

Clinical Study to Evaluate the Effectiveness of Primary Total Hip Arthroplasty in Various Disorders of Hip

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Abstract:

Background: Total hip arthroplasty (T.H.A) remains one of the most frequently performed reconstructive surgeries. Much work has been done in this discipline over the past years with regards to scientific investigation, clinical outcome assessment, and the treatment of complications.

Result: All patients had poor Harris hip score preoperatively. 88% patients had good or excellent results postoperatively. One (6%) patient had poor result that had vertical migration of the acetabular cup and one (6%) patient had fair result with perforation of acetabulum which was asymptomatic.

Summary: 20 hips were operated in 18 patients for avascular necrosis (8 patients), fracture neck of femur (7 patients), ankylosing spondylitis (3 patients), Rheumatoid arthritis and osteoarthritis (1 patient each).

Keywords: Total hip arthroplasty, Total hip replacement, Harris hip score, Avascular necrosis Fracture neck.

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Introduction

The human hip joint is extremely complex on account of the functional demands on it by the body. On account of its complex biomechanics & important function, a stable painless hip is required for normal locomotion. [1] Number of diseases affects the hip joint. This number has grown over the years as the life expectancies of individuals have increased. In the beginning the thought of operating on the hip deterred even the most aggressive surgeons. With the improvement in anaesthesia, post operative care and especially the aseptic operating room ritual has brought the risk of operating on the hip very low, thus increasing the widespread acceptance of elective surgery. [2]

Although hip surgery had its root in the 19th century, its greatest period of growth & development has occurred in 20th century. An ever growing population of chronic joint disease demanding relief of pain & disability has led to development of operating such as osteotomy & arthroplasty. The original intent of arthroplasty was to restore motion to an ankylosed joint. This concept has expanded to include the restoration as far as possible the integrity & functional power of a diseased joint. [3]

While in an arthrodesis, the purpose of the operation is to create raw cancellous bone surface on each side of the joint & hold them in rigid apposition. In an arthroplasty, the purpose of the operation is to shape the ends of the bones & to hold the surfaces apart,

almost always using some material interposed between the fragments. [4]

Total joint replacement has undergone many changes since it was first attempted in the early 20th century. It was on the basis of failures of previous surgeries & valuable clinical experience from it by the surgeons that these changes were introduced. [5]

Initially, bone cement was used to fix the articulating surfaces of the THA to the bony ends. But high rates of loosening of the implants, especially the acetabular components led to a change in the technique of fixation of the implants. [6]

Thus bone ingrowth for biological fixation was introduced. The technique of cementless Total Hip Arthroplasty could be used in younger patients in the hope that it might last longer. However, failures in femoral stem fixation on account of little bone ingrowth, thigh pain & ideal method of fixation of the femoral stem. Cemented Acetabular and cemented femoral stem fixation is advised in elderly patients. [7,8]

Objectives

- To study the clinical course and result of Primary Total Hip Arthroplasty in various disorders of hip.
- To study the efficacy of Primary Total Hip Arthroplasty by clinical and radiological signs in post operative period.

- To study the pitfalls of primary Total Hip Arthroplasty in various disorders of hip by clinical assessment in post operative period.

Material and Method

Study done at Nalanda Medical College and Hospital Patna. Patients presenting to the OPD and emergency between 2015 and May 2019 were screened for various disorders of hip. Patients were operated upon for Total Hip Arthroplasty using cemented acetabular cup and cemented femoral stem.

Inclusion Criteria

All cases are selected on the basis of

- Clinical signs and symptoms
- Radiological findings
- Patients who have been diagnosed with various disorders of hip.
- Patients who are fit for surgery.

Exclusion Criteria

- Patients below the age of 45 years.
- Patients who are unfit for surgery due to associated medical problems.
- Patients with compound fractures and septic arthritis.

Preanaesthetic assessment was done on all patients. The patients were admitted 48 hours prior to surgery for education regarding the rehabilitation program to be followed subsequent to surgery. Patients were started on chest physiotherapy and static quadriceps, hamstring and gluteal exercises. Patients were told about back care and ways to lift themselves for use of bedpan. Patients were explained in detail about surgery, possible complications and limitations to be followed after surgery.

Mark center of acetabular component: This will correspond to the new center of rotation, AP view of pelvis to determine whether the bone is OK for fixation of the acetabular cup, to estimate how much reaming will be necessary, & to determine whether a bone graft will be required to support cup & whether protrusion or osteophyte formation may make dislocation of the hip difficult.

Determination of Acetabular Anteversion

Acetabular retroversion is present when posterior acetabular margin ends in a more medial position than the anterior margin in relation to the superior aspect of the acetabular rim. Anterior and posterior margins of the acetabulum should be approximately 1.5 centimetres apart as measured from the center of the femoral head in a plane that is vertical to the anterior aspect of the acetabular rim. Decrease in this distance suggests a decrease in acetabular anteversion. Increase in this distance suggests an increase in acetabular anteversion.

