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Intertrochanteric fracture treated with TFN (trochanteric femoral nail): A clinical study

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Abstract
Background: The Trochanteric femoral nail (TFN) is a recently introduced intramedullary system, designed to improve treatment of intertrochanteric fractures of the hip. In a clinical study, the intra-operative use, complications and outcome of treatment using the TFN. The intra-operative blood loss was lower with the TFN. Post-operatively, lateral protrusion of the hip screws of the TFN was documented. Functional outcome and consolidation is good with implants.
Materials and Methods: Twenty patients diagnosed with intertrochanteric fracture were treated in Gulbarga Government Hospital. Classification used in AO, Surgery has been performed according to standard protocols for the TFN. Patient is positioned on fracture table with traction supine. Dressing has been done on third day. All patients were grade with Harris hip for the outcome on 5th day, 14th day, 1st month and 3rd month and 6th month.
Results: The study reveals that Hip score at the end of 6 months was excellent 50%, good in 25%, fair in 20% and poor in 5%. The newly developed TFN has got minimal pitfalls and comparable complications.
Conclusions: In our study intertrochanteric fracture fixed with TFN has given good results to the patient with early weight bearing and good fracture heal.

Keywords: TFN, Intertrochantric fracture, clinical profile

Introduction
Earlier most of trochanteric fractures were treated by a sliding hip-screw system. Since this device performed less well in unstable trochanteric fractures, with high rates of failure, [1-5] intramedullary fixation devices have become increasingly popular. [6, 8]. The main principle of this type of fixation is based on a sliding screw in the femoral neck-head fragment, attached to an intramedullary nail. The latter has advantages from the biomechanical point of view [7, 9, 10]. The trochanteric femoral nail (TFN) was developed to improve the rotational stability of the proximal fracture fragment, combining the features of an unreamed intramedullary femoral nail with a sliding, load-bearing, femoral neck screw in order to combine the advantages of semi-closed intramedullary nailing, a dynamic femoral neck screw and early post-operative weight-bearing. [11-14]. its introduction in 1997, several clinical studies [6, 25] have shown good results with few intra-operative problems and a low rate of complications [26] The clinical relevance of the presumed advantages and lower complication rates are still to be established.

Material and Methods
Twenty patients from May 2013 to Dec 2015 diagnosed with intertrochanteric fracture were treated in Gulbarga government hospital. Classification used is AO (Fig 1). Inclusion criteria were the radiological diagnosis of an intertrochanteric femoral fracture were selected (Fig 2) and classified as according to the AO/ASIF classification for long bones (Table 1), 30 to 60 years age. Exclusion criteria were inability to `walk before the fracture, other fractures interfering with rehabilitation, or (suspicion of) pathological fracture.

Table 1: Type of Fracture

S No	Type of Fracture	Number
1	A1.2	5
2	A1.3	3
3	A2.1	8
4	A2.2	2
5	A2.3	2

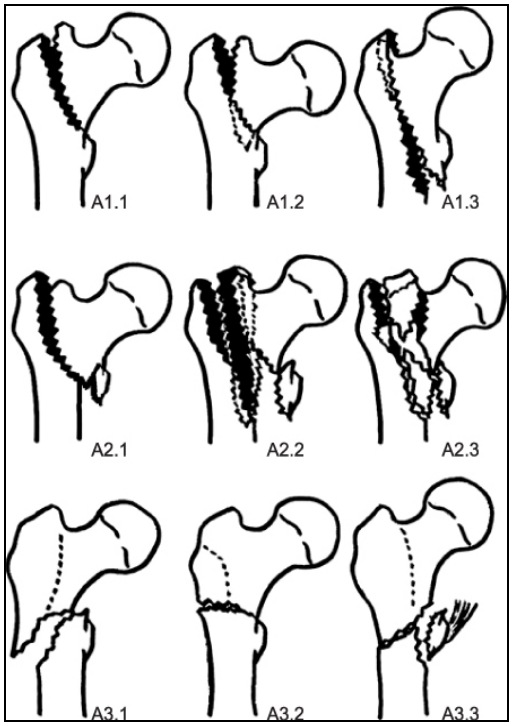

Fig 1:

Surgery has been performed according to standard protocols for the TFN. Regional anaesthesia was given to all patients. The TFN used in the study was a solid nail of 180 mm in length and 10 or 11 mm in diameter, which was inserted with and without reaming of the medullary canal. Nail-screw angle used are 130^0 and 135^0 angle nails where used with de-rotation screw of 6mm and compression screw of 8mm. The TFN has be distally locked with dynamically and statically with bolts.

