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Dr. Hiranya Kumar S
Professor, Department of Orthopedics, Vydehi Institute of Medical Sciences and Research center, Bengaluru, Karnataka, India

Dr. Mahesh Kumar Reddy V
Senior Resident, Department of Orthopedics, Vydehi Institute of Medical Sciences and Research center, Bengaluru, Karnataka, India

Dr. Gowtham G
Senior Resident, Department of Orthopedics, Vydehi Institute of Medical Sciences and Research center, Bengaluru, Karnataka, India

Dr. Abhinav Gandra
Senior Resident, Department of Orthopedics, Vydehi Institute of Medical Sciences and Research center, Bengaluru, Karnataka, India

Correspondence
Dr. Mahesh Kumar Reddy V
Senior Resident, Department of Orthopedics, Vydehi Institute of Medical Sciences and Research center, Bengaluru, Karnataka, India

The functional outcome in patients treated with THA with acute fracture neck of femur in patients aged above 60 years using Harris hip score

Dr. Hiranya Kumar S, Dr. Mahesh Kumar Reddy V, Dr. Gowtham G and Dr. Abhinav Gandra

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Abstract
The incidence of femoral neck fractures is increasing continuously among the aging population. The numbers of hip fracture are expected to increase from 1.7 million in 1990 to 6.3 million during the year 2050. The femoral neck fractures and pertrochanteric fractures are of approximately equal incidence and together make up to 90% of the proximal femur fractures and the remaining 5 – 10% is subtrochanteric. A total 40 patients with acute fracture of neck of femur aged above 60 years treated with THA attending the Department of Orthopedics, constituted the sample size. The sample size was calculated by assuming a Harris hip score of 81 points with a standard deviation of 5, with a relative precision of 2% (Alpha of 5%, 95% confidence interval). The Harris hips score was 81.82 at the end of 6 months of follow up, 86.07 at the end of 3 months and 91.1 at the end of 6 months. The mean difference in Harris Hip score between the 6 weeks versus 3 months was 4.25, 9.27 between 6 weeks versus 6 months and 5.02 between 3 months versus 6 months. There was a statistically significant difference in the Harris Hip score in the period of follow up.

Keywords: THA, acute fracture neck of femur, Harris hip score

Introduction
The fracture neck of femur has always been a great challenge to the orthopaedic surgeon and remains unsolved mystery as far as the treatment and its results are concerned. Femoral neck fractures occur in high incidence in elderly population and this incidence is expected to increase to over six million hip fractures worldwide by year 2050.[1] Patients with displaced femoral neck fracture have high mortality and disability as a consequence these fractures have a significant impact on the patient personal dependence, mobility, quality of life and as well as on global economic health costs [2].

The most frequently used treatment of displaced femoral neck fractures is by hemiarthroplasty as majority of them are old and have a limited life expectancy but as the life expectancy of an individual has increased globally due to better health care facilities and availability and the elderly are more active in the society therefore hemiarthroplasty cannot be the main stay of treatment as it has higher complication rates after a year and requires secondary surgery in many cases [2]. The incidence of femoral neck fractures is increasing continuously among the aging population. The numbers of hip fracture are expected to increase from 1.7 million in 1990 to 6.3 million during the year 2050. The femoral neck fractures and pertrochanteric fractures are of approximately equal incidence and together make up to 90% of the proximal femur fractures and the remaining 5 – 10% is subtrochanteric [3]. In United States, the prevalence rate of at least 10% for at least 10% for ipsilateral femoral shaft fractures, of which 30% are missed on the initial presentation [4] A study had reported higher rate of stress fractures than men, with relative risks ranging from 1.2 to 10 for similar training volumes [5]

There are various modes of surgical management available for the treatment of fracture neck of femur. Due to osteoporosis and poor bone quality in elderly people total hip replacement serves better results. Elderly people are highly prone for these fractures due to osteoporosis postural imbalance, poor eye sight, poor general conditions, unsafe surroundings etc.

Any simple fall and direct blow results in neck of femur fracture. Many people become bed ridden due to poor or improper selection of surgical management. Following surgery additional factors such as systemic illness and improper mobilisation make the patients handicapped. This leads to bed sores, infections, deep vein thrombosis etc. Numerous implant failures and resurgeries are encountered. [6]
The main methods of choices are internal function, hemiarthroplasty and total hip arthroplasty. Internal fixation is the main alternative for young patients with displaced intracapsular fractures and in frailest elderly patients who are not medically fit for the prosthesis surgery [7]. Most surgeons seem to recommend that hemiarthroplasty is the preferred treatment for elderly patients with low functional demands in the absence of arthritic changes in the hip [8].
The high incidence of non union and avascular as it is influenced by many factors such as age of the patients, degree of osteoporosis, displacement of head, delay in reduction, type of fixation device and its final position [9].
Hemiarthroplasty avoids these complications, which result from inadequate-blood supply to the femoral head, but is often unsatisfactory in younger patients because of high incidence of acetabular erosion and pain. Infection, loosening and dislocation are other problems, which add to the poor clinical results and a need for second surgery. Repeat surgery has its own share of high incidence of medical complications and mortality [10, 11]
Evidence is accumulating to support THA in elderly patients [1] as use of THA has shown to reduce the need for subsequent re-operation and improve patient satisfaction. Several recent studies demonstrate great success with the use of THA as a primary procedure following fracture of the neck of femur. This functional outcome without any increase in mortality or morbidity for active elderly patients with an acute displaced femoral neck fracture. As many such studies have not been done in India, this study was taken up to understand the functional outcome.

