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Structured Abstract: Management of Femoral Neck Fractures Using Cemented Bipolar Prosthesis

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ABSTRACT

Femoral neck fractures are common orthopedic injuries, particularly among the elderly. Surgical intervention is often necessary to restore mobility and alleviate pain. This study explores the management of femoral neck fractures through the use of cemented bipolar prostheses. Patient evaluation: Comprehensive assessment, including age, bone quality and medical history, is conducted to determine surgical candidacy. Radiographic imaging aids in fracture pattern assessment. Surgical Planning: Implant selection involves cemented bipolar prostheses, comprising a femoral stem and bipolar head. Surgical Procedure: Fractured femoral neck exposure, debridement, femoral canal preparation and stem cementation are executed. Bipolar head attachment permits joint articulation. Postoperative Care: Rehabilitation and weight-bearing restrictions are crucial. Regular follow-up and imaging monitor healing and implant performance. Clinical Outcomes: Cemented bipolar prosthesis implantation yields pain relief, improved joint stability and functional restoration. Complications: Potential complications include infection, implant loosening and dislocation, influenced by patient health and bone quality. Advantages: Cemented bipolar prostheses offer stability and mobility restoration. Challenges: Complications underscore the need for careful patient selection and postoperative care. Future Directions: Ongoing research aims to refine techniques and implant designs, enhancing patient outcomes. Management of femoral neck fractures using cemented bipolar prostheses is a valuable surgical approach, providing stability and improved quality of life. Clinical Implications: This study contributes to orthopedic knowledge, guiding clinicians in the treatment of femoral neck fractures.

INTRODUCTION

Fractures of the femoral neck, a critical junction of the hip joint, pose significant challenges in orthopedic practice. These fractures primarily affect the elderly population and are associated with reduced mobility, pain and a heightened risk of complications. Among the diverse treatment options available, the utilization of cemented bipolar prostheses has emerged as a noteworthy surgical intervention to address femoral neck fractures. This introduction provides an overview of the rationale, context and significance of studying the management of femoral neck fractures using cemented bipolar prostheses.

Rationale for study: Femoral neck fractures are a substantial public health concern, often necessitating surgical intervention to mitigate their profound impact on the patient's life. The choice of surgical technique is influenced by multiple factors, including patient demographics, fracture characteristics and surgeon preference. Cemented bipolar prostheses have gained prominence as a viable option for managing these fractures due to their potential to provide stability, alleviate pain and enhance postoperative mobility.

Context: The femoral neck is a critical anatomical region that connects the femoral head to the femoral shaft, forming a pivotal component of the hip joint. Fractures in this region disrupt the biomechanics of the hip joint and, if not appropriately managed, can lead to complications such as avascular necrosis, non-union and secondary arthritis. Given the aging global population, the incidence of femoral neck fractures is expected to rise, further emphasizing the need for effective and evidence-based management strategies.

Significance of the study: Understanding the management of femoral neck fractures using cemented bipolar prostheses holds substantial clinical and societal significance. This study contributes to the body of knowledge in orthopedics and informs healthcare providers, orthopedic surgeons and policymakers about the advantages, challenges and outcomes associated with this surgical approach. By evaluating the clinical results, complications and patient satisfaction related to cemented bipolar prostheses, this study aims to refine treatment protocols and improve patient care, ultimately enhancing the quality of life for individuals affected by femoral neck fractures.

In the following sections of this study, we delve into the methods, results, discussion and conclusions related to the management of femoral neck fractures using cemented bipolar prostheses, with the goal of providing a comprehensive understanding of this important orthopedic intervention.

MATERIALS AND METHODS

Source of data: Patients who have sustained an intracapsular femoral neck fracture and are admitted in Deccan College of Medical Sciences (PEH), Hyderabad was be taken up for this study after obtaining their consent. This is a prospective study from November 2013 to March 2015.

No. of cases: 20 cases.