Patient is positioned on fracture table with traction supine, than under image intensifier fracture reduction is done. Lateral incision done just 2 cm above the greater trochanter and 3 cm in length, after incision tip of greater trochanter is identified and just 2mm lateral to the tip of trochanter in AP view and in lateral view of centre of trochanter is marked and that is the insertion point. But in severely communited fracture insertion is done from fracture site. After that entry is made through awl over that point and guide wire is passed in to the femoral canal over that the entry site is reamed with reamer and nail is inserted into the bone before that femoral neck angle is measured and nail is selected. Than guide wires are passed into the head and neck for placement of de-rotation and compression screw and it is guided with the image intensifier. Both the guide wires are reamed one by one first for de-rotation screw and fixed it with measurement on reamer than with compression screw which is almost 10mm larger than de-rotation screw tip of this screw is in subchondral bone. Than both the distal lock blots are placed with the help of the zig. Post-operative x-ray (Fig 3) was taken for the reduction and alignment. Dressing has been done on third day. And patient was mobilised on third day with the help of the walker with partial weight bearing, and discharged on the fifth day to review on 12^{th} post-operative day for suture removal. After first month (Fig 4) and third month (Fig 5) check X-ray was done to see the fracture heal and prognosis All patient were grade with Harris hip score for the outcome on 5^{th}day, 14thday, 1^{st} month and3^{rd} month and 6^{th} month.

Results

Time for completing surgery was 1hr 20min (1to 2hr). The intraoperative blood loss is around100ml (150 to 90ml). Out of twenty patients 15 was having anatomical reduction and 5 were stable fixation. On fifth post-operative day the patient as mobilized with support and sutures were removed on 14^{th} post-operative day. Post-operative check x-ray (Fig 3) was done for the evaluating the reduction and latter mobilization started with support. Than patient were followed for first month and follow up x-rays were taken and patient were allowed to bare full weight. One of the patient had back out of compression screw on 1^{st} month follow up and all other were doing well. At 3^{rd} month follow up x-rays were taken and reduction was good in all the case and pain was normal. Hip score at the end of 6 months was excellent 50%, good in 25%, fair in 20% and poor in 5%.

Fig 2: Pre-operative x ray

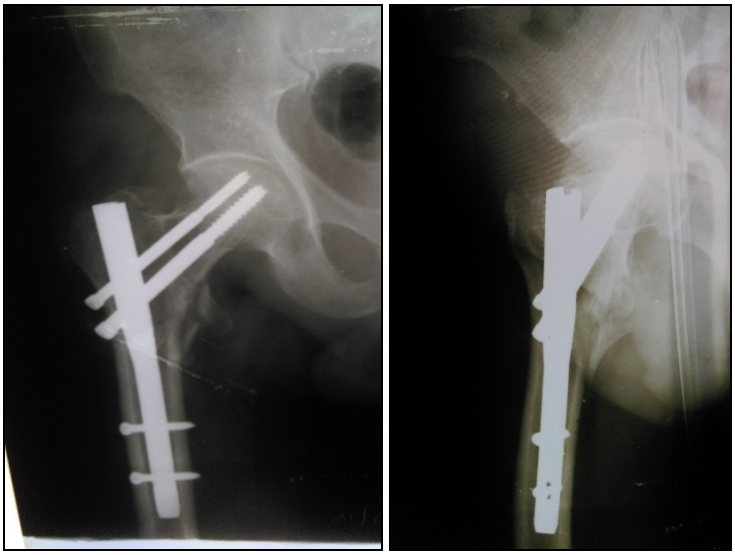

Fig 3: Post- operative x-ray

Fig 4: One month post-operative

Fig 5: 3 month post-operative

Discussion

Hypothesis that the TFN would reveal fewer complications than the other implants. Pilot studies in relatively small patient groups [6, 16-18] had shown good outcome with few complications after treatment with the PFN. Extramedullary fixation devices with the TFN in stable and unstable trochanteric fractures the TFN gave better results. The intra-operative complication has been described before [11, 13, 15, 19] and may be due to insufficient reaming or improper technique when introducing implant. The mean blood loss during operation was less. In our study there were no cut out effect knife effect. The PFNs cutting-out generally appeared to result from poor positioning of the proximal screw(s) in the femoral head, rather than being implant related. The importance of the proper positioning of the screw has been emphasised before [4, 5, 20, 21]. A relevant complication is the lateral protrusion of the proximal screws, because of impaction of the fracture. The question remains as to why this complication assuming that the anchorage of the lag screws in the femoral head of both implant, the difference must be caused by collapse or impaction of the fracture rather than migration of the screws. A different sliding mechanism of the hip screw through the nail [4, 22, 23] may play a role. Overall, impaction of the fracture is beneficial to its consolidation. The general complications and mortality rates did not reveal any surprising results and are in range with the results of other studies [18, 24].

For many years attempts have been made to overcome the difficulties which surgeons encounter in the treatment of intertrochanteric fractures. Many questions have been raised regarding the configuration of the perfect fixation device. The results of our study have shown that the newly developed TFN is as good with minimal pitfalls and comparable complications. Optimal reduction of the fracture and positioning of the nail and screws remain of crucial importance and should be obtained at all times. Correctly placed fixation device will never make up for surgical failures. Therefore, improvement of treatment of the intertrochanteric fractures will predominantly be in the hands of surgeons, and correctly place implant.

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