Original Article

A comparative prospective study of dynamic hip screw with traffon nail in the management of intertrochanteric fractures

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Abstract

Context: To prospectively compare the rate of union, complications, operative risks and functional outcomes in intertrochanteric fractures treated with dynamic hip screw and traffon nail. To determine the effectivenes of traffon nail in comparison to dynamic hip screw in treatment of intertrochanteric fractures. **Methods:** Data was collected from the patients with intertrochanteric fractures admitted at Basaveshwara Teaching and General hospital, Gulbarga, Karnataka for the period of 2 years from February 2013 to March 2015. Cases operated with Traffon nail and DHS were selected, 30 cases of each Traffon Nail and DHS which met inclusion criteria were included in the study group. Cases were followed up at interval of 6 weeks, 3 months, 6 months and 1 year. These cases were evaluated at every visit clinically and radiologically, functional assessment was done by Kyle's criteria. **Results:** The functional outcome was measured by Kyle's criteria. In the Traffon nail group, 15(50%) patients had excellent result, 8(26.6%) patients had good results, 5 (16.6%) patients had fair results and 2(6.6%) had poor results. In the DHS group, 8(25%) patients had excellent results, 12(40%) patients have good, 7(21.9%) have fair and 3 cases (10%) have poor results. **Conclusion:** Although literature suggests that dynamic hip screw is the gold standard for treatment of stable and unstable intertrochanteric fractures, our study says that Traffon nail can be considered to be more judicial method of treating intertrochanteric fractures, especially the reverse and oblique variations, osteoporotic fractures. Functional results were better in the traffon nail group than DHS group according to Kyle's criteria.

Key Word: Kyle's criteria, Dynamic hip screw (DHS), Traffon Nail, Intertrochanteric fractures

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INTRODUCTION

Intertrochanteric fractures are defined as 'fractures involving upper end of femur through and in between both trochanters with or without extension into upper femoral shaft'. An increasing incidence of intertrochanteric fractures with advancing age is well known being the major osteoporotic fractures around the hip in the elderly. Injuries to the femur which is the longest bone in the body present challenging situation to the orthopaedic surgeon. Femur fractures are commonly seen in polytrauma patients-mechanism of injury include automobile crashes, vehicle versus pedestrian injuries, gunshot wounds, fall from height and industrial accidents. These fractures account for 10%-34% of all hip fractures. They have bimodal age distribution and very different mechanisms of injury. The older patient typically sustains low velocity trauma whereas in younger patients these fractures commonly result from high energy trauma and often are associated with other fractures[1]. The treatment options were few and less effective than the treatment now available. Now the Intertrochanteric fracture is best treated surgically in most cases as restoration of femoral length and rotation and correction of femoral head and neck angulation can be done. There are two ways to treat fracture proximal femur by internal fixation i.e. sliding compression hip screw with side plate assembly and

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intramedullary fixation devices. The open technique entailing the sliding hip screw may result in deterioration of pre-existing comorbidities in elderly patients owing to increased blood loss, soft-tissue damage, and longer rehabilitation. Cutting out of the sliding hip screw, excessive medialisation of the distal fragment (in unstable fractures), and collapse upon weight bearing are major concerns.[2] Advantages of Intramedullary devices include retained blood supply to bone fragments, less operative blood loss and less disruption of the environment. The intramedullary devices offer certain distinct advantages like the implant itself serves as a buttress against lateral translation of the proximal fragment; the intramedullary location of the junction between the nail and lag screw makes the implant stronger at resisting the binding forces; the intramedullary device has a reduced distance between the weight bearing axis and the implant that is a shorter lever arm; An intramedullary device bears the bending load which is transferred to the intramedullary nail and is resisted by its contact against the medullary canal (load sharing device); the intramedullary hip screw is a more biological method of fixation.[3]

MATERIALS AND METHODS:

The study was conducted on 60 patients with intertrochanteric fractures admitted at Basaveshwara Teaching and General hospital, Gulbarga, Karnataka for the period of 2 years from February 2013 to March 2015. Cases were operated with Traffon nail and DHS, 30 cases of each Traffon Nail and DHS which met inclusion criteria were included in the study group.

Criteria to include patients in the series were

1. All Intertrochantric fractures
2. Age > 20 years

Exclusion criteria

1. Less than 20 yrs.
2. Sub-trochanteric fractures.
3. Compound Intertrochanteric fractures with Previous wound or bone infections, operatively treated fractures, or retained hardware in the same extremity

Patients were carefully evaluated preoperatively which included detailed history to determine the cause of fracture and other diseases. The radiograph of pelvis with both hips and lateral view of the affected hip was taken. The fracture was classified using Boyd and Griffin classification. Skin traction was applied to all cases. Implant either DHS or Traffon nail was randomly selected by operating surgeon. For DHS Length of compression screw is measured from tip of the head to the base of greater tronchanter on AP view X-ray subtracting magnification, neckshaft angle Neck shaft angle is determined using goniometer on X-ray AP view on unaffected side and length of side plate length of the side plate is determined to allow purchase of atleast 8 cortices to the shaft distal to the fracture. For Traffon nail, diameter was determined by measuring diameter of the femur at the level of isthmus on an AP X-ray, Neck shaft angle was measured in unaffected side in AP X-ray using goniometer and a standard length Traffon nail (180 mm) was used in all our cases. All cases were operated on a standard fracture table under spinal anesthesia using standard operating technique of the implant chosen. The fracture table is essential to achieve reduction and as it allows free access for the C-arm in both views.

