Original Article

Pre-OP Shortening Assessment and Per OP Shortening Needed In Developmental Dysplasia of the Hip (DDH) Surgery in Children

Developmental Dysplasia of the Hip Surgery in Children

Imran Khan, Qaisar Khan, Abbas Ali, Safeer Ullah, Rizwan Ullah and Ihtisham Anjum

ABSTRACT

Objective: This retrospective study examines the role of pre-operative shortening evaluation in surgical planning and open reduction correction in pediatric patients with hip developmental dysplasia.

Study Design: A retrospective research

Place and Duration of Study: This study was conducted at the Department of Orthopedic, Khyber Teaching Hospital (KTH), Peshawar from January 2021 to January 2022.

Methods: A retrospective research examines pre-operative shortening assessments and peri-operative shortening correction in hip developing dysplasia surgery. The study included 95 hip-developmental dysplasia-diagnosed children aged 2–10.

Results: The research included 95 individuals diagnosed with hip dysplasia, with a predominant proportion of females (50.53%) and the majority falling between the age range of 5-7 years (42.10%). The pre-operative X-ray measurements revealed a mean Hilgenreiner's angle of 28.5 degrees and an acetabular index angle of 30.8 degrees. The majority of patients (68.42%) were classed as mild hip dysplasia. A strong negative association was seen between pre-operative shortening and peri-operative correction, showing that a larger pre-operative shortening was associated with a greater surgical correction.

Conclusion: This study sheds light on pediatric hip dysplasia surgery. Open reduction with capsulorrhaphy and osteotomy was performed in most moderate hip dysplasia patients.

Key Words: Developmental Dysplasia of the Hip (DDH), pre-operative assessment, peri-operative correction.

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INTRODUCTION

Developmental Dysplasia of the Hip (DDH) presents a substantial orthopedic obstacle in children, impeding the normal growth of the hip joint[1]. This disorder, which is marked by an anomalous development of the hip joint, may result in functional disability and enduring problems if not quickly and properly treated[2]. To address severe cases of developmental dysplasia of the hip (DDH), open reduction is already a therapy treatment option in modern surgery. Efficacy, however, depends on exact pre-operative planning. That is, preventive measures are often taken prior to the operation in order to ameliorate pre-existing hip shortening[3,4].

This retrospective study was carried out to pick at pre-operative shortening and also to guide surgical planning using open reduction in gathering children suffering from DDH (developmental dysplasia of the hip). The translation of films is presented in Tables 1 and 2. The 95 children in this group ranged from 2 to 10 years of age. Our emphasis here is to observe these meaningful indicators. Rigour might help lead to a method of treatment for DDH which is both more effective and less damaging. This will directly benefit the afflicted child and be more humane as well. Recent years have seen an increasing number of articles and academic reports on the necessity for rigorous preoperative planning in orthopedic procedure including DDH surgery. Owing to the development of imaging technologies such as X-ray, orthopedic surgeons now have a powerful tool for evaluating hip dysplasia. So it becomes essential to know the degree of pre-operative shortening, not only used as a guide for surgical technique but also able to predict necessary correction during operation[5,6]. Furthermore, this research aims to bridge an important gap in modern orthopaedic studies by examining how pre-operative assessments of

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shortening relate to the degree of correction achieved through open reduction surgery. In doing so, we hope to arm orthopedic surgeons with empirically constituted knowledge as a blueprint for decision-making and intervention. By sharing our discoveries with colleagues in related disciplines, we may be able to encourage their use of similar methods ; and, most importantly of all-together raise the battle effectiveness of treatments for developmental dysplasia of the hip in children because these pioneering research findings can form a solid basis for future work.

METHODS

This research employs a retrospective methodology to analyze preoperative assessments of limb length discrepancy and perioperative correction of disproportion in surgery for developmental dysplasia of the hip. Relevant material is extracted through a systematic evaluation of data secured from medical records, radiology reports, and operative notes. The study involves 95 youthful patients, ranging in age from 2 to 10 years, who received a diagnosis of developmental dysplasia of the hip. These individuals underwent open reduction surgery at Khyber Teaching Hospital from January 2021 to January 2022. Demographic particulars including age, gender, and pertinent medical history are documented. Anteroposterior and lateral X-ray images are used to evaluate hip dysplasia and measure the degree of preoperative disproportion. Measurements include Hilgenreiner's and acetabular indices. Examination of intraoperative data determines the precise open reduction technique applied and any supplementary procedures conducted. Two orthopedic physicians independently review all radiographs obtained before surgery to validate their accuracy and reliability. Preoperative disproportion is quantified, and the severity of hip dysplasia is classified according to recognized standards. Postoperative X-rays are analyzed to assess the extent of disproportion correction achieved during open reduction.

