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Research Article

Comparison between moore and hardinge approach in hip arthroplasty in term of posterior dislocation of hip

[1]Syed Hahib Ullah, [2]Imran Haider and [3]Zubair Khalid

[1]Associate Professor, Department of Orthopedic Surgery
DG Khan Teaching Hospital, DG Khan
[2]Assistant Professor, Department of Orthopedic Surgery
DG Khan Teaching Hospital, DG Khan
[3]Medical Officer, BHU Soon Miani, Rajanpur

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ABSTRACT

Objective: To compare the incidence of posterior dislocation of hip joint in Moore and Hardinge approach in hip arthoplasty for the treatment of fracture neck of femur during 12 weeks follow-up after surgery

Materials & Methods: This comparative study was conducted at Department of Orthopedic Surgery, Dera Ghazi Khan Teaching Hospital, DG Khan, from July 2018 to December 2018 over the period of six months. A total of 320 patients, 65 to 85 years of age with Garden type IV fracture of neck of femur were included in the study. Patients were divided into two age groups A (Moore approach)& B (Hardinge approach) randomly. Posterior Dislocation of hip joint was compared between the both groups.

Results: Age range in this study was from 65 to 85 years with mean age of 79.59 ± 5.37years.The mean age of patients in group A was 79.87 ± 5.25years and in group B was 79.41 ± 5.43years. In study group A, posterior dislocation was found in 16 (10%) patients while in study group B posterior dislocation was found in 5 (3.13%) patients. Significantly (P = 0.013) higher posterior dislocation was found in study group A as compared to study group B.

Conclusion: This study concluded that incidence of posterior dislocation of hip joint was less after anterolateral (Hardinge) approach compared to posterior (Moore) approach in hip arthroplasty for the treatment of fracture neck of femur in elderly patients. So, we recommend that anterolateral (Hardinge) approach is preferable surgical approach in hip arthroplasty for femoral neck fractures in order to avoid posterior dislocation of hip joint post-operatively.

Keywords: Hip fractures, hip arthroplasty, approaches, dislocation.

INTRODUCTION

A hip fracture is a femoral fracture that occurs in the proximal end of the femur (the long bone running through the thigh), near the hip.[1]Hip fractures are classified as intracapsular, which includes femoral head and neck fractures, or extracapsular, which includes trochanteric, intertrochanteric, and subtrochanteric fractures. The location of the fracture and the amount of angulation and comminution play integral roles in the overall morbidity of the patient, as does the preexisting physical condition of the individual.[2]

Hip fractures are seen globally and are a serious concern at the individual and population level. By

2050 it is estimated that there will be 6 million cases of hip fractures worldwide.[3]

Hip fractures are devastating injuries that affect the elderly and have a tremendous impact on the health care system. Most hip fractures are treated by orthopedic surgery, which involves implanting an orthosis.

Several different surgical approaches to the hip joint capsule have been advocated; including the Gibson approach,[4] the "Southern exposure,[5] the Smith–Petersen approach,[6] the modified Kocher approach,[14] and various lateral approaches.[7] The line of distinction between these and other approaches is perhaps not as important as whether an anterior or a posterior capsulotomy is performed for prosthetic insertion as in Moore and Hardinge approach.

The posterior (Moore or Southern) approach accesses the joint and capsule through the back, taking piriformis muscle and the short external rotators off the femur. This approach gives excellent access to the acetabulum and femur and preserves the hip abductors and thus minimises the risk of abductor dysfunction post operatively. It has the advantage of becoming a more extensile approach if needed. Critics cite a higher dislocation rate, although repair of the capsule, piriformis and the short external rotators along with use of modern large diameter head balls reduces this risk.[8]

The anterolateral approach to the hip has been one of the most commonly used approaches for total hip replacement around the world for the last 40 years. It provides excellent and safe access to the hip, and hip dislocation following the anterolateral approach has been uncommon.Virtually any type of prosthesis can be used with the anterolateral approach.[9] Because of retraction of the abductors with this approach, some patients can have a limp lasting for 3-4 weeks and a longer period to regain abduction strength. This approach results in stable hip, superior limb-length symmetry, and is considered versatile across a wide range of implant choices.[10]

