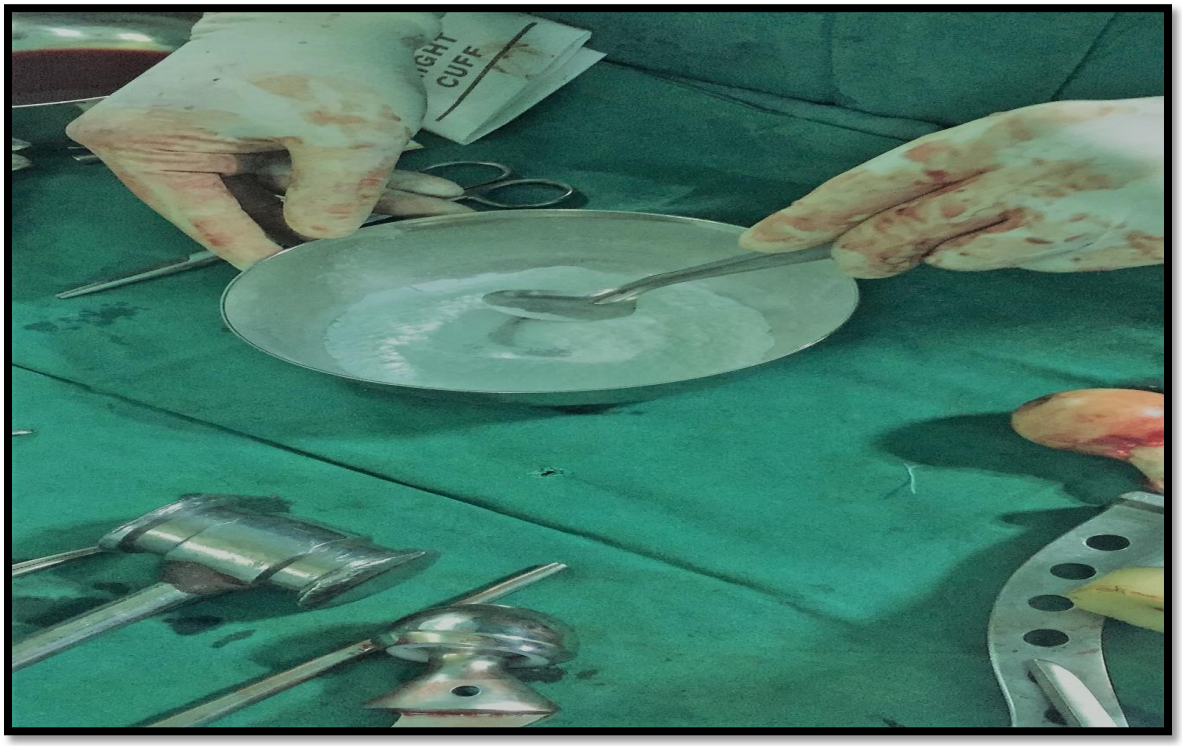
RASPING OF MEDULLARY CANAL



PROSTHESIS TRIAL

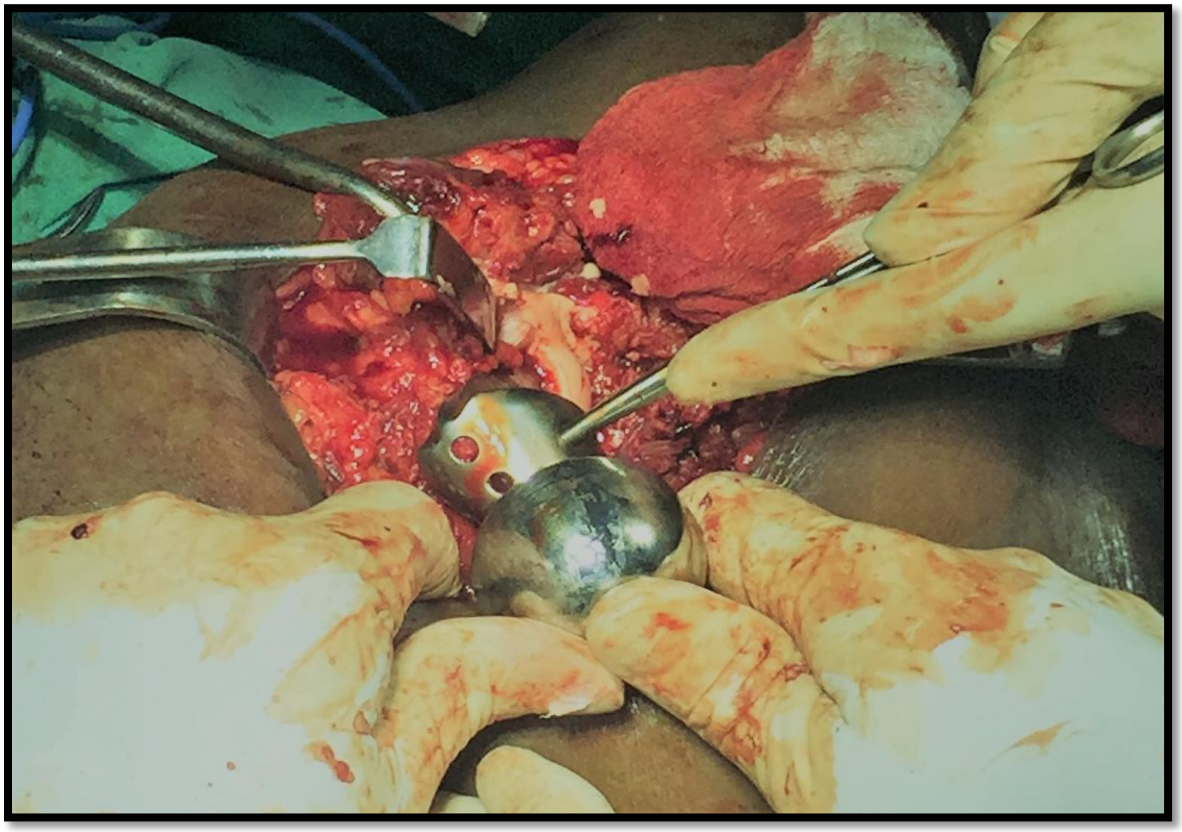


BONE CEMENT MIXING

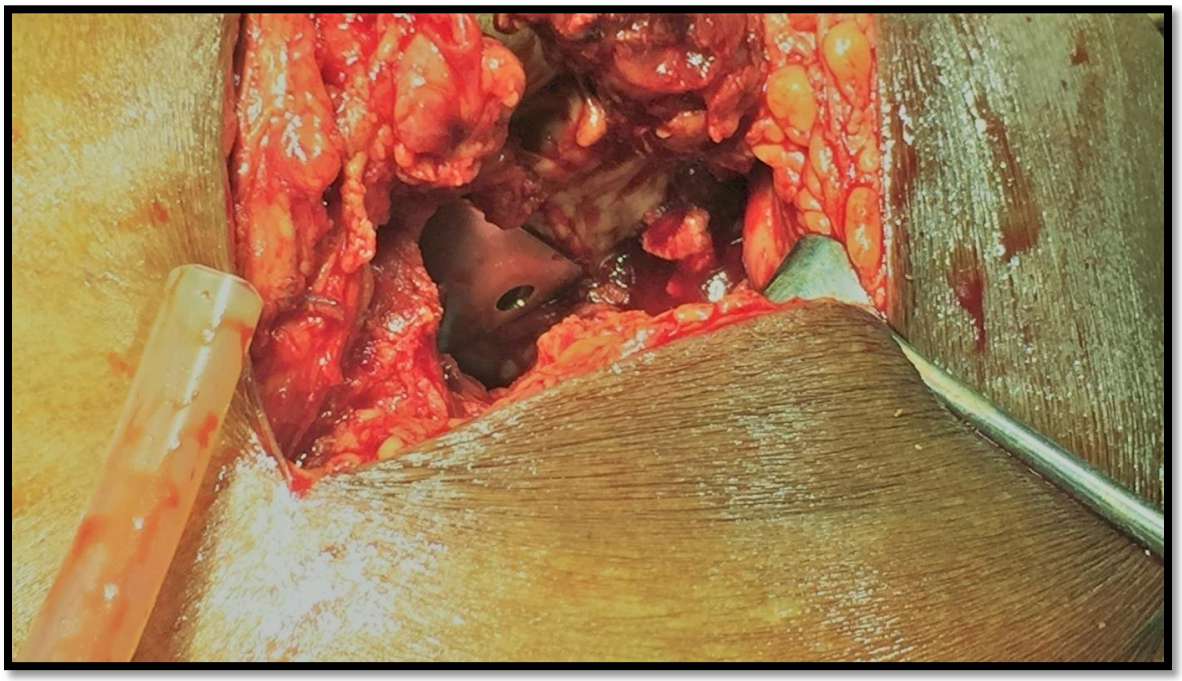


BONE CEMENT APPLIED OVER PROSTHESIS

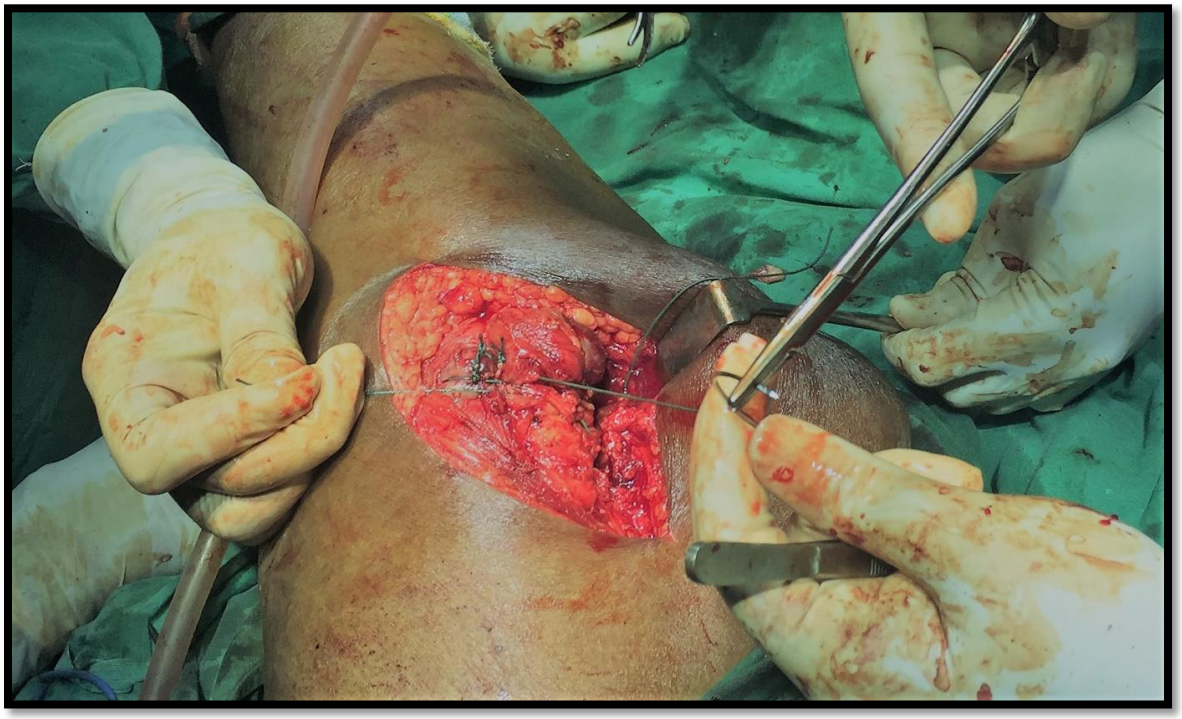
PROSTHESIS INSERTION



REDUCTION WITH PROSTHESIS



GREATER TROCHANTER RECONSTRUCTION WITH ETHIBOND SUTURES



SKIN CLOSURE

POSTOPERATIVE MANAGEMENT:

- In case of spinal anesthesia, foot end elevation was given.
- Lower limbs kept in abduction using pillows.
- Every half an hour blood pressure, pulse rate, temperature, and respiratory rate were monitored for the first 24 hours.
- Whenever necessary, postoperative blood transfusion was given.
- Intramuscular analgesics were given as per patient's compliance, IV antibiotics were continued for 5 days.
- Drain removal was done after 48 hours.
- Check radiograph was taken after 48 hours.
- Patients were made to sit up on the second day, standup with support (walker), on the third day and were allowed to full weight bear and walk with the help of a walker on the fourth postoperative day, depending on his/her pain tolerance and were encouraged to walk thereafter. Sitting cross-legged and squatting were not allowed.
- Suture removal was done on the 12 to 15 postoperative days.
- The patients were checked for any shortening or deformities.
- Complications like infections and bed sores are treated and later patients were discharged.
- Follow up was done at an interval of 6 weeks, 3 months, 6 months and 12 months. Clinical follow up was based on Harris Hip

Score.

- Radiological follow up done for signs of loosening, protrusion, dislocation or dissociation of implant.

“HARRIS HIP SCORING FOR FUNCTIONAL EVALUATION OF HIP

Point scale with maximum of 100 points distributed as follows:-

Pain	44
Function	47
Range of motion	05
Absence of deformity	04
Total	100

Table 2 HARRIS HIP SCORE

	PAIN	44
1	Totally disabled, crippled, pain in bed, bedridden	00
2	Marked pain, serious limitation of activities	10
3	Moderate pain, tolerable but makes concession to pain	20
4	Mild pain, no effect on average activities	30
5	Slight, occasional, no compromise in activity	40
6	None, or ignores it	44
Total		
II	Function	47
A	Distance walked	
1	Bed and chair only	00
2	Two or three blocks	05
3	Six blocks	08
4	Unlimited	11