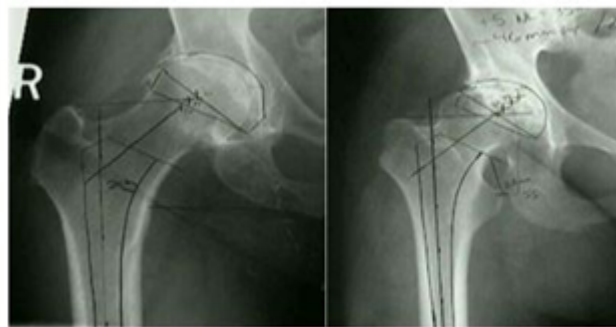


Figure 1: Templating for femoral & acetabular component

Using prosthesis X Ray templates locate desired position of the acetabular component, maximizing bony containment mark the center of rotation on X-Ray then mark a point above the acetabular center of rotation at a distance equal to the amount of additional leg length as desired Choose the femoral component of sufficient size to fill the canal the template has the mark designating the center of rotation of the femoral head with various neck length or head sizes, choose the one that will lie in the point above the center of rotation of the acetabulum.

Patients were shaved of all hair from nipples to toes both anteriorly and posteriorly in minor O.T just prior to shifting the patient to major O.T. They were made to have a through wash with soap and water

since two days prior to surgery. Nails were cut short. Proctoclysis enema was given one night before, pre operative prophylactic injectable antibiotics were started on all patients from 12 hours prior to surgery and continued till 5 days post operative. These were then switched to oral antibiotic till the time of stitch removal.

All the patients were started Ceftriaxone + Sulbactam 1.5 gram and Amikacin 500mg intravenously after test dose every 12 hourly, dose was adjusted according to the body weight and renal functions of the patients. Inj Tetanus toxoid was also given pre operative 0.5 cc intramuscular. Fresh gown and gloves were kept for the case. Instrumentation was autoclaved and Operation

Theatre was fumigated. All operative surgeons and staff nurses scrubbed for 10 min and double mask and gloves were used for surgery. Ceftriaxone + Sulbactam 1.5 gm was also given at the time of induction of anaesthesia, urinary catheter was introduced in all patients just prior to surgery.

Operative Steps

Procedure

Anaesthesia: Spinal Anaesthesia/ Epidural Anaesthesia

Approach: Posterior Approach (Moore's/ Southern Approach)

Position: True lateral with the affected limb uppermost

A 10-15 cm curved incision, centered on the posterior aspect of the greater trochanter is taken. After dissecting the subcutaneous tissue, fascia lata is incised in line with the skin incision over the center of the greater trochanter. The gluteus maximus fibers are split bluntly. Internally rotate the hip to put the short external rotator muscles on a stretch and detach the tendons close to their femoral insertion to expose the capsule. The capsule is

incised with a T-shaped incision. The knee is flexed to 90 degree and the thigh is internally rotated. The head is then delivered out of the acetabulum using bone levers and head extractor.

Post-operative Regimen

The foot end of the bed was elevated for 4 hours. A pillow was kept in between the two legs so that the limb was in abduction. Half hourly TPR and blood pressure charts were maintained for the first 24 hours. Intravenous antibiotics (Ceftriaxone with Sulbactam 1.5gm and Amikacin 500mg) were administered twice daily for the first 5 days and then shifted to Cefdinir 300 mg twice daily for the next 5 days. Intramuscular analgesics (Diclofenac Sodium 75mg) were administered twice daily for the first 48 hours and then shifted to oral analgesics twice daily.

Results

This study was conducted in Department of Orthopaedics in NMCH Patna. 20 hips were operated in 18 patients, for various disorders of hip joint using Charnley's type cemented acetabular component and cemented femoral component (monoblock and modular). Following results were obtained.

Table 1: Age varied from the lowest of 45 to a highest of 68 years. Mean age of patient in our study was 58 years.

Age (in years)	No. of Patient	Percentage(%)
46-50	1	5.5%
51-55	4	22.2%
56-60	8	44.0%
61-65	4	22.2%
66-70	1	5.5%
Total	18	100.0%

Avascular necrosis was seen in 8 patients (44%). It was due to steroids in 2 patients, taken for skin disorder and nephrotic syndrome, respectively. 2 patients had developed the disorder after pregnancy. It was post-traumatic in 2 patients and idiopathic in 2 patients. Fracture neck of femur was present in 7 patients (39%). 2 cases were of failed hemiarthroplasty operated 1 year and 1½ years back respectively. 4 patients were cases of fresh trauma, 1 case was old neglected fracture neck femur presenting after 6 months of trauma.

