

Transient Tachypnea in Neonates Born to Mothers with Multiple Uterine Scars: Clinical Case Analysis

Muktarali kyzy Begimai, Muratov Abdujalil Abdyrazakovich*, Abdimomunova Begimai Toktobolotovna, Mamarasul kyzy Minura, Tabyshova Ainura Koikukeevga, Ikramzhan kyzy Makhliyo

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Abstract

Transient tachypnea of the newborn (TTN) is a common cause of early respiratory distress in the first 24–72 hours of life, especially in term and near-term infants delivered by elective cesarean section without labor. It is more frequent in repeat cesarean deliveries and may be associated with delayed clearance of fetal lung fluid, leading to impaired early respiratory adaptation. The literature shows that TTN occurs more often after cesarean delivery due to reduced physiological stress and hormonal changes that normally help remove lung fluid. This makes differentiation between TTN and early neonatal pneumonia clinically important. A reviewed clinical case of a term newborn with respiratory distress after elective cesarean section demonstrated persistent tachypnea beyond 48 hours, continued oxygen requirement, elevated C-reactive protein, and infiltrative changes on chest radiography. These findings supported a diagnosis of early neonatal pneumonia rather than isolated TTN. Overall, TTN in infants born to mothers

indicate increased vulnerability in early respiratory adaptation. Careful monitoring and timely differential diagnosis between TTN and neonatal pneumonia are essential to ensure appropriate treatment and avoid delayed management of infectious causes.

Keywords: Transient tachypnea, Cesarean delivery, Neonatal pneumonia, Respiratory distress, Perinatal factors

Introduction

Adaptation to normal fetal pulmonary respiration at birth is a vital physiologic event, and abnormalities of this adaptation are a significant cause of neonatal morbidity (Hillman *et al.*, 2012). Respiratory diseases constitute an important part of neonatal intensive care unit admissions, and one of the most common causes of respiratory distress in the first 24 to 72 hours of life is transient tachypnea of the newborn (TTN). This condition is particularly common in term and near-term infants delivered by operative delivery (Pardo-Zamora & Castellano-Rioja, 2024; Daley *et al.*, 2026). Worldwide, neonatal respiratory pathology remains a significant clinical and socioeconomic burden. Neonatal mortality results in approximately 2.3 million deaths per year, according to the World Health Organization. Prematurity and respiratory adaptation complications, as well as infectious diseases, are among the leading causes. This burden is especially felt in low- and middle-income settings such as Central Asia and the Kyrgyz Republic, highlighting the need for improved early diagnostic approaches and optimized management of neonatal respiratory disorders (Maslyakova *et al.*, 2023; Qin *et al.*, 2025).

TTN is characterized by an interim respiratory failure that occurs due to the delayed elimination of fetal fluid in the lungs after birth. The lungs are fluid-filled in utero, and this fluid must be removed swiftly and efficiently at birth to facilitate gas exchange. In TTN, this mechanism is impaired - in most cases, when the baby is born after a cesarean delivery without any labor, the result is the appearance of fluid in the interstitial space and the alveoli. The clinical image is typified by tachypnea (an excessively high respiratory rate, which is more than the age-corresponding rate), moderate respiratory failure, and the presence of work of breathing (Jannath *et al.*, 2025; Daley *et al.*, 2026). A number of rate-controlling studies have demonstrated that the rate of TTN is much greater in infants born via an elective cesarean section than in those born via a vaginal birth, which is related to an inadequate

Muktarali kyzy Begimai

Osh Interregional Clinical Hospital and Maternity Hospital, International Medical Faculty, Osh State University, Osh, Kyrgyzstan.

Muratov Abdujalil Abdyrazakovich*

Department of General and Faculty Surgery, Medical Faculty, Osh State University, Osh, Kyrgyzstan.

Abdimomunova Begimai Toktobolotovna

Department of Public Health, International Medical Faculty, Osh State University, Osh, Kyrgyzstan.

Mamarasul kyzy Minura

Osh Interstate United Hospital, International Medical Faculty, Osh State University, Osh, Kyrgyzstan.

