ORIGINAL ARTICLE

MEAN TIP-APEX DISTANCE IN LAG SCREW CUT-OUT AFTER DYNAMIC HIP SCREW FIXATION OF HIP FRACTURE

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Background: To determine mean tip-apex distance after Dynamic Hip Screw fixation of intertrochanteric fracture. **Methods:** This descriptive cross-sectional study was conducted in the Department of Orthopaedics, Hayatabad Medical Complex, Peshawar from October 2015 to September 2016 on a total 285 patients. **Results:** A total of 285 patients were observed. Status of TAD among 285 patients was analysed as 171 (60%) patients had TAD ranged 15 mm to 20 mm, 91(32%) patients had TAD ranged 21 mm to 25 mm, 23 (8%) patients had TAD ranged >25mm. Mean TAD was 18 mm with SD±7.45. Eight percent patients had screw cut out while 92% patients didn't had screw cut out. **Conclusion:** To avoid lag screw cut out in dynamic hip screw for intertrochanteric fracture of hip the Tip apex distance must be accurate otherwise there will be cut out of lag screw.

Keywords: Tip-Apex Distance; Lag Screw Cut-Out; Dynamic Hip Screw; Intertrochanteric fracture

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INTRODUCTION

Hip fracture at the Intertrochanteric region are the most common which occurs predominantly in older people.[1] Blood supply of the head may not be compromised due to the extracapsular nature of these fractures.[2] These fractures can be fixed internally with dynamic hip screw or with proximal femora nail or gamma nail.[3] Surgery for such fractures is challenging job for the surgeons as most of these fractures occurs in osteoporotic bones which has hi complication rate.[4] Most of the complications in dynamic hip screw are related to proximal migration of the lag screw which is called cut-out.[5–7] The lag screw can migrate in cephalic direction in femoral head which leads to varus deformity of head due to displacement of the head–neck fragment.[2,6]

Carr JB suggested tip-apex distance (TAD), which is the total distance from the tip of the lag screw to the apex of the femoral head. It is measured on the anterior-posterior and lateral views of radiographs. Mean TP-apex distance is gold standard for lag screw cut-out.[8] Tip apex distance is the distance of proximal part of lag screw in relation to the head on anteroposterior and lateral radiograph of hip. Increased or decreased distance both causes lag screw cut out. The vast majority of research has been done to minimized proximal migration of lag screw by mean TAD.[5] When the tip apex distance <25 mm, the chances of screw cutting out from femoral head is minimal.[9,10]

The objective of this study is to determine mean tip-apex distance after Dynamic Hip Screw fixation of intertrochanteric fracture.

MATERIAL AND METHODS

This Descriptive cross-sectional study was conducted in Department of Orthopaedics, Hayatabad Medical Complex, Peshawar from October 2015 to June 2016 on 285 consecutive patients. All patients after DHS fixation of either gender of age 20–60 years with intertrochanteric femur fractures were included in the study while patients the with Neuromuscular disorder, Pathological fractures, Ipsilateral femoral fractures and History of previous surgery on the same hip were excluded from the study.

Ethical committee approval was sought before conducting the study. After detailed explanation of the purpose of study, patient was offered an enrolment in the study. Informed written consent was taken from the patient/guardian of each patient. Attending surgeon performed detailed clinical evaluation in the form of history, examination and review of relevant laboratory investigation and X-Ray.

All the patients with Intertrochanteric femur fractures presenting to the orthopaedics department HMC through emergency, OPD and those referred from other hospitals were recruited. Patient demographics and any other risk factors for Intertrochanteric femur fractures were recorded. The diagnosis of Intertrochanteric femur fractures will be made on the anterio-posterior and lateral radiographs of the hip. Hip antero-posterior and lateral view was obtained after surgery, using standard protocol: 15–30 degrees of internal rotation of hip in supine position with beam focus from one meter of distance of symphysis pubis.

All observation and examination were done by the same observer. Data was entered on designed

study pro-forma. Statistical package for social sciences version 20 (SPSS-20) was used to analyse variables.