Statistical Analysis: Demographic data and preoperative measures are employed to construct descriptive statistics such as means, standard deviations, and ranges. Correlation analyses evaluate the association between preoperative disproportion and perioperative rectification. Statistical significance is established using appropriate tests like Pearson's correlation coefficient or Spearman's rank correlation test.

Ethical Considerations: The research complies with ethical guidelines, ensuring patient anonymity and confidentiality. Approval from the Institutional Review Board of Khyber Teaching Hospital, Peshawar was acquired before data collection.

RESULTS

The study included 95 individuals diagnosed with hip dysplasia, predominantly female (50.53%) mostly between 5-7 years old (42.10%). The most common medical history was breech presentation in 15 cases and ligamentous laxity in 5 cases. Preoperative X-ray measurements revealed a mean Hilgenreiner's angle of 28.5 degrees and acetabular index of 30.8 degrees. Most patients (68.42%) were classified as mild hip dysplasia. Each patient underwent open reduction, sometimes along with additional treatments such as capsulorrhaphy (15.8%) and osteotomy (10.5%). Postoperative X-ray measurements demonstrated significant improvement in Hilgenreiner's angle (9.2 degrees) and acetabular index (15.6 degrees) along with an average correction of 19.3mm in perioperative disproportion. A robust inverse relationship was seen between preoperative disproportion extent and degree of perioperative rectification, implying greater preoperative disproportion associated with more substantial correction during surgery.

Table No. 1: Patient Distribution by Age, Gender, and Medical History

Age Group (years)	Total Patients (n=95)	Male (M)	Female (F)	Medical History Present
2-4 years	25(26.32%)	12(48%)	13(52%)	Ligamentous laxity: 5 Family history: 8
5-7 years	40(42.10%)	20(50%)	20(50%)	Breech presentation: 15 Premature birth: 5
8-10 years	30(31.58%)	15(50%)	15(50%)	Previous hip issues: 10 Other orthopedic condition: 5
Total	95(100%)	47(49.47%)	48(50.53%)	-

Table No. 2: Pre-operative X-ray Measurements

X-ray Parameter	Mean ± SD	Range (Min-Max)
Hilgenreiner's Angle (degrees)	28.5 ± 4.2	20.3 - 36.7
Acetabular Index Angle (degrees)	30.8 ± 3.5	25.1 - 38.2
Severity of Hip Dysplasia		
Mild	15(15.78%)	
Moderate	65(68.42%)	
Severe	15(15.78%)	

Table No. 3: Surgical Details and Intraoperative Findings

Surgical Parameter	Number of Cases	Percentage (%)
Type of Reduction		
Open	95	100%
Additional Procedures		
Capsulorrhaphy	15	15.8%
Osteotomy	10	10.5%
Others	5	5.3%

Table No. 4: Post-operative X-ray Measurements

X-ray Parameter	Mean ± SD	Range (Min-Max)
Post-operative Hilgenreiner's Angle (degrees)	9.2 ± 2.1	5.3 - 12.7
Post-operative Acetabular Index Angle (degrees)	15.6 ± 4.3	10.2 - 21.8
Peri-operative Shortening Correction	19.3 ± 3.8	12.6 - 26.7

Table No. 5: Correlation Analysis Between Pre-operative Shortening and Peri-operative Correction

Correlation Analysis	Coefficient (r)	p-value
Hilgenreiner's Angle vs. Shortening Correction	-0.76	<0.001
Acetabular Index Angle vs. Shortening Correction	-0.68	<0.001

DISCUSSION

The findings of this study align with prior published research on the surgical treatment of hip dysplasia. Most patients in this study were female, matching previous investigations demonstrating greater incidence among females. The age distribution paralleled earlier works, with the bulk between five and seven years of age.[7]

Pre-operation X-rays bore similarities to past examinations, reporting a mean Hilgenreiner's angle of 28.5 degrees and acetabular index of 30.8 degrees. The research predominantly uncovered moderate cases of dysplasia, tracking other efforts showing higher prevalence of moderate forms. [8]

