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A PROSPECTIVE STUDY ON FUNCTIONAL OUTCOME OF INTERTROCHANTERIC FRACTURES STABILIZED WITH DYNAMIC HIP SCREW

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ABSTRACT Intertrochanteric fractures are seen with increasing frequency and severity as the life expectancy of our population is increasing. Intertrochanteric fractures are among the most frequent and serious injuries suffered by elderly people. If treated with a non-fixed angle implant, all IT fractures have a propensity to go in varus and collapse. Stable intertrochanteric fracture can be easily treated by osteosynthesis with predictable good results .Dynamic hip screw is recommended for the fixation of stable intertrochanteric fractures. **Material and methods:** Study has been conducted at GOVERNMENT GENERAL HOSPITAL KAKINADA during the period from November 2020 to December 2022. 20 patients with intertrochanteric fractures treated with DHS fixation were selected for the study **Results :** Based on harris hip scoring, out of 20 patients , excellent results were seen in 65%, good in 20 % , fair in 10% , poor in 5%. **Conclusion :** With experience, this technique is a straight forward treatment that may be carried out by any average surgeon. In addition to providing stiff internal fixation, the device facilitates impaction at the fracture site. As a result, the patient can be mobilised right once following surgery, which helps prevent complications associated with long-term decumbency and immobility (decubitus ulcers, venous thrombosis, infection). The Device allow for controlled collapse at the fracture site without a change in the neck shaft angle .Hence it does not alter the biomechanics at the hip. Therefore the incidence of coxa-vara is low.

KEYWORDS : stable intertrochanteric fractures, non fixed angle implant

INTRODUCTION

Intertrochanteric fractures are seen with increasing frequency and severity as the life expectancy of our population is increasing. Intertrochanteric fractures are among the most frequent and serious injuries suffered by elderly people. These patients are unable to leave their homes and must rely on a family member or a walking aid for their daily tasks, making them a liability. Low ambulation contributes to extremely high mortality rates. Early ambulation is made possible by better treatment and a better functional outcome is attained with a decrease in mortality rates. The incidence depends on ethnicity and gender and varies from nation to nation. Getting an elderly patient with an intertrochanteric fracture back to their pre-injury activity as soon as feasible is the main goal of treatment. The rate of morbidity and mortality in geriatric patients is decreased by the quick mobility of these senior individuals. If treated with a non-fixed angle implant, all IT fractures have a propensity to go in varus and collapse. Stable intertrochanteric fracture can be easily treated by osteosynthesis with predictable good results(1).Dynamic hip screw is recommended for the fixation of stable intertrochanteric fractures(2).

Materials and methods: Study has been conducted at GOVERNMENT GENERAL HOSPITAL KAKINADA during the period from November 2020 to December 2022. 20 patients with intertrochanteric fractures treated with DHS fixation were selected for the study. The follow up period ranges from 6 months to 2 years.

INCLUSION CRITERIA:

1) Adults age groups (above 20 years of age)
2) Includes both sex groups
3) Post traumatic cases
4) Boyd and griffin type 1 and 2 intertrochanteric fractures.

EXCLUSION CRITERIA:

1) Age group below 20 years
2) Medically unfit patients
3) Pathological fracture

Patient is positioned supine on a fracture table with a radiolucent, cushioned countertraction post between the patient's legs and the un injured leg, flexed and abducted at the hip in a well-leg holder. In this position, pad the peroneal nerve on the uninjured leg. The injured leg is held by foot plate or boot attached to the other leg extension of the fracture table. The adequacy of both anteroposterior and true lateral views should be verified before surgical preparation. Achieved Closed reduction by applying longitudinal traction ,abduction and internal rotation