Posterior hip dislocations are also seen following total hip arthroplasty. Relatively minor forces, such as flexing the hip to pick an item up from the floor, can result in post-operative hip dislocation. Recent studies[11-12]indicate that slight alterations in surgical technique (slightly larger femoral head and slightly less acetabular component anteversion) may decrease post-operative dislocation rates.The incidence of posterior dislocation in the study by is 7.4% in Moore approach while it was 1.1% in Hardinge approach.[13] Dislocation is a common complication of hip hemi-arthroplasty, but exact effect of surgical approach on dislocation rates remains unclear.[14-15] Because little randomized prospective data exist in this context,[16] so, we have conducted this prospective randomized controlled trial to establish which surgical approach is better in terms of posterior dislocation, so that a standard approach could be developed in the treatment of fracture neck of femur in the elderly patients.

OPERATIONAL DEFINITIONS:

- **Posterior Dislocation of hip joint:** It was defined as the displacement of prosthetic head of the femur out of the acetabulum to any extent from its normal anatomical position on the post-operative X-ray of the hip joint in Antero-Posterior view during 12 week follow-up after surgery.
- **Moore Approach:** The curved incision was given centered over greater trochanter and hip was approached posteriorly by division of capsule and short external rotators.
- **Harding Approach:** The lateral incision was given over greater trochanter and hip was approached anteriorly by division of anterior 1/3 of abductors.

MATERIAL AND METHODS

This comparative study was conducted at Department of Orthopedic Surgery, Dera Ghazi

Khan Teaching Hospital, DG Khan, from July 2018 to December 2018 over the period of six months. Total 320 patients Garden type IV (completely displaced fragments on X-Rays) fracture of neck of femur within two weeks having age 65-85 years either male or female and fit for anesthesia were selected for this study.

Patients with previous hip surgery, patients with co-morbid diseases like spastic diseases, Parkinsonism and bowel in-continence, patients with pathological fractures and patients of open fracture of the neck of the femur were excluded.

Study is approved by the ethical committee and written informed consent was taken from every patient.

Demographic profile of all the patients was entered in pre-designed proforma. X-ray pelvis AP view with both hip joints was carried out. All the selected patients were randomly divided into two groups A & B. Base line investigations like complete blood count, random blood sugar, Urine Complete Examination, Renal functions tests and ECG (where needed) were done in every patient on admission for anesthesia purposes. Antero-posterior and lateral X-rays of the affected leg were done an all patients.

All patients in Group A were operated by Moore approach. In this approach, the joint and capsule was accessed through the back, taking piriformis muscle and the short external rotators off the femur. This approach gave excellent access to the acetabulum and femur and preserved the hip abductors and thus minimized the risk of abductor dysfunction post operatively. While all patients in Group B were operated by Hardinge approach, in which the patient was placed in a supine or, if desired, a lateral position on the operating table. A straight lateral incision was made, and dissection down to the fascia lata followed. The interval between the vastuslateralis and abductor muscles was developed. The abductor was released and repaired later with the closure. The hip capsule was identified and opened, and the hip was dislocated by traction and external rotation. The femoral head was then removed, allowing direct access to the acetabulum. The femur was placed into a figure-of-four position for broaching.

Patients were mobilized on the next post-op day with walker and partial weight bearing started on operated side. Patients were advised not to sit down beyond 90 degrees on knee and hip joint. Patients were called after two weeks for stitch removal. Clinical examination for operated hip was done during 12 weeks follow-up to see its dislocation clinically and confirmed on X-ray of the Hip Joint. All this information was collected through a special designed proforma.

All the collected data was entered in SPSS version 18 and analyzed. Age of the patients and BMI were presented as mean and standard deviation. The qualitative variables (gender and dislocation of hip joint) were evaluated and presented as frequency distribution table. The incidence of posterior dislocation of hip joint of two groups was compared with chi-square test. The level of significance was ≤ 0.05. Effect modifiers like age, gender, duration of fracture, BMI and co-morbid condition i.e. diabetes mellitus, were controlled through stratification and post-stratification chi square was applied to see their effect on outcome. P-value ≤ 0.05 was considered as significant.

