

A comparative study of Lateral Hardinge's versus Posterior Southern Moore's Approach in Total Hip Arthroplasty-A Prospective Study

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Abstract :

Background : Disease/Trauma which involves the hip joint disables the individual from his day-to-day activity. Degenerative hip disorders are one of the most common and debilitating musculoskeletal disorders with increased morbidity and decreased quality of life 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. 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 orthopaedic surgery, which includes Hemi-arthroplasty, Total hip arthroplasty, etc. A number of surgical approaches to the hip joint exist, each with unique advantages and disadvantages The direct lateral (Hardinge's) approach of hip allows the adequate access for orientation of implant, for insertion of the cement and for correction of leg length discrepancy and thus by permitting early mobilization of the patient following surgery. The posterior (Moore's) approach permits for easy access with less tissue dissection and blood loss while increasing the risk of neurovascular injury and post- operative dislocation of the prosthesis **Aim of the study:** Is to assess the functional outcome and the complications associated with total hip arthroplasty using

modular prosthesis by Hardinge's vs Moore's approach. **Material and methods** : This is a prospective cohort study was performed from September 2021 to August 2022 in the Department of Orthopaedics, Sree Mookambika institute of medical sciences, Kanyakumari, India. The patients for this study were recruited by convenient sampling technique. Total of 30 patient, were clinically and radiologically confirmed for the need of total hip arthroplasty. 30 patients were divided into two groups namely group "LH" (n=15) received total hip arthroplasty by lateral Hardinge's approach and group "SM" (n=15) received total hip arthroplasty by posterior Moore's approach. The follow up were done at the end of 1st, 3rd and 6th month and every 1 year thereafter with modified Harris Hip score. **Results** : The functional assessments were made with modified Harris Hip scores. In group 'LH'(n=15), the range of movements were excellent in 10 patients (66%), good in 5 patients (34%) and there is no poor outcome . In group 'AM'(n=15), the range of movements were excellent in 10 patients (66%), good in 4 patients (26%) and poor in 1 patients (8%). The poor range of movements (n=3) were due to limb length discrepancy. At the end of 6th and 12th month, there is a significant statistical difference among both the groups ($p < 0.001$) in terms of functional assessment of modified Harris' Hip scores. **Conclusion**: Total hip arthroplasty is safe and affordable surgical procedure of choice for the patients with arthritic hip disorder. Total hip arthroplasty provides a painless, stable, and mobile hip. In our present study we conclude that both the procedure gives excellent to good outcome in which Harding's approach gives better functional outcome then the Southern Moore approach. The lateral Hardinge's approach needs a long learning curve with utmost technical precision. As lateral Hardinge's approach provides wide exposure to the acetabulum and lesser dislocation rates. However better understanding of the anatomy and skilled technical precision will give excellent functional outcome.

Key words: Total Hip Arthroplasty, lateral (Hardinge's) approach, The posterior (Southern Moore's) approach, Modified Harris Hip scores.

Introduction:

Disease/Trauma which involves the hip joint disables the individual from his day-to-day activity. Degenerative hip disorders are one of the most common and debilitating musculoskeletal disorders with increased morbidity and decreased quality of life [1].

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.

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 orthopaedic surgery, which includes Hemi-arthroplasty, Total hip arthroplasty, etc.

Total hip arthroplasty with an artificial prosthesis is a reconstructive procedure that has improved in the management of degenerative disorders of the hip joint that have responded poorly to conventional medical therapy and improved the functional quality of life by providing the stable, painless and mobile hip joint [2].

Total hip arthroplasty was introduced as a panacea to relieve the intractable pain of hip arthritis. The additional objectives of deformity correction and restoration of hip joint mobility and stability were achieved later with total hip arthroplasty. Total hip arthroplasty has revolutionized and provided millions of patients with an ability to lead a normal life [3]. Total Hip Arthroplasty represents the greatest single advance in modern orthopaedic surgery.

