COMPARISON OF UNIPOLAR (MOORE'S PROSTHESIS) AND BIPOLAR HEMIARTHROPLASTY IN FRACTURE NECK OF FEMUR IN THE ELDERLY- A SHORT-TERM PROSPECTIVE STUDY

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ABSTRACT

BACKGROUND

Femoral neck fractures are common in postmenopausal elderly females as a result of osteoporosis due to trivial trauma or in the young due to high energy trauma. The goal of the surgeon is to return the patient to his/her prefracture functional status. Femoral neck fracture could be impacted and undisplaced or displaced. Femoral neck fractures are also considered "fractures of necessity", best treated surgically irrespective of displacement. Surgery permits early patient mobilisation and minimises the complications of prolonged recumbence. The bipolar prosthesis has advantage over the unipolar in having two bearings for the movements to occur. This study intends to compare the functional outcome of unipolar Moore's hemi-replacement and fixed bipolar replacement in elderly patients with fracture neck of femur. In this scenario, the null hypothesis would be that there is no significant difference in the results between the patients treated with Moore's prosthesis and those treated with bipolar prosthesis.

The aim of the study is to compare the results of unipolar and bipolar hemi-arthroplasty for fracture neck of femur in the elderly patients.

MATERIALS AND METHODS

30 elderly postmenopausal women with fracture neck femur were included in the study. They were divided into 2 groups and were operated upon by using unipolar and bipolar implants respectively after thorough investigation. The functional outcome was assessed using the Harris Hip Score (HHS).

RESULTS

Femoral neck fractures belonged to 53.3% with type III fracture and 46.7 had type IV fractures. Fifteen patients had replacement with Austin Moore prosthesis and fifteen patients with bipolar prosthesis. The average HHS at 6 weeks for unipolar and bipolar groups was 65.2 and 66.0, respectively. The average HHS at 12 months for unipolar and bipolar group was 81.0 and 83.6, respectively. 19 (65.5%) patients had good HHS at the end of one year. Corrected chi-square value is 2.84, df 2 and p value is 0.241, which is >0.05 showing no significance.

CONCLUSIONS

There was no difference in functional outcomes in different age groups in both unipolar and bipolar groups. Females were involved overall more commonly than males, but there was no significant difference in final functional outcome in two groups. No advantage was found for the bipolar prosthesis over the unipolar prosthesis. No difference in functional outcome, return to pre-injury status, patient satisfaction or hip score in both groups.

KEYWORDS

Fracture Neck of Femur, Arthroplasty, Unipolar, Bipolar, Hemiarthroplasty and Moore's Arthroplasty.

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BACKGROUND

Review of the evolution of management of fracture neck of femur shows a wide variety of conservative and surgical procedures from late 18th century to the present modern days. In 1950, Moore[1,2] introduced a self-locking cobalt chrome alloy prosthesis, later models have slot in the stem to allow cancellous bone to penetrate and so anchor the device. In 1953, Haboush of New York suggested the use of fast setting methyl methacrylate dental cement as a means of fixing the prosthesis firmly to the femoral shaft. In 1954, Thompson[3] advocated primary replacement arthroplasty of the hip for fracture neck of femur because of simplicity of the operation and rapid recovery of the function without necessity for elaborate rehabilitation measures. Innumerable reports similar to upper femoral prosthesis have appeared since then including those of McKeever[4] (1961) who used stainless steel, Movin (1957) whose

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prosthesis has a long stem, Kevethe (1957) who used titanium stem, Fitzgerald (1952) used all-purpose stainless steel head and neck prosthesis and Lippman's crane type (1957). Christiansen described trunnion type of bipolar prosthesis, which allowed axial movements between head and neck of prosthesis (flexion and extension) and other movements between prosthesis and acetabulum.[4] The erosion of bone on the pelvic side (acetabulum) brought attention to resurface the acetabulum. Metal-on-metal total hip arthroplasty described by McKee-Farrar[5] (1966) did not prove satisfactory because of friction and metal wear. The credit of modern total hip replacement should go to Sir John Charnley[5,6] (1967). His pioneer work on low friction arthroplasty using high molecular weight polyethylene cup and metallic femoral components revolutionised the management of hip problems. The bipolar prosthesis was first introduced by James E. Bateman and Giliberty[7] in 1974. The commonly known versions of bipolar prosthesis are Monkduo pleat, Monk (1976), Hastings bipolar prosthesis.[8,9] Modular bipolar prosthesis (Biotechnic; France) and Talwalkar's bipolar endoprosthesis[10] (Inor, India). Rationale was that erosion and protrusion of acetabulum would be less because motion is present between metallic cup and acetabulum (outer bearing), since cup is not fixed in bone.[11] Theory is that the distribution of shear forces between the inner and outer bearings will spare the acetabular surface from wear and erosion.

Principle of Bipolar Prosthesis[12]

Acetabular wear is diminished through reduction of total amount of motion that occurs between the acetabulum and metallic outer shell by the interposition of a second low friction inters bearing within the implant. Because of compound bearing surface, bipolar designs provide greater overall range of motion than either unipolar designs or conventional total hip arthroplasty.