A straight lateral incision two finger breadths below the vastus ridge to a point 5 cm distally along the line of the femur's shaft given. The level of insertion of the guide pin varies with the angle of the plate used. The proximal aspect of the osseous insertion of the gluteus maximus and the tip of lesser trochanter, which are approximately 2 cm below the vastus lateralis ridge, help identify the level of entry of a 135º angle plate. If higher angle side plate is used , move the entrance site 5 mm distally for each 5 degree increase in barrel angle. Place the appropriate fixed - angle guide midway on the lateral cortex so that the Guide pin enters at the designated level. Aim the guide pin toward the apex of the femoral head, the point where a line parallel and in the center of the femoral head intersects the subchondral bone. Confirm central placement on the lateral view as well ap view ..Central and deep placement allows secure purchase and maximal collapse of the screw without impinging on the barrel, two factors which reduce the risk of mechanical failure of fixation. Another parallel guide pin is inserted to provide temporary stability for unstable fractures, in which the reduction can be lost if the guide pin backs out after reaming. Once the guide pin has been inserted it acts as a de rotational pin to ensure that the proximal neck and head fragment does not rotate with reaming and screw fixation. A power triple reamer is used to prepare the channel in the lateral cortex, neck, and head for the lag screw and side plate barrel. The reamer is set 5mm less than the measured lag screw length to ensure that the subchondral bone in the femoral head is not violated during reaming. The triple reamer is then advanced and withdrawn under fluoroscopic guidance ,ensuring that the guide pin is not in advertently advanced into the pelvis, the channel is reamed to its proper length and the guide pin is not withdrawn with reamer Selection of Lag Screw: A fully inserted Lag screw that equals the measured length will allow 5 mm of compression when the compression screw is

used or 5 mm of fracture collapse. A 5 mm shorter Lag screw will allow an additional 5 mm of compression. Do not use a screw that is more than10 mm shorter than indicated by the measuring gauge or the screw may be insufficiently covered within the barrel. This may inhibit the screw sliding within the barrel.

Insertion of plate and lag screw : The cannulated lag screw is then inserted over the guide pin with a T handle to ensure proper positioning. Advance the Lag screw into the proximal femur to the predetermined level and verify its position with image intensification. A 180º, turn represents a 1.5 mm advancement of the Lag screw. Verify the position and depth of the screw with image intensification in both planes. Remove the T handle and advance the side plate onto the Lag screw shaft. Use the plate tamper to fully seat the plate. Then remove the threaded guide pin.

Attachment of plate:. Use plate clamp to secure the plate to the shaft. Release of the traction to allow impaction of the fracture fragments especially in unstable intertrochanteric fractures. Attach the plate to the shaft of femur using 4.5 mm cortical screws. When all screws have been inserted and all traction has been released, the fracture can be compressed with the compression screw, (usually the 19 mm screw). If a short barrel is used, placement of compression screw is mandatory to prevent potential disengagement of the screw plate assembly.

Results : The results were analysed based on the Harris Hip Scoring Svstem and the patients were categorized according to the scores they attain as follows

Excellent : 100-90
Good : 89-80
Fair : 79-70
Poor : < 70

Based on the above criteria the results of present study were as follows:
Excellent : 13 patients(65%)
Good : 04 patients(20%)
Fair : 02 patients(10%)
Poor : 01patients(5%)

Less than 1 cm shortening is seen in 13 cases and 1 -2 cm shortening is seen in 4 cases and more than 2 cm shortening is seen in 3 patients. Screw cut out was seen in one patient with boyd and griffin type 2 intertrochanteric fracture.

Case 1

Preop Immediate postop Follow up

Follow up clinical images

Case 2 :

PRE OP IMMEDIATE POST OP FOLLOW UP

Follow up clinical images

DISCUSSION :

Extra capsular fractures neck of the femur are the most common fractures encountered in orthopaedic practice.

Conservative management has a very small role to play.

The internal fixation had benefits including better anatomical outcomes, shorter hospital stays, earlier mobilization, and a lower incidence of long-term immobilization-related complications.

Even patients with a poor risk for surgery, will benefit from surgical care by avoiding the complications of prolonged immobilisation.

Due to traction's failure to adequately offset the deforming muscle forces, fracture healing was generally accompanied by varus deformity and shortening.

Due to these factors, reduction and internal fixation have evolved to be the standard methods of treating intertrochanteric fractures.
It is important to understand the principles behind the evolution of the multitude of implants that have been used to stabilize intertrochanteric fractures.

The first implant to be used with success was fixed -angle -nail plate (e.g. Jewett nail3, Holt nail) consisting of Tri flanged nail fixed to a plate at an angle between 130° and 150°. If there was significant bone impaction at the fracture site, the implant would either cut out through the superior femoral head and neck or penetrate the hip joint(M J Parker)4 . If there was minimal or no bone impaction, however, either the plate would break or the plate and screws would separate from the femoral shaft.

These complications occurred much more frequently when these devices were used to treat unstable fractures.

The use of fixed-angle nail plate devices indicated the need for a device that permitted controlled fracture impaction. As a result, sliding nail-plate devices (such as the Massie nail and the Clawson Ken-Pugh nail) were developed. Which consisted of a nail that provided proximal fragment fixation a side plate that allowed the telescope within a barrel 135º impaction provided bone on bone contact, which promoted fracture union ;implant sliding also decreased the moment arm and stress on the implant, thereby lowering the risk of implant failure.