A number of surgical approaches to the hip joint exist, each with unique advantages and disadvantages [1] The direct lateral (Hardinge's) approach of hip allows the adequate access for orientation of implant, for insertion of the cement and for correction of leg length discrepancy and thus by permitting early mobilization of the patient following surgery. The posterior (Moore's) approach permits for easy access with less tissue dissection and blood loss while increasing the risk of neurovascular injury and post-operative dislocation of the prosthesis [4-6]. Aim of the study is to assess the functional outcome and the complications associated with total hip arthroplasty using modular prosthesis by Hardinge's vs Moore's approach.

Material and Methods :

This is a prospective cohort study was performed from September 2021 to August 2022 in the Department of Orthopaedics, Sree Mookambika institute of medical sciences, Kanyakumari, India. The patients for this study were recruited by convenient sampling technique. Total of 30 patient, were clinically and radiologically confirmed for the need of total hip arthroplasty. 30 patients were divided into two groups namely group “LH” (n=15) received total hip arthroplasty by lateral Hardinge’s approach and group “SM” (n=15) received total hip arthroplasty by posterior Moore’s approach. The follow up were done at the end of 1st, 3rd and 6th month and every 1 year thereafter with modified Harris Hip score. The patients above the age of 18 years, patients with definite indications for total hip arthroplasty (AVN hip, osteoarthritis hip, malunited acetabular fracture, the non-union neck of femur fracture), patients with normal septic profile and patients who are willing to undergo total hip arthroplasty according to our protocol were included in the study. The patients aged less than 18 years, patients with positive septic screen and patients who are not willing and unfit for surgical management according to our protocol were excluded from the study.

Preoperative assessment

After getting informed and written consent, all the patients in both the groups were subjected for thorough clinical examination and investigations which include routine blood counts, ESR, CRP, and AP and lateral X-ray views of the pelvis with both hips. Adequate analgesics, antibiotics, tetanus toxoid, and blood transfusions were given as needed before surgery. Aspirin, anticoagulants and other anti-inflammatory drugs were stopped 7 to 10 days before surgery. Any occult infections like skin lesions, dental caries, and urinary tract infections were identified and treated preoperatively. The roentgenographic evaluation was done to determine the anatomic relationship of the femur and pelvis to allow for accurate restoration of joint anatomy and biomechanics. The standard pelvic roentgenogram AP view with both hips along with upper-end femur, AP X-ray of the hip in 15 degrees of internal rotation and lateral X-ray of the hip were taken. The templating was done with the use of plastic overlay templates both for femoral and acetabular components to aid in the selection of the implant size and neck length required to restore equal limb lengths and medial offset. The medullary canal of the femur was assessed with Dorr’s classification in pre-operative radiographs. According to Dorr’s classification, group A patients were managed with an

uncemented prosthesis and group B and C patients were managed with cemented prosthesis or bone grafting with the excised femoral head ^[7].

Surgical approach by lateral Hardinge's approach ^[8,9]

The patient was positioned in the lateral decubitus position with sterile draping techniques. A longitudinal incision of 5 cm proximal to the tip of the greater trochanter and centered over the greater trochanter and extend down along the line of the femur for about 8 to 10 cm's was made. The dissection of superficial fascia lata and detachment of gluteus medius and the exposure of anterior joint capsule and anterior dislocation of the femoral head were performed. The femoral neck osteotomy proceeded with acetabular preparation and removal of osteophytes and loose bodies. The placement of the acetabular cup at 45°-50° of inclination and fastening with an appropriate number of screws were done. The femoral stem was prepared and placement of appropriate stem at 5° to 10° of femoral anteversion after application of cement if needed after performing trial stem placement. The performance of modular head reduction into the acetabular component proceeded. The stability of the hip joint was observed. Then the wound was closed in layers with the application of sterile drain.