Recent Modifications of Bipolar Prosthesis

Axes of metallic and polyethylene cups are now eccentric, so that with loading of hip, metallic cup rotates laterally rather than medially and thus avoids fixations in various position and avoids impingement of head on edge of cup, which causes friction of polyethylene bearings insert and dislocation.[13] Dr. Della Pria introduced an alumina ceramic bipolar prosthesis, the advantage of which is very low wear rate (2 microns/year compared to 200 microns of polyethylene per year). However, polyethylene has an effect of protecting the subchondral bone from fractures. Therefore, the ceramic bipolar should have a PE jacket between the ceramic bearing surface and the outer head. A finite element analysis showed that such a jacket is effective at reducing the prosthesis stiffness. Lausten G.S. et al[14] (1987) performed a series of 75 patients with 77 bipolar hip endoprosthesis, which were followed up for an average of 51 months postoperatively. All prostheses had been inserted due to intracapsular fractures of the femoral neck. Average age was 77 yrs. Three cases of protrusion were found. Functionally, 75% of active ambulators had excellent or good results. The authors conclude that as acetabular erosion and protrusion appear to have been reduced to some extent. The bipolar hip prosthesis is a good alternative to conventional unipolar prosthesis in fracture neck of femur in the elderly.

MATERIALS AND METHODS

The present study was conducted at Department of Orthopaedics, KMCT Medical College Hospital, Mukkam, between June 2015 and June 2016. The present prospective and comparative study includes 30 cases of intracapsular fracture neck of femur in elderly patients above the age of 50 years treated by hemiarthroplasty using unipolar (Austin Moore's) or bipolar endoprosthesis. All the patients were selected on the basis of purposive sampling (judgment sampling) method. Of the 30, 15 were treated by hemiarthroplasty using unipolar (Austin Moore's) prosthesis and remaining 15 were by bipolar endoprosthesis. The clearance has been obtained from ethical committee of the institute.

Inclusion Criteria

1. All the elderly patients with fracture neck of femur.

Exclusion Criteria

1. Patients with injury to ipsilateral knee joint, leg. 2. Patients who were not willing to participate in study. 3. Patients with dementia. 4. Patients who were non-ambulatory. 5. Patients with pathologic femoral neck fracture. All the patients were treated by hemiarthroplasty were followed up for 12 months. At the end of 6 weeks following surgery, 1 male patient died. The functional results after hemiarthroplasty are therefore analysed for the remaining 29 patients.

Preoperative Management

History was taken with particular emphasis on mode of injury and associated medical illnesses. Clinical assessment was carried out in all patients, preoperatively. Buck's traction with appropriate weight was applied to the fractured lower limb with the aim of relieving pain, preventing shortening and to reduce unnecessary movements of the injured limb. Anteroposterior and lateral radiographs of the affected hip joint of pelvis and contralateral hip were taken for all the patients keeping the fractured limb in 15° internal rotations to bring the neck parallel to x-ray film. Regular blood investigations, blood grouping and typing, urine routine, RBS, serum urea, creatinine, HbsAg, HIV, chest x-ray, ECG, were done in all patients. Necessary and adequate treatment was given for those associated with medical problems such as anaemia, diabetes, hypertension, IHD, COPD, asthma, etc. were evaluated and treated before taking them to surgery. Certain therapeutic exercises were taught preoperatively to the patients whom had to be continued postoperatively such as deep breathing exercises, static quadriceps exercises and ankle movements. Intravenous antibiotics and tetanus immunisation were given an hour before the surgery. The limb was prepared from nipple to

knee including perineum and back. All surgeries were elective under spinal or general anaesthesia. Posterior approach (Moore's approach) was used in all patients.

Moore's Approach

(Southern exposure) was used for exposure. The fractured head and neck of the femur were levered out of the acetabulum and size measured using femoral head gauge. The prosthesis was inserted into the femoral shaft in about 5°-10° of anteversion and impacted into the femur. The reduction of the prosthesis was then done using gentle traction of the thigh. In case of cemented procedure, the stem was cemented in place using standard cementing techniques- lavage, cleaning, drying and plugging of the canal. Absolute haemostasis was obtained. Both the lower limbs kept in abducted position with a pillow in between both the legs. Drain removal was done after 48 hours. Check radiograph was taken after 48 hours. Patients were made to sit up on the second day, stand up with support (walker) on the third day and were allowed to full weight bear and walk with the help of a walker on the fourth postoperative day depending on his/her pain tolerance and were encouraged to walk thereafter. The patients were assessed for any shortening or deformities if any and discharged from the hospital. Patients were followed up at an interval of 6 weeks, 3 months, 6 months and 12 months and functional outcome was analysed by modified Harris hip scoring system. At each follow up, radiograph of the hip was taken for radiological analysis. One patient from unipolar group died 6 weeks postoperatively, so it is excluded from postoperative analysis and 29 patients were followed up. At follow up, detailed clinical examination was done systematically. Patients were evaluated according to Harris hip scoring system for pain, limp, the use of support, walking distance, ability to climb stairs, ability to put on shoes and socks (in our study for some patients ability to cut toenail was enquired) sitting on chair, ability to enter public transportation, deformities, leg length discrepancy and movements. All the details were recorded in the follow up chart. The radiograph of the operated hip was taken at regular intervals at each follow up.

