

Original Research Article

A study of comparative analysis of the outcome of Hardinge's and Moore's approach of hemi arthroplasty of hip

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ABSTRACT

Background: The posterior (Moore) approach is generally considered to be easy to perform and has less tissue dissection, which leads to shorter operation times and less blood loss. The lateral (Hardinge) approach can provide generous exposure of the acetabulum, which facilitates cup positioning results may decrease rates of hip dislocation.

Methods: In this study a prospective comparative study of outcome of Hardinge's vs. Moore's approach in hemi arthroplasty of hip done on 60 consecutive consenting cases who presented with a primary diagnosis of neck of femur fractures. The Selection of patients was randomized by selecting every alternate case of neck of femur fractures by Moore's approach or Hardinge's approach. Study recruited 30 cases in each group after the preoperative parameters like age, sex, side, mechanism of injury and the type of fracture.

Results: 30 cases underwent hemi - arthroplasty of hip by Hardinge's approach vs. Moore's technique and we found that there was difference in duration of hospital stay, the duration of healing and the rate of complications were much higher in the Moore's technique. In our study there was no mortality.

Conclusions: Based on the findings of our study we recommend that between Hardinge's and Moore's approach, Hardinge's approach is recommended as better than Moore's approach due to number of complications is lower in Hardinge's.

Keywords: Hardinge's approach, Moore's approach, Hemi arthroplasty of hip

INTRODUCTION

Injuries related to proximal femur and hip are common in the population and they are increasing in their prevalence during the past few decades. The mortality and morbidity due to these fractures leads 30% of elder patients to die post one year fracture.¹ After 1 year, patients seem to resume their age-adjusted mortality rate.

Fractures to femur neck commonly occurs in elders because of only moderate or minimal trauma. Whereas, high energy trauma is the major cause for these type of fractures in younger age peoples.² Despite similar

locations of the fracture, the differences in low-velocity and high-velocity injuries in older compared with younger patients outweigh the similarities.³ Most of the times, high-velocity trauma is more difficult to manage and also it results in associated complications than low-velocity trauma.

Nowadays, the aim of treatment is made to attempt to return the patient to his/her normal level of function irrespective of the age and fracture pattern. Various studies have considered the replacement of the femoral head as an alternative due to the frequent development of nonunion, failure of osteosynthesis and avascular necrosis of femoral head.

Prosthetic replacement designs have been formulated to manage the fracture at the femoral neck which disrupts the blood supply to the femoral head, which leads to obstruct the fracture healing. The complications of persistent pain and protrusio acetabuli with unipolar hemiarthroplasties have lead many studies to choose the bipolar system. Various studies recommended that the current generation of bipolar hemiarthroplasties may have lower incidence of protrusio acetabuli than do earlier designs.

The bipolar prosthesis was designed so that primary articulation would be at the inner bearing of the prosthesis and not at prosthesis-cartilage interface, thereby decreasing the amount of acetabular erosion and pain that the patient encountered. Based on the previous literature, current study designed to compare and analyze the outcome of Hardinge's and Moore's approach of hemiarthroplasty of hip.

METHODS

The study was a prospective randomized case study performed after obtaining Ethical clearance from the institutional Ethics committee done on 60 consecutive consenting cases who presented with a primary diagnosis of neck of femur fractures to the department of orthopedics at Narayana Medical College and Hospital for a period of 18 months from December 2014 to June 2016. The patients who met the below said criteria were enrolled in the study after proper consent for examination and subsequent treatment.

Inclusion criteria

Inclusion criteria were age: 60 to 80 years; gender: both male and female; all types of neck of femur fractures; nonunion of neck of femur fractures.

Exclusion criteria

Exclusion criteria were age: less than 60 years; pathological fractures; those managed conservatively for other medical reasons; revision surgeries.

The Selection of patients was randomized by selecting every alternate case of neck of femur fractures by Hardinge's and Moore's approaches.

Following a detailed history and clinical diagnosis and provisional diagnosis was made. The following details regarding the patient were collected age of the patient, symptoms and their duration of treatment given, complications if any, duration of hospital stay, duration of return to work.

