IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 3 Ver.11 March. (2018), PP 85-97
www.iosrjournals.org

Clinical and Functional Outcome between Proximal Femoral Nailing and Cemented Hemiarthroplasty in the Management of Elderly Patients with Intertrochanteric Fractures – A Comparative Study

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Keywords: Proximal Femoral Nailing(PFN), Bipolar Hemiarthroplasty, Harris Hip Score(HHS)

Date of Submission: 06-03-2018 Date of acceptance: 26-03-2018

I. Introduction

Inter-trochanteric fractures are a major cause of morbidity and mortality in elderly population. They contribute upto 45% of all hip fractures[1]. Unstable inter-trochanteric fractures in elderly age group are associated with high rates of morbidity and mortality[2]. Lately the results have improved with internal fixation and early mobilisation. However fracture comminution, osteoporosis and instability often prevent full weight bearing early[3]. Both direct and indirect forces result in these fractures following fall. Koval[4] and Zukerman postulated that Intertrochanteric fractures constitute almost 50% of fractures of the proximal femur. Direct forces act along the axis of the femur or directly over greater trochanter. Indirect forces include pull of the Ilio-psoas muscle on the lesser trochanter and pull of the abductor muscle on the greater trochanter region. Intertrochanteric fractures is often seen in patients over 60 years of age. They are three times more frequent in women than men due to postmenopausal osteoporosis. Before the development of internal fixation devices, treatment was nonoperative, consisting of prolonged bed rest with traction until fracture healed (usually 10 to 12 weeks), followed by lengthy rehabilitation. In elderly patients, this was associated with high complication rates which include decubitus ulcer, urinary tract infection, joint contractures, pneumonia, atelectasis, malunion and thromboembolic complications. In addition, fracture healing was generally accompanied by varus deformity and shortening because of the inability of traction to effectively counteract the deforming muscular forces. Surgery is important in elderly intertrochanteric fractures to prevent these complications.

II. Aim Of The Study

To compare the clinical and functional outcome of intertrochanteric fractures in elderly patients treated with proximal femoral nail and cemented hemiarthroplasty

III. Materials And Methods

- A prospective comparative study
- 40 elderly patients were included in the study
- Patients operated with PFN were alloted Group A and Bipolar prosthesis Group B
- 20 patients were allotted in each group randomly

INCLUSION CRITERIA

1. Patients more than 60 years of age
2. Comminuted intertrochanteric fractures
3. Type3 and type 4 fractures under Boyd and Griffith classification
4. Closed fractures
5. Fracture within 3 weeks of injury

EXCLUSION CRITERIA:

1. Patients less than 60 years of age
2. Seriously ill patients and patients not fit for surgery
3. Pathological fractures

4. Compound fractures and polytrauma
5. Previous implant failure
6. Associated Neurovascular injuries

Preoperative Assessment:

- Detailed history after admission
- Mode of injury and associated medical illness
- Clinical evaluation and assessment
- X ray involved hip – AP and Traction internal rotation view

Anaesthetic Assessment:

The American society of Anesthesiologists(ASA)score was calculated as under

I. A normal healthy patient
II. Patient with mild systemic disease
III. Patient with severe systemic disease
IV. Patient with severe systemic disease that is a constant threat to life
V. Moribund patient who is not expected to survive without operation

OUTCOME: Fair-Harris hip score between 70 and 80
Good-Harris hip score between 80 and 90
Excellent-Harris hip score 90 and above

HARRISHIPSCORE

APPENDIX 1

Harris Hip assessment tool

I. Pain (44 possible)

A) None or ignores it 44
B) Slight, occasional, no compromise in activities 40
C) Mild pain, no effect on common activities, rarely moderate pain with unusual activity, may take simple pain medication 30
D) Moderate pain, tolerable, accepts limitations caused by pain. Some limitation of common activities or work. Occasionally takes pain medication stronger than aspirin 20
E) Pronounced, serious limitation of activities 10
F) Totally disabled, crippled, pain in bed, bedridden 0

II. Function (47 possible)

A. Gait (33possible)

1. Limp
a) None11
b) Slight 8
c) Moderate 5
d) Severe 0

2. Support
a) None 11
b) Cane for long walks 7
c) Cane most of the time 5
d) One crutch 3
e) Two canes 2
f) Two crutches 0
g) Not able to walk 0
(specify reason:_____)

3. Distance walked
a. Unlimited 11
b. 6 blocks 8
c. 2-3 blocks 5
d. Indoors only 2
e. Bed and chair 0

B. Activities (14 possible)

1. Stairs
a) Normally without using a railing 4
b) Normally using a railing 2
c) In any manner 1
d) Unable to do stairs 0

2. Shoes and socks
a) With ease 4
b) With difficulty 2
c) Unable 0

3. Sitting
a) Comfortably in ordinary chair one hour 5
b) On a high chair for one half hour 3
c) Unable to sit comfortably in any chair 0

4. Enter public transportation 1

III Absence of deformity points (4) are given if the patient demonstrates:

