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COMPARATIVE STUDY BETWEEN UNIPOLAR AND BIPOLAR HEMIREPLACEMENT ARTHROPLASTY FOR FRACTURE NECK OF FEMUR IN OLD AGE

KEYWORDS: BIPOLAR, UNIPOLAR, HARRIS HIP SCORE

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ABSTRACT *Fracture neck of femur are usually sustained by elderly persons from a trivial fall.Replacement of the femoral head is an alternative due to the frequent development of non-union, failure of osteosynthesis and avascular necrosis of the femoral head.*

- *AIMS AND OBJECTIVES: The aim of this study is to compare the functional results of unipolar and bipolar hemiarthroplasty in the treatment of displaced femoral neck.*
- *MATERIALS AND METHODS:In this retrospective study to begin with 30 patients operated not less than before six month for Hemireplacement Arthroplasty, with unipolar Austin Moore Prosthesis 15 patient and bipolar prosthesis 15 patient; were enrolled..*
- *RESULTS: Results were considered in terms of complication, mobility, implantused, and duration of stay, acetabularerosion, hip dislocation, and Harris hip score.*
- *CONCLUSION: Fracture neck femur treated with Bipolar as treatment modality yielded excellent results. Werecommend operating the fracture neck of femur by bipolar over unipolar.*

INTRODUCTION

Femoral neck fractures, recognised since the time of Hippocrates, still remains a vexing clinical problem for orthopaedic surgeons. Fracture neck of femur are usually sustained by elderly persons from a trivial fall. Proximal femur fractures are a significant cause of morbidity and mortality in all age groups, especially in old age.Various methods of reatment have been employed since ages. The prolonged immobilization in elderly, will further lead to decubitus problems and associated complications, and hence surgery was resorted to achieve early ambulation.Replacement of the femoral head is an alternative due to the frequent development of nonunion, and avascular necrosis of the femoral head. The theoretical advantage of bipolar over unipolar prosthesis is the reduction of acetabular erosion due to movement at two poles causing less movement at prosthetic head and acetabulum. The same mechanism is described for less pain during locomotion.

AIMS AND OBJECTIVES

To follow up and study comparison of results of fracture of neck of femur treated by

bipolar versus unipolar.

- To observe the results of these technique at our setup, and to critically analyse them
- To measure the final range of movement of hip joint
- To measure rate of complications.
- To compare both limb lengths.

ANATOMY OF THE FEMORAL NECK

The proximal end of the femur consists of head, neck, greater trochanter, and the lesser trochanter.The head is joined to the shaft by the femoral neck. It projects superiorly, anteriorly and medially from the femoral shaft. It is smaller in diameter than the head and is flattened anteroposterioily. It is broader at the base and is narrowest just below and lateral to the origin of the femoral head. Femoral valgus neck shaft angle is about 160. at birth and it decreases throughout the skeletal growth reaching an average of about 130' in adults.The neck forms an angle of 10°-15° with the femoral shaft in the coronal plane, which is known as ante version.Posteriorly, there is crest known as inter-trochanteric crest.The greater trochanter projects upwards from the junction of the neck and shaft and gives attachments to the abducters and rotators of the hip.The lesser trochanter is a conical projection of bone located posteromedially at a point where the neck arises from the femoral diaphysis. It gives attachment to the ilio-psoas muscle.The calcar femorale is a dense vertical stem extending from the postero-medial aspect of femoral shaft just below the lesser trochanter extending laterally in the greater trochanter while reinforcing the neck of femur postero-inferiorly.

The **ligaments** of this region include- Capsule, Iliofemoral ligaments, Ischiofemoral ligament, Pubofemoral ligament, Transverse acetabular ligaments, LabrumAcetabulare, LigamentumTeres.

The **medial and lateral circumflex femoral arteries** are the primary arteries of supply to the developing proximal end of the femur.

Occasionally, **arteries of the ligamentum teres** contribute to this blood supply.

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MATERIAL AND METHODS

In this retrospective study to begin with 60 patients operated not less than before six month for Hemireplacement Arthroplasty, with unipolar Austin Moore Prosthesis 15 patient and bipolar prosthesis 15 patient; were enrolled and were traced for the follow up examinations. All patients were followed up subjectively, clinically and radiologically to compare the results in standard manner.