Hardinge's approach

Incision

- Begin 5 cm proximal to tip of greater trochanter.

- Longitudinal incision centered over tip of greater trochanter and extends down the line of the femur about 8 cm.

Superficial dissection

- Split fascia lata and retract anteriorly to expose tendon of gluteus medius.
- Detach fibers of gluteus medius that attach to fascia lata using sharp dissection.

Deep dissection

- Split fibers of gluteus medius longitudinally starting at middle of greater trochanter.
- Do not extend more than 3-5 cm above greater trochanter to prevent injury to superior gluteal nerve.
- Extend incision inferior through the fibers of vastus lateralis.
- Develop anterior flap.
- Anterior aspect of gluteus medius from anterior greater trochanter with its underlying gluteus minimus.
- Anterior part of vastus lateralis.
- Requires sharp dissection of muscles off bone or lifting small fleck of bone.

Expose anterior joint capsule

- Follow dissection anteriorly along greater trochanter and onto femoral neck which leads to capsule.
- Gluteus minimus needs to be released from anterior greater trochanter.

Moore or southern approach

Incision

- Make 10 to 15 cm curved incision one inch posterior to posterior edge of greater trochanter (GT).
- Begin 7 cm above and posterior to GT.
- Curve posterior to the GT and continue down shaft of femur.
- Mini-incision approach shows no long-term benefits to hip function.

Superficial dissection

- Incise fascia lata to uncover vastus lateralis distally.
- Lengthen fascial incision in line with skin incision.
- Split fibers of gluteus maximus in proximal incision.
- Cauterize vessels during split to avoid excessive blood loss.

Deep dissection

- Internally rotate the hip to place the short external rotators on stretch.
- Place stay suture in piriformis and obturator internus tendon (short external rotators).

- Detach piriformis and obturator internus close to femoral insertion.
- Reflect backwards to protect sciatic nerve.
- Incise capsule with longitudinal or T-shaped incision
- Dislocate hip with internal rotation after capsulotomy.
- Proximal extension.
- May extend proximal incision towards iliac crest for exposure of ilium.
- Distal extension.
- Extend incision distally down line of femur down to level of knee.
- Vastus lateralis may either be split or elevated from lateral intermuscular septum.

