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Comparision of Long and Short Proximal Femoral Nails in Unstable Intertrochanteric Fracture

KEYWORDS

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INTRODUCTION

In elderly, the intertrochanteric fracture is one of the most common fractures of the hip. The rise in the incidence of intertrochanteric fracture is because of the increase in number of elderly population with osteoporosis. These fractures are three to four times more common in women. The low-energy trauma like a simple fall is usually the cause. By the year 2040 the incidence is estimated to be doubled. In India the figures may be much more.

Of these intertrochanteric fractures 50% are unstable. Unstable patterns occur

more commonly in patients with increased age and who has low bone mineral density.2 The presence of osteoporosis in patients with intertrochanteric fractures has a great impact on the outcome since the fixation of proximal fragment depends greatly on the quality of cancellous bone present.

The surgical stabilization of unstable intertrochanteric fractures is a persistent challenge

The current practice of treatment of intertrochanteric fractures are either with a dynamic hip screw for a stable intertrochanteric fractures or a proximal femoral nail for an unstable intertrochanteric fracture. But there is not enough data supporting the use of either a long or a short proximal femoral nail for the treatment of intertrochanteric fractures.

However with long PFN there are advantages of increased stability because of the advantage of splinting the whole length of femur. But there are studies showing the problems with excessive operative time, excessive reaming, difficulty in distal locking with long PFN1. Moreover many a times there is mismatch between the curvature of the nail and the femur2.

AIMS AND OBJECTIVe

The aim of the present study was to

To achieve fracture union by using two different kind of internal fixation modality devices long PFN and short PFN in the management of in similar type of inter trochanteric fractures

MATERIALS AND METHODS

This study is a randomized, time bound, hospital based study conducted in Rajarajeswari Medical College, Bangalore between the periods September 2013 to September 2015. The study included 40 cases of unstable intertrochanteric fractures of the Boyd & Griffin classification – type III and type IV fracture patterns in each group i.e., Group A and Group B. Group A were operated with the short PFN which fitted into the inclusion criteria and Group B patients were operated with long PFN. The study was initiated after an ethical clearance was taken from the committee's ethical clearance committee. All patients were informed about the study in all aspects and an informed consent of the participating patients was obtained.

METHOD OF COLLECTION OF DATA

- By interview
- By clinical and radiological examination
- By analyzing case papers
- By follow up at intervals at 1.5, 3, 4.5 and 6 months.

INCLUSION CRITERIA

- All unstable intertrochanteric fractures based on AO system of classification
- All patients above 50 years of age.

EXCLUSION CRITERIA:

- All patients with any pathological cause for the frac ture
- All young patients
- All patients with multiple limb fractures
- Patients with any contraindications for operative management

MANAGEMENT OF PATIENTS

After the patient with unstable intertrochanteric fracture of the Boyd & Griffin classification – type III and type IV fracture patterns diagnosed by clinical and radiological examination was admitted to hospital the patients were thoroughly evaluated and associated medical illness if present were optimized and the patients who met the predefined criteria, all the necessary clinical details were recorded in the proforma prepared for this study. The patients who were willing for the study were subjected to the following investigations.

- Skin or skeletal traction was applied, till the patient was taken up for surgery.
- Preanaesthetic medical evaluation and stabilization of the patient was begun in consultation with the Anaesthetist and Physician (if necessary).

Blood investigations

- Hemoglobin, Total count, differential count, erythro cyte sedimentation rate, Urine routine
- Liver function tests

Imaging

- Chest x-ray Posterio anterior view
- Standard pre-operative radiographs needed for all pa tients are
- Pelvis with both hips – anteroposterior view

Volume : 6 | Issue : 7 | July 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

- Full length radiograph of femur of the affected limb- AP and Lateral views
- Lateral view of the ipsilateral knee

Standard post-operative radiographs needed for all patients are:

- Pelvis with both hips – anteroposterior view
- Hip lateral view – affected side
- For patients undergoing long PFN fixation - Full length radiograph of femur of the affected limb- AP and Lateral views and lateral view of the knee

Standard Pre-operative work up:

- All patients were classified based on AO system of classification
- Standard preoperative evaluation will be fol lowed with complete assessment by physician and an esthetist .
- Routine institutional protocol were followed for preop erative preparation and surgery
- The patients were taken up for surgery after obtaining written and informed risk consent of the nature and complications of the surgery.
- The operative site (lateral aspect of the thigh) was shaved and prepared with betadine scrub, a day prior to the surgery.
- Xylocaine test dose & tetanus toxoid injections were given preoperatively.
- All patients were started on antibiotics prophylactical ly.
- Randomization was done by double blind method. All patients in group A were treated using a Short Proximal Femoral Nail and group B patients with Long Proximal Femoral Nail.

PREOPERATIVE PLANNING

1)**Determination of neck shaft angle**: Neck shaft angle was measured on the unaffected side on an AP x-ray using a goniometer.

2)**Determination of nail diameter**:Nail diameter was determined by measuring diameter of the proximal femur on an AP x-ray.

3)**Determination of proximal screw sizes**:Approximate sizes of the compression and antirotation screws were measured in the head neck region. A 10-15 mm smaller screw than compression screw was chosen for the Antirotation screw to prevent Z- Effect.

3)**Length of the nail**:A Short PFN nail (180mm) was used in all our cases.

IMPLANT DETAILS

Short Proximal Femoral Nail

A short proximal femoral nail has a length of 180 mm and a proximal diameter of 15 mm. The narrow proximal diameter enables easy insertion and reduces the risk of femoral fracture. Distally, it is available in 9, 10, 11 and 12 mm diameters. The nail has a 6° medio-lateral angle for easy insertion and a flexible distal tip to avoid stress generation and refracture. This nail is available in femoral neck angles of 130 and 135 degrees. It has a 8mm compression screw and a 6.4mm antirotation/stabilizing screw proximal to it. Distally, it has 4.9mm both static and dynamic locking bolts. The nail has a longitudinal slot throughout, so as to accelerate regeneration of the endosteal bone. The nail is made up of 316L stainless steel.Various Indian implant companies manufacture the Short PFN. We used the Short PFN manufactured by Nebula Surgicals which was readily available in our region.

Long Proximal Femoral Nail

Proximal femoral nails that we used had the proximal diameter of 15 mm and length varied from 38 to 42 cm. The nail had proximal 6° mediolateral angle for smooth fit in the trochanter. The radius of curvature was 2.3 mts. The proximal screw inclination angle was of 130 and 135° and the proximal screw had an anteversion angle of 10°.

Intra operative data were recorded.

A third generation Cephalosporin was administered via IV route prior to induction of anaesthesia

Following parameters were recorded intra-operatively:

1. Total time of the surgery
2. Type of reduction : Closed /Joystick / Limited Open
3. Temporary fixation with 2 K wires : Yes/No
4. length of incision
5. Implant details
6. Radiation duration
7. Intra operative complications
8. Quality of reduction.

Standard post-operative :

Post operative data and events were noted.