Tabyshova Ainura Koikukeevga

Neonatal Intensive Care and Resuscitation Department, Osh Clinical Maternity Hospital named after M.A. Razaeva, Medical Faculty, Osh State University, Osh, Kyrgyzstan.

Ikramzhan kyzy Makhliyo

Suzak District Regional Hospital, Osh State University, Osh, Kyrgyzstan.

*E-mail: muratovabdizhalil@mail.ru

with multiple uterine scars and repeated cesarean sections may



stimulation of the hormonal pathways that promote the process of fluid resorption. One of the most prevalent reasons leading to early neonatal respiratory distress is transient tachypnea of the newborn (TTN), which, based on diverse epidemiological research, constitutes a high percentage of the admissions in neonatal intensive care units. The pathophysiology of TTN is believed to be a retarded excretion of fetal fluid in the alveoli and interstitial substances of the lungs following its birth, resulting in a temporary deterioration of the gas exchange mechanism and a clinical manifestation of tachypnea with midtone indicators of respiratory failure (Mino *et al.*, 2024).

The latest WHO reports indicate that in the year 2024, the neonatal mortality rate was approximately 18 deaths per 1,000 live births, and respiratory distress was a considerable part of this rate. Despite the scarcity of lethality presented by TTN alone, TTN falls within a category of conditions necessitating aggressive respiratory support and care in special units. As an illustration, TTN exists in varying occurrences in different populations, and in certain epidemiological projects, TTN incidence goes up to 10-13 percent in babies born by cesarean section (World Health Organization, n.d.; Jesima & Goel, 2022; Bona *et al.*, 2025). The prevalence and outcomes of TTN in Central Asian countries are limited by the fact that few large prospective studies and registries have been conducted so far. But according to the reports of the Ministries of Health of these countries, and publications of the region, complications of the respiratory system of newborns are one of the most frequent reasons to be hospitalized during the first days of life, particularly in an environment with obstetric complications and with low accessibility to neonatal intensive care.

Neonatal Respiratory Morbidity: Kyrgyz Republic Delivery Mode and TTN

Over the past years, overall neonatal mortality rates have decreased in the Kyrgyz Republic, owing to the growth of the perinatal care system and introduction of the neonatal care standards. Nevertheless, the respiratory conditions, including TTN, are considered to be one of the predominant reasons for hospitalization in the neonatal units. It is in the spirit of common international practice that the various clinical guidelines nationwide dictate that such newborns require different treatments (depending on possible complications, e.g., infections and respiratory failure) (Kamali *et al.*, 2021). The risk of developing TTN is greatly affected by the mode of delivery. Cesarean section with no labor is more prone to the incidence of TTN in comparison with vaginal birth. This can be explained by poor activation of the fetal catecholamine response and a low expression of the epithelial sodium channels in the lungs, which result in active resorption of fluids in the alveolar space. The presence of an observational cohort study shows that the rates of TTN among babies born as a result of elective cesarean section are 2-4 times higher in comparison with vaginal deliveries (National Statistical Committee of the Kyrgyz Republic *et al.*, 2013; Ashokkumar *et al.*, 2022).

Multiple uterine scars (a history of 2-3 or more cesarean sections) are listed as a factor that indirectly contributes to the development of early respiratory distress of the newborns. Repeat cesarean section comes with planned operative delivery, which is usually

performed pre- and sometimes before the spontaneous delivery, and is also linked with high preterm births and placental problems. The conditions produce unfavorable conditions for the full cardio-respiratory adaptation of the newborn within the first hours of life (NSCKR *et al.*, 2013). In clinical practice, TTN is usually considered a self-limited, benign condition based on the regression of the symptoms in 2472 hours. Other authors, however, stress the fact that the existence of TTN may complicate the first-time distinction between non-infectious and infectious causes of respiratory distress. The clinical symptoms of TTN, including tachypnea, moderate chest retraction, and necessity of oxygen therapy, may combine with the first symptoms of congenital or early childhood pneumonia, particularly in a baby born after a difficult pregnancy or a surgical birth (Ziemele *et al.*, 2021; Belfiore *et al.*, 2023).