Inclusion criteria:

- Intracapsular fracture neck of femur in patients of age 60 years and above
- Ununited fracture neck of femur
- Fracture neck of femur with avascular necrosis

Exclusion criteria:

- Patients below 60 years.
- Avascular necrosis of femoral head with acetabular changes
- Pathological fractures of neck of femur
- Patients medically unfit for surgery

Method of collection of data: Once the patient was admitted to the hospital, both clinical and radiological investigations were carried out and all essential information of those who fulfilled the inclusion criteria was recorded in the proforma prepared for this study. Associated injuries, if any, were noted and the necessary investigations were carried out in order to evaluate fitness for anaesthesia and the surgical procedure.

Preoperative protocol: All study patients were put on skin traction and 3-5 kg of weight applied to maintain the length of the lower limb and facilitate subsequent hemiarthroplasty procedure. Adequate medical management of associated co-morbid conditions like Diabetes Mellitus, Systemic Hypertension and Heart Diseases were initialized to optimize patient's fitness for anesthesia. An informed written consent for the procedure as per the guidelines of the institution and a consent for inclusion of the patient for the present study was taken. The involved lower limb from nipple to ankle was prepared on the day before surgery. The peri-operative antibiotic used was Cefperazone in combination with Sulbactam 8th hourly intra-venous starting 20 min before the procedure and continued for 5-7 days. All patients received Deep Vein Thrombosis (DVT) prophylaxis using low molecular weight heparins (Inj. Enoxaparin, 1 mg kg^{-1} body weight), twice daily, from the day of admission and was stopped 12 hrs prior to the surgery.

Surgical procedure: All cases were done under regional anaesthesia which included spinal or epidural anaesthesia. The choice of the anaesthesia was according to the discretion of the anaesthetist.

Surgical approach: Moore's posterior approach to the hip[1].

After induction of either spinal or epidural anaesthesia the patient was placed on the lateral position on the operative table with the affected side facing up. A curved incision is taken from 8 cm distal to the posterior superior iliac spine, extended distally and laterally, parallel with fibers of gluteus maximus muscle to the posterior margin of the greater trochanter. The incision is then directed distally 5-8 cm along the femoral shaft. The deep fascia is exposed and divided in line with the skin incision. By blunt dissection the fibers of the gluteus maximus are separated taking care not to disturb the superior gluteal vessels in the proximal part of the exposure. The gluteus maximum muscle is split and short external rotators are exposed. Stay sutures are applied to the short external rotators and a tenotomy of the short external rotators is done close to their insertion on the inner surface of the greater trochanter. The short external rotators are retracted to protect the sciatic nerve and expose the posterior hip capsule. The capsule is incised by a T-shaped incision and the hip flexed, adducted and internally rotated to dislocate the hip joint. Using a head extractor and bone levers, head is delivered out of the acetabulum and the acetabulum is cleared of debris. The size of the extracted head is measured by using measuring gauze and the size of prosthesis is selected.

Preparation of proximal femur: The neck is trimmed leaving 1.5 cm of the medial calcar, on which the flare of the prosthesis would eventually sit. The proximal femur was over reamed with rasp, for the insertion of bone cement. The direction of the insertion of the rasp was ascertained by using the lesser trochanter as a guide to achieve correct seating of the prosthesis in 10-150 anteversion.

Preparation and insertion of bone cement: The liquid monomer is added to the powder in a bowl and stirred for 2-3 min using a spatula till the mixture is a homogenous mass and resembles a sticky dough, by the process of polymerization. Once the dough is not sticky but of low viscosity, the cement is inserted into the medullary cavity by the method of Manual cement packing until it is completely packed firmly in the canal with a finger before the stem is introduced. After the canal has been filled, cement is pressed with the thumb, preventing its escape and increasing pressure within canal[2].

Insertion of the bipolar prosthesis: The appropriate sized prosthesis is inserted into the reamed canal taking care to place it in 10-150 of anteversion. The final seating of the prosthesis is by gentle blows with the help of a mallet and the insertor. Adequate seating of the prosthesis on the calcar is visualized directly. The bone cement is allowed to set for a time period of 8-10 min starting from the mixing of the cement components, following which the hip joint is reduced by gentle traction with external rotation of the hip and simultaneous manipulation of the head of the prosthesis into the acetabulum. The range of movement in all directions is checked by taking the joint through the whole range of movements. The stability of the prosthesis and its tendency to dislocate is checked by flexing and adducting the hip. The limb is kept in slight abduction and external rotation for suturing the wound. Great care is taken to achieve adequate closure of the posterior capsule and anatomical reattachment of the short external rotators. The rest of the wound is closed in layers over a suction drain placed beneath the gluteus maximus. Haemostasis is maintained throughout the procedure.

