International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(3): 181-185
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www.orthopaper.com
Received: 16-05-2021
Accepted: 18-06-2021

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Comparison of long vs short proximal femoral nailing with Intertan in stable intertrochanteric fractures

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DOI: https://doi.org/10.22271/ortho.2021.v7.i3c.2744

Abstract
Aim: A comparative evaluation of the surgical treatment and outcome of patients with stable intertrochanteric fractures treated with long versus short INTERTAN nail.
Objectives: Inter-trochanteric fractures of femur are among the most common orthopedic injury in elderly age group. Proximal femoral nailing with INTERTAN has become a popular method of stabilization of inter-trochanteric fractures in adults. stable trochanteric fractures can be treated using the conventional proximal femoral nailing method or the newly deviced proximal femoral nailing with INTERTAN nail. The present study was conducted to assess and evaluate the outcomes following treatment of stable inter-trochanteric fracture femur with long INTERTAN nail vs short INTERTAN nail.

Keywords: intertrochanteric fracture, intertan, short, long nail

Introduction
Globally, proximal femoral fractures have been on the rise with the increase in life expectancy and osteoporosis in the elderly population and road traffic accidents among the younger counterparts [1-3]. The total number of trochanteric fractures are predicted to reach 1.6 million by 2025 and 2.5 million by 2050 [4]. In 1990, 26% of all intertrochanteric fractures were reported in Asia, this figure is estimated to rise to 32% in 2025 and 38% in 2050.
Intertrochanteric fractures are a common injury in geriatric patients with osteoporosis or an underlying disease. Similar to most hip fractures among the elderly, intertrochanteric fractures occur subsequent to a lateral fall that has an impact on the greater trochanter. The overall intertrochanteric fracture prevalence, severity, and risk of unstable fracture morphologies show a relationship with the severity of trochanteric osteoporosis. Even though the direction of impact has an effect on the overall risk of hip fracture, an absolute correlation between impact direction and fracture location or morphology is not evident [5, 6]. Unstable intertrochanteric fractures in the elderly is linked to a high mortality rate, nearly 20%, in the first postoperative year.[7]In intertrochanteric fractures, there is an increase in the bending effect of the joint load since the lever arm (distance between line of action of hip joint load & fracture line) is longer. This leads to bending of the proximal fragment in the varus direction. Shear forces acting on such fractures are not major. The axial rotation force acting on femoral shaft during internal or external rotation of limb is important and may interrupt fixation. During fixation, it is essential for the bone to support load, so that the load on the implant is less. In comminuted fractures, the stress on the implant is comparatively more as the implant bears more load than bone support.
Clinical attention is generally given to the number, size, shape, location and displacement of fracture fragments. Comminution encompasses the posteromedial cortex of bone acting as a major contributing factor for complication of fixation. Multiple fragments with posteromedial cortex comminution are likely to displace in varus and retroversion, consequently considered as unstable fractures.[8] Apart from comminution and displacement, additional key features for intertrochanteric fractures include orientation of the fracture line and stability. A typical intertrochanteric fracture has a primary fracture line oriented from the greater trochanter

(proximal and lateral) to the lesser trochanter (distal and medial). For the typical orientation, a primary fracture line connotes stability. The goal for treating such injuries is to reduce displacement and stabilize with implants to allow early mobilization and weight bearing during fracture healing.[5]

Today, with the improvements in treatment modalities, surgical treatment has been established as a standard of management to achieve adequate reduction and early mobilization in the elderly osteoporotic population. Attaining successful fixation is of utmost importance in this group since implant failure can result in devastating complications.