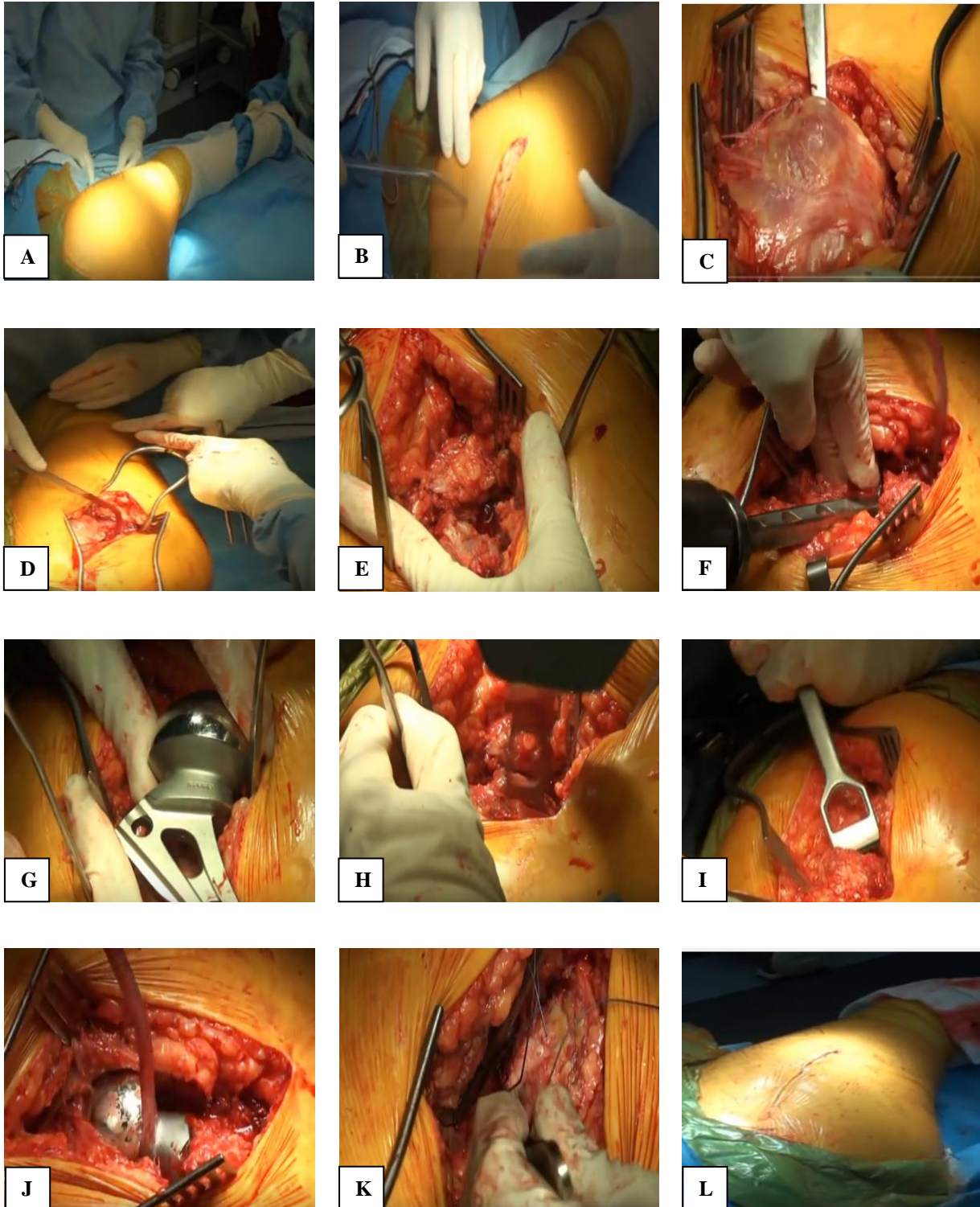


Figure 1: Procedure of Hardinge's hemi arthroplasty in the study.

