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To evaluate fuctional outcome of total hip arthroplasty

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Abstract
Background: THA has evolved into a reliable and suitable surgical procedure to relieve pain and restore function among patients with damaged or degenerated hip joints and chronic pain. The purpose of this study was to evaluate outcome before and after THA operated at Hamidia hospital, Bhopal.
Methods: 115 patients (150 hips) 89 men and 26 women with mean age 38 years were evaluated with harris hip score before surgery and after at 1, 3, 12 month and as well as final follow up after surgery.
Result: present study shows that outcome of THA done at Hamidia Hospital has 90.5% excellent and 9.5% good results. More than 62% patients were less than 40years old hence this procedure is no longer reserved for elderly population.

Keywords: THA, harris hip score, osteoarthritis, prosthesis

Introduction
THR has evolved into a reliable and suitable surgical procedure to relieve pain and restore function among patients with damaged or degenerated hip joints and chronic pain. Indications for hip replacement include radiological evidence of joint damage, persistent pain, and/or functional disability that is not adequately relieved by non-surgical treatment such as analgesics or physical therapy. Patients with deterioration due to primary osteoarthritis, fractures, or rheumatoid arthritis constitute the largest group of patients.
THR has been described as the greatest achievement in orthopaedic surgery in the twentieth century, and the annual number of THR procedures has risen steadily worldwide during the last decades. As the number of primary surgical interventions grows, the number of revisions is expected to increase. The predictability of the results of THR is excellent in the older age groups, whereas the longevity of the implant in young and active patients still remains unsatisfactory, with failure rates ranging from 20% to 42%.
When the outcomes of THR are evaluated, numerous factors other than the surgery itself should be taken into account. Outcome after THR depends not merely on a successful surgical procedure, but also on adequate postoperative rehabilitation. Multimodal rehabilitation or fast-track surgery has been introduced to reduce the surgical stress response, improve recovery, reduce hospitalization, and improve rehabilitation after surgery. However, no current evidence suggests any single measure to improve postoperative rehabilitation after THR.

Material and Methods
180 hips with severe arthritis of hip joint were treated with total hip replacement. All total hip replacements done from January 2013 to August 2017 at Department of Orthopaedics and Traumatology, Gandhi Medical College associated with Hamidia Hospital, Bhopal were included in present study. Out of 180 THR 30 cases were lost to follow up or did not give consent for the study, hence present study consists of 150 THR.
Male and Female patients with severe arthritis hip joint, age group 20 -70 years, who are medically fit for surgery and who have given their written informed consent for the surgery & study were included in study.
Patients with age <20 years and>70years, who were medically unfit for surgery and who are not given written informed consent for surgery & study.

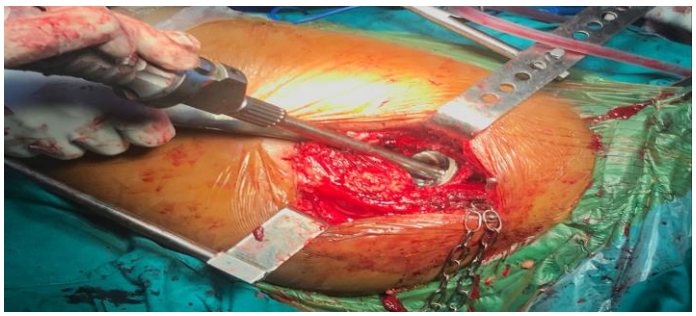
Preoperative Protocol
The detailed history of onset of pain, deformity and associated disease was recorded. Patient's general condition was assessed and detailed systemic examination was done.

Both lower limb was examined for deformity, also examination of Gait, range of motion of hip joint, limb length discrepancy, neurovascular status, Clinical picture with gait video, templating of x-ray were also performed.
Patient was assessed with Harris Hip Score and SF-36 Score.
Investigation like CBC, RFT, LFT, Blood Sugar, Blood Culture sensitivity, urine routine and microscopy and culture sensitivity, ECG, Chest X-ray, X-ray pelvis with both hips were done for all patients.
Operative room, tables, equipments was cleaned with Glutradex-2% (glutaraldehyde) and fumigated with 11% H2O 2 and 0.01% silver nitrate one day prior to surgery.

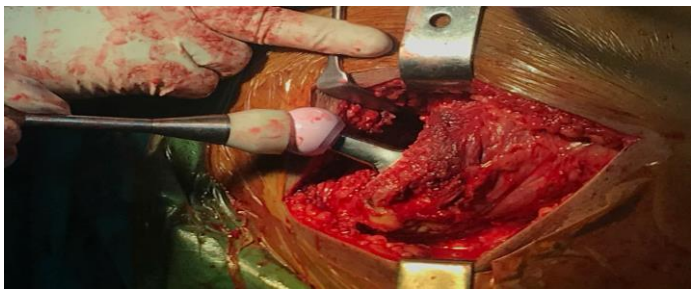
Follow up
Quadriceps exercises were started on 2nd post-operative day and weight bearing with support started on 3rd post-operative day.
Patients were followed up by OPD visits and interviews.
Functional assessment was done using Harris Hip score. Follow up done at TSR, 3 month, 1 year and final follow up.

Statistical Technique
Statistical analysis was done using Statistical Package of Social Science (SPSS Version 22; Chicago Inc., USA). Data comparison was done by applying specific statistical tests to find out the statistical significance of the comparisons. Quantitative variables were compared using mean values and qualitative variables using proportions.
Significance level was fixed at $P < 0.05$.

Position of patient



Acetabular component placement



Femoral component placement

Results
In present series the mean pre-op Harris Hip Score was 49 (Range 28 to 78) and at final follow up it was 95.07 (Range 87 to 98). Repeated measure of ANOVA test was applied and it showed there was statistically significant increment in Harris hip score till 1 year. (p=0.001). As compared to various studies in the past the pre-op mean Harris Hip Score in our study was less. It may be due to the fact that cases in our study population presented with their complains at a later stage of the disease.

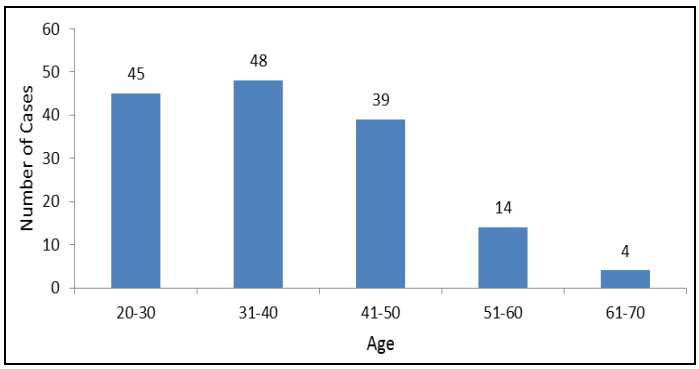


Fig 1: Distribution of studied cases according to age

Figure 1 represents distribution of studied cases according to the age. 45 cases (30%) belong to 3rd decade, 48 cases (32%) belong to 4th decade, 39 cases (26%) belong to 5th decade, 14 cases (9.3%) belong to 6th decade and 4 cases (2.7%) belong to 7th decade of life.

Table 1: Fixed Deformities of the Hip among the studied patients.

Type of Deformity	Number	Percentage
Flexion	21	14.0%
External Rotation	3	2.0%
Internal Rotation	4	2.7%
Abduction	14	9.3%
Adduction	13	8.7%
None	95	63.3%
Total	150	100%

Table 1 reveals the fixed deformities of the affected Hip among the studied patients. Out of 150 cases, 21 cases (14%) had fixed flexion deformity, 3 cases (2%) had fixed external rotation deformity, 4 cases (2.7%) had fixed external rotation deformity, 14 cases (9.3%) had fixed abduction deformity, 13 cases (8.7%) had fixed adduction deformity while 95 cases (63.3%) had no fixed deformity of the affected hip joint.
All the fixed deformities were corrected post operatively and there was no fixed deformity noted in any patient after Surgery.

Table 2: Aetiological Distribution of studied cases

Aetiology	Number	Percentage
Avascular Necrosis	100	66.7%
Rheumatoid Arthritis	17	11.3%
Post traumatic Sec OA	15	10%
Ankylosing Spondylitis	10	6.7%
Sec OA from DDH	4	2.7%
Sickle Cell Anaemia	4	2.7%
Total	150	100%

Table 2 reveals that among the studied cases avascular necrosis was the diagnosis of 100 cases (66.7%), while rheumatoid arthritis cases were 17 (11.3%). Post traumatic secondary osteoarthritis (15 cases, 10%), ankylosing spondylitis (10 cases,

6.7%), secondary osteoarthritis from Developmental Dysplasia of Hip (4 cases, 2.7%) and sickle cell anaemia (4 cases, 2. 7%) consisted of the remaining causes.

Fig 2: Comparision of mean Harris hip score from before surgery to final follow up

Figure 2 reveals comparison of Harris Hip Score from Pre-op to 1 year after surgery. It shows that harris hip score is continuously increasing from pre op to till final follow up. It was 48.92±11.69 before surgery and just at TSR it increase to 80.61±5.15. After 3 month it was 92.93±4.41 and at 1 year it increase to 95.07±3.10. At final follow up it was 95.07±3.10. Before surgery its range was 28-78 and at final follow up its range was 87-98.

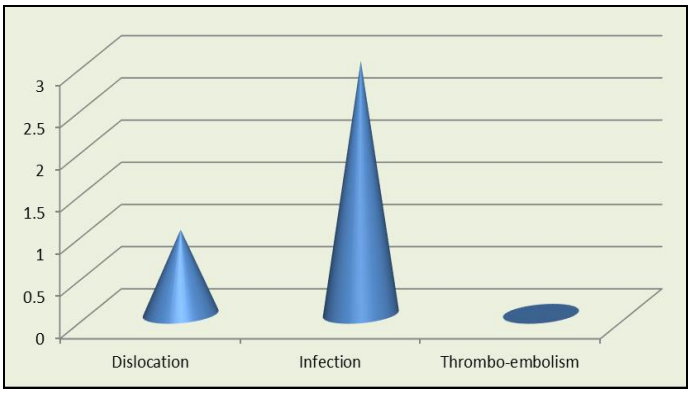


Fig 3: Complication after surgery among study subjects

Figure 3 reveals complication after surgery among study subjects. Complication was found only in 4(2.67%) patients. Dislocation was found only in 1 patient, superficial infection was seen in 3 patients. thrombo-embolism was not seen in any patients.

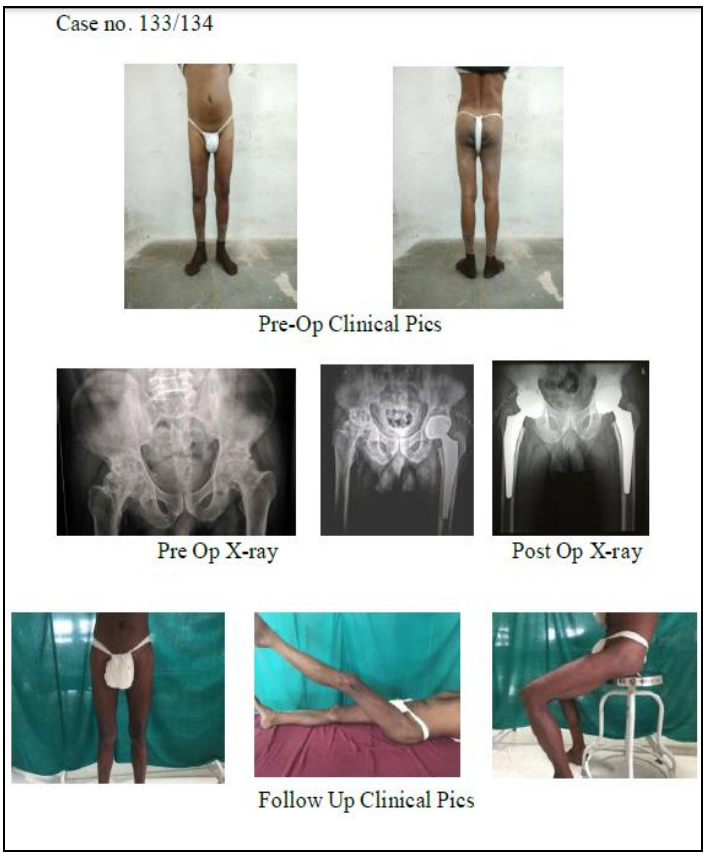
Table 3: Limb Length Discrepancy among study subjects.

Table 3reveals Limb Length Discrepancy among study subjects. Out of 150 hips, among 25 hips, limb discrepancy was seen. 1.5 cm limb discrepancy was seen in 11(7.3%) patients and 1 cm, 2 cm & 3 cm was seen in 9 cases (6%), 4 cases (2.7%) and 1 case (0.7%) respectively.

Table 4: Comparison of SF-36 score before surgery & at final follow up

	SF-36 SCORE		
	Mean	**SD**	**Range**
Before Surgery Score	78.00	6.711	64-90
After Surgery Score at final follow up	40.35	3.67	31-49
Paired Student 't' Test	53.228		
Significance 'p' Value	0.001(HS)		

Table 4 reveals Comparison of SF-36 score before surgery & at final follow up. Mean SF-36 score was reduced from 78.90±6.71 to 40.35±3.67 at final follow up. Before surgery its range was 64-90 and at final follow up it was 31-49. Paired student test was applied to see significant change, which showed there was statistically significant reduction in SF-36 score after surgery. (p=0.001)



Discussion

Total of 115 patients (150 hips) were studied during the study period. During this period total of 180 THR were performed. Of these, 30 patients were lost to follow up, 2 patients died within 2 weeks of post operative period. Thus a total of 113 patients constituting 147 hips were followed up.

In the present era, total hip replacement is no longer confined to old people alone, an ever increasing number of patients is now belong to much younger population. In present study the mean age of patients was 38.42 years, with the range of patients age operated being of 20 to 70 years. 45 cases (30%) belong to 3rd decade, 48 cases (32%) belong to 4th decade, 39 cases (26%) belong to 5th decade, 14 cases (9.3%) belong to 6th decade and 4 cases (2.7%) belong to 7th decade of life.

Table 5: Comparison of mean age group in previous studies.

Studies	Mean age (years)
Dawson J. *et al.* (1996) [66, 67]	69
Massimo Mariconda *et al.* (2011) [94]	55
Mariana Kátia *et al.* (2015) [99]	69
Present Series	38

Thus the mean age in present series is much younger than previous studies. This may also be attributed because more than half of the patients had avascular necrosis and they are young. There was no case of primary degenerative osteoarthritis in present series which occurs in elderly population. It shows that an ever increasing number of younger population is undergoing hip arthroplasty.

Out of 115 study subjects, 89(77%) were males & 26(23%) were females.

Table 6: Comparison of percentage between male and female in previous studies

Studies	Males (%)	Females (%)
Dawson J. *et al.* (1996) [66, 67]	37	63
Massimo Mariconda *et al.* (2011) [94]	35	65
Mariana Kátia *et al.* (2015) [99]	45	55
Present Series	77	23

Thus the gender distribution of the present series shows that more percentage of males are undergoing THR as compared to other studies. This may again be because avascular necrosis is the commonest aetiology in present series and it has male predominance.

Most common diagnosis of studied cases was found to be avascular necrosis of femur head (100 cases, 66.7%). Rheumatoid arthritis (17 cases, 11.3%), post traumatic secondary osteoarthritis (15 cases, 10%), Ankylosing Spondylitis (10 cases, 6.7%), secondary osteoarthritis from developmental dysplasia of hip (4 cases, 2.7%) and sickle cell anaemia (4 cases, 2.7%) were other causes contributing to the diseased joint.

Table 7: Comparison of percentage between AVN, Primary OA and RA in previous studies

Studies	AVN (%)	Primary OA (%)	RA (%)
Lazansky M. *et al* (1973) [5]	7	60	2
Dawson J. *et al* (1996) [66, 67]	8	87	0
Siwach R.C. *et al* (2007) [90]	16	26	16
Present Series	67	0	11

This shows that primary degenerative osteoarthritis is not seen in this part of the country, however incidence of AVN was much higher than other series.

Harris Hip Score has been widely used as a gold standard tool for the clinical evaluation of patients following total hip arthroplasty.

In present series the mean pre-op Harris Hip Score was 49 (Range 28 to 78) and at final follow up it was 95.07 (Range 87 to 98). Repeated measure of ANOVA test was applied and it showed there was statistically significant increment in Harris hip score till 1 year. (p=0.001). As compared to various studies in the past the pre-op mean Harris Hip Score in our study was less. It may be due to the fact that cases in our study population presented with their complains at a later stage of the disease. Studies

Table 8: Comparison of mean pre op HHS and post op HHS in previous studies

Callaghan Major J.J. *et al.* (1988) [43]	Pre Op Mean Harris Hip Score – 81 Post Op Mean Harris Hip Score – 92 Good to Excellent Grade – 94% Fair to Poor – 6%
Harris W.F. *et al.* (1989) [45]	Pre Op Mean Harris Hip Score – 84 Post Op Mean Harris Hip Score – 93 Good to excellent results – 94% Fair to Poor – 4%
D'Antonio J.A *et al.* (1992) [57, 58]	Pre Op Mean Harris Hip Score – 74 Post Op Mean Harris Hip Score – 93 Good to excellent results – 94% Fair to poor – 4%
Clohisy J.C. *et al.* (1999) [71]	Pre Op Mean Harris Hip Score – 79 Post Op Mean Harris Hip Score – 92 Good to excellent results – 91% Fair to poor – 7%
Meding J.B. *et al.* (2004) [80]	Pre Op Mean Harris Hip Score – 80 Post Op Mean Harris Hip Score – 92 Good to excellent results – 82% Fair to poor – 9%
Dhaon B.K. *et al* (2005) [84]	Pre Op Mean Harris Hip Score – 67 Post Op Mean Harris Hip Score – 89 Good to excellent results – 92% Fair to poor – 2%
Present Series	Pre Op Mean Harris Hip Score – 49 Post Op Mean Harris Hip Score – 95 Good to excellent results – 100% Fair to poor – 0%

Thus the results obtained in present series are similar to those published in literature.

No deep infection was present in this series. Only 3 cases (Case 113,114 & 116) presented with superficial infection of fascial plane which were treated with IV antibiotics. Patient had no further recurrence after clearing of infection.

Table 9: Comparison of percentage incidence of infection in previous studies

Studies	Incidence of infection
Charnley John (1972) [2]	3.8%
Charnley J. and Cupic Z. (1973)[7]	6.6%
Bergstrom B. *et al* (1974) [14]	5%
Hill G.E. *et al* (1989) [44]	0.43%
Joseffson G. *et al* (1990) [47]	2.7%
Dhaon B.K. *et al* (2005) [84]	7%
Siwach R.C. *et al* (2007) [90]	4%
Present Series	2%

The findings in present series, 3 cases (2%) with superficial infection are similar to other studies reported. This may be due

to strict protocol followed.
No cases of thromboembolism were reported in this series. Other investigators have reported this complication in a number of studies.

Table 10: Comparison of percentage cases of thromboembolism in previous studies

Crawford W. J. (1968) [1]	1.8%
Charnley J. (1972) [2]	7.9%
Coventry M.B. (1974) [14]	0.7%
Lotke P.A. et. al. (1994) [60]	0.7%
Warwick D. *et al* (1995) [63]	1.7%

Various authors have advocated the use of prophylactic drugs (aspirin, heparin, LMWH) (Charnley & Cupic, 1973; Lotke 1994; Philip Comp 2001; Warwick 1995, 2007) [60, 63].
In present series we only used aspirin 75 mg OD as well as early mobilization of patients post operatively. The incidence of thromboembolism is low in India.
There was 1 case (0.67%) of dislocation in this series.
The case (Case no 148) occurred in a Female, 2 months into her post operative period. Her immediate post op X ray were unremarkable. The cause of her dislocation was non compliance (she squatted) coupled with weak soft tissue support. She was put on traction after Closed Reduction. She had no recurrence of the problem.

Table 11: Comparison of percentage incidence of dislocation in previous studies

Studies	Incidence of Dislocation
Bergstorm B. et. al. (1973) [8]	4.6%
Coventry M.B. *et al* (1974) [14]	3%
Lewineck George *et al* (1978) [19]	3%
Khan M.A.A. *et al* (1981) [25]	2.1%
Li E Mending *et al*(1999)	3.9%
Dhaon B.K. *et al* (2005) [84]	4%
Siwach R.C. *et al* (2007) [90]	5%
Present series	0.67%

This finding in present series, 1 case (0.67%) is in accordance with previous studies.
Limb length discrepancy of more than 1 cm was observed clinically in 25 cases (16.7%). None of the patients complained of limp.
The Mean LLD in present series was 0.24 cm. LLD of this magnitude does not correlate with clinical symptoms.

Table 12: Comparison of mean LLD in previous studies

Williamson J.A. (1978) [18]	1.6 cm
Turula K.B. *et al* (1986) [36]	0.87 cm
Woolson S.T. (1990) [46]	2.8 mm
Present Study	0.24 cm

The difference in various studies could be attributed to different techniques for measuring LLD.
SF – 36 Score has been widely used as a quality of life questionnaire for clinical evaluation of patients about their health.
In present series mean SF – 36 score was 78 preoperatively and 40 postoperatively. All cases postoperatively improved to excellent grade.

Table 13: Comparison of post op mean SF-36 score in previous studies

Dawson J. *et al.* (1996) [66, 67]	44
Massimo Mariconda *et al.* (2011) [94]	45
Mariana Kátia *et al.* (2015) [99]	56
Present Study	40

This finding in present series was found to be in accordance with previous studies.
The findings of present study shows that outcome of THR done at Hamidia Hospital has 90.5% excellent and 9.5% good results. More than 62% patients were less than 40 years old hence this procedure is no longer reserved for elderly population.

Summary and Conclusion
Present study included 150 hips of total hip replacement operated in Department Of Orthopaedics And Traumatology Gandhi Medical College, Bhopal associated with Hamidia Hospital. The cases were follow up post operatively for a minimal period of 1 year and maximum period of 4 years; cases were evaluated clinically by Harris Hip Score and SF-36 score.
The average age of patient group in this study was 38 years (range 20 – 70 years). Out of 115 study subjects, 89(77%) were male & 26(23%) were females. More than 62% patients were less than 40 years old.
Out of 150 studied cases, fixed deformities were observed in 55 cases (37%). Fixed flexion deformity was observed in 21 cases (14%), 3 cases (2%) had fixed external rotation deformity, 4 cases (2.7%) had fixed external rotation deformity, 14 cases (9.3%) had fixed abduction deformity, 13 cases (8.7%) had fixed adduction deformity. All the fixed deformities were corrected post operatively and there was no fixed deformity noted in any patient after Surgery.
Total ROM was measured in the studied hips by taking sum of ROM in all movements. Mean total ROM was found to be 1590 (Range 00 to 2000). One case had no movement at hip joint as he had bony ankylosis of the joint. Total ROM improved significantly post operatively.
40 cases (27%) had limb shortening. Of these patients 19 cases (12.7%) had a shortening of 1 cm and 21 cases (14%) had a shortening of 2 cms.
The indications for THR in present study were avascular necrosis with secondary osteoarthritis (100 cases, 67%), rheumatoid arthritis (17cases, 11.3%), post traumatic secondary osteoarthritis (15 cases, 10%), ankylosing spondylitis (10 cases, 6.7%), secondary osteoarthritis from Developmental Dysplasia of Hip (4 cases, 2.7%) and sickle cell anaemia (4 cases, 2. 7%).
The clinical results were analysed using the Harris hip Score. The mean pre-Op HHS was 49 and at final follow up mean HHS was 95. This shows marked improvement in all patients reflecting upon the success of the procedure. The improvement is maintained over the entire follow up period.
The incidence of infection (2%) was low with no deep infection and could be attributed to strict aseptic techniques and routine use of prophylactic antibiotics. No case of thromboembolism was seen in present series. Despite no prophylaxis this was due to early mobilisation advocate to the patients.
Dislocation was a complication in one case (0.67%). This could be attributed to patient's non compliance and stresses the need of proper counselling.
A limb length discrepancy was of concern and could be minimize with proper preoperative evaluation and meticulous intra operative measurements. LLD was found in 25 cases (16.7%). Mean LLD in present series was 0.24 cms. Those cases with LLD of more than 2 cm responded to shoe raise.

2 patients (3 hips) died within 2 weeks of surgery. The final cause of death was not identified as post-mortem examination wasn't carried out.

The clinical results were also analysed using the SF-36. The mean pre-Op SF-36 score was 78 and at final follow up mean SF-36 score was 40. This shows marked improvement in all patients reflecting good outcome in these patients.

To summarise, THR continues to be an excellent procedure to achieve painless, mobile, stable hip in cases with advanced hip problems (Mean post op Harris Hip Score in present study was 95). Clinical evaluation is essential to identifying complicating factors and to undertake measures for their eradication.

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