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Management of Intracapsular Fracture Neck of Femur with Bipolar Hemiarthroplasty: A Prospective Study.

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ABSTRACT

Background: 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 may be done at a later date. Primary prosthetic replacement should be considered in older patients who are active and need early mobilization. The concept of dual bearing surfaces offers considerable advantage, it results in sharing of motion at the two surfaces and hence reduction of net wear at either surface, thus reducing erosion at the acetabular – joint interface. In addition, the total range of motion of joint is increased. **Methods:** 22 patients were included in the study with Intracapsular Fracture neck of femur with 10 fracture of Garden type III and 12 fracture of Garden type IV category. All were managed with bipolar hemiarthroplasty: The study was carried out to evaluate the immediate and early results of hemiarthroplasty for intracapsular fracture of neck of femur in elderly from July 2008 to July 2010. Patient were followed up after 6 weeks, 3 months, 6 months & 1 year. Patients were evaluated using clinical examination, X-ray of operated hip and Harris hip scoring system at each follow up. **Results:** Out of total 22 patients, 16 were male (72.72%) and 6 were female (27.27 %) with age distribution between 40 years to 75 years old. Mechanism of injury was fall after slipping in 17 patients (77.27%), road traffic accident in 2 patients (9.09%) and fall after giddiness in 3 patients (13.63%). As per Garden's classification 10 patients were in type III and 12 patients in type IV. Few Intra operative complications included increasing duration of surgery and increased amount of blood. Post operatively complication was superficial infection, deep infection, Limb length discrepancy, heterotopic ossification, fracture of lateral cortex below the level of lesser trochanter. Most patients were able to perform house hold activities and were able to walk outside and to their work. No acetabular erosion was noted in our study in x-ray. All the patients were able to do more than 90 degree flexion , more than 30 degree of abduction at regular follow up except those who were immobilized for around 3 weeks . As per Harris hip score, 8 patients had excellent results with score more than 90, 11 patients had good result with score between 80-90, 2 patients had fair result with score between 70-80 and 1 patient had poor result with score less than 70. **Conclusion:** Bipolar hemiarthroplasty produces good functional outcomes with minimal complications for displaced intracapsular femoral neck fractures and has several advantages.

Keywords: Femur, Fracture, Hemiarthroplasty..

INTRODUCTION

The fracture neck of femur is one of the Commonest fractures in elderly. With life expectancy increasing with each decade, our society is becoming increasingly an active geriatric society, with significant number of hospitalized and nursing home patients with femoral neck fractures and their sequelae. It has always presented great challenges to orthopedic surgeons and even today it remains an unsolved fracture as far as treatment is concerned.[1]

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Different modalities of treatment are used depending on consideration of many factors. Some of them include age of the patient, type of fracture, co-morbid conditions, and risk of developing complications such as nonunion or osteonecrosis.

Prosthetic replacement of femoral head with hemiarthroplasty has been the gold standard now in the management of intracapsular fracture neck of femur in geriatric patients. The advantages being early weight bearing to return to activity and help avoid complications of recumbency and inactivity, and avoiding complications of the fracture healing like nonunion and osteonecrosis.

Selection of the type of prosthesis is very important in hemiarthroplasty as different types are available. Although the fixed head endoprosthesis like Austin-Moore Prosthesis has produced excellent results,[2] persistent pain and protrusio acetabuli have been associated with this device and led many surgeons to choose a bipolar system. This prosthesis is very useful and results are encouraging.[3]

The present study is to analyze the short term results and the outcome of the management of fracture neck of femur with bipolar Hemiarthroplasty.

MATERIALS AND METHODS

A prospective study was conducted on 22 patients with Intracapsular Fracture neck of femur admitted in department of orthopaedics, St. Theresa hospital, Hyderabad from July 2008 to July 2010. The inclusion criteria included Elderly patients aged above 50 years with displaced acute intracapsular fracture neck of femur, Nonunion following intracapsular fracture neck of femur, Osteonecrosis following intracapsular fracture neck of femur, failed internal fixation following fracture neck of femur. With exclusion criteria including Age < 50 years, Undisplaced or minimally displaced intracapsular fracture, Patients with senile dementia for whom the assent of their next of kin was not obtained, Patients with a pathological fracture from a tumor or Paget's disease of bone, Patients who were not considered to be fit for the surgical procedure, Patients with significant arthritis of the hip that necessitated treatment with a total hip replacement.

Patients were admitted to the ward. Detailed history was taken with particular emphasize on mode of injury and associated medical illness. In depth, clinical assessment was carried out in each case. 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. Oral or parental NSAIDs were given to relieve the pain. Anteroposterior radiographs of the affected hip joint and pelvis with both hips were taken for all the patients, keeping the fractured limb in 150 internal rotations to bring the neck parallel to X-ray film.

Routine blood investigations, blood grouping and typing, urine routine, RBS, serum urea, creatinine, HBsAg, HIV, chest x-ray, ECG, were done in all cases. Necessary and adequate treatment was given for those associated with medical problems such as anemia, diabetes, hypertension, IHD, COPD, asthma, etc. were evaluated and treated before taking them to surgery. Informed written consent for surgery is taken. Deep venous thrombosis prophylaxis with low molecular weight was given an all at risk patients. Intravenous antibiotics were given an hour before the surgery. Tranexamic acid was given in all patients after induction of anesthesia. Intravenous antibiotics was given an hour before surgery. All surgeries were performed on an elective basis using standard aseptic precautions surgery in lateral position by Posterior approach or Lateral approach under spinal or general anaesthesia.

Patient was discharged after stitch removal as per protocol and were asked to come for follow up after 6 weeks and for further follow up at 3 months, 6 months & 1 year. 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 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.

RESULTS

Out of total 22 patients who were admitted to our hospital and were ready to participate in the study, 16 were female (72.72%) and 6 were male (27.27 %) [Figure 1] with age distribution between 40 years to 75 years old, 2 patients were less than 50 years (9.09%), 3 patients between 50-60 years (13.63%), 8 patients between 60-70 years (36.36%) and 9 patients of more than 70 years of age (40.90%) [Figure 2].

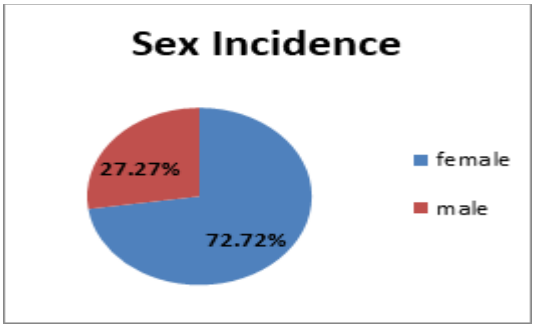

Figure 1. Chart showing sex incidence

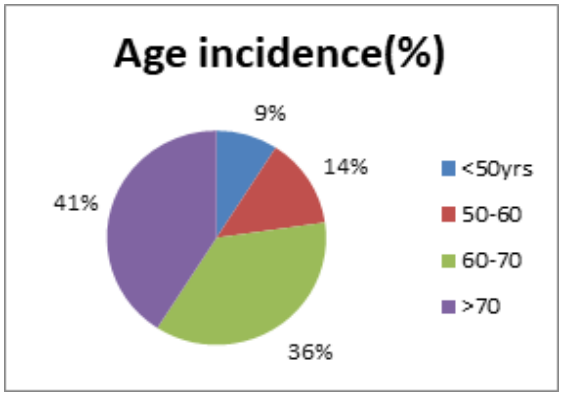

Figure 2: Chart showing age incidence.

Mechanism of injury was fall after slipping in 17 patients (77.27%), road traffic accident in 2 patients (9.09%) and fall after giddiness in 3 patients (13.63%).

Fracture was classified according to garden's classification 10 patients were in type III and 12 patients in type IV [Figure 3] Incidence of side of limb was 11 in right limb (50%) and 1 in left limb (50%) [Figure 4]

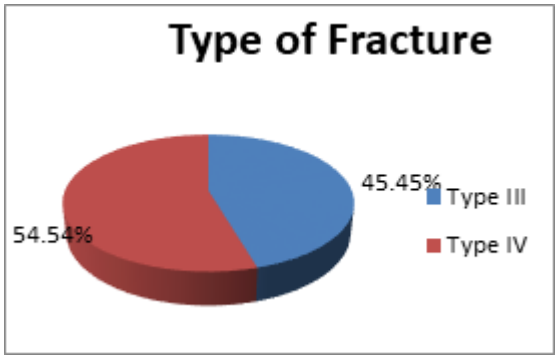

Figure 3: Showing incidence of type of fracture.

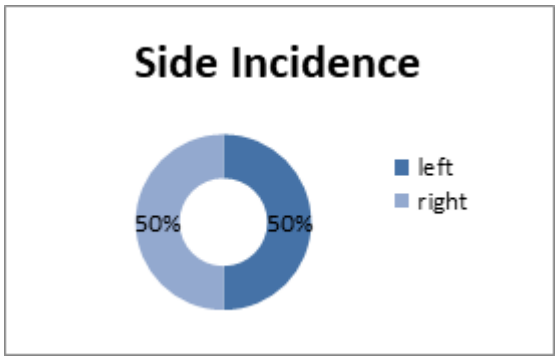

Figure 4: Showing sex incidence.

Interval between injury and admission were also variable. 14 patients (63.63%) came to hospital within 7 days of injury, 3 patients (13.63%) came after 7-30 days of injury and 5 patients (22.72%) came after 30 days of injury.

Associated disease were diabetes, hypertension and ischemic heart disease in 14 (63.63%), 11 (50%) and 4 (18.18%) patients respectively [Figure 5].

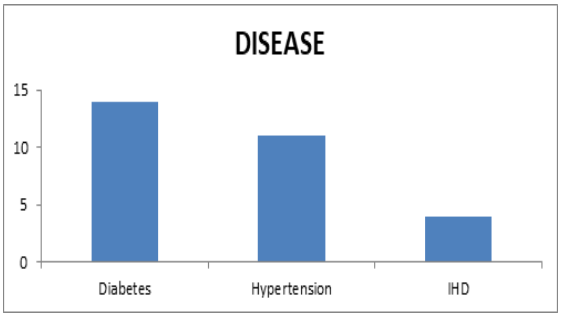

Figure 5: Incidence of disease associated with fracture.

Duration of follow up was 12-24 week in 3 patients (13.63%), 24-52 weeks in 13 patients (59.09%) and more than 52 weeks in 6 patients (27.27%). The average follow up in our study range from 12 weeks to 72 weeks.

We had intra operative complications in 4 patients, in 2 increasing duration of surgery and in another 2 increased amount of blood loss. The duration of surgery ranged from 60 min to 120 min. We operated many patients 13 (43.3%) whose hemoglobin was less than 10 gm %. So pre-operative, intra-operative as well as post operative blood transfusions were done. The blood loss was noted from 250 ml to 600 ml with average of 300 ml. Minimal reaming was done in all cases to prevent fat embolism and proper placement of the femoral stem in the proximal femoral shaft. In all cases in the intra-operative period close monitoring of the blood pressure and SPO2 was done by the anesthetists

Post operatively there was superficial infection in 2 patients (9.09%). No patient had dislocation of prosthesis or loosening of the stem. 1 patient had deep infection (4.54%) that required debridement and IV antibiotics. Limb length discrepancy was seen in 3 patients (13.63%), of which shortening was noted in 2 patients and lengthening was noted in 1 patient. However, the limp was corrected with a shoe raise for the shorter limb. One patient developed heterotopic ossification, which was moderate at final follow-up, but the patient had good range of motion at hip joint. 1 patient had a fracture of lateral cortex below the level of lesser trochanter that was found on postoperative X-ray. She was mobilized partial weight bearing after 10 days and she regained full functional mobility. In our study we did not find any case of deep vein thrombosis and pulmonary embolism [Table 1].

Table 1: Incidence of complication occurring in the study.

Complication	No. of Patients	Percentage
Superficial Infection	2	9.09
Deep Infection	1	4.54
Periprosthetic Fracture	1	4.54
Limb Length Discrepancy	3	13.63
Heterotopic Ossification	1	4.54

On follow up the activity level and Harris Hip was checked at regular interval at 6 weeks, 3 months, 6 months, and 12 months. Most patients were able to perform house hold activities and were able to walk outside and to their work. The ambulation was started on 4th -10th post operative day. All the patients were able to walk comfortably with partial weight bearing walking with walker except few. But after 6 weeks, many patients walked comfortably without walker just holding the walking stick.

Check X-ray was done for assessing positioning of the prosthesis, any radiological signs of loosening. Acetabulum was normal till the last follow up in all cases; No acetabular erosion was noted in our study.

Range of movements was calculated in all patients. All the patients were able to do more than 90 degree flexion, more than 30 degree of abduction at regular follow up except those who were immobilized for around 3 weeks . We did not allow patients to cross leg sitting and squatting in our follow up. At the follow up we noted that few patients were squatting against our advice and used to sit on the floor comfortably. Others used to sit on chair and they used western toilet.

The pre fall activity level was achieved by 10 patients (45.45% %) by the end of 3 months and 19 patients (86.6 %) by the end of 6 months. Only 3 patients (13.63 %) unable to get their pre fall level.

As per Harris hip score, 8 patients (36.36%) had excellent results with score more than 90, 11 patients (50%) had good result with score between 80-90, 2 patients (9.09%) had fair result with score between 70-80 and 1 patient (4.54%) had poor result with score less than 70 .

Outcome

Table 2: Table showing outcome as per Harris score.

Harris Hip Score	Result	No. of Cases	Percentage
> 90	Excellent	8	36.36
80-90	Good	11	50
70-80	Fair	2	9.09
< 70	Poor	1	4.54
	Total	22	100

Below are shown some clinical photograph of operated patients [Case 1, 2].

Case 1: Photograph showing pre-operative x-ray, immediate post-operative x-ray of patient treated with bipolar hemiarthroplasty.

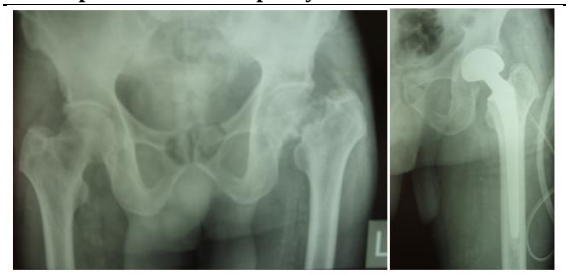

Figure 2: Photograph showing pre-operative x-ray, immediate post operative x-ray of patient treated with bipolar hemiarthroplasty.

DISCUSSION

In India, the technically demanding procedure of total hip replacement lacks universal application and the hemireplacement procedure needs to have continued application to fill the lacuna produced by deficient resources and finances. In this context, we undertook the present study to evaluate the immediate and early results of hemiarthroplasty in fracture neck of the femur using bipolar prosthesis keeping in view the living condition of an average Indian.

The average age of our patients was 62 years in case of males and 65.68 years in case of females, with an overall average of 64.68 years. Majority of the patients were between 51-70 years. Similar age distribution is reported by other authors. Saxena & Saraf (1978) had age distribution 45-90 years (Mean 66 years); Mukherjee & Puri (1986) 65 years.[4,5]

In our series the intracapsular fracture of femoral neck were found to be more common in females (72.72%). The elderly females are more prone to fracture neck of femur due to osteoporosis (Choudhari & Mohite 1987).[6] Female preponderance has been reported in several series. Moore[2] (1957): 62.5%, Sikroski & Barrington (1981):[7] 66.7%; Arwade (1987):[8] 68.3%. Male preponderance is reported in few series: D'Acry and Devas (1976):[9] 91.4%; Mukherjee and Puri (1986):[5] 58.3%; Bavadekar and Manelkar (1987): 60.9%.[10]

Left and right sides are equally affected in our series. Some studies show preponderance of left side. Boyd and Salvatore (1964) reported 55% fractures on left side.[11] D'Acry and Devas (1976) similarly found 55.4% fracture in left hip of their patients.[9]

All the fractures in our series belonged to displaced fractures of Garden Type III and IV. Depending on the anteroposterior radiographs available, we could group 10 patients (45.45%) into type III and 12 patients (54.54%) into Garden type IV.

G.S. Kulkarni (1987) had grouped type III and type IV into one group of 'displaced fractures' and

reported it in 82.5% of his patients. Mukherjee & Puri (1986) had 85% patients of Garden type III and IV fractures.[5,10] 90% percent of our patients had trivial trauma. This is in accordance with majority of the series reported - [Gyepes (1962),[5] Evarts (1973),[13] Seth (1987) etc.[14] The common problems in our series were gross anaemia, hypertension, diabetes mellitus, chronic bronchitis and bronchial asthma. 40% of our patients had one or more of the problem. Hinchey and Day (1964) reported similar problems in 84.6% of their patients,[15] whereas rest also had slight anaemia and mild hypertension with good health. Anaemia was a major problem which is not commonly found in western literature. Most of the patients were anemic and received pre-op, intra-op, and postoperative blood transfusions as required.

We have used the Cemented Bipolar Hemiarthroplasty technique in all of our cases. Some studies show better clinical ratings with uncemented bipolar than cemented bipolar.[16] The peri-operative variables like duration of surgery, amount of blood loss, length of hospital stay and postoperative complications (DVT, chest infection, mortality) were found to be less in the uncemented group. The size of prosthesis commonly used was 41 mm & 43 mm for female and 45 mm & 47 mm for male cases. The average duration of surgery was 75 min. The average blood loss in surgery was 300 ml.

Other series show that cemented hemiarthroplasty is better than uncemented.[17] These studies found that a cemented hemiarthroplasty led to less pain in the hip, improved return of mobility and a reduced hospital stay compared to an uncemented prosthesis. There was no increase in complications or mortality related to the use of cement. In our study, we do not have any complications pertaining to the use of cement. According to Me Conville et al,[18] anterior thigh pain attributed to femoral component loosening would be decreased by use of proportionately sized femoral components and use of cement when indicated. In our series, there is no case of persistent anterior thigh pain, and no evidence of loosening of the prosthesis.

In our series hospital stay ranges from 7 days to 30 days with a mean average of 15 days.

We did not operate any patient as an emergency and all were thoroughly prepared before surgery. 50% of our patients who had various medical problems could not be taken to surgery on the operation day available in the first week of their admission. 75% of patients had prosthesis by first week of their admission to the hospital. Those patients who had no operative or post operative complications were discharged once they were able to walk with support. About 70%' of our patients could go home by second week. About 80% could go home within 3 weeks. Patients who developed complications such as infection, bedsore etc., in the post operative period had to stay longer in the hospital.

Early ambulation and comparatively less hospital stay following hemiarthroplasty have also been reported in other series. This is an advantageous factor in relation to economy of hospital beds and favors financial condition of the patients.

We also found that significant number of our patients who had come from rural areas could not come to the hospital soon after the injury. 35% of the patients were admitted 7 days after the fracture; whereas 5 patients sought medical assistance after 1 month. Poverty, ignorance and difficulty in transportation of the patients to the hospital were the main explanations given for this delay.

We had no operative deaths in our series. Moore (1957) reported 16.6% mortality;[2] Stinchfield and Cooperman (1957) reported 4% dislocation, 6% fractures of the proximal femur. Temporary mental confusion was the commonest complication in the immediate post operative period of Hinchey and Day (1964) series.[15] Salvatti et al (1973) reported 14.3% mortality,[19] 8.3% superficial infection in their patients. C.M Robinson et al (1994) reported 11% mortality within one year,[20] 5% infection, 2% deep vein thrombosis and 3% dislocation in their series.

In our series 2 patients (9.09%) had superficial wound infection. They were treated with proper antibiotics and dressings. 1 patient had deep infection that subsided after single debridement and intravenous antibiotics. The organisms isolated in the above cases were Staphylococcus aureus. (Salvatti et al (1974),[21] Moore (1940), and Wood et al (1980) have reported extremely high mortality following infection of the prosthesis.[22]

Dislocation of the bipolar prosthesis is a rare phenomenon reported in literature ranging from 1.1% at 1 year follow up to 5% at 20 years.[23] However, in our series, no dislocation has occurred at final follow-up.

Salvatti et al.[21] (1974) believed that excessive postoperative flexion or rotation with hip adducted is the main cause for dislocation of the prosthesis and they also observed that dislocation was commonly caused while shifting the patients from the operation theatre to the ward. In 1998, John E. Kenzora et al.[24] noted that all 6 dislocation in their series followed after posterior approach.

