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Original Article

Minimally Invasive Dynamic Hip Screw Fixation in Stable and Unstable Intertrochanteric Fractures

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Abstract

Introduction: In minimally invasive dynamic hip screw (DHS) fixation procedure, we have found a lesser amount of blood loss compared to the conventional DHS fixation. It is probably due to less soft tissue dissection and less exposure of the fracture fragments.

Objectives: To evaluate peroperative blood loss, duration of operation, duration of hospital stay in patients with stable and unstable intertrochanteric fractures.

Materials and Methods: Of 29 patients, 20 stable and nine unstable intertrochanteric fracture treated by minimally invasive DHS fixation. Peroperative average blood loss, post-operative hemoglobin (Hb) reductions, duration of surgery, and duration of hospital stay were studied.

Results: Average blood loss was 64 ml and post-operative Hb reduction was 1.1 g. Average wound size 3.5 cm. A mean duration of surgery 52 min and average duration of post-operative hospital stay was 6 days.

Conclusion: Minimally invasive DHS fixation is technically demanding with advantages of less blood loss, minimum soft tissue dissection, and shorter duration of hospital stay in stable and unstable intertrochanteric fractures.

Key words: Dynamic hip screw, Intertrochanteric, Minimally invasive

INTRODUCTION

The use of dynamic hip screw (DHS) still considered as a common mode of fixation in cases of intertrochanteric fractures of femur in patients resulting in stable fixation and early mobilization. Several studies are available showing, the minimally invasive DHS technique produces better outcome regarding the operating time, length of hospital stay, and blood loss compared to the conventional approach.[1-7] There is also rapid post-operative rehabilitation time in the minimally invasive DHS technique. This study is to confirm the same in cases of unstable fractures also.

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MATERIALS AND METHODS

This is a prospective study conducted in RKMSP in July 2012 to June 2015 in the Department of Orthopedics. 29 patients underwent minimally invasive DHS, and they are followed up for at least 6 months.

About 19 fractures of them were stable and 10 fractures were unstable (Tables 1 and 2). All closed stable intertrochanteric fractures (A.O. Type A1.1-A2.1) and few unstable fractures (A.O. Type A2.2, A2.3, and A3.2) were included in this study (Figure 1). Furthermore, the fractures which were to closed reduction were also included.[1]

A.O. Type A3.1 and A3.3 and the compound fractures were excluded from this study.

Procedure

All surgeries were done under spinal anesthesia in fracture table. Closed reduction was possible in 18 patients. Open reduction required in rest 11 patients. Incision was placed

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1 cm distal to the trochanteric flare under fluoroscopic guidance. Diathermy was used in every case. Tensor fascia lata and vastus lateralis were split proximally and distally in line (Figure 2). After placement of the guidewire, position checked in anteroposterior (AP) and lateral views under image intensifier. Reaming was carried out through this incision. Fractures which failed closed reduction, we had gone for open reduction. Incision was increased and gently, the soft tissues were removed from fracture site. Proximal fragment's rotational deformity was corrected by direct thumb pressure over the anterior aspect of the neck, and one free handed guide wire placed to hold the fragment in position followed by reaming through the finally placed guide wire. Desired length of head screw was placed under fluoroscopic guidance. Over the guide wire, the plate was placed and rotated along the line of skin incision. Now, the guide wire was removed and the plate was inserted within soft tissue by retracting skin, fascia, and muscle (Figure 3). Side plate was fixed to the femur shaft with four cortical screws. Distal 4th cortical screw drill hole was placed first through drill sleeve and screw applied. Compression screw was applied (Figures 4 and 5). The drain was not used. Soft tissues were closed in layers (Figure 6).

Peroperative blood loss was measured weighting the blood-soaked gauge pieces and mops (Figure 7). We used vertical drapes for the operation in 10 patients where the blood loss was measured directly.

Post-operative intravenous paracetamol 1 g injection was given 8 hourly for 2 days for the pain management followed by tablet paracetamol 1 g thrice daily given for another 3 days. Post-operative X-rays of hip in AP views were obtained within 24 h.