Postoperative protocol: All the patients who were operated were kept in supine position with the involved lower limb in 20-300 abduction using an abduction pillow. Regular half hour TPR and blood pressure chart was maintained for initial 6 hrs followed by two hourly monitoring for 24 hrs. The drain was removed between 24-48 hrs depending on the amount of collection. Peri-operative prophylaxis of Inj. Cefperazone in combination with Sulbactam was administered 8th hourly intra-venously and was continued for the first 5-7 days, followed by administration of oral antibiotics. Deep vein thrombosis prophylaxis using Inj. Enoxparin 1 mg kg^{-1} body weight was continued for 5 days, the first dose starting 24 hrs following surgery. The wound was inspected at the time of drain removal and at the time of suture removal. If however, there was soakage of the dressing or if patient had high fever the wound was inspected accordingly.

All the patients were advised to sit with back rest from the 2nd postoperative day and advised deep breathing exercises. Mobilization with a walker was started between third and fifth post-operative day. Patients were initially advised toe-touch down weight bearing with the help of a walker and later advised progress to full weight bearing with the aid of a walker as tolerated. The sutures were removed between 10-14 days. The study patients were discharged from the hospital on an average of 21 days, the maximum hospital stay being 32 days and the minimum being 10 days.

The patients were examined before discharge for the evidence of any infection at operated site. Active hip and quadriceps exercises for the knee were advised for a period of 6 weeks.

Follow up: Regular follow up of all cases was done at 6 weeks, 3 months and at the end of 6 months. At each follow up patients were evaluated clinically using the Harris Hip Score112 and radiologically with appropriate X-rays.

The harris hip score[3]
Maximum points possible-100

- Pain (44 possible)
  - None or ignores it: 44 points
  - Slight, occasional, no compromise in activities: 40 points
  - Mild pains, no effect on average activities, rarely moderate pain with unusual activity, may take aspirin: 30 points
  - Moderate pain, tolerable but makes concessions to pain some limitation of ordinary activity or work: 20 points
  - Marked pain, serious limitation of activities:10 points
  - Totally disabled, crippled, pain in bed, bed ridden: 0 points

- **Function (47 possible)**
  Gait (33 possible)
  - Limp
  - None 11 points
  - Slight 8 points
  - Moderate 5 points
  - Severe 0 points

- **Support:**
  - None 11 points
  - Cane for long walk 7 points
  - Cane most of the time 5 points
  - One crutch 3 points
  - Two canes 2 points
  - Two crutches 0 point
  - Not able to walk (Specify reason) 0 point

- **Distance walked:**
  - Unlimited 11 points
  - About 5000 meters 8 points
  - About 1000 meters 5 points
  - Indoors only 2 points
  - Bed and chair 0 point

- **Activities (14 possible points)**
  Stairs (4 maximum)
  - Foot over foot without use of railingsL 4 points
  - Foot over foot using railings: 2 points
  - Stairs in any manner: 1 points
  - Unable to do stairs: 0 point

- **Shoes and socks (4 maximum):**
  - With ease 4 points
  - With difficulty 2 points
  - Unable 0 points

- **Sitting:**
  - Comfortably in ordinary chair for 1 hr: 5 points
  - On a high chair for half an hour: 3 points
  - Unable to sit comfortably in any chair: 1 point
  - Ability to enter public transportation: 1 point

- **Absence of deformity:** Points (4) are given if the patient demonstrates:
  - Less than 300 fixed flexion contracture
  - Less than 100 fixed adduction
  - Less than 100 fixed internal rotation in extension
  - Limb length discrepancy less than 3.2 cm

- **Range of motion (5 points possible)**
  - Flexion: 0o-140o
  - Abduction: 0o-40o
  - Adduction: 0o-40o
  - External rotation: 0o-40o
  - Internal rotation: 0o-40o

- **Range of motion scale:**
  - 211o-300o (5)
  - 161o-210o (4)
  - 101o-160o (3)
  - 61o-100o (2)
  - 31o-60o (1)
  - 0o-30o (0)

Though Harris Hip score is evaluated at every visit, the final Harris Hip Score calculated at one year is taken to determine the result of the procedure in the present study. Results are rated as:

- Excellent: 90-100
- Good: 80-89
- Fair: 70-79
- Poor: <70.

RESULTS

During the period between November 2013 to March 2015, 20 patients were treated by hemiarthroplasty using cemented bipolar prosthesis, for fracture neck of femur at the Deccan College of Medical Sciences (PEH), Hyderabad.

Data was collected based on detailed patient evaluation with respect to history, clinical examination and radiological examination. The postoperative evaluation was done both clinically and radiologically. Out of the 20 cases, all patients were available for follow up till six months which was taken as a basic pre-requisite for inclusion in the study.

Table 1 shows the age distribution pattern of the patients. The average age was noted to be 75 years. The youngest patient in the study was 60 years and the oldest was 82 years

Table 2 shows the sex distribution pattern of the study patients. Most of the patients were found to be women (55%).

Table 3 shows the laterality pattern of all the study patients with left side being affected in 50% of the patients.

In Table 4, 75% of the patients sustained the injury by tripping or slipping, 15% due to an RTA and the remaining 10% by a fall from a height.

Table 5 shows the time of presentation after injury. 55% presented within 24 hrs, 30% presented between 24-72 hrs, 10% presented between 72-1 weak and 5% patients presented after a delay of 1 week, this case was diagnosed to be an old fracture neck of femur wherein the patient sustained trauma three months back.

Table 6 shows that 7 patients had a Garden type III fracture, 12 patients had a Garden type IV fracture while 1 patient was diagnosed with a fracture non union of the femur.

Table 7 depicts that 20% of study patients had heart disease, 10% had diabetes, 5% had hypertension, 10% had heart disease as well as diabetes mellitus, 5% of the patients had heart disease and hypertension and 5% had both hypertension and diabetes mellitus.

Timing of surgery: All the study patients were taken up for the surgical procedure between the 2nd and 4th day after the presentation, the average delay to surgery being 4 days.

Type of anaesthesia, position and approach: All the surgeries were performed under spinal or epidural anaesthesia after a thorough preanaesthetic evaluation and preparation. The choice of the type of anaesthesia was as per the anaesthetist's discretion.

All patients were operated after being put into lateral decubitus position by the posterior approach of Moore.

Table 8 depicts that the most commonly used prosthesis size was 45mm followed by 43, 47 and 41 mm.

Table 9 depicts the average blood loss during the procedure. Majority of the patients had a blood loss of below 750 mL.

Table 10 depicts that the most commonly encountered peri-operative problem was technical difficulty in insertion of the prosthesis and difficulty in cementation. In 5 patients, intra operative hypotension was encountered on insertion of cement which was corrected on table by the anaesthetist.

Table 1: Age distribution

Age in years	No. of patients	Percentage
60-69	10	50
70-79	7	35
80-89	3	15

Table 2: Sex distribution

Sex	No. of patients	Percentage
Males	9	45
Females	11	55

Table 3: Laterality

Side affected	No. of patients	Percentage
Right	10	50
Left	10	50

Table 4: Mode of injury

Mode of injury	No. of patients	Percentage
Tripping/slipping	15	75
RTA	3	15
Fall from a height	2	10

Table 5: Time to presentation after injury

Time to presentation	No. of patients	Percentage
<24 hrs	11	55
24-72 hrs	6	30
72-1 week	2	10
>1 week	1	5

Table 6: Radiological type of fracture

Radiological types	No. of patients	Percentage
Garden type I	0	0
Garden type II	0	0
Garden type III	7	35
Garden type IV	12	60
Non-union	1	5

Table 7: Systemic co-morbidities

Systemic co-morbidity	No. of patients	Percentage
Heart Disease	4	20
Diabetes	2	10
Hypertension	1	5
Heart disease+diabetes mellitus	2	10
Heart disease+hypertension	1	5
Hypertension+diabetes mellitus	1	5

Table 8: Size of prosthesis

Size of the prosthesis (mm)	No. of patients	Percentage
41	1	5
43	6	30
45	10	50
47	3	15

Table 9: Average blood loss

Average blood loss	No. of patients	Percentage
<500 mL	8	45.45
500-750 mL	9	40.90
>750 mL	3	13.63

A limb lenghtening of 1 cm was observed in 4 patients while one patient had a shortening of less than 1.5 cm post operatively probably due to an error in calcar preparation. Superficial infection in the form of a wound dehiscence was seen in two patients who were diabetic. Both the patients were managed by antibiotic treatment, debridement and secondary suturing with adequate control of the diabetic status. The infection resolved without any sequelae and there was no late reactivation of the same.

