

## Observational study of proximal fixation nail anti rotation and gamma nail in trochanteric fracture of Femur

Mohammad Sahamim<sup>1</sup>, Mohd Mohasin khan<sup>1</sup>, Cui Xuewen<sup>1</sup>, Harish singh<sup>2</sup>,  
Pankaj kumar<sup>3</sup>

<sup>1,2,3</sup>Orthopedics Department No. 3, Affiliated Hospital of Jiangsu University, Zhenjiang, Jiangsu Province, P. R. China

**Abstract:** The basic purpose of study is to find out advantage and disadvantage of fixation nail anti rotation and gamma nail in trochanteric fracture of femur. I observed about 100 cases of unstable fracture of femur in my hospital which was treated by anti rotational fixation nail of two years and took some data of gamma nail. I did observe that in PFNA blood loss was very less and duration of surgery was short and PFNA is very good in osteoporotic patients in compare to the gamma nail. Reduction of the fracture was considered good in both cases and radio graphically both device position was good postoperatively. Intra operative complication was comparatively more in gamma nail than anti rotational fixation nail such as shaft fracture of the femur, blood loss, duration of surgery. Post operative complication was not seen in both cases such as nonunion, malunion. So after studying both cases I did not found so much difference between these two devices which are used in trochanteric fracture by the orthopedic surgeons but very few advantage with the proximal fixation nail. So the both intramedullary nailing device was good compare to the extramedullary device like dynamic screw in trochanteric fracture of femur.<sup>1,2</sup> Recent study find out some complication with gamma nail like shaft of femur fracture<sup>3</sup>, fixation failure<sup>4</sup>, distal locking complication need to reoperate but they are very few cases.<sup>3,4</sup> Gamma nail are still widely used despite of having such complication. The comparative data of gamma nail and PFNA result that PFNA is little better device in unstable proximal fracture.<sup>2,5</sup> Something about gamma nails which is used in my hospital since last three years. The proximal femoral nail anti rotation (PFNA; Synthes, Oberdorf, Switzerland) was developed by AO/ASIF (Davos, Switzerland) as an alternative to the proximal femoral nail. It has small distal shaft diameter which causes less stress concentration of tip. The PFNA blade compact the cancellous bone and provide stability and prevent retard rotation and varus collapse. Since its introduction, so many clinical studies have shown very good result with very little intraoperative problems and post operative complication.<sup>6</sup>

**Key words:** Intertrochanteric fracture, PFNA (proximal fixation nail antirotation), Gamma nail.

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### I. Material and method:

All patients with unstable proximal trochanteric fracture of my hospital between 2010 Sep to May 2012 was observe for the study. Criteria for Participation in this Clinical Trial

Inclusion Criteria:

1- Age 55 years and more. 2- Patients with isolated, unstable, closed or type 1 open trochanteric fractures, classified as AO 31-A2 or AO 31-A3. 3- Definitive primary fracture treatment with PFNA or Gamma 3 within three days after the index event. 4- Signed written informed consent (by the subjects or legal guardian) and agreement to attend the planned follow-ups.

Exclusion Criteria:

1 - Pathologic fracture of any other cause than osteoporosis. 2 - Patients or legal guardian refusing to sign the informed consent form. 3 - Multiple traumas. Type 2 and 3 open fractures. 4 - Drug or alcohol abuse. 5- Wound and/or bone healing disorders of any other cause than diabetes mellitus or smoking. 6 - Active malignancy. 7- Expected life expectancy  $\leq$  3 months. Inability to walk independently prior to injury event (use of one stick is allowed. Not meeting inclusion criteria are bedridden, wheel-chair ridden and walker dependent subjects). 8- Neurological and psychiatric disorders that would preclude reliable assessment (eg. Parkinson disease, Multiple sclerosis, severe depression). 9- Rheumatoid arthritis. 10- Gender Eligibility for this Clinical Trial: Both- Minimum 11- Age for this Clinical Trial: 55 Years, Maximum Age for this Clinical Trial: N/A. 12- Are Healthy Volunteers Accepted for this Clinical Trial: Accepts Healthy Volunteers?

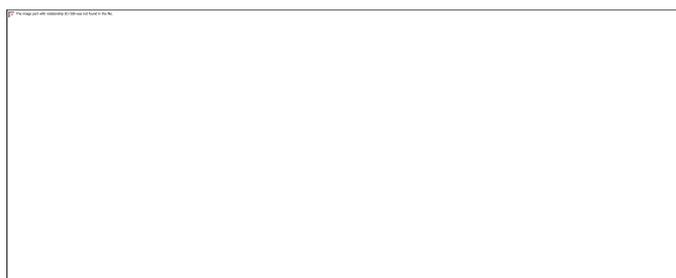
Background parameter, ASA [American society of anesthesiologist] risk scores 1 to 4 and preadmission mobility record.