Harris Hip Scoring System

Total functional outcome was graded as following depending on the total Harris hip score. Poor: Harris hip score less than 70. Fair: Harris hip score between 71-80. Good: Harris hip score between 81-90. Excellent: Harris hip score between 91-100.

Statistical Methods

Nominal variables were tested by the chi-square test or corrected chi-square test. All tests were two sided. The results were considered significant at $p<0.05$.

OBSERVATIONS AND RESULTS

In the present study, the maximum age was 86 years in case of unipolar group and 83 years in case of bipolar group. Most of the patients were in the age group of 71-80 years (34.50%) with the mean age of 73.07 years for males and 70.68 years for females (Table 1).

			Uni/Bipolar		Total
			Unipolar	Bipolar	
Age Group	Up to 60 yrs.	Count	4	0	4
		% Within Uni/Bipolar	28.60	0	13.80
	61-70 yrs.	Count	4	5	9
		% Within Uni/Bipolar	28.60	33.30	31.00
	71-80 yrs.	Count	4	6	10
		% Within Uni/Bipolar	28.60	40.00	34.50
	Above 80 yrs.	Count	3	4	7
		% Within Uni/Bipolar	20.00	26.70	20.70
Total		**Count**	**15**	**15**	**30**
		% Within Uni/Bipolar	**100.00**	**100.00**	**100.00**

Table 1. Showing the Distribution of Patients by Age, (n=30)

In the study, the intracapsular fracture of femoral neck were found to be more common in females. 16 females (53.3%). Unipolar group has more males while bipolar group has more females.

			Unipolar/Bipolar		Total
			Unipolar	Bipolar	
Sex	Male	Count	9	5	14
		% Within Uni/Bipolar	60.0	33.30	46.7
	Female	Count	6	10	16
		% Within Uni/Bipolar	40.0	66.70	53.3
Total		**Count**	**15**	**15**	**30**
		% Within Uni/Bipolar	**100.00**	**100.00**	**100.00**

Table 2. Showing the Distribution of Patients by Gender, (n=30)

			Unipolar/Bipolar		Total
			Unipolar	Bipolar	
Side	Left	Count	6	10	16
		% within Uni/Bipolar	40.0	66.70	55.20
	Right	Count	9	5	14
		% within Uni/Bipolar	60.0	33.30	44.80
Total		**Count**	**15**	**15**	**30**
		% within Uni/Bipolar	**100.00**	**100.00**	**100.00**

Table 3. Showing the Distribution of Cases by Involvement of the Side Involved, (n=30)

Depending on the anteroposterior and lateral radiographic view, available fractures were classified using Garden's classification. In the present study, 53.3% patients had type III fracture and 46.7 had type IV fracture.

		Frequency	Percent
	Garden III	16	53.3
	Garden IV	14	46.7
	Total	**30**	**100.0**

Table 4. Showing the Descriptive Statistics for the Type of Fracture of the Cases Selected, (n=30)

			Unipolar/Bipolar		Total
			Unipolar	Bipolar	
Garden's Type	Type III	Count	5	11	16
		% Within Uni/Bipolar	33.3	73.3	53.3
	Type IV	Count	10	4	14
		% Within Uni/Bipolar	66.7	26.7	46.7
Total		**Count**	**15**	**15**	**30**
		% Within Uni/Bipolar	**100.00**	**100.00**	**100.00**

Table 5. Showing the Distribution of Patients by the Type of Fracture, (n=30)

All the patients, 30 (100%) of the patients had history of trivial trauma. Most of them slipped and fell down on flat ground or in bathroom and were not able to walk or stand.

	Valid	Frequency	Percent
	Fall	30	100

Table 6. Showing the Descriptive Statistics of Cases Selected by Mechanism of Injury, (n=30)

One patient (3.3%) from bipolar group had other associated injury in our series. None of the patient from unipolar had associated injury.

		Frequency	Percent
Valid	No	29	96.7
	Colles fracture	1	3.3
	Total	**30**	**100.0**

Table 7. Showing the Descriptive Statistics of Cases Selected by Associated Injuries, (n=30)

Most of the patients 28 (93.3%) were independent in ambulation while 2 patients (one each from both group) were using walking aid stick for ambulation.

Valid	Frequency	Percent
Independent	28	93.3
Walking Aids	2	6.7
Bedbound	0	0
Total	**30**	**100.0**

Table 8. Showing the Descriptive Statistics of Cases Selected by Prefracture Ambulatory Status, (n=30)

Twenty four patients in our series had various medical and surgical problems. Hypertension, anaemia and diabetes mellitus were the most common problems. One patient had Parkinson's disease. They were seen by physician in the early period of hospitalisation and were given necessary treatment. Many patients had multiple comorbidities. The patients were taken for surgery only after they became fit for the surgical procedure.

