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LAG SCREW CUTOUT IN INTERTROCHANTERIC FRACTURES FIXED WITH DHS.

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ABSTRACT… Objectives: To determine the failure of DHS (dynamic hip screw) in terms of lag screw cutout. **Study Design:** Hospital Based Cross Sectional study. **Setting:** BVH and Civil Hospital Bahawalpur. **Period:** From 2013 to 2018. **Material & Methods:** 273 patients of both genders with age more than 50 years having stable intertrochanteric fractures were included in this study. With the help of C arm, the best possible anatomical reduction and rigid internal fixation was done with 135 degree DHS. Lag screw position and TAD determined on first postoperative day on radiographs (Anteroposterior & Lateral). Failure of fixation was determined on the radiographs during follow up. Lag screw cut-out was the projection of the screw from the femoral head by more than 1mm. **Results:** The mean age of the patients was 68.6 years (50-88). There were 132 (51.1 %) males and 126 (48.8%) females. Overall lag screw cutout rate was 11.2%. 21(30.8%) had screw cutout while 47 (69.1%) healed successfully among 68 patients with TAD ≥ 25mm. On the other hand 8(4.2%) had screw cutout while 182 (95.7%) healed successfully among 190 patients with TAD < 25mm. Middle middle and inferior middle position had highest success rate (> 92%) while inferior posterior position had highest cutout rate (36.2%). Among different age categories high failure rate (17.8%) seen in patients more than 70 years. **Conclusion:** The incidence of lag screw cutout is 11.2 % and risk of cutout can be minimized by placing lag screw in middle middle or inferior middle position and keeping the TAD < 25mm. More attention during follow up should be paid to patients with age > 70 years.

Key words: Cutting Out Lag Screw, DHS, Stable IT Fractures, Tip Apex Distance.

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INTRODUCTION

Intertrochanteric fracture is extracapsular hip fracture between greater and lesser trochanter region. According to data these are so common as nearly half of the hip fractures are intertrochanteric. These fractures are associated with increased hospital stay, co-morbidity & mortality. As the elderly population increasing globally such fractures will increase public health burden.[1,2,3]

According to commonly used Evans classification, Intertrochanteric fractures are divided into stable and unstable fractures. These fractures are treated with rigid internal fixation via either extra medullary (DHS) or IM (intramedullary) implants. DHS (dynamic hip Screw) comprises of a lag screw and side plate. Lag screw goes into femoral head through femoral neck while plate is applied to side of proximal femoral shaft.[2,3]

DHS is commonly used implant to get optimal fixation in intertrochanteric fractures.[4] The most frequent mechanical failure is lag screw cutout from the femoral head.[5] Fracture pattern, fixation methods, bone quality and few other factors are important to achieve ideal results.[2] According to the literature 1.9 to 23% is the mechanical failure rate associated with intertrochanteric fractures treated with DHS.[6]

We aimed to demonstrate failure of DHS in terms of lag screw cutout in our local population treated with DHS for intertrochanteric fractures as limited data pertaining to this issue is available in Pakistan.

MATERIAL & METHODS

This hospital based cross sectional study was conducted at BVH and Civil Hospital Bahawalpur from 2013 to 2018. 273 patients of both genders with age more than 50 years having stable intertrochanter fractures were included in this study. Patients having subtrochanteric extension, pathological fracture, unstable intertrochanteric fracture and the fractures with osteoproctic bones were excluded from the study. Patients recruited through Non probality consecutive sampling technique.

X-ray Pelvis Ap view and lateral view of the hip used to make the diagnosis. All the patients operated and osteosynthesis done with 135 degree DHS. With the help of C arm, the best possible anatomical reduction and rigid internal fixation were achieved during surgery. Tip of lag screw placed within 10 mm of femoral head articular surface. The lag screw accepted in inferior middle, middle, middle posterior and inferior posterior positions in femoral head. All patients were operated by consultant orthopedic surgeon having minimum three years post fellowship experience. Position of lag screw and TAD was determined on first postoperative day on the radioghraphs.

