

Original Research Article

Evaluation of clinical and functional outcome of total hip arthroplasty in avascular necrosis of head of femur in adults

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ABSTRACT

Background: Aim of the study was to evaluate clinical and functional outcome of bipolar hemiarthroplasty in avascular necrosis (AVN) of HIP in adults.

Methods: Thirty patients of either sex between age group 20-80 years of age came for the treatment at government medical college and hospital Aurangabad. Between December 2020 to December 2022. Patients were followed every day till the discharge. Patients were discharged after they were mobilised with assistance of physiotherapist. Functional and clinical outcome was measured at 6, 12 and 24 weeks postoperatively according to Harris hip score (HHS).

Results: the methods show significant improvement in HHS in patient undergoing total hip replacement.

Conclusions: total hip replacement is a very good option for AVN of head of femur in all age groups.

Keywords: Total hip replacement, AVN, AVN of head of femur

INTRODUCTION

Osteonecrosis of the femoral head is a progressive condition that primarily affects individuals in their 30s to 50s.¹ If left untreated, it can lead to complete destruction of the hip joint. In the USA, the incidence of this condition is on the rise, with approximately 15,000 to 30,000 new cases annually. Considering India's large population of around 1.3 billion, it's estimated that around 70,000 to 90,000 individuals in India are affected by AVN. This condition is more prevalent in men than women.¹

AVN of the femoral head occurs due to the loss of blood supply to the femoral head. Various factors can contribute to this, including alcohol abuse, sickle cell disease, systemic steroid use, caisson's disease, Gaucher's disease, renal osteodystrophy, and trauma.² Radiological changes have led to the classification of AVN by Ficat and Arlet.³ Treatment approaches vary based on the disease's stage.

For instance, stages I and IIA may be managed with core decompression with or without secondary bone grafting, while stage IIB treatment is debated. Some researchers have reported positive outcomes with femoral osteotomies for selected cases. Stages III and IV typically require total hip replacement or bipolar hemi-arthroplasty, although success rates for the latter in stage III AVN are contested.

Total hip arthroplasty (THA) and hemiarthroplasty are procedures used as a last resort for addressing joint damage that can't be repaired conservatively. Hemiarthroplasty is applied when the femoral head or proximal femur is damaged while the acetabulum remains intact.³ THA involves replacing both the acetabular and femoral components. Previous studies have shown better postoperative outcomes with THA compared to hemiarthroplasty, but THA comes with a higher risk of joint dislocation due to its structural characteristics. Hemiarthroplasty offers benefits such as lower dislocation risk, simpler surgery, shorter operation time, reduced

blood loss, and lower initial costs. However, concerns about acetabulum erosion and groin pain after surgery have arisen.

In this study, we aim to evaluate the clinical outcomes of THA in cases of AVN of the femoral head in adults

METHODS

Study design

This prospective study was conducted in accordance with the ethical guidelines established by the hospital's ethical committee.

Study approval

Institutional medical ethical committee approval was obtained for this study. Written and informed consent was obtained from all participating patients.

Study population

The study included thirty patients of various genders, aged between 20 and 80 years, who sought treatment at the Aurangabad government medical college and hospital between December 2020 to December 2022.

Inclusion criteria

Patients who met the following criteria were included in the study: Age between 20 and 80 years, willingness to cooperate and comply with study procedures, radiologically diagnosed AVN in the femoral head and provided consent to participate in the study.

Exclusion criteria

Patients meeting any of the following criteria were excluded from the study: Involvement of the acetabulum (hip socket), presence of bony ankyloses (abnormal fusion of bones), age less than 20 or greater than 80 years, refusal to provide informed consent, medically unfit for surgical intervention and lack of willingness for the surgical treatment.

Follow-up and assessment

Patients were closely monitored and followed daily until discharge. Discharge occurred once patients could mobilize with assistance from a physiotherapist. Follow-up evaluations were conducted at 6-, 12-, and 24-weeks post-surgery. Clinical and functional outcomes were assessed using the HHS, which evaluates pain, function, and activities. Deformity and range of motion (ROM) were measured using a goniometer. For patients who could not attend in-person follow-up, telephone consultations were conducted to gather information about pain, function, and activities.

Statistical analysis

Quantitative data were expressed as mean ± standard deviation (SD). The paired Student's t-test was utilized for statistical analysis.

RESULT

In the present study we observed 30 patients of AVN of the hip attending the department of orthopaedics Aurangabad.

Table 1: Distribution of study subjects according to sex.

Sex	THA	Percentage (%)
Male	19	32
Female	11	18
Total	30	50

Males are more commonly involve in AVN of head of femur.

Table 2: Distribution of study subjects according to age.

Age (in years)	THA	Percentage (%)
20 to 30	2	3
31 to 40	5	8
41 to 50	7	12
51 to 60	16	27
Total	30	50

Most common age group is 50-60 years.

Table 3: Distribution of study subjects according to chief complaints.

Chief complaints	THA	Percentage (%)
Restriction of the movement	13	22
Painful hip	13	22
Deformity	4	7
Total	30	50

Most common chief complain in AVN hip is painful hip and restriction of movement.

Table 4: Distribution of study subjects according to operating time (Min).

Operating time (Min)	THA	Percentage (%)
60 to 90	0	0
91 to 120	21	35
121 to 150	9	15
> 150	0	0
Total	30	50

Maximum cases were completed in 90-120 mins.

Table 5: Distribution of study subjects according complications.

Complications	THA	N	Percentage (%)
Intra operative complications	Peri prosthetic fracture	1	3
	No complications	29	97
Early complications	Sciatic nerve palsy	1	3
	Dislocation	1	3
	SSI	1	3
Late complications	Component loosening	1	3
	Dislocation	1	3

One peri prosthetic fracture, 1 sciatic nerve palsy, 1 dislocation, 1 surgical site infection (SSI), noted in early complication. One component loosening and 1 dislocation noted in late complication.



Figure 1: Distribution of study subjects according to outcome.

The 24 patients having excellent outcome and 5 were having good outcome and in 1 case poor outcome was there according to HHS.



Figure 2: Pre-operative x-ray.



Figure 3: Immediate post op x-ray.



Figure 4: Post op. day 5.

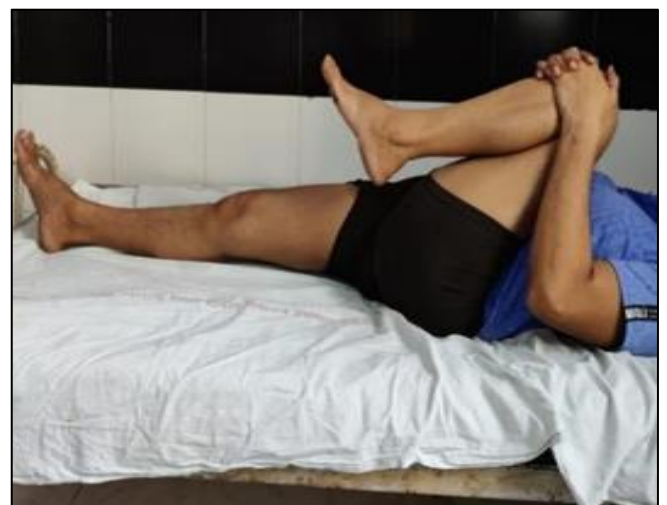


Figure 5: After 6 months.



Figure 6: After 9-month weight bearing on operated site

DISCUSSION

In the current study, a total of 30 patients underwent THA, with 19 being male and 11 females. Most patients fell within the age range of 51 to 60 years, followed by those aged 41 to 50 years. Among the younger age groups, 8 patients were in the 31 to 40 years range, while 2 patients each were found in both the 20 to 30 years group and the THA group. The average age for patients in the THA group was 48.4 ± 9.442 years.¹

Patients undergoing THA exhibited various complications, including restricted movement (13 cases), hip pain (13 cases), and hip deformity (4 cases).² The most common complaints among the study participants were pain and difficulty in walking (90%), and a significant portion (43.33%) had experienced symptoms for over a year.³

Surgical duration for THA varied, with 21 cases taking 91 to 120 minutes and 9 cases taking 121 to 150 minutes.⁴ The extent of AVN was graded according to the Ficat-Arlet classification where grade II, IV, and V AVN were found in 7, 13, and 10 THA cases, respectively.^{4,6} Dudani et al noted mild to moderate acetabular involvement in all hips at stages 3 and 4 of the Ficat classification.

Intraoperative and postoperative complications were also recorded. Peri-prosthetic fracture occurred in 1 THA case, while early complications included Sciatic nerve palsy (1 case), dislocation (1 case), and SSI (1 case). Late complications consisted of component loosening (1 case) and dislocation (1 case).^{1-4,10,11}

Patients' functional status was assessed using the HHS at various time points.¹¹ Preoperatively, the HHS ranged between 21 and 40 in 26 THA cases, with 4 cases having an HHS above 40. After 1 month, HHS ranged from 31 to

40 in 20 cases and exceeded 40 in 10 cases. Similarly, at 3 months, HHS was between 41 and 50 in 26 cases, and over 50 in 4 cases. At 6 months, HHS exceeded 60 in 30 cases, and at 9 months, HHS surpassed 80 in 29 cases.^{4,5,7,13}

Limitation

The main limitations of the study included a small sample size and a brief follow-up period. To comprehensively explore postoperative complications, it would be crucial to extend the observation period.