Valid	Frequency	Percent
Nil	5	16.7
Diabetes	4	13.3
DM and HT/CVA	8	26.7
COPD	2	6.7
Parkinson's disease	1	3.3
CVA/Hemiplegia	4	13.3
Other-CCL/BPH/Cholelithiasis	3	10.0
Depression	1	3.3
HT	1	3.3
Past history of hip fracture	1	3.3
Total	**30**	**100.0**

Table 9. Showing the Distribution of Patients by Associated Comorbidities, (n=30)

There is variation in the interval between trauma or minor injury where the patient had fracture neck of femur and the surgery. Mean delay in surgery for unipolar group was 1.53 days and that for bipolar group was 1.6 days. Delay was calculated from time of injury. 22 (73.3%) patients were operated within twenty four hours of admission after preoperative anaesthetic workup. 5 patients were operated

after more than 5 days of delay. Various reasons for delay were like late presentation to hospital, neglected patient, patient who was on anticoagulants for which same drugs were stopped before surgery. Maximum delay observed was of 9 days.

			Unipolar/Bipolar		Total
			Unipolar	Bipolar	
Delay	No delay	Count	12	10	22
		% Within Uni/Bipolar	80.0	66.70	73.3
	1-5 days	Count		3	3
		% Within Uni/Bipolar		20.00	10.0
	Above 5 days	Count	3	2	5
		% Within Uni/Bipolar	20.0	13.30	16.7
Total		**Count**	**15**	**15**	**30**
		% Within Uni/Bipolar	**100.00**	**100.00**	**100.00**

Table 10. Showing the Distribution of Patients by Delay in Surgery, (n=30)

Fifteen patients in our series had replacement with Austin Moore prosthesis and fifteen patients with bipolar prosthesis.

		Frequency	Percent
Valid	Unipolar	15	50.0
	Bipolar	15	50.0
	Total	**30**	**100.0**

Table 11. Showing the Descriptive Statistics of Patients Selected by Type of Prosthesis, (n=30)

The most common size of prosthesis used was between 41-45 mm in unipolar group, smallest being 37 mm and largest being 49 mm. In bipolar group, the most common size was between 41-45 mm, the smallest being 39 mm and largest being 47 mm. In both groups, fenestrated prosthesis were used.

			Unipolar/Bipolar		Total
			Unipolar	Bipolar	
Size Categorised in mm	Up to 40	Count	3	2	5
		% Within Unipolar/Bipolar	20.0	13.30	16.7
	41-45	Count	9	12	20
		% Within Unipolar/Bipolar	60.0	80.00	70.00
	Above 45	Count	3	1	4
		% Within Unipolar/Bipolar	20.0	6.70	13.3
Total		**Count**	**15**	**15**	**30**
		% Within Unipolar/Bipolar	**100.00**	**100.00**	**100.00**

Table 12. Showing the Distribution of Patients by Size of Prosthesis Used, (n=30)

The mean duration of surgery for unipolar group was 85.4 minutes while mean duration for bipolar group was 88.86 minutes. The average total postoperative drain output for unipolar group was about 144.28 mL and same for bipolar group was about 156.66 mL. Total duration of hospital stay was around 2 weeks in 18 patients (62.1%). One patient was admitted for 20 days. Mean average hospital stay for unipolar group was 10.46 days and that for bipolar group was 11.2 days. Patients had long stay due to peroperative and postoperative complications due to associated comorbidities. Minimum stay was 6 days.

	N	Minimum	Maximum	Mean	Std. Deviation
Duration of surgery in minutes	30	75.00	96.00	87.0333	4.88829
Hospital stay in days	30	6.00	20.00	10.8333	3.08593
Valid N (list wise)	30				

Table 13. Descriptive Statistics of Cases Selected by Duration of Surgery and Hospital Stay, (n=30)

In our study, no infection was reported. One patient from unipolar group had dislocation of prosthesis. One patient from unipolar group died at six weeks postoperatively.

		Frequency	Percent
Valid	No complications	28	93.3
	Dislocation	1	3.3
	Death	1	3.3
	Total	**30**	**100.0**

Table 14. Showing the Descriptive Statistics of Patients by Complications, (n=30)

At the end of 6 weeks, the HHS was poor in most of the patients, i.e. 26 out of 29 (89.7%). The results were almost same in both unipolar and bipolar group. The average HHS at 6 weeks for unipolar and bipolar group was 65.2 and 66.0, respectively. Pearson chi-square test value is 0.299, df 1 and p value is 0.584, which is >0.05 showing no statistical significance.

			HHS Category at 6 Weeks		Total
			Poor	Fair	
Type of Prosthesis	Unipolar	Count	13	1	14
		% Within Type of Prosthesis	92.9	7.1	100.0
	Bipolar	Count	13	2	15
		% Within Type of Prosthesis	86.7	13.3	100.0
Total		**Count**	**26**	**3**	**29**
		% Within Type of Prosthesis	**89.7**	**10.3**	**100.0**

Table 15. Showing the Distribution of Patients by Functional Outcome at 6 Weeks, (n=30)

19 (65.5%) out of total 29 were had fair HHS at the end of 3 months. The average HHS at 3 months for unipolar and bipolar group was 73.2 and 74.7, respectively. Here, corrected chi-square value is 0.18, df 2 and p value is 0.991, which is >0.05 showing no significance.