1 patient in our series had undisplaced fracture of lateral cortex of femur following prosthetic replacement. It was treated conservatively delaying weight bearing. Hinchey and Day (1964) emphasize that all fractures occur when the surgeon attempts to reduce the prosthesis.[15]

We observed that 14 patients (63.63%) in our series had no pain. Out of 5 patients who had slight pain, 1 patient had heterotopic ossification, 1 had Periprosthetic fracture. 1 patient with deep infection recovered from infection, but had marked

pain. 2 patients with slight pain had no post operative complication.

Lanceford (1965) felt that the pain following hemiarthroplasty should not be the cause for condemning the procedure.[25] He listed following causes for pain: Infection, improper prosthetic seating, metallic corrosion and tissue reaction, improper sized femoral head, contractures, periarticular ossification, toggle or acetabular wandering and redundant ligamentum teres.

Hinchey and Day (1964) reported the use of radiotherapy and intraarticular steroids.[15] It relieved pain in 15 patients and failed to do so in 7. Intraarticular steroids gave relief in 1 patient. Revision arthroplasty was also reported in 1 patient. Active exercises of gluteal and quadriceps muscles relieved in 7 patients after a period of 8 to 20 months. Coventry (1964) recommended physiotherapy,[26] local intraarticular steroids, revision, replacement, girdle stones arthroplasty and Milch Bachelor arthroplasty for painful prosthesis. Now total hip arthroplasty (Muller 1984) is the procedure of choice.

Our 6 patients required treatment for pain. Four of them are partially relieved by analgesics. 2 patients with slight pain were regularly on analgesics.

7 of our patients have varying degree of limping. All of them had slight limp. Limping is a common consequence of hemiarthroplasty in adults. Though 3 of them had mild limb-length discrepancy that was corrected with shoe rise, the exact cause cannot be attributed to this. Alteration in the abductor mechanism due to excision of little more neck is the most probable cause [Saraf and Saxena, (1978);[4] Hinchey and Day (1964)].[15]

All the patients were asked to use a cane on the sound side regularly. This decreases load on the prosthetic head. Once the patient got enough endurance, they were advised to discard the cane. 16% of Barr and Donovan (1964) series were using the cane always,[27] 34% were using occasionally and 20% discarded it. Saraf and Saxen (1978) reported 52.7% patients using cane regularly,[4] 23.1% occasionally and 21.8% were not using it. Our patients are comparable to this.

Polyethylene wear debris and metallosios causing failure of bipolar hemiarthroplasty were reported as isolated instances by Kim et al and Kobayashi et al respectively.[28,29] In our study we did not find any case of Deep Vein thrombosis or Pulmonary Thromboembolism.[30]

In our series, 8 (36.36%) patients had excellent results with Harris Hip Score more than 90, 11 (50%) patients had good results with 80 to 90 score, 2 (9.09%) had fair results with score 70 to 80 and 1 (4.54%) had poor results with score < 70.

The satisfactory results in our series were 86.36%. Our results are comparable with other series: Hinchey and Day:[15] 72.8%; Lanceford 81%;[31] 80.3%; Saxena and Saraf:[4] 90.9%, Mukherjee:[5] 78%.

Mean Harris Hip Score for Bateman's bipolar prosthesis was 85 and for Unipolar hemiarthroplasty was 77 in other series and in our series was 85.18.[32]

There was no evidence of loosening, radiolucent zones, distal migration or subsidence of prosthesis. The patient with Periprosthetic fracture healed and is weight bearing fully with no pain.

CONCLUSION

Hemiarthroplasty is a common procedure in the treatment of femoral neck fractures in elderly. Decision to perform hemiarthroplasty using either unipolar or bipolar prosthesis remains controversial with proponents on either side. Unipolar hemiarthroplasty has been shown to produce good results, though there is high incidence of erosion, protrusion and needs revision in future. The concept of dual bearing surfaces offers considerable advantage, it results in sharing of motion at the two surfaces and hence reduction of net wear at either surface, thus reducing erosion at the acetabular – joint interface. In addition, the total range of motion of joint is increased. From our relatively short-term prospective nonrandomized study, we conclude that bipolar hemiarthroplasty produces good functional outcomes with minimal complications for displaced intracapsular femoral neck fractures and has several advantages; these results are comparable to the other studies.

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