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RESEARCH ARTICLE

MINIMALLY INVASIVE DHS (MIDHS) DOES IT REALLY MAKE A DIFFERENCE?: A COMPARISON OF A NOVEL TECHNIQUE AT A TERTIARY CARE TRAUMA CENTRE

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ABSTRACT

Aim: The purpose of the study was to compare Minimally Invasive DHS (MIDHS) or Conventional DHS (CDHS) techniques for surgical parameters affecting treatment of Extra capsular Proximal Femur fractures.

Methods: Prospective Case Control study have evaluated 108 extracapsular proximal femur fractures operated upon between Feb 2014 to March 2016. Patients presenting to the Orthopaedic Surgery department with Extra Capsular Proximal Femoral Fractures who were treated with Minimally Invasive DHS (MIDHS) were compared with those who presented in the same time frame but were managed using Conventional DHS (CDHS) using a muscle reflecting lateral approach.

The two groups were matched for pre-operative parameters such as age and gender distribution, mechanism of injury, patient comorbids, classification of fracture pattern. The two groups were compared for incision size and operative time. Postoperative outcome measures were analgesia requirement, Visual Analog Score for pain, accuracy of reduction and lag screw positioning as well as drop in Haemoglobin level and transfusion requirement. Hip functional scores (Katz Basic Activities of Daily Living - BADL) and (Harris Hip Functional Score) were also compared following the two procedures.

Results: 97 patients met the inclusion criteria. Out of these 5 patients were lost in the followup, 3 due to death and 2 due to change in address and contact details. Out of the 92 patients that remained in the study MIDHS technique was employed in (n=40) cases and CDHS was done for (n=52) patients.

Conclusion: In view of our findings we conclude that MIDHS significantly minimizes blood loss and transfusion requirement and reduces postoperative pain giving a much more cosmetically sized scar while not compromising on, operative time, accuracy of reduction and postoperative hip function.

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INTRODUCTION

Proximal femur fractures in the elderly are becoming increasingly common not only in the developed world but also in the developing world. Most of these fractures occur after trivial trauma and are classical insufficiency fractures. Extracapsular Intertrochanteric fractures form a large group of proximal femur fractures. Fixation with a sliding hip screw and an angle bearing barreled side plate, the so called Dynamic Hip Screw (DHS) has cemented its place as the gold standard for management of these fractures. Conventional fixation technique involves a 10-15 cm long incision after which either a vastus splitting or a vastus elevating approach has been described. This method involves significant soft tissue dissection translating into an equally high intra-operative blood loss and more post- operative pain. Other options such as the intramedullary PFN, PFNa and the Gamma Nail are now becoming easily popular due to limited observation, less devascularization of bone and have shown better long term results. Since these implants are still costly in Pakistan, and the DHS system can be purchased at 1/3rd of the cost of any of the Intramedullary devices, there is a strong need to continue to rely on extramedullary fixation until the cost can be brought down. However a need for more biological fixation needing lesser soft tissue stripping is always desirable. To achieve this surgeons have used specially designed implants or instruments for the Minimally Invasive DHS (MIDHS).

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MATERIALS AND METHODS

We in our prospective case control study have evaluated 108 extracapsular proximal femur fractures operated upon between Feb 2014 to March 2016. Minimum follow up was 6 months. Inclusion criteria were (a) Intertrochanteric fractures in adult patients who were (b) Ambulatory with or without assistance before the fracture with (c) Presented within 14 days of sustaining the fracture. Patients excluded from the study were

(a) Aged less than 16 years, (b) were bedbound or wheelchair dependent before the injury, (c) Has fracture extending to the subtrochanteric region or femoral neck (d) Bilateral hip fractures (e) Previous lower limb orthopaedic surgery (f) Polio affected extremity fracture (g) trauma to other regions of the body including head injury (h) those with cognitive impairment or (i) those who had a delayed presentation (more than 14 days of injury) or those with (j) nonunions and pathological fractures. 97 patients met the inclusion criteria. Out of these 5 patients were lost in the followup, 3 due to death and 2 due to change in address and contact details. Out of the 92 patients that remained in the study MIDHS technique was employed in (n=40) cases and CDHS was done for (n=52) patients. All the MIDHS were performed by two surgeons Ali S.D. and Siddiqi M.A. Out of the 52 CDHS procedures, 17 were performed by the same two surgeons and the other were performed by other surgeons of the department. Due to the assignments of the two surgeons, patient distribution was assumed to be randomized.