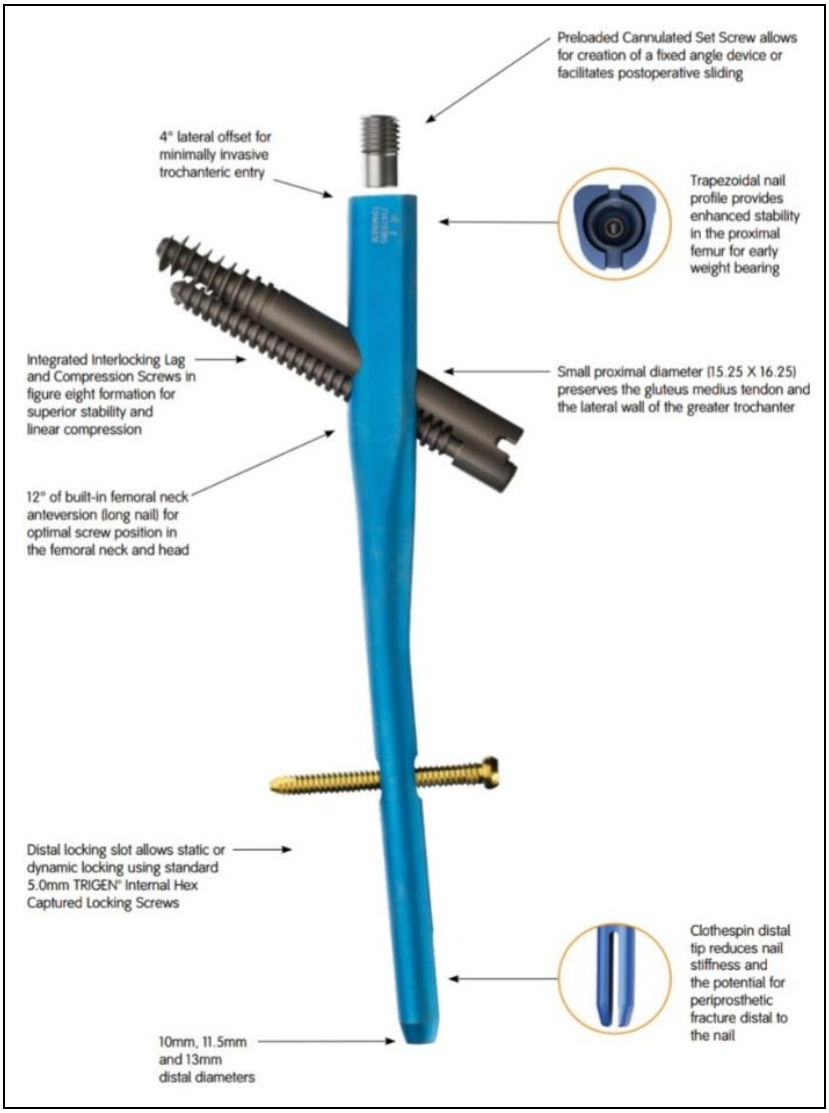
The INTERTAN nail is indicated for fractures of the femur including simple shaft fractures, comminuted shaft fractures, spiral shaft fractures, long oblique shaft fractures and segmental shaft fractures; subtrochanteric fractures; intertrochanteric fractures; ipsilateral femoral shaft/neck fractures; intracapsular fractures; nonunions and malunions; polytrauma and multiple fractures; prophylactic nailing of impending pathologic fractures; reconstruction, following tumor resection and grafting; bone lengthening and shortening.

INTERTAN Intertrochanteric Antegrade Nail allows patients to experience:

- Lower risk of implant failure and reoperation [9-12-14-16]
- Faster time to fracture union [9-12-15]
- High return to pre-fracture status [9-10-12, 16]

Features and Benefits

- Maintain compression and eliminate Z-effect
- Intertrochanteric rotational stability
- Control rotation during reduction
- Eliminate medial migration
- Prevent periprosthetic fractures



Intertan nail

This study aims for correlating functional outcome short INTERTAN & long INTERTAN within the terms of blood loss, surgical time, functional outcome and other modalities.