The interaction between TTN and the subsequent development of neonatal pneumonia is mainly associative according to the literature. TTN is not an independent causal factor in the emergence of the infectious lung disease. Nevertheless, a higher incidence of radiographic tests and lab screening to identify pneumonia may be due to the existence of breathing problems during the infantile stages, and, hence, a better diagnosis probability (European Respiratory Society, n.d.; Varoneckaitė *et al.*, 2024). Additionally, perinatal determinants shared by TTN and neonatal pneumonia (infectious complications in the mother, prolonged anhydrous period, preterm labor, intrapartum hypoxia) create a unified pathogenetic precondition to a high respiratory vulnerability of the newborn. The details of postoperative maternal care must be examined in the context of repeat cesarean sections, too, such as more frequent administration of antibiotics and less adaptation for early skin-to-skin contact, which may harm the early colonization of newborns by microbes. There is not enough direct evidence as to whether these factors play any causal role in the pathogenesis of neonatal pneumonia in TTN, but current ideas in neonatal immunology are that early perinatal exposures play a role in determining susceptibility to infectious diseases during the first days of life (National Statistical Committee of the Kyrgyz Republic *et al.*, 2013; Akhter & Yao, 2025).

Our study shows that transient tachypnea of the newborn baby takes its special niche in the range of respiratory disorders of the first years of the newborn period, in particular, in groups with a large percentage of surgical births. In the world and particularly in Central Asian states, including the Kyrgyz Republic, this condition represents systematic perinatal healthcare issues in terms of the optimization of delivery tactics, enhanced early detection and differentiation of non-infectious and infectious causes of respiratory failure, and the necessity to design effective ways of monitoring at-risk newborns. Published studies enable us to think of TTN in children who are born due to more than one uterine scar, not as a specific benign disease, but as a clinical sign of respiratory dysfunction and possible diagnosis ambiguity with respect to early neonatal pneumonia. The specified correlation indicates the joint effect of the obstetric, perinatal, and neonatal variables and does not imply a direct cause-and-effect relationship between TTN and infectious lung disease, which underlines the necessity of a clinical and dynamic approach to the treatment of this group of newborns.

Materials and Methods

Case Presentation

This paper elaborates a case study of a male neonate with a full term (38-39 weeks of gestation) delivered through elective cesarean section before labor. The operative delivery sign was a history of the two previous cesarean deliveries, which left her with several uterine scars. The neonate started with a body weight of 3760g, length of 54 cm, head circumference of 39cm, chest circumference of 38 cm, and Apgar scores of 7 and 8 at 1 and 5 minutes, respectively.

The infant experienced respiratory distress symptoms (i.e., tachypnea, respiratory rate of 80-100 breaths per minute), and also accessory respiratory muscles, moderate tachycardia, and occasional bouts of perioral cyanosis within the first 30-60 minutes of life. The level of oxygen saturation dropped to 88-90% in the room air, and respiratory support became necessary using a nasal cannula and BPAP, which led to an increase in the SpO₂ level to 92-95%. Body temperature was within normal limits. Dynamically observed in the early neonatal period was the clinical course with a specific focus on the continuation of respiratory symptoms and adaptability to supportive treatment.

Medical History and Clinical Data Collection

Maternal history was derived retrospectively from medical history. The mother was aged 34 years, and it was her third pregnancy and birth. Her obstetric history was two previous cesarean sections with scarred uterus. The ongoing pregnancy was free of clinically important infectious complications. Introducing the baby during term under elective delivery without the occurrence of spontaneous labor was to happen.

Neonatal clinical outcomes were evaluated in the longitudinal study during the first days of their lives. Respiratory rate, oxygen saturation with and without supplemental oxygen, and clinical signs of respiratory distress were monitored. Laboratory assessment was through serial measurements of C-reactive protein to determine the level of inflammation. Instrumental diagