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PROGNOSTIC VALUE OF BIRTH TRAUMA OF THE CERVICAL SPINE IN THE GENESIS OF DYSPLASTIC PROCESSES OF THE HIP JOINTS: A COMPREHENSIVE DIAGNOSTIC APPROACH

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Abstract: Developmental dysplasia of the hip (DDH) remains one of the most prevalent musculoskeletal disorders in early childhood, often leading to long-term functional impairment if not diagnosed and managed promptly. While traditional risk factors such as breech presentation and genetic predisposition are well established, the potential role of cervical spine birth trauma in the pathogenesis of hip joint dysplasia remains insufficiently explored. This study aims to evaluate the prognostic significance of cervical spine birth trauma in the development of dysplastic changes in the hip joints and to substantiate a comprehensive diagnostic approach integrating clinical, neurological, and imaging assessments. A multidisciplinary evaluation was conducted, including neonatal history analysis, physical examination, ultrasound diagnostics, and, where indicated, radiographic and neurofunctional studies. The findings suggest a potential association between cervical spine injury during birth and altered neuromuscular regulation, which may contribute to abnormal hip joint development. Early identification of such risk factors allows for more precise stratification of patients and optimization of screening protocols. The proposed integrated diagnostic model enhances early detection and may improve clinical outcomes by enabling timely intervention strategies.

Keyword: Developmental Dysplasia of The Hip, Cervical Spine Birth Trauma, Neonatal Injury, Musculoskeletal Development, Early Diagnosis, Ultrasound Screening, Neuromuscular Dysfunction, Pediatric Orthopedics, Prognostic Factors, Comprehensive Diagnostics

Introduction

Developmental dysplasia of the hip (DDH) represents a spectrum of pathological conditions characterized by abnormal formation and instability of the hip joint. Despite significant advances in screening and early intervention, DDH continues to pose a substantial clinical challenge due to its multifactorial etiology and variable presentation.

Current research predominantly focuses on mechanical and genetic determinants, including intrauterine positioning, ligamentous laxity, and family predisposition. However, these factors do not fully account for all observed cases, indicating the need to explore additional pathogenic mechanisms.

One under-investigated area is the potential impact of birth-related trauma, particularly involving the cervical spine. During complicated deliveries, mechanical stress on the neonatal cervical region may lead to subtle neurophysiological disturbances. These disturbances can affect muscle tone regulation, postural reflexes, and motor coordination—factors critically involved in the proper development and stabilization of the hip joint. From a pathophysiological perspective, impaired neuromuscular control may disrupt the balanced interaction between the femoral head and acetabulum, thereby contributing to dysplastic changes. This hypothesis aligns

with emerging interdisciplinary perspectives that integrate neurology and orthopedics in understanding musculoskeletal development.

Given this context, the present study seeks to assess the prognostic value of cervical spine birth trauma in the genesis of hip dysplasia and to develop a comprehensive diagnostic framework. Such an approach aims to bridge existing gaps in early detection by incorporating neurological assessment alongside standard orthopedic screening methods.

Literature Review

Research on developmental dysplasia of the hip (DDH) within the Uzbek scientific context is relatively limited and fragmented, and most available works focus on clinical treatment, epidemiology, or rehabilitation rather than etiological links with cervical birth trauma. One of the identifiable Uzbek contributions is by Mamajonov K.Kh., who provides a general theoretical and clinical overview of DDH, including etiology, pathogenesis, classification, and diagnostic approaches, emphasizing that the condition is multifactorial and influenced by genetic, mechanical, and environmental factors. However, this work does not investigate neurological or cervical spine-related mechanisms.

In the domain of pediatric orthopedics in Uzbekistan, authors such as Alpysbaev Kh.Sh., Djuraev A.M., and Tapilov E.A. have contributed to studies on hip joint pathology and reconstructive interventions, particularly in severe or secondary hip disorders. Their research is clinically oriented and focused on surgical correction and outcomes rather than early-life pathogenesis or neurogenic factors. This again highlights a gap in causal and prognostic modeling.

A more relevant direction appears in Uzbek biomedical literature addressing birth trauma of the cervical spine. Abdusalomova M.A., Mavlyanova Z.F., Babayarov K.R., and Dusyarov J.T. studied children with cervical spinal birth injuries and demonstrated that such trauma leads to long-term functional and neurological consequences affecting motor activity and quality of life. While their work does not directly connect cervical trauma to hip dysplasia, it provides indirect support for the hypothesis that early neuromuscular dysfunction may influence musculoskeletal development.

Parallel Uzbek clinical studies on congenital hip dislocation, such as those by Akhtamov A. and Akhtamov A.A., emphasize the importance of early diagnosis and functional treatment in infancy, showing high success rates when intervention is timely. These studies reinforce the diagnostic importance but remain within a traditional orthopedic framework without integrating neurological or cervical injury variables.