1. Postoperatively, patient's pulse, blood pressure, respiration, temperature were monitored.
2. Operated limb was elevated for a day.
3. IV fluids were given post surgery till patient started orally.
4. IV third generation Cephalosporin were administered 12 hourly for 3-5 days, and switched over to oral form till the 12th day post-operatively, i.e. until suture removal.
5. Analgesics were given as per patient compliance.
6. Blood transfusion was given depending on the require ment.
7. Suction drainage was removed after 48 hours, if insert ed.
8. Dressing was done on 2nd, 5th and 8th post operative day.
9. Static quadriceps exercises were begun on 2nd post - operative day.
10. Active quadriceps exercises and hip flexion exercises were started on 4th or 5th post operative day.
11. Patient was ambulated non-weight bearing with axillary crutches.
12. Sutures were removed on 12th (alternate) and complete suture removal done on 14th post -operative day.
13. Partial weight bearing was started after reviewing clini cally and radiologically at about 6 weeks post opera tively
14. Full weight bearing allowed after the confirmation of radiological and clinical union.

All patients were accessed in immediate post op,12 days,1 month,3 month,6 month and at 1 year with Harris hip score.

After the completion of the hospital treatment, patients were discharged and called for follow up at outpatient department for serial clinical and radiological evaluation.

PHYSIOTHEAPRY

1. Patients were encouraged to sit in the bed after 24 hours after surgery.
2. Active isometric and isotonic quadriceps exercises were started from day 2.

Volume : 6 | Issue : 7 | July 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

3. Non weight bearing ambulation was started from 2nd week.
4. Partial weight bearing ambulation was started from 6th week.
5. Full weight bearing ambulation was started after radio logical signs of union

Follow up protocol

Patient was called for follow-up every month. On follow up following points were noted :

1. Complaints of pain if any
2. Deformity
3. Shortening
4. Range of hip and knee movements
5. Ability to squat and sit cross legged
6. Walking ability with or without support
7. Whether the patient returns to pre-injury occupation

Radiological assessment for progression and time of union, fracture alignment and implant related complications were analyzed X-Ray pelvis with both hip AP-view and lateral view of operated hip were looked for:

1. Signs of union
2. Neck - shaft angle
3. Failure of fixation
4. Failure of implant
5. Reaction to metal

OPERATIVE TECHNIOUE:

Anaesthesia: Spinal or Epidural Anaesthesia was given to all patients.

Patient positioning: The patient was placed in supine position on a fracture table with the unaffected leg, flexed and abducted as far as possible in order to accommodate the image intensifier. Operative leg was put on traction.

Upper body tilted to unaffected side, for easy insertion of the nail. The image intensifier was positioned so that AP & lateral views of the hip and proximal femur could be taken. The patient was then prepared and draped, as for the standard hip fracture fixation.

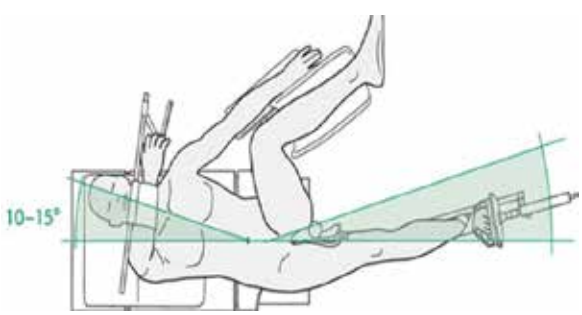


FIG 32: PATIENT POSITIONING FRACTURE REDUCTION

Unstable fracture reduction is a persistent challenge. Closed reduction was achieved by traction and internal rotation primarily, and adduction or abduction as required. In cases where reduction becomes very difficult, Steinman pins were used as joysticks to reduce the fracture percutaneously. Reduction was checked in a C-arm with anterior-posterior and lateral view. Open reduction was rarely done.

Percutaneous fixation of fracture:

In unstable trochanteric fractures, we temporarily fixed the fracture percutaneously using two 2.5 mm K-wires, which pass along the anterior cortex of the proximal femur into the neck and head of femur. By doing so, we can prevent the fracture from opening up on adduction of limb, for easy insertion of the nail. This has two advantages: it keeps the reduction in place (in any position of the limb), and gives direction for insertion of the proximal screws and the position of the jig. In cases where there is posterior sag of distal fragment, the assistant was asked to lift the distal fragment with a towel and then fracture was transfixed with K wires.

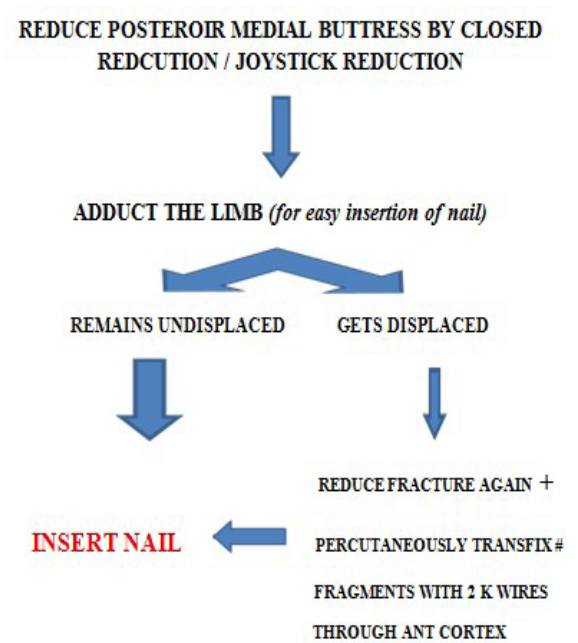


Figure33: REDUCTION PROTOCOL FOR UNSTABLE FRACTURES

APPROACH:

The tip of the greater trochanter was located, by palpation in thin patients and in hefty patients, we used the image intensifier and a 5 cm longitudinal incision was made proximal to the tip of the greater trochanter. An incision was made in the fascia lata and gluteus medius was split in line with the fibres. Tip of the greater trochanter was exposed.

Determination of the entry point and insertion of guide wire:

In AP view on C-arm, the entry point was on the tip of the greater trochanter. In lateral view, guide wire position was confirmed in line with the medullary cavity. Entry was made with a bone awl. A 2.8 mm long guide wire was inserted into the femoral medullary cavity, across the fracture site under C-arm guidance.

Reaming of the proximal femur:

Over the guide wire, a 15 mm cannulated reamer was inserted through the protection sleeve and manual reaming was done till the stopper on the protection sleeve. Protection sleeve was now removed. In osteoporotic bone, extensive reaming may not be required.

Volume : 6 | Issue : 7 | July 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

Insertion of the Short PFN:
After satisfactory fracture reduction, an appropriate size nail as determined pre operatively was assembled to the insertion handle/ Jig. Before insertion of the nail, the drill sleeves for the proximal screws and distal bolts were inserted into the jig and confirmed if they matched with the holes on the nail. Now the nail was inserted manually into the femoral opening with limb in adduction. This step was done by twisting movements of the hand under C-arm guidance until the hole for 8mm screw is at the level of inferior margin of neck. Light blows with the hammer may be done. if needed carefully. If the nail is inserted to the correct depth, proximal tip of nail usually corresponds to tip of greater trochanter.

Insertion of the guide wires for Compression screw and Antirotation screw:
The drill sleeve for the compression screw was first inserted appropriately into the jig and pushed up to the lateral femoral cortex, after making a stab incision. 2mm Guide wires provided for the cannulated proximal screws are not meant to drill hole in the lat cortex. Hole was made in the lat cortex with trocar first, to avoid bending of guide wire. This step prevents a lot of guide wire related complications. It is important that the sleeves rest against bone and not the vastus lateralis muscle. The guide wire was then inserted through the sleeves into the femoral neck and head using image intensification and advanced deeper into the head uptil the subchondral bone.

The final position of this guide wire was in the lower half of the neck in AP view and in the centre in lateral view. If the first guide wire was inserted properly, then second guide wire for antirotation screw was well within the superior border of the neck in AP view. If the guide wire was not correctly positioned, it was removed and the nail position readjusted and guide wire inserted again.

A second drill sleeve for the antirotation screw was inserted proximally, in the same manner. The guide wire was inserted through the drill sleeve above the first one. The tip of second guide wire was advanced slightly shorter till a point where the tips of both guide wires and the proximal tip of the nail lie in one horizontal line. This is very important for proper load sharing of the screws and preventing Z-effect.

Insertion of the Antirotation Screw:
The Antirotation screw was inserted first, to prevent the possible rotation of the medial fragment when inserting the compression screw. Under C-arm guidance drilling was done over the guide wire with 6.4 mm cannulated step drill bit upto a depth of antirotation screw previously measured. Intra operatively, a measuring device can be inserted over the guide wire, until it touches the bone to measure the length. Also the drill bits come with graduations to measure the depth drilled. Tapping was not done as these screws are self tapping. The selected size antirotation Screw was inserted with the help of hexagonal cannulated screwdriver. Length and position was confirmed with C-Arm. Guide wire was then removed.

Insertion of the Compression screw:
The 8mm Compression screw was inserted in the same manner. Reaming was done with the 8 mm cannulated step drill bit. Reaming was done 10- 15 mm short from the desired length in osteoporotic bone. Desired length of the screw was measured in the same way, which should be uptil less than 10 mm from the subchondral bone. Final position was confirmed with image intensifier.

The final tightening of both screws was done in a sequential manner to get a good fixation. The tips of both screws and the proximal tip of the nail should lie in one horizontal line. This is very important for proper load sharing of the proximal screws and preventing Z-effect. Antirotation screw is usually 10- 15 mm shorter than the compression screw.

EVALUATION OF REDUCTION
Evaluation of the reduction was done using the following criteria on the post operative AP & Lat X-ray.

IMAGE GALLERY

Fig 34: INSTRUMENTS AND IMPLANT

SHORT PFN

SHORT PFN WITH JIG & SLEEVES

Volume : 6 | Issue : 7 | July 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

STATISTICAL ANALYSIS

After data collection, data entry was done in Excel worksheet. Data analysis was done with help of SPSS software version 23. Quantitative data was presented with help of Mean, Standard deviation, Median,

Qualitative data was presented with the help of frequency and percentage. Association among various qualitative parameters was done with the help of Pearsons Chi square test. P value less than 0.05 was taken as the level of significance.

RESULTS AND OBSERVATIONS

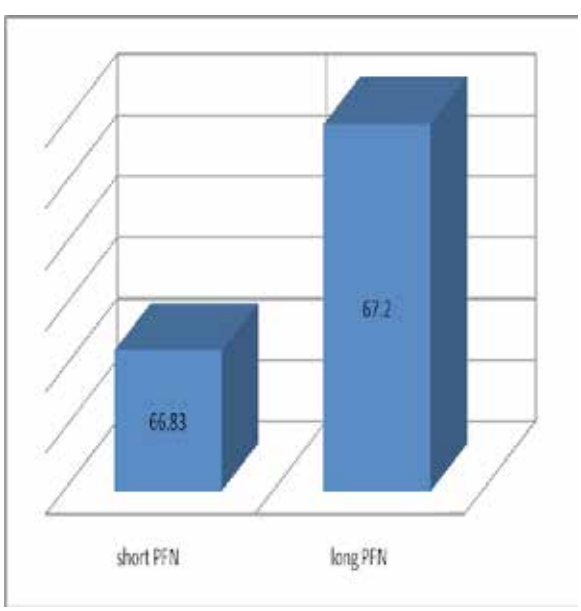
This study is a randomized, time bound, hospital based study conducted in Rajarajeswari Medical College, Bangalore between the periods September 2013 to September 2015. The study included 40 cases of unstable intertrochanteric fractures of the Boyd & Griffin classification – type III and type IV fracture patterns in each group i.e., operated with the short PFN and Group B patients were operated with long PFN

DEMOGRAPHIC DATA

AGE

Group	Mean age in years
Short PFN	66.83
Long PFN	67.2

TABLE : AGE



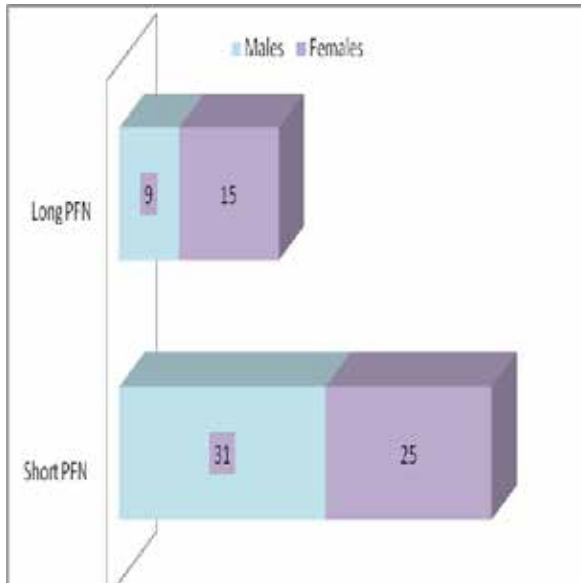
GRAPH :AGE

The mean age in the short PFN group was 66.83 and the long PFN group was 67.20 with a two- P value equals 0.8107 which is not significant reflecting there was no gar bias in the study groups with age as the parameter.

GENDER

Group	Males	Females
Short PFN	31	25
Long PFN	9	15

TABLE : GENDER



GRAPH : GENDER

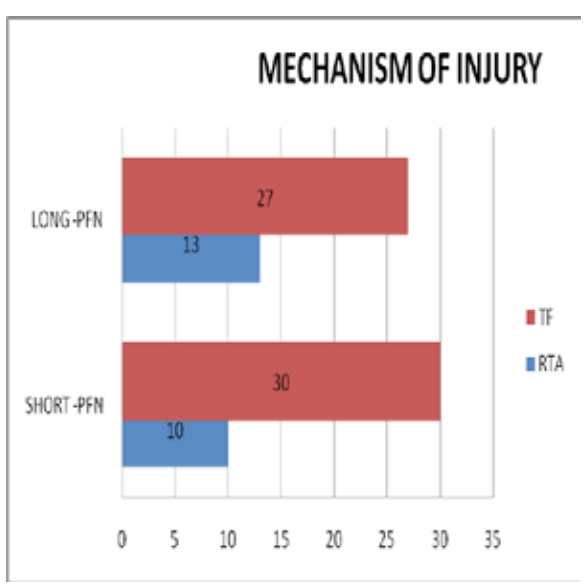
In the our study intertrochanteric fracture was equally in both sexes 40 cases in each gender was no bias in the study groups with gender as the parameter.