Materials and Methods

A prospective review was conducted of patients with stable intertrochanteric fractures treated between January 2019 and june 2020. In all 80 patients were enrolled in the study, of which 40 were treated with short INTERTAN and the remaining 40 with long INTERTAN. Comparative analysis of demographic data, peri-operative outcome and complications were carried out.All fractures were classified as per Orthopedic Trauma Association(OTA) AS 31A1.1-31A1.3.All the patients were evaluated on immediate post-operatively, 1st, 3rd, 6th and 12th month using Harris hip score.

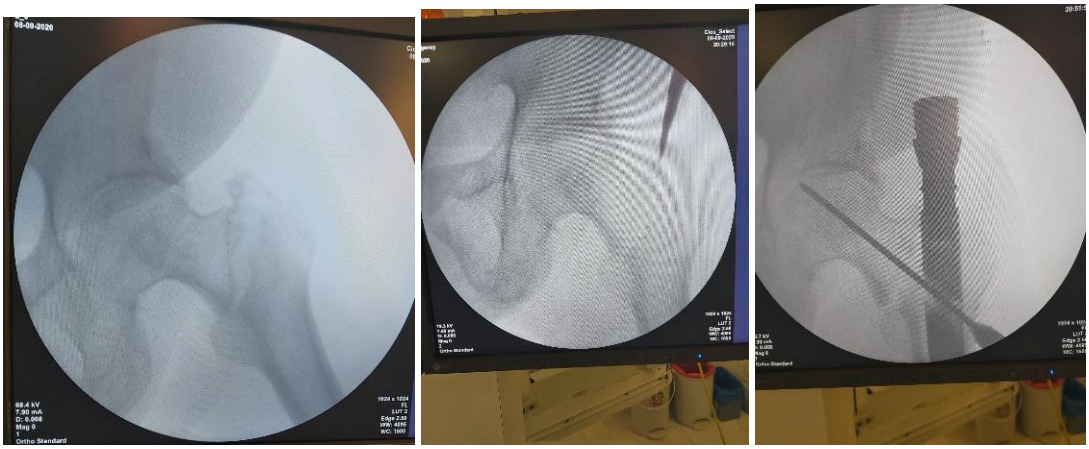


Fig 1: Intra-Op Images

Fig 2: Post-operative

1. Age

The mean ± SD age in patients of Group A(long INTERTAN) was 67.56 ± 15.13 years while that of those in Group B(short INTERTAN) was 61.16 ± 16.29 years. The t-test revealed no statistically significant difference (p=0.1565) between the mean age of patients in the 2 groups.

2. Gender distribution

Of the 40 patients in Group A, 40% were males and 15% were females, whereas in Group B, 52% were males and 48% were females. The chi-square test revealed no statistically significant difference (p=0.3946) between the distribution of gender among the groups.

3. Mode of injury

In the present study, the mode of injury was RTA in 24% patients in Group A (LONG INTERTAN) and 40% patients in Group B(SHORT INTERTAN), whereas fall was the mode of injury in 76% patients in Group A and in 60% patients in group B. The chi-square test revealed no statistically significant difference (p=0.2252) between the mode of injury among the 2 groups.

Table 1: AO classification (Stable Intertrochanteric Fractures)

AO classification (Stable Intertrochanteric Fractures)				
AO classification	Group A		Group B	
	No.	%	No.	%
31 A1.1	3	5	3	8
31 A1.2	15	40	15	37
31 A1.3	12	30	10	25
31 A2.1	10	25	12	30

5. Type of anaesthesia

Spinal anaesthesia was used for majority of our patients, i.e. in 88% patients in Group A and in 92% patients in Group B. In the remaining, 12% patients in Group A and 8% patients in Group B, spinal/epidural anaesthesia was used.

6. Blood loss

Table 2: Blood loss

Blood loss	Group A		Group B		p-value*
	No.	%	No.	%	
<100 mL	7	15	31	75	0.00001
≥100 mL	33	85	09	25	

*Calculated using the chi-square test. P<0.05 considered statistically significant

7. Blood transfusion

Table 3: Blood transfusion

Blood transfusion	Group A		Group B		p-value*
	No.	%	No.	%	
Yes	34	88	3	4	<0.00001
No	6	12	37	96	
*Calculated using the chi-square test. P<0.05 considered statistically significant					

8. Intraoperative complications

Among the two groups in the present study, intraoperative complications were noted only in 8% patients treated using LONG INTERTAN. There were no intraoperative complications among patients treated using SHORT INTERTAN.