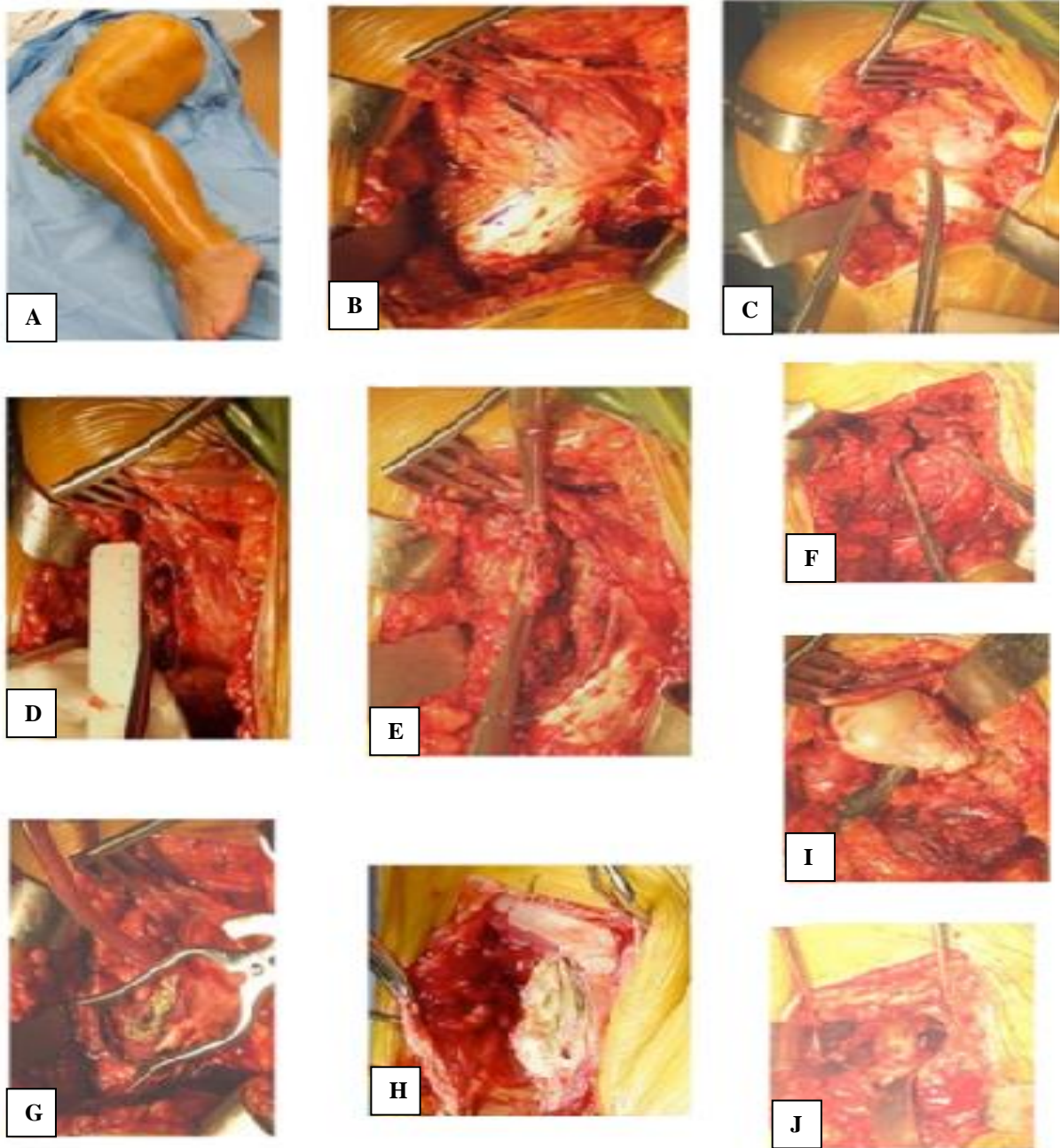


Figure 2: Procedure of Moore's hemiarthroplasty in the study.

RESULTS

In this study a prospective comparative study of outcome of Hardinge's vs. Moore's approach in hemiarthroplasty of hip done on 60 consecutive cases who presented with a primary diagnosis of neck of femur fractures to the department of orthopedics at Narayana medical college and hospital for a period of 18 months from December 2014 to June 2016. The mean age group in Hardinge's was 43.48 years, Moore's group was 44.24 years. There were 16 in Hardinge's and 18 females in Moore's distribution. 14 male in Hardinge's and 12 males in Moore's distribution.

Table 1: Demographics.

	Hardinge's	Moore's
Age (in years)		
20-29	2	2
30-39	6	7
40-49	7	8
50-59	15	13
Sex		
Female	16	18
Male	14	12
Total	30	30

P>0.05– not significant.

Table 2: Side of fracture.

Side	Hardinge's	Moore's	Percent	Valid percent	Cumulative percent
Left	12	12	40	40	40
Right	18	18	60	60	100
Total	30	30	100	100	P value not significant

Table 3: Line of fracture.

Fracture line	Hardinge's	Moore's	Percent	Valid percent	Cumulative percent
Communitied	3	3	10	10	10
Oblique	6	6	20	20	30
Transverse	16	16	53.3	53.3	83.3
Wedge	5	1	16.6	16.6	100
Total	30	30	100	100	P=1 ns

The p value for gender distribution in both the groups was by chi square test was >0.05 not significant.

Mechanism of injury

Assault- 2 cases under Hardinge's category. Fall from height- 17 cases under Hardinge's and 17 cases under Moore's category. RTA- 11 cases under Hardinge's and 13 cases under Moore's category.

Table 4: Type of fracture based on classification by Garden.

Garden type	Hardinge's	Moore's	Valid percent	Cumulative percent
3	5	5	16.7	16.7
4	25	25	83.3	100
Total	30	30	100	P=1 ns

The p value for hospital stay (days) in both the groups was by chi square test was <0.05 significant.