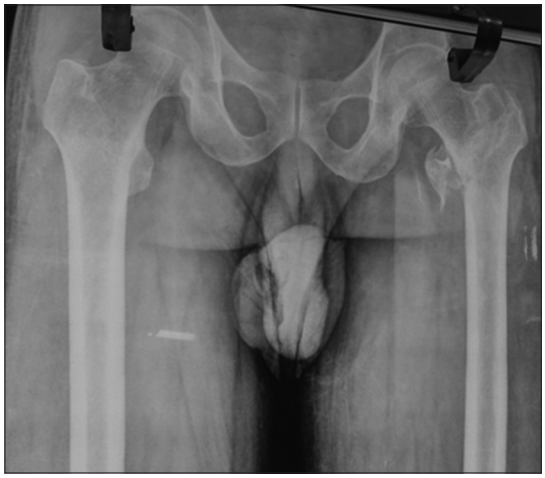

Figure 1: Pre-operative X-ray

Table 1: Master chart showing distribution of the study population

Age	Sex	AO type	Pre-operative Hb	Post-operative Hb	Duration of hospital stay	Amount of blood loss	Length of incision	Duration of surgery
78	Male	1.2	10.1	9.4	6	67	3.5	48
67	Male	2.2	10.5	9.3	6	75	4	50
89	Female	1.1	10.2	9.4	6	55	3.2	45
84	Male	1.3	10.8	9.8	7	75	3.4	50
78	Female	2.3	10.9	9.8	6	78	4.5	60
73	Female	1.3	10.2	9.2	6	65	3.3	48
67	Female	2.1	10.1	9.1	6	67	3.8	54
69	Male	2.1	10.4	9.5	6	67	3.9	50
81	Female	3.2	10.6	9.1	7	70	4.4	64
80	Male	1.2	10.9	9.8	5	60	3.6	52
82	Male	1.1	10.7	9.9	6	75	3.2	45
95	Female	3.2	10.6	9	6	73	4.4	63
64	Female	1.2	11	10.1	6	65	3.2	45
66	Female	2.1	10.8	9.7	6	60	3.3	57
73	Female	2.2	10.7	9.6	7	65	3.9	46
77	Male	1.3	10.5	9.2	6	72	3.4	54
69	Male	1.1	10.1	9	6	56	3.3	60
77	Female	2.3	10.9	9.6	5	75	3.7	51
70	Male	1.2	10.3	9.4	6	78	3.2	55
73	Male	2.2	10.1	9	6	68	3.6	57
74	Male	1.3	10.2	9.3	6	67	3.7	44
91	Male	3.2	10.5	9.2	7	67	4.2	58
80	Female	1.1	10.6	9.4	6	75	3	54
75	Male	2.2	10.5	9.4	6	50	3.9	51
76	Male	2.1	10.4	9.2	5	65	3.5	56
77	Male	2.3	10.3	9.1	6	77	3.7	58
78	Female	1.2	10.2	9.2	6	65	3.9	48
79	Male	2.1	10.1	9	7	64	3.8	54
81	Male	2.1	10.3	9.1	6	65	3.4	53

Hb: Hemoglobin

Post-operative Rehabilitation

Bedside knee bending and chest physiotherapies are started on day 2.

Partial weight bearing walking with walker was allowed after 48 h on day 3.

Full weight bearing walking started at average after $2^1/_2$ months.

Stitches removed after 14 days.

AP and lateral view X-rays are obtained at 1 month, $2^1/_2$ months, and 6 months.

RESULTS

All patients were regularly followed up for at least 6 months. Of 29 patients, 19 was having stable and other 10 was having unstable fracture patterns. The average age of the patients was 76 years (ranging from 64 to 96 years of age). There were 17 male and 12 were female with 15 right sided and 14 left sided fractures. 18 fractures were closely reduced and 11 required open reduction. The average duration of operation was 52.7 minutes (ranging from 44 to 64 min). Perioperative blood loss was measured to be 67.62 ml (ranging from 50 to 78 ml). Post-operative average hemoglobin loss was 1.1 g/dl (Table 3).

The duration of hospital stay was 6.06 days on average (ranging from 5 to 7 days). Average wound size measured to be 3.65 cm (ranging from 3 to 4.5 cm) (Table 4). Except for 1 patient, all others having healthy and uncomplicated wound. That one diabetic patient showed persistent discharge for three consecutive weeks and improved later. All fractures had united at 2 and ½ months.

Figure 2: Visualisation through the small incision

Figure 3: Plate insertion

DISCUSSION

Here, in this study, all fractures had united without complications. Several studies are there showing good results using minimally invasive approach for DHS fixation in stable intertrochanteric fractures of femur. But here, we have fixed both stable as well as several varieties of unstable fractures using minimally invasive techniques.

