

## Original research article

**Total hip arthroplasty in displaced neck of femur fracture: a radiological assessment**Dr. Mohammad Sabir Ali<sup>1</sup>, Dr. Shree Prakash Singh<sup>2</sup>, Dr. Vinod Kumar Singh<sup>3</sup><sup>1</sup>Senior Resident, Department of Orthopaedics, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India<sup>2</sup>Professor and HOD, Department of Orthopaedics, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India.<sup>3</sup>Professor, Department of Orthopaedics, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India.

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**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 Orthopaedics Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India Total 110 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 110, 80 patients were male and 30 female, 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 position. 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 results of this study shows that Total Hip Arthroplasty gave better results in Displaced Intracapsular Neck of femur fractures radiologically.**Introduction**

Total hip arthroplasty (THA) is a very common procedure in orthopedic surgery.<sup>1</sup> Total hip arthroplasty is often indicated to relieve pain and increase range of motion in patients with arthritis and other collagen diseases.<sup>2</sup> Postoperative hip dislocation is one of the major complications and has been reported in 0.5 to 10.6 % of patient after primary THA.<sup>3,4</sup> Surgical technique and approach as well as implant selection, implant positioning, patient education and patient-related factors have an impact on the incidence of dislocations. Total hip replacement is one of the most successful and cost-effective interventions in orthopedic surgical field.<sup>5</sup> Hip replacements have transformed the lives of hundreds of thousands of people regardless of the underlying etiology.<sup>6</sup> Total hip arthroplasty is an operation to restore motion and stability to a joint and function to the muscle, ligaments and other soft tissue structures that control the joint. Implanting an artificial head and socket to replace the degenerated head, fractured head exerted such a profound social impact and enjoyed such a dramatic early success. Various immediate and long term complications may compromise this procedure, but it still remains the greatest boon available to orthopedic patients, and has proved to be the greatest advancement in the field of orthopaedic surgery in the 21<sup>st</sup> century.<sup>7</sup>

The role of arthroplasty for an acute displaced femoral neck fracture is still a matter of debate.<sup>8</sup> There is ongoing controversy about the relative merits of different types of arthroplasty among specific groups of patients. There is a group of surgeons, which favour THR for an acute

displaced femoral neck fractures but on the other hands, another group of surgeons do not favour this. Paucity of quality data provides an opportunity for extension of this debate. Based on Andrew Whaley and Daniel et al. criteria<sup>9</sup> 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<sup>10</sup> 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<sup>11</sup> was measured by AP radiograph by 2 lines, one is trans-ischial line and other line parallel to opening of acetabular component, and grouped in to Normal (30-40°), Vertical (>45°) and Horizontal cup(<30°) 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.<sup>12</sup> 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 Orthopaedics Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India for one year. after taking the approval of the protocol review committee and institutional ethics committee. Total 110 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.<sup>13</sup> 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

**Table 1: Demographic profile of the study population**

Variables	Number	Percentage
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	(N=110)	(%)
Gender		
Male	80	72.7
Female	30	27.3
Age		
<40	Nil	Nil
40-45 years	10	9.1
45-50	20	18.2
Above 50	80	72.7
Cemented/uncemented		
Cemented	65	59.1
Un-cemented	45	40.9
Laterality		
Right	67	60.9
Left	53	39.1

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

Harris hip score	Number (N=110)	Percentage (%)
Excellent (90-100)	52	47.3
Good (80-89)	30	27.3
Fair (70-79)	12	10.9
Poor (<70)	16	14.5

**Table 3: Radiographic evaluation of the study population**

Radiographic evaluation	Number (N=110)	Percentage (%)
Acetabular cup inclination		
Normal (30-45 degrees)	85	77.2
Vertical (> 45 degrees)	15	13.6
Horizontal cup (<30 degrees)	10	7.2
Femoral stem position		
Central	82	74.5
Valgus	15	13.6
Varus	13	11.8
Subsidence & Migration		
Subsidence	2	1.8
Migration of Acetabular cup	1	0.9
Heterotrophic ossification	4	3.6
Dislocation	2	1.8

### Discussion

Total hip arthroplasty, or surgical replacement of the hip joint with an artificial prosthesis, is a reconstructive procedure that has improved the management of those diseases of the hip joint that have responded poorly to conventional medical therapy. Current evidence suggests that

traditional total hip replacements last more than 10 years in more than 90% of patients. More than 90% of patients report having either no pain or pain that is manageable with use of occasional over-the-counter medications. The large majority of hip replacement patients are able to walk unassisted (i.e. without use of a cane) without any limp for reasonably long distances.<sup>8</sup> Like any major surgical procedure total hip replacement is associated with certain medical and surgical risks. Although major complications are uncommon they may occur.

John C and W.H. Harris<sup>14</sup> (JBJS 1999) presented a series of 188 Harris-Galante porous coated acetabular components that were followed for an average of 122 months. The hips were evaluated with Judet radiographs as well as anteroposterior and true lateral radiographs. 4% (8 hips) had osteolytic lesions of the pelvis and less than 1% (1hip) had an osteolytic lesion that necessitated bone grafting.

Engh C.A. Jr et al.<sup>15</sup> (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 2 case of dislocation (1.8%). The dislocation occurred during the 2<sup>nd</sup> 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.<sup>16</sup> Philips studied incidence rates of dislocation along with other parameters after elective total hip replacement and observed dislocation rate of 3.9%.<sup>17</sup> 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<sup>0</sup> to 45<sup>0</sup>. In our study 85 neutral, 15 vertical and 10 horizontal positions were seen. The ideal position of stem of femoral component is central. In this study we had 82 central, 15 each in valgus and 13 varus position. 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 2 subsidences and 1 migration seen. It is seen on x-rays only 3 weeks post operatively, following THA and well defined in 6 months.<sup>18-20</sup> The incidence of heterotrophic ossification ranges from 5% to 90% in various literatures.<sup>21</sup> In our study 4 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 results of the present study concluded that that on radiological examination the total hip arthroplasty gave better results in displaced intracapsular Neck of femur fracture. Long term review is essential with larger sample to generalize the results. This study opens new vistas for future research.

### 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 Livingstone 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

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