A) Less than 30° fixed flexion contracture
B) Less than 10° fixed adduction
C) Less than 10° fixed internal rotation in extension
D) Limb length discrepancy less than 3.2 centimeters

IV. Range of motion (index values are determined by multiplying the degrees of motion possible in each arc by the appropriate index)

A. Flexion
0—45 degrees X 1.0
45—90° X 0.6
90—110° X 0.3

B. Abduction
0—15° X 0.8
15—20° X 0.3
over 20° X 0

C. External rotation in extension
0—15 X 0.4
over 15° X 0

D. Internal rotation in extension
any X 0

E. Adduction
0—15° X 0.2

To determine the overall rating for range of motion, multiply the sum of the index values X 0.05. Record Trendelenburg test as positive, level or neutral.

IV. Results

TABLE - 4.1: AGE DISTRIBUTION

AGE(YEARS)	PFN	BIPOLAR	TOTAL
60-65YEARS	9	10	19
66-70	5	5	9
71-75	1	2	3
76-80	3	1	4
81-85	2	2	4
TOTAL	20	20	40

GRAPH 1: AGE DISTRIBUTION

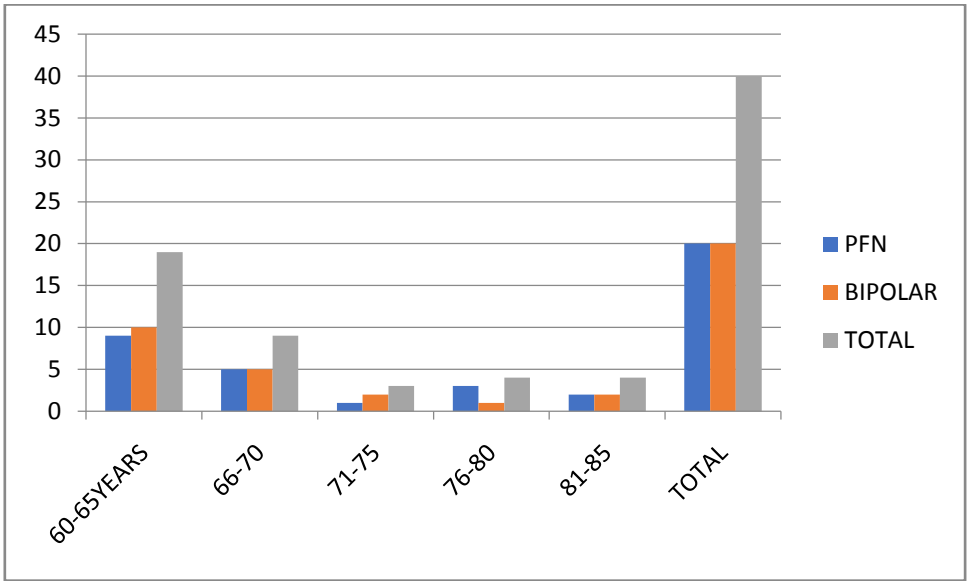


TABLE – 4.2: SEX DISTRIBUTION

SEX	PFN	BIPOLAR	TOTAL
MALE	12	9	21
FEMALE	8	11	19
TOTAL	20	20	40

GRAPH-2: SEX DISTRIBUTION

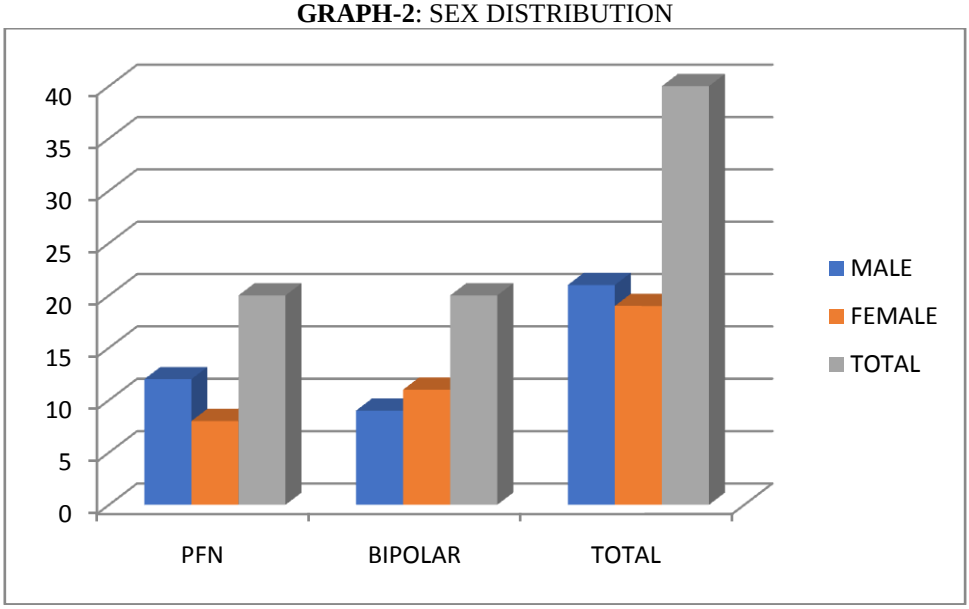


TABLE – 4.3: MODE OF INJURY

MODE	PFN	BIPOLAR	TOTAL
RTA	6	3	9
TF	14	17	31
TOTAL	20	20	40

GRAPH 3: MODE OF INJURY

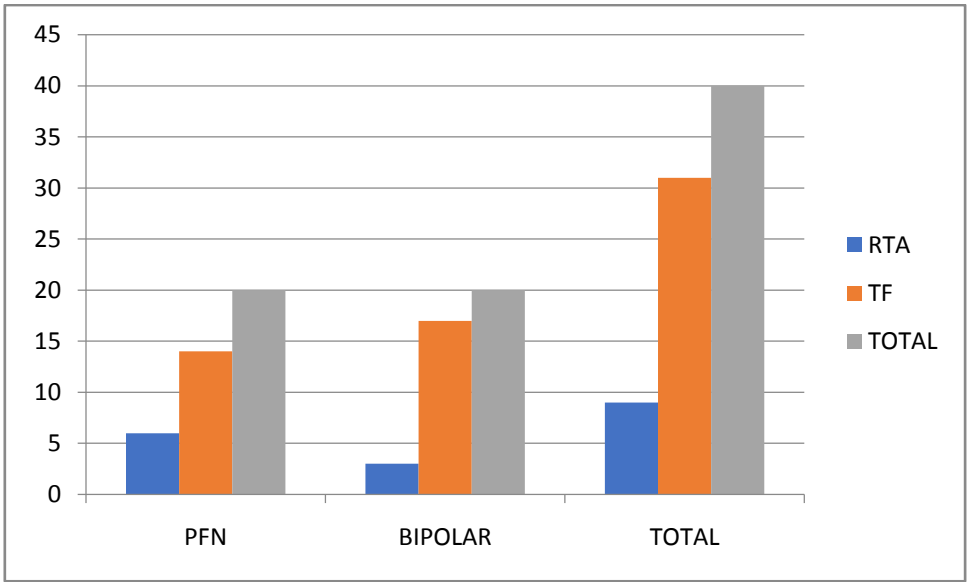


TABLE – 4.4: TYPE OF FRACTURE WITH METHOD OF FIXATION

TYPE	PFN	BIPOLAR	TOTAL
T3	11(55%)	12(60%)	23(58%)
T4	9(45%)	8(40%)	17(42%)
TOTAL	20(100%)	20(100%)	40(100%)