B	Activities	
Shoes & Socks		
1	Unable to fit or tie	00
2	With difficulty	02
3	With ease	04
Public transportation		
1	Unable to use public transportation (bus)	00
2	Able to use transportation (bus)	01
Limp		
1	Severe or unable to walk	00

2	Moderate	05
3	Slight	08
4	None	11
Support		
1	Two crutches or not able to walk	00
2	Two canes	02
3	One crutch	03
4	Cane most of the time	05
5	Cane for long walks	07
6	None	11
Stairs		
1	Unable to do stairs	00
2	In any manner	01
3	Normally using a railing	02
4	Normally without using a railing	04
Sitting		
1	Unable to sit in any chair comfortably	00
2	On a high chair for 30 min	03
3	Comfortably on a ordinary chair for one hour	05
Total		
III	Motions Flexion+ Abduction + Adduction+ External rotation + internal rotation	05
1	00 to 29°	00
2	30 to 59°	01
3	60 to 99°	02
4	100 to 159°	03
5	160 to 209°	04
6	210 to 300°	05
Total		
IV	Deformity	04
1	Flexion deformity 30° of more	00

2	Flexion deformity less than 30°	01
1	Fixed adduction 10° more	00
2	Fixed adduction less than 10°	01
1	Fixed internal rotation(in extension) 10°or more	00
2	Fixed internal rotation(inextension) less than 10°	0
1	Limb length discrepancy more than or equal to 3.2 cms	00
2	Limb length discrepancy less than 3.2cms	01
	Total	
	Total of I+II+III+IV	100

The score is reported as follows:-

HHS between 90 to 100- Excellent results

HHS between 80 to 89- Good

HHS between 70 to 79- Fair

HHS between 60 to 69-Poor, and

HHS below 60:- as a failed result"[(69)].

* HHS: - Harris Hip Score

RESULTS

Results were obtained from the data collected during the study of 31 cases of unstable intertrochanteric fractures treated by Cemented Bipolar Hemiarthroplasty in the Department of Orthopaedics in BLDE (DEEMED TO UNIVERSITY) shri B M PATIL MEDICAL COLLEGE AND RESEARCH CENTER, VIJAYAPUR from year between 2016 and 2018.

TABLE 3: AGE DISTRIBUTION

Mean age was **73.84**

Age(Years)	No. of Patients	%
<= 70	14	45.2
71 – 75	3	9.7
76 – 80	7	22.6
81 – 85	4	12.9
86 – 90	3	9.7
Total	31	100.0

GRAPH 1: AGE DISTRIBUTION

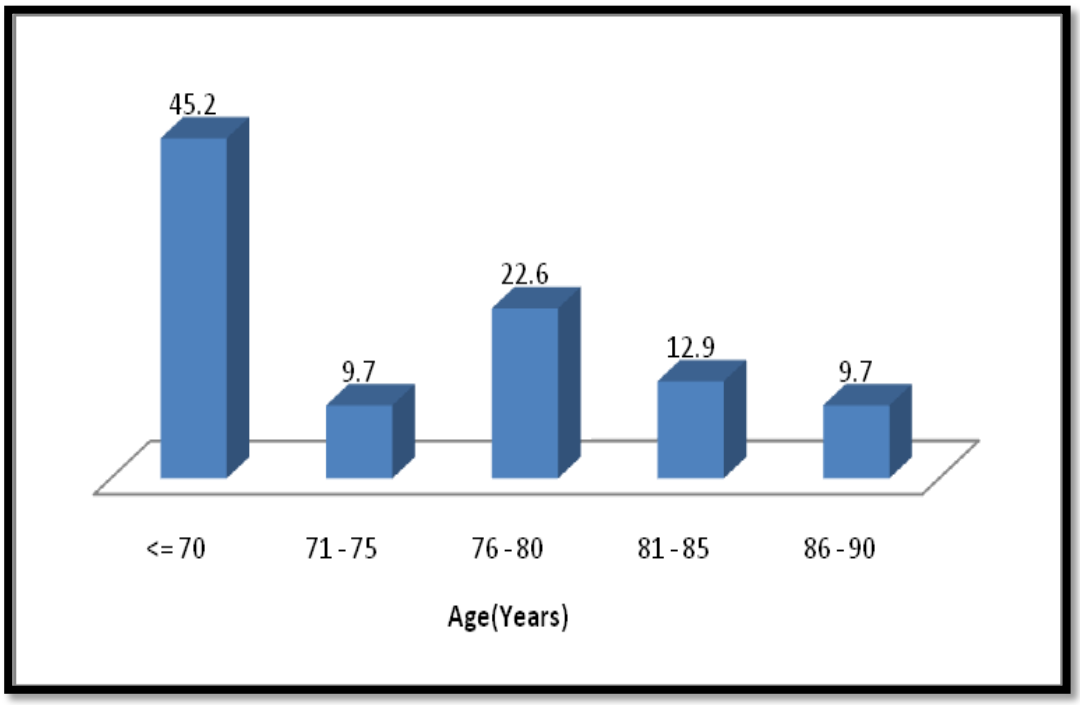


TABLE 4: AGE DISTRIBUTION IN STUDIES BY OTHER AUTHORS

Study by	No Of Cases	Mean age group
Hantjens. P et al	37	82
Niebuhr. H et al	361	83
Casey. C.K et al	54	84.2
George.J et al	60	70
Broos. P. L et al	565	75
Rodop. O et al	54	75.6
Kesemenli.C et al	27	78