Methodology

A total 40 patients with acute fracture of neck of femur aged above 60 years treated with THA attending the Department of Orthopedics, constituted the sample size. The sample size was calculated by assuming a Harris hip score of 81 points with a standard deviation of 5, with a relative precision of 2% (Alpha of 5%, 95% confidence interval).
Patients with acute fracture neck of femur treated with total hip arthroplasty aged above 60 yrs who satisfied the inclusion criteria were included in the study. They were admitted and examined according to protocol both clinically and radiologically. Trained joint replacement surgeons in the hospital provided the treatment. The patients were evaluated clinically and radiologically before surgery and at 6 weeks, 12 weeks, and 24 weeks. Each case were followed minimally for 6 months. Functional outcome is assessed by Harris hip scores where the score range from 70-100 and the interpretations are as follows. Less than 70 is poor, 70- 79 is fair, 80-89 is good and 90-100 is excellent.

Radiological assessment

Radiogram of the pelvis with both hips with proximal half of shaft of femur AP view was taken for all patients. The radiograph was evaluated for:

- Size of the acetabulum
- Bone stock of the acetabulum
- The structural integrity of the acetabulum
- Need for bone grafting
- Size of the femoral canal Templating was done for the acetabular and femur components. The appropriate acetabular cup size, and anteversion was determined. On the femoral side, using a template, appropriate neck length, offset and stem size of the implant is chosen.

Templating

- This includes the use of plastic overlay templates supplied by the prosthesis manufacturer both for femoral and acetabular components to aid in selection of the type of implant that will provide the best fit, implant size and neck length required to restore equal limb lengths and medial offset.
- A horizontal line drawn joining both ischial tuberosities intersect the lesser trochanters in normal individuals. In limb length discrepancy, the difference between the lesser trochanter and the point of intersection of the line at the affected femur is measured and it is considered to be the amount of discrepancy to be corrected.
- Acetabulum: Place acetabular templates on the film and select a size that closely matches the contour of patient‟s acetabulum. The medial surface of the cup is at the teardrop and the inferior limit is at the level of obturator foramen. Mark the new center of rotation of hip. Femur: Select a size that most precisely matches the contour of proximal canal with 2-3 mm of cement mantle. Select a neck length so that the difference in the height of femoral and acetabular center is equal to the limb length discrepancy.

Results

Table 1: Distribution of the study group according to interval between trauma and date of surgery

Interval between trauma and date of surgery	Frequency	Percent
2 – 5 days	23	57.5
6 – 10 days	11	27.5
More than 10 days	6	15.0
Total	40	100.0

This study had shown that, about 57.5% of the patients had surgery within 2 – 5 days after injury, 27.5% had surgery between 6 – 10 days and 15% had surgery after 10 days of the fracture.

Table 2: Distribution of the study group according to type of THA

Type of THA	Frequency	Percent
Cemented	17	42.5
Hybrid	2	5.0
Reverse hybrid	15	37.5
Uncemented	6	15.0
Total	40	100.0

About 15% of the patients in this study had uncemented arthroplasty, 5% had hybrid arthroplasty, 37.5% had reverse hybrid and about 42.5% had cemented total hip arthroplasty.

Table 3: Distribution of the study group according to duration of hospital stay

Duration of hospital stay	Frequency	Percent
10 – 15 days	20	50.0
16 – 20 days	19	47.5
More than 20 days	1	2.5
Total	40	100.0

About 50% of the patients were hospitalized for 10 – 15 days, 47.5% stayed in the hospital for 16 – 20 days and 2.5% stayed for more than 20 days.

Table 4: Distribution of the study group according to final outcome

Final outcome (HHS)	Frequency	Percent
Excellent	33	82.5
Good	6	15.0
Fair	1	2.5
Total	40	100.0

The outcome of the arthroplasty was excellent in 82.5% of the patients, fair in 2.5% of the patients and good in 15% of the patients.

Table 5: Distribution of the study group according to post-operative limb length

Post operative limb length	Frequency	Percent
1 cm lengthening	5	12.5
Normal	33	82.5
1 cm shortening	2	5.0
Total	40	100.0

The post operative limb lengthening by 1 cm was present in 12.5% of the patients and shortening by 1 cm was present in 5.0% of the patients. Rest of the patients had normal limb length.

Table 6: Distribution of the study group according to post operative follow up

Follow up	Frequency	Percent
12 months	16	40.0
13 months	3	7.5
14 months	7	17.5
15 months	4	10.0
16 months	7	17.5
17 months	1	2.5
18 months	2	5.0
Total	40	100.0

About 40% of the patients were followed up for 12 months, 17.5% were followed up for 14 months and 16 months and 10% were followed for 15 months.