Post-operative management was done by

- Limb elevation.
- IV antibiotics in the form of third generation cephalosporin's, aminoglycosides were given.
- Oral antibiotics started from fifth post op day and continued till suture removal.
- Analgesics/Epidural top up for 2 days.
- Drain removal after 48 hrs.
- Static quadriceps exercises from day 2 were begun.
- Early hip and knee assisted ROM exercise were started from third day.
- Suture removal after 10 days.
- Patient discharged 1 week after operation after giving appropriate physiotherapy instructions.
- Rehabilitation: partial weight bearing was started 2 to 4 weeks post operatively. Full weight bearing was allowed after radiological and clinical signs of union.

Follow up was done at 4 weeks interval initially and then later at 6 weeks interval. These cases were evaluated at every visit clinically and radiologically, functional assessment was done by Kyle's criteria.

Dring the follow up the following parameters were assessed

Clinically:

1. Wound condition
2. Function on kyles criteria
3. Shortening
4. kyles criteria

Radiologically

1. Union
2. Amount of collapse
3. Complications like screw cut out and z phenomena

Outcomes were evaluated on the basis of kyle's criteria, duration of surgery, amount of blood loss intra-operatively, complications intra-operatively, resumption of activities.

RESULTS

Table 1: Distribution of study population as per Traffon and DHS

Particulars		Traffon		DHS	
Age Incidence	20-40yrs	1	3.4%	2	6.67%
	40-60yrs	10	30%	13	43.33%
	>60yrs	19	63.34%	15	50%
Sex Incidence	Male	21	70%	22	60%
	Female	9	45%	8	40%
Mechanism of Injury	High velocity injury	6	20%	7	23.34%
	Trivial fall	24	80%	23	76.67%
Side of Injury	Right	23	76.67%	21	70%
	Left	7	23.33%	7	30%
Classification of Fractures	Type 1	2	6.67%	4	13.34%
	Type 2	10	25%	13	43.34%
	Type 3	15	50%	10	3.34%
	Type 4	3	10%	3	10%
Time Interval between Trauma and Surgery	<7 days	24	80%	25	83.34%
	> 7 days	6	20%	5	16.66%

Table 1 show that the incidence of fall is usually above the age of 60 yrs with osteoporotic bones who sustained trivial injury more prevalance in the males.

Table 2: Distribution of study population as per types and duration of surgery

Particulars		Traffon		DHS	
Type of Surgery	Closed reduction	27	90%	--	--
	Open reduction	3	10%	30	100%
Duration of Surgery	< 2hrs	25	83.34%	20	66.67%
	>2 hrs.	5	16.67%	10	33.33%
Type of Union and Duration	Union	27	90%	25	83.34%
	Delayed union	3	10%	5	16.66%
	Non union	--	--	--	--
Functional Grading of Patient as per Kyle's Criteria	Excellent	15	50%	8	25%
	Good	8	26.6%	12	40%
	Fair	5	15.6%	7	21.9%
	Poor	2	6.6%	3	10%

Table 2 shows that 50% of the patients had excellent results with the traffon group and mostly operated with closed reduction in the traffon group but for 3 of the patients open reduction had to be done.

Table 3: Complications in the Traffon group

Complications in the Traffon group			
Intraoperative	Flaring of tip of nail	-	-
	Difficulty in distal locking	-	-
	Difficulty in proximal locking	3	10%
	Difficulty in entry point	2	6.67%
	Difficulty in achieving closed reduction	3	10%
Early	Shortening	1	3.34%
	Rotation deformity	-	-
	Superficial infection	1	3.34%
	Deep infection	-	-
	Bed sores	-	-
	Mortality	-	-
Late	Malunion	2	6.67%
	Non union	-	-
	Implant failure	1	3.34%
	Delayed union	-	-
	Knee stiffness	1	3.34%

As evident from Table 3 that, the difficultly in taking entry point was faced with individuals who were fat and with complicated fracture patterns.