GRAPH 4: TYPE OF FRACTURE WITH METHOD OF FIXATION

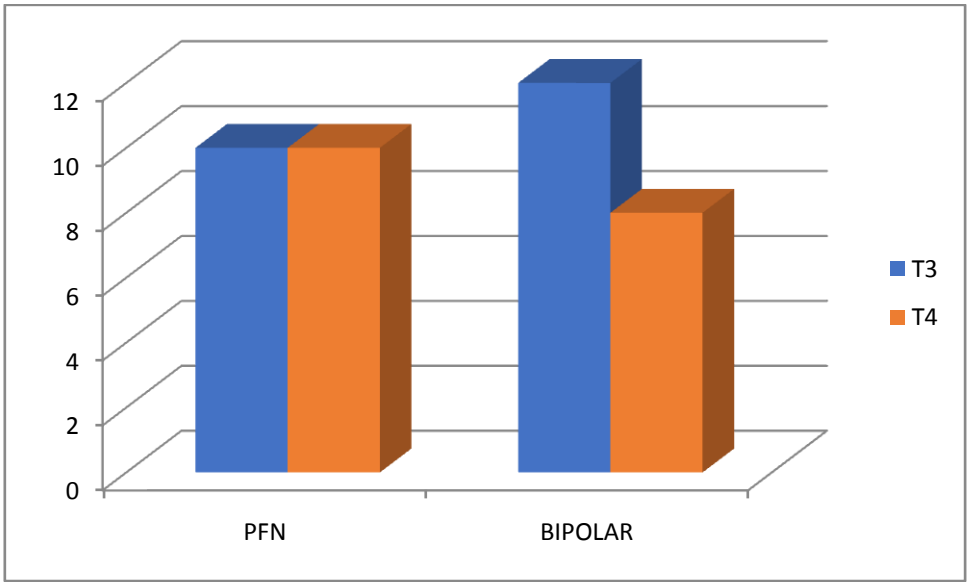


TABLE – 4.5: POST-OPERATIVE COMPLICATIONS

POST OPERATIVE COMPLICATIONS	PFN	BIPOLAR	TOTAL
WOUND INFECTION	2	3	5
SCREW BACKOUT	2	0	2

GRAPH - 5: POST OPERATIVE COMPLICATIONS

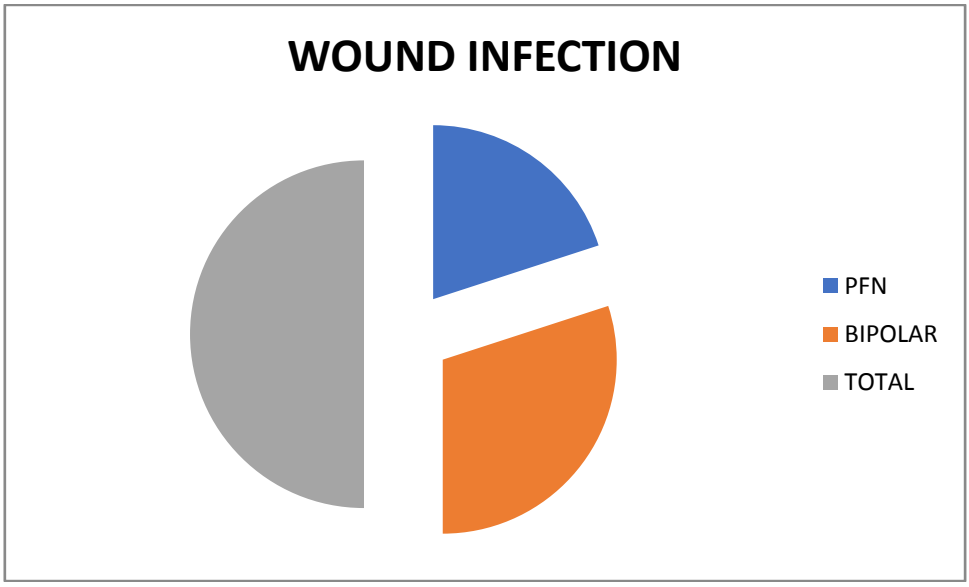


TABLE – 4.6: POSTOPERATIVE PAIN

POST OPERATIVE PAIN	PFN	BIPOLAR	TOTAL
1	4(20%)	4(20%)	8(20%)
2	10(50%)	10(50%)	20(50%)
3	6(30%)	6(30%)	12(30%)
TOTAL	20(100%)	20(100%)	40(100%)

1-NO PAIN
2-MILD PAIN NOT AFFECTING AMBULATION
3-MODERATE PAIN AFFECTING AMBULATION REQUIRES ANALGESICS
4-SEVERE PAIN,EVEN AT REST,REQUIRES STRONGER ANALGESICS

GRAPH - 6: POST OPERATIVE PAIN

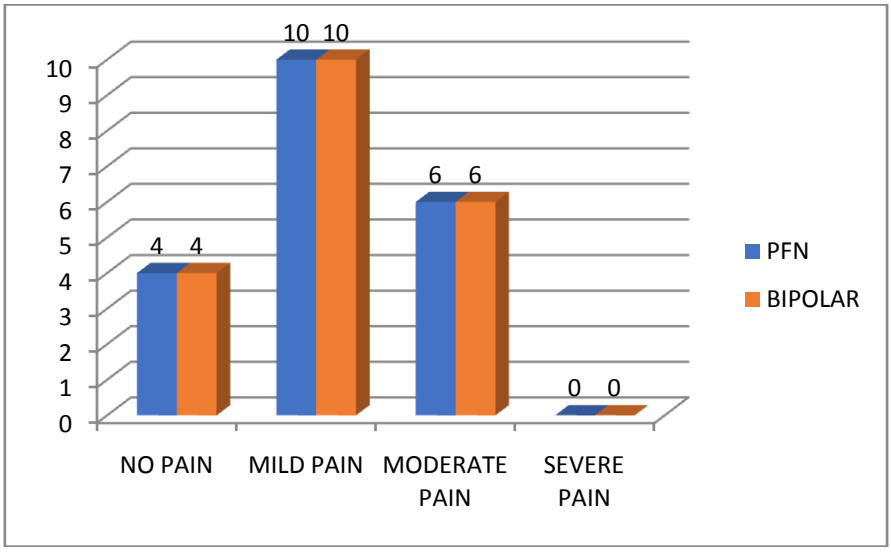


TABLE – 4.7: POST OPERATIVE MOBILITY SCORE

METHOD		MEAN+SD	TOTAL
PFN	PRE-OPERATIVE	1.26+/-0.31	20
	POST OPERATIVE	1.63+/-0.65	
BIPOLAR	PRE OPERATIVE	1.05+/-0.23	20
	POST OPERATIVE	2.38+/-0.70	