TABLE 5 :SEX DISTRIBUTION

Gender	No. of Patients	%
Male	13	42
Female	18	58
Total	31	100.0

GRAPH 2 :SEX DISTRIBUTION

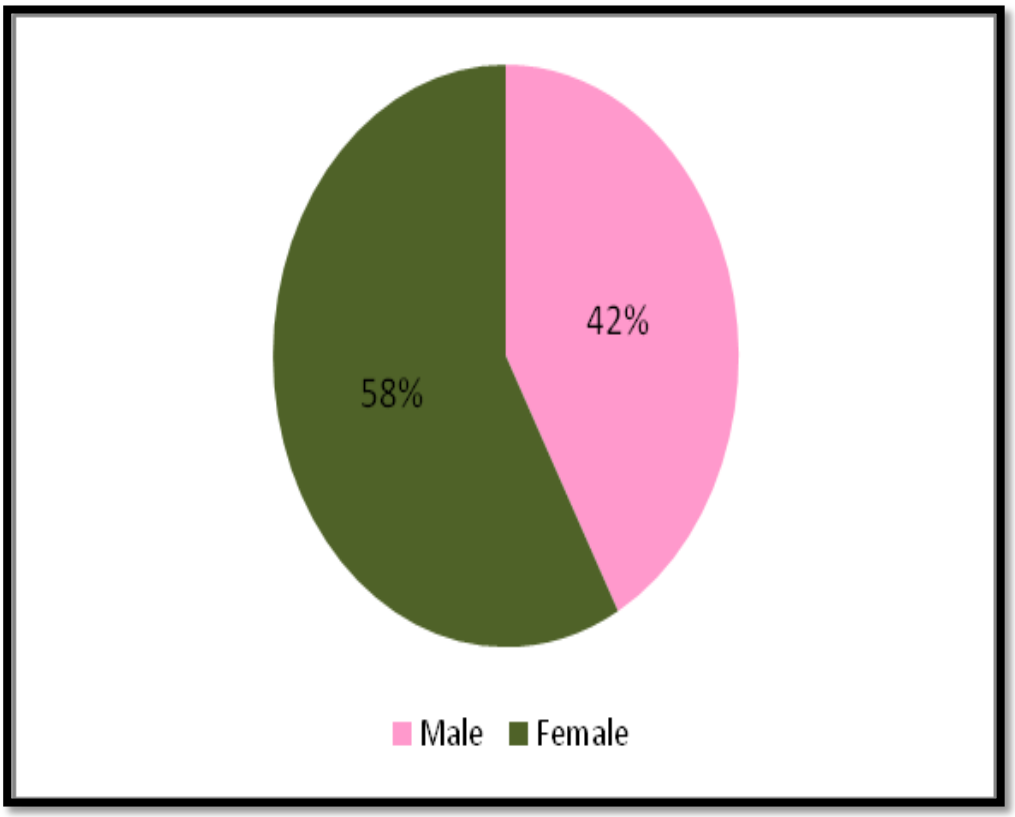


Table 6: Distribution of patients according to Side

Side	No. of Patients	%
Right	13	42
Left	18	58
Total	31	100.0

GRAPH 3 :Distribution of patients according to Side

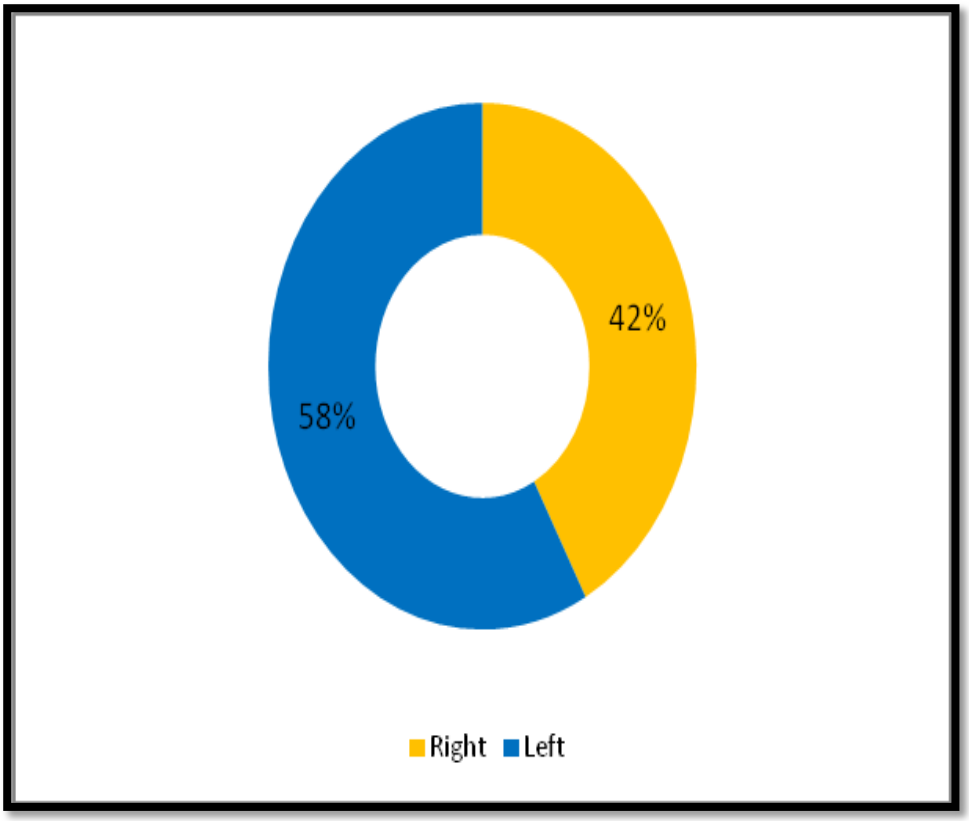


TABLE 7: Mode of Injury

Mode of Injury	No. of Patients	%
RTA	5	16
TT	26	84
Total	31	100.0

GRAPH 4:Mode of Injury

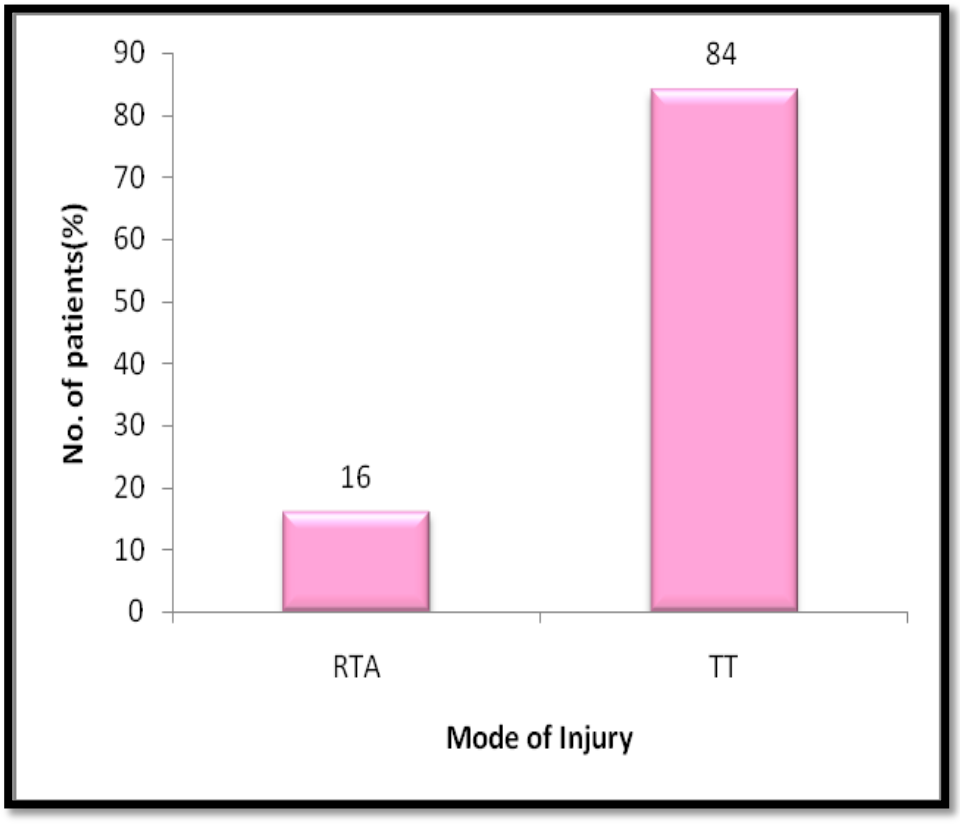


TABLE 8 :SIZES OF BIPOLAR PROSTHESIS USED

Size of prosthesis	No. of Patients	%
39	3	9.7
41	7	22.6
43	10	32.3
45	6	19.4
47	4	12.9
49	1	3.2
Total	31	100.0