RESULTS

A total of 285 patients were inducted in the study. Those aged between 20–30 years of age were 14 (5%) patients, 31–40 years of age were 28 (10%) patients, 41–50 years of age were 63 (22%) patients, and 51–60 years of age were 180 (63%) patients. Mean age of the patients were 52 years with SD±8.45. (Table-1). Male patients were 171 (60%) while female patients were 114 (40%).

TAD had ranged from15mm to 20 mm in 171 (60%) patients, 91 (32%) patients had TAD ranged 21 mm to 25 mm, 23 (8%) patients had TAD ranged >25mm. Mean TAD was 18 mm with SD 7.45. (Table-2)

Screw cut out was observed in 23(8%) patients while 262 (92%) patients didn't had screw cut out. (Table-3). Stratification of TAD with respect to age and gender were shown in table 4 and 5.

Table-2: Mean tip apex distance (n=285)

Mean TAD	Frequency	Percentage
15–20 mm	171	60
21–25 mm	91	32
>25 mm	23	8
Total	**285**	**100**

Mean Tip Apex Distance was 18 mm with SD±7.46

Table-3: Screw cut out (n=285)

Screw cut out	Frequency	Percentage
Yes (failure)	23	8
No (success)	262	92
Total	**285**	**100**

DISCUSSION

As old age population is increasing in Pakistan so Intertrochanteric fracture is also increased due to senile osteoporosis. The patient with this fracture can be managed with optimization of the patient conditions and then fracture fixation. Fracture fixation with DHS has been shown in many studies to be effective for this fracture.[10]

Many studies have shown excellent results of this type of fixation but it is not without complications. It has failure rate of 5–23%[10–13] Nordin *et al* study showed screw penetration of 6.7% and screw cut out in 6.7%.[14] It was the collapse of the neck-shaft angle into varus alignment, that leads to extrusion of the screw superiorly from the head, is called 'screw cut out'. The screw that cuts out destroys the articular surface of the acetabulam. The destroyed part of the acetabulam results in hip pain during movements.[14]

In this study mean age was 52 years with SD±8.45. Sixty percent patients were male while 40% patients were female. Mean TAD was 18 mm with SD±7.45. Eight percent patients had screw cut out while 92% patients didn't show cutting out of the screw.

Ahrengart *et al* and Mainds *et al* studies showed the incidence of screw cut out as 2.0%, while Davis *et al* study showed it as 12.6%.[15–17] In other studies the frequency of screw cut out was 10% while post-operatively, 3.8 months were the mean time to screw cut out.[18–20] For union to occur in Intertrochanteric fracture the initial six months after surgery is very crucial. Most of the cut out of screw in femoral head occurs during this period. Screw cut out occurs if the union is not achieved in time.

Baumgaertner *et al*[21] had studies the mean TAD and compared it with the fracture TAD. His study showed the mean TAD was 24 mm in immediate post-operative period as compared with screw cut out of 38 mm. have shown that the rate of cut out has a very strong statistical relationship with increased TAD. Distance of more than 25mm (TAD) is said to have a high risk of screw cut out. Most of orthopaedic surgeons try to keep the distance (TAD) of less than 20 mm to minimize the cut-out risk.[21]

Similar results were found in another study conducted by Fakhry SM *et al*.[22] In his study the mean age was 60 years (SD±10.11). The male to female ratio was 2.5:1 that is male (70%) while female (30%). In his study, the mean TAD was 20 mm, five percent patients had screw cut out while 95% patients didn't had screw cut out while in our study screw cut out was 8% and no cut out was 92%.

CONCLUSION

Our study concludes that Lag Screw Cut-Out occurs when mean Tip-Apex Distance is more than 18 mm with SD±7.45 after fixation of Intertrochanteric fracture with DHS.

AUTHORS' CONTRIBUTION

MS: Idea and final approval. MI: Drafting and data analysis. ASA: Data Interpretation and guarantor. FK: Data Collection. NA: Data Collection

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