GRAPH 7 - POSTOPERATIVE MOBILITY SCORE

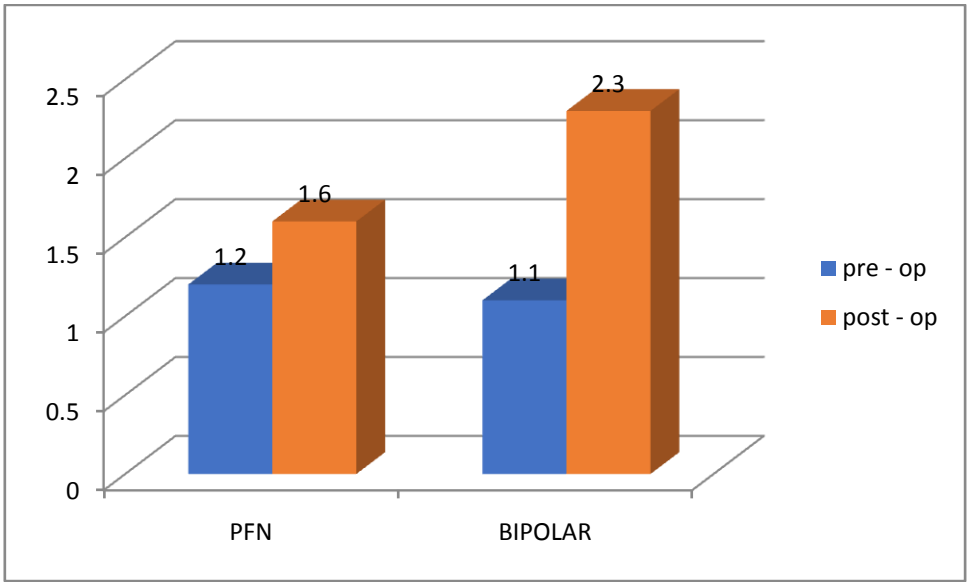


TABLE – 4.8: POST-OPERATIVE SHORTENING

METHOD	MEAN+SD	TOTAL
PFN	1.23+/-0.67	20
BIPOLAR	0.5+/-0.43	20

GRAPH - 8: POST-OPERATIVE SHORTENING

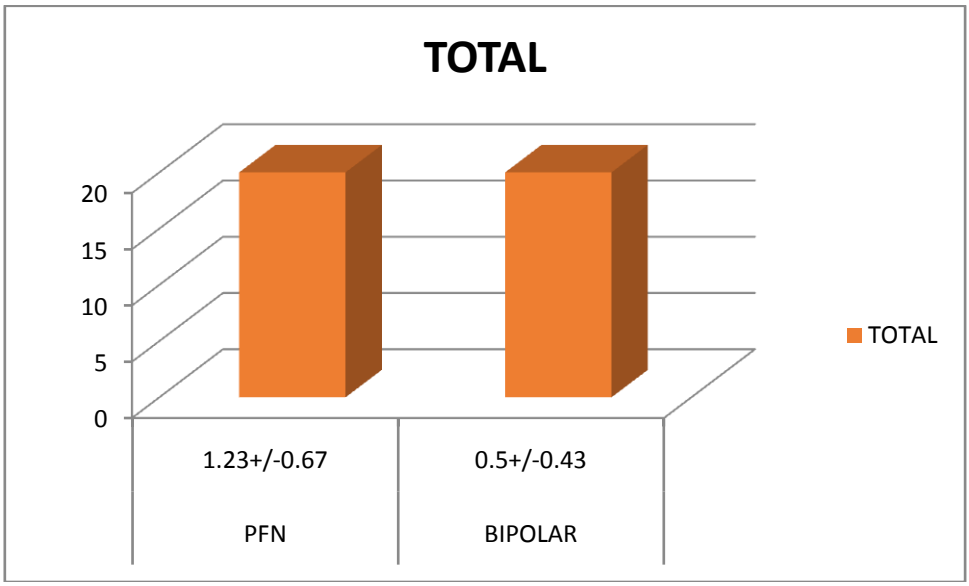


TABLE – 4.9: POST OPERATIVE ROM

METHOD	ROM MEAN+SD	TOTAL
PFN	110+/-8.74	20
BIPOLAR	90+/-4.51	20

GRAPH - 9: POST-OPERATIVE ROM

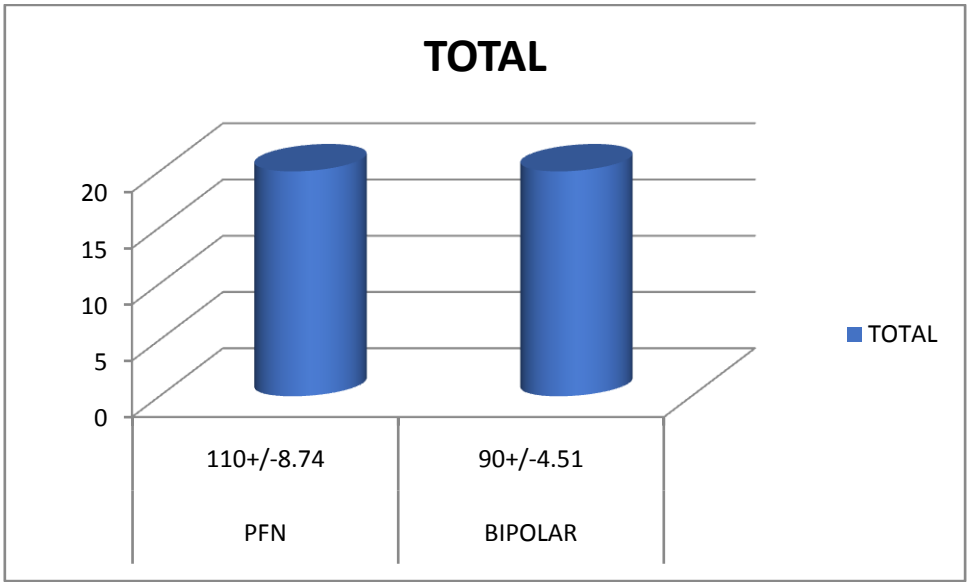


TABLE – 4.10: FUNCTIONAL OUTCOME VS TYPE OF FRACTURE: PFN

OUTCOME	TYPE OF FRACTURE		TOTAL
	T3	T4	
EXCELLENT	3	1	4
GOOD	4	3	8
FAIR	4	4	8
TOTAL	10	10	20

GRAPH 10: FUNCTIONAL OUTCOME VS TYPE OF FRACTURE: PFN