GRAPH 5 : SIZES OF BIPOLAR PROSTHESIS USED

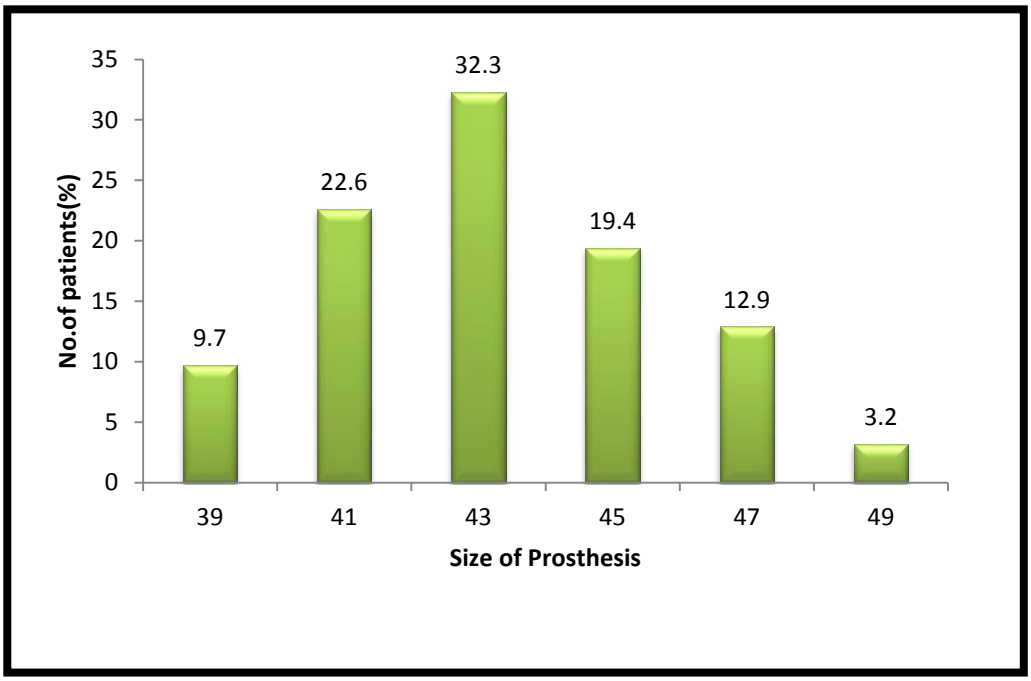


TABLE 9: COMPLICATIONS

Complications	No. of Patients	%
Bed sore	2	6.5
Death	1	3.2
No	27	90.3
Total	31	100.0

TABLE 10 : **Patients With Limb Length Discrepancy**

Limb length discrepancy		No. of Patients	%
Shortening	<2cm	6	19.35
	>2cm	2	6.4516
Lengthening	<2cm	4	12.90
Total		12	38.71

TABLE 11 :POST OPERATIVE DEFORMITY

Deformity		No. of Patients	%
ER	**<20**	4	12.9
IR	**<20**	2	6.5

TABLE 12: POST OPERATIVE DAY OF WEIGHT BEARING

Post operative day weight Bearing	No. of Patients	%
3rd	11	35.5
4th	11	35.5
5th	8	25.8
7th	1	3.2
Table	31	100.0

GRAPH 6: POST OPERATIVE DAY OF WEIGHT BEARING

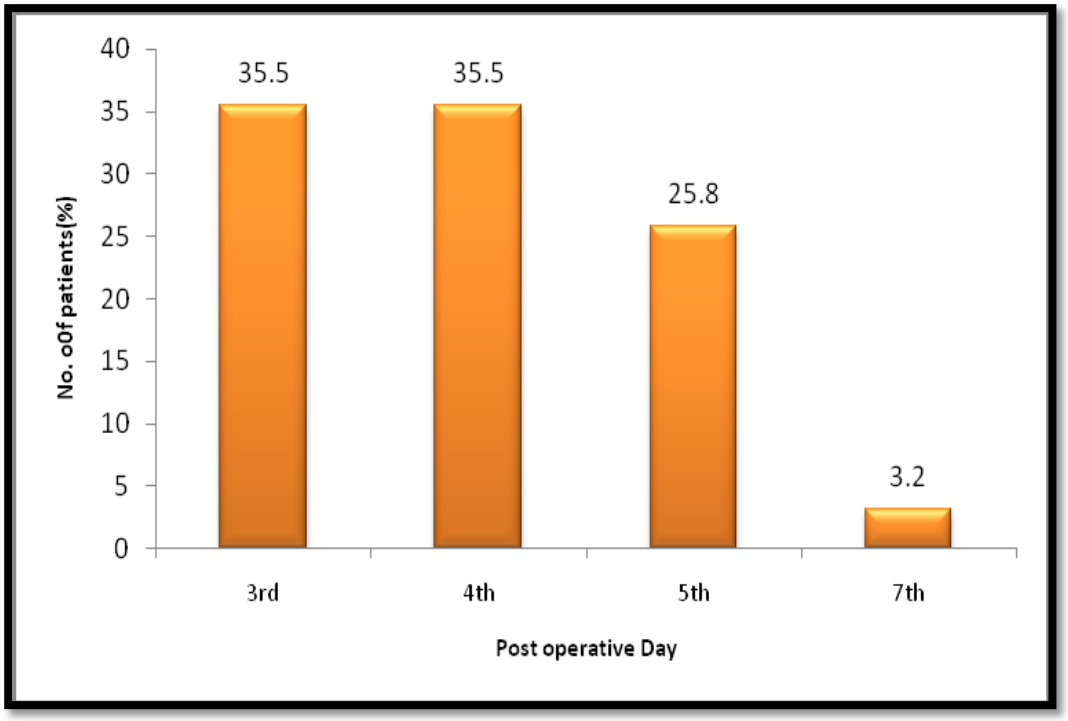


TABLE 13: HOSPITAL STAY

Discharge Day	No. of Patients	%
5th	7	22.58
12th	17	54.81
15th	6	19.35
20th	1	3.23
Total	31	100

GRAPH 7: HOSPITAL STAY

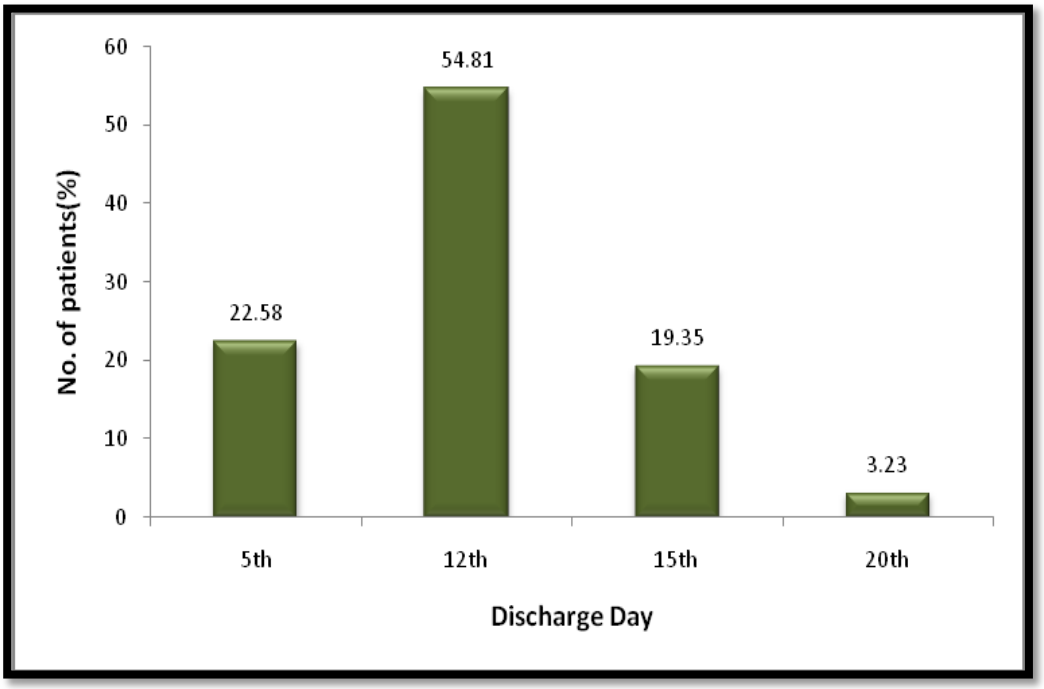


TABLE 14 : FUNCTIONAL RESULTS ACCORDING TO HARRIS HIP SCORE

Functional outcome	No. of Patients	%
Excellent	9	29.0
Fair	8	25.8
Good	10	32.3
Poor	3	9.7
Death	1	3.1
Total	31	100.0