As described by Baumgaertneret al, the TAD defined as the sum of the distance, in millimetres, from the tip of the lag screw to the apex of the femoral head, as measured on an anteroposterior radiograph and that distance as measured on a lateral radiograph, after correction had been made for magnification.

All patients discharged on 2nd or 3rd postoperative day. Average follow up period was 13 months with range from 06 to 17 months. 15 patients lost the follow up. 258 patients were available for final anyalysis. Radiographs of the fractures were obtained postoperatively and used to demonstrate any failure of fixation during follow up after 12 weeks. The protrusion of the lag screw by more than 1mm from femoral head was taken as cutout of lag screw. Results analysed by using SPSS 22 version. Chi square and way anova test used to analyse the results. P value less than 0.05 was taken as significant.

RESULTS

The patients were categorized into five groups regarding age (Table-I). The mean age of the patients was 68.6 years (50-88).

Age of Patients (Years)	Numbers	Percentage
50 – 55	24	9.3 %
56 – 60	47	18.2 %
61 – 65	73	28.2 %
66 – 70	86	33.3 %
More than 70	28	10.8 %

Table-I. Frequency of patient's age distribution (n=258)

Outcome	TAD ≥ 25mm (n=68)	TAD < 25mm (n=190)	Total	P-Value
Cutout	21 (30.8%)	8 (4.2%)	29 (11.2%)	< 0.001
Healed	47 (69.1%)	182 (95.7%)	229 (88.7%)	

Table-II. TAD and lag screw cutout (n=258).

Lag Screw Cutout	Age					Total No
	50-55	56-60	61-65	66-70	More than 70	
Yes % p value	2 (8.3%) 0.320	4 (8.5%) 0.311	8 (10.9%) 0.237	10 (11.6%) 0.201	5 (17.8%) 0.011	29
No (Healed successfully)	22	43	65	76	23	229
Total	24	47	73	86	28	

Table-III. Frequency of lag screw cutout with age groups (n=258).

Gender	Lag Screw Cutout		Total	P-Value
	Yes	No (Healed)		
Male	13	119	132	0.231
Female	16	110	126	
Total	29	229		

Table-IV. Frequency of lag screw cutout with gender (n=258).

Screw Position	Faliure (Lag Screw Cutout)	Successful (Fracture Healed)	Comparison with MM Position (P-Value)
Middle Middle	4 (4.2%)	91, 95.7%	-
Inferior Middle	8 (7.2%)	102, 92.7%	0.207
Middle Posterior	4 (8.7%)	42, 91.3%	0.183
Inferior Posterior	13 (36.2%)	23, 63.8%	< 0.001

Table-V. Distribution of patients with various screw positions and Lag screw cutout rate comparison with MM (Middle middle position), (n=258)
(Analysis by one way Anova)

DISCUSSION

Extra capsular Hip (intertrochanteric) fractures are commonly treated by DHS (Dynamic hip screw). In this construct lag screw slides within the barrel of side plate and produces compression at the fracture site when patient stands and puts weight on the lower extremity. It requires intact lesser trochanteric region of medial wall for successful mechanical compression function of lag screw.[1]

Various complications like Non Union, malunion, loss of reduction, shortening of leg length or lag screw cutout are associated with osteosynthesis of intertrochanteric fractures via dynamic hip screw.[5] Most important factors related with mechanical failure include patient's age, facture pattern, position of lag screw in the femoral head, bone quality and type of implant used.[6] Lag screw cutout was the complication that we focused in this study.

Our study has 68.6 years mean age (50-88) of IT fractures. Another study from Peshawar by et al has mean age 57 years (45-70)[1] while Ravi K. Jain et al from India has 71 years (51-90).[9] Ram Chander Siwach, Rajesh Rohilla Roop Singh et study from Haryana, India noted mean age 72.8 years (60-85).[8] M. Güvena, U. Yavuz b et al from Turkey had observed mean age of 57.6 years (22-86) in their study.[6] The obvious reason of difference in mean age between these studies is wide range of patient's age included in these studies. Age more than 70 years has statistically significant effect on outcome variable and associated with more lag screw failure rate in our study. Similar findings noted in studies of Kuang-Kai Hsueh & Chi-Kuang Fang et al from china[5] and Ravi K. Jain et al from India.[9] The studies of Baumgaertner MR[10] and Pervez H[11] also reported similar results of increased lag screw cutout rate with advancing age (osteoporosis). In contrast to above described studies, lower screw cut out rate were reported by M. Güvena, U. Yavuz b et al[6] in their study and reason was younger patients (mean age 57.6 years). S Nordin study also reflected good results in patients younger than 60 whereas more than 50% failure in above 70 years age.[12]