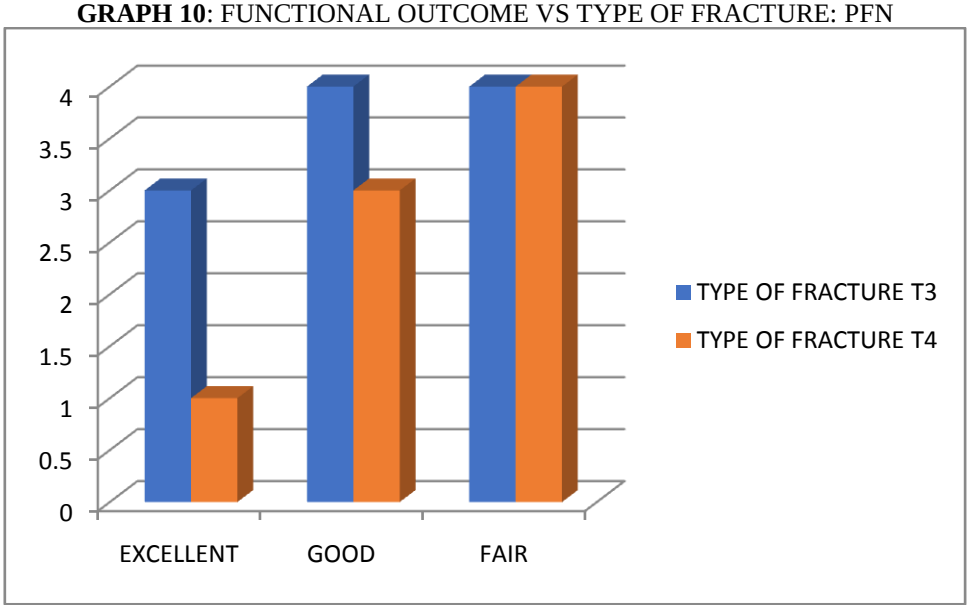
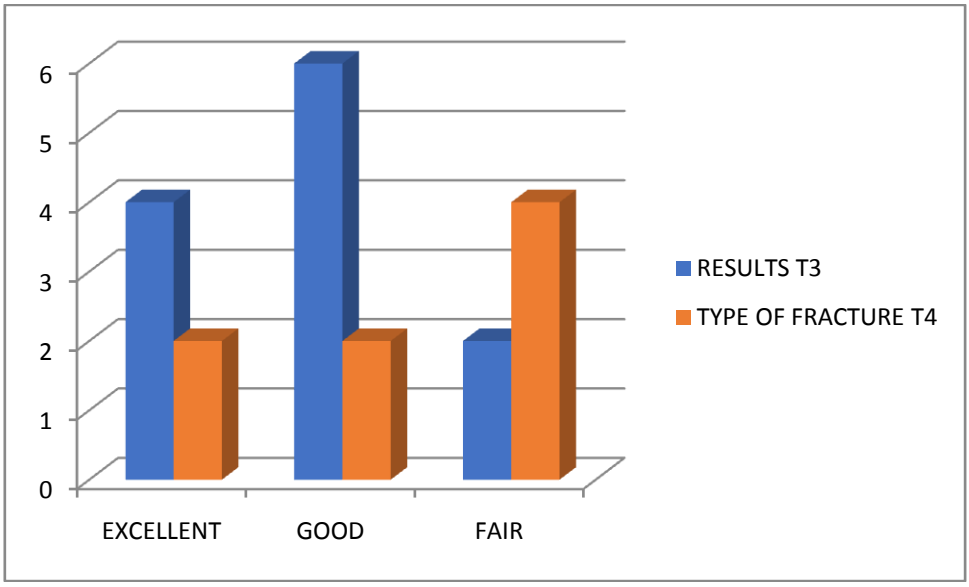


TABLE 4.11: FUNCTIONAL OUTCOME VS METHOD OF FIXATION: BIPOLAR

RESULTS		TYPE OF FRACTURE	
	T3	T4	
EXCELLENT	4	2	6(30%)
GOOD	6	2	8(40%)
FAIR	2	4	6(30%)
TOTAL	12	8	20(100%)

GRAPH 11: FUNCTIONAL OUTCOME VS METHOD OF FIXATION: BIPOLAR



V. Discussion

All our cases were assessed using harris hip score. They were graded as excellent, good, fair, poor and failure. 70% excellent and good results was seen in bipolar group and 60% with PFN group. The mean HHS score was 85.4 in Bipolar group and 83.6 in PFN group.