GRAPH 8: : FUNCTIONAL RESULTS ACCORDING TO HARRIS HIP SCORE

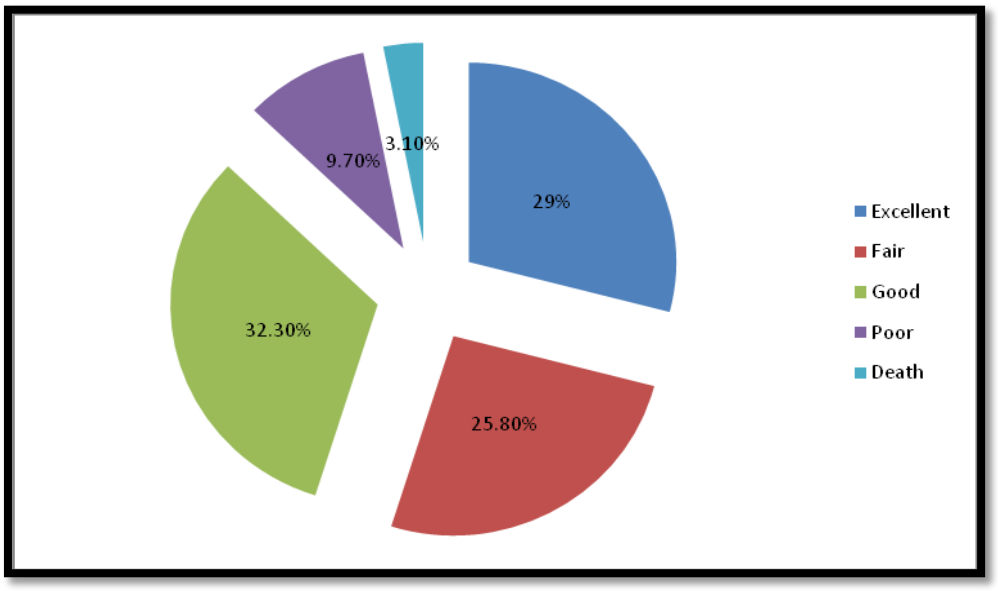


TABLE 15 :FUNCTIONAL RESULTS IN STUDIES BY OTHER AUTHORS

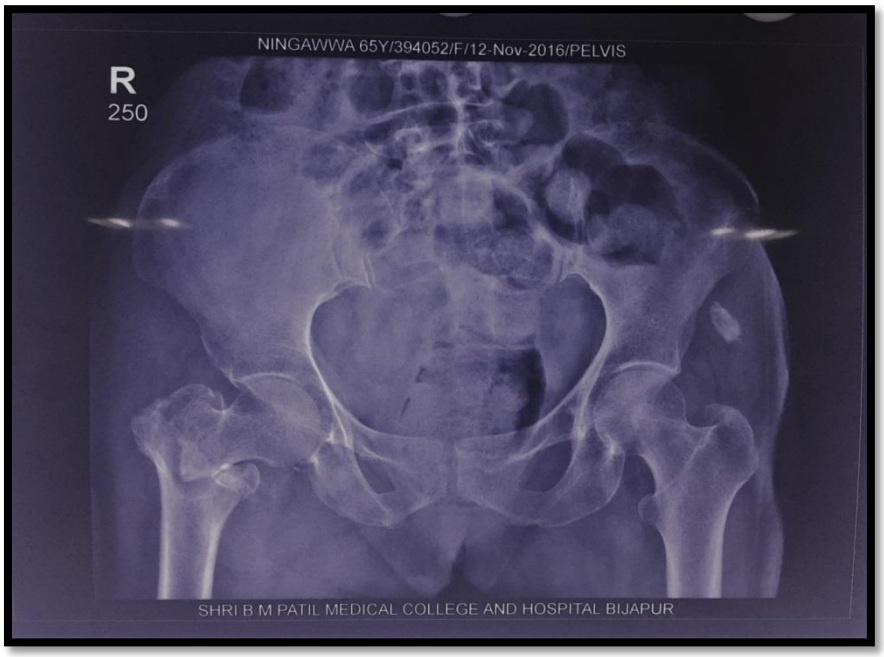
Study by	No. of Cases	Excellent	Good	Fair	Poor	Death
Green S et al	20	3	7	2	4	4
Hantjens P et al	37	7	11	7	5	3
Casey C K et al	54	54	54	54	54	54
Rodop O et al	19	19	19	19	19	19
Kesemeli C et al	27	27	27	27	27	27
George et al	-	-	-	-	-	-
Rosenfeld et	22	22	22	22	22	22