Late postoperative complications: There were no late postoperative complications like implant loosening, dislocation, painful prosthesis erosion, protrusio acetabuli or periprosthetic fracture.

Table 10: Peri-operative complications

Peri-operative complication	No. of patients	Percentage
Technical difficulty	6	30
Intra-op hypotension	5	25

Table 11: Early post operative complications

Complication	No. of patients	Percentage
Limb length discrepancy	5	25
Superficial infection	2	10

Table 12: Distribution of samples by the criteria of pain

Criteria	Scores	Frequency	Percentage
None	44	7	35
Slight	40	5	25
Mild	30	7	35
Moderate	20	1	5
Marked	10	0	0
Pain in bed	0	0	0
Total	20	100	

χ^2: 17.83 and p: 0.003(S)

Table 13: Distribution of samples by the criteria of LIMP

Criteria	Scores	Frequency	Percentage
None	11	7	35
Slight	8	12	60
Moderate	5	1	5
Severe	0	0	0
Total	20	100	

χ^2: 18.8 and P: 0.0003(HS)

Table 14: Distribution of samples by the criteria of use of support

Criteria	Scores	Frequency	Percentage
None	11	13	65
Cane for long walks	7	6	30
Cane most of the time	5	1	5
One crutch	3	0	0
Two canes	2	0	0
Two crutches	0	0	0
Unable to walk	0	0	0
Total	20	100	

χ^2: 52.02 and P<0.0001(HS)

Table 15: Distribution of samples by the criteria of walking distance

Criteria	Scores	Frequency	Percentage
Unlimited	11	15	75
6 blocks	8	4	20
2-3 blocks	5	1	5
Indoors only	2	0	0
Bed and chair	0	0	0
Total	20	100	

χ^2: 40.5 and p<0.0001(HS)

Duration of hospital stay: The minimum duration of hospital stay amongst the study patients was 10 days and maximum duration was 32 days with the average being 21 days.

Follow up: All patients were followed up regularly at 6 weeks, 3 and 6 months. All patients who completed six months follow-up were included in the final analysis. Functional results of hemiarthroplasty were assessed by using the modified Harris hip scoring system under the following headings (Table 12-21):

- Pain
- Limp
- Use of support
- Walking distance
- Climbing up stairs
- Ability to put on shoes and socks
- Sitting in chair
- Enter public transportation
- Absence of deformities and limb length discrepancy
- Range of movements

Table 16: Distribution of samples by the criteria of ability to put on shoes and socks

Criteria	Scores	Frequency	Percentage
With ease	4	20	100
With difficulty	2	0	0
Unable	0		0
Total	20	100	

χ^2: 40.06 and p<0.0001(HS)

Table 17: Distribution of samples by the criteria of stair climbing

Criteria	Scores	Frequency	Percentage
Without using railing	4	17	85
Using a railing	2	3	15
Any manner	1	0	0
Unable	0	0	0
Total	20	100	

χ^2: 39.6 and p<0.0001(HS)

Table 18: Distribution of samples by the criteria of sitting

Criteria	Scores	Frequency	Percentage
Comfortably in ordinary chair for 1 hr	5	20	100
Comfortably on a high chair for 1 hr	3	0	0
Unable to sit comfortably	0	0	0
Total	20	100	

χ^2: 40.06 and p<0.0001(HS)

Table 19: Distribution of samples by the criteria of entering public transportation

Criteria	Scores	Frequency	Percentage
Yes	1	20	100
No	0	0	0
TOTAL	20	100	

χ^2: 20 and p<0.0001(HS)

Table 20: Distribution of samples by the criteria of absence of deformity and limb length discrepancy