Table 4: Complications in the DHS group

Complications in the DHS group		
Intraoperative	Insufficient reduction	3 10%
	Improper positioning of lag screw	3 10%
	Drill bit breakage/guide wire	
	Fracture of lateral cortex or distal fragment	26.67%
Early	Shortening > 2cms	3 10%
	Rotation deformity	26.67%
	Superficial infection	13.34%
	Deep infection	13.34%
	Bed sores	13.34%
	Mortality	
Late	Malunion	26.67%
	Non union	
	Implant failure	26.67%
	Delayed union	26.67%
	Knee stiffness	26.67%

Table 4 shows that shortening was noted in 3 patients where there was comminuted fracture pattern and was corrected using shoe raise, rotational stability was encountered and was solved using a de-rotational CC screw in few patients. Bed sore was seen in the same individual who had developed the deep infection.


Figure 1

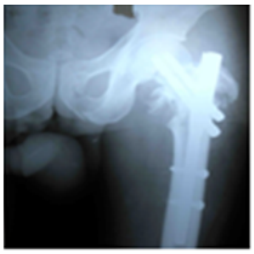
Figure 2


Figure 3


Figure 4


Figure 5


Figure 6


Figure 7


Figure 8


Figure 9


Figure 10

Legend

Figure 1: Pre-operative x-ray; **Figure 2:** Immediate post; **Figure 3:** Follow up x-ray; **Figure 4:** Standing; **Figure 5:** Straight leg rising; **Figure 6:** Squatting; **Figure 7:** Pre-operative x-ray; **Figure 8:** Follow-up x-ray; **Figure 9:** Squatting; **Figure 10:** Straight leg rising

DISCUSSION

Successful treatment of Intertrochanteric fractures depends on bone quality, patient age, general health, interval from fracture to treatment, treatment adequacy, comorbidities, and fixation stability. Surgical management is preferred because it facilitates early rehabilitation. In the last 3-4 decades treatment of intertrochanteric fractures has changed significantly. A large number of fixation implants has been devised and discarded. The treatment still merits the type of fracture and condition of patient. The development of the dynamic hip screw in the 1960's saw a revolution in the management of unstable fractures. The device allowed compression of the fracture site without complications of screw cut out and implant breakage associated with a nail plate. However the extensive surgical dissection, blood loss and surgical time required for this procedure often made it a contraindication in the elderly with comorbidities. The implant also failed to give good results in extremely unstable and the reverse oblique fracture. In the early 90s intramedullary devices were developed for fixation of Intertrochanteric fractures. These devices had numerous biomechanical and biological advantages over the conventional dynamic hip screw.[3,4,5] Long term studies however revealed that the use of these devices was associated with higher intra operative and late complication often requiring revision surgery. This has lead to modifications in the device and technique of the intramedullary devices. A review of literature will reveal several studies.[4,6,7,8, 9,10] On the comparison of the dynamic hip screw to intramedullary nail. All of them aimed to compare intra and postoperative complications, postoperative function, union rates and implant failure rate between the two. In a meta-analysis study conducted by Kairui Zhang et al involving 669 fractures of which 308 were managed by proximal femoral nail and 361 by DHS, it was found out that PFN had better outcome in terms of lesser operating time, lesser intra-operative blood loss and smaller length of incision. As literature suggests that DHS has more advantage for stable fractures, for unstable fractures intramedullary nail is more suitable.[11]

The pitfalls of open reduction:

- Deterioration of pre-existing comorbidities in elderly patients owing to
- Increased blood loss,
- Soft-tissue damage, and longer rehabilitation,
- Cutting out of the sliding hip screw,
- Excessive medialisation of the distal fragment (in unstable fractures) causing collapse upon weight bearing.

Benefits of the closed reduction with Intramedullary Devices:

- Because of its location it provides more efficient load transfer.
- Retained blood supply to bone fragments.
- Less operative blood loss.
- Less disruption of the environment.
- Shortens the time of procedure.
- Faster union rates.
- Decreased infection rate.

- Minimum soft tissue dissection and wound complications.

Traffon nail being only 180mm and also not tapering and fitted above the isthumus reduced chances of stress fractures around the implant. In comparision, better rotational stability was seen in traffon nail group as DHS had a single lag screw.

CONCLUSION

Literature suggests that dynamic hip screw is the gold standard for treatment of stable type of intertrochanteric fractures as well as unstable types. According to our study and use of Traffon nail in Intertrochanteric fractures we can say that: Traffon nail can be considered to be an effective way to surgically treat inter-trochanteric fractures.

The reasons to support this are

- It can be used in all configurations of IT#.
- It is closed method thus minimal soft tissue damage & preserves the fracture hematoma and yields early healing and early union.
- Closer to weight bearing axis.
- It can be used with equally good results in all grades of osteoporosis.
- Functional results observed were better than DHS
- Morbidity was significantly lesser with lesser amount of blood loss and shorter duration of surgery.
- It gives good results even with non-anatomical reduction.
- Complications were minimal and comparable with other fracture systems.
- But Traffon nail requires a higher surgical skill, good fracture table, good instrumentation and C-arm control. It has a steep learning curve.

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