Table 5: Duration of hospital (days)

Hospital stay (in days)	Hardinge's	Moore's
13 days	4	2
14 days	7	7
15 days	8	7
16 days	7	7
17 days	3	4
20 days	1	1
24 days	0	2
Total	30	30

Mean time of union

The p value for mean time of union (weeks), in both the groups was by chi square test was <0.05 which was significant. Harris hip score pre-OP: Poor- 22 cases under Hardinge's and 22 cases under Moore's. Fair- 8 cases

under Hardinge's and 8 cases under Moore's. There were no cases comes under good and excellent score. The p value for Harris hip score-pre op in both the groups was by chi square test was >0.05 not significant.

Table 6: Mean time of union (weeks).

Mean time of union (weeks)	Hardinge's	Moore's
weeks 10	2	1
weeks 12	2	1
weeks 14	12	3
weeks 15	1	1
weeks 16	2	11
weeks 17	4	1
weeks 18	2	5
weeks 20	1	3
weeks 21	0	1
weeks 24	2	1
weeks 28	2	2

Harris hip score-post op: Poor- 3 cases under Hardinge's and 8 cases under Moore's. Fair- 7 cases under Hardinge's and 6 cases under Moore's. Good- 12 cases under Hardinge's and 11 cases under Moore's. Excellent- 8 cases under Hardinge's and 5 cases under Moore's. The p value for Harris hip score score- postop in both the groups was by chi square test was <0.001 which was significant.

Table 7: Complications.

Complications	Hardinge's	Moore's
None	17	16
Dislocations	0	4
Infection	2	3
Mal-orientation of the cup	1	2
Reduced rom	1	1
Sciatic nerve injury	0	4
Abductor lurch gait	3	0
Total	30	30

The p value for complications in both the groups was by chi square test was <0.001 which was significant.

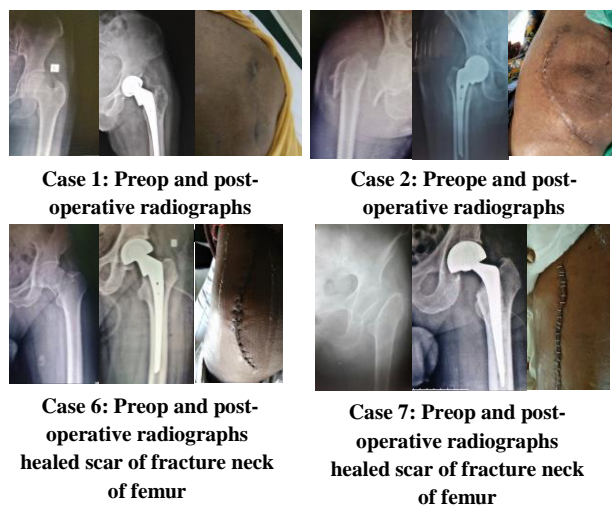


Figure 3: Pre-op and postoperative radiographs of femur fractures.

DISCUSSION

Demographic data

In our study the mean age was 44 years $SD \pm 2.34$ years. We also found that most falls in elderly were secondary to minor fall ($p < 0.001$). In our study most of the cases were females 34 cases (57%). Of the 34 cases 30 cases were due to fall and 4 due to RTA. This can be explained by the fact that in females osteopenia and osteoporosis is more common.

Pillai et al, evaluated, there were 90 patients below the, In group A (<64 years), 702 patients in group B (65-84) and 385 patients in group C (>85 years).⁴ Hip fractures are more common among females irrespective of age.

In less than 64 years, hip fractures were seen more commonly in females (71.1%). In group B ($n=702$), hip fractures were seen more commonly in females (77.8) In Group C ($n=385$) also hip fractures were seen more commonly in females (87%).