Criteria	----------Results----------	
Less than 30° flexion contracture	Yes	No
Less than 10° fixed abduction	Yes	No
Less than 10° fixed internal rotation in extension	Yes	No
Limb length discrepancy less than 3.2 cm	Yes	No

The following observations were made

Criteria	Score	No. of patients	Percentage
If all 4 yes	4	20	100
Less than 4 yes	0	0	0

χ^2: 20 and p<0.0001(HS)

Table 21: Distribution of samples by the criteria of range of movements

ROM	Scores	Frequency	Percentage
211°-300°	5	19	95
161°-210°	4	1	5
101°-160°	3	0	0
61°-100°	2	0	0
31°-60°	1	0	0
0°-30°	0	0	0
Total	20	100	

χ^2: 88.7 and p<0.0001(HS)

The progression of the harris hip score: The average Harris Hip Score at 6 weeks after surgery was 77.55 with the highest score being 91 and the lowest being 63. The average Harris Hip Score at the second follow-up of 3 months was 83 with the maximum score being 100 and the minimum 66. At the third and final follow-up at 6 months the average Harris Hip Score was 87.2 with the highest being 100 and the lowest being 55 (Fig. 1).

Final harris hip score and clinical result: In our study, the final Harris Hip Score as evaluated at six month follow-up averaged 87.2 with the maximum score being 100 and the minimum score being 55. Overall, 10 patients (50%) achieved Excellent result, 6 patients

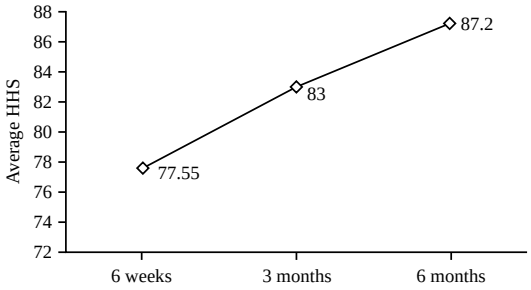

Fig. 1: Average HHS at each follow up

Table 22: Final harris hip score and clinical result

Grade	Harris Hip score	No. of patients	Percentage
Excellent	90-100	10	50
Good	80-89	6	30
Fair	70-79	3	15
Poor	<70	1	5

Table 23: Comparison of clinical result with standard studies

Grade	Our study	Dhawan *et al*.[4]	Lestrange[5]
Excellent	50	54.2	39.6
Good	30	21.0	31.2
Fair	15	10.7	15.3
Poor	5	3.7	13.9

Table 24: Correlation of age with final harris hip score

	Result				
Age	Excellent	Good	Fair	Poor	p-value
60-69	7	3	0	0	0.086
70-79	3	2	1	1	
80-89	0	1	2	0	

Table 25: Correlation of systemic co-morbidities with outcome

	Result				
Co-morbidity	Excellent	Good	Fair	Poor	p-value
Present	2	5	3	1	0.017
Absent	8	1	0	0	

(30%) achieved Good result, 3 patients (15%) achieved fair result and 1 patient (5%) achieved poor result. 80% of the patients achieved an excellent or good result (Table 22).

Table 23 shows the comparison of the present study with standard studies. The results obtained with bipolar hemiarthroplasty in the current study are comparable with standard studies.

From the above stastical data with a p-value of 0.086, we found that there was no significant correlation between the age of the patient and the final outcome (Table 24).

From the above data with a p-value of 0.017, we inferred that there is a significant correlation between the presence of systemic co-morbidities and the final outcome of the patients (Table 25).

DISCUSSIONS

The aim of replacement surgery in fracture neck femur is early return to daily activities. This is particularly applicable to the elderly age group where complications due to long periods of immoblization have to be prevented.

The mean age of the patients in the present study was 75 years, the youngest being 60 years and the eldest being 82 years. Age distribution is an important factor in the management of hip fractures. The results of our study showed that age of the patient had minimal influence on the final functional outcome.

As in most standard studies, the present study also had a higher number of females who sustained a fracture neck of femur as compared to the male population. Elderly females are more prone to fracture neck of femur due to osteoporosis[6].