Table 7: Distribution of the study group according to type of anesthesia

Type of anesthesia	Frequency	Percent
GA	3	7.5
SA	1	2.5
SA + Epidural	36	90.0
Total	40	100.0

About 90% of the patients had spinal with epidural anesthesia, 7.5% had general anesthesia for their surgery and 2.5% had spinal anesthesia.

Table 8: Distribution of the study group according to Harris Hip score

Harris Hip score	Mean	Std deviation
6 weeks	81.82	3.33
3 months	86.07	4.2
6 months	91.1	5.07

The Harris hips score was 81.82 at the end of 6 months of follow up, 86.07 at the end of 3 months and 91.1 at the end of 6 months.

Table 9: Distribution of the study group according to comparison of Harris Hip score

Harris Hip score	Mean difference	Std deviation	T value	P value
6 weeks vs 3 months	4.25	1.88	14.315	<0.001, Sig
6 weeks vs 6 months	9.27	3.2	18.511	<0.001, Sig
3 months vs 6 months	5.02	2.7	11.757	<0.001, Sig

The mean difference in Harris Hip score between the 6 weeks versus 3 months was 4.25, 9.27 between 6 weeks versus 6 months and 5.02 between 3 months versus 6 months. There was a statistically significant difference in the Harris Hip score in the period of follow up.

Discussion

About 40% of study subjects presented to the hospital at 2 – 5 days and 35% presented on 1st day of fracture. No studies compared these results. This study had shown that, tripping / slipping was the main reason for fracture in 95% of the patients. No studies were available to compare these results.

The fracture was direct in 5% of the patients and indirect in 95% of the patients. None of the studies were available to compare these results.

About 37.5% of the patients in this study had Garden stage III fractures and 62.5% had Garden stage IV fractures. In a study by Monzon *et al*, 65.5% of the patients had type III fractures and 34.5% had type IV fractures [12].

About 17.5% of the patients in this study had diabetes mellitus and 7.5% had diabetes mellitus and hypertension and 30% had hypertension. In a study by Mani *et al*, 15% had diabetes, 20% had hypertension, 15% had old Cerebrovascular Accidents and 25% had ischemic heart disease [13].

This study had shown that, about 57.5% of the patients had surgery within 2 – 5 days after injury. In a study by Sriram *et al*, the average delay between the admission and operation was 3.1 days [14].

About 37.5% had reverse hybrid and about 42.5% had cemented total hip arthroplasty. In contrary to this results, 86% of the patients had acetabular cementation was good. In a study by Mani *et al*, 55% had uncemented arthroplasty and 45% had cemented arthroplasty [13] About 50% of the patients were hospitalized for 10 – 15 days and 47.5% stayed in the hospital for 16 – 20 days. No studies compared these results.

The outcome of the arthroplasty was excellent in 82.5% of the patients in this study. In a study by Sriram *et al*, excellent results were seen in 7 out of 23 cases, good results were obtained in 25 patients and 1 patient had poor results.[14] In a study by Mani *et al*, the 40% of the cases had excellent outcome, 45% had good outcome and none had poor outcome.[13] *Gregory et al,* reported a mean Harris score of 83 with 6 patients having poor results (Score <70). But in 4 of these cases this was due to factors other than the hip itself [15]

The post operative limb shortening by 1 cm was present in 5.0% of the patients. In a study, Sidhu *et al.* had noticed that limb lengthening of 0.5 – 1.0 cm was noticed in 13 patients. In a study by Sriram *et al*, an average of 1.1 cm of postoperative shortening was found in 4 cases.

About 40% of the patients were followed up for 12 months and 17.5% were followed up for 14 months. In a study by Sidhu *et al*, the follow up period ranged from three to five years with a mean duration of 3.7 years. In a study by Sriram *et al*, the follow up period ranged from 2 weeks to 1 year with a mean duration of 7 months [14].

About 90% of the patients had spinal with epidural anesthesia in this study. In a study by Monzon *et al*, spinal anesthesia was used in majority of the patients [12].

The Harris hips score was 81.82 at the end of 3 months of follow up, 86.07 at the end of 6 months and 91.1 at the end of 9 months. In a study by Sidhu *et al*, the Harris hip score at one month was 66, at three months it was 72 and at three year follow up was 76. In a study by Sriram *et al*, the mean Harris Hip score was 90.08 [14].

The mean difference in Harris Hip score between the 6 weeks versus 3 months was 4.25, 9.27 between 6 weeks versus 6 months and 5.02 between 3 months versus 6 months. There was a statistically significant difference in the Harris Hip score in the period of follow up. No studies compared these results.

Conclusion

The overall functional and clinical outcome had shown excellent result. In Our short term follow up study we support THA as a primary surgery in acute fracture neck of femur in active elderly over 60 years of age. But this study is not without limitations which include a small sample size of 40 patients and a short follow up period of average 1 year. But this study was able to bring out many important facts about the use of THA in elderly patients with fracture neck of femur. Further research in this direction can bring out more facts about the disease.

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