ISSN: 0975-5160

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2021; 11(5); 54-59

Original Research Article

A Radiographic Evaluation of Total Hip Arthroplasty Done in Cases of Displaced Fracture Neck of Femur

Anshu Anand[1], Ajoy Kumar Manav[2]

[1]Senior Resident, Department of Orthopaedics, Patna Medical College and Hospital, Patna, Bihar, India

[2]Associate Professor, Department of Orthopaedics, Patna Medical College and Hospital, Patna, Bihar, India

Received: 09-07-2021 / Revised: 28-08-2021 / Accepted: 15-09-2021

Corresponding author: Dr. Anshu Anand

Conflict of interest: Nil

Abstract

Aim: Radiological assessment of Total Hip Arthroplasty in Displaced fracture Neck of femur. **Materials and Methods:** This observational study was carried out in the Department of Orthopedics, Patna Medical College and Hospital, Patna, Bihar, India. Total 120 patients were patients treated with total hip replacement. Plain X-ray pelvis with both hips and proximal femur-AP view and X-ray of the operated hip lateral view were evaluated. **Results**: Out of 120, 85 patients were male and 35 females, most of the patients in were above 50 year and followed by 45-50 year. Patients scored 47.3% excellent, 27.3 good, 10.9% fair and 14.5% patients scored poor. The acetabular cup inclination 85 neutral, 15 vertical and 10 horizontal positions were seen. We had 82 central, 15 each in valgus and 13 varus positions. There were 2 subsidences and 1 migration seen, and Class II heterotopic ossification was noted in 4 hips, i.e., 6 % incidence that underwent THA. We had 2 cases of dislocation (1.8%). **Conclusion**: The result of this study shows that Total Hip Arthroplasty gave better results in Displaced Intracapsular Neck of femur fractures radiologically.

Keywords: Radiological, Arthroplasty, femur.

Introduction

Total hip arthoplasty (THA) is a popular orthopaedic operation[1]. One of the most common indications for total hip arthroplasty is arthritis and associated collagen disorders[2]. Postoperative hip dislocation has been documented in 0.5 to 10.6% of patients following initial THA[3,4]. Surgical method and approach, implant selection, implant placement, patient education, and patient-related variables all influence dislocation incidence.

Total hip replacement is one of the most effective and cost-efficient orthopaedic procedures[5]. Hip replacements have improved the lives of millions of individuals, regardless of the cause[6]. Total hip arthroplasty is a procedure to restore joint

mobility and stability, as well as muscle, ligament, and other soft tissue function.

The use of an artificial head and socket to replace a deteriorated or damaged head had a major societal influence and early success. While there are certain short- and long-term risks to this technique, it is still the best option for orthopaedic patients and the biggest breakthrough in orthopaedic surgery in the 21st century[7]. The relevance of arthroplasty in acute displaced femoral neck fractures is debated[8].

The relative advantages of different forms of arthroplasty among certain patient populations are still debated. Some surgeons choose THR for acute displaced femoral neck fractures, whereas others do not. Lack of quality data allows the discussion to continue. Based on Andrew Whaley and Daniel et al. criteria[9] radiological assessment of acetabular components in uncemented acetabulum is done and defined loosening when Migration of > 2mm in horizontal /vertical direction, Rotation of implant, Screw breakage or more than 1mm radiolucent line in all zones. Loosening in cemented acetabular components is assessed in 3 zones defined by De Lee and Charnley criteria[10] which manifest as radiolucent line between cement-bone and cement-cup interface, distribution, thickness and progression of these lines, tilting and bulk migration of the socket in relation to the bone in X-rays. Acetabular cup inclination[11] was measured by AP radiograph by 2 lines, one is trans-ischial line and other line parallel to opening of acetabuar component and grouped in to Normal (30-40^{O}), Vertical (>45^{O}) and Horizontal cup(<30^{O}) alignment. Femoral stem position is determined as Varus, Valgus or Centre based on angle made by the lines drawn from mid points of transverse diameter of shaft of femur and the stem of the femoral component at 1cm, 3cm and 5cm from the tip of femoral stem. Heterotopic ossification was graded according to the Brooker et al.[12] classification in to Grade I-IV, with Grade IV being Ankylosis. Observations and measurements were evaluated using the X-ray AP view of the pelvis and X-ray AP/lateral view of the operated hip during post op, 4 weeks and then 5-6 months once follow up.

Material and methods

This observational study was carried out in the Department of Orthopedics, Patna Medical College and Hospital, Patna, Bihar, India from Jan 2019 to December 2019, after taking the approval of the protocol review committee and institutional ethics committee. Total 120 patients were treated with total hip replacement.

