https://doi.org/10.29309/TPMJ/2025.32.10.9836

The Professional Medical Journal
www.theprofesional.com
2025, Volume, 32 Issue, 10

ORIGINAL ARTICLE

Clinical outcomes following containment procedures for patients with Legg-calvé-perthes disease.

Asad Amin[1], Shahan Raza[2], Uzair Rashid[3], Sadaf Saddiq[4], Junaid Mazhar[5], Atiq uz Zaman[6]

Article Citation: Amin A, Raza S, Rashid U, Saddiq S, Mazhar J, Atiq uz Zaman. Clinical outcomes following containment procedures for patients with Legg-calvé-perthes disease. Professional Med J 2025; 32(10):1313-1317. https://doi.org/10.29309/TPMJ/2025.32.10.9836

ABSTRACT… Objective: To assess short-term functional outcomes following surgical containment in children with Legg-Calvé-Perthes disease (LCPD) classified as Herring group B or C. **Study Design:** Prospective Observational study. **Setting:** Department of Orthopaedics & Spine Centre, Ghurki Trust Teaching Hospital, Lahore. **Period:** August 01, 2024 to January 31, 2025. **Methods:** Fourteen children aged 4–10 years with LCPD (Herring B or C) underwent surgical containment. Patients with comorbidities affecting hip function were excluded. Functional status was evaluated using the Harris Hip Score (HHS) preoperatively and six weeks postoperatively. Statistical analysis was performed using SPSS v23, with significance set at $p \leq .05$. **Results:** The mean HHS improved significantly from 35.5 ± 7.88 preoperatively to 89.0 ± 3.62 postoperatively ($p < .05$). Subgroup analysis by age, gender, laterality, and Stulberg classification showed no statistically significant differences; however, greater improvements were observed in unilateral cases and those with Stulberg grades IV–V. **Conclusion:** Surgical containment significantly improves short-term functional outcomes in children with moderate-to-severe LCPD. Although subgroup differences were not statistically significant, observed trends support better recovery in unilateral and radiologically severe cases. Larger multicenter studies with longer follow-up are recommended.

Key words: Functional Recovery, Harris Hip Score, Legg-Calvé-Perthes Disease, Pediatric Hip, Surgical Containment.

INTRODUCTION

Perthes disease, also known as Legg-Calvé-Perthes disease, is a pediatric orthopedic condition characterized by idiopathic avascular necrosis of the femoral head.[1] It primarily affects children between the ages of 4 and 10 years, leading to a spectrum of clinical manifestations ranging from mild hip pain to significant functional impairment and deformity.[2] The natural history of the disease varies considerably, and timely intervention is critical to preserving hip joint integrity and function.[3]

Several treatment modalities exist for managing Perthes disease, including conservative and surgical approaches. The choice of treatment depends on the patient's age at presentation, the extent of femoral head involvement, and the degree of femoral head extrusion.[4,5] Surgical intervention is generally indicated in more advanced cases, particularly in patients classified as Herring lateral pillar group B or C, where the risk of poor outcomes is higher.[6,7] The lateral pillar classification is a reliable prognostic tool and helps stratify treatment and expected outcomes.[8]

Numerous studies have examined long-term functional outcomes in Perthes disease; however, there is limited literature focusing on short-term postoperative recovery using validated functional scores such as the Harris Hip Score (HHS).[9,10] Early improvement in HHS may provide insight into surgical efficacy and patient recovery trajectories.[11]

This study aims to evaluate the early outcomes of surgical procedures performed in patients with Perthes disease, specifically those classified as Herring group B or C, irrespective of gender and the specific surgical technique used.

1. MBBS, PGR Orthopedics & Spine Centre, Ghurki Trust Teaching Hospital, Lahore.
2. MBBS, PGR Orthopedics, Ghurki Trust Teaching Hospital, Lahore.
3. MBBS, FCPS (Ortho), Senior Registrar Orthopedic, Ghurki Trust Teaching Hospital, Lahore.
4. MSc (Biostatistics), Ghurki Trust Teaching Hospital, Lahore.
5. MBBS, House Officer Orthopedics & Spine Centre, Ghurki Trust Teaching Hospital, Lahore.
6. MBBS, FCPS (Ortho), MME, Professor Orthopedics & Spine Centre, Ghurki Trust Teaching Hospital, Lahore.

Correspondence Address:
Dr. Asad Amin
Department of Orthopedics & Spine Centre
Ghurki Trust Teaching Hospital, Lahore.

Article received on: 12/05/2025
Date of revision: 24/06/2025
Accepted for publication: 16/07/2025

Functional outcomes were assessed using the HHS, measured both preoperatively and at six weeks postoperatively. To ensure clarity in outcome interpretation, patients with comorbid conditions affecting hip function—such as developmental dysplasia of the hip, unrelated inflammatory arthritis, neuromuscular disorders, or severe systemic diseases—were excluded from the study.

By focusing on short-term postoperative outcomes in a well-defined cohort, this research seeks to contribute valuable insights into the early functional recovery following surgical intervention for Perthes disease.[12]

METHODS

This prospective study was conducted at the Orthopedic Department of Ghurki Trust Teaching Hospital, Lahore, over a six-month period from August 1, 2024, to January 31, 2025, following topic approval by the College of Physicians and Surgeons Pakistan (CPSP). Institutional ethical approval was obtained prior to data collection (Ref. No. 2024/08/R-24, Dated: 01-08-2024). A total of 20 patients who underwent surgical containment procedures for Legg-Calvé-Perthes disease (LCPD) were enrolled using nonprobability consecutive sampling.

Inclusion criteria comprised children aged 4 to 10 years diagnosed with LCPD categorized as Herring group B or C, regardless of gender or the specific type of containment surgery performed. Exclusion criteria included patients with comorbid conditions affecting hip function—such as developmental dysplasia of the hip, unrelated arthritis, neuromuscular disorders, or significant systemic diseases—as well as those who had undergone hip replacement or failed to complete their treatment course for Perthes disease. Informed written and verbal consent was obtained from all participants or their legal guardians.

Demographic information (age, gender) and preoperative clinical details (disease duration, affected side, and Herring classification) were recorded. Surgical containment procedures were performed based on the discretion of the attending consultant orthopedic surgeon. Postoperative functional assessment was conducted at six weeks using the Harris Hip Score (HHS), administered by a consultant orthopedic surgeon. The HHS is a validated clinical tool that assesses hip function and pain, with scores ranging from 0 to 100—higher scores indicating better function. Interpretation of scores is generally categorized as follows: 90–100 (excellent), 80–89 (good), 70–79 (fair), and below 70 (poor) (19)

19. Data were recorded in a pre-designed questionnaire.

Statistical analysis was performed using SPSS version 23. The Shapiro-Wilk test was used to assess data normality. Post-stratification analysis student's t-test was applied to measure significant improvement in Harris hip scores (HHS) and to study effect modifiers by taking p-value $\leq .05$ as substantial.

RESULTS

The study evaluated the clinical outcomes of patients with Legg-Calvé-Perthes disease who underwent containment procedures. A total of 14 patients were included, with a mean age of 8.00 years (SD = 2.25, range: 4–16). The mean preoperative Harris Hip Score (HHS) was 35.5 (SD = 7.88), which significantly improved postoperatively to 89.0 (SD = 3.62). The median postoperative HHS was 88, indicating overall functional improvement.

Regarding disease severity, the Stulberg classification showed that 42.9% of patients (Grade II) had spherical congruency with minor deformities, which is associated with a good prognosis, 7.1% of patients (Grade III) had aspherical congruency with some head deformity, linked to mild-to-moderate arthritis, 28.6% of patients (Grade IV) had a flat femoral head and acetabulum, indicating moderate arthritis and a poor prognosis and 21.4% of patients (Grade V) had severe aspherical incongruency, associated with severe early arthritis and a poor long-term outcome.

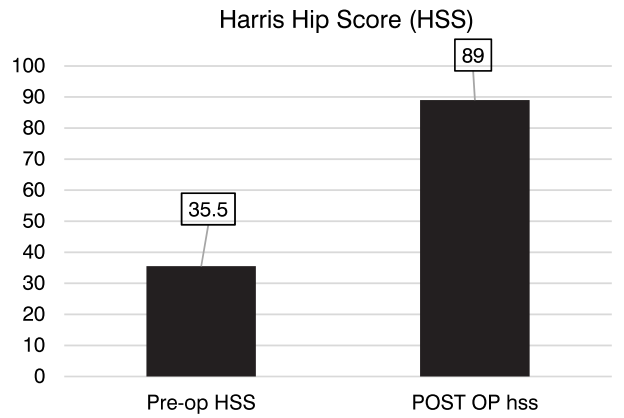

Figure-1. Mean Harris Hip Score pre- & post operatively

Parameters	Mean±SD	P-Value
Gender		
Male	54.00±7.76	.790
Female	52.60±11.61	
Age (years)		
<6	53.33±10.02	.973
6-12	53.55±9.09	
Side		
Unilateral	54.18±8.16	.603
Bilateral	51.00±13.00	
Stullberg Classification		
I	51.17±10.72	.659
III	47.00±0.00	
IV	57.50±10.09	
V	55.00±8.89	