X RAYS

CASE 1

65 year old female patient with history of trivial fall

PRE OPERATIVE



Immediate Post-operative

Follow up at 6 week

CLINICAL PHOTO

FULL WEIGHT BEARING ON POST OP DAT 3

FLEXION AND ABDUCTION ON POST OP DAY 3

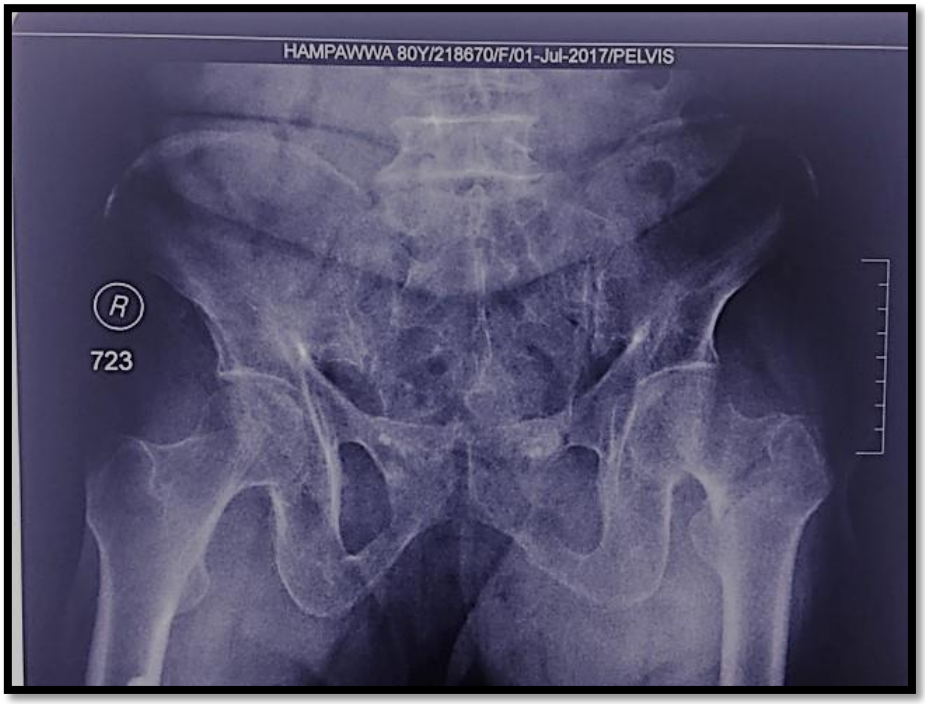
FOLLOW UP AT 6 WEEKS

MOVEMENTS AT 6 WEEKS OF FOLLW UP

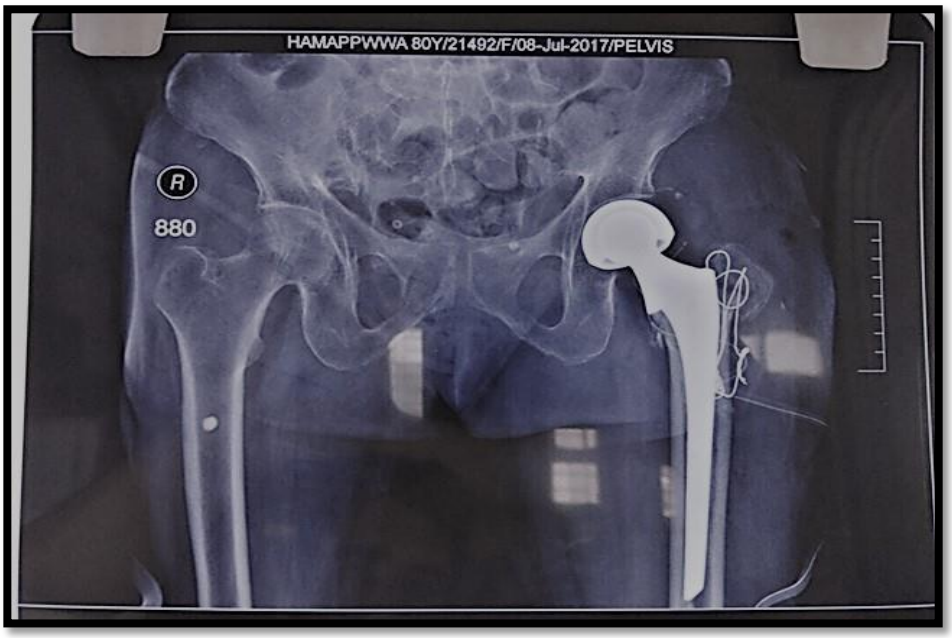
Case-2

80 year old female patient with history of trauma

PRE OPERATIVE

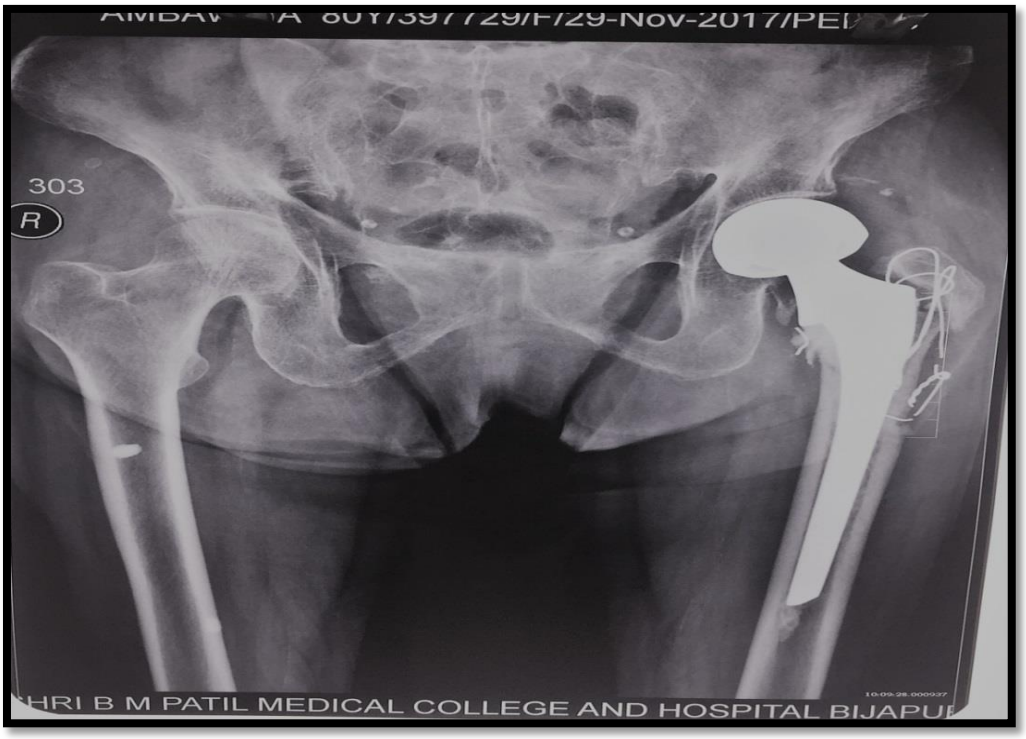


Immediate Post-operative



Follow up at 6 week

Follow up at 12 week

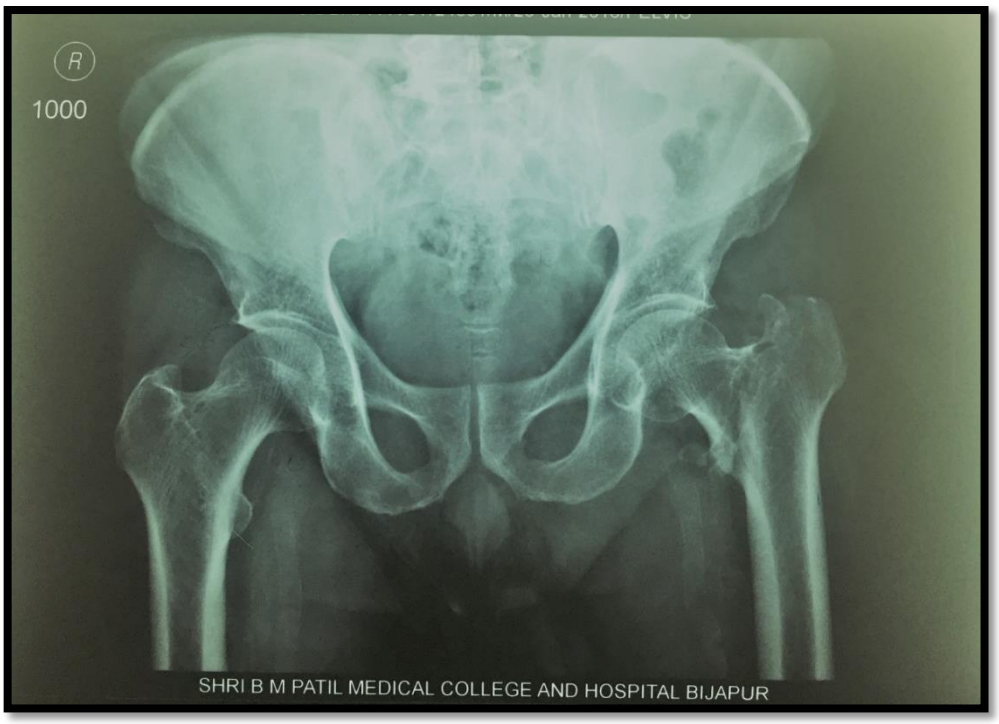


POST OP DAY 5 WEIGHT BEARING

FLEXION ABDUCTION MOVEMENTS AT POST OP DAY 5

Case 3

PRE OPERATIVE



Immediate POST OPERATIVE

POST OP DAY 3 WEIGHT BEARING

FLEXION ABDUCTION MOVEMENTS AT POST OP DAY 3

DISCUSSION

The treatment of intertrochanteric fracture is still associated with some failures.

High stress concentration that is subject to multiple deforming forces and high incidence of complications reported after surgical treatment compels the surgeon to give a second thought regarding selection of proper implant. A large number of fixation implants has been devised and discarded. The treatment still merits the type of fracture and condition of the patient. Displaced, unstable, posteromedial comminuted intertrochanteric fracture in osteoportic ederly patient is not easy to treat.

Hemiarthroplasty has been used for unstable intertrochanteric fractures since 1971[57] however less frequently as compared to femoral neck fractures[61]. Its initial use was as a salvage procedure for failed pinning or other complications[62].Tronzo claimed to be the first to use long, straight-stemmed prosthesis for the primary treatment of intertrochanteric fractures[63]. Rosenfeld, Schwartz, and Alter reported good results with the use of the Leinbach prosthesis[64]. Since then there are multiple studies showing good results using this technique.

In our study, the mean age was 73.44 years. The mean age in studies by Hantjens et al[28] was 80 years, by Casey C.K et al[29] was 84.2 years, by George J et al[30] was 70 years, by Broos P L et al[58] was 75 years, by Rodop O et al[31] was 75.6 years, and by Kesemenli C et al[33] was 78 years.

In our study of 31 cases, 18 patients were female and 13 patients were male,13 patients had right-sided fracture and 18 patients had left-sided fracture. 26 patients had trivial trauma, 5 patients had an RTA.

The most common associated medical problem was hypertension in 5 cases (16%), followed anemia in 6(19%) diabetes in 3 cases (9.6%), 1(3%) patient had COPD and 1(3%) with IHD.

Pre-operatively 6 patients (19%) had blood transfusion and post operatively 7 patients (22%) had blood transfusion, which were uneventful.

Cerclage wiring for Greater trochanter was done in 19 cases (60%) to hold the fragments together. Calcar reconstruction done in 8 cases (25%).

2 patient had grade 1 bedsores , daily dressing is done and wound cured and patient was discharged from the hospital.

1 patient died on 5^{th} post-operative day due to myocardial infraction. Postoperatively, 8 patients had shortening of same limb of which 6 had less than 2 cm, they take help of cane for walking.

2 patient had shortening more than 2 cm, had slight limp and walks with help of quadruple walker .

4 patients had lengthening of less than 2cm.

Operated limb was fixed in less than 20 degrees of external rotation in 4 cases and less than 20 degree internal rotation in 2 case.

Patient is asked to bear weight on and after the third post-operative day.

The mean day of full weight bearing was on 3.97 th day

30 patients were discharged on and before 15th day. One patient died on 5^{th} post-operative day.

The mean number of days spent by the patient in the hospital was 11 days. All patients were advised not to squat and sit crossed legged. follow up done at 6 weeks, 3 month, 6 months, 9 months and 1 year post operatively. There were no of acetabular erosion, loosening of the prosthesis in this series, on follow up of 1year.

At the end of 6 weeks

21 patients walked without any support,

8 patients walked with the help of a cane,

2 patients used walker.

The functional results according to Harris Hip Scoring System, score of more than 90 indicates excellent result,

between 80 and 90 indicates good results,

between 70 and 80 indicates fair results

below 70 is rated as poor.

In our study,

9 patients had excellent results,

10 patients had good results

8 patients had fair results, and

3 patients had poor result.

Green et al[28], in a "series of 20 cases, performed Bipolar Hemiarthroplasty for elderly patients with unstable trochanteric fractures with a mean time to ambulation of 5.5 days, and a mean follow up of 13.2 months. Amongst the 20 cases, 7 patients had excellent results, 11 patients had good results, 7 patients had fair results, 5 patients had poor results and 3 patients died. They concluded that elderly patients were a suitable alternative to internal fixation because the prosthesis provided for early full weight bearing and rapid rehabilitation".

Haentjens et al[29], in a "series of 37 cases, with a mean age of 82 years who sustained unstable intertrochanteric fractures were treated with immediate Bipolar Hemiarthroplasty. Amongst the 37 cases, who were rated according to criteria of

Merle d'Aubigne, 7 patients had excellent results, 11 patients had good results, 7 patients had fair results, 5 patients had poor results and reported death of 3 cases. They concluded that immediate Bipolar Hemiarthroplasty for independently mobile patients older than 70 years having an unstable intertrochanteric fractures, allowed early walking with full weight bearing and helped the patients to return to prefracture level of activity rapidly, preventing complications such as pressure sores, pneumonia, atelectasis and pseudoarthrosis".

