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CLINICAL COURSE OF CONGENITAL PNEUMONIA IN NEONATES AND THE DIAGNOSTIC SIGNIFICANCE OF INFLAMMATORY MARKERS

Shamsiev Furqat Muxitdinovich

Head of the Pulmonology Department, Republican Specialized Scientific-Practical Pediatric Medical Center, Ministry of Health of the Republic of Uzbekistan; Doctor of Medical Sciences (PhD), Professor

Musajanova Ra'no Anvarbekovna

Leading Researcher, Pulmonology Department, Republican Specialized Scientific-Practical Pediatric Medical Center, Ministry of Health of the Republic of Uzbekistan; Doctor of Medical Sciences (PhD)

Ismoilova Shamsiya Soxibnazar qizi

Assistant, Department of Propedeutics of Childhood Diseases, Pediatrics and Family Medicine, Termez Branch of Tashkent State Dental University

Email: ismoilovashamsiya4@gmail.com

Xudoynazarov Haydarqul Soxibnazar o'g'li

Neurologist, Shargun Central Polyclinic, Sariosiyo District, Surxondaryo Region

Abstract: Background: Congenital pneumonia remains a significant cause of morbidity and mortality in neonates worldwide. Early detection is often challenging due to nonspecific clinical symptoms, making the identification of reliable inflammatory markers crucial for timely diagnosis and management. This study aims to investigate the clinical course of congenital pneumonia in neonates and to evaluate the diagnostic value of specific inflammatory markers in predicting disease severity and progression. A prospective observational study was conducted in neonates diagnosed with congenital pneumonia.

Keywords: Congenital pneumonia; neonates; inflammatory markers; C-reactive protein; procalcitonin; clinical course; neonatal respiratory infection.

Introduction

Congenital pneumonia is one of the leading causes of morbidity and mortality in neonates, particularly during the first days of life. The condition arises due to intrauterine

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or perinatal infections, which can lead to systemic inflammation and impaired respiratory function. Early diagnosis is often difficult because the clinical signs in neonates are subtle and nonspecific, including poor feeding, mild respiratory distress, and lethargy. Laboratory assessment plays a key role in the diagnosis and management of congenital pneumonia. Inflammatory markers such as C-reactive protein (CRP) and procalcitonin (PCT) are commonly used to detect infection and evaluate disease severity. Hematological parameters, including leukocyte count and neutrophil ratio, can also provide valuable information regarding the neonate's immune response. Understanding the relationship between clinical presentation and laboratory findings is essential for timely diagnosis and effective treatment. Despite advances in neonatal care, congenital pneumonia remains a significant challenge, particularly in regions with limited access to specialized healthcare. Identifying reliable diagnostic markers can improve early detection, guide appropriate therapy, and reduce complications. Therefore, this study aims to analyze the clinical course of congenital pneumonia in neonates and to evaluate the diagnostic significance of inflammatory markers in predicting disease severity and outcomes.

Materials and Methods

This prospective, observational study was conducted in the Neonatology and Pulmonology Departments of the Republican Specialized Scientific-Practical Pediatric Medical Center, Ministry of Health of the Republic of Uzbekistan. The study period spanned 12 months, allowing for comprehensive assessment of neonates with suspected congenital pneumonia in both full-term and preterm populations. The center provides tertiary-level neonatal care and receives referrals from various regions, ensuring a representative sample of the target population. Demographic variables included gestational age, birth weight, sex, mode of delivery, Apgar scores at 1 and 5 minutes, and maternal history of infection or obstetric complications. Clinical assessment recorded the onset, duration, and severity of respiratory symptoms, feeding difficulties, temperature instability, lethargy, and cyanosis. Severity of pneumonia was categorized according to a modified neonatal respiratory distress scoring system. Time from symptom onset to hospital admission was documented to evaluate the impact of delayed presentation. Venous blood samples were collected within the first 24 hours of admission. The following parameters were measured: C-reactive protein (CRP): Quantitative measurement using high-sensitivity immunoturbidimetric assay. Procalcitonin (PCT): Measured using enzyme-linked immunosorbent assay (ELISA), interpreted according to neonatal reference ranges Complete Blood Count (CBC): Total leukocyte count, neutrophil percentage, lymphocyte count, and platelet count. Additional laboratory

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evaluations included arterial blood gases, serum electrolytes, and lactate levels, which were used to assess systemic involvement and metabolic status. Correlation between laboratory markers and clinical severity scores was analyzed. All neonates underwent chest radiography to confirm pulmonary involvement. Findings such as diffuse infiltrates, lobar consolidation, or atelectasis were recorded. In selected cases, lung ultrasonography was performed to enhance detection of interstitial involvement. Microbiological investigations included blood culture and, when feasible, tracheal aspirate culture to identify causative pathogens.

Results

A total of 120 neonates with congenital pneumonia were included. Most were full-term, and slightly more were male than female. The majority presented within the first 72 hours of life, although some had delayed admission due to subtle or nonspecific symptoms. Common clinical features included tachypnea, retractions, nasal flaring, cyanosis, and feeding difficulties. Elevated CRP and procalcitonin (PCT) levels were observed in most neonates and were associated with more severe clinical presentations. Hematological abnormalities, such as leukocytosis and neutrophilia, were present in a portion of patients and moderately correlated with disease severity. Chest X-rays showed diffuse interstitial infiltrates or lobar consolidation in many cases. Blood cultures were positive in some neonates, identifying pathogens such as Klebsiella pneumoniae and Escherichia coli. The severity of pneumonia varied from mild to severe. Severe cases were linked to higher inflammatory markers, delayed admission, and prematurity. Hospitalization duration increased with disease severity. Persistent respiratory or feeding difficulties at discharge were noted in a few neonates, mainly among the severe cases.

Discussion

The present study shows that congenital pneumonia in neonates can manifest with a range of clinical signs, from mild respiratory distress to severe systemic involvement. Early diagnosis remains challenging due to nonspecific symptoms such as feeding difficulties, mild tachypnea, and lethargy. Delayed hospital admission was associated with more severe disease, emphasizing the importance of early recognition and timely referral. Laboratory markers, particularly C-reactive protein (CRP) and procalcitonin (PCT), were elevated in neonates with more severe clinical presentations. Both markers demonstrated a positive correlation with clinical severity, supporting their role as useful diagnostic and prognostic tools. Hematological changes, including leukocytosis and neutrophilia, were observed in some patients but were less strongly associated with disease severity compared to CRP and PCT. Radiological assessment confirmed pulmonary involvement in the majority of cases, while microbiological cultures identified

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common neonatal pathogens such as Klebsiella pneumoniae and Escherichia coli, aiding targeted antibiotic therapy. Preterm neonates and those with delayed admission were more likely to develop severe disease and prolonged hospitalization.

Conclusion

Congenital pneumonia in neonates is a significant clinical condition that requires early recognition and intervention. Assessment of inflammatory markers, especially CRP and PCT, together with careful clinical and radiological evaluation, can improve diagnostic accuracy and guide appropriate management. Early detection, prompt referral, and timely initiation of therapy are essential to reduce morbidity, shorten hospital stay, and improve outcomes in neonates with congenital pneumonia.

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