Mean preoperative Harris hip score was 34, ranging from 17-54. This score had improved postoperatively to 88 (Range = 45.5 - 97).

Pain: Preoperative, marked pain was present in 50% of our patients, moderate pain was present in 39% of patients, and no pain was present in 11%.

At the latest follow up 94% patients had no pain. Only 6% patients had moderate pain for which analgesics were required.

Description of pain	Preoperative(%)	Postoperative(%)
Marked pain	50	0
Moderate pain	38	6
Mild pain	12	0
Slight pain	0	0
No pain	0	94

While 100% patients had a limp preoperatively, only 12% of the patients had moderate limp post-operatively. 88% patients had slight or no limp.

Limp	Preoperative (%)	Postoperative (%)
Sever	78	0
Moderate	22	12
Slight or None	-	88

Support: While 100% patients required a support for ambulation preoperatively, only 12% required a support postoperatively. 88% of patients required no or occasional support for walking.

Distance walked: Preoperatively most of the patients were restricted to indoor activities or bed only. Post operatively, 88% patients could walk for long distances and 12% were restricted to less than 500 meters only.

Deformity: 44% of the patients had a significant deformity preoperative (more than 30 degree fixed flexion, more than 10 degree fixed adduction, more than 10 degree fixed internal rotation in extension, limb length discrepancy more than 3.2 cm).

Discussion

Component loosening due to osteolysis is one of the major problems associated with Total hip arthroplasty. [9,10] This results in reduced rates of survival of total hip components. With improved cementing techniques, it has been seen that cemented femoral acetabular fixation has provided durable results. However, acetabular component fixation showed loss of fixation in a number of cases after 10 years. [11]

While our study was limited to 20 T.H.A., Berger et al performed 150 T.H.A., Harris et al performed 126 T.H.A. and Goldberg et al performed 125 T.H.A. This is due to the fact that this study was limited to a very short duration. Also, financial constraints and unawareness of this procedure to the patient limited the number of patients for this study. Most common diagnosis in the present series was avascular necrosis (44%) followed by fracture neck of femur (39%). There were 3 cases of Ankylosing Spondylitis, one case each of rheumatoid arthritis and osteoarthritis. [12] Studies in the west report Osteoarthritis as the most common diagnosis (63% by Harris et al & 77% by Berger et al). Avascular necrosis is the second most common diagnosis in the western literature (10% by Harris et al & 7% by Berger et al). In this series, the difference in diagnosis might suggest a high rate of A.V.N. and a low rate of osteoarthritis in Indian patients. A study for longer period of time and with longer follow up is needed to establish this fact and to determine the reason for this difference. [13,14]

Chemoprophylaxis was routinely carried out in all patients. No patient developed deep infection and only one case of superficial infection was detected. All surgeries were performed in conventional operating theatre. Wilson et al reported a significant fall in the infection rates when prophylactic

antibiotics were used from 11% to 1%. Goldberg et al reported a rate of 0.8% of deep infection using vertical laminar flow operating rooms and body exhaust systems. No case of deep infection in the present study highlights the importance of proper operating room discipline along with prophylactic antibiotics can significantly reduce infection rates. Patients were evaluated after discharge at 4 weeks, 2 months, 6 months, 1 year, 1½ yrs and then yearly. [15] Average follow up was 11 months in this study, as compared to much larger follow ups available in western literature (42 months by Harris et al, 8.6 years by Goldberg et al and 103 months by Berger et al). Mean Harris hip score improved from 34 points preoperatively to 88 points postoperatively. 88% of hip were graded as good or excellent in this study, 6% were graded fair and 6% were graded as poor. Harris et al reported improvement in Harris hip score from 57 preoperatively to 93 points postoperatively. 96% good to excellent results, 4% fair and no poor results were reported. [16] Goldberg et al reported improvement in Harris hip score from 47 preoperatively to 88 points postoperatively. 85% good to excellent results, 13% fair and 9% poor results obtained in his series. Pain relief was also dramatic following THR. 50% of the patients had marked pain preoperatively and 31% had moderate pain. Postoperatively 94% of patients were relieved of pain only 6% patients had moderate pain. Similar result was obtained by Harris et al (98% complete pain relief) and Berger et al (94.5% complete pain relief). [17]

Conclusion

We have done an evaluation of Total Hip Arthroplasty using cemented femoral and cemented acetabular components. We have operated 20 hips in 18 patients for vascular necrosis (8 patients), fracture neck of femur (7 patients), ankylosing spondylitis (3 patients), rheumatoid arthritis and osteoarthritis (1 patient each). In all patients Harris hip score was used to evaluate the patient. Charnley type modular and monoblock cemented femoral stems and acetabular cup prosthesis was used in all patients. Patients were started on progressive weight bearing after removal of negative suction drain on 2nd post operative day.

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