			HHS Category at 3 Months			Total
			Poor	Fair	Good	
Type of Prosthesis	Unipolar	Count	4	9	1	14
		% Within Type of Prosthesis	28.6	64.3	7.1	100.0
	Bipolar	Count	4	10	1	15
		% Within Type of Prosthesis	26.7	66.7	6.7	100.0
Total		**Count**	**8**	**19**	**2**	**29**
		% Within Type of Prosthesis	**27.6**	**65.5**	**6.9**	**100.0**

Table 16. Showing the Distribution of Cases by Functional Outcome at 3 Months, (n=30)

The average HHS at 6 months for unipolar and bipolar group was 79.0 and 79.8, respectively. 11 (37.9%) patients had good results while 14 (48.3%) patients were had fair results. Here, Pearson chi-square value is 5.18, df 2 and p value is 0.05, which is >0.05 showing no significance statistically.

			HHS Category at 6 Months			Total
			Poor	Fair	Good	
Type of Prosthesis	Unipolar	Count	1	10	3	14
		% Within Type of Prosthesis	7.1	71.4	21.4	100.0
	Bipolar	Count	3	4	8	15
		% Within Type of Prosthesis	20.0	26.7	53.3	100.0
Total		**Count**	**4**	**14**	**11**	**29**
		% Within Type of Prosthesis	**13.8**	**48.3**	**37.9**	**100.0**

Table 17. Showing the Distribution of Patients by Functional Outcome at 6 Months, (n=30)

The average HHS at 12 months for unipolar and bipolar group was 81.0 and 83.6, respectively. 19 (65.5%) patients were had good HHS at the end of one year. Corrected chi-square value is 2.84, df 2 and p value is 0.241, which is >0.05 showing no significance.

			HHS Category at 12 Months			Total
			Poor	Fair	Good	
Type of Prosthesis	Unipolar	Count	0	6	8	14
		% within Type of Prosthesis	0	42.9	57.1	100.0
	Bipolar	Count	1	3	11	15
		% within Type of Prosthesis	6.7	20.0	73.3	100.0
Total		**Count**	**1**	**9**	**19**	**29**
		% within Type of Prosthesis	**3.4**	**31.0**	**65.5**	**100.0**

Table 18. Showing the Distribution of Patients by Functional Outcome at 12 Months, (n=30)

Group	HHS at 6 Weeks	HHS at 3 Months	HHS at 6 Months	HHS at 12 Months
Unipolar	65.2	73.2	79.0	81.0
Bipolar	66.0	74.7	79.8	83.6

Table 19. Showing the Distribution of Patients by Mean HHS, (n=30)

Figure 1. Showing the X-Ray

Figure 2. Showing the Follow Up at 6 Weeks

Figure 3. Showing Follow Up at 3 Months

Figure 4. Follow Up at 6 Months

Figure 5. Follow Up at 12 Months

Figure 8. X-Ray Showing NOF Left Side

Figure 6. Follow Up Photos of Patient Treated with Unipolar Amp Prosthesis at 3 Months

Figure 7. Follow Up Photos of Patient Treated with Bipolar at 12 Months

Figure 9. Neck of Femur Treated with Bipolar Hemiarthroplasty

Figure 10. Months Follow Up

Figure 11. 6 Months Follow Up

Figure 12. 6 Months Follow Up

Figure 13. 6 Months Follow Up

DISCUSSION

Management of fracture of femoral neck still remains major and difficult undertaking for an orthopaedic surgeon. The pendulum is swinging between reduction and internal fixation with various supplementary methods as osteosynthesis to total hip replacement. It is now the general feeling that reduction and internal fixation should be reserved for the younger patients in whom if needed revision surgery maybe done at a later date. Primary prosthetic replacement in older patients who are active and need early mobilisation should be considered. Bavadekar and Manelkar[15] (1987) feel that "in India, the erotic and technically demanding procedures of total hip replacement will lack universal application for a long time to come and the hemi-replacement procedure will need to have continued application to fill the lacuna produced by deficient resources and finances..." In this context, the present study was conducted to evaluate the immediate results of hemiarthroplasty in fracture neck of the femur using either unipolar (AMP) or bipolar prosthesis keeping in view the living condition of an average Indian. The average age of our patients was 73.07 years in case of males and 70.68 years in case of females. Majority of the patients were between 71-80 years. The physiological age of our patients is more than the chronological age and hence these patients are considered old for all practical purposes. The average age for unipolar group was 70.73 years and that for bipolar group was 73.93 years. Similar age distribution is reported by other authors. Saxena and Saraf[16] (1978) had age distribution 45-90 years (mean 66 years); Mukherjee and Puri[17] (1986) 65 years, Arwade[1] (1987) 54-86 years with incidence between 70-80 years (average 72 years). Bavadekar and Manelkar[15] (1987) had mean age group in fresh fractures was 75 years whereas in old cases it was 62 years. Dutta D, Bajracharya AR[18] got the mean age of patient in bipolar group (78.67 years) was higher than unipolar group (74.13 years), which was statistically insignificant. In study done by WL Loo[19] et al in 2011, average age of unipolar group were 82.86 years and same for bipolar group was 79.65 years. In our series, the intracapsular fracture of femoral neck were found to be more common in females, 16 females (53.3%). The elderly females are more prone to fracture neck of femur due to osteoporosis (Choudhari and Mohite[20] 1987). Female preponderance has been reported in several series. Carl Johan Hedbeck[21] et al in their study had found 76% of the patients being females. Dutta D, Bajracharya AR[18] also had female preponderance in their study. The left-sided hip was fractured in 16 patients (53.3%) of our series. This has been a subject of limited studies. Boyd and Salvatore[22] (1964) reported 55% fractures on left side. D'Acry and Devas[23] (1976) similarly found 55.4% fracture in left hip of their patients. Depending on the anteroposterior radiographic view, available fractures were classified using Garden's classification. In our series, 53.3% patients had type III fracture and 46.7 had type IV fracture. Mukherjee and Puri[24] (1986) had 85% patients of Garden type III and IV fractures. Of the 16 Garden type III fractures (53.3%), 5

fractures (33.3%) were operated with unipolar prosthesis and remaining 11 patients (73.3%) had bipolar prosthesis, while of the 14 Garden type IV fractures, 10 fractures (66.7%) were operated with unipolar prosthesis and remaining 4 (26.7%) had bipolar prosthesis. Almost, all 30 patients of our series had trivial fall. This is in accordance with majority of the series reported. One (3.3%) of our patient who had broken his hip due to fall had associated Colles fracture, a well-known injury among the elderly. He was treated by closed manipulation and plaster of Paris cast. Boyd and Salvatore[22] (1964) reported 1.5% Colles fractures in their series. Hinchey and Day[25] (1964) reported 5.4% associating fractures. The common problem in our series was gross anaemia, hypertension, diabetes mellitus, chronic bronchitis and bronchial asthma and cerebrovascular accidents. 8 patients (26.7%) had more than one problem. Hypertension, diabetes mellitus were commonly detected after the patient got admitted with fracture neck of femur. These problems were the reason for more hospital stay in some patients. Hinchey and Day[25] (1964) reported similar problems in 84.6% of their patients. In our series, minimum delay observed was of zero day and maximum of 9 days. Mean delay in surgery for unipolar group was 1.53 days and that for bipolar group was 1.6 days. The reasons for delay were like late presentation at hospital, neglected patient, stopping of anticoagulant medicines in preoperative period, economical problems and associated medical problems. 3 (21.40%) patients from unipolar group and 5 (33.30%) patients from bipolar group were operated late. In Dutta D, Bajracharya AR[18] study, the mean delay in surgery for unipolar and bipolar group were 11 days and 13.87 days. In Xu M[26] et al study, the time from injury to operation ranged from 2 to 14 days with an average of 5.6 days. Fifteen patients in our series had replacement with Austin Moore prosthesis and fifteen patients with bipolar prosthesis. The most common size of prosthesis used was between 41-45 mm in unipolar group, smallest being 37 mm and largest being 49 mm. In bipolar group, the most common size was between 41-45 mm, the smallest being 39 mm and largest being 47 mm. In both groups, fenestrated prosthesis were used. The mean duration of surgery for unipolar group was 85.4 minutes while mean duration for bipolar group was 88.86 minutes. In Dutta D, Bajracharya AR[18] study, mean duration for surgery for unipolar and bipolar group was 68 minutes and 67.33 minutes, respectively. In our series, hospital stay ranges from 6 days to 21 days with a mean average of 10.83 days. Mean duration for unipolar group was 10.46 days and that for bipolar group was 11.2 days, S. Delkel[27] (1976) 21 days. Dutta D, Bajracharya AR[18] et al had shown mean hospital stay for unipolar group 25.13 days and same for bipolar group 24.33 days. We did not operate any patient as an emergency and all were thoroughly prepared before surgery. All necessary preoperative checkup was done. Blood transfusion was given in some patients. Patients who were diabetic were regularly monitored for fasting blood glucose levels and they were operated only after blood glucose level was controlled. In patients with anticoagulant therapy for heart disease or cerebrovascular accidents, these anticoagulant medicines were stopped preoperatively for 3 to 5 days. Postoperatively, patients were monitored for their associated medical problems and they were discharged only when parameters were controlled. Anticoagulant therapy, which was stopped preoperatively in some patients was started twenty four hours postoperatively. In our study, no infection was reported. One patient from unipolar group had dislocation of prosthesis. This patient was managed conservatively. The dislocation was reduced under image intensifier. This patient was then kept on restricted mobilisation. There was no associated fracture of proximal femur or acetabulum. In 1998, John E. Kenzora et al[28] noted that 6 dislocations in their series followed posterior approach. Dislocation is a well-known complication of posterior approach. However, in our series, numbers of dislocations are not great enough to reach statistical significance. One (3.3%) patient from unipolar group died after six weeks postoperatively. This patient was having associated medical disease and reason of death was reported as cardiorespiratory failure. Carl Johan Hedbeck[21] et al had 12% mortality rate in unipolar group. In our series, radiographic observations were made at the time of follow up in hospital. No evidence of acetabular protrusion or erosion was found. No complications were reported regarding stem of prosthesis loosening. The results can be attributed to short follow up period and need for longer follow up period is recommended. The functional outcome after hemiarthroplasty for intracapsular fracture neck of femur was graded as excellent, good and fair after adding the scores given for each criterion for assessment of hip using Harris hip score. The scoring was done at the time of follow up at 6 weeks, 3 months, 6 months and 12 months. In early follow up period at 6 weeks, 13 patients each from both group had poor functional outcome. Fair results were seen in one patient from unipolar group and 2 patients from bipolar group. None of the patients from either group had shown good or excellent results. The reasons for early poor postoperative HHS were attributed to old age associated medical diseases. Hinchey and Day[25] (1964) observed that the poor results were due to pre-existing medical conditions and pain following arthroplasty. Don King (1964) agrees with Hinchey and Day and feels that delayed weight bearing (due to medical problems) is the cause of poor results. The results in our study were statistically not significant ($p > 0.05$). At 3 months follow up, four patients each from both group had poor HHS while one patient each from both group had good HHS. Remaining 9 patients (64.3%) from unipolar group and 10 patients (66.7%) from bipolar group had shown fair results. This was statistically not significant ($P > 0.05$). At 6 months follow up, eight (53.3%) patients from bipolar group had good HHS while three (21.4%) from unipolar group had good HHS. One patient from unipolar group and three patients from bipolar group had poor results. Patients from bipolar group were doing better at the end of 6 months follow up, but statistically this has not shown significance ($P > 0.0$). At 12 months follow up, eight (57.1%) patients from unipolar group and eleven (73.3%) patients from bipolar group had good HHS. The results were statistically not

significant (p >0.05). None of patients from either group had excellent result. This can be attributed to environment in and around home, limited ambulation of patients and associated comorbidities. Headbeck CJ[21] et al had also shown that equivalent clinical outcome in both unipolar and bipolar groups. Dragica Smrke[29] had shown that considering clinical outcomes, general health and costs, it can be concluded that the choice of endoprosthesis does not pose an obstacle to a patient's recovery. Raia, Frank J. MD[30] concluded that there were no differences between the groups in estimated blood loss, length of hospital stay, mortality rate and number of dislocations, postoperative complications or ambulatory status at 1 year. The results of our study is on concordance with Mohamed Ali Ahmed Mohamed (2007), Wathne et al (1995)[31] and Davidson et al (2001)[32] who had concluded that there was no statistically significant difference between the 2 groups in terms of age, sex, medical comorbidities, previous ambulatory status, blood loss, length of hospital stay, mortality rate or postoperative complications. There are several limitations in our study including the facts that 1. Sample size in both groups was small. 2. In some patient's radiological follow up was not done as they were unable to report to hospital at time of follow up. 3. The 12-month follow up period is also short.

A review of literature on intracapsular fracture neck of femur has been presented. Its pertinent anatomy, traumatic and biomechanical principles has been reviewed. Thirty cases of displaced fracture neck of femur in elderly were selected. These grouped in two groups, unipolar (Austin Moore prosthesis) and bipolar prosthesis. In each group, fifteen patients were treated with hemiarthroplasty.

The follow up results are analysed and discussed. The maximum age was 86 years in case of unipolar group and 83 years in case of bipolar group. Most of the patients were in the age group of 71-80 years with the mean age of 73.07 years for males and 70.68 years for females. Almost, all 30 patients of our series had trivial fall. Among the associated medical conditions, hypertension, diabetes and cerebrovascular accidents were common. We used Moore's posterior approach for all the patients and appropriate-sized prosthesis were selected depending on the size of the femoral head. Patients were ambulated early. Most of the patients were discharged within two weeks of surgery. Of these patients, one patient from unipolar group died six weeks postoperatively. Thus, remaining 29 patients were followed for assessment of functional results. There were eight (57.1%) patients from unipolar group and eleven (73.3%) patients from bipolar group with good HHS at the end of follow up. We did not get any significant difference between the various parameters discussed and final outcome in both groups. The success of hemiarthroplasty, no doubt depends on preoperative planning and proper attention to surgical details to achieve the optimum biomechanical conditions. There is one frequently cited disadvantage associated with the bipolar hemiarthroplasty, i.e. the higher cost.

CONCLUSION

Majority of the patients were elderly between age group of 71-80 years. There was no difference in functional outcomes in different age groups in both unipolar and bipolar groups. Females were involved overall more commonly than males, but there was no significant difference in final functional outcome in two groups. No advantage was found for the bipolar prosthesis over the unipolar prosthesis. No difference in functional outcome, return to pre-injury status, patient satisfaction or hip score in both groups. Considering above results of our study, the null hypothesis is accepted, that is, there is no significant difference in the results of functional outcome between the patients treated with Moore's prosthesis and those treated with bipolar prosthesis. In conclusion, hemiarthroplasty of hip for femoral neck fractures is a good option in elderly patients. The mortality and morbidity are not high, operative procedure is simple, complications are less disabling, weight bearing is early, early functional results are satisfactory.