We compared the outcome of the conventional technique (CDHS) versus the Minimally Invasive (MIDHS) mainly for operating time, blood loss and postoperative pain. Other variables evaluated were lag screw position (Tip Apex Distance – TAD) and accuracy of reduction in terms of varus/valgus angultion in AP projection and posterior sag/angulation on a cross table lateral projection.

Surgical Technique

The technique for CDHS has been well described in published literature. The VastusLateralis lifting approach was used as a standard in all the CDHS performed. The technique for MIDHS and its modifications adapted by the authors will be described in detail here. All the patients had spinal or spinal epidural anesthesia. They were positioned on a fracture table and the fracture was reduced by applying linear traction, internal rotation sequentially to obtain satisfactory closed reduction. Attainment of satisfactory closed reduction with stable apposition of the postero - medial cortex in both AP and Lateral projection on an image intensifier were regarded as pre-requisites for MIDHS. After prepping and draping the operative site, two techniques were employed to mark the incision. In the first technique, a 4 hole side plate was positioned over the anterior aspect of the thigh and the image overlapped with the underlying femur in a position that the plate would be sitting in finally. A vertical line dropping to the ground was then drawn between hole 1 and 2 and hole 3 and 4. This was taken as the horizontal extent of the incision, approximately 3-4 cms. The lateral aspect of the femur was confirmed by palpation and the incision given between the two marked lines. In the alternative technique developed by S. D. Ali, the 135° angle guide with a guide wire was placed over the anterior aspect of the thigh and image overlapped with the underlying femur in the approximate position that the wire would finally be positioned in AP projection. Two lines drawn vertically down to the ground one from the oblique guide wire sleeve and the other from the end of the angle guide was used to mark the horizontal extent of the incision. The incision was then marked as previously described. Sharp dissection with a vastus splitting approach using a size 10 surgical knife was used to stab the fascia and the muscle up to the bone. The lateral surface of the bone was then bared using a periosteal dissector to extend 2 -3 cm distal to the superficial extent of the incision and upto the distal edge of the trochanteric/ flare proximally. Guide wire was introduced using the 135 degree angle guide introduced obliquely through the incision and final placement confirmed by image intensifier. Angle guide was removed. A 50 cc feeding syringe with the tip cut was then used as a sleeve for the triple reamer, a technique developed by M.A. Siddiqi. Reaming and Tapping of the bone was then continued in the usual manner. The Screw was then introduced and the guide wire and sleeve removed at this stage. The DHS side plate was introduced in the 180° rotated position obliquely through the incision and was rotated back once in the submuscular plane using artery forceps. A 4.5 mm Hexagonal screwdriver was then introduced through the plate barrel and the plate guided into position over the lag screw under image intensifier using the screwdriver as a joystick. After confirmation of engagement of barrel to screw the plate was gently tapped into full seated position. Cortical screws were then inserted into the side plate using standard AO technique. Final confirmation of position was then checked under image intensification. Compression screw was then used only when the need for more acute compression was felt. After irrigation of the wound, Fascia was approximated using No 2 VICRYL™ sutures. Subcutaneous fat was approximated using 2/0 VICRYL™ sutures and then skin was closed with staples. A drain was used in only 2 out of the 40 patients who underwent MIDHS and these were the patients in whom then incision had to be extended due to difficulty in plate insertion. The maximum incision length however in these remained _____.

Post operatively, Hb levels were checked 24 hours after surgery as a routine for both MIDHS and CDHS patients. Mean drop in Hb from postoperative level was compared between the two groups. AP and Lateral Radiographs of the hip joint were obtained. Lag screw position was determined using the tip apex distance TAD <25 mm as reference for adequate positioning of the screw. Reduction was assessed and criteria for accurate reduction was (a) <10° Valgus / Varus angulation on AP radiographs, (b) < 5° angulation on lateral radiographs and (c) < 5mm of translation (sag) of either fragment with reference to the other on lateral radiograph. All the patients received a standard regimen of postoperative analgesia that included I/V Ketorolac 30 mg regularly 12 hourly, I/VNalbuphine 10 mg IV on need basis for 1st 48 hours after surgery. I/V ketorolac was switched to an oral NSAID on need basis on 3rd post-operative day. Oral Nuberol Forte™ was added as regular oral analgesic and continued for 2 weeks postoperatively. Patients were usually discharged between 3rd to 5th POD. Number of I/V Nalbuphine injections required in the first 48 hours were recorded and Visual Analog Score - VAS for pain on 1st, 2nd and 3rd POD as well as on 1st Outpatient follow-up usually at 2 weeks.