CLINICAL DATA

MECHANISM OF INJURY

	LONG - PFN			SHORT -PFN				
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent
RTA	13	32.5	32.5	RTA	10	25	25	25
TF	27	67.5	67.5	TF	30	75	75	100
Total	40	100	100	Total	40	100	100	

TABLE: MECHANISM OF INJURY



GRAPH : MECHANISM OF INJURY

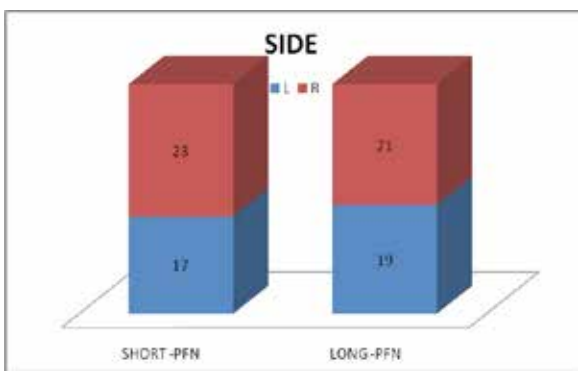
Volume : 6 | Issue : 7 | July 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

In our study the most common cause of inter-trochanteric fracture was a trauma following a fall seen in seen in 57 cases of the 80 cases studied accounting for 71% of the cause of injury

SIDE

	LONG - PFN			SHORT -PFN				
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent
L	19	47.5	47.5	L	17	42.5	42.5	42.5
R	21	52.5	52.5	R	23	57.5	57.5	100
Total	40	100	100	Total	40	100	100	

TABLE : SIDE



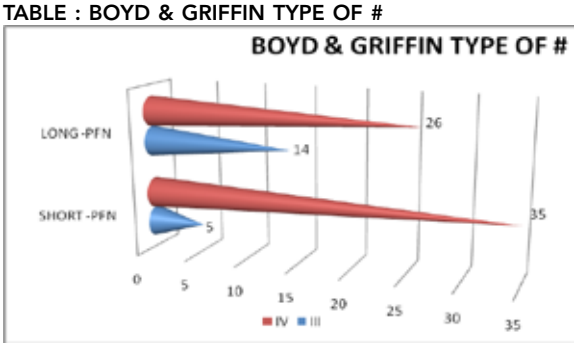
GRAPH : SIDE

In our study the 55% of the cases the fracture was on the right side (44 cases)

BOYD & GRIFFIN TYPE OF #

LONG - PFN				SHORT -PFN			
	Frequency	Percent	Valid Percent	Frequency	Percent	Valid Percent	Cumulative Percent
III	14	35	35	5	12.5	12.5	12.5
IV	26	65	65	35	87.5	87.5	100
Total	40	100	100	40	100	100	

TABLE : BOYD & GRIFFIN TYPE OF #



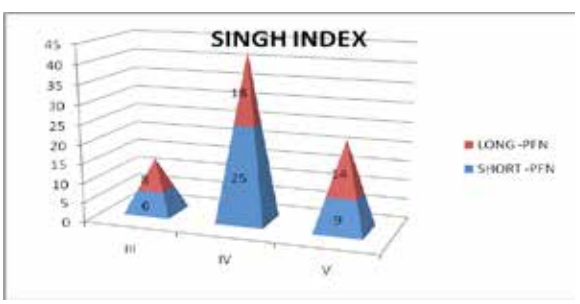
GRAPH : BOYD & GRIFFIN TYPE OF #

In our study we included only type 3 (19cases,34 %)and type 4 fractures (61 cases 76%),

SINGH INDEX

LONG - PFN				SHORT -PFN				
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent
III	8	20	20	III	6	15	15	15
IV	18	45	45	IV	25	62.5	62.5	77.5
V	14	35	35	V	9	22.5	22.5	100
Total	40	100	100	Total	40	100	100	

TABLE : SINGH INDEX



GRAPH : SINGH INDEX

In our study when we evaluated the singh index 6 cases 14% had III, 25cases 43% had IV, 9 cases 23% had V.

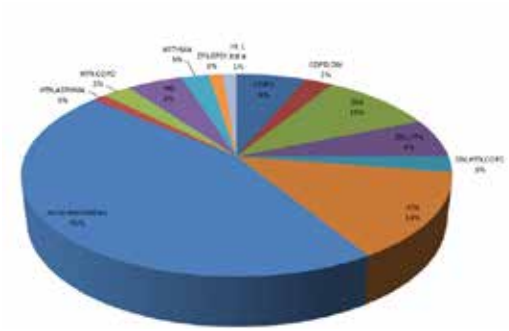
ASSOCIATED DISEASE/ INJURY

LONG - PFN				SHORT -PFN					
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent	
	18	45	45	-	18	45	45	45	
COPD	3	7.5	7.5	ASTHMA	2	5	5	50	
COPD,DM	1	2.5	2.5	COPD	2	5	5	55	
DM	6	15	15	DM	2	5	5	60	
DM,HTN	3	7.5	7.5	DM,COPD	1	2.5	2.5	62.5	
DM,HTN,COPD	2	5	5	DM/HTN	2	5	5	67.5	
HTN	5	12.5	12.5	EPILEPSY	1	2.5	2.5	70	
HTN,ASTHMA	1	2.5	2.5	HI, L RIB #	1	2.5	2.5	72.5	
HTN,COPD	1	2.5	2.5	HTN	6	15	15	87.5	

			100		HTN, COPD	1		2.5	2.5	90	
	40	100	IHD	4		10	10	100			
Total			Total	40		100	100				

associated diseases	Frequency	percentage	
no co-morbidities	36	45	
COPD	5	6	
COPD,DM	2	3	
DM	8	10	
DM,HTN	5	6	
DM,HTN,COPD	2	3	
HTN	11	14	
HTN,ASTHMA	1	1	
HTN,COPD	2	3	
IHD	4	4	
ASTHMA	2	3	
EPILEPSY	1	1	
HI, L RIB #	1	1	
Total	80	100	

TABLE : ASSOCIATED DISEASE/ INJURY



GRAPH: ASSOCIATED DISEASE/ INJURY

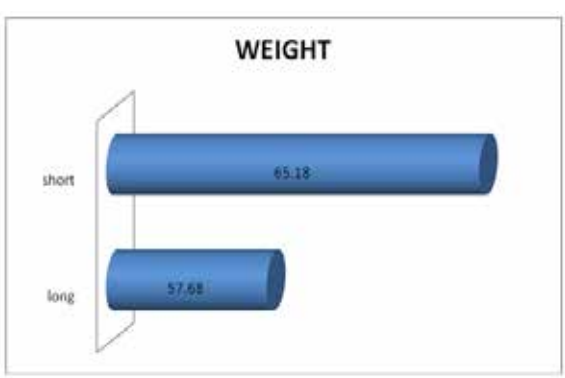
In our study 45% had no morbidities, 17% had more than one associated co-morbidity, the most isolated common morbidity was hypertension seen in 14% followed by diabetes mellitus in 10 %.

WEIGHT

Group	long	short
Mean	57.68	65.18
SD	9.87	7.62
SEM	1.56	1.21
N	40	40

TABLE WEIGHT

GRAPH: WEIGHT



The mean age in the Long and Short PFN group was 57.68kgs and 65.18kgs respectively

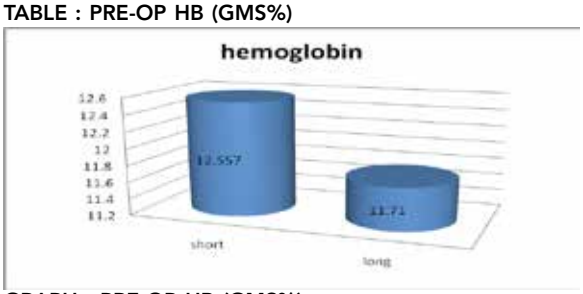
INVESTIGATIONS

PRE-OP HB (GMS %)

The two-tailed P value equals 0.0183

Group	short	long
Mean	12.557	11.710
SD	1.619	1.524
SEM	0.256	0.241
N	40	40

TABLE : PRE-OP HB (GMS%)



GRAPH : PRE-OP HB (GMS%)

PRE-OP PCV (%)

The mean pre-operative hemoglobin was 12.557 in the short PFN group and 11.71 in the long PFN group there was no statistically significant difference with a p value equals 0.0683

INTRA-OPERATTIVE DETAILS

REDUCTION

LONG - PFN				SHORT -PFN				
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent
CR	36	90	90	CR	38	95	95	95
JM	1	2.5	2.5	JM	1	2.5	2.5	97.5
OR	3	7.5	7.5	OR	1	2.5	2.5	100
Total	40	100	100	Total	40	100	100	

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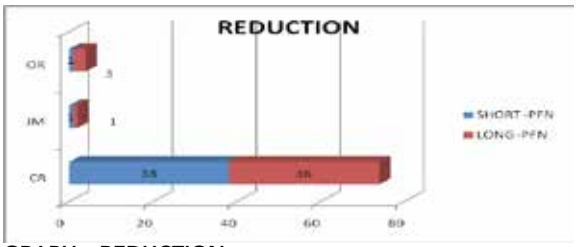
TABLE:REDUCTION



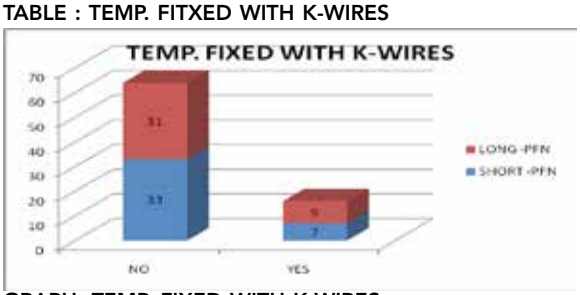
GRAPH : REDUCTION

On evaluation of the type of reduction most patients in both the groups underwent closed reduction 36 cases 90% in the long PFN group 38 cases 95% in the short PFN group followed by open reduction 3cases in the long PFN group 1 cases in the short PFN group.

TEMP. FIXED WITH K-WIRES

LONG - PFN				SHORT -PFN				
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent
NO	31	77.5	77.5	NO	33	82.5	82.5	82.5
YES	9	22.5	22.5	YES	7	17.5	17.5	100
Total	40	100	100	Total	40	100	100	

TABLE : TEMP. FITXED WITH K-WIRES



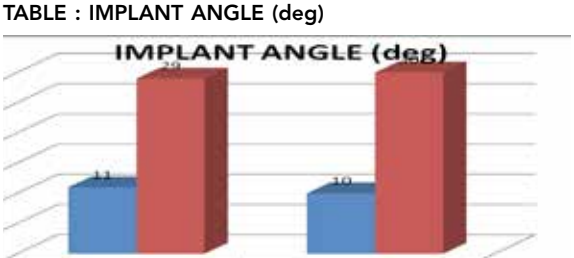
GRAPH: TEMP. FIXED WITH K-WIRES

On evaluation of the need for additional support with k wires most patients in both the groups underwent closed reduction 22.5% in the long PFN group 17% in the short PFN group needed K- wires .

IMPLANT ANGLE (deg)

LONG - PFN				SHORT -PFN				
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent
130	10	25	25	130	11	27.5	27.5	27.5
135	30	75	75	135	29	72.5	72.5	100
Total	40	100	100	Total	40	100	100	

TABLE : IMPLANT ANGLE (deg)



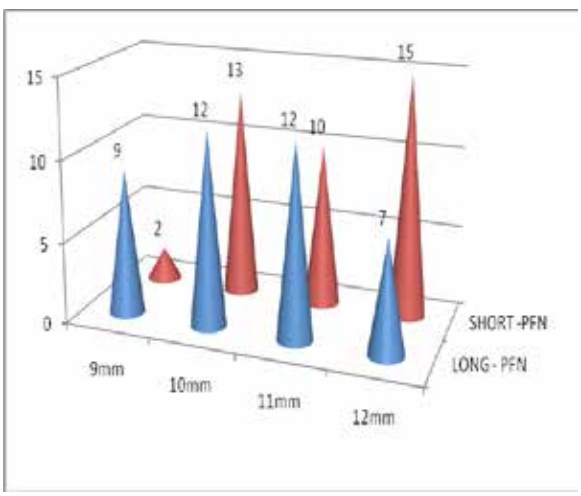
GRAPH : IMPLANT ANGLE (deg)

The mean implant angle in the long PFN group was 133.75 degrees' and the short PFN group was 133.63 degrees. The two-tailed P value equals 0.802 not statistically significant

NAIL DIAMETER (mm)

	LONG - PFN			SHORT -PFN				
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent
9	9	22.5	22.5	10	13	32.5	32.5	32.5
10	12	30	30	11	10	25	25	57.5
11	12	30	30	12	15	37.5	37.5	95
12	7	17.5	17.5	9	2	5	5	100
Total	40	100	100	Total	40	100	100	

TABLE : NAIL DIAMETER (mm)



G5RAPH: NAIL DIAMETER (mm)