Gender has no effect (p value, 0.370) on cutout of lag screw in the present study. These findings are comparable with results of Kuang-Kai Hsueh & Chi-Kuang Fang et al from china[5] and M. Güvena, U. Yavuz b et al from Turkey.[6]

The incidence of lag screw cutout in our study is 11.2%. It is compareable with other studies in Pakistan like Sajid Akhtar(10%),[1] Syed Imaduddin(12.5%).[13] Ravi K. Jain et al from India also reported similar failure rate (11.9%).[9] S Nordin from Malaysia reported little higher failure rate (16.7%).[12] As unstable fractures were also included in S Nordin study so it has increased the failure rate.

Tip apex distance (TAD) plays an important role in predicting implant failure. If TAD is more than 25 mm, there is significantly increased risk of lag screw cutout as compared to the patients having TAD less than 25mm.[15,18,19] We noted 72.4% cutout in patients with TAD ≥ 25mm in comparison to 27.5% cutout in the patients with < 25mm TAD in our study. Kuang-Kai Hsueh et al[5] reported cutout in 83% patients with TAD 25mm whereas 17% in patients with TAD <25mm. These findings are almost comparable with our study. Similarly impact of TAD also noted in IT fractures treated with cephalomedullary nails.[20] Jeffrey A. Geller documented cutout in 44% of their patients fixed with cephalomedullary nails having TAD 25 mm.[14]

The position of screw in the femoral head is also related with the cutting out. The MM (middle/ middle) lag screw position found to be the best position in the present study with failure rate only 4.2% as compared to inferior posterior position with highest failure rate 36.2%. Same findings have been reported by Kuang-Kai Hsueh et al study.[5]

CONCLUSION

The incidence of lag screw cutout is 11.2% and risk of cutout can be minimized by placing lag screw in middle middle or inferior middle position by keeping the TAD < 25mm. More attention during follow up should be paid to patients with age > 70 years.

REFERENCES

1. Sajid Akhtar, Shahab Ud Din et al. **Frequency of lag screw cutout after dynamic hip screw fixation of stable intertrochanteric femur fracture by keeping tip apex distance less than 25 milli meter.** Pakistan Journal of Medical and Health Sciences. 2018; 12(2):844.

2. Senthil Nathan Sambandam, Jayadev Chandrasekharan, Varatharaj Mounasamy, Cyril Mauffrey. **Intertrochanteric fractures: A review of fixation methods. Eur J Orthop Surg Traumatol.** Eur J Orthop Surg Traumatol. 2016 May; 26(4):339-53. doi: 10.1007/s00590-016-1757-z.

3. Avakian Z, Shiraev T, Lam L, Hope N. **Dynamic hip screws versus proximal femoral nails for intertrochanteric fractures.** ANZ J Surg. 2012 Jan-Feb; 82(1-2):56-9. doi: 10.1111/j.1445-2197. 2011.05929.

4. Dhiraj V Sonawane. **Classifications of intertrochanteric fractures and their clinical importance.** Trauma International. 2015; 1(1)5 July-Sep:7-11.

5. Hsueh KK, Fang CK, Chen CM, Su YP, Wu HF, Chiu F. **Risk factors in cutout of sliding hip screw in intertrochanteric fractures: An evaluation of 937 patients.** Int Orthop. 2010 Dec; 34(8):1273-6. doi: 10.1007/s00264-009-0866-2.