Partial weight bearing was allowed on 1st POD and patients discharged on the same with the use of walker or crutches. Full weight bearing was allowed usually at 6 weeks or earlier depending on individual decision. Follow-up radiographs were taken at 6 and 12 weeks and then at 6 months post-op. Evidence of bridging callus and obliteration of fracture line was taken as evidence of satisfactory healing. Time to union in weeks was recorded and compared as outcome measure. BADL and HHS score was compared for CDHS and MIDHS patients at 6 months follow up.

Statistical Analysis

The chi-squared, Fisher's exact and independent values T-test were used where appropriate to compare the two groups. SPSS version 17.0 statistical package was used to analyze the data.

Parameter		MIDHS	CDHS	P Value
Preoperative Variables				
Age (Mean)		61±15	64±13	
Gender	Males	15/42	19/55	
	Females	27/42	36/55	
Comorbids	Hypertension	9/42	15/55	
	Diabetes Mellitus	13/42	18/55	
	Cardiac Disease	8/42	7/55	
	Renal Dysfunction	2/42	4/55	
	Respiratory Disorder	2/42	2/55	
Mechanism of Injury	Simple Fall	30/42	44/55	
	RTA	5/42	6/55	
	High Energy Fall	7/42	5/55	
Type of Fracture	Stable	39/42	49/55	
	Unstable	3/42	6/55	
Intra-Operative Variables				
Lag Screw Size (Mean)		85±10	85±10	
Plate Size	4 Hole	41/42	50/55	
	5 Hole	1/42	5/55	
Incision Size (Cm)		4.2±0.4	10.9±1.4	
Operative Time (Min)		61±13	69±14	
Postoperative Radiographic Evaluation				
Tip Apex Distance (mm)		20±5	20±5	
AP Alignment	Satisfactory	38/42	47/55	
	Unsatisfactory	4/42	8/55	
Lateral Alignment	Satisfactory	29/42	36/55	
	Unsatisfactory	13/42	19/55	
Posterior Sag	Satisfactory	37/42	49/55	
	Unsatisfactory	5/42	6/55	
Overall Reduction	Satisfactory	23/42	29/55	
	Unsatisfactory	19/42	26/55	
Post-Operative Clinical Parameters				
Drop in Hb(g/dl)		1.2±0.5	2.7±0.5	
Transfusion	No of Patients Transfused	9/42	26/55	
	No of PRBC Transfused	10	43	
IV Analgesia	AvgNo of Nalbuphine Injections	3	5	
Visual Analog Score	1st POD	6	9	
	2nd POD	5	7	
	1st FUP (2Wks)	2	5	
Final Outcome Measures				
Outcome	Healed	39/42	51/55	
	Non-Union	1/42	1/55	
	Death	1/42	2/55	
	Lost to Followup	1/42	1/55	
Complication	Failed Fixation	1/40	1/52	
	SSSI	1/40	2/52	
	DSSI	0/40	1/52	
	VTE	0/40	1/52	
	MI	0/40	1/52	
	Respiratory Depression	1/40	0/52	
Time to Healing (wks)		11	12	
Basic Activities of Daily Living Score (Total = 6)		4	4	
Harris Hip Score (Total = 100)		82	83	

RESULTS

All the surgeries were performed using a 4-hole DHS side plate except for 6 cases (1 for MIDHS and 5 for CDHS) where a 5 hole side plate was used mainly due to fracture extension or unavailability of the 4-hole plate. A locking screw side plate was used in two cases of MIDHS and 3 cases of CDHS due to poor bone quality and the need for locking screws for better pullout strength.

Conclusion

As per the results mentioned, minimally invasive DHS has similar functional outcome as compared to the conventional DHS which is indicated by the similar Harris hip scoring. Also it is less time consuming and post op morbidity is reduced. One limitation is that this technique requires higher level of surgical skill. We recommend it should be a routine practice to use minimally invasive DHS technique for most extra capsular proximal femur fracture.

Limitations of the study

Single Centre study.
Results of a high volume trauma Centre.

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