RESULTS

Age range in this study was from 65 to 85 years with mean age of 79.59 ± 5.37years.The mean age of patients in group A was 79.87 ± 5.25years and in group B was 79.41 ± 5.43years. In study group A, posterior dislocation was found in 16 (10%) patients while in study group B posterior dislocation was found in 5 (3.13%) patients. Significantly (P = 0.013) higher posterior dislocation was found in study group A as compared to study group B. (Table 1)

Patients of both groups were divided into two age groups i.e. age group 65-75 years and age group 76-85 years. In age group 65-75 years, total 61 (38.13%) patients belonged to study group A while 62 (38.75%) patients belonged to study

group B. Posterior dislocation was found in 04 (6.56%) patients of study group A while no patient of study group B was found with posterior dislocation. Difference of posterior dislocation between the both groups was statistically significant withy p value 0.042. In age group 76-85 years, total 99 (61.88%) patients belonged to study group A while 98 (61.25%) patients belonged to study group B. posterior dislocation was noted in 12 (12.12%) patients and 05 (5.10%) patients respectively in study group A & B. But the difference was not statistically significant with p value 0.076. (Table 2)

Out of 67 (41.88%) male patients of study group A and 64 (40%) male patients of study group B, posterior dislocation was found in 06 (8.96%) patients and in 03 (4.69%) patients of study group A & B respectively. Difference of posterior dislocation between the male patients of both study groups was statistically insignificant with p value 0.334. Out of 93 (58.13%) female patients of study group A, posterior dislocation was seen in 10 (10.75%) patients. Out of 96 (60%) female patients of study group B, posterior dislocation was found in 02 (2.08%) patients. Difference of posterior dislocation between the female patients of both groups was statistically significant with p value 0.015. (Table 3)

Patients were divided into two groups according to duration of fracture i.e. < 7 days duration of fracture and ≥7 days duration of fracture. In < 7 days duration of fracture group, posterior dislocation was seen in 11 (9.73%) patients of study group A while in 04 (3.45%) patients of study group B. difference was statistically significant with p value 0.05. In ≥7 days duration of fracture group, posterior dislocation was found in 05 (10.64%) patients of study group A while in 01 (2.27%) patient of study group B. But the difference was not statistically significant with p value 0.108. (Table 4)

posterior dislocation was found in 07 (8.96%) diabetic patients of study group A while in 04 (4.69%) diabetic patients of study group B and the difference was statistically insignificant with p value 0.310. Total 09 (10.75%) non-diabeticpatients of study group A and 01 (2.08%) non-diabetic patient of study group B found with posterior dislocation. Difference of posterior dislocation between the both groups was statistically significant with p value 0.010. (Table 5)

Table 1: Comparison of posterior dislocation between the both groups

Group	posterior dislocation		Total	P value
	Yes (%)	No (%)		
A (Moore approach)	16 (10%)	144 (90%)	160	0.013
B (Hardinge approach)	5 (3.13%)	155 (96.87%)	160	

Table 2: Comparison of posterior dislocation between the both groups for age

Group	Posterior Dislocation		Total	P value
	Yes (%)	No (%)		
Age group 65-75 years				
A	04 (6.56%)	57 (93.44%)	61 (38.13%)	**0.042**
B	00 (0.0%)	62 (100.0%)	62 (38.75%)	
Age group 76-85 years				
A	12 (12.12%)	87 (88.88%)	99 (61.88%)	**0.076**
B	05 (5.10%)	93 (94.90%)	98 (61.25%)	

Table 3: Comparison of posterior dislocation between the both groups for gender

Group	Posterior Dislocation		Total	P value
	Yes (%)	No (%)		
Male Patients				
A	06 (8.96%)	61 (91.04%)	67 (41.88%)	**0.334**
B	03 (4.69%)	61 (95.31%)	64 (40%)	
Female Patients				
A	10 (10.75%)	83 (89.25%)	93 (58.13%)	**0.015**
B	02 (2.08%)	94 (97.92%)	96 (60%)	

Table 4: Comparison of posterior dislocation between the both groups for duration of fracture