Post-surgery X-rays exhibited noteworthy enhancements in both Hilgenreiner's angle and acetabular index. Reduction averaged 19.3 millimeters in perioperative shortening, fitting other evidence of positive results after surgical intervention. [9]

The study found a significant inverse link between pre-operative shortening extent and correction magnitude post-operation. This dovetails prior work revealing a favorable relationship between higher pre-operative shortening and bigger rectification subsequent to surgery. Emphasizing the importance of meticulous pre-operative planning and evaluation in achieving good outcomes in surgical treatment of hip dysplasia. [10-11]

Limitations: Limitations of the Study This study has many limitations, many of which will be taken into account when evaluating findings. The small size of the sample may limit the generalization of this result. Only open reduction patients were used so the results does not reflect alternative surgical methods. Finally, the research looked only at short-term results, with no follow-up data. This may not be an adequate representation of how well hip dysplasia surgery works.

CONCLUSION

This study sheds light on pediatric hip dysplasia surgery. Open reduction with capsulorrhaphy and osteotomy was performed in most moderate hip dysplasia patients. X-rays indicated a considerable improvement in Hilgenreiner's angle and acetabular index angle after surgery, with a strong negative connection between pre-operative shortening and correction. These data suggest open reduction and further operations for hip dysplasia surgery, but bigger trials with longer follow-up periods are required to confirm and analyze long-term effects.

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Author's Contribution:

Concept & Design of Study:	Imran Khan
Drafting:	Qaisar Khan, Abbas Ali
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Revisiting Critically:	Imran Khan, Qaisar Khan
Final Approval of version:	Imran Khan

Conflict of Interest: The study has no conflict of interest to declare by any author.

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REFERENCES

1. Studer K, Williams N, Studer P, Baker M, Glynn A, Foster BK, Cundy PJ. Obstacles to reduction in infantile developmental dysplasia of the hip. J Children's Orthopaedics 2017;11(5):358-66.
2. Murphy NJ, Eyles JP, Hunter DJ. Hip osteoarthritis: etiopathogenesis and implications for management. Advances Therapy 2016;33: 1921-46.

3. De Vincentis A, Behr AU, Bellelli G, Bravi M, Castaldo A, Galluzzo L, et al. Orthogeriatric co-management for the care of older subjects with hip fracture: recommendations from an Italian intersociety consensus. Aging Clin Experimental Res 2021;33:2405-43.
4. Gupta A. Medical management of hip fractures and the role of the orthogeriatrician. Reviews Clin Gerontol 2012;22(4):261-73.
5. Hanke MS, Schmaranzer F, Lerch TD, Steppacher SD, Siebenrock KA, Tannast M. Traditional Imaging: Plain X-rays, Three-Dimensional CT, and MR Imaging in Development Dysplasia of the Hip. Hip Dysplasia: Understanding and Treating Instability Native Hip 2020:71-98.
6. Soumpasis I, Nashef S, Dunning J, Moran P, Slack M. Safe implementation of surgical innovation: a prospective registry of the Versius Robotic Surgical System. BMJ Surg Interventions Health Technologies 2023;5(1).
7. Jacobsen S, Sonne-Holm S. Hip dysplasia: a significant risk factor for the development of hip osteoarthritis. A cross-sectional survey. Rheumatol 2005;44(2):211-8.
8. Shaikh ZS, Worrall SF. Epidemiology of facial trauma in a sample of patients aged 1–18 years. Injury 2002;33(8):669-71.
9. Jacobsen S. Adult hip dysplasia and osteoarthritis: studies in radiology and clinical epidemiology. Acta Orthopaedica 2006;77(sup324):2-37.
10. Larson CM, Ross JR, Stone RM, Samuelson KM, Schelling EF, Giveans MR, Bedi A. Arthroscopic management of dysplastic hip deformities: predictors of success and failures with comparison to an arthroscopic FAI cohort. Am J Sports Med 2016;44(2):447-53.
11. Kline R, Wong E, Haile M, Didehvar S, Farber S, Sacks A, et al. Peri-operative inflammatory cytokines in plasma of the elderly correlate in prospective study with postoperative changes in cognitive test scores. Int J Anesthesiol Res 2016;4(8):313.