Surgical approach by posterior Southern Moore's approach ^[8,9]

The patient was positioned in lateral position over unaffected hip with sterile draping techniques. An incision centering the greater trochanter and 10-15 cm long incision extending from the posterior border of greater trochanter curving posteriorly along the fibres of gluteus maximus 5 cm below the posterior superior iliac spine and from greater trochanter along the shaft for approximately 10 cm was made. The fascia over gluteus medius was incised and uncovering of vastus lateralis was performed. The gluteus maximus is splitted along the direction of muscle fibres. The sciatic nerve is identified and protected The short external rotators are identified and cut as close to its insertion over the greater trochanter. Incise the joint capsule in longitudinal fashion or T shaped incision and the dislocate the head by internally rotating the femur and posterior dislocation of the femoral head. The femoral neck osteotomy proceeded with acetabular preparation and removal of osteophytes and loose bodies. The placement of acetabular cup at 45°-50° of inclination and fastening with an appropriate number of screws were done. The femoral stem was prepared and placement of appropriate stem at 5° to 10° of femoral anteversion after application of cement if needed

after performing trial stem placement. The performance of modular head reduction into the acetabular component proceeded. The stability of the hip joint was observed. Then the wound was closed in layers with the application of sterile drain.

Post-operative management

The operated limb was kept in abduction with a pillow in between the two lower limbs. The vital parameters were monitored carefully for 24 hours. The check X-ray was performed. The intravenous antibiotics were continued for 5 days. The drain was removed and the tip sent for culture and sensitivity after 48 hours. The staged physiotherapy was followed for all patients who were involved in our study. The upper limb and chest physiotherapy and static quadriceps exercises were started on the 1st day. The patient was made to sit up on the 3rd day, non-weight bearing standing on the 5th day, walk with help of a foldable walker on the 10th day. The patient was discharged with the advice not to adduct and internally rotate the limb, not to squat and to walk with a walker (protected weight bearing) for 6 weeks.

Follow-up protocol

On discharge, the patients were followed up at the end of 1st, 3rd and 6th and every 1 year thereafter. At the follow-up, a detailed clinical examination was done and the patient was assessed subjectively for symptoms like pain, swelling, and restriction of joint motion. The modified Harris hip scoring system was used for functional evaluation. The check X-rays were taken to study for any signs of complications of the procedure.

Results :

A total of 30 patients, who underwent total hip arthroplasty as per the study protocol, were taken into consideration for statistical analysis. The group 'LH' patients (n=15) received total hip arthroplasty by Hardinge's approach and group 'SM' patients (n=15) received total hip arthroplasty by Moore's approach.

Among 30 patients in this study, 12 patients (40%) were males and 18 patients (60 %) were females. All the patients belong to age between 45 to 70 years of age. The average age of the study population was 50.63 ± 5.03 years.[Table 1 & Figure 1]

AGE (YEARS)	GROUP “LH” (n=15)		GROUP “SM” (n=15)	
	MALE	FEMALE	MALE	FEMALE
41-50	1	2	1	1
51-60	2	1	4	3
>60	4	5	1	6
Total	7 (46%)	8 (54%)	6 (40%)	9 (60%)

Table 1: Age distribution among LH and SM groups

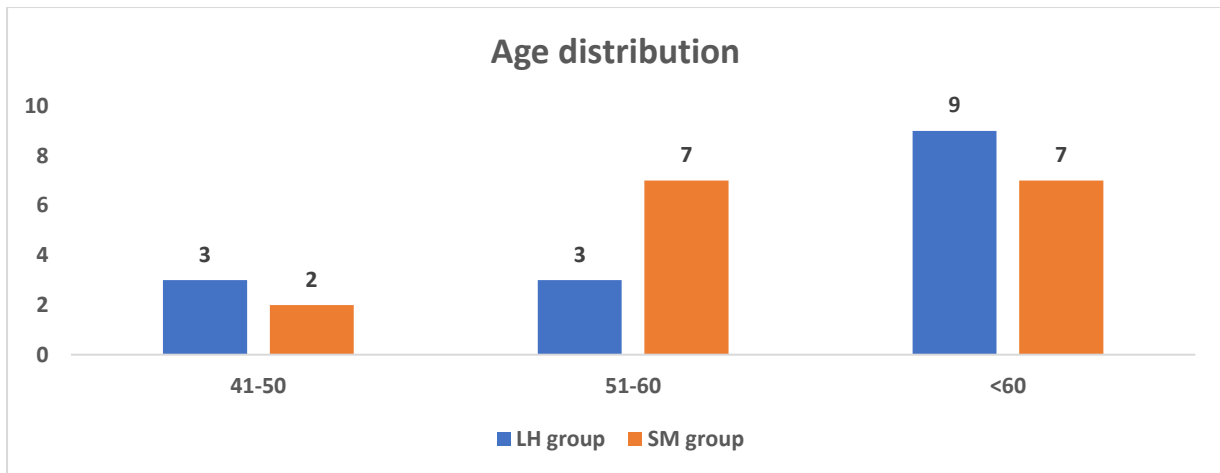


Fig 1: Bar graph of age of patients and the age group they belong to

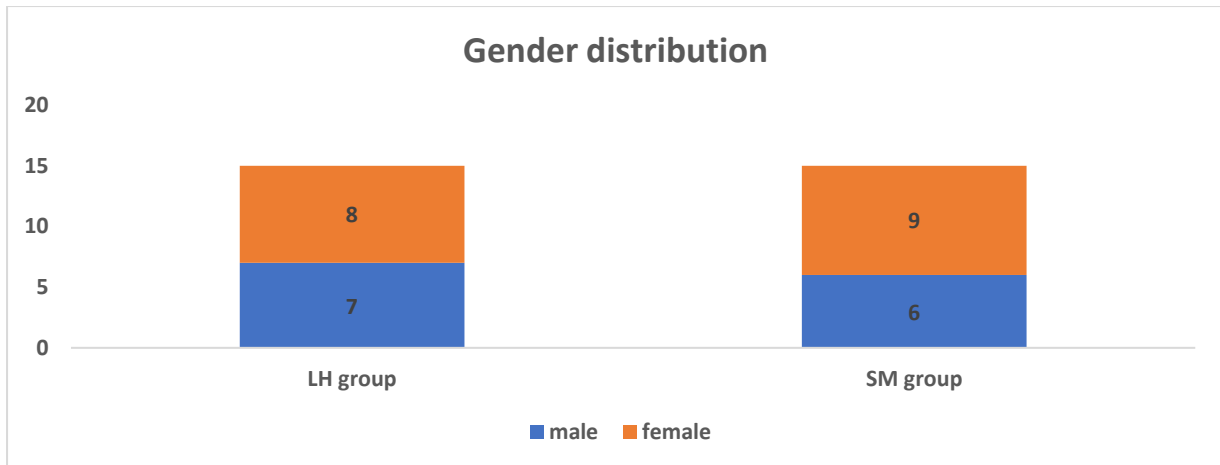


Fig 2: Pictorial representation of gender among patients in each group

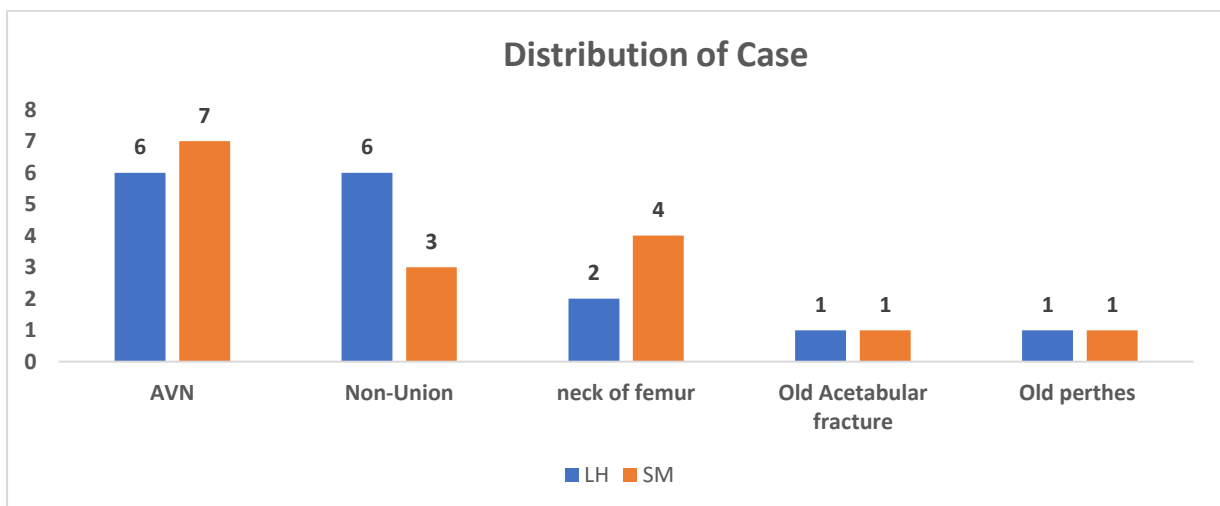


Fig 3: Pictorial representation of distribution of case among two groups

Out of 30 patients, 13 patients (43%) were due to avascular necrosis of femoral head, 9 patients (30%) due to non-union neck of femur, 6 patients (20 %) due to neck of femur fracture and 2 patients (6.6 %) due to old acetabular fracture , 2 patients (6.6%) due to healed cases of Perthes disease.

A total of 30; 12 patients (40%) have got cemented total hip arthroplasty and 18 patients (60 %) underwent uncemented total hip arthroplasty.in which 12 patients with cemented total hip arthroplasty 8 patient undergone lateral Hardinge’s approach and remaining

4 patients undergone Posterior southern Moore’s approach. Out of 18 patient with uncemented total hip arthroplasty, 12 patient undergone lateral Hardinge’s approach and remining 6 patients undergone Posterior southern Moore’s approach.

All patients were treated with IV antibiotics for 5 days followed by one week of oral antibiotics. All patients were advised to start dynamic and static quadriceps exercises and ankle pump exercises to prevent stiffness and contractures. The sutures were removed at the end of the 10th post-op day. No intraoperative complications were noted during the surgical procedures. All the patients were followed up serially as per our protocol with serial clinical and radiographical examinations

The functional assessments were made with modified Harris Hip scores. In group ‘LH’(n=15), the range of movements were excellent in 10 patients (66%), good in 5 patients (34%) and there is no poor outcome . In group ‘AM’(n=15), the range of movements were excellent in 10 patients (66%), good in 4 patients (26%) and poor in 1 patients (8%). The poor range of movements (n=3) were due to limb length discrepancy. At the end of 6th and 12th month, there is a significant statistical difference among both the groups (p<0.001) in terms of functional assessment of modified Harris’ Hip scores.[Table 2]

