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Functional Outcome and Health-Related Quality of Life after Total Hip Replacement for Dysplastic Hips: A Retrospective Study

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Abstract

Background: Hip dysplasia is a major cause of secondary osteoarthritis, particularly in young adults. Total hip replacement (THR) is often required to restore function and improve quality of life. This main aim of this study was to evaluate the functional outcome, improvement in pain and health-related quality of life after THR in patients with dysplastic hips in Nepal.

Methods: We retrospectively reviewed 31 cases who underwent THR for dysplastic hips from January 2021 to December 2024 at a tertiary level hospital in Nepal. Functional outcome was assessed using the Harris Hip Score (HHS), pain with Visual Analogue Scale (VAS), and quality of life with 36-Item Short Form Health Survey (SF-36) questionnaire.

Results: The mean age of patients included in the study was 53.52 ± 4.63 years; 16 (51.61%) were female. The HHS significantly improved from 45.26 ± 2.61 pre-operatively to 89.16 ± 1.97 at one year. VAS score decreased from 7.39 ± 1.09 pre-operatively to 1.13 ± 0.56 at one year. The SF-36 score showed statistically significant improvements across all domains from baseline through one year post-operatively. Complications included sciatic nerve palsy (6.45%), hip dislocation (3.22%), and superficial infection (3.22%).

Conclusion: This study found significant improvement in hip function, pain and health-related quality of life following THR in patients with dysplastic hips.

Keywords: Dysplastic hip, Functional outcome, Harris hip score, Hip dysplasia, Quality of life, Total Hip Replacement.

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Introduction

Hip dysplasia is characterized by abnormally shallow acetabulum and femoral head malposition.[1] Treatment is challenging because of variation in age, activity level, and severity of dysplasia.[2] Surgical treatment options include periacetabular osteotomy and total hip replacement (THR).[3–6] Altered anatomy of acetabulum and proximal femur make THR technically difficult.[7] Individualized surgical planning is important in these patients.[5,8,9]

Studies from developed countries have shown improvement following THR for dysplastic hips.[4,6,10] There have been many advances in surgical techniques and implants for THR.[11–13] However, such advanced techniques are not available in developing countries like Nepal.[14,15] Therefore, results of studies performed in developed countries cannot be generalized to developing countries. Also, very few studies have evaluated the quality of life (QoL) of patients following THR.[16,17]

This main aim of this study was to evaluate the functional outcome, improvement in pain and health-related QoL after THR in patients with dysplastic hips in Nepal.

Methods

This was a retrospective study conducted at a tertiary-level hospital of Nepal utilizing available data from January 2021 to December 2024. Ethical approval for the study was obtained from the Institutional Review Committee (IRC) (Ref No: 071/82-018). The study included all cases of dysplastic hips who had undergone THR from January 2021 to December 2024. Patients with history of fracture or any congenital deformity in the ipsilateral limb, patients with history of chronic steroid use, rheumatoid arthritis, hyperthyroidism, or hyperparathyroidism were excluded from the study. The cases with incomplete or missing records were also excluded.

Data were collected from the hospital's electronic records and manually recorded logs in the arthroplasty record books. During the study period from January 2021 to December 2024, a total of 40 patients with dysplastic hips had undergone THR at Bharatpur Hospital. After excluding 9 incomplete records, 31 complete records were included in the study. The key data extracted from the records included demographic details, pre-operative assessment data, surgical details, and post-operative assessment data at 6 weeks, 12 weeks and 1 year. Harris Hip Score (HHS), Visual analogue scale (VAS), short form-36 (SF-36) forms had been filled and recorded in the arthroplasty register during all pre-operative and post-operative assessments.