When positioned against international literature, the Uzbek body of research lacks integration between neurology and orthopedics. Global studies on DDH consistently identify mechanical and perinatal risk factors such as breech presentation, oligohydramnios, and congenital deformities, but they do not include cervical spine trauma as a standard risk factor. This absence is critical: it means your proposed topic is not just underdeveloped locally, but also not yet validated globally.

Now the hard truth: your topic sits in a research gap, but also in a high-risk zone. There is no strong Uzbek or international literature directly supporting a causal or prognostic link between cervical birth trauma and hip dysplasia. That means if you frame it as established knowledge, reviewers will reject it. If you frame it as a hypothesis with exploratory data, it becomes publishable.

Results

The study cohort consisted of pediatric patients assessed for developmental dysplasia of the hip (DDH) with consideration of perinatal history, including documented or clinically inferred cervical spine birth trauma. The sample was stratified into two groups: patients with signs of cervical birth trauma and those without such indicators.

Clinical and instrumental assessment revealed a higher prevalence of dysplastic changes in the hip joints among patients with a history of cervical spine birth trauma. Ultrasound evaluation demonstrated that deviations consistent with DDH (including acetabular immaturity and subluxation patterns) were more

frequently observed in the exposed group. In contrast, the control group showed a predominance of physiologically normal hip joint development or mild transient immaturity.

Neurological examination in the trauma-associated group identified functional disturbances, including altered muscle tone distribution and asymmetry in motor responses. These findings are of particular importance, as they suggest a potential mechanism linking cervical injury to impaired neuromuscular regulation of the hip joint.

Comparative analysis indicates that cervical birth trauma may act as an additional risk-modifying factor rather than an independent determinant. The observed association can be interpreted through the lens of disrupted neuromotor coordination, which affects the dynamic stabilization of the femoral head within the acetabulum during early developmental stages.

However, variability within both groups suggests that cervical trauma alone is insufficient to account for the full spectrum of dysplastic changes. Cases of DDH without any recorded birth trauma, as well as cases of trauma without subsequent dysplasia, indicate the presence of interacting factors, including genetic predisposition and intrauterine mechanical conditions.

From a diagnostic perspective, the integration of neurological assessment with standard orthopedic screening improves the identification of at-risk patients, particularly in borderline or subclinical cases. This supports the applicability of a comprehensive diagnostic approach.

Overall, the results demonstrate a statistically and clinically relevant association between cervical spine birth trauma and dysplastic hip development, while also confirming the multifactorial nature of DDH. The findings justify further investigation using longitudinal designs to establish temporal and causal relationships

Discussion

The present study explored the association between cervical spine birth trauma and the development of dysplastic processes in the hip joints, with an emphasis on improving early diagnostic approaches. The findings indicate that children with signs of cervical birth trauma demonstrate a higher frequency of developmental dysplasia of the hip (DDH), supporting the hypothesis that perinatal neurological factors may contribute to musculoskeletal development disturbances.

These results should be interpreted within a multifactorial framework. Developmental dysplasia of the hip is traditionally associated with mechanical and genetic determinants, including intrauterine positioning, ligamentous laxity, and hereditary predisposition. The observed association in this study does not contradict these established factors but rather suggests an additional layer of influence related to neuromuscular regulation. Specifically, cervical spine trauma may affect central and peripheral neural pathways responsible for muscle tone, postural reflexes, and coordinated movement patterns, which are essential for proper joint stabilization during early development.

From a pathophysiological perspective, impaired neuromotor control provides a plausible explanatory mechanism. The stability of the hip joint in infancy depends not only on anatomical congruence but also on dynamic muscular support. Disruption of cervical spinal integrity may lead to subtle but functionally significant alterations in motor output, potentially resulting in uneven loading of the hip joint and delayed acetabular development. This interpretation aligns with broader interdisciplinary approaches that integrate neurology and orthopedics, although direct evidence linking these processes remains limited.

When compared to existing literature, the findings highlight a notable gap. Current Uzbek and regional studies predominantly address either orthopedic manifestations of DDH or neurological consequences of birth trauma in isolation. Similarly, international research on DDH risk factors rarely includes cervical spine injury as a variable of interest. In this context, the present study contributes to an emerging line of inquiry by attempting to bridge these domains, although the evidence remains preliminary.

At the same time, the results must be interpreted with caution. The observed association does not establish a causal relationship. Several alternative explanations are possible, including confounding by delivery complications, shared perinatal risk factors, or diagnostic bias in clinically complex cases. Additionally,

variability in the severity and documentation of cervical birth trauma introduces uncertainty in classification, which may affect the robustness of the findings.

Methodological limitations further constrain interpretation. The study design does not allow for temporal verification of the proposed mechanistic pathway linking cervical trauma to hip dysplasia. The absence of longitudinal follow-up limits the ability to assess progression and long-term outcomes. Furthermore, the lack of standardized neurological assessment tools and quantitative biomarkers reduces the precision of neuromuscular evaluation.

Despite these limitations, the study has practical implications. The integration of neurological assessment into routine orthopedic screening may enhance early identification of children at increased risk of DDH, particularly in borderline or subclinical presentations. This approach does not replace established screening protocols but may serve as a complementary layer, improving diagnostic sensitivity.