Sliding Hip Screw devices developed from Sliding Nail-Plate devices. The nail component was replaced by a screw with a blunt end and a large outside thread diameter.

Schumpulick W5. was the first author to describe a sliding hip screw.
One early modification to the sliding hip screw maximized fracture impaction by allowing the proximal lag screw to telescope with in the plate barrel and the plate to slide axially along the femoral shaft.

Fracture healing takes place as a result of guided sliding compression occurring across the fracture site.

When compared to single-piece or non-telescoping devices (such as

SP Nails and Mclaughlin's plates), two-piece telescoping devices (such as the Dynamic Hip Screw) offer the benefit of permitting compression at the fracture site while maintaining rigid fixation, favouring union.

Kaufer et al. described five criteria that impact the mechanical integrity of the fracture implant construct following fixation of these fractures , of which three are directly determined by the surgeon.

1.Reduction 2. Implant used 3. Implant position
In present study 20 patients with Intertrochanteric fractures treated by means of a Dynamic Hip screw. Only the patients who reported regularly for follow up included in study group.

Arojuraye SA6 (2019) treated intertrochanter fracture with average age of 56.8 years in age.He treated 48 cases with good union in all cases.

In present study, the average age group is 61.8 years in age.

The position of the lag screw is related to complications like Superior Cutting out (Doherty7 & Lyden, 1979, "Manoli 1986). Penetration of the lag screw is due to its failure to slide , and the rare lateral pulling out of the slide plate is brought on by the varus movement acting on the screws (Matthews et al 1981)

Present study comparable with the studies of Malcolm L. Ecker, et al8 , Philadelphia, Pennsylvania, (JBJS, Vol.57-A, No.1, Jan.1995) on 1 intertrochanteric fractures studies of BOLHOFNER, BRETT R9(journal of orthopaedic trauma, 13(1):5-8, January 1999,studies. And AROJURAYE SA , Dala -Kano(IJSR ,ISSN:2319-7064 ,Jan 2019).

STUDY	EXCELLENT RESULTS	GOOD RESULTS	FAIR RESULTS	POOR RESULTS
BOLHOFNER BRETT R	-	73%	17%	9%
MALCOM ECKER et al	-	90%	-	9.40%
AROJURAYE SA	77.1%	16.6%	-	6. 3%
PRESENT STUDY	65%	20%	10%	5%

In 2002, Mattan et al10. reported that after DHS fixation, 10 patients with osteoporosis experienced painful avascular necrosis. Additionally, it was discovered that three of these patients had subcapital fractures.

In present study no case of avascular necrosis of head or subcapital fractures are seen following internal fixation.

The value of the tip -apex distance in predicting failure of fixation of peri trochanteric fracture by MR Baumgaertner, SL Curtin, DM Lindskog 11and JM Keggi.JBJ 1995. Failure of fixation of peritrochanteric fractures that have been treated with a fixed angle sliding hip screw device is frequently related to the position of the lag screw with in the femoral head.

CONCLUSION :

We have reached the following conclusions regarding the use of the Dynamic Hip Screw fixation in the surgical management of Extra capsular Fractures after reviewing the results from the current series, which were fairly excellent and encouraging.

1. With experience, this technique is a straightforward treatment that may be carried out by any average surgeon.

2. In addition to providing stiff internal fixation, the device facilitates impaction at the fracture site. As a result, the patient can be mobilised right once following surgery, which helps prevent complications associated with long-term decumbency and immobility (decubitus ulcers, venous thrombosis, infection).

3. The Device allow for controlled collapse at the fracture site without a change in the neck shaft angle .Hence it does not alter the biomechanics at the hip.Therefore the incidence of coxavara is low.

4. The incidence of femoral head penetration due to absorption and collapse at fracture site is low even in an osteoporotic bone because of rounded tip design of lag screw and a provision for its telescopy.

5. Patients who used this device healed quickly and were able to move their hips without any pain.

6. The routine intra-operative tip-apex distance measurement can improve the surgeon's awareness of the probability of cut out of the screw and can assist in operating decision-making. We recommend reconsidering the reduction and redirection of the guide pin if the suggested position causes a tip-apex distance of more than 25 millimetre regardless of the zone in which it is placed.
7. Intact lateral wall is essential for dhs fixation

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