International Journal of Orthopaedics Sciences

ISSN: 2395-1958
IJOS 2019; 5(3): 214-219
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www.orthopaper.com
Received: 21-05-2019
Accepted: 25-06-2019

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Study of functional and radiological outcomes of hip arthroplasty via posterior approach

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DOI: <https://doi.org/10.22271/ortho.2019.v5.i3d.1534>

Abstract

Many surgical approaches to hip have evolved over the period of time surgical approaches differs chiefly in position of patient in supine or lateral and whether the hip is dislocated anteriorly or posteriorly. However most of the surgeon prefer approach where hip is dislocated posteriorly, patient in lateral position.

In this study we try to evaluate the clinical, radiological and functional outcome of hemi-replacement and total hip replacement operated by posterior approach.

No significant difference was found in limb length discrepancy. No peri prosthetic fractures were seen. Dislocation rate was 10 percent with posterior approach. No post-operative lurch was found with posterior approach.

Keywords: hemireplacement arthroplasty (Hra), total hip arthroplasty (Tha/Thr), sickle cell anemia

Introduction

The normal hip functions as a “ball-and-socket” joint. The femoral head (ball) articulates with the acetabulum (Socket), allowing smooth range of motion in multiple planes. Any condition that affects either of these structures can lead to deterioration of the joint. This, in turn, can lead to deformity, pain and loss of functions. The most common condition affecting the hip joint in this way is osteoarthritis. Other conditions affect the hip joint adversely include idiopathic osteonecrosis, alcohol induced and other secondary osteonecrosis. Inflammatory arthritis (Rheumatoid arthritis, psoriatic arthritis, spondyloarthropathies, etc), developmental dysplasia, childhood hip disorders & trauma ^[1].

Total Hip Arthroplasty (THA) is a procedure whereby the diseased articular surfaces are replaced with synthetic materials, thus relieving pain and improving joint kinematics and function ^[18].

Hemireplacement Arthroplasty (HRA) is a procedure in which femoral component is replaced by prosthesis, commonly in cases on neck of femur fractures ^[18].

Many surgical approaches to hip have evolved over the period of time surgical approaches differs chiefly in position of patient in supine or lateral and whether the hip is dislocated anteriorly or posteriorly. The choice of surgical approaches is largely depending on personal preference and training. Posterior is the most commonly used surgical approaches. It is feared with increased rate of postoperative hip dislocation by posterior approach Although long term results of this differing approaches are unknown at his point short term benefits of some approaches have been reported ^[2].

Arthroplasty surgeons remained discordant in their choice between approaches.

In this study we try to evaluate the clinical, radiological and functional outcome of hemi replacement and total hip replacement operated by posterior approach.

Aims

- To evaluate the clinical, radiological and functional outcome of hemi-replacement and total hip arthroplasty by posterior approach
- To determine safety and efficacy of the approach

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- To determine significant predictors of complications

Inclusion criteria

1. All patients operated for hip arthroplasty giving informed consent for the trial will be included in the study
2. Outside the home ambulatory patient before fracture
3. non-pathological neck femur fracture
4. Avascular necrosis of hip

Material and Methods

- 30 patients operated for total hip or hemi arthroplasty posterior approach
- **Position:** lateral

- **Anaesthesia:** Spinal or general
- **Antibiotics:** Prophylactic antibiotic half an hour before surgery and to be continued for 48 hours after surgery.
- **Stitch Removal:** 12 to 15 days
- **Dressing** on 2nd day (Removal of suction drain) and 7th day
- **Evaluation:** On Basis of intra operative notes, Harris Hip Score and radio graphical evaluation

Follow UP: On 1 Month, 3 Month and 6 Months

Surgical approach

Fig 1: Incision-make 10 to 15 cm curved incision On posterior edge of greater trochanter (GT).

Fig 2: Begin 7 cm above and posterior to GT. curve posterior to the GT and continue down shaft of femur.

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)

Fig 3

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-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.

Closure done in double layer with myodesis of short external rotators.

Modified harris hip score ^[23]

Pain

None/ignores (44points)

Slight, occasional, no compromise in activity (40 points)

Mild, no effect on ordinary activity, pain after activity, uses aspirin (30 points)

Moderate, tolerable, makes concessions, occasional codeine (20 points)

Marked, serious limitations (10 points)

Totally disabled (0 points)

Function: Gait

Limp

None (11 points)

Slight (8 points)

Moderate (5 points)

Severe (0 points)

Unable to walk (0 points)

Support

None (11 points)

Cane, long walks (7 points)

Cane, full time (5 points)

Crutch (4 points)

2 Canes (2 points)

2 crutches (1 points)

Unable to walk (0 points)

Distance walked

Unlimited (11 points)

6 blocks (8 points)

2-3 blocks (5 points)

Indoors only (2 points)

Bed and chair (0 points)

Functional activities

Stairs

Normally (4 points)

Normally with banister (2 points)

Any method (1 points)

Not able (0 points)

Socks/Shoes

With ease (4 points)

With difficulty (2 points)

Unable (0 points)

Sitting

Any chair, 1 hour (5 points)

High chair, ½ hour (3 points)

Unable to sit, ½ hour, any chair (0 points)

Public transportation

Able to enter public transportation (1 points)

Unable to use public transportation (0 points)

Absence of deformity (All yes=4; less than 4=0)

1. Less than 30° fixed flexion contracture

2. Less than 10° fixed abduction

3. Less than 10° fixed internal rotation in extension

4. Limb length discrepancy less than 3.2 cm

Range of motion score

Flexion

Adduction

Abduction

External rotation

Internal rotation

Scale: 211-300(5); 161-210(4); 101-160(3); 61-100(2); 31-60(1); 0-30(0)