REFERENCES

1. Arwade DJ. A review of internal fixation and prosthetic replacement for fresh fractures of the femoral neck. Clini Orthop India 1987;1:77-82.
2. Lance Ford EM. Use of Moore self-locking vitallium prosthesis in acute fractures of the femoral neck. J Bone Joint Surg Am 1965;47(4):832 841.
3. Thompson FR. Two and a half years' experience with a vitallium intramedullary hip prosthesis. J Bone Joint Surg Am 1954;36-A(3):489-502.
4. Barr JS, Donovan JF, Florence DW. Arthroplasty of the hip. J Bone Joint Surg Am 1964;46(2):249-266.
5. Charnley J. The bonding of prostheses to bone by cement. Clin Orthop Relat Res 2010;468(12):3149-3159.
6. Delkel, Neissman SL. Immediate prosthetic replacement in fracture neck of the femur. J Bone Joint Surg Am 1976;58B:380.
7. Raia FJ, Chapman CB, Herrera MF, et al. Unipolar or bipolar hemiarthroplasty for femoral neck fractures in the elderly? Clin Orthop Relat Res 2003;414:259-265.
8. LaBelle LW, Colwill JC, Swanson AB. Bateman bipolar hip arthroplasty for femoral neck fractures. A five- to ten-year follow-up study. Clin Orthop Relat Res 1990;251:20-25.
9. Martin NS. Metallic replacement of the femoral head: report of three cases sixteen years after operation J Bone Joint Surg 1965;47:548-551.
10. Basu AK. Talwalkarâ€™s endo-prosthetic replacement of the hip in the management of sub-capital fracture neck of femur. Indian Journal of Orthopaedics 1986;20(2):136-140.
11. Giliberty RP. Hemiarthroplasty of the hip using a low friction bipolar endoprosthesis. Clin Orthop Relat Res 1983;175:86-92.
12. Victor R. Unipolar versus bipolar arthroplasty. Techniques in Orthopaedics 2004;19(3):138-142.

13. Bhuller GS. Use of the Giliberty bipolar endoprosthesis in femoral neck fractures. Clin Orthop Relat Res 1982;162:165-169.
14. Lausten GS. Vedel P, Nielsen PM. Fractures of femoral neck treated with bipolar endoprosthesis. Clin Orthop Relat Res 1987;218:63-67.
15. Bavadekar AV, Manelkar KR. Hemiarthroplasty of the hip in the treatment of intracapsular fracture neck of the femur state of the art and an appraisal. Clincial Orthopaedics of India 1987;1:43-52.
16. Saxena PS, Saraf JK. Moore prosthesis in fracture neck of femur. Indian Journal of Orthopaedics 1978;12(2):138-145.
17. Arnoldi CC, Lemperg RK. Fracture of the femoral neck. II. Relative importance of primary vascular damage and surgical procedure for the development of necrosis of the femoral head Clin Orthop Relat Res 1977;129:217-22.
18. Dutta D, Bajracharya AR. Hemireplacement arthroplasty with unipolar vs bipolar prosthesis for displaced hip fractures in elderly. Journal Nepal Health Research Council 2009;7(2):131-134.
19. Loo WL, Loh SY, Lee HC. Is there a significant difference in surgery and outcomes between unipolar and bipolar hip hemiarthroplasty? a retrospective study of a single institution in Singapore. Malaysian Orthopaedic Journal 2011;5(1):3-7.
20. Choudhary, Mohite. Pathology of fracture neck of femur. Clinical Orthopaedics India 1987;1:45-48.
21. Hedbeck CJ, Blomfeldt R, Lapidus G, et al. Unipolar hemiarthroplasty versus bipolar hemiarthroplasty in the most elderly patients with displaced femoral neck fractures: a randomised, controlled trial. Int Orthop 2011;35(11):1703-1711.
22. Boyd HB, Salvatore JE. Acute fractures of the femoral neck: internal fixation or prosthesis? J Bone Joint Surg Am 1964;46(5):1066-1068.
23. D'Acry J, Devas M. Treatment of fractures of the femoral neck by replacement with the thompson prosthesis. J Bone Joint Surg Br 1976;58(3):279-286.
24. Mukherjee DL, Puri HC. Early hemiarthroplasty for fresh fractures of the neck of the femur in geriatric patients. Indian Journal of Surgery. 1986;48:77-80.
25. Hinchey JJ, Day PL. Primary prosthetic replacement in fresh femoral neck fractures. JBJS 1960;42B:633-640.
26. Xu M. Comparison of effectiveness of three operations in treatment of displaced femoral neck fractures in the elderly patients. Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi 2010;24(12):1419-1423.
27. Delkel, Neissman SL. Immediate prosthetic replacement in fracture neck of the femur. JBJS 1976;58B:380.
28. Kenzora JE, Magaziner J, Hudson J, et al Outcome after hemiarthroplasty for femoral neck fractures in the elderly. Clini Orthop Relat Res 1998;348:51-58.
29. Smrke D, Biščević M. Unipolar, bipolar or total hip endoprosthesis after femoral neck fracture: what is a right decision? Acta medica academica 2006;35(2):77-81.
30. Raia FJ, Chapman CB, Herrera MF et al. Unipolar or bipolar Hemirthroplasty for femoral neck fractures in elderly? Clini Orthop Relat Res 2003;414:259-265.
31. Wathne RA, Koval KJ, Aharonoff GB, et al. Modular unipolar versus bipolar prosthesis: a prospective evaluation of functional outcome after femoral neck fracture. J Orthop Trauma 1995;9(4):298-302.
32. Davison JNS, Calder SJ, Anderson GH, et al. Treatment for displaced intracapsular fracture of the proximal femur. A prospective, randomised trial in patients aged 65 to 79 years. J Bone Joint Surg 2001;83(2):206-212.