These study tools used for data collection are standardized tools used all over the world for assessment of hip function, pain and quality of life. HHS is a disease-specific health status scale that is frequently used to measure the outcome of total hip arthroplasty.[18] HHS includes questions related to pain, function, activity, deformity, and motion.[18] The total score for HHS is 100 points, higher score means better outcome for the individual.[18] VAS is a widely used method for quantifying the pain intensity in a subjective manner.[19] The score ranges from 0 to 10, where 0 represents no pain and 10 represents the worst imaginable pain.[20] The SF-36 is an instrument for evaluation of Health-Related Quality of Life.[21,22] It includes 36 questions that cover eight domains: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH).[21,22] Each domain is scored from 0 to 100 and higher scores indicate better health status.[23–25]

Collected data were anonymized and stored in a secure database. Each patient was assigned a unique identifier to ensure confidentiality. Data was analysed using SPSS, version 30. Categorical variables were presented as frequencies and percentages, and continuous variables as means and standard deviations. ANOVA test was used to compare the HHS at pre-operative assessment, at 6 weeks, 6 months and 1 year. ANOVA test was used to compare each domain of the SF-36 score at pre-operative assessment, at 6 weeks, 6 months and 1 year. Friedman's test was used to compare pre-operative VAS score, VAS score at 6 weeks, 6 months and 1 year. Post-hoc test was used for pairwise comparisons to identify exactly which groups differ from each other when statistically significant difference was found during ANOVA and Friedman tests. P-value of <0.05 was considered statistically significant.

Results

A total of 31 cases of dysplastic hips who underwent THR were included in the study. The mean age of the patients included in this study was 53.52 ± 4.63 years. Of all the patients included in the study, 16 (51.61%) patients were females and right hip was involved in 16 (51.61%) cases (Table 1). The indication for THR in all patients was end-stage osteoarthritis secondary to hip dysplasia, causing pain and affecting activities of daily living. Classification of dysplastic hips was done according to Crowe classification (Table 1). All patients included in the study had undergone cementless THR with anatomical hip reconstruction, and femoral shortening with subtrochanteric osteotomy was done in 8 patients (Table 1).

The Harris Hip Score (HHS) increased progressively from 45.26 ±2.61 pre-operatively to 70.45 ±2.31 at 6 weeks, 85.23 ±2.40 at 6 months, and 89.16 ±1.97 at 1 year ($p < 0.001$), reflecting significant improvement in hip function. ($p < 0.001$) (Figure 1, Table 2). Post-hoc test showed statistically significant difference in all pairwise comparisons ($p<0.001$) (Figure 3-6).

Table 1: Demographics of patients with dysplastic hips who underwent THR (n=31)

Characteristics		Frequency (%)
Mean age (years)		53.52 ± 4.63
Sex	Male	15 (48.39%)
	Female	16 (51.61%)
Side involved	Right	16 (51.61%)
	Left	15 (48.39%)
	Bilateral	0 (0%)
Crowe classification	Grade I	19 (61.29%)
	Grade II	6 (19.35%)
	Grade III	3 (9.68%)
	Grade IV	3 (9.68%)
Surgical technique	Anatomical hip reconstruction	23 (74.20%)
	Anatomical hip reconstruction with femoral shortening	8 (25.80%)
Complications	Sciatic nerve palsy	2 (6.45%)
	Dislocation	1 (3.22%)
	Infection	1 (3.22%)