Total Harris hip score

Fig 4: Hip prosthesis zones

Table 1: Radiological evaluation of Total HIP Arthroplasty

		6 weeks	3 months	6 months
1	Limb length discrepancy			
2	The horizontal center of rotation			
3	The vertical center of rotation			
4	The acetabular inclination			
5	Stress shielding			
6	The acetabular antversion			
7	Femoral stem positioning			
8	Cement mantle			
9	Spot welding			
10	Subsidence of stem/migration of acetabular component			
11	Other positive finding			

Results

Table 2: Functional Outcome

	N	Mean	Std. Deviation
Harris hip score 3 month	30	87.96	4.1
Harris hip score 6 month	30	92.27	3.2

Fig 5: Harris hip score

Table 3

Surgery type	Posterior approach
Lurch	
HRA	8.33%
THR (cemented)	10%
THR (Uncemented)	12.5%
Dislocation	
HRA	0.00%
THR (Cemented)	20%
THR (Uncemented)	12.5%

- Dislocation rate was 10 percent (3 patients) with posterior approach.
- Post-operative lurch was found not significant in our study

Table 4: Femoral Stem Positioning

		Center	Varus	Valgus	Total
	Counts	22	6	2	30
Posterior Approach	% Within	73.33%	20%	667%	100%

Femoral Stem Was Found Eccentric in 26.67 Percent of Cases in Posterior Approach

Table 5: Limb length discrepancy

Surgery type	N	Average lld
HRA	12	0.36 cm
THR (Cemented)	10	0.6 cm
THR (Uncemented)	8	0.5 cm

- No significant difference was found in limb length discrepancy in both approach
- No heterotopic ossification was seen in cases operated by posterior approach
- No peri prosthetic fractures were seen in cases operated by posterior approach

Discussion

- Total Hip Replacement/Hemiarthroplasty was performed as a mode of treatment in 30 selected patients by posterior approach in new civil hospital, surat. Hip replacement in all cases was performed in otherwise active individuals the age group ranged from 17 to 85 years. Such cases were followed up and evaluated clinically and radiologically.
- In our study, the follow up period was 6 months. All patients were alive at the last follow up. Coates and armor^[34] had reported a mortality of 29%, 7% were known to have died in the first month mainly due to medical complications like ischemic heart diseases, pulmonary embolism and septicemia complicating wound infection. In the later studies mortality reported was significantly reduced, Taine and armor 3% at one month 10% at 6 months (1985), Delamarter and moreland^[27] 12% at one year (1987), Gebhart *et al.* report a 0% in hospital mortality (1991). This has been attributable to advances in anaesthesia and critical care medicine and improvement in medical facilities.
- All the operations were performed in modular operation theatre with laminar airflow under antibiotic cover. This suggested that prophylactic antibiotic significantly reduced the rate of sepsis in conventional operation theater. This was based on the studies in favor of the use of systemic antibiotics, in orthopaedic surgery, by Bryan

et al. Wilson *et al.* reported significant decrease in infection rate, when prophylactic antibiotics are used. In our study, superficial infection was detected in 5 patients. 1 patient had deep infection. All 6 patients were surgically debrided and treated with intravenous antibiotics according to culture sensitivity report for 2 weeks followed by oral antibiotics for 4 weeks. ^[17]

- Numerous approaches to the hip joint have been described, each claiming to have an advantage over the other.
- In our study we have used modified Gibson approach pioneered by Kocher-Lenggenbach, in which short external rotators were tagged and cut capsule incised in & hip dislocated posteriorly, capsule was closed in double layer.
- According to the Harris hip score 91% patients had well to excellent results in our study with mean score of 93. Taine and Armour had reported 70% good or excellent results, Gregory *et al.* ^[22] 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.
- Only 9% patients complained of hip pain with 3% patient requiring regular analgesics. Coates and Armour ^[22] reported 89% patients to be pain free or having mild pain whereas 11% had severe pain which limited function and for which patients required 76% patients to be pain free following operation.
- Post-operative lurch was not found significant in hip replacement done by this approach can be explained on the basis that abductors were not dissected. Marco Antonio *et al.* ^[19]
- Incidence of hip dislocation was found significantly high in patients operated by posterior approach 10%, all cases were managed with closed reduction under anaesthesia and immobilization for 4 weeks. Tuberculosis, rheumatoid and sickle cell disease was associated with post-operative hip dislocation. No implant loosening was found. Rate of dislocation reported in various series was Coates and Armour ^[22] 8%, Sim and Stauffer ^[25] 10.7%, Cartlidge ^[14] 14.6%, Taine and Armour 12.3%, Dorr *et al.* 18% and Greenough and Jones 8%.
- No subsidence or migration of the femur or acetabulum components was seen. There was no change in the orientation of the femoral or acetabular components till last follow up. Stress shielding was found in 54% of cases radiolucent zones were seen around the femoral component in six cases which were non progressive till last follow up. Radiolucent shadow in all the above cases occupied <50% area at the bone cement interface.

Conclusion

- At 6 Months Hip Score Was Found 93 In Posterior Approach
- Dislocation rate was 10 percent (3 patients) with posterior approach.
- Post-operative lurch and limb length discrepancy were found not significant in our study
- Femoral stem was found eccentric in 26.67 percent of cases in posterior approach
- No heterotopic ossification was seen in cases operated by posterior approach
- No peri prosthetic fractures or implant loosening were seen in cases operated by posterior approach
- None of the patients in our study had complications of

immobilisation like deep vein thrombosis, pneumonia atelectasis.

- Early mobilization with hip replacement and post-operative anti-coagulants was main reason for the significant reduction in these complications.

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