Majority of our study patients (75%) sustained the injury due to a trivial trauma like tripping or slipping. This is a very common occurrence in elderly population where poor vision and lack of neuro-muscular coordination is a problem. Most of such injuries can be classified as “indirect” trauma. 10% patients sustained the injury due to a fall from a height and 15% due to a Road Traffic Accident

A little more than half of our study patients were brought to the hospital within three days of sustaining the injury. 55% of the patients were brought to the hospital within 24 hrs of the injury while 30% presented for treatment within 24-72 hrs. 10% were brought to the hospital between 72 hrs to 1 weak and the remaining 5% presented for treatment after one week. Difficulty in post-operative rehabilitation was particularly noticed in the patient who presented after 90 days following trauma, probably due to bony and soft tissue changes that would occur in this duration which finally gave a poor outcome.

All of our study patients had a displaced fracture of the neck of femur. Majority of the patients (60%) had a Garden type IV fracture while seven patients (35%) had Garden type III fracture and one patient (5%) was diagnosed with a non union fracture neck of femur. Even in a comparision study by Krishnan *et al*.[7], between the outcomes following Cemented and Uncemented bipolar prosthesis, 29 patients were of Garden type IV, while 5 patients sustained a Garden type III fracture type. However, the type of fracture and the displacement did not have any bearing on the final function.

Heart disease was found to be the most common co-morbidity seen in 20% of the study patients. Two patients had Type II Diabetes and were on oral hypoglycaemic agents or Inj. human actrapid. They were shifted to insulin pre-operatively and blood sugar values optimized before taking up for surgery. 5% of the patients were hypertensives, while 10% of the patients had both heart disease and diabetes mellitus, 5% had heart disease and hypertension and another 5% of the patients were diagnosed with both hypertension and diabetes mellitus. It was observed that the post-operative rehabilitation of patients was significantly affected by the presence of the

above co-morbidities[8]. This also had an effect on the final functional result of the procedure[9]. Similar observations have been made by Koval and Zuckerman[8] and Bath[9].

All the study patients were taken up for the surgical procedure between the 2nd and 4th day after the trauma, the average delay to surgery being 4 days. Delay in taking up for surgery was usually for optimizing the medical condition of the patient. DVT prophylaxis was given for all patients, using low molecular weight heparins, on admission and was stopped 12 hrs before the surgery. All cases were performed on an elective basis and were scheduled as the first surgery in the morning.

All the surgeries were performed under spinal or epidural anaesthesia after a thorough preanaesthetic evaluation and preparation. The choice of the type of anesthesia was as per the anaesthetist's discretion.

All patients were operated after being put into lateral decubitus position by the posterior approach of Moore. The posterior approach was preferred because of the familiarity of most of the surgeons at our institution with the approach. Though the dislocation rate is reported to be more with the posterior approach, none of our study patients had a post-operative dislocation of the prosthesis[9]. This was because, meticulous attention was given to suturing the posterior capsule and the short external rotators and keeping the limb in slight abduction using an abduction pillow, after the procedure. Patients were also explained in the immediate post-operative period, about the risk of dislocation with excessive flexion or adduction of the hip.

In 50% of the cases 45 mm prostheses were used which was followed by 43 mm (30%), 47 mm (15%) and 41 mm (5%) prostheses in the order of frequency. Following calcar preparation and over reaming of the medullary cavity using the rasps which were provided, manual packing of cement and insertion of the prosthesis was done.

Technical difficulties encountered with the procedure, firstly was calculating the angle of the neck osteotomy required and the amount of calcar to be retained for the correct placement of the prosthesis. Secondly a difficulty in cement insertion by the technique of manual packing was also encountered. Intra operative hypotension was encountered in 5 patients, during cement insertion but was corrected on table by the anaesthetist.

In upto half of the cases, the blood loss was <500 mL for the whole procedure and in most of the others it was between 500-750 ml. Only 13.63% of cases had a blood loss of >750 ml requiring a blood transfusion. It has been reported in literature that the average blood loss with hip hemiarthroplasty is less in the anterior approach as compared to the posterior approach[9,10]. Most of the surgeries were completed between 90-120 minutes of starting the procedure. Similar duration of the procedure has been reported by Haidukewych *et al*.[11] and Drinker and Murray[12]. Neither the intra-operative blood loss nor the duration of the procedure had any effect on final function. Most of our study patients were mobilized in bed on day one of surgery and with weight bearing as tolerated within the 72 hrs postoperative period. Delay if at all was due to medical reasons.