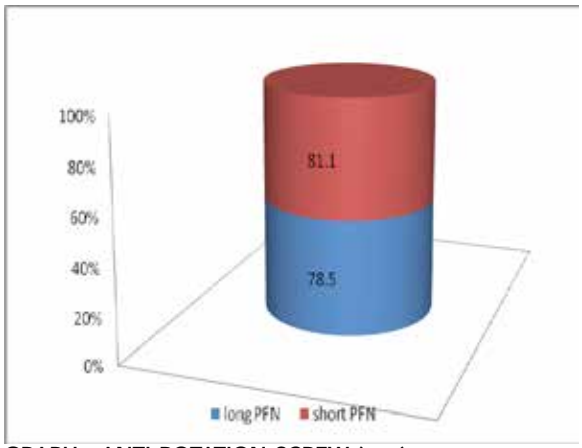
The mean nail diameter in the long PFN group was 10.44mm and the short PFN group was 10.95mm. The two-tailed P value equals 0.0255 not statistically significant

ANTI ROTATION SCREW (mm)

LONG - PFN				SHORT -PFN				
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent
65	1	2.5	2.5	100	1	2.5	2.5	2.5
70	7	17.5	17.5	65	3	7.5	7.5	10
75	10	25	25	70	3	7.5	7.5	17.5
80	10	25	25	75	5	12.5	12.5	30
85	11	27.5	27.5	80	10	25	25	55
100	1	2.5	2.5	85	13	32.5	32.5	87.5
Total	40	100	100	89	1	2.5	2.5	90
				90	2	5	5	95
				95	2	5	5	100
				Total	40	100	100	

Volume : 6 | Issue : 7 | July 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

TABLE : ANTI ROTATION SCREW (mm)



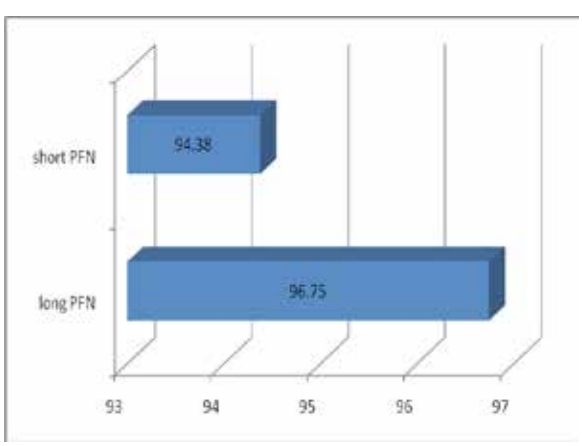
GRAPH : ANTI ROTATION SCREW (mm)

The mean anti rotation screw width in the long PFN group was 78.50 mm and the short PFN group was 81.10 mm. The two-tailed P value equals 0.1200 not statistically significant

COMPRESSION SCREW (mm)

	LONG - PFN			SHORT -PFN				
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent
85	1	2.5	2.5	100	10	25	25	25
90	9	22.5	22.5	105	5	12.5	12.5	37.5
95	13	32.5	32.5	110	1	2.5	2.5	40
100	11	27.5	27.5	80	3	7.5	7.5	47.5
105	4	10	10	85	6	15	15	62.5
110	2	5	5	90	7	17.5	17.5	80
Total	40	100	100	95	8	20	20	100
				Total	40	100	100	

TABLE : COMPRESSION SCREW (mm)



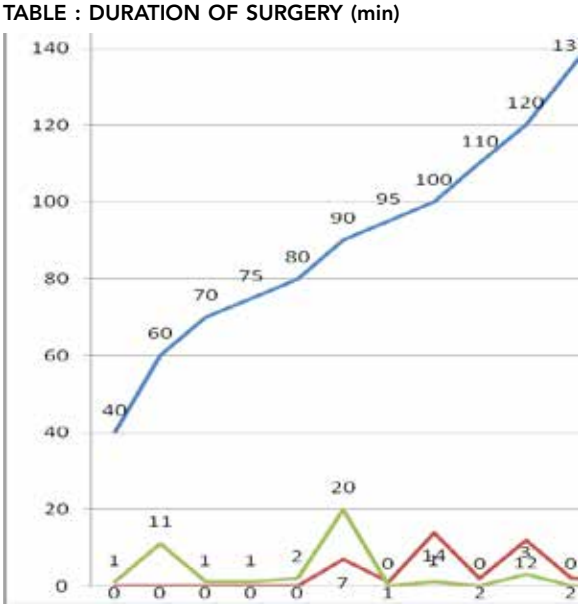
GRAPH : COMPRESSION SCREW (mm)

The compression screw width in the long PFN group was 96.75 mm and the short PFN group was 94.38 mm. The two-tailed P value equals 0.1289 not statistically significant

DURATION OF SURGERY (min)

	LONG - PFN			SHORT -PFN				
	Frequency	Percent	Valid Percent		Frequency	Percent	Valid Percent	Cumulative Percent
90	7	17.5	17.5	100	1	2.5	2.5	2.5
95	1	2.5	2.5	120	3	7.5	7.5	10
100	14	35	35	40	1	2.5	2.5	12.5
110	2	5	5	60	11	27.5	27.5	40
120	12	30	30	70	1	2.5	2.5	42.5
135	2	5	5	75	1	2.5	2.5	45
150	2	5	5	80	2	5	5	50
Total	40	100	100	90	20	50	50	100
				Total	40	100	100	

TABLE : DURATION OF SURGERY (min)



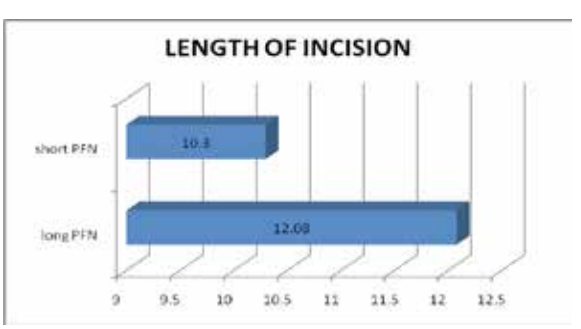
GRAPH : DURATION OF SURGERY (min)

The mean duration of surgery in the long PFN group was 108.88minutes and the short PFN group was 81.63 minutes .The two-tailed P value equals 0.0001 this difference is considered to be extremely statistically significant.

LENGTH OF INCISION (CM)

group	LENGTH OF INCISION
long PFN	12.08
short PFN	10.3

TABLE : LENGTH OF INCISION (CM)

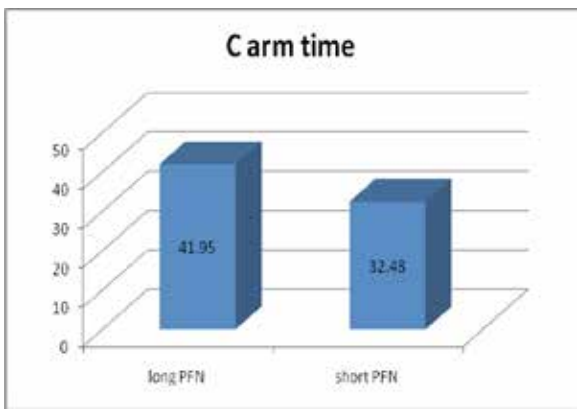


Volume : 6 | Issue : 7 | July 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

GRAPH : LENGTH OF INCISION (CM)

The length of incision in the long PFN group was 12.08 cms and the short PFN group 10.03cms was.The two-tailed P value equals 0.0001 this difference is considered to be extremely statistically significant.

C arm time (sec)
TABLE : C arm time (sec)



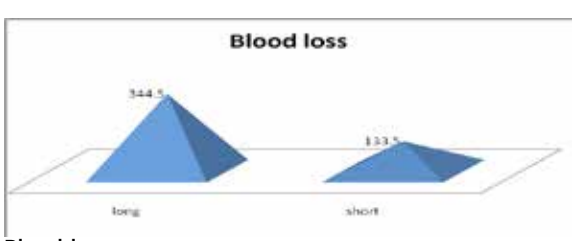
GRAPH : C arm time (sec)

The C-arm time in the long PFN group was 41.95 minutes and the short PFN group was 32.48 minutes .The two-tailed P value equals 0.0001 this difference is considered to be extremely statistically significant.

Blood loss

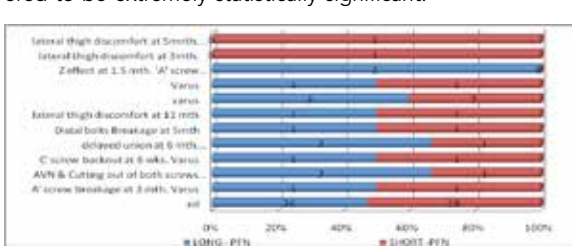
Group	long	short
Mean	344.5	133.5
SD	70.93	42.46
SEM	11.21	6.71
N	40	40

Blood loss



Blood loss

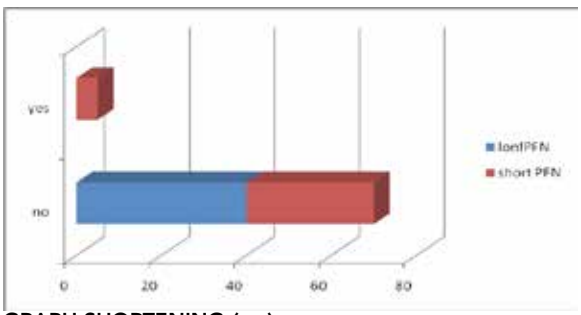
The mean intraoperative blood loss in the long PFN group was 344.5 ml and the short PFN group was 133.5 ml. The two-tailed P value equals 0.0001 this difference is considered to be extremely statistically significant.



s

GRAPH : POST OPERATIVE COMPLICATION
The postoperative complication in the short PFN group was significantly lesser than the long PFN group .

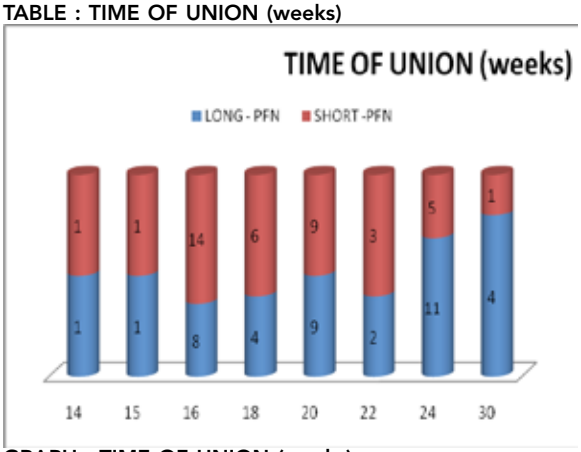
STTTHORTENING (cm)



GRAPH:SHORTENING (cm)

The number of cases with limb shortening were more in the Short PFN group than the patients in whom long PFN was used

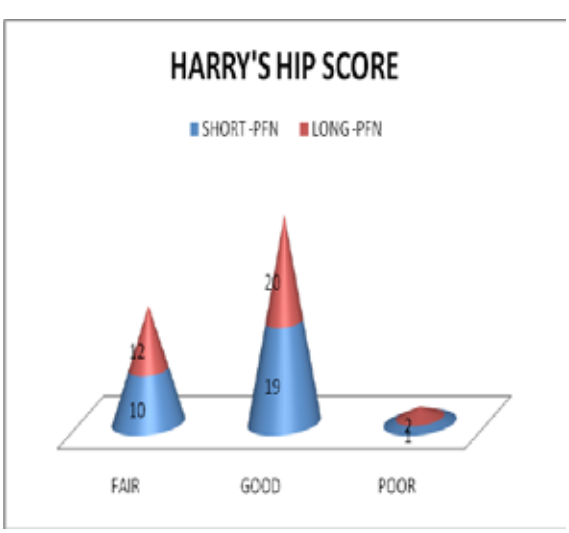
TABLE : TIME OF UNION (weeks)



GRAPH : TIME OF UNION (weeks)

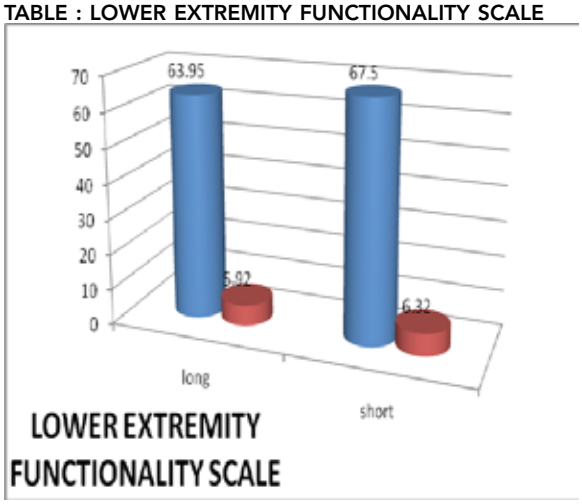
The mean time of union in the short PFN group was 10.05 weeks and the long PFN group was 21.10 weeks. The two-tailed P value equals 0.0217 by conventional criteria; this difference is considered to be statistically significant.

HARRY'S HIP SCORE



Volume : 6 | Issue : 7 | July 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

TABLE : LOWER EXTREMITY FUNCTIONALITY SCALE



GRAPH : LOWER EXTREMITY FUNCTIONALITY SCALE

The mean lower extremity functionality scale in the short PFN group was 63.95 and the long PFN group was 67.50 The two-tailed P value equals 0.0114 statistically significant.

DISCUSSION

Fractures of intertrochanteric femur have been recognized as a major challenge by the Orthopaedic community, not solely for achieving fractures union, but for restoration of optimal function in the shortest possible time that to with minimal complications. The aim of management accordingly has drifted to achieving early mobilization, rapid rehabilitation and quick return of individuals to premorbid home and work environment as a functionally and psychologically independent unit. Operative treatment in the form of internal fixation permits early rehabilitation and offers the best chance of functional recovery, and hence has become the treatment of choice for virtually all fractures in the trochanteric region. Amongst the various types of implants available i.e. fixed nail plate devices, sliding nail/screw plate and intramedullary devices, the compression hip screw is most commonly used(still remains the gold standard) but recently techniques of closed intramedullary nailing have gained popularity.