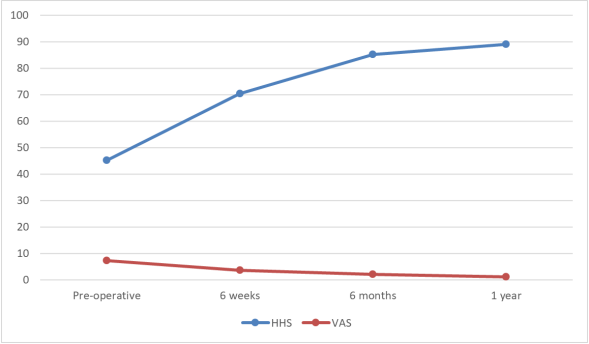

Figure 1 Improvement in HHS and VAS over time

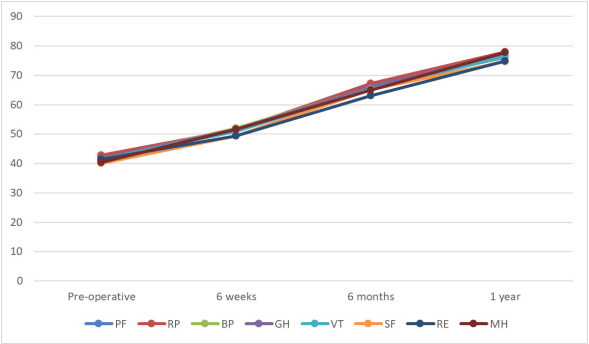

Figure 2 Improvement in different domains of SF-36 score over time

Table 2: Comparison of HHS, SF-36 score and VAS score at different time points (n=31)

	Pre-operative	6 weeks	6 months	1 year	P-value
HHS (Mean ± SD)	45.26 ± 2.61	70.45 ± 2.31	85.23 ± 2.40	89.16 ± 1.97	<0.001*
VAS score (Mean ± SD)	7.39 ± 1.09	3.68 ± 0.75	2.09 ± 0.59	1.13 ± 0.56	<0.001**
SF-36 score (Mean ± SD)					
Physical functioning (PF)	42.52 ± 11.60	51.06 ± 11.05	66.61 ± 12.48	76.11 ± 9.90	<0.001*
Role physical (RP)	42.81 ± 10.93	51.43 ± 10.27	67.20 ± 11.33	77.99 ± 10.81	<0.001*
Bodily pain (BP)	41.34 ± 10.54	52.01 ± 11.34	65.73 ± 12.43	76.22 ± 12.52	<0.001*
General health (GH)	41.64 ± 9.98	51.63 ± 10.84	65.87 ± 10.75	77.45 ± 10.49	<0.001*
Vitality (VT)	41.33 ± 11.32	50.91 ± 9.91	65.35 ± 12.19	76.31 ± 11.13	<0.001*
Social functioning (SF)	40.08 ± 13.33	49.29 ± 13.61	65.05 ± 14.14	74.69 ± 12.59	<0.001*
Role emotional (RE)	41.43 ± 10.06	49.32 ± 12.33	63.01 ± 9.38	74.75 ± 11.49	<0.001*
Mental health (MH)	40.28 ± 10.32	51.63 ± 11.49	64.87 ± 12.21	77.73 ± 9.89	<0.001*

**ANOVA test **Friedman test*

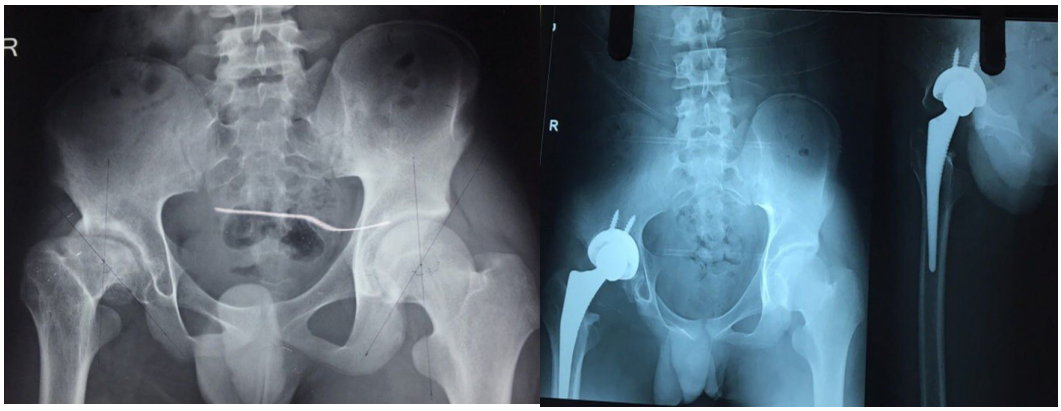

Figure 3 Pre-op and post-op images of THR for dysplastic hip

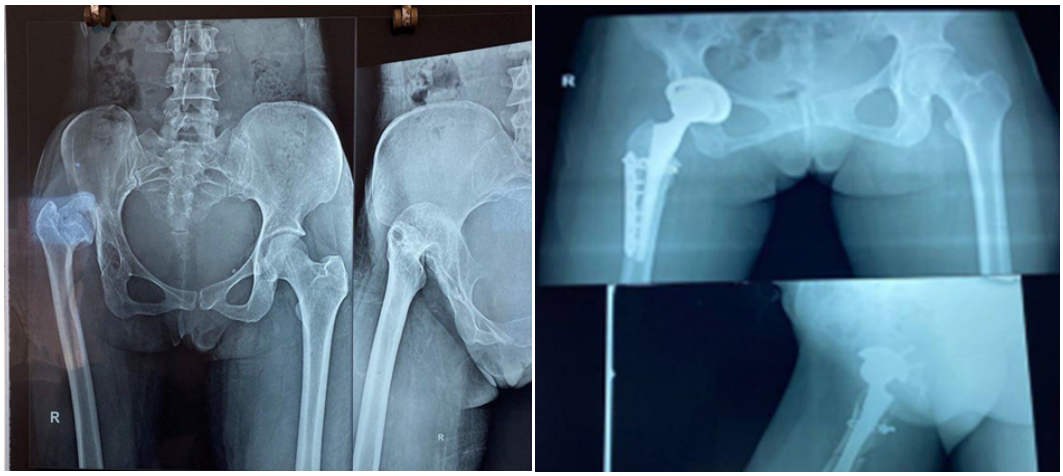

Figure 4 Pre-op and post-op images of cementless THR with transverse subtrochanteric femoral shortening osteotomy in a Crowe Type IV dysplastic hip

Similarly, the Visual Analogue Scale (VAS) score for pain decreased markedly from 7.39 ±1.09 preoperatively to 3.68 ±0.75 at 6 weeks, 2.09 ±0.59 at 6 months, and 1.13 ±0.56 at 1 year ($p < 0.001$), indicating consistent and substantial pain relief (Figure 1, Table 2). Post-hoc test showed statistically significant difference in all pairwise comparisons ($p<0.001$). All eight domains of the SF-36 Health Survey showed statistically significant and progressive improvements from baseline through 1 year postoperatively (Figure 2, Table 2).

- Physical Functioning (PF) improved from 42.52 ± 11.60 preoperatively to 51.06 ± 11.05 at 6 weeks, 66.61 ± 12.48 at 6 months, and 76.11 ± 9.90 at 1 year ($p < 0.001$).
- Role Physical (RP) increased from 42.81 ± 10.93 to 51.43 ± 10.27 at 6 weeks, 67.20 ± 11.33 at 6 months, and 77.99 ± 10.81 at 1 year ($p < 0.001$).
- Bodily Pain (BP) rose from 41.34 ± 10.54 to 52.01 ± 11.34 at 6 weeks, 65.73 ± 12.43 at 6 months, and 76.22 ± 12.52 at 1 year ($p < 0.001$).
- General Health (GH) scores improved from 41.64 ± 9.98 preoperatively to 51.63 ± 10.84 at 6 weeks, and 65.87 ± 10.75 at both 6 months and 1 year, indicating a plateau in perceived general health after 6 months ($p < 0.001$).
- Vitality (VT) increased from 41.33 ± 11.32 to 50.91 ± 9.91 at 6 weeks, 65.35 ± 12.19 at 6 months, and 76.31 ± 11.13 at 1 year ($p < 0.001$).
- Social Functioning (SF) improved from 40.08 ± 13.33 to 49.29 ± 13.61 at 6 weeks, 65.05 ± 14.14 at 6 months, and 74.69 ± 12.59 at 1 year ($p < 0.001$).
- Role Emotional (RE) rose from 41.43 ± 10.06 preoperatively to 49.32 ± 12.33 at 6 weeks, 63.01 ± 9.38 at 6 months, and 74.75 ± 11.49 at 1 year ($p < 0.001$).
- Mental Health (MH) scores improved from 40.28 ± 10.32 to 51.63 ± 11.49 at 6 weeks, 64.87 ± 12.21 at 6 months, and 77.73 ± 9.89 at 1 year ($p < 0.001$).