Functional assessment	LH group	SM group
Pre-operative	22.4 ± 2.4	23.9 ± 4
Immediate post op	60 ± 3	59.24 ± 1.7
One month follow-up	69.8 ± 1	62.9 ± 2.9
Third month follow-up	80.5 ± 2.6	81 ± 2.5
Sixth month follow-up	86.2 ± 3.19	82.65 ± 1.8
One year follow-up	95 ± 0.3	90 ± 2.3

Table 2: Functional assessment by Modified Harris’ Hip scores.

The most common complication encountered in our study were limb length discrepancy 1 patients (8%) followed by 2 patients (2.24%) superficial infection which was treated with antibiotics.

Discussion :

Total Hip Arthroplasty (THA) has been proven to be a reliable surgery of choice in relieving pain and dysfunction associated with severe and painful hip arthrosis [10]. The surgeon must have a thorough understanding of the anatomy in order to optimize exposure and implore precise technique to minimize complications and optimize patient outcomes. The most commonly used approaches worldwide for THA include the posterior approach, direct lateral approach, and the direct anterior approach. The primary goal for painful hips is to provide a painless, stable and a mobile hip to the patient. The selection of patients is an important job while planning total hip arthroplasty [11,12].

Goyal et al. [13] suggested cemented implants are preferred over uncemented implants as cemented implants are cheaper and provide pain-free and early full weight bearing than uncemented implants. Mäkelä et al. [14] compared the survival of cemented and uncemented hip replacement prosthesis in patients older than 55 years and concluded that cemented implants have better survival than uncemented implants. Hailer et al. analyzed 10-year survival of cemented and uncemented THR with cemented being better as uncemented implants had more revisions due to aseptic loosening of the cup [15]. Zimmerma et al. [16] concluded no statistically significant differences in clinical or functional outcomes between uncemented and cemented prostheses up to 12 months post- surgery.