Group	posterior dislocation		Total	P value
	Yes (%)	No (%)		
< 7 days duration of fracture				
A	11 (9.73%)	102 (90.27%)	113 (70.63%)	**0.055**
B	04 (3.45%)	112 (96.55%)	116 (72.5%)	
≥7 days duration of fracture				
A	05 (10.64%)	42 (89.36%)	47 (29.38%)	**0.108**
B	01 (2.27%)	43 (97.73%)	44 (27.5%)	

Table 5: Comparison of posterior dislocation between the both groups for diabetes mellitus

Group	posterior dislocation		Total	P value
	Yes (%)	No (%)		
Diabetic				
A	07 (8.96%)	48 (91.04%)	55 (34.38%)	**0.310**
B	04 (4.69%)	53 (95.31%)	57 (35.63%)	
Non-diabetic				
A	09 (10.75%)	96 (89.25%)	105 (65.63%)	**0.010**
B	01 (2.08%)	102 (97.92%)	103 (64.38%)	

DISCUSSION

In our study, incidence of posterior dislocation in posterolateral (Moore) approach was 10.0% while in anterolateral (Hardinge) approach was 3.13% with p-value<0.019. Wang G et al[101] in his study has found this incidence rate of posterior dislocation after anterolateral approach as 0% and 5% after posterolateral approach in hip arthroplasty.Masonis et al[17] reported this posterior dislocation rate after posterolateral approach in primary hip arthroplasty as 3.95% and after anterolateral approach as 2.18% which is not statistically significant. Wood[18] reported increased dislocation rates after posterior approaches compared with anterior approaches, though this difference was not significant.

In another randomized controlled trials done by Martinez AA et al[19], incidence of posterior dislocation was found in 7.4% in Moore approach while it was 1.1% in Hardinge approach.

Post-operative dislocation rates was also found to be three times more after posterior approaches compared to anterior approaches.[20] Bush JB et al[21] in his randomized trial of anterior versus posterior approach in hip hemiarthroplasty has shown 0% post-operative dislocation after Hardinge approach and 4.5% after Moore approach which was statistically significant. Keene and Parker[22] reported a 4.3% dislocation rate after posterior capsular approaches.

Enocson A et al[23] in his study of 698 patients who had undergone a primary total hip replacement for a non-pathological, displaced femoral neck fracture (Garden III or IV) or a secondary total hip replacement due to a fracture-healing complication after a femoral neck fracture concluded the posterolateral approach as the only factor associated with a significantly increased risk of dislocation. He has found the lower rate of posterior dislocation after anterolateral surgical approach than the posterolateral approach (2%

versus 12%) which was statistically significant. Another study done by similar author has shown that compared to the posterolateral approach, the anterolateral approach reduces the risk of dislocation after hemiarthroplasty (HA) in patients with femoral neck fractures.[24]

Skoldenberg O et al[25] in his study has also recommended that the anterolateral approach in hip arthroplasty for femoral neck fractures is effective and associated with less dislocation rates compared to posterolateral approach. He has found the 9% dislocation rate for the posterolateral approach and 1% for the anterolateral approach. In a report from the Swedish Hip Arthroplasty Register on hemiarthroplasty and total hip arthroplasty patients with femoral neck fractures, the anterolateral approach was associated with a lower risk of revision due to dislocation compared to the posterolateral approach.[26]Contrary to results of our study and all studies described above i.e. the posterior approach with an increased risk of dislocation, Palan J et al[27] and Hedlundh U et al[28] found no significant difference in dislocation rates between the anterolateral and posterior approaches. On the whole it is concluded that incidence of posterior dislocation of hip in Hardinge approach is less than in Moore approach in hip arthroplasty

CONCLUSION

This study concluded that incidence of posterior dislocation of hip joint was less after anterolateral (Hardinge) approach compared to posterior (Moore) approach in hip arthroplasty for the treatment of fracture neck of femur in elderly patients. So, we recommend that anterolateral (Hardinge) approach is preferable surgical approach in hip arthroplasty for femoral neck fractures in order to avoid posterior dislocation of hip joint post-operatively.

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