Now PFN has evolved into use more largely.It comes in longer and shorter versions , practically no comparison in the use of long and short PFN has been made so far, in any evidence based studies. So it was lead to a dilemma whether to use long or short PFN in the treatment of unstable intertrochanteric fractures

In this study an attempt was made to survey, evaluate, document and quantify our success in the management of such individuals by using long and short Proximal femoral nail

Age relation to intertrochanteric region

The mean age in the short PFN group was 66.83 and the long PFN group was 67.20 with a two- P value equals 0.8107 which is not significant reflecting there was no gar bias in the study groups with age as the parameter.

The reason why intertrochanteric region is the most common site fracture is probably due tensile osteoporosis as the age advances. Hip joint being a major joint n the mechanism of weight bearing, this already weakened part cannot withstand any sudden abnormal stress. The space between bony trabeculae is enlarged and loaded with fat, whilst ensheathing compact tissue is thinned out and calcar is atrophied.

CONCLUSION

In our results it was evident that the use of short PFN has a number of advantages over the long PFN in terms of the mean duration of surgery, C-arm time, length of incision, intraoperative blood loss, intraoperative complication, postoperative complication, mean time of union being lesser and better scores in terms of the quality of reduction and lower extremity functionality scale.

The short proximal femoral nail reduces stress concentration at the tip and the smaller distal shaft diameter may prevent femoral shaft fractures. It also acts as a buttress to prevent medialisation of the shaft and provides more efficient load transfer than does a sliding hip screw. It is a superior implant for stable and unstable intertrochanteric fractures in terms of operating time, surgical exposure, blood loss, and complication rates.

The only disadvantage of the short PFN was that the numbers of cases with limb shortening were more in the Short PFN group than the patients in whom long PFN was used.

The limitation and suggestions

The short duration of the study is the major drawback of this study and larger studies are needed for validation

SUMMARY

This study is a randomized, time bound, hospital based study conducted in Rajarajeswari Medical College, Bangalore between the periods September 2013 to September 2015. The study included 40 cases of unstable intertrochanteric fractures of the Boyd & Griffin classification – type III and type IV fracture patterns in each operated with the short PFN which fitted into the inclusion criteria and Group B patients were operated with long PFN after an ethical clearance was taken from the committee's ethical clearance committee and an informed consent of the participating patients was obtained.

- In our study the most common cause of inter-trochan teric fracture was a trauma following a fall seen in seen in 57 cases of the 80 cases studied accounting for 71% of the cause of injury
- In our study we included only type 3 (19cases,34 %) and type 4 fractures (61 cases 76%),
- The Singh index 6 cases 14% had III, 25cases 43% had IV, 9 cases 23% had V.
- In our study 45% had no morbidities, 17% had more than one associated co-morbidity, the most isolated common morbidity was hypertension seen in 14% fol lowed by diabetes mellitus in 10 %.
- The mean weight in the Long and Short PFN group was 57.68kgs and 65.18kgs respectively
- The mean pre-operative hemoglobin was 12.557 in the short PFN group and 11.71 in the long PFN group there was no statistically significant difference with a p value equals 0.0683
- n evaluation of the type of reduction most patients in both the groups underwent closed reduction 36 cases 90% in the long PFN group 38 cases 95% in the short PFN group followed by open reduction 3cases in the long PFN group 1 cases in the short PFN group.

Volume : 6 | Issue : 7 | July 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

Reference

1. Ritchie C. "Medicine and Man." (1958).54.
2. Littré, Emile. "Corpus Hippocraticum." Corpus Hippocraticum (1839).
3. Drucker, C. B. (2008). Surgery Issue: AmbroiseParé and the Birth of the Gentle Art of Surgery. The Yale journal of biology and medicine, 81(4), 199.
4. Dahl HK. Surgical treatment of femoral neck fractures. The 100-year an niversary. Tidsskrift for den Norske laegeforening: tidsskrift for praktisk medicin, ny raekke,.1994; 114(30):3600-3603.
5. HARTY, M. (1957). The calcarfemorale and the femoral neck. The Jour nal of Bone & Joint Surgery, 39(3), 625-630.
6. Liechti, R., &Liechti, R. (1978). Anatomy of the Hip Joint. Hip Arthrode sis and Associated Problems, 8-11.
7. Garden, R. S. (1961). The structure and function of the proximal end of the femur. Journal of Bone & Joint Surgery, British Volume, 43(3), 576-589.
8. M. Singh, A. R. Nagrath, P. S. Maini, 1970Changes in Trabecular Pattern of the Upper end of the Femur as an index of osteoporosis, The Journal of Bone and Joint Surgery, 52457467
9. Hollinshead WH. Anatomy for surgeons. Vol. 3. The back and the limbs. First ed. London, etc: Cassell and Company Ltd, 1958:733-40.
10. Netter, Frank H. "Atlas of Human Anatomy", 2nd Edition, Icon Learning Systems, 2001.
11. Sevitt S, Thompson RG. The distribution and anastomoses of arter ies supplying the head and neck of the femur. J Bone Joint Surg [Br] 1965;47-B:560-73.
12. Bruce J, Walmsley R, Ross JA. Manual of surgical anatomy.Edinburgh: Churchill-Livingstone, 1964:467.
13. Birnbaum, K., Prescher, A., Hepler, S., & Heller, K. D. (1998). The sen sory innervation of the hip joint-an anatomical study. Surgical and Ra diologic Anatomy, 19(6), 371-375.
14. Byrne, D. P., Mulhall, K. J., & Baker, J. F. (2010). Anatomy & biomechan ics of the hip. Open Sports Medicine Journal, 4(1), 51-57.
15. Johnston, J. D., Noble, P. C., Hurwitz, D. E., &Andriacchi, T. P. (2007). Biomechanics of the hip. The adult hip, 1, 81-90.
16. Bergmann, G., Deuretzbacher, G., Heller, M., Graichen, F., Rohlmann, A., Strauss, J., &Duda, G. N. (2001). Hip contact forces and gait pat terns from routine activities. Journal of biomechanics, 34(7), 859-871.
17. Greenwald, A. S., & Haynes, D. W. (1972). Weight-bearing areas in the human hip joint. J Bone Joint Surg Br, 54(1), 157-63.
18. Martin RB, Burr DB, Sharkey NA. 'Skeletal tissue mechanics'. New York: Springer 1998; p. 392.
19. Rydell NW. Forces acting on the femoral head-prosthesis. A study on strain gauge supplied prostheses in living persons. ActaOrthopScand 1966; 37(Suppl 88): 1-132.
20. Lecerf, G., Fessy, M. H., Philippot, R., Massin, P., Giraud, F., Flecher, X., ...&Stindel, E. (2009). Femoral offset: anatomical concept, definition, as sessment, implications for preoperative templating and hip arthroplasty. Orthopaedics& Traumatology: Surgery & Research, 95(3), 210-219.