In minimally invasive DHS fixation procedure, we have found a lesser amount of blood loss compared to the conventional DHS fixation. It is probably due to less soft tissue dissection and less exposure of the fracture

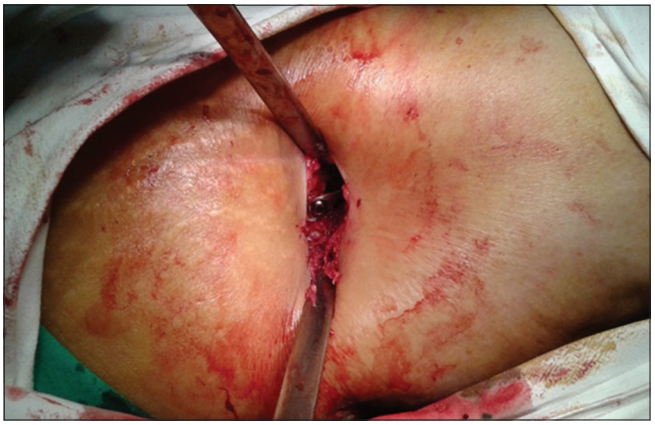

Figure 4: *In situ* plate and screws

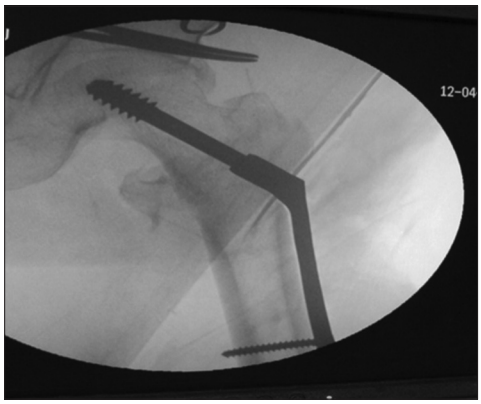

Figure 5: Intra-operative fluoroscopic image

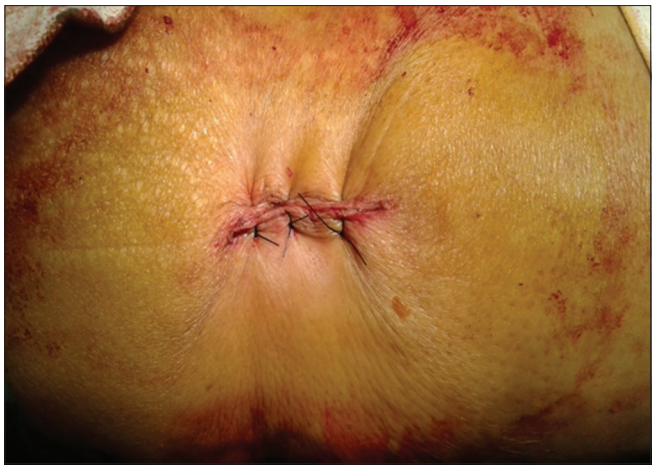

Figure 6: After closure

Figure 7: Amount of blood loss

Table 2: Demographic data distribution

Mean age	76 years
Gender	
Male	17
Female	12
AO fracture classification	
31A1.1	4
31A1.2	5
31A1.3	4
31A2.1	6
31A2.2	4
31A2.3	3
31A3.2	3

fragments. Table 3 shows the comparative analysis of the blood loss in different studies. Risks of blood transfusion and its cardiovascular and immunological complications are reduced due to the relatively less blood loss.

Table 3: Comparison of reduction of post-operative Hb in various studies

Study	*n*	Hb reduction (g/dl)	
		MIDHS	CDHS
Wong *et al.* (2009)[2]	66	1.4	2.6
Ho *et al.* (2009)[3]	88	1.18	2.4
Wang *et al.* (2010)[4]	97	1.3	3.4
Pandey *et al.* (2013)[7]	25	0.9	
Ours	29	1.1	

MIDHS: Minimally invasive dynamic hip screw, CDHS: Conventional dynamic hip screw, Hb: Hemoglobin

Table 4: Comparison of wound size in various studies

Study	*n*	Wound size (cm)	Barrel plate used
		MIDHS	(holes)
Wong *et al.* (2009)[2]	66	2.5	4
Ho *et al.* (2009)[3]	88	5	4
Alobaid *et al.* (2004)[5]	48	3	2
Walia *et al.* (2010)[6]	25	3	2
Pandey *et al.* (2013)[7]	25	5	4
Ours	29	3.65	4

CONCLUSION

Minimally invasive DHS fixation is technically demanding with advantages of less blood loss, minimum soft tissue dissection, and shorter duration of hospital stay in stable and unstable intertrochanteric fractures.

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