HARRIS HIP SCORES in various studies:

SERIES	YEAR	BIPOLAR%
Carl johan Hedbeck	2010	79.3
Cadler	1996	72
Nottage	1990	85
Meyer	1981	77
Drinker and Murray	1979	77.5

Yamagata et al reviewed 1001 cases of hip hemiarthroplasty. 682 unipolar and 319 bipolar cases were studied. Patients undergoing Bipolar exhibited higher hip score and lower acetabular erosion rates compared to unipolar prosthesis.[69]

Bochner et al reported their experience with Bipolar hemi-arthroplasties in a consecutive series of 120 hemiarthroplasties. In this group 90 patients were followed for atleast 2 years with 91% being pain free and 92% demonstrating satisfactory power and motion.[70]

Lestrange reviewed 496 patients with Bipolar hemi-arthroplasties for displaced femoral neck fractures and compared them with patients having fixed head prosthesis. He found that the Bipolar prosthesis offered advantages over one-piece designs interms of stability, decreased acetabular erosion and improved function.[71]

In 1988, cornell et al reported no difference in the functional outcome in a small study including 48 patients with a six month follow up.[72]

Calder et al published the results of a study including 250 patients aged 80 years and above with a 2 year follow-up. A higher proportion of patients were found to return to their pre-injury state was found in the unipolar HA group, but no other differences was found with regard to bipolar group.[73]

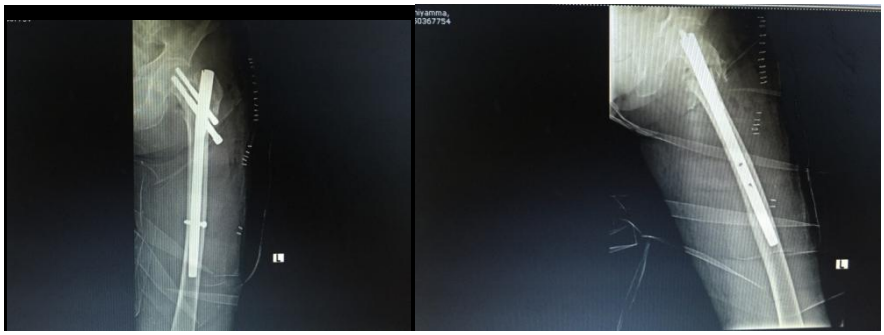
According to Ong BC, there was no significant difference between the unipolar and bipolar groups[74] Finally in 2003, Raia et al reported the results of a study including 115 patients randomized to a more modern cemented unipolar HA or Bipolar HA with identical stems. At the one-year assessment there were no significant difference between the groups in terms of surgical complications and functional outcome.

