

A clinical study to evaluate the effectiveness of primary total hip arthroplasty in various disorders of hip

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Abstract

Background and Objectives: 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. The short term results of THR for nonunion, AVN and failure of internal fixation of femoral neck fractures have been uniformly good. **Methods:** Between July 2017 and June 2019, 18 patients with various disorders of the hip got admitted in Department of Orthopaedics, Saraswati Medical College, Unnao, U.P., India. They were subjected to primary cemented THR and the functional outcome was evaluated using Harris hip score. **Results:** 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). Harris hip score was used for evaluation of functional outcome which was on an average 34.6 (16-53) preoperatively and 87.9 (45.5-97) postoperatively. We had complications in 2 patients, acetabular perforation was seen in 1 patient and acetabular cup migration was seen in another. We had good to excellent results in 88% of patients. Average follow-up was of 11 months in our study. **Conclusion:** The patient sample approximately reflected the regular cases of hip pathologies encountered in our setup. At present it can be interpreted that in properly selected cases, cemented THA offers a better alternative procedure for various hip joint pathologies in the elderly. We also confirmed the proven efficacy of THR in treatment of fracture neck of femur in elderly patients.

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

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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. 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. Although hip surgery had its root

in the 19th century, it's 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. While a resection restores motion arthroplasty must not only restore motion but also provide stability to the joint. 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. Total joint replacement has undergone many changes since it was first attempted in the early 20th century. It was on the

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basis of failures of previous surgeries & valuable clinical experience from it by the surgeons that these changes were introduced. Thus bone in growth 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 in growth, thigh pain & ideal method of fixation of the femoral stem. Cemented Acetabular and cemented femoral stem fixation is advised in elderly patients. A study has been conducted to evaluate clinical & radiological results of cemented THR in various disorders of Hip in the Department of Orthopaedics, Saraswati Medical College, Unnao, U.P., India.

Materials and methods

Source of data

This study was conducted in Department of Orthopaedics, Saraswati Medical College, Unnao, U.P., India patients presenting to the OPD and emergency between Department of Orthopaedics, Saraswati Medical College, Unnao, U.P., were screened for various disorders of hip. All confirmed cases of various disorders of hip admitted in Department of Orthopaedics, Saraswati Medical College, Unnao, U.P. Patients were operated upon for Total Hip Arthroplasty using cemented acetabular cup and cemented femoral stem.

Method of collection of data

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. (AVN, fracture neck of femur, O.A. of hip, etc.)
- 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.

Detailed history, clinical examination, and radiological examination were carried out in all patients. Salient features included

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. The negative suction drain was removed depending upon the amount of collection at 48 hours and the patients were mobilized with a walker. The sutures / staples were removed between 10th and 12th post operative day and the patient was discharged.

Rehabilitation

Patients were taught quadriceps strengthening exercises, weight bearing with support and leg dangling by the side of the bed

Precautions advised to the patient at the time of discharge

- Not to sit cross-leg.
- Not to squat.
- Not to use low level chairs.
- Not to sleep on operated limb.
- Daily routine modification to avoid running, lifting heavy loads, bending, etc. to prolong to life of implant.

Patient is recalled 4 weeks after discharge (6 weeks postoperative) and instructed in gait training, to walk with full weight bearing on a walker. Patient is reviewed again after 4 weeks (2 months postoperative) and assessed for gait pattern. Patient is instructed to use cane in opposite hand from now onwards. If any abductor weakness is seen, patient is taught abductor exercises to strengthen abductors. Patient is again assessed after 6 months. Hence the patient is evaluated after 6 weeks, 2 months, 6 months 1 year and 1 ½ years after surgery, and then yearly. Results are evaluated both clinically and roentgenographically. Subsidence, osteolysis and loosening of implants are assessed on subsequent radiographs and compared with previous X-rays.

Results

This study was conducted in Department of Orthopaedics. 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.

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

Table 1:Age, number of patients and percentage

Age (in years)	Number of Patients	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%

Sex:8 patients were male and 12 were female

Weight:Mean weight of patients operated was 61 kg. (Range = 50-75)

Side of surgery:Right side: 7,Left side:13

Preoperative diagnosis: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.Ankylosing spondylitis was the preoperative diagnosis in 3 patients. All patients had spine and sacro-iliac involvement.1 patient was a case of rheumatoid arthritis.1 patient had osteoarthritis as preoperative diagnosis.

Clinical results

Mean preoperative Harris hip score was 34, ranging from 17-54. This score had improved post-operatively 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%.

Table 2:Description of pain

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

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

Limp

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

Table 3:Limps preoperative and postoperative

Limp	Preoperative (%)	Postoperative (%)
Severe	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). Post operatively, only 6% of the patients had any significant deformity remaining.

Clinical 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.