The standard protocol for both Gamma nail and PFNA was followed as earlier mention.<sup>7</sup> The PNFA which was used for study made by titanium nail with length of 170 or 240 mm and diameter of 10 to 11 mm with medullary nail with mediolateral curvature of 6 degree which is inserted without reaming of

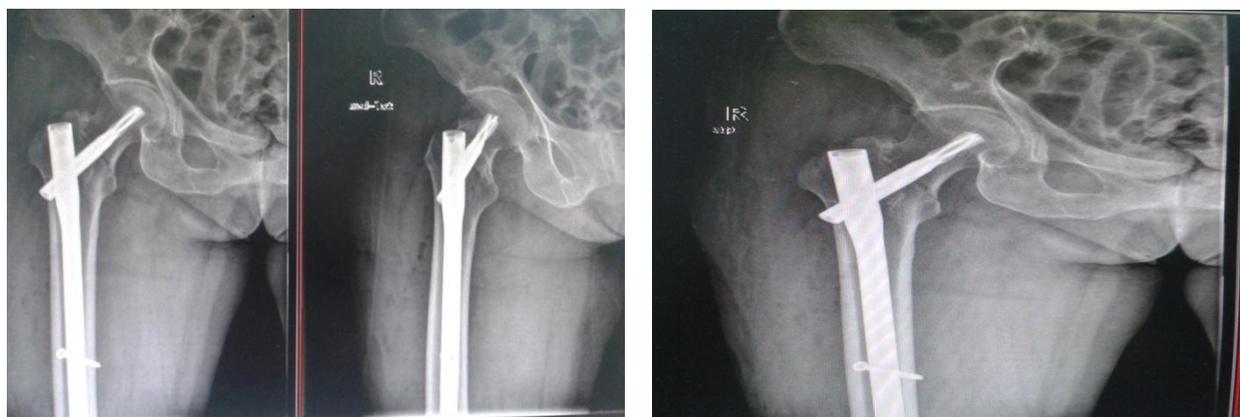
intramedullary canal. Operation time, fluoroscopy time, blood loss, and any intraoperative complications were recorded. Standard plain anteroposterior (AP) and lateral radiographs were obtained on the first postoperative day, or during the hospitalization period. The quality of reduction of the fracture was classified as good if alignment was normal, acceptable ( $5^{\circ}$ - $10^{\circ}$  varus/valgus and/or ante version/retroversion), or poor ( $>10^{\circ}$  varus/valgus and/or ante version/retroversion). The ideal position of the blade or screw was defined as being central or inferior on the AP radiograph and central on the lateral radiograph.

The PFNA may be distally locked either dynamically or statically. Gamma nail have 170 mm annulated steel nail with lower 4 degree mediolateral curvature and the diameter is of 11mm. The femur was reamed 2 mm larger than the proximal and distal diameters of the nail, and insertion was performed manually without hammering. There is 1 distal locking screw for anti rotation. The neck shaft angle of the 2 devices was  $130^{\circ}$ . The PFNA and the GN-3 were inserted using the percutaneous technique.

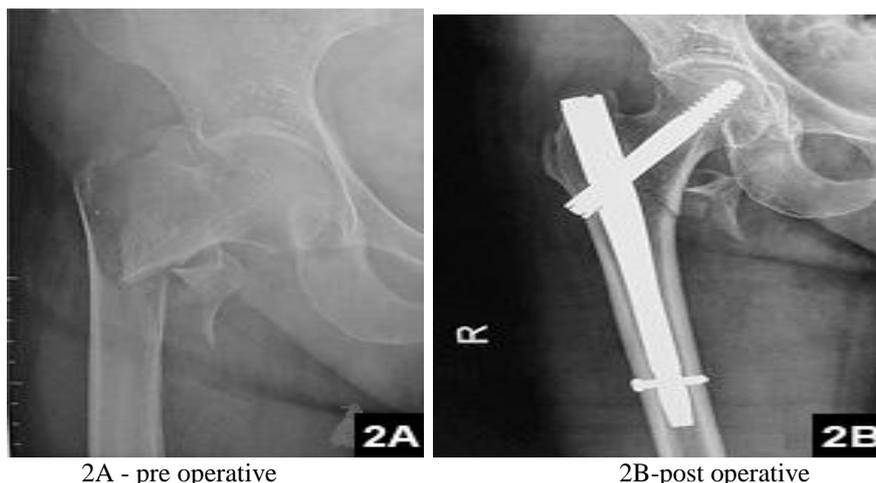
First post radiograph was A-P and lateral view and also during hospitalisation. The quality of reduction was taken as good if the alignment was normal, acceptable if varus/valgus/ant version/retroversion. The ideal of blade or screw is central inferior to the on A-P radiograph and can take lateral radiograph also.