Mechanism of injury

As age advances and osteoporosis sets in and minor trauma like a simple fall can lead to fracture neck of femur as in our study in which 34 (40%) the etiology was slip and fall. In a study by Tandon et al, fall at home was commonest mode of injury (76.7%), followed by RTA. The average time from injury to surgery was 6.7 days.⁵

In Alicia Mangram study there were 239 patients (73.5%) who fell at home, 18 patients (5.5%) who fell at nursing home, and 68 patients (21%) who fell at other locations.

Intracapsular femoral neck fractures are commonly seen in the elderly population after a trivial fall. However, femoral neck fractures in adults younger than age 50 years are uncommon and often the result of high-energy trauma. They account for only 2-3% of all femoral neck fractures.

Side of fracture

In our study the right side was commonly involved 60% with 36 cases, as fall is the most common etiology, most patients were right dominant sided so they tend to fall on the right side, which explains why right side is commoner in our study.

In a study by Tandon et al, Left side was fractured in 20 patients and right side in 10 patients, as compared to our study in which the right side was more commonly involved 60%.⁵

Type of fracture

In our study garden grade 3 were 16.7% and grade 4 were 83.3%. Mukherjee and Puri had 85% patients of Garden type III and IV fractures.⁶

Mean duration of healing

The mean duration of healing was 14 weeks $SD 2.948$ weeks in our study. The Mean duration of union was around 14.5 ± 1.2 weeks and was somewhat more for comminuted and displaced fractures in a study by Pawar.⁷

Roy et al, in the study showed that average time of fracture union for the present study was 5.04 months.⁸ Average time for fracture union in our series is 14 weeks.

Outcome

Final outcome was excellent in 26 patients, good in 12 patients, fair in 3 patients and poor in 1 patient. Pawar study at the end of 2 years, 7 patients had a good functional outcome, 14 had fair outcome and 9 had poor outcome.⁷

Roy et al, in their study showed that reduction was good in 26 patients (87%), acceptable in three out of 30 patients (10%), poor in 1 patient (3%) of patients.⁸

Complications

In our study Moore's approach had more number of complications as compared Hardinge's approach. In Moore's approach, dislocations in four patients Sciatic nerve injury in four cases, infection in three patients, version of the prosthesis was seen in two cases and reduced range of movement was seen in one case. Whereas in Hardinge's there were no dislocations and sciatic

nerve injuries, but abductor lurch gait was seen in three patients.

Pawar study, nerve injuries during hip arthroplasty has been reported to be around 1%. Nerve injury can occur under several different circumstances, including direct trauma during dissection or placement of devices, such as wires or acetabular screws; retraction; thermal injury from methylmethacrylate; compression due to hematoma; leg lengthening; and component positioning.⁷

The risk of sciatic nerve injury is greater during the posterior approach. Schmalzried and colleagues reviewed more than 3000 THA's and found an incidence of isolated sciatic nerve palsy of 1.3%.⁹

In a prospective randomized trial by Barrett and colleagues compared 43 direct anterior and 44 direct posterior approaches to THA.¹⁰ The primary end point was the ability to climb stairs and walk unlimited distances, as assessed with the HHS at 6 weeks, 3 months, 6 months and 12 months postoperatively. That there was a greater risk of wound complications associated with an anterior approach and opted to undergo a posterior approach

The complications following the hemi-arthroplasty for fracture neck of femur is reported in varying incidences. Moore reported 16.6% mortality; Stinchfield and Cooperman reported 4% dislocation, 6% fractures of the proximal femur.^{11,12} Temporary mental confusion was the commonest complication in the immediate post-operative period of Hinchey and Day 22 series.¹³ Salvatti et al reported 14.3% mortality, 8.3% superficial infection in their patients.¹⁴ Robinson et al reported 11% mortality within one year, 5% infection, 2% deep vein thrombosis and 3% dislocation in their series.¹⁵ We had no operative deaths in our series.

CONCLUSION

Based on the findings of our study we recommend that between Hardinge's and Moore's approach, Hardinge's approach is recommended as the best over Moore approach as:

- The number of the complications post operatively is lower.
- Patient's compliance is better post operatively.
- Surgical wound healing is better.
- No sciatic nerve involvement.
- No femoral head dislocation chances.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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