Radiographic Results

Results of the radiographic evaluation on all hips on all follow up visits were as follows

Femoral Component

The cement mantle was assessed in all 20 hips about the femoral component. The column of cement distal to the tip of the component was assessed. The cement mantle was graded as:

Table 4:Cement mantle grade

Grade A	44%
Grade B	30%
Grade C1	16%
Grade C2	10%
Grade D	0%

The femoral component was in neutral alignment in 17 hips (85%), in less than 10 degree valgus in 2 hips (10%) and in less than 5 degree of varus in one hip (5%). At the last follow up, no radiographs showed any evidence of a new radiolucency, any shift in the position of any femoral component or any crack in the cement mantle.

Acetabular Component

Two patients had gaps between the bone and the acetabular component on initial postoperative radiographs. One was 1½ mm wide in Zone 1 and Zone 2 each. Other was 1 mm gap in Zone 3. Cups were positioned on an average of 40 degree of abduction (Range = 30-55 degrees). One patient showed vertical migration of acetabular cup and one patient showed perforation of acetabulum. At the latest follow up 19 of the 20 acetabular components did not show any evidence of horizontal or vertical migration but one showed vertical migration. No radiolucent lines were seen at the bone-cement prosthesis on any radiographs. There were no fractures.

Complications

- Superficial stitch infection was noted in one patient on routine wound inspection on 5th post operative day. Wound was explored and no communication was found beneath the deep fascia. So superficial tissues were debrided and they healed well on antibiotics.
- Vertical migration of acetabular cup was seen in one patient caused due to perforation of acetabular wall during surgery.

- Perforation of acetabulum is seen in one patient on post operative x ray.

Discussion

Component loosening due to osteolysis is one of the major problems associated with Total hip arthroplasty. 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. The present study was a series of 20 hips operated between July 2017 and June 2019 for cemented hip arthroplasty for various disorders of hip in the department of Orthopaedics, Saraswati Medical College, Unnao, U.P. While our study was limited to 20 T.H.A., Berger et al[1] performed 150 T.H.A., Harris et al[3] performed 126 T.H.A. and Goldberg et al[2] 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. The age limit for this series was upto 68 years. Many series have shown that the rate of loosening and revision of total hip arthroplasty is high in younger patients. The cemented acetabular component has been the source of most of these failures. The short-term results of the cementless acetabular reconstruction have been encouraging in young patients. Berger et al reported a 10-year survival of 98.8% in patients younger than 50

years. 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. Studies in the west report Osteoarthritis as the most common diagnosis (63% by Harris et al [3] & 77% by Berger et al [1]). Avascular necrosis is the second most common diagnosis in the western literature (10% by Harris et al [3] & 7% by Berger et al [1]). 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. 96% good to excellent results, 4% fair and no poor results were reported. 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. These figures were comparable to our results. 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 [3] (98% complete pain relief) and Berger et al [1] (94.5% complete pain relief). Slight or no limp is seen in 88% of patients in this study. Moderate limp was present in 12% of patients. In a study by Harris 63% patients had no limp and 28% of patients had slight limp. Berger et al also reported low rate of limping. The limping improves over a period of time with progressive abductor exercises. As this study has a follow up of 11 months, percentages of patients limping are expected to decrease with time. 94% patients needed no support or only occasional cane for walking long distances. 6% patients required cane full time. This finding is comparable to the results obtained by Harris et al (95% patients used cane occasionally). Radiographically results were also excellent. Second generation cementing techniques were used. Grading the initial appearance cement mantle columns resulted in 44% hips with Grade A, 30% with Grade B, 16% with Grade C₁, and 10% with Grade C₂ cementing technique. This result was comparable to results by Berger et al [1] (41% hips with Grade A, 24% with Grade B, 7% with Grade C₁, and 27% with Grade C₂ and 1% Grade D cementing

technique). No hip showed any evidence of loosening or osteolysis in femoral and acetabular component. Only one hip showed vertical migration of acetabular cup due to perforation of acetabular wall during surgery. In series by Harris et al [3], no femoral component as definite or probably loose and one acetabular component showed migration. Low complications were seen in our series. 1 acetabular perforation, 1 acetabular cup migration and 1 superficial infection were seen. Harris et al [3] reported 5 cases of trochanteric non-union (8%), 19 cases of deep vein thrombosis (15%), 9 dislocation (7%), 2 partial femoral and sciatic nerve paralysis and 2 patients had peroneal nerve paralysis (1.5% each). Goldberg et al [2] had 3 dislocations (2.4%), 1 deep infection (0.8%) and 3 deep vein thrombosis (2.4%).

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. Excellent to good results were obtained in 88% of patients postoperatively according to Harris hip criteria. No radiological loosening was seen in femoral or acetabular component. Hence this study provides an evidence modality of treatment for various disorders of hip.

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