VI. Examples

PROXIMAL FEMORAL NAILING

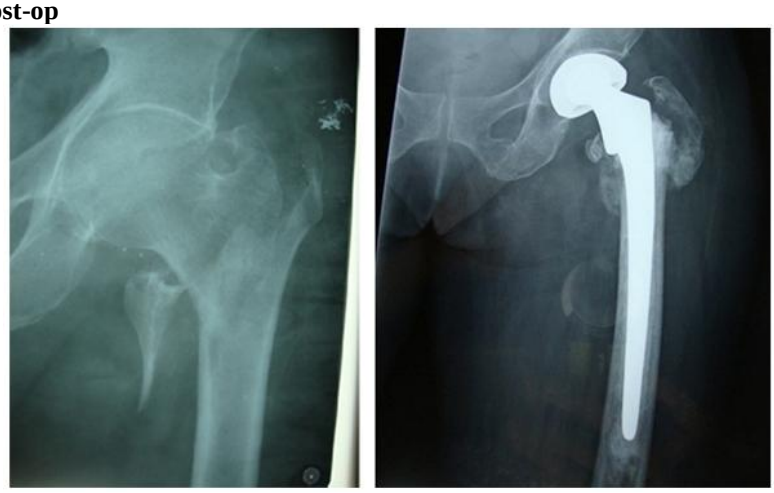
CASE 1: PRE AND POST OP XRAYS

CASE 2: PRE AND POSTOP XRAYS

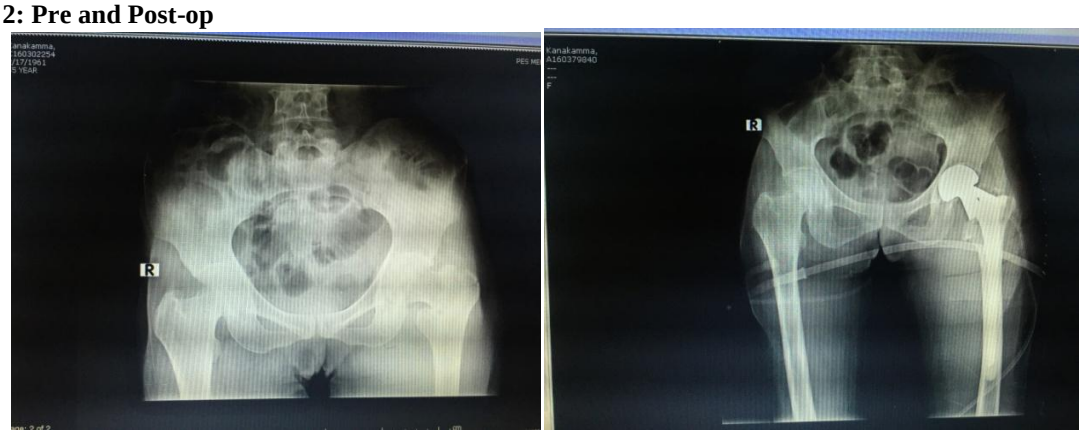


BIPOLAR HEMIARTHROPLASTY

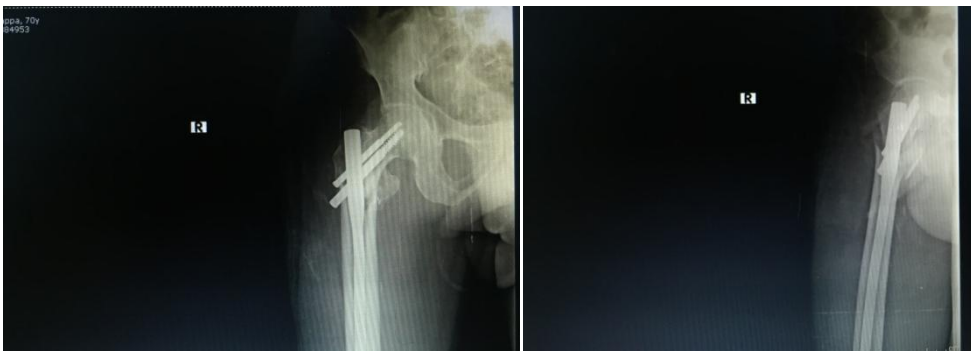
Case 1: Pre and Post-op

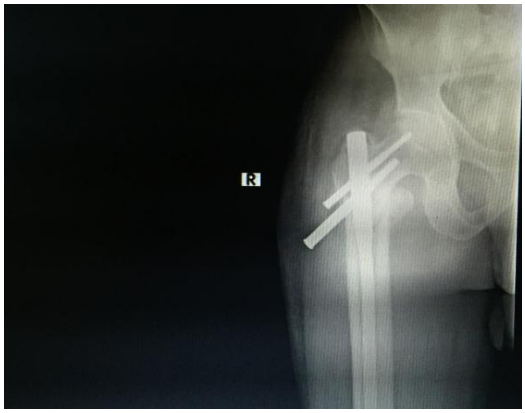


Case 2: Pre and Post-op



COMPLICATION:
SCREW PULL-OUT





VII. Conclusion

- Both modalities PFN and Bipolar Hemi-arthroplasty have shown good functional outcome
- Patients treated with PFN(internal fixation) started full weight bearing late compared to hemiarthroplasty, hence functional recovery was delayed in internal fixation group
- Early postoperative HHS was good in patients treated with hemiarthroplasty as compared to internal fixation group but at the end of 1 year scores were comparable
- All inter-trochanteric fractures treated with PFN showed union by 12-16 weeks
- 2 cases showed implant failure due to screw back-out
- Fractures treated with hemi-arthroplasty with bipolar prosthesis showed minimal and acceptable shortening of 1cm
- In Patients treated with hemi-arthroplasty early mobilization was achieved thus avoiding complications of prolonged immobilization and recumbency
- Patients treated with PFN showed better range of mobility, thus proving the fact that biological union and retaining original head of the femur gives better results. However quality of the bone in the form of density and texture dictates the treatment
- Activities of daily living involving squatting and sitting cross-legged are better achieved by biological union
- In patients with higher co-morbidities, poor bone quality, less functional activity and household ambulants, hemiarthroplasty is preferred than PFN.
- Most of the fractures above 60 years were due to trivial trauma
- Small sample size is one of the limitations of our study
- Thus in our study, primary hemiarthroplasty provides stable, pain free and mobile joint with acceptable complication rate as seen in our study. However larger prospective randomized study comparing the use of PFN against primary hemiarthroplasty for unstable intertrochanteric fractures is needed

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Dr. Ganta Varaprasad1. " Clinical And Functional Outcome Between Proximal Femoral Nailing And Cemented Hemiarthroplasty In The Management of Elderly Patients With Intertrochanteric Fractures – A Comparative Study." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 3, 2018, pp 85-97