6. Güven M, Yavuz U, Kadioğlu B, Akman B, Kilinçoğlu V, Unay K, Altintaş F. **Importance of screw position in intertrochanteric femoral fractures treated by dynamic hip screw.** Orthop Traumatol Surg Res. 2010 Feb; 96(1):21-7. doi: 10.1016/j.rcot.2009.

7. J. Parry, J. Langford, K. Koval, G. Haidukewych. **Predictors of excessive lag screw sliding and cutout after cephalomedullary nail fixation of intertrochanteric fracture.** Orthopaedic Proceedings. 2018: 100-B, No. SUPP_13.

8. Ram Chander Siwach, Rajesh Rohilla Roop Singh, Rohit Singla etal. **Radiological and functional outcome in unstable, osteoporotic trochanteric fractures stabilized with dynamic helical hip system.** Strat Traum Limb Recon. 2013: 8:117–122.

9. Ravi K. Jain, Abhineet Verma etal. **Factors determining failure of intertrochanteric fracture fixation with a dynamic hip screw: A retrospective analysis.** Int J Res Orthop. 2018 Sep; 4(5):720-725.

10. Baumgaertner MR, Curtin SL, Lindskog DM, Keggi JM. **The value of the tip-apex distance in predicting failure of fixation of peritrochanteric fractures of the hip.** J Bone Joint Surg Am. 1995; 77:1058—64.

11. Pervez H, Parker MJ, Vowler S. **Prediction of fixation after sliding hip screw fixation.** Injury 2004; 35:994—8.

12. Nordin S, Zulkifli O, Faisham WI. **Mechanical failure of Dynamic Hip Screw (DHS) fixation in intertrochanteric fracture of the femur.** Medical Journal of Malaysia. 2002;56:12-7.

13. Syed Imaduddin, Tayeb Asim, Rahila Razzak. **The value of the tip-apex distance (TAD) in predicting failure of fixation of Intertrochanteric fractures of femur.** Pak J Surg 2014; 30(4):320-326.

14. Jeffrey A. Geller, Comron Saifi , Todd A. Morrison et al. **Tip-apex distance of intramedullary devices as a predictor of cut-out failure in the treatment of peritrochanteric elderly hip fractures.** International Orthopaedics (SICOT) (2010) 34:719–722.

15. Rubio-Avila J, Madden K, Simunovic N, Bhandari M. **Tip to apex distance in femoral intertrochanteric fractures: A systematic review.** J Orthop Sci. 2013 Jul; 18(4):592-8.

16. Chirodian N, Arch B, Parker MJ. **Sliding hip screw fixation of trochanteric hip fracture: Outcome of 1024 procedures.** Injury. 2005; 36:793-800.

17. Taeger G, Schmid C, Zett I R, Schweiberer L, Nast-Kolb D. **Stable and unstable pertrochanteric femoral fractures.** Differentiated indications for the dynamic hip screw. Unfallchirurg. 2000; 103:741-8.

18. Parmar V, Kumar S, Aster A, Harper WH. **Review of methods to quantify lag screw placement in hip fracture fixation.** Acta Orthop Belg 2005; 71:260-3.

19. Bonnaire F, Weber A, Bösl O, Eckhardt C, Schwieger K, Linke B. **"Cutting out" in pertrochanteric fractures-problem of osteoporosis?** Unfallchirurg 2007; 110:425-32.

20. Kyle RF, Gustilo RB, Premer RF. **Analysis of six hundred and twenty-two intertrochanteric hip fractures.** J Bone Joint Surg Am.1979; 61:216-21.

21. Lindskog DM, Baumgaertner MR. **Unstable intertrochanteric hip fractures in the elderly.** J Am Acad Orthop Surg. 2004; 12:179-90.

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

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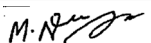
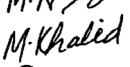
1	Muhammad Nasir Ali	Conception and design, acquisition of data analysis and interpretation of data drafting and critical revision, final approval of the version to be published.	
2	M. Khalid Chishti		
3	Kashif Siddiq	Acquisition of data, Analysis and interpretation of data, Drafting and critical revision.	
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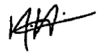
5	M. Tayyab Waheed	Acquisition of data, and interpretation of data.	
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