CONCLUSION

For the selection of surgical methods, we should consider several aspects, such as the age of the patient, whether there is osteoporosis, the type of femoral neck fracture, the preoperative reduction situation, and the needs of the patient and his family for the postoperative situation. Selecting the optimal implant is a crucial factor in ensuring the best possible treatment of AVN of femoral head. In addition, management with preoperative assessment and correction of any identified risk factors, together with post-operative optimisation of functional recovery, are two other major components of the treatment strategy.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Hanumanth Araya GH, Kamala GR. A study on AVN cases attending at a tertiary care hospital: Etiological factors and treatment. *Indian J Orthop Surg.* 2016;2(1):69-76.
2. Steffen RT, Athanasou NA, Gill HS, Murray DW. Avascular necrosis associated with fracture of the femoral neck after hip resurfacing: histological assessment of femoral bone from retrieval specimens. *J Bone Joint Surg Br.* 2010;92(6):787-93.
3. Babhulkar SS. Osteonecrosis of the femoral head (in young individuals). *Indian J Orthop.* 2003;37:2.
4. Moya-Angeler J, Gianakos AL, Villa JC, Ni A, Lane JM. Current concepts on osteonecrosis of the femoral head. *World J Orthop.* 2015;6(8):590-601.
5. Mont MA, Marulanda GA, Jones LC, Saleh KJ, Gordon N, Hungerford DS, Steinberg ME. Systematic analysis of classification system for osteonecrosis of the femoral head. *J Bone Joint Surg.* 2006;88(A):3.
6. Hamilton TW, Goodman SM, Figgie M. Surgical Arthritis Service clinic weekly rounds: Avascular necrosis. *Hospital Special Surgery J.* 2009;5:99-113.
7. Steinberg ME, Corces A, Fallon M. Acetabular involvement in osteonecrosis of the femoral head. *J Bone Joint Surg Am.* 1999;81:60-5.
8. Lee SB, Sugano N, Nakata K, Matsui M, Ohzono K. Comparison between bipolar hemiarthroplasty and

- THA for osteonecrosis of the femoral head. *Clin Orthop Rel Res.* 2004;424:161-5.
9. Lieberman JR, Berry DJ, Mont MA, Aaron RK, Callaghan JJ, Rajadhyaksha AD et al. Osteonecrosis of the hip: Management in the 21 st century. *Instr Course Lect.* 2003;52:337-55.
 10. Muraki M, Sudo A, Hasegawa M, Fukuda A, Uchida A. Long term results of bipolar hemiarthroplasty for osteoarthritis of the hip and idiopathic osteonecrosis of the femoral head. *J Orthop Sci.* 2008;13:313-7.
 11. Haidukewych GJ, Israel TA, Berry DJ. Long term survivorship of cemented bipolar hemiarthroplasty for fracture of the femoral neck. *Clin Orthop Relat Res.* 2002;403:118-26.
 12. Bateman JE. The classic: Single-assembly total hip prosthesis preliminary report 1974. *Clin Orthop Relat Res.* 2005;441:16-8.
 13. Giliberty RP. Bipolar endoprosthesis minimizes protrusioacetabuli, loose stems. *Orthop Rev.* 1985;14:27.
 14. Harkess AJ. Arthroplasty of hip. In *Campbell's Operative Orthopaedics.* Edited by Canale. Edition 9th, Vol. 1, Mosby. 1998;267-300.
 15. Coventry MB. Historical perspective of hip arthroplasty. In *Joint Replacement Arthroplasty.* Edited by Morrey BF. Edition 1st. New York, Edinburgh, London, Melbourne, Tokyo. Churchill Livingstone. 1991;491-9.
 16. Coventry MB. The history of joint replacement arthroplasty. In *Joint Replacement Arthroplasty.* Edited by Morrey BF. Edition 1st. New York, Edinburgh, London, Melbourne, Tokyo. Churchill Livingstone. 1991;3-5.
 17. Chelius JM. *A system of surgery.* Edited by South JF. Edition 2nd. London. 1847;979.
 18. Judet J, Judet R. The use of an artificial femoral head for arthroplasty of the hip joint. *J Bone Joint Surg Br.* 1950;32-B(2):166-73.
 19. D'Aubigne RM, Postel M. Functional results of hip arthroplasty with acrylic prosthesis. *J Bone Joint Surg Am.* 1954;36-A(3):451-75.
 20. Moore AT. The self-locking metal hip prosthesis. *J Bone Joint Surg Am.* 1957;39-A(4):811-27.
 21. Hinchey JJ, Day PL. Primary prosthetic replacement in fresh femoral neck fractures. *J Joint Bone Surg.* 1964;64(2):223-334.
 22. McKee GK, Watson-Farrar J. Replacement of arthritic hips by McKee-Farrar prosthesis. *J Bone Joint Surg Br.* 1966;48(2):245-59.
 23. Follacci FM, Charnley J. A Comparison of the results of femoral head prosthesis with and without cement. *Clin orthop Relat Res.* 1969;62:156-61.
 24. Welch RB, Charnley J. Low friction arthroplasty of the hip in rheumatoid arthritis and ankylosing spondylitis. *Clin Orthop Relat Res.* 1970;72:22-32.
 25. Salenius P, Laurent LE. Experience with the McKee-Farrar total hip replacement: A report of 143 operations. *Acta Orthop Scand.* 1973;44(4):451-9.

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