Nachiketan KD et al. [17] stated that the modified direct lateral approach provides easy accessibility to hip joint and excellent exposure of both acetabular and proximal femur. They stated that there was no incidence of prosthesis dislocation in the post-operative period. Jian Li et al. [18] utilized combined anterior and posterior approach to total hip arthroplasty using a lateral incision in patients with severe, spontaneous ankylosis provides very good exposure, protects the abduction unit and results in good to excellent postoperative recovery. Oscar Skoogh et al. investigated how the relationship between surgical approach and risk of reoperation due to dislocation has evolved over time. They concluded that the increased risk of early reoperations due to dislocations using posterior Moore's approach compared with the direct lateral Hardinge's approach [19]. Gharanizade et al. [20] conducted a study on 134 patients for primary hip arthroplasty. The lateral approach was used in 79 hips and posterolateral approach was used in 55 hips. There was no significant difference between the two approaches regarding demographic characteristics, Harris Hip score, blood loss,

transfusion, haemoglobin level, dislocation and cup inclination angle. They observed a statistically significant difference in the incidences of infections, DVT, proximal femur fracture and discrepancy of limb length between the two approaches. They concluded that both approaches offer an excellent return to function and pain reduction after total hip arthroplasty.

The direct lateral and posterior approaches are fundamentally muscle-splitting approaches to the hip. The most important determinants of a successful total hip arthroplasty are mitigation of pain, improved quality of life and restoration of function [21]. Barber et al. [22] prospectively followed for 2 years 28 patients undergoing direct posterior and 21 undergoing direct lateral total hip arthroplasty. Both the groups had similar improvements on the Harris Hip Score at the 2-year follow-up and had no observable differences in complications.

Witzleb WC et al. [23] assigned 60 patients to undergo total hip arthroplasty through either a posterior or lateral approach. The primary endpoint was the HHS, WOMAC, and SF-36 at the 12-week follow-up. Both posterior and lateral approaches showed similar improvements across the HHS, WOMAC and SF-36 questionnaires at 12 weeks postoperatively. A common comparator between the posterior Moore's and lateral Hardinge's approach is the incidence of abductor insufficiency.

Witzleb WC et al. [23], Masonis JL et al. [24], Jolles BM et al. [25] and Iorio R et al. [26] have suggested the direct lateral approach has an increased incidence of abductor insufficiency following total hip arthroplasty. The reported incidence varies from 0% to 16% for the posterior approach and from 4% to 20% for the direct lateral approach. Potter HG et al. [27], Potter HG et al. [28], Muller M et al. [30] and Pfirrmann CW et al. [30] used the presence of Trendelenburg gait or lateral trochanteric pain, which may lead to poor inter-rater reliability, to make the diagnosis. Magnetic resonance imaging has become a popular method for assessing soft tissue pathology following total hip arthroplasty. Pfirrmann CW et al. [30] and Twair A et al. [31] have shown that metal suppression pulsed MRI sequences can identify abductor damage in patients with symptomatic abductor tears following total hip arthroplasty.

In our present study with 30 patients The functional assessments were made with modified Harris Hip scores. In group 'LH'(n=15), the range of movements were excellent in 10 patients (66%), good in 5 patients (34%) and there is no poor outcome . In group 'AM'(n=15), the range of movements were excellent in 10 patients (66%), good in 4 patients

(26%) and poor in 1 patients (8%). The poor range of movements (n=3) were due to limb length discrepancy. At the end of 6th and 12th month, there is a significant statistical difference among both the groups ($p<0.001$) in terms of functional assessment of modified Harris' Hip scores. We observed a significant statistical difference between surgical approach and complications between two groups with $p<0.05$.

Conclusion:

Total hip arthroplasty is safe and affordable surgical procedure of choice for the patients with arthritic hip disorder. Total hip arthroplasty provides a painless, stable, and mobile hip. In our present study we conclude that both the procedure gives excellent to good outcome in which Harding's approach gives better functional outcome than the Southern Moore approach. The lateral Hardinge's approach needs a long learning curve with utmost technical precision. As lateral Hardinge's approach provides wide exposure to the acetabulum and lesser dislocation rates. However better understanding of the anatomy and skilled technical precision will give excellent functional outcome.

Limitation of this study : The limitations of this study were smaller sample size, limited follow-up duration and non-usage of MRI for follow up.

Conflict of interest: nil

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