Inclusion Criteria

- Displaced Intracapsular Neck of Femur Fracture
- Non-union Neck of Femur

Exclusion Criteria

- Young patients
- Pathological femur fractures.
- Patients with neuromuscular disorders
- Infections
- Failed cancellous screw fixation
- Intertrochantric fractures and associated acetabulum fractures

Methodology

In the present study Posterior approach in all the cases of THA was used and the second-generation cementing techniques for cemented THA were utilized. Radiographic evaluation includes Loosening of the acetabulum and femoral components, Inclination of Acetabular cup, Stem position of femoral component, Vertical subsidence, Migration of the Acetabular cup and Heterotopic Ossification. Modified Harris hip score was used for clinical and functional evaluation of patients.[13] Plain X-ray pelvis with both hips and proximal femur-AP view and X-ray of the operated hip lateral view for radiological evaluation.

Results

Out of 120, 85 patients were male and 35 females, most of the patients in were above 50 year and followed by 45-50 year. Patients scored 45.0% excellent, 26.7% good, 12.5% fair and 15.8% patients scored poor. The acetabular cup inclination 88 neutral, 18 vertical and 14 horizontal positions were seen. We had 92 central, 20 each in valgus and 18 varus positions. There were 4 subsidences and 2 migrations seen, and Class II heterotopic ossification was noted in 8 hips, i.e., 6.7 % incidence that underwent THA. We had 4 cases of dislocation (3.3%).

Table 1: Demographic profile of the study population

Variables	Number (N=120)	Percentage (%)
Gender		
Male	85	70.8
Female	35	29.2
Age		
<40	Nil	Nil
40-45 years	13	10.8
45-50	23	19.2
Above 50	84	70.0
Cemented/uncemented		
Cemented	70	58.3
Un-cemented	50	41.7
Laterality		
Right	72	51.7
Left	58	48.3

Table 2: Clinical and functional evaluation of study subjects using Harris hip score

Harris hip score	Number (N=120)	Percentage (%)
Excellent (90-100)	54	45.0
Good (80-89)	32	26.7
Fair (70-79)	15	12.5
Poor (<70)	19	15.8

Table 3: Radiographic evaluation of the study population

Radiographic evaluation	Number (N=120)	Percentage (%)
Acetabular cup inclination		
Normal (30-45 degrees)	88	73.3
Vertical (> 45 degrees)	18	15.0
Horizontal cup (<30 degrees	14	11.7
Femoral stem position		
Central	92	76.7
Valgus	20	16.7
Varus	18	15.0
Subsidence & Migration		
Subsidence	4	3.3
Migration of Acetabular cup	2	1.7
Heterotropic ossification	8	6.7
Dislocation	4	3.3

Discussion

Surgery to replace the hip joint with an artificial prosthesis has improved the management of hip disorders that have not responded to standard medical therapy. Studies show that typical complete hip replacements endure beyond ten years in 90% of patients. More than 90% of patients report no discomfort or pain that is controlled with infrequent OTC drugs. Most hip replacement patients can walk unaided (without a cane) for extended distances without a limp[8]. A complete hip replacement, like any major surgery, has medical and surgical risks. Major problems are rare but can occur. John C. and W.H. Harris[14] (JBJS 1999) described a 122-month follow-up of 188 Harris-Galante porous coated acetabular components Judet, anteroposterior, and true lateral radiographs were used to examine the hips. 4% (8 hips) developed osteolytic lesions of the pelvis, and less than 1% (1 hip) required bone grafting.

Engh C.A. Jr et al.[15] (JBJS 1997) reported in his series, 174 hips were followed for a minimum of 10 years. A total of 7 acetabular components, i.e., 4.02% of the 174 hips were radiographically loose. 4 patients of the 174 hips had symptomatic loosening of the acetabular cup, and the cup was revised eight, nine, ten and 12 years after index arthroplasty. The other 3 hips were not revised because they were not causing any symptoms. The average duration between the index operation and the diagnosis of loosening was 7.8 years. In our study there were no Loosening of the acetabulum and femoral components.

This procedure is riddled with a large number of long-term complications ranging from dislocations including recurrent dislocations. Primary endoprosthetic replacement has been advocated to improve survival by eliminating fracture fixation and healing problems and by allowing early mobilization. Conventional treatment for fracture neck of femur, grade 1 and 2, is open reduction and internal fixation, whereas that for grade 3 and 4 is still controversial. Regarding functional outcome, our study showed that hip replacement for patient in non-traumatic group had better outcome as indicated by better Harris hip score than the traumatic group. We had 4 case of dislocation (3.3%). The dislocation occurred during the 2nd month of the surgery at home. The patient was treated by open reduction and trochantric osteotomy. Another study observed increased rate of dislocation following posterior approach. His study shows dislocation rate of 2.8% following posterior approach.[16] Philips studied incidence rates of dislocation along with other parameters after elective total hip replacement and observed dislocation rate of 3.9%[17]. The incidence of dislocation was highest during the immediate post-operative period but remain elevated throughout the first three post operative months.

The normal acetabular cup inclination is 30^{o} to 45^{o}. In our study 88 neutral, 18 vertical and 14 horizontal positions were seen. The ideal position of stem of femoral component is central. In this study we had 92 central, 20 each in valgus and 18 varus positions. Varus position of the stem may lead to complications such as anterior thigh pain and periprosthetic fractures. Till the most recent review the femoral stem position has not changed in any patients.