Limb length discrepancies were observed in 5 patients (25%) post-operatively, of which 4 patients had a lengthening of 1 cm each, probably due to the less amount of calcar resection, while one patient had a shortening of 1.5 cm post operatively, probably due to excessive resection, during preparation of the calcar.

Superficial infection in the form of a wound dehiscence was seen in two patients (10%) who were diabetic. Both the patients were managed by antibiotic treatment, debridement and secondary suturing with adequate control of the diabetic status. The infection resolved without any sequelae and there was no late reactivation of the same. Infection rate of 3.9% after bipolar hemiarthroplasty is reported by Nottage and McMaster[13].

No complications of Deep vein thrombosis was noticed in any patient due to the administration of low molecular weight heparins, pre operatively and for 5 days post operatively[4].

The minimum duration of hospital stay amongst the study patients was 10 days and maximum duration was 32 days with the average being 21 days. Average hospital stay of 21 days with bipolar hemiarthroplasty has been reported by Lestrange[5]. Drinker and Murray have reported an average hospital stay of 23 days with the same procedure[12].

There were no late postoperative complications like loosening, dislocation, erosion, secondary osteoarthritis, protrusio acetabuli or periprosthetic fracture. We are unable to comment upon long term acetabular erosion due to relative short follow up.

Post operatively and on discharge, patients were adviced physical rehabilitation excercises of the hip and the knee in the form of quadriceps excercises. Moreover toe touch down weight bearing with the help of a walker was initiated by the third to fifth day post operatively and was continued till the first follow up according to tolerance of pain.

All patients were followed up regularly at 6wks, 3 months, 6 months and the functional outcomes were assessed using the Harris Hip Scoring system.

Pain following hemiarthroplasty is a major concern. Hinchey and Day[14] in their series of 294 patients found pain following hemiarthroplasty in 22 patients in the early post operative period. They could not find any definitive cause in them. Lunceford[15]

stated that the causes of pain could be due to infection, improper prosthetic seating, metallic corrosion and tissue reaction, improper sized femoral head, contractures and periarticular ossification. In our study, 13 patients had complaints of pain on the final follow up. These patients were however adviced excercises and were reassured about the condition, along with which medications were prescribed and adviced to be consumed only when the pain was intolerable.

In our study, the final Harris Hip Score as evaluated at six month follow-up averaged 87.2 with the maximum score being 100 and the minimum score being 55. Off 20 patients, 10 patients (50%) achieved Excellent result, 6 patients (30%) achieved Good result, 3 patients (15%) achieved fair result and 1 patient (5%) achieved poor result. Overall 80% of the patients achieved either an excellent or good result. Our results are comparable with standard studies of bipolar hemiarthroplasty performed for fracture neck femur. The poor result in one patient may be attained to the late presentation following trauma, which had an effect on the surgical procedure and post operative rehabilitation, probably due to soft tissue and bony changes that must have occurred.

No radiological changes or complications were noticed in any patients, at the end of 6 months follow up.

Our study is not without its own shortcomings. Firstly, our duration of follow-up of six months is very less in assessing the longevity and functional endurance of the prosthesis used and hence come to definitive conclusions. Secondly, we have not evaluated the degree of intra-prosthetic motion at the inner bearing at each follow-up. Such studies are complicated and beyond the facilities available at our institution. Such studies are indicated because there are claims that the motion at the inner bearing reduces over time and most prostheses behave as unipolar prostheses over a period of time.

CONCLUSION

The management of femoral neck fractures using cemented bipolar prostheses is a clinically valuable and evolving approach in orthopedic practice. This study contributes to the existing body of knowledge by providing insights into patient selection criteria, surgical techniques, clinical outcomes and potential challenges associated with this intervention. While this method offers significant benefits, it is crucial for healthcare providers and orthopedic surgeons to exercise careful judgment, tailor treatment to individual patient characteristics and remain vigilant in postoperative care to optimize outcomes and enhance the quality of life for those afflicted with femoral neck fractures. Continued research and innovation in this field promise to further enhance the effectiveness and safety of this surgical approach, benefiting patients worldwide.

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