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

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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. The choice of surgical approaches is largely depending on personal preference and training. Arthroplasty surgeons remained discordant in their choice between two approaches.
In this study we try to evaluate the clinical, radiological and functional outcome of hemi-replacement and total hip replacement operated by anterolateral approach.
No postoperative Disloaction was found high in patients operated by posterior approach. Peri prosthetic fractures were seen in 2 cases operated by anterolateral approach. Post-operative lurch was found significant with anterolateral approach.no significant increase was seen in intra-op blood loss, duration of surgery.

Keywords: Hemi replacement arthroplasty (HRA), total hip arthroplasty (the/thr), sickle cell anemia (SCA), modified Harris hip score

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 leads 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 (the) is a procedure whereby the diseased articular surfaces are replaced with synthetic materials, thus relieving pain and improving joint kinematics and function [8].
Hemi replacement arthroplasty (hra) is a procedure in which femoral component is replaced by prosthesis, commonly in cases on neck of femur fractures [8].
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. Gibsons posterior and hardinges direct lateral approach are the two most commonly used surgical approaches. Although long term results of this differing approaches are unknown at his point short term benefits of some approaches have been reported [2].
The anterolateral and posterolateral approaches were compared by Macedo *et al.* [3] in 1999 and in 2002. When assessing postoperative complications, they found that anterolateral approach demanded longer surgical times, increased intraoperative bleeding and greater need for blood transfusion. However, the functional difference was not assessed postoperatively.
In 2010, Chin J Traunatol. & CO. Comparative study of anterolateral approach versus Posterolateral approach for total hip replacement in the treatment of femoral neck fractures in elderly patients; concludes, anterolateral approach can decrease trauma, operation time, length of hospital stay and bed stay and rehabilitation time [4].

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Arthroplasty surgeons remained discordant in their choice between two approaches.

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

Aims

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

- 24 Patients Operated For Total Hip Or Hemi arthroplasty via anterolateral approach
- **Position:** supine
- **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

Incision-begin 5cm proximal to tip of greater trochanter. Longitudinal incision centered over tip of greater trochanter and extends down the line of the femur about 8cm

Superficial dissection-split fascia lata and retract anteriorly to expose tendon of gluteus medias. 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.

Hip is reduced by traction, adduction and internal rotation; limb is put in figure of 4 manner.

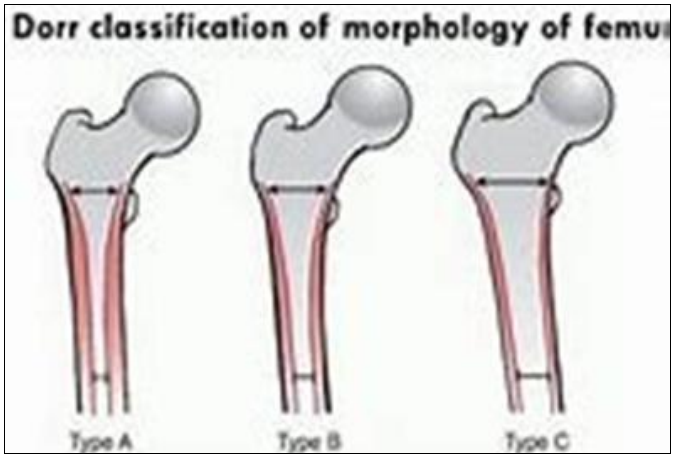

Fig 1: Dorr classification

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 descripancy 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

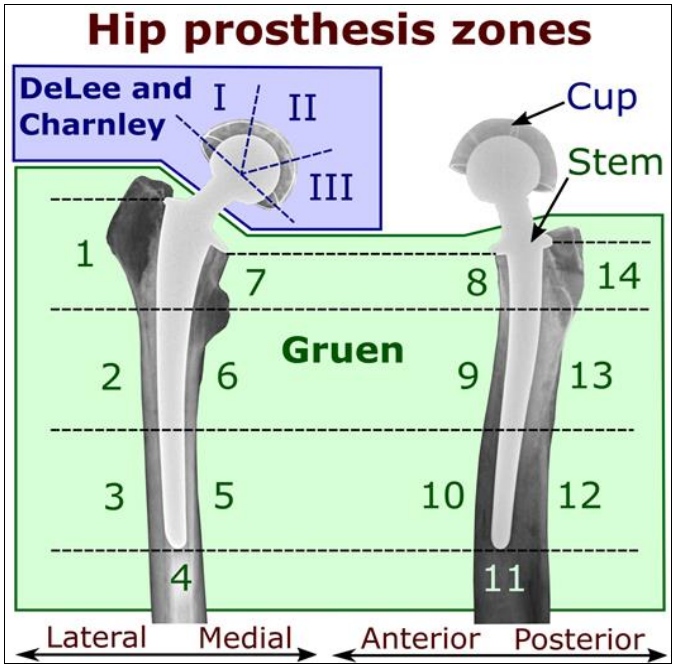

Fig 2: Radiological evaluation of total hip arthroplasty

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 ant version			
7	Femoral stem positioning			
8	Cement mantle			
9	Spot welding			
10	Subsidence of stem/migration of acetabular component			
11	Other positive finding			

Table 2: Heterotrophic ossification classified by the system of broker *et al.*

Grade I	Represents islands of bone with in the soft tissue about the hip
Grade 1*1	Include bone spurs in the pelvis or proximal end of femur leaving at least 1 cm between the opposing surfaces.
Grade III	Represent bone spurs that extend, from the pelvis or the proximal end of femur which reduce the space between the opposing bone surfaces to less than I cm.
Grade IV	Indicates radiographic ankyloses

Table 3: Vancouver classification of per prosthetic fracture

Type	Description
A	Fracture in trochenteric region
B1	Fracture around or just below, with well-fixed stem
B2	Fracture around or just below, with loose stem but good proximal bone
B3	Fracture around or just below, with poor quality or severly cominuted proximal bone
C	Fracture below the prosthesis

Results

Dorr's Index

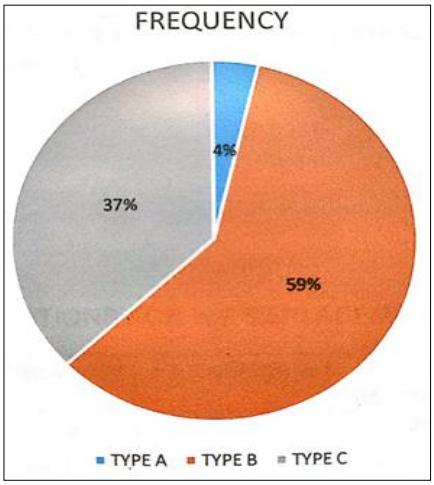

Fig 3: Type b canal is found in 59%of patients

Functional outcomes

Harris-3 month: 88.59
Harris-6 month: 90.33

Table 4: Mean Harris hip score

	Number of atients	Mean hs	Std. deviation
Harris 3 month	24	88.59	4..2
Harris 6 month	24	90.33	3.6

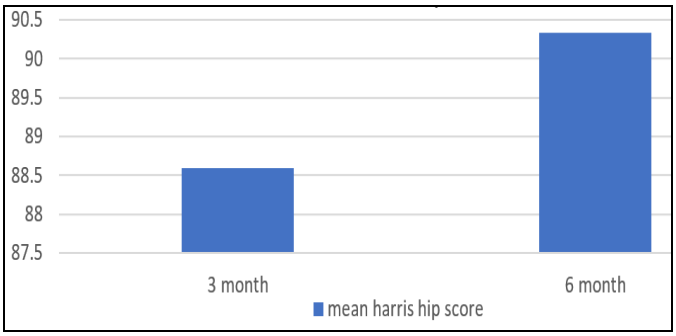

Fig 4: Mean Harris hip score

Table 5: Lurch and Dislocation Statistics

Surgery type	Percentage of patients	Total no. Of patients
Lurch		
Hra	0%	10
Thr (Cemented)	100%	6
Thr (Uncemented)	66.69%	8
Dislocation		
Hra	0%	10
Thr (Cemented)	0%	6
Thr (Uncemented)	0%	8

N0 Incidence of Disloaction and Signnificant Lurch Was Found in Patients Operated by Anterolateral Approach

