

A prospective study of clinical and functional outcome of coxofemoral bypass bipolar hemiarthroplasty in elderly patient with comminuted intertrochanteric fracture.

¹Dr. Avinashdev D Upadhyay, Registrar, Department of orthopaedic, Post Graduate Institute of Swasthiyogpratisthan, Miraj.

²Dr. Suresh Kriplani, DNB, Orthopaedics, Professor, Department of orthopaedic, Post Graduate Institute of Swasthiyogpratisthan, Miraj.

³Dr. Milind G Kulkarni, MS, Orthopaedics, Director, Department of orthopaedic, Post Graduate Institute of Swasthiyogpratisthan, Miraj.

⁴Dr. Shekhar Malve, DNB, Orthopaedics, D. Orthopaedics, Associate Professor, Department of orthopaedic, Post Graduate Institute of Swasthiyogpratisthan, Miraj.

⁵Dr. Tejas Patil, Registrar, Department of orthopaedic, Post Graduate Institute of Swasthiyogpratisthan, Miraj.

Corresponding Author: Dr. Avinashdev D Upadhyay, Registrar, Department of orthopaedic Post Graduate Institute of Swasthiyogpratisthan, Miraj.

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Abstract

Introduction: There is a worldwide increase in the incidence of intertrochanteric fracture among elderly patients due to the increased life expectancy of people and osteoporosis. Intertrochanteric fracture is defined as the fracture extending from the extra-capsular basilar neck region to region along the lesser trochanter before medullary canal development. The aim of this study is to evaluate the clinical & functional outcomes of

coxofemoral bypass bipolar hemiarthroplasty in elderly patients with comminuted intertrochanteric fractures.

Methodology: A hospital based prospective study was conducted on patients admitted in the Department of Orthopaedics, Post Graduate Institute of SwasthiyogPratishthan, Miraj. Patients who were admitted from June 2018 to January 2020 and underwent coxofemoral bypass bipolar hemiarthroplasty for comminuted intertrochanteric fracture (cemented) were included in this study.

Results: In present study majority of cases were seen between 61-70 yrs of age followed by 5 cases (20%) in 71-80 years of age. 21 cases (84%) had injury due to fall while walking and 4 (16%) had injury due to fall from bike. No complications were seen in 21 (84%) cases, 1 (4%) had abductor weakness, 3 (12%) had superficial infection. 10 (40%) of cases had Excellent Harris hip score followed by 7 (28%) Good score, 5 (20%) fair score, 3 (12%) had poor hip score.

Discussion & Conclusion: Bipolar hemiarthroplasty reduced the complications of prolonged immobilisation, prolonged rehabilitation, marked residual deformities and need for revision surgeries than other surgical modalities. Coxofemoral bypass is a better option in the treatment of unstable IT fracture in the elderly as it provides stable, painless, mobile joint with restoration of walking ability, few complications and good functional outcome.

Keywords: Elder, Comminuted Intertrochanteric Fractures, Hemiarthroplasty, Harris Hip Score.

Introduction

Intertrochanteric fractures in elderly patients are becoming a major social problem from various perspectives, including progressive aging of populations. The elderly have a high risk of hip fracture, even with minor injuries because of osteoporosis, while early surgical treatment may be difficult due to comorbidities and multiple medications they might be taking.

The management of comminuted fracture is still controversial. Initially, in the past, fixation of comminuted fractures with fixed blade plate and enders nail had high rate of cut through and fracture displacement. [1,2] Subsequently sliding hip screw was used with much success and become the predominant method of fixation of these fractures. However, even

with this device, early full weight bearing mobilisation of comminuted fracture can result in rotational deformity and limb length shortening, due to uncontrolled telescoping, metal fracture, screw cut out through head. Early weight bearing following internal fixation of comminuted trochanteric fractures by various means in physiologically elderly and osteoporotic patients leads to fixation failure and poor results. Hence period of restricted mobilisation is suggested for this patient which may cause complications like atelectasis, bed sores, pneumonia, deep vein thrombosis. [3-5] At present intramedullary interlocking devices shows better results in fixing comminuted fractures. However long-term outcome of these device is yet to be defined. Recently endoprosthetic replacements have shown to achieve early mobilisation of the patient and good long-term results. [6-8] Although further prospective randomized trials are required before reaching to conclusion. Hence an ideal treatment method for comminuted intertrochanteric fracture is still controversial. This study evaluates the role of coxofemoral bypass bipolar hemiarthroplasty in treatment of comminuted intertrochanteric fracture in the elderly and physiologically elderly patients.

Material and methods

It was a hospital based prospective study conducted on patients admitted in the Department of Orthopedics, Post Graduate Institute of SwasthiyogPratishthan, Extension Area, Miraj during the study period of 18 months with sample size of 25. Patients aged more than 50 years, patients with comminuted intertrochanteric fracture treated by cemented Coxo femoral bypass bipolar hemiarthroplasty, patients with Independently mobile before the fracture, patients with No head injury or other injury and patients with Fracture less than 3 weeks old

were included in the study. Patients with transcervical, subcapital, Basicervical or subtrochanteric fractures, patients with Non comminuted intertrochanteric fractures. Patients with compound intertrochanteric fractures, polytrauma patients and patient medically unfit for surgery and/or anesthesia were excluded from the study.

Data collection

Functional outcome evaluation

The patients were evaluated using the Harris Hip Score at 3months, 6 months and 12 months which were graded as <70 poor, 70-79 fair, 80-89 good, and 90-100 excellent.

Radiological evaluation

The femoral stem stability was classified into fixation by bone ingrowth, stable fibrous fixation, and unstable prosthesis. The changes in the alignment and subsidence of the femoral components were measured from after surgery to the last follow-up; $\geq 3^\circ$ of valgus or varus and ≥ 5 mm longitudinal change were considered significant. The radiolucent line, bone resorption, endosteal new bone formation and osteolysis were examined in the seven zones. A radiolucent line was denoted the radiolucent area around the stem surrounded by radio dense lines, and were considered present if it occupied $\geq 50\%$ of any zone. Loosening of the femoral stem were defined as the appearance of a radiolucent line progressive or > 1 mm in all zones, or the presence of continuous subsidence or migration of the femoral stem. Consent form were obtained from every patient. On admission of the patient, a careful history was elicited from the patient and /or from the attendants to reveal the mechanism of injury and severity of the trauma. Then the patients were assessed clinically to evaluate their general condition, any co morbidities, local site for any

signs of injury, vital signs were examined and a quick general physical examination and systemic examination was done. Methodical examination was done to rule out fractures at other sites.

All the patients included were investigated thoroughly with Routine blood investigations (Complete blood counts, random blood sugar, kidney function tests, liver function tests), Viral markers (for HBsAg, ANTI HCV,HIV), Routine urine(for albumin, sugar, proteins and microscopy), Radiological examinations pre operatively (x-rays along with CT scans), 2 D echo,ECG in elderly patients, Medical fitness for surgery were taken, Pre operative planning on the basis of CT scan and X-rays, Adequate amount of compatible blood if needed were arranged. Any complications during the intra-operative, immediate post-operative period and at different follow up points were noted as well.

Preoperative evaluation

After patient's admission detailed history regarding mode of injury, associated co-morbid condition was taken. Clinical assessment of the patients were done in detail. All patients were treated preoperatively with buck's traction, with the aim of relieving pain preventing shortening and to reduce unnecessary movement of injured limb. Oral or parental NSAIDs were given to relieve the pain. The following investigations were done routinely on all these patients preoperatively. Blood investigations includes Haemoglobin %, blood grouping and Cross matching, fasting and post prandial blood sugar, blood urea and Serum creatinine.

Radiograph

- Pelvis with both hips – AP
- Injured Hip with femur-AP (Traction and internal rotation view)
- Chest X ray PA view.

Pre-operative templating

Pre-operative templating of radiographs of the fractured side and contralateral side was performed to determine the approximate size and position of the stem and the approximate femoral neck offset.