Rosenfeld et al[64], in a "series of 72 elderly patients with unstable trochanteric fractures treated using head neck replacement prosthesis. The series showed excellent results in 33 patients, good results in 21 patients, fair results in 11 patients, poor results in 2 patients and reported death of 5 patients. They concluded that in elderly, fragile, osteoportic patients who had intertrochanteric fractures, Hemiarthroplasty helped in faster ambulation and reduced the complications".

Casey C K et al[30], in a "series of 55 patients with intertrochanteric fractures, with a mean age of 84.2 years, were treated using Cemented Bipolar Hemiarthroplasty. They reported excellent results in 19 cases good results in 8 cases, and death of 12 cases in the series. They concluded that, Cemented Bipolar hemiarthroplasties for intertrochanteric fractures have the advantage because the patients can bear full weight immediately after the surgery and there was no risk of excessive collapse, compromising walking function and so is a reasonable alternative to a sliding screw device for the treatment of unstable intertrochanteric fractures"[(30)].

Stern M B et al[27], in a series of 105 cases with type III and type IV comminuted intertrochanteric fractures who were treated using Leinbach Bipolar prosthesis, concluded that functions were restored within a short period of time and allows unrestricted weight bearing almost immediately. The hospital stay was

shortened and the incidence of secondary operations, thrombophlebitis, pulmonary embolism, decubitus ulcers and pneumonia were relatively very low.

Broos P L et al[66], in a "series of 565 patients, who sustained a fresh per trochanteric fracture, were treated with compression hip screw, angled blade plate, enders pins and Bipolar Hemiarthroplasty. They concluded that fixation with angled blade plate and enders pins should be forsaken, patients treated with compression hip screw had good results but at this treatment had a risk for serious collapse and pain in 80% of the cases, he suggested that complex multifragmentary intertrochanteric fractures can be treated with endoprosthesis as it is no longer considered a severe intervention with less than 1% danger of mechanical complications"[(66)].

George et al[31], in a series of 60 patients with a mean age of 78 years amongst which 24 patients were treated by total hip arthroplasty, 27 patients were treated with Bipolar arthroplasty, and 9 patients were treated with unipolar arthroplasty, secondary to failed internal fixation of intertrochanteric fractures. The series "showed excellent results in 26 cases, good results in 20 cases, fair results in 10 cases and poor results in 4 cases. None of the patients had a revision arthroplasty for acetabular erosion. They did not observe any association between the quality of pain relief and treatment with Bipolar Hemiarthroplasty as opposed to total hip arthroplasty they concluded that hip arthroplasty is an effective salvage procedure after the failed treatment of an intertrochanteric fracture in older patients. Most of the patients had good pain relief and functional improvement"[(31)].

Rodop et al[32], in a series of 54 elderly patients, with a mean age of 75.6 years, who had unstable intertrochanteric fractures were treated primarily with Bipolar hemiarthroplasties. The series "showed excellent results in 17 cases, good results in 14 cases, fair results in 3 cases, poor results in 13 cases and reported death of 7 cases.

They concluded that Bipolar Hemiarthroplasty for unstable intertrochanteric fractures in the elderly was a good procedure which provides rapid weight bearing and rehabilitation of the patients"[32].

Kesemenli C et al[34], in a series of 27 patients with unstable intertrochanteric fractures, who were at the mean age of 78 years, were treated by Leinbach type Bipolar endoprosthesis. The series showed excellent results in 22 cases, poor results in 3 cases and reported death 2 cases. They concluded that in "elderly patients with unstable intertrochanteric fractures due to pathologies related complications and complications due to immobilization are seen frequently. Treatment with Bipolar endoprosthesis is to be helpful in decreasing these complications and early mobilization of the patients"[34].

A C Vahl et al[35] "in a series of 22 patients with unstable trochanteric fractures with severe communition and osteoporosis. Endoprosthesis was inserted in 5 patients with sub trochanteric and 17 with pertrochanteric fractures. Pre and postoperative ambulation levels were classified. Seventeen patients (17%) achieved full weight bearing mobilization. Five patients never walked again (23%). 2 patients died in first month (9%). It is concluded that for elderly and debilitated patients with an unstable intertrochanteric fracture, Hemiarthroplasty is an acceptable alternative to osteosynthesis"[35].

Chris Grimsud et[36] al in a "series of 39 patients with unstable three and four part intertrochanteric hip fractures, treated with Cemented Bipolar hip arthroplasty with a novel technique of cerclage fixation of the trochanteric bone fragments allowing retention of the femoral calcar. At one year minimum follow up, there was no loosening or subsidence of the femoral components. All trochanteric fractures healed. One dislocation and one deep infection occurred. They concluded that, this

technique allows safe early weight bearing on the injured hip and had a relatively low rate of complications"[36].

Kiran Kumar GN, Sanjay Meena, Vijaya Kumar N, Manjunath S, Vinaya Raj MK[39] studied outcome of Bipolar Hemiarthroplasty in 20 cases of intertrochanteric femur fracture, according to their study the "treatment of unstable intertrochanteric fractures in elderly patients with severe osteoporosis differs from the treatment of patients with other proximal femoral fractures. These fractures are better treated with Cemented hemi-arthroplasty than with internal fixation. Besides an early ambulation and less hospital stay, Cemented hemi-arthroplasty provides stable and mobile hips. Weight bearing can be started earlier than in other methods of treatment, which prevents any recumbency related complications"[39] .

Ibrahim et al[40] studied 10 patients with intertrochanteric femur fracture treated with Bipolar Hemiarthroplasty and concluded that " Bipolar arthroplasty is of choice in freely mobile elderly patients above sixty years of age with an intertrochanteric femoral fracture. Postoperative full weight bearing after Hemiarthroplasty spares the postoperative complications of non-weight bearing after internal fixation. Yet Hemiarthroplasty in these cases is a surgically demanding technique. Bad surgical technique may lead to prolonged operative time, high incidence of deep infection, dislocation, and a poor radiological and functional outcome"[40].

Dr Milind Ingle , Dr Ulhas Sonar , Dr M R Koichade , Dr Avinash Yelne , Dr Ashish Radke[41] studied 30 patients with intertrochanteric fracture treated with Bipolar Hemiarthroplasty and concluded that Hemiarthroplasty gives stable pain free mobile joint and is a improved modality of treatment in unstable osteoporotic intertrochanteric fractures Stern and Goldstein[62] used the Leinbach prosthesis for the

primary treatment of 22 intertrochanteric fractures and found early ambulation and early return to the prefracture status as a definite advantage.

Liang et al[67]in their study of unstable intertrochanteric fractures concluded hemiprosthesis arthroplasty is an effective method to treat the unstable intertrochanteric fractures in elderly. It can reduce the complications, reduce the death rate, improve the patient's living quality, and reduce the burden of the patient's family.

Grimsrud et al[68] studied 39 consecutive patients of unstable intertrochanteric fractures treated with a Cemented Bipolar hip arthroplasty. They concluded that these fractures can be treated with a standard femoral stem and cerclage cabling of the trochanters. The technique allows safe and early weight bearing on the injured hip and had a relatively low rate of complications.

CONCLUSION

Intertrochanteric fractures of femur are very common among old age patients, females being more commonly affected. The most common mode of injury is domestic fall.

According to our results, we believe that Cemented Bipolar Hemiarthroplasty is of choice in freely mobile elderly patients above sixty years of age with an intertrochanteric femoral fracture.

In elderly patients with intertrochanteric fractures of the femur treated with hemiarthroplasty gave early mobilization, early return to pre injury level, superior the quality of life and gave a long term solution.

Postoperative early full weight bearing after Hemiarthroplasty avoids long-term immobilization, rehabilitation, deformities and need for revision surgeries.

SUMMARY

- In our study, use of Bipolar prosthesis in unstable intertrochanteric fractures among the elderly above 60yrs of age group, 31 patients with mean age of 73.44 years were included.
- Men to women ratio were 1:1.3 (42%:58%).
- Cerclage wiring to hold the greater trochanter was done in case of 19 patients (60%).
- There was a low rate of infections, namely superficial bedsores in 2 cases (6%). With death of 1 patient (3%).
- The mean day of full weight bearing was on 3.9^{th} day.
- Post operatively 6 patients (20%), had a shortening of less than 2 cm and 2 patient (6%) had a shortening of more than 2 cm. 4 patient (12%) had lengthening of less than 2cm.
- 4 patients (12%) had fixed external rotation of the operated limb of less than 20 degrees.
- 2 patients (6%) had a fixed internal rotation of less than 20 degrees.
- There was no incidence of postoperative dislocation of the prosthesis in the study.
- Patients were discharged from the hospital at a mean on the 11^{th} day.
- Patients were followed up at 6 weeks, 3months, 6 months and 12 months. The mean time of follow up was 9 months. Majority of the patients had a pain free mobile hip, with full range of flexion, abduction and adequate amount of rotations and adduction.
- There was no incidence of loosening of the prosthesis or acetabular erosion

radiologically on follow up. There was no incidence of revision surgeries.

- The final functional results were excellent in 29% cases, good in 32% cases and fair in 26% cases according to Harris hip scoring system.