Table 6: Femoral Stem Positioning

	Center	Varus	Valgus	Total
Numbers	18	5	1	24
Percentage	75%	20.83%	4.17%	100

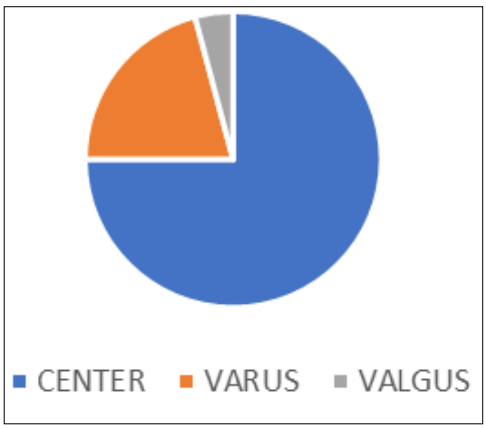

Fig 5: Stem Position

- Femoral Stem Was Found Eccentric In 25 Percent Cases In Anterolateral Approach

Table 7: Limb length discrepancy

Type of surgery	n	mean lld
hra	10	0.5 cm
thr	14	0.3 cm

- No Significant Limb Length Discrepancy Was Found In Both Groups

Table 8: Operated By Anterolateral Approach

			Mean
Blood loss	Hra	10	264 ml
	Thr	14	356 ml
Duration of surgery	Hra	10	65 min
	Thr	14	102 min

- No significant increase was seen in intra-op blood loss, duration of surgery
- Heterotropic ossification was seen in 2 cases operated by anterolateral approach
- Peri prosthetic fractures were seen in 2 cases operated by anterolateral approach

Discussion

- Total Hip Replacement/Hemiarthroplasty was performed as a mode of treatment in 24 selected patients by anterolateral 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 theatre. This was based on the studies in favour 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 2 patients. No patient had deep infection. Both patients were 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. We have used the modified approach based on the anatomical observation made by *Macfarland and Osborne*[8], that gluteus Medius and vastus lateralis are in direct functional continuity. It was incised and hip dislocated anteriorly. *Charnley* recommended osteotomy of greater trochanter. For better visualization of acetabulum and operative field.
- According to the *Harris hip score* 95% patients had well to excellent results in our study with mean score of 91. *Taine and armor* had reported 70% good or excellent results, *Gregory et al.* [2]. 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 found significantly high in total hip replacement done by lateral approach can be explained on the basis that abductors were elevated leading to shortening of the abductor lever arm. Marco Antonio *et al.* [19].
- No Incidence of post-operative hip dislocation was found in anterolateral approach, No implant loosening was found. Rate of dislocation reported in various series was *Coates and Armour* [22] 8%, S*im and Stauffer* [25] 10.7%, *Cartlide* [14] 14.6%, T*aine and Armour* 12.3%, D*orr et al.* 18% and G*reenbush and Jones* [43] 8%.
- femoral stem was found eccentric in 25 percent of cases in anterolateral approach
- Heterotropic ossification was seen in 2 cases operated by anterolateral approach at 6 months. Both patients were non symptomatic.
- Peri prosthetic fractures were seen in 2 cases operated by anterolateral approach. In both the case Vancouver type 1-avulsion of greater trochanter were found. 1 intra-op fracture was managed by tension band wiring and 1 post-operative patient was managed with conservative approach. Both patients were doing well at 3 month and 6 month follow up.
- No subsidence or migration of the femur or acetabulum components was seen. There was no change in the orientation of the formal or acetabular components till last follow up. Stress shielding was found in 54% of cases radiolucent zones were seen around the formal 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

- According to the *Harris hip score* 95% patients had well to excellent results in our study with mean score of 91.
- dislocation did not occur with any patient in lateral approach
- post-operative lurch was found significantly higher with anterolateral approach
- femoral stem was found eccentric in 25 percent of cases in anterolateral approach
- Heterotropic ossification was seen in 2 cases operated by anterolateral approach
- peri prosthetic fractures were seen in 2 cases operated by anterolateral approach
- None of the patients in our study had complications of immobilsation 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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