Table-I. Improvement in Harris Hip Score based on demographic characteristics

The analysis of Harris Hip Score (HHS) improvement across different demographic and clinical characteristics revealed no statistically significant differences. Males demonstrated a slightly higher mean improvement (54.00 ± 7.76) compared to females (52.60 ± 11.61), though the difference was not significant (p = .790). Similarly, age did not appear to influence improvement, as patients under 6 years had a mean improvement of 53.33 ± 10.02, while those aged 6–12 showed a comparable increase (53.55 ± 9.09, p = .973). When examining the laterality of the disease, unilateral cases exhibited a slightly greater improvement (54.18 ± 8.16) compared to bilateral cases (51.00 ± 13.00), but this difference was not significant (p = .603). Stulberg classification also did not significantly affect HHS improvement (p = .659), although patients classified as Grade IV had the highest mean improvement (57.50 ± 10.09), followed by Grade V (55.00 ± 8.89), while those in Grade III showed the lowest improvement (47.00 ± 0.00). These findings suggest that gender, age, laterality, and Stulberg classification did not play a significant role in determining post-treatment functional recovery. However, the numerical trends indicate slightly better improvement in unilateral cases and among patients with higher Stulberg grades (IV–V).

DISCUSSION

Official recommendations for treating LCPD are currently missing. But there is a widespread tendency in the management of LCPD that patients be treated conservatively before undergoing surgery in cases of late-onset and severe disease.[13]

The clinical outcomes following containment procedures for patients with Legg-Calvé-Perthes Disease (LCPD) have been a subject of considerable research, with various studies highlighting the effectiveness of surgical interventions. Our findings demonstrate a significant improvement in the Harris Hip Score (HHS) from a mean of 35.5 preoperatively to 89.0 postoperatively, aligning with previous literature that supports the efficacy of surgical containment methods in managing LCPD.

A retrospective study that corroborates our results, indicates that surgical interventions, particularly proximal femoral varus derotation osteotomy, yield statistically significant improvements in clinical outcomes as HHS score (pre= 45.47± 9.28, post= 72.00± 9.25), p<.001 for children with severe Perthes disease.[13]

Adulyanukosol et al. also highlighted that disease stage and age have considerable effects on radiological and clinical results, affirming the view that younger patients benefit more from surgical

containment. This aligns with our study, wherein the average age of patients was 8.00 years, meaning that our sample was in the age bracket, which generally responds to surgical intervention well. The mean age of patients was 8.1 years. Twenty-two hips were rated as “fair” (Stulberg III), four as “poor” (Stulberg IV), and nineteen as “good” (Stulberg I or II); no hips were categorized as Stulberg V. In our study, 42.9% of patients (Grade II) had a good prognosis, 7.1% of patients (Grade III) had mild-to-moderate arthritis, 28.6% of patients (Grade IV) had moderate arthritis and a poor prognosis, and 21.4% of patients (Grade V) had severe aspherical incongruency, associated with severe early arthritis and a poor long-term outcome.[14]

Moreover, the results of a study point to the significance of surgical containment in older children, observing that conservative treatment might be enough for younger patients but surgical intervention becomes inevitable as the disease advances.[15]

Our results are aligned with Wagner et al.’s study, indicating that At final follow-up, 42% had a good outcome (Stulberg I/II), 47% had a fair outcome (Stulberg III), and 11% had a poor outcome.[16] According to the classification of Stulberg et al., 89 hips (45%) were class I, 57 (29%) were class II, 35 (18%) were class III, 12 (6%) were class IV, and 4 (2%) were class V.[17]

Despite the significant findings of this study, several limitations must be acknowledged. First, the sample size was relatively small (n=14), which may limit the generalizability of the results to a broader population of patients with Legg-Calvé-Perthes Disease (LCPD). More significantly, multicenter studies would provide more robust data and enhance the external validity of our findings. A longer follow-up period is necessary to assess the durability of the improvements in Harris Hip Scores (HHS) and the potential for late complications such as osteoarthritis.

Another limitation is the lack of a control group receiving non-surgical or alternative treatments, making it difficult to compare the effectiveness of containment procedures against other management approaches.

CONCLUSION

This study concludes that surgical containment measures greatly enhance functional outcomes for patients with Legg-Calvé-Perthes Disease, as indicated by the noteworthy improvement in Harris Hip Scores. Demographic and severity characteristics failed to present statistically significant differences in improvement, but trends indicated superior recovery in unilateral conditions and greater Stulberg grades. These results point to the effectiveness of surgical management in treating LCPD and support the importance of continued investigation to maximize treatment options.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

1. Braun S, Adolf S, Brenneis M, Boettner F, Meurer A. **Legg-Calvé-Perthes disease—surgical treatment options.** Arch Orthop Trauma Surg. 2025; 145(3):186-93.

2. Herring JA, Kim HT, Browne R. **Legg-Calvé-Perthes disease. Part II: Prospective multicenter study of the effect of treatment on outcome.** J Bone Joint Surg Am. 2004; 86(10):2121-34.

3. Rampal V, Clement JL, Solla F. **Legg calve perthes disease: Classification and prognostic factors.** Clin Cases Miner Bone Metab. 2017; 14(1):74-82.

4. Joseph B, Mulpuri K, Varghese G. **Perthes’ disease in the adolescent.** J Bone Joint Surg Br. 2001; 83(6):715-20.

5. Kim HK. **Legg-Calvé-Perthes disease.** J Am Acad Orthop Surg. 2010; 18(12):676-86.

6. Park MS, Chung CY, Lee KM, Kim TW, Sung KH. **Reliability and stability of three common classifications for Legg-Calvé-Perthes disease.** Clin Orthop Relat Res. 2012; 470(8):2376-82.

7. Herring JA, Neustadt JB, Williams JJ, Early JS, Browne RH. **The lateral pillar classification of Legg-Calvé-Perthes disease.** J Pediatr Orthop. 1992; 12(2):143-50.

8. Joseph B. **Prognostic factors and outcome measures in Perthes disease.** Orthop Clin North Am. 2011; 42(2):295-300.

9. Rich MM, Sucato DJ, Millis MB, Kim YJ. **Treatment of hips with maintenance of range of motion and use of an A-frame orthosis resulted in congruency in 93% of hips.** J Pediatr Orthop. 2013; 33(3):e1-6.

10. Farsetti P, Tudisco C, Caterini R, Potenza V, Ippolito E. **The Herring lateral pillar classification for prognosis in Perthes disease: Late results in 49 patients treated conservatively.** J Bone Joint Surg Br. 1995; 77(4):739-42.

11. Wenger DR, Hosalkar HS. **Principles of treating the sequelae of Perthes disease.** Orthop Clin North Am. 2011; 42(2):365-72.

12. Kim H, Herring JA. **Pathophysiology, classifications, and natural history of Perthes disease.** Orthop Clin North Am. 2011; 42(2):285-95.

13. Nguyen NA, Klein G, Dogbey G, McCourt JB, Mehlman CT. **Operative versus nonoperative treatments for Legg-Calvé-Perthes disease: A meta-analysis.** Journal of Pediatric Orthopaedics. 2012 Oct 1; 32(7):697-705.

14. Adulyanukosol V, Lewsirirat S, Chinvattanachot G. **Age and factors associated with clinical and radiological outcomes of surgical containment in Legg-Calve-Perthes Disease.** Journal of Southeast Asian Orthopaedics. 2022 Mar 19; 46(1):36-41.

15. Goyal T, Barik S, Gupta T. **Hip arthroscopy for sequelae of Legg-Calve-Perthes disease: A systematic review.** Hip & Pelvis. 2021 Mar 2; 33(1):3.

16. Wenger DR, Pring ME, Hosalkar HS, Caltoum CB, Lalonde FD, Bastrom TP. **Advanced containment methods for Legg-Calvé-Perthes disease: Results of triple pelvic osteotomy.** Journal of Pediatric Orthopaedics. 2010 Dec 1; 30(8):749-57.

17. Grzegorzewski A, Bowen JR, Guille JT, Glutting J. **Treatment of the collapsed femoral head by containment in Legg-Calve-Perthes disease.** Journal of Pediatric Orthopaedics. 2003 Jan 1; 23(1):15-9.

AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Asad Amin:** Conceptualization, homework of study.
2	**Shahan Raza:** Literature review.
3	**Uzair Rashid:** Writing draft.
4	**Sadaf Saddiq:** Data analysis, interpretation.
5	**Junaid Mazhar:** Data collection.
6	**Atiq uz Zaman:** Critical review.