Pre operative radiograph of trochanteric fracture & intra operative radiograph and PFNA



Post operative radiograph of PFNA GAMA NAIL



2A - pre operative

2B-post operative

## II. Result:

The treatment of the two groups on the basis of injury, age, sex, ASO, mobility before injury. ASO classification fracture pattern in the both group...is given in the following table. The anesthetic agent was same in both cases it was general spinal anesthesia. The fluoroscopy time was longer in Gama nail than PFNA. Fracture reduction was good in the both cases. Time of fracture healing was better in PNFA than Gama nail. The blood loss was less in the PNFA than Gama nail. The implant position was good in most of the cases in both devices on postoperative radiograph. Intra and postoperative complication is given in list 1, 2 and 3.femar shaft fractures are seen intra and post operative in both the condition. There are no cases of non union in both. Complete weight bearing occurs by near one and half month.

Table 1			
Baseline group data			
	PFNA	GN-3	P Value
No. patents	55	45	
No. women	29	33	.7807
Mean patient age,	75±1.2	74±1.0	.7049
ASA score			
1	19	24	
2	26	20	
3	9	12	
4	7	9	
Fracture type			.5696
A2	37	49	
A3	6	8	
Mode of injury			
Fall at home	31	34	.7694
Fall from height	7	5	
RTC	10	13	
Walking ability score	7±0.28	6.8±0.26	.6726

ASA=American association anesthetic

RTC=Road traffic accident

PFNA=Proximal fixation nail anti rotation

Table 2			
perioperative data			
	PFNA	GAMMA NAIL	p value
No.general	31	29	
No.spinal	19	21	
No.open reduction	12	17	
Results of reduction			

Good	33	37	
Acceptable	11	16	
Poor	3	2	
Mean operating time,min	60±1.8	68±2.4	.1413
Mean blood loss,ml	217.3±12.6	272.5±14.8	.0071
Mean fluroscopy time,min	2.7±0.14	3.1±0.13	.0081
No. patients transfused	21	29	.3467
Mean units blood transfused	1.95± 0.90	2.03±0.98	.7767
Mean hospital stay,days	7.2±0.2	7.4±0.2	.5040
Mean time fracture healing,weeks	9.5±2.2	10.2±2.8	.1836

complication	PFNA	GN-3	P value
Femoral shaft fracture	1	1	.3513
Superficial wound infection	7	7	.5168
Hematoma	1	2	.6661
Lateral migration	3	1	.3151
Decubitus ulcer	2	2	
Chest infection	3	2	.7355
Urinary tract infection	6	5	

Standard plain anteroposterior (AP) and lateral radiographs were obtained on the first postoperative day, or during the hospitalization period. The quality of reduction of the fracture was classified as good if alignment was normal, acceptable (5°-10° varus/valgus and/or ante version/retroversion), or poor (>10° varus/valgus and/or ante version/retroversion). The ideal position of the blade or screw was defined as being central or inferior on the AP radiograph and central on the lateral radiograph.

Postoperative Functional Results at Last Follow-up			
	PFNA	GN-3	P value
Mean walking ability score	5.3±0.29	5.1±0.19	.9147
Mean hip flexion, deg	98.3±2.1	94.7±2.2	.2501
No. patients with hip thigh pain	17	9	.0617
No. of patients recovering walking ability to preoperative status	27	32	.6087
Mean femur shortening, mm	4.3±0.35	5.0±0.38	.7313

### III. Discussion:

By observing of these two surgical devices treatment in intertrochanteric fracture I did not found very big difference in the procedure and complication .Its depend on the surgeon to choose the device in the surgery? Still I think PFNA is used commonly in my hospital [from last three years using only PFNA] because the blood loss was less and it was better to use in osteoporotic patients because its anti rotational blade fixed to the head of femur properly.

Anesthetic agent (fentanyl is a synthetic opioid analgesic, muscle relaxant was rocuronium, midazolam and propofol also was used) was same in both device surgical procedure. But these two devices are better than the dynamic screw.

Strauss et al have mentioned that fixation of head of femur with helical blade was better than standard sliding screw. Similar biomechanical advantage of the blade over screw was reported by Sommers et al,<sup>8</sup> in blade cut out resistance gives better trochanteric fixation.

Shaft fracture at the tip of the nail occurred intra operatively which was treated conservatively with full delayed weight bearing.<sup>2,3,4</sup> After 6 to 8 weeks patient allowed full weight bearing. Lateral migration has seen in both implant proximal screw and blade. But it was more with PFNA than Gamma nail.<sup>2,9</sup> it was because of impaction of fracture.

Pain was most common complication when treating such fracture with intramedullary implant especially in hip and thigh.<sup>2,7</sup> it was because of mismatch of proximal end of PFNA and proximal femur length (short height of Asians).

Most of the fracture showed union within 3 months and about more than 60% of patients achieved same a minimally diminished pre trauma Parker Mobility Score without any correlation to the implant used. We compared this result to the result of retrospective study by Simm ermacher RR et al<sup>9</sup> who observed pre operative mobility 56% to 80% of patients treated with PFNA. It is same for Gamma nail also so overall result was that more than 60% patients came back to their pre operative status.

#### **IV. Conclusion:**

PFNA was as good as gamma nail but PFNA was minimally invasive procedure with minimal post operative complication and better device for osteoporotic patient. So both devices are good in the treatment of the intertrochanteric fracture of the femur.

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