The patients were operated on elective basis after overcoming the avoidable Anaesthetic risks. Patients as well as the attenders were explained about the surgery and the risk factors; a written consent for the surgery was taken for all patients.

Preoperative preparation

Injection Xylocaine 0.5cc Intradermally and injection TT 0.5cc Intramuscularly given the day prior to surgery. Intravenous antibiotic were given an hour before the surgery.

The back, lateral aspect of the hip from the iliac crest to the distal thigh, groin was prepared.

Surgical procedure

Position of the patient

Straight lateral position with the patient lying on the unaffected side. knee of the unaffected side is flexed to 45 degree which is used as intraoperative reference for measuring limb length. The skin over the hip was prepared with a scrub and application of povidone-iodine and surgical spirit. The operative field was outlined by 4 sterile towels held in place by clips.

Approach

Posterior approach

Exposure

Incision made from a point 10 cm distal to posterior superior iliac spine and extended distally and laterally to the posterior margin of the greater trochanter and then directed about 10cm parallel to the femoral shaft. Deep fascia was exposed and then gluteus maximus is split in the direction of its fibres using blunt dissection. By

retracting the proximal fibres of the muscle proximally, the greater trochanter is exposed. The fractured greater trochanter is reflected anteriorly. The sciatic nerve was usually not exposed, and if it was, it was gently retracted out of the way.

Extraction of Femoral head

After exposure of posterior part of the capsule, capsulotomy done in a 'T' shaped manner. The thigh and knee are flexed to 90° and the thigh is rotated internally to expose the neck of the femur, osteotomy was done at the level of the neck. The head of the femur was levered out of the acetabulum and size measured using template.

Acetabulum preparation

The acetabulum was prepared, the remnant ligamentum teres was completely excised and the remaining soft tissue from the pulvinar region was curetted.

Femoral canal preparation

The femoral shaft was rasped using a broach (rasp) and prepared for the insertion of the prosthesis.

Trial reduction

Trial reductions were performed to determine the exact length that would provide the desired tension and tissue balancing of the abductor muscles and an equal leg length.

Two drill holes were placed in the proximal end of the shaft of femur for passing stainless steel wires

Cementing technique and reduction of prosthesis

Bone cementing done by standard cementing technique. Then bipolar prosthesis introduced in the proximal femur and then reduced into the hip joint once the bone cement set in. Then the greater trochanter was put back in place. One stainless steel wire was passed through the anterior fractured trochanteric fragment and second stainless steel wire was passed through the posterior fractured fragment and tightened to restore the abduction

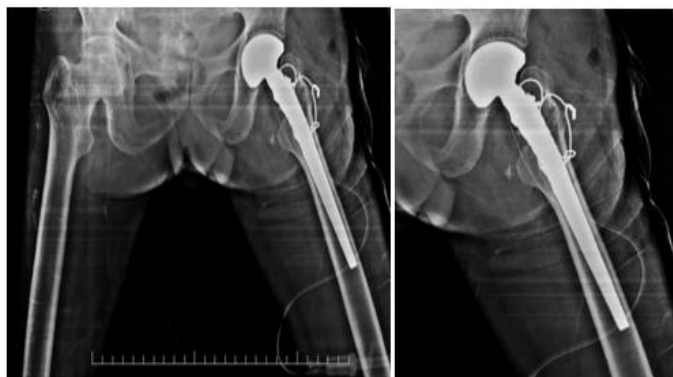
mechanism. The external rotators were sutured, the wound was closed in layers over a suction drain, which is removed at the first change of dressing after 48 hours.

Case 1: type 2 boyd and Griffith intertrochanteric fracture – left femur

Figure 1: Preoperative radiograph



Figure2: post operative radiograph



Case 2: type 2 boyd and Griffith intertrochanteric fracture – right femur

Figure3: Preoperative radiograph



Figure4: post operative radiograph



Post operative protocol

Post operatively Patients were made to sit up on the first postoperative day, stand up with support (walker) on the second post operative day and were allowed to full weight bear and walk with the help of a walker on the third postoperative day, depending on his/her pain tolerance and were encouraged to walk thereafter. Anticoagulants were not given to any patient post operatively. Sitting cross-legged and squatting were not allowed. Suture removal was done on the fifteenth postoperative day. Patients were followed up at an interval of 6 weeks, 3 months, 6 months and 12 months. Patient was analysed clinically and radiologically at each follow up. Functional status was evaluated using the Harris hip score (HHS) and was graded as <70 = poor, 70–79 = fair, 80–89 = good, and 90–100 = excellent.

Radiologically the patient was assessed for position of stem, stem loosening, periprosthetic fracture. The below figure shows the Seven delineated sections around the, femoral component for zonal evaluation of looseness and progressive loosening.

Statistical analysis

The collected data were numerically coded and entered in Microsoft excel 2019 and then transferred to Windows Statistical Package of Social Sciences (SPSS) software (version 21). Quantitative data was described as means and standard deviations and qualitative data was described as median and interquartile range. Normality

of the data was checked using the Kolmogorov–Smirnov test. Means were compared using the paired t test for normal data and Wilcoxon signed rank test for not normal data. Categorical data was compared using the χ^2 test. A two-sided p-value less than 0.05 will be considered statistically significant.

Results

In present study majority of cases were seen between 61-70 yrs of age followed by 5 cases (20%) in 71-80 years of age, 3 (12%) cases in 51-60 yrs of age and 2 (8%) cases had age more than 80 years. 13 cases (52%) were male and 12 (48%) were female. 21 cases (84%) had injury due to fall while walking and 4 (16%) had injury due to fall from bike. 14 (56%) cases had injury on Right side where 11 (44%) cases had on Left side. Most of the cases had Hypertension i.e., 10 (40%) followed by diabetes mellitus in 8 (32%) cases. 7 cases (28%) had Hypertension and Diabetes mellitus. 25 (100%) were operated with cemented technique. Mean operative time was 81.68 mins. 16 cases had less than 350 ml blood loss where 9 cases had more than 350 ml blood loss. 21 (84%) cases were seen without any complications where 1 (4%) case had abductor weakness and 3 (12%) had superficial infection. 1 (4%) case had cardiovascular injury and 1 (4%) case had cerebrovascular injury. Mean shortening (cm) 0.4 cm was seen in present study. Patients required time to full weight bear was 4.02 days. 10 (40%) of cases had Excellent Harris hip score followed by 7 (28%) had good score, 5 (20%) had fair score and 3 (12%) cases were seen with poor hip score. 11 (44%) cases were identified with TYPE 2 fracture and 14 (56%) cases were TYPE 3 fracture. 7 (28%) cases had poor HHS score, 6 (24%) cases had fair score and 12 (48%) cases had Good Score, 10 (40%) cases had Good HHS at 6th month, followed by 7 (28%) cases

with excellent HHS, 5 (20%) cases with Fair HHS and 3 (12%) cases had poor Harris Hip score and at 12th month most cases 10 (40%) were having Excellent Harris Hip score, 7 (28%) Good HHS, 5 (20%) Fair HHS and only 3 (12%) cases were having poor Harris Hip score. From Post op to 12th months significant improvement was observed in Harris hip score (p=0.03*)

Table 1: Demographic profiles

Demographic profile and clinical features	No of cases	Percentage of Cases
Age		
51-60	3	12%
61-70	15	60%
71-80	5	20%
> 80	2	8%
Gender		
Male	13	52%
Female	12	48%
Mode of Injury		
Fall from bike	4	16%
Fall while walking	21	84%
Side		
Left	11	44%
Right	14	56%
Co morbidities		
Diabetes Mellitus	8	32%
Hypertension	10	40%
Hypertension, Diabetes Mellitus	7	28%

Table 2: Operative findings

Operative findings	No of cases	Percentage of Cases
Operative Time		
< 75	8	32%
76 – 85	8	32%
> 85	9	36%
Blood Loss		

< 350	16	64%
> 350	9	36%

Graph 1:

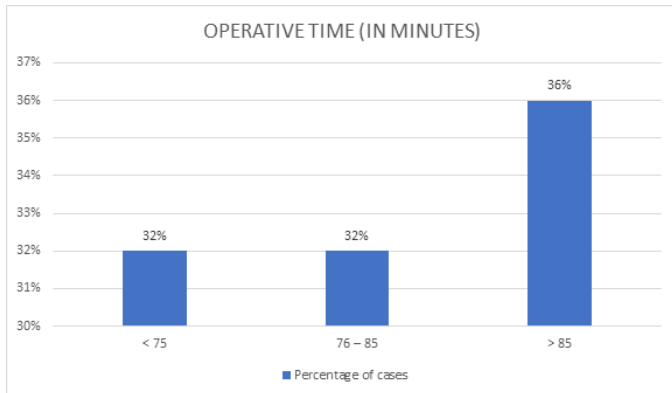


Table 3: Complications

Complications	No of cases	Percentage of Cases
Abductor Weakness	1	4%
Superficial Infection	3	12%
No Complication	21	84%
Total	25	100%

Graph 2:

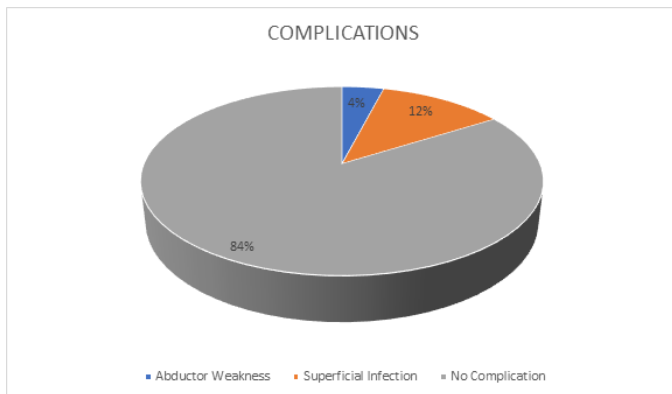


Table 4: Shortening in cm

Shortening in cm	No of cases	Percentage of Cases
1 cm	6	24%
2 cm	2	8%
No Shortening	17	68%
Total	25	100

Graph 3:

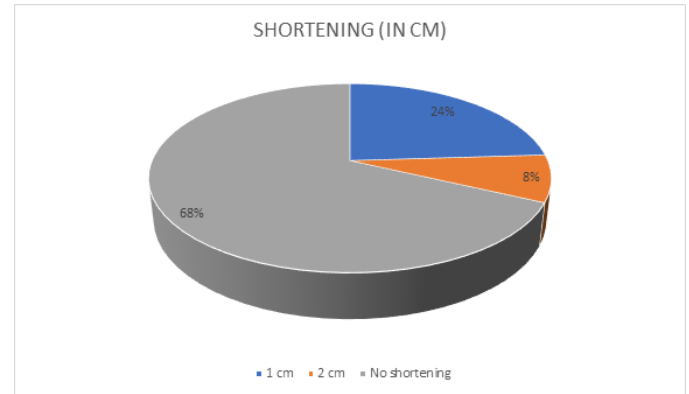
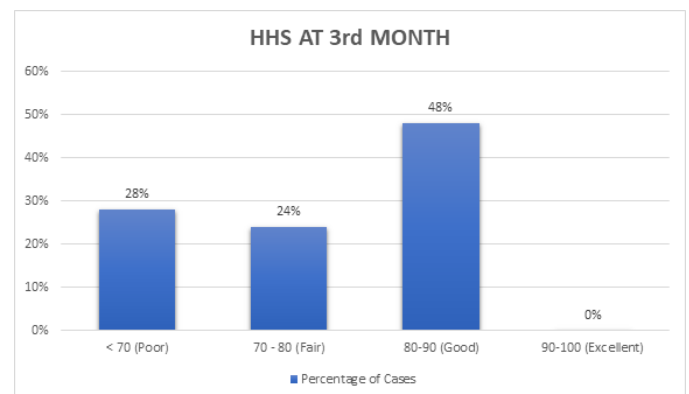


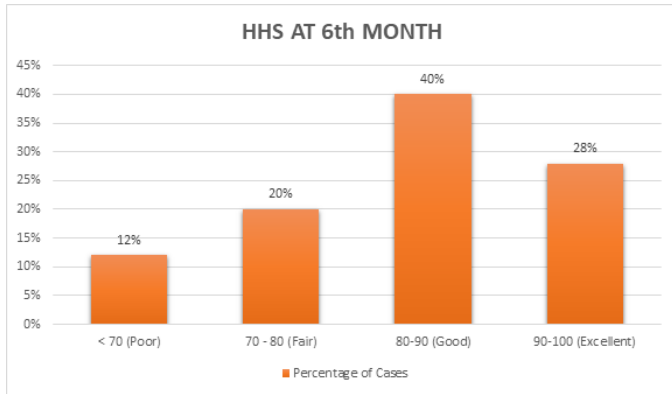
Table 6: HHS

HHS	No of cases	Percentage of cases
At 3 rd month		
< 70 (Poor)	7	28%
70 - 80 (Fair)	6	24%
80-90 (Good)	12	48%
90-100 (Excellent)	0	0%
At 6 th month		
< 70 (Poor)	3	12%
70 - 80 (Fair)	5	20%
80-90 (Good)	10	40%
90-100 (Excellent)	7	28%
At 12 th month		
< 70 (Poor)	3	12%
70 - 80 (Fair)	5	20%
80-90 (Good)	7	28%
90-100 (Excellent)	10	40%

Graph 4:



Graph 5:



Graph 6:

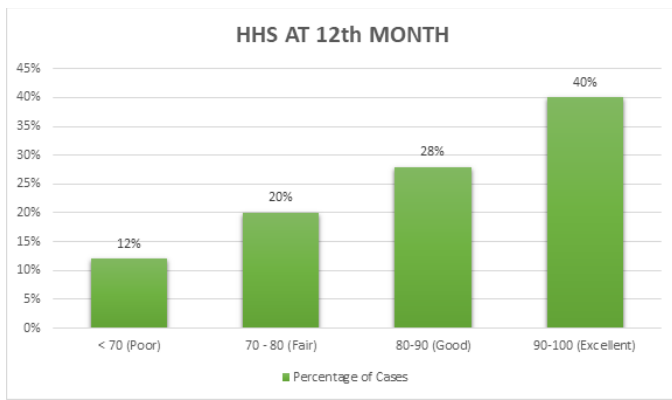
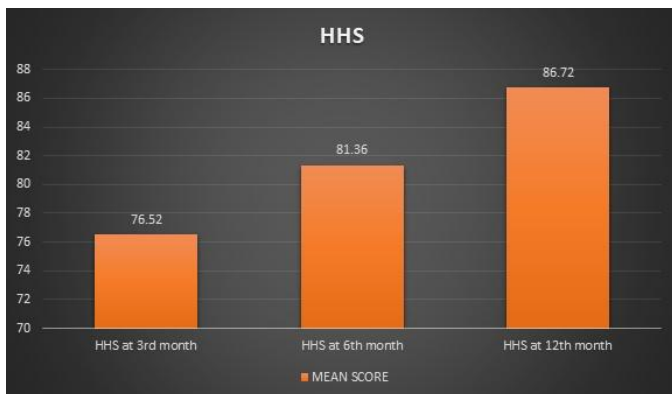


Table 7: HHS month wise

HHS	MEAN±SD	t	P value
HHS at 3rd month	76.52±9.97	1.83	0.03
HHS at 6th month	81.36±10.27		
HHS at 12th month	86.72±10.39		

Graph 7:



Discussion

Internal fixation with dynamic hip screw is the treatment of choice for stable intertrochanteric fracture. However, the scenario is different when comes to the management of comminuted fracture. Failure rate of as high as 56% have been noted with internal fixation of comminuted fractures. [9,10] Hemiarthroplasty is a frequently employed alternative as it gives stability and allows early full weight bearing. Most of the complications associated with internal fixation are avoided with the use of prosthetic replacement. [11,12] Initially hemiarthroplasty was used only in the treatment of failed fixation of intertrochanteric fractures. In 1974 Tronzo was the first surgeon to use long- stem Matchett Brown endoprosthesis for the primary treatment of intertrochanteric fractures.[6] Other surgeons also reported good results with the use of various prosthesis. [13,14] In this study we used bipolar prosthesis in all 25 cases and position of stem was normal in 23 (92%) cases. The average age of patients in our study was 69.44 years which is in concordance of studies done by Atul Patil et al[15] was 65.5 years. Geiger et al [16] reported a significant increase in blood loss (1050 ml) and operating time (115 min) compared to the internal fixation group. Stappaerts et al [17] found no significant difference between outcomes of prosthetic group and internal fixation group except for the higher transfusion need in replacement group. Sanchetti et al [15] reported average blood loss of 350 ml and operative time of 71 mins. In our study average blood loss was 348.4 ml with only 9 patients required blood transfusion and the operative time was 81 mins 68 secs. Our results are comparable with other authors. Stern and Goldstein[14, used Leinbach prosthesis for treatment of 22 intertrochanteric fractures and found early ambulation

and early return to preinjury status as a definite advantage. Grim surd et al [18] in a study of 39 patients of unstable intertrochanteric fractures treated with cemented bipolar hip arthroplasty, reported a relatively low rate of complication. In this study all the cases were treated with cemented bipolar hemiarthroplasty. Siwach et al [19], reported shortening of < 5 mm in 64% of cases, 28% of cases had limb lengthening between 5mm and 10 mm. He noticed shortening was due to excessive sinking of prosthesis following weight bearing. Kiran kumar et al [20], reported 20% cases had shortening of less than 2cm, 10% of case had shortening of more than 2 cm. In our series there were 6 cases had shortening less than 1 cm and 2 cases had shortening < 2 cm. Remaining 17 (68%) cases doesn't had any shortening. In our study 5 patients out of 20 cases had abductor weakness, 21 (84%) cases had no any complication, 1 case had (4%) abductor weakness and 3 cases (12%) had superficial infection. Rodop et al [21], in their study of 37 intertrochanteric fractures treated with bipolar hemiarthroplasty achieved 82% of good to excellent results as assessed by Harris hip score. The higher the HHS, the less dysfunction. Total score of <70 is considered as a poor result; 70–80 is considered fair, 80–90 is good, and 90–100 is an excellent result. In our study fair to excellent results was achieved in 88% of cases. 12% cases had poor Harris hip score. Hence the results of hemiarthroplasty in the management of intertrochanteric fractures are definitely promising. Post-operative mortality reports were conflicting as cited in the literature, varying from 5.4 % to 48.8 %. Most of the comparative studies have shown a slight increase in mortality rate in prosthetic group than the internal fixation group. Kesmezacare et al [22], reported post-op mortality rate of 48.8 % after a mean of 6 months in

patients treated with endoprosthesis. In our study no mortality was noted.

The potential of the bipolar prosthesis in varied indications, shows its versatility. Bipolar hemiarthroplasty reduced the complications of prolonged immobilization, prolonged Rehabilitation, marked residual deformities and need for revision surgeries. The procedure offered, faster mobilization, rapid return to pre injury level, improved the quality of life and gave a long-term solution in elderly patients with intertrochanteric fractures of the femur.

Conclusion

This procedure offered excellent pain free mobile hip, with early mobilisation, easy rehabilitation and early return to functional level, when standard techniques were used. The potential of the bipolar prosthesis in varied indications, shows its versatility. This speaks for the superiority of the procedure. Bipolar hemiarthroplasty reduced the complications of prolonged immobilisation, prolonged Rehabilitation, marked residual deformities and need for revision surgeries.

Coxofemoral bypass is a better option than proximal femoral nail in the treatment of unstable IT fracture in the elderly as it provides stable, painless, mobile joint with restoration of walking ability, few complications and good functional outcome.

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