Inclusion criteria

- Patients of age above 55 yrs at the time of admission
- Patients sustained a fracture of neck of femur
- Patients with atleast 1yr follow up after surgery

Exclusion criteria

- Patients with multiple procedures previously performed on same limb
- Patients not operated by unipolar or bipolar implants
- Patients with repeat trauma to same limb after initial surgery under study.

All routine investigations were done and after radiographic evaluation according to AO/OTA classification

AP VIEW

- CROSS TABLE LATERAL VIEW
- CONED DOWN AP VIEW

Surgical approach

Moore's Posterior approach:

Advantage:

- good atraumatic surgical exposure
- good orientation
- less blood loss

Disadvantage:

- increased incidence of dislocation
- historically stated increased infection

Modified Posterolateral approach (Modified Gibson's Approach): •

Advantage:

- good surgical exposure
- Because of the anterior capsule is left intact dislocation rate can be reduced.

Disadvantage:

- flexion contracture should not be more than 20 degrees

orientation comes with experience

When acetabulum requires remolding division of glutei is required so that recovery of function is delayed and a trendelenburg limp may result.

Smith-Peterson iliofemoral or Anterior Approach:

Advantage:

If associated with the flexion contracture is present, it can be corrected simultaneously.

Disadvantage:

highly vascular area so blood vessels of moderate size also require to be ligated

more chance of anterior dislocation of prosthesis post operatively

Antero-Lateral Approach:

Requires greater dissection to mobilize the femur, and abductor weakness can be more problematic.

RESULTS, ANALYSIS AND DISCUSSION

Age Group	No. of cases	Percentage
50-60	7	23.33%
61-70	13	43.33%
71-80	10	33.33%
81-90	0	00.00%
>90	0	00.00%
Total:	30	100%

A total of 60 patients were evaluated in our study. Their demographic, pre-operative data, operative and clinical results are as follows….

(A) AGE INCIDENCE OF THE PATIENT

(B) SEX INCIDENCE

Sex	No. of cases	Percentage
Male	9	30.00%
Female	21	70.00 %
Total	30	100 %

(C) INDICATIONS OF THE OPERATIONS:

Indications	No.ofCases	Percentage
Fresh Fracture of Neck-femur	30	100%
Dislocation or AVN	00	00.00%
Implant failure or nonunion after osteosynthesis	00	00.00 %
Pathological #	00	00.00 %
TOTAL	30	100%

(D) SHOWS DISTRIBUTION OF INJURY-OPERATION INTERVAL:

Weeks	No. of cases	Percentage
<1 week	23	76.67%
1-4 week	7	23.33%
4-8 weeks	0	0.00 %
8-12 weeks	0	0.00 %
> 12WEEKS	0	0.00 %

(E) DISTRIBUTION OF OPERATED SIDE:

Operated side	No. of cases	Percentage
Right	17	56.67%
Left	13	43.33%
Total	30	100

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(F) TYPE OF FRACTURE ACCORDING GARDEN CLASSIFICATION

Garden Type	No.Case	Percentage
Type 1	2	6.66%
Type2	2	6.66%
Type3	11	36.66%
Type4	15	50.00%

(G) SIZE OF PROSTHESIS USED:

Size of prosthesis	No .of cases	Perctange
39	2	6.67%
41	1	3.33%
43	11	36.67%
45	7	23.33%
47	5	16.66%
49	4	13.33%

(H) ASSOCIATED ILLNESS:

	No. of cases	Percentage (%)	Expired cases
Ischemic Heart Disease	3	10.00 %	0
Hypertension	11	36.66 %	0
Diabetes Mellitus	05	16.66 %	0
Psychotic disorder	00	00.00 %	0
Parkinsonism	00	00.00 %	0
Epilepsy	00	00.00 %	0
Pulmonary Koch's	00	00.00 %	0
Respiratory disease	02	6.66 %	0
Blindness	00	00.00 %	0
Total:	20	69.98 %	0

(I) SURGICAL APPROACH:

Surgical Approach	No. of cases	Percentage
Smith-Peterson	0	-
Watson-Jones	0	-
Modified Gibson's(Postero Lateral approach)	30	100%
Moore's pasterior approach	0	-
Others	0	-
TOTAL	30	100%

(J) POST OPERATIVE COMPLICATION (ACCORDING TO THE HISTORY GIVEN BY THE PATIENTS):