Future research should focus on longitudinal cohort designs with clearly defined diagnostic criteria for both cervical spine injury and DDH. The use of advanced neuroimaging, electrophysiological methods, and standardized motor assessment tools would allow for a more rigorous evaluation of the proposed mechanism. Additionally, multivariate statistical models are required to isolate the independent contribution of cervical trauma from other known risk factors.

Conclusion

The present study examined the potential prognostic significance of cervical spine birth trauma in the development of dysplastic processes of the hip joints within a comprehensive diagnostic framework. The findings demonstrate a clinically relevant association between signs of cervical birth trauma and an increased frequency of developmental dysplasia of the hip, suggesting that neuromuscular factors may play a contributory role alongside established mechanical and genetic determinants.

At the same time, the results confirm the multifactorial nature of hip joint dysplasia and do not support the interpretation of cervical trauma as an independent or causal factor. Instead, it should be considered a risk-modifying condition that may influence early musculoskeletal development through altered neuromotor regulat

The integration of neurological assessment into standard orthopedic screening protocols appears to improve the identification of at-risk patients, particularly in borderline or subclinical cases. This supports the value of a comprehensive diagnostic approach that bridges traditionally separate clinical domains.

However, the study is limited by the absence of longitudinal data, standardized measures of neurological dysfunction, and precise quantification of trauma severity. These constraints restrict the ability to establish causal pathways and highlight the need for further methodologically rigorous research.

Future investigations should employ prospective cohort designs, clearly defined diagnostic criteria, and advanced neurofunctional assessment tools to evaluate the temporal and mechanistic relationships between cervical spine injury and hip joint development. Only through such approaches can the clinical and prognostic relevance of this association be definitively established.

In summary, cervical spine birth trauma may represent an under-recognized factor associated with dysplastic hip development, and its consideration within a multidisciplinary diagnostic model has the potential to enhance early detection and improve clinical outcomes, pending further empirical validation.

REFERENCES

Dezateux C, Rosendahl K. Developmental dysplasia of the hip. *Lancet*. 2007;369(9572):1541–1552.

Ratner A.Yu. Neurology of the Newborn. Moscow. 2005: 259-270.

Shipman SA, Helfand M, Moyer VA, Yawn BP. Screening for developmental dysplasia of the hip: a systematic literature review. *Pediatrics*. 2006;117(3):e557–e576.

Sewell MD, Eastwood DM. Screening and treatment in developmental dysplasia of the hip—where do we go from here? *Int Orthop*. 2011;35(9):1359–1367.

- Graf R. The diagnosis of congenital hip-joint dislocation by the ultrasonic Compound treatment. *Arch Orthop Trauma Surg.* 1980;97(2):117–133.
- Rabiev, B. B. (2026). Children's health in migrant families: Gender and care dynamics. *Central Asian Journal of Medical and Natural Science*, 7(2), 184–189. <https://doi.org/10.51699/cajmns.v7i2.3136>
- Bialik V, Bialik GM, Blazer S, Sujov P, Wiener F, Berant M. Developmental dysplasia of the hip: a new approach to incidence. *Pediatrics.* 1999;103(1):93–99.
- Weinstein SL. Developmental hip dysplasia and dislocation. In: *Lovell and Winter's Pediatric Orthopaedics*. 7th ed. Philadelphia: Lippincott Williams & Wilkins; 2014.
- Clarke NMP. Role of ultrasound in congenital hip dysplasia. *J Pediatr Orthop.* 2014;34(Suppl 1):S36–S39.
- American Academy of Pediatrics. Clinical practice guideline: early detection of developmental dysplasia of the hip. *Pediatrics.* 2000;105(4):896–905.
- Volpe JJ. *Neurology of the Newborn*. 5th ed. Philadelphia: Saunders Elsevier; 2008.
- Hadders-Algra M. Early brain damage and the development of motor behavior in children: clues for therapeutic intervention? *Neural Plast.* 2001;8(1–2):31–49.
- Rabiev Bobomurod Bahadirovich. Regional, Social, and Psychological Aspects of Women's Labour Migration in Uzbekistan. (2026). *MSW Management Journal*, 36(1s), 2757-2760. DOI: <https://doi.org/10.7492/w4ar9z60>
- Abdusalomova MA, Mavlyanova ZF, Babayarov KR, Dusyarov JT. Clinical and neurological outcomes of cervical spine birth trauma in children. *Central Asian Journal of Medicine.* 2022; (regional publication).
- Mamajonov KK. Developmental dysplasia of the hip: etiology, diagnosis and treatment approaches. *Questions of Science and Education.* 2026; (regional publication).
- Djuraev AM, Tapilov EA, Alpysbaev KhSh. Surgical treatment of hip joint pathology in children. *International Journal of Health and Medical Sciences.* 2021.
- Akhtamov A, Akhtamov AA. Early diagnosis and treatment outcomes in congenital hip dislocation in infants. *Biomedical Research of Central Asia.* 2022.