9. Post-operative complications

In our study, there were no early post-operative complications among any patients in both groups treated using either long INTERTAN or short INTERTAN. However, late post-operative complications were observed in 12% patients treated using long INTERTAN,

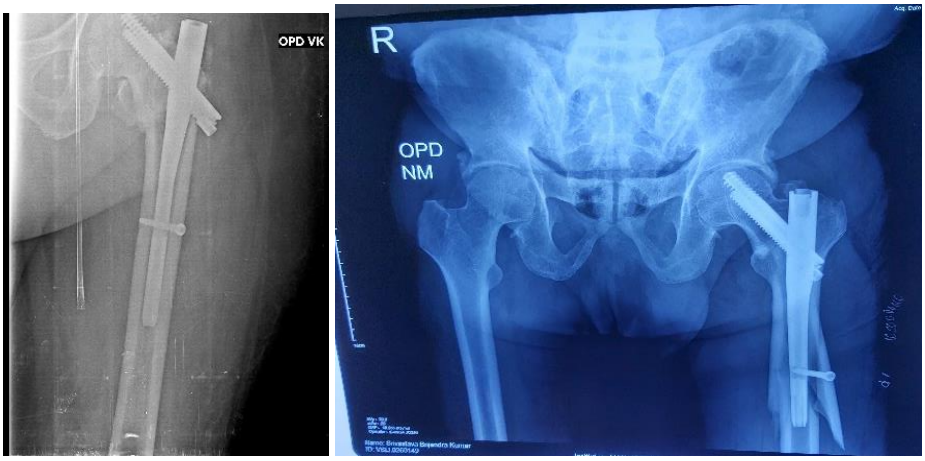


Fig 3: Post-operative complications

1 patient had screw back-out, 1 had screw breakage and 1 had stress fracture. There was 1 late post-operative complications among patients treated using INTERTAN and there was fracture shaft of femur from the tip of nail of the operated side.

10. Harris hip score

The mean ± SD HHS in patients of Group A was 85.32 ± 12.96 while that of those in Group B was 83.36 ± 11.57. The t-test revealed no statistically significant difference (p=0.5753) between the mean HHS of patients in the 2 groups.

11. Fluoroscopy Shoots

Table 4: Fluoroscopy Shoot (In Nos.)

Shoot	Group A		Group B		p-value*
	Avg No.	%	Avg No.	%	
>40	3	92.5	3	4	0.00001
<40	4	7.5	37	96	

*Calculated using the chi-square test. P<0.05 considered statistically significant

12.Operative Timing

Table 5: Operative Timing

	Group A		Group B		p-value*
	Avg No.	%	Avg No.	%	
>60 mins	37	90	6	12.5	0.00001
<60 mins	3	10	34	92.5	

*Calculated using the chi-square test. P<0.05 considered statistically significant

Results

The mean follow up period was 15 months. There was not much significant difference noted in the two groups with regards to Arbeitsgemeinschaft fur Osteosynthesefragen (AO) fracture classification, time from injury to surgery & hospital stay. The surgical duration for a short INTERTAN procedure was significantly less (averaging 48 minutes) when compared to that of a long INTERTAN (averaging 64 minutes). Fluoroscopy exposure time was more in long INTERTAN group than short INTERTAN group. Similarly, intra-operative blood loss was significantly higher in the long INTERTAN group as compared to the short INTERTAN.

Conclusion

A relatively quicker surgical time of just under an hour ,Less radiation exposure and lesser blood loss makes short INTERTAN nail a better implant choice when compared to long INTERTAN nail in the treatment of stable intertrochanteric fractures.

Financial Support & Sponsorship: None

Coflicts Of Interest: There Are No Conflicts of Interest.

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