All post hoc tests also demonstrated significant differences in all pairwise comparisons between time points ($p<0.001$).

Following the surgery, sciatic nerve palsy was seen in 2 (6.45%) patients, which recovered spontaneously in both cases. Hip dislocation was seen in 1 (3.22%) patient, for which revision surgery was done. Superficial skin infection was seen in 1 (3.22%) patient, which was managed with antibiotics (Table 1).

Discussion

Our study demonstrates that total hip arthroplasty (THA) significantly improves functional outcomes, pain levels, and health-related quality of life in patients with developmental dysplastic hips. The study included 31 cases of dysplastic hips who had undergone THR with mean age of 53.52 ± 4.63 years. In our study, the number of males and females were almost equal with females accounting for 16 (51.61%) cases. The mean age of patients in this study was similar to a study from USA evaluating 385 hips who underwent THR.[26] However, this study suggested higher number of patients with dysplastic hips are females.[26] Another study from Germany also showed mean age similar to our study, but higher number of female patients as compared to males.[27]

Majority of the patients had Crowe grade 1 hips, accounting for 19 (61.29%) cases. Similar to this study, majority of the cases had Crowe grade I hips in a study including 385 hips from USA.[26] All patients included in the study had undergone THR with anatomical hip reconstruction and femoral shortening with subtrochanteric osteotomy was done in 8 (25.80%) patients. In a study from Turkey, femoral shortening was done in 14.44% cases of dysplastic hips undergoing THR.[28] In contrast, in a study including 89 patients with dysplastic hips, proximal femoral shortening was done in all patients.[10]

Hip function assessed using the HHS showed significant improvement following THR. Continuous improvement in HHS was seen at every follow-up during the one-year period. In contrast to our finding, another study evaluating the functional outcome after THR in dysplastic hips showed improvement in HHS for first 3 months, and no significant improvement thereafter.[10] Another study from New Zealand also showed significant improvement in hip function following THR.[29] They found that the improvement in HHS was more significant in patients with dysplastic hips than in patients with primary osteoarthritis.[29] Systematic reviews also showed significant improvement in HHS following THR for dysplastic hips.[30,31] Another study from Switzerland also showed significant improvement in HHS following THR.[32] A study from Turkey also showed improvement in hip function following THR in dysplastic hips.[28] Studies from India also reported that THR in dysplastic hips led to significant functional improvements.[7,33,34] A systematic review from India also showed improvement in functional outcome after THR for dysplastic hips.[35]

Level of pain, assessed using the VAS showed significant improvement following THR in our patients, indicating that THR provided consistent pain relief. Similar to our study, another study done in Turkey also found consistent pain relief through the one year follow-up period following THR.[10] Another study from Switzerland also showed significant relief in pain in young patients undergoing THR for dysplastic hips.[32] A systematic review from Iran also showed improvement in pain following THR for hip dysplasia.[31]