Complication	No. Of Cases	Percentage
Infection	3	10.00 %
Dislocation	0	00.00 %
Periprosthatic fracture	0	00.00 %
Prosthetic #	0	00.00 %
femoral Ecstasy	0	00.00 %

FOLLOW UP EXAMINATIONS:

L.1 Pain at the time of Follow Up

Pain	Hip Score	No. of pt.		%	
		AMP	BIPOLAR	AMP	BIPOLAR
None	44	07	09	46.66 %	60%
Mild	40	07	06	46.66%	40%
Occ. Moderate	20	01	00	06.66 %	00%
Moderate	10	00	00	2.50 %	00%
Sever	00	00	00	0.00 %	00%
Total:		15	15	100%	100%

(L-2) Functional Limp at follow up:

Functional Limp	Score	No. of cases		%	
		AMP	BIPOLAR	AMP	BIPOLAR
None	11	06	05	40.00 %	33.33%
Slight	08	09	10	60.00 %	66.66%
Moderate	05	00	00	00.00 %	00.00%
Severe	00	00	00	00.00 %	00,00%
Total:		15	15	100 %	100%

(L-3) Requirement of support at follow up :

Support	Score	No. of cases		Percentage	
		AMP	BIPOLAR	AMP	BIPOLAR
None	11	11	12	73.33 %	80.00%
1 stick	07	04	03	26.67 %	20.00%
2 stick(walker)	03	00	00	00.00 %	00.00%
Disabled	00	00	00	00.00 %	00.00%
Total:		15	15	100%	100%

(L-4) Shows Walking distance at time of follow up:

Distance walking	Score	No. of cases		Perctange	
		AMP	BIPOLAR	AMP	BIPOLAR
Unlimited	11	08	08	53.33%	66.67%
Six blocks	8	07	07	46.67%	33.33%
Two or three blocks	5	00	00	0.00%	00.00
Indoor	2	00	00	0.00%	00.00%
Bed/Chair	0	00	00	0.00%	00.00
TOTAL		15	15	100%	100%

(L-5) Performance of Activities of Daily Living :

Result	Score	No. of Cases		Percentage	
		AMP	BIPOLAR	AMP	BIPOLAR
Good	>12	11	13	73.33%	86.67%
Fair	7-11	4	02	26.67 %	13.33%
Poor	<7	00	00	0.00 %	00.00%
Total:		15	15	100%	100%

(L-6) Limb length discrepancy :

Length discrepancy	No. of cases		Percentage	
	AMP	BIPOLAR	AMP	BIPOLAR
Shortening	04	02	26.67 %	13.33%
Lengthening	00	00	0.00%	00.00
No change	11	13	73.33%	86.67%
Total	15	15	100%	100%

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Patient's own satisfaction:

Satisfaction	No. Of Cases		Percentage	
	AMP	BIPOLAR	AMP	BIPOLAR
Fully satisfied	12	13	80.00%	86.67%
Partly satisfied	03	02	20.00 %	13.33%
Unsatisfied	00	00	00.00 %	00.00%
Total	15	15	100 %	100%

Over All Result using Modified Harris Hip Score:

Result	Score	No. Of Pt.		Percentage	
		AMP	BIPOLAR	AMP	BIPOLAR
Excellent	90-100	07	09	46.67 %	60.00%
Good	80-89	05	04	33.33 %	26.67%
Fair	70-79	03	02	20.00 %	13.33%
Poor	< 70	00	00	0.00 %	00.00%
Total:		15	15	100 %	100%

Results:

Results	Hip score
Excellent	90-100
Good	80-89
Fair	70-79
Poor	< 70

CONCLUSION

- Fracture neck of femur is a common fracture in old age.
- Hemiarthroplasty is an established method in dealing with these fractures.
- Use of surgical approach depends upon surgeons preference.
- Use of Bipolar implant as hemiarthroplasty is preferred over unipolar implant as it reduces acetabular erosion.

- The key to successful treatment is
- Proper size of head,neck,modular stem
- Maintaining anteversion
- Obtaining equal limb length
- Minimal soft tissue trauma will lead to improved patient outcomes while reducing the complication rates.
- We recommend operating the fracture neck of femur with bipolar implant as hemirthroplasty in old ages.

Thus in conclusion, irrespective of fracture pattern ,implants used, selection of proper size of implantwith maintenance of antrversion and valgus while operating with minimum soft tissue trauma and early post-operative mobilization gives gratifying results.

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