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ANNEXURE I

ETHICAL CLEARANCE CERTIFICATE

B.L.D.E. UNIVERSITY'S
SHRI.B.M.PATIL MEDICAL COLLEGE, BIJAPUR-586 103
INSTITUTIONAL ETHICAL COMMITTEE

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this college met on 04/10/2016 *at* 3-00 pm *to scrutinize the Synopsis of Postgraduate Students of this college from Ethical Clearance point of view. After scrutiny the following original/corrected & revised version synopsis of the Thesis has been accorded Ethical Clearance.*

Title Study of unstable intertrochanteric fractures treated with cemented bipolar hemiarthroplasty in elderly

Name of P.G. student Vijaykumar Patil
Dept orthopaedics

Name of Guide/Co-investigator Dr Santosh.S. Nandi
Associate professor orthopaedics

DR.TEJASWINI. VALLABHA
CHAIRMAN
INSTITUTIONAL ETHICAL COMMITTEE
BLDEU'S, SHRI.B.M.PATIL
MEDICAL COLLEGE, BIJAPUR.

Following documents were placed before E.C. for Scrutinization
1) Copy of Synopsis/Research project.
2) Copy of informed consent form
3) Any other relevant documents.

ANNEXURE – II

SHRI B.M. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE, VIJAYPUR - 586103

PROFORMA

CASE NO :

NAME :

AGE/SEX :

I.P. NO :

DATE OF ADMISSION :

DATE OF SURGERY :

DATE OF DISCHARGE :

OCCUPATION :

ADDRESS :

PRESENTING COMPLAINTS WITH DURATION

HISTORY OF PRESENTING COMPLAINTS:

FAMILY HISTORY

PERSONAL HISTORY

PAST HISTORY

GENERAL PHYSICAL EXAMINATION:

Pallor: present/absent

Icterus: present/absent

Clubbing: present/absent

Generalized lymphadenopathy: present/absent

Built: poor/moderate/well

Nourishment: poor/moderate/well

Vitals :

PR:

BP: TEMP:

SYSTEMIC EXAMINATION:

Respiratory system –

Cardiovascular system –

Per abdomen –

Central nervous system

LOCAL EXAMINATION:

INSPECTION

a) Deformity and Attitude

b) Shortening

c) Swelling

d) Skin

e) Wounds if any

f) Other injuries or fractures if any Right Left

PALPATION

a) Tenderness

b) Local bony irregularity

c) Swelling

d) Abnormal mobility

e) Crepitus/grating of fragments

f) Absence of transmitted movements

g) Wounds Right or Left

MANAGEMENT: INVESTIGATIONS:

X-ray of antero-posterior view of pelvis with both hips and lateral view of affected hip will be taken.

BLOOD:	Hb%
	TC
	DC
	ESR
	Blood grouping Rh typing
URINE	Albumin
	Sugar

BLOOD SUGAR RANDOM

BLOOD UREA

SERUM CREATININE

ECG in elderly

CHEST X RAY - PA view

OTHER SPECIFIC INVESTIGATIONS WHICHEVER NEEDED.

FINAL DIAGNOSIS

TREATMENT

A PROPOSED SURGERY HEMIARTHROPLASTY WITH BIPOLAR PROSTHESIS.

POST OPERATIVE MANAGEMENT:

Intravenous antibiotics will be continued for first three days and then shifted to oral.

Check x-ray on 3rd post-operative day.

Dressing will be done on 2nd,5th, and 8th post-operative day.

Sutures will be removed on 12th post-operative day.

Progressive quadriceps exercises - static and dynamic.

- **Mobilization**
  - Day of mobilization of hip
  - Day of patient sitting
  - Day of weight bearing
- **Complications**
  - Infection
  - Change in position of implant
  - Loss of reduction
  - Nerve palsy
- **Day of discharge**

CONDITION AT DISCHARGE

- **Clinical**
  - Shortening if any
  - Lengthening if any
  - Complications if any
  - Deformity

- Flexion
- Adduction
- Rotational
    - Range of movements
        - Active
        - Passive
        - Flexion
        - Adduction
        - Abduction
        - Internal rotation
        - External rotation

Follow up :

ANNEXURE-III

CONSENT FORM FOR ANAESTHESIA/OPERATION

I_____ Hosp IP No_____ in my full senses hereby give my complete consent for _____ or any other procedure deemed fit which is a diagnostic/ therapeutic/ procedure/ biopsy/ transfusion/ operation to be performed on me/my/son/daughter/ward_____ age_____ under any anaesthesia deemed fit. The nature and risks involved in the procedure have been explained to me in my own language to my satisfaction. For academic and scientific purpose, the operation/ procedure may be television or photographed, or used for statistical measurements.

Date:

Signature/thumb impression of patient/guardian

Name:

Age:

Address:

ANNEXURE-IV

KEY TO MASTER CHART

M	**–**	Male
F	**–**	Female
R	**–**	Right
L	**–**	Left
RTA	–	Road Traffic Accident
TT	**-**	Trivial Trauma
ANE	**-**	Anemia
HTN	**–**	Hypertension
DM	**–**	Diabetes Mellitus
MOI	–	Mode of injury
IR	-	Internal Rotation
ER	-	External Rotation
Pre op	**–**	preoperative
Post op	**-**	Postoperative

MASTER CHART

SL NO.	NAME	I P no	AGE	SEX	SIDE	MOI	MEDICAL CONDITION	SIZE OF PROSTHESIS	BLOOD TRANSFUSION		COMPLICATION	SHORTENING	LENTHENING	ER	IR	POST OP WEIGHT BEARING	DAY OF DISCHARGE	FUNCTIONAL OUTCOME
									Pre Op	Post Op								
1	Ningawwa	31727	65	F	R	TT	HTN	43	-	-	Bed sore	-	-	-	-	3	12	Excellent
2	Danamma	37671	70	F	L	TT	DM,HTN,IHD	49	-	1	Death	<2	-	-	-	3	-	-
3	Veeraprakash	40277	86	M	L	TT	-	43	-	-	-	-	-	-	-	3	5	Excellent
4	Laxmi	1059	85	F	R	RTA	DM,ANE	39	1	-	-	-	-	<20	-	4	12	Fair
5	Arjun	3837	87	M	L	TT	-	43	-	-	-	<2	-	-	-	5	12	Fair
6	Devamma	5019	70	F	L	TT	HTN,DM,COPD,ANE	41	1	1	Bed sore	-	-	-	-	7	20	Good
7	Dayanand	5380	78	M	L	RTA	-	45	-	-	-	>2	-	-	<20	4	15	Fair
8	Ravi	6958	60	M	R	TT	-	47	-	-	-	-	-	-	-	5	12	Excellent
9	Shiranna	11643	62	F	R	TT	HTN	45	-	-	-	-	-	-	-	4	5	Excellent
10	Kalavati	10798	80	F	R	TT	HTN	41	-	-	-	-	<2	-	-	4	15	Fair
11	Girija	12864	82	F	R	TT	-	43	-	1	-	<2	-	-	-	5	15	Good
12	Rajappa	17818	76	M	L	TT	-	41	-	-	-	-	-	-	-	4	12	Poor
13	Sumangala	1873	86	F	R	TT	-	43	-	-	-	-	<2	-	-	3	5	Good
14	Jakappa	19099	79	M	L	TT	-	47	-	-	-	<2	-	<20	-	4	12	Good
15	Hampawwa	21492	80	F	R	TT	ANE	41	1	1	-	-	-	-	-	4	12	Good
16	Gayatri	10698	68	F	R	TT	-	39	-	-	-	<2	-	-	-	3	12	Good
17	Basamma	12004	71	F	L	TT	-	45	-	-	-	-	-	<20	-	3	12	Fair
18	Tara	9864	67	F	R	RTA	-	39	-	-	-	<2	-	-	-	5	15	Excellent
19	Chanamma	14814	78	F	R	TT	-	41	-	-	-	-	-	-	-	4	12	Fair
20	Kallappa	22769	65	M	L	RTA	ANE	47	1	-	-	-	<2	-	-	4	5	Good
21	Shantappa	24060	68	M	R	TT	-	45	-	-	-	>2	-	-	-	5	12	Excellent
22	Prashuram	24532	74	M	R	TT	ANE	43	1	-	-	-	-	-	-	4	12	Good
23	Sidappa	25413	77	M	L	TT	-	41	-	-	-	-	-	-	<20	5	12	Poor
24	Mahantappa	25834	70	M	R	TT	-	45	-	-	-	-	-	-	-	3	5	Excellent
25	Nirmala	20839	69	F	R	TT	-	43	-	1	-	-	<2	-	-	3	5	Good
26	Mangala	27118	85	F	L	TT	-	41	-	-	-	-	-	<20	-	4	15	Poor
27	Kallappa	28052	60	M	R	RTA	-	43	-	-	-	-	-	-	-	3	12	Excellent
28	Gouramma	30734	83	F	R	TT	ANE	47	1	1	-	-	-	-	-	5	12	Fair
29	Bhanu	41631	75	F	L	TT	-	43	-	1	-	-	-	-	-	3	15	Good
30	Chanabasappa	40795	70	M	L	TT	-	45	-	-	-	-	-	-	-	5	12	Fair
31	Yamuna	37327	62	F	R	TT	-	43	-	-	-	-	-	-	-	3	5	Excellent