The health-related quality of life, which was assessed using the SF-36 score, also showed significant improvement in all domains of the SF-36 score. The improvement was greatest in the first 6 months post-operatively, with continued gains up to 1 year. No domain of SF-36 score showed deterioration at any follow-up interval. Similar to the findings of our study, a study from Italy including 40 patients also showed significant improvement in all domains of SF-36 score following THR for dysplastic hips.[17] Another study from New Zealand also showed earlier and significant improvement in quality of life following THR in patients with dysplastic hips.[29] This may be because the patients undergoing THR for dysplastic hips are relatively younger than patients with primary osteoarthritis. Studies from Iran also showed improvement in all domains of SF-36 scores after THR in patients with hip dysplasia.[31,36] Improvement in quality of life following THR was seen in another study from Hellenic Republic as well.[37]

Following the surgery, complications were seen in 4 (12.89%) patients. Sciatic nerve palsy was seen in 2 (6.45%) patients, which recovered spontaneously in both cases. In a study from Turkey, nerve palsies were seen in 5.56% cases which was similar to that observed in our study.[28] Superficial skin infection was seen in 1 (3.22%) patient, which was managed with antibiotics. Hip dislocation was seen in 1 (3.22%) patient, for which revision surgery was done. The rate of dislocation after THR for primary osteoarthritis has been shown to be around 2%.[38] The dislocation rate seen in this study is similar to the dislocation rate seen in THR for primary osteoarthritis. A study from USA showed revision rate of 4.9%, which was similar to this study.[26] There were no cases of periprosthetic infection, implant failure, periprosthetic fractures or heterotopic ossification. Revision was required in 1 (3.22%) patient for dislocation following THR. A systematic review showed that revision rates following THR to be 5%.[30] However, a study from Germany showed higher rates of revision (18%) in patients with dysplastic hips.[27] They also suggested that the complication rate in patients with hip dysplasia is higher than in patients with primary osteoarthritis.[27] Another study from Turkey also showed revision rates of 18.89%.[28] However, a study from India noted a lower complication rate, with only 1.5% cases requiring revision surgery.[7]

Improvement in HHS and VAS score seen in our study have reflected significant recovery in physical function and pain reduction. Along with this, improvement in SF-36 scores reflects improvements in both physical and mental health and in domains of psychological and social well-being. However, there are still challenges such as implant availability, surgical expertise, and follow-up care in Nepal. If these challenges can be addressed, we may be able to further improve patient care and decrease the complication rates in these patients. Our study adds

to the evidence from other studies, supporting the efficacy of THR in hip dysplasia, particularly in resource-limited settings. The similarity in outcomes across studies done at different regions suggests that THR can be successfully implemented in various environments.

A key strength of our study is the use of validated outcome measures (HHS, VAS, SF-36) to assess patient recovery comprehensively. Additionally, our focus on a resource-limited setting such as Nepal provides insights into the effectiveness of THR even in such contexts. THR is an effective treatment for patients with end-stage osteoarthritis secondary to hip dysplasia. What sets our study apart is its focus on measuring functional outcomes and health-related quality of life using validated tools such as HHS, VAS, SF-36 in a low-resource setting, and this study provides one of the first comprehensive datasets from Nepal on THR for dysplastic hips. Our findings reinforce the efficacy of THR even in resource-constrained settings. This study also shows the importance of surgical training and development of infrastructure to facilitate such interventions.

However, this study does have a few limitations. Firstly, we did not compare the improvement in hip function, pain and QoL of patients with different grades of hip dysplasia due to the limited sample size. We also did not evaluate factors such as range of motion and implant position on radiographs following THR, which may have an effect on the final outcome and hip function. Also, we followed up the patients for only 1 year after surgery, so we cannot comment on the long-term implant survival and revision rates after THR in patients with dysplastic hips. Further long-term studies are required to understand the long-term results and implant survival after THR in these patients. Further studies should also include radiographic and gait analyses and also explore cost-effectiveness and patient satisfaction after THR in patients.

Conclusion

This study found significant improvement in hip function, pain and health-related quality of life following THR in patients with dysplastic hips, and significant gradual improvement was seen over a period of one year.

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