In this study there were 4 subsidences and 2 migrations seen. It is seen on x-rays only 3 weeks post operatively, following THA and well defined in 6 months[18-20]. The incidence of heterotrophic ossification ranges from 5% to 90% in various literatures[21]. In our study 8 patient with class II heterotrophic ossification seen. The bone marrow and debris escape when uncemented femoral implant is used however there is less chance for this when cemented implant is used. In a study by William J. Maloney and William H. Harris, (1991 JBJS) the incidence of heterotopic ossification in an uncemented group and a

hybrid group were compared. 65 uncemented and 70 hybrid (uncemented acetabular component and cemented femoral component) total hip replacements with minimum follow up of 1 year were reviewed. In the group who had uncemented hip replacement, there was a statistically significant increase in the incidence of heterotopic ossification.

Conclusion

The outcomes of the current study revealed that that on radiological evaluation the complete hip arthroplasty produced better results in displaced intracapsular Neck of femur fracture.

Long term review is necessary with bigger sample to generalise the results. This study provides new doors for future investigation.

Reference

1. Pivec R, Johnson AJ, Mears SC, Mont MA. Hip arthroplasty. Lancet. 2012;380(9855):1768-77.
2. Ram G, Thamodaran B, Varthi V. Analysis of functional and radiological outcome of total hip replacements in rheumatoid and osteoarthritis patients. Open J Rheumatol Autoimmune Dis. 2013; 3:246-50.
3. Hummel MT, Malkani AL, Yakkanti MR, Baker DL. Decreased dislocation after revision total hip arthroplasty using larger femoral head size and posterior capsular repair. J Arthroplasty. 2009;24(6 Suppl):73-6.
4. Pellicci PM, Bostrom M, Poss R. Posterior approach to total hip replacement using enhanced posterior soft tissue repair. Clin Orthop Relat Res. 1998; 355:224-8.
5. Jonsson B, Larsson SE. Functional improvement and costs of hip and knee arthroplasty in destructive rheumatoid arthritis. Scand J Rheumatol. 1991; 20:351-7.
6. Crawford RW, Murray DW. Total hip replacement: Indications for surgery and risk factors for failure. Ann Rheum Dis. 1997; 56:455-7.
7. Liang MH, Cullen KE, Larson MG, Thompson MS, Schwartz JA, Fossel AH, et al. Cost-effectiveness of total joint arthroplasty in osteoarthritis. Arthritis Rheum. 1986; 29:937-43.
8. Schmidt AH, Leighton R, Parvizi J, Sems A, Berry DJ. Optimal arthroplasty for femoral neck fractures: Is total hip arthroplasty the answer? J Orthop Trauma. 2009; 23:428-33
9. Andrew, Whaley, and Daniel. Criteria for loosening of uncemented acetabular component. JBJS 83A 2001.
10. Campbell's Operative Orthopaedics' international edition: eleventh edition.
11. Mont, MA, Maar, Dc. Krackow, K.A, Jacobs M. A. Jones total hip replacement without cement for non-inflammatory osteoarthritis in patients who are less than 45 yrs old. J Bone J Surg 1993;75A;740-51.
12. Brooker AF, Bowermann RA, Railey LH. Ectopic ossification following THR, Incidence and classification. JBJS 1973;55A:1629-32
13. Harris WH. Traumatic arthritis of the hip after dislocation and acetabular fractures: Treatment by mold arthroplasty. An end result study using a new method of result evaluation. J Bone Joint Surg Am. 1969; 51:737-55.
14. William H. Harris, John. The Harris Galante porous coated acetabular component with screw fixation. J Bone J Surg 1999;81-A:66-73.
15. Engh C. AJR Culpepper, W.J H and Engh. CA long term results of use of anatomic medullary locking prosthesis in total hip arthroplasty. J Bone Joint Surg 1997;79-A177-84
16. Goldstein WM, Gleans TF. Prevalence of dislocation after total hip arthroplasty through a poster lateral approach with partial capsulotomy and capsulorrhaphy. J Bone Joint Surg. 2001;83(2 suppl 1): S2 - 7.
17. Phillips CB, Barrett JA, Losina E,

Mahomed NN, Lingard EA, Guadagnoli E, et al. Incidence rates of dislocation, pulmonary embolism, and deep infection during the first six months after elective total hip replacement. J Bone Joint Surg. 2003;85- A(1):20-6.

18. Delee Jesse, Ferrari, Antonio and Charnley. John ectopic bone formation following low friction arthroplasty of hip. Clin Orthop 1976; 121:53-7.
19. Ritter MA and Gioe. The effect of indomethacin on periarticular ectopic ossification following THA. Clin Orthop 1982; 167:113-7.
20. Hamblen D. Lectopic ossification in complications of THR. Edited by R.S.M ling London, Churchill Livingston 1984.
21. Rosendahl S, Christofferson J.K and Norgaaid M. Para articular ossification following hip replacement. 70 arthroplasties ad modum moore using mc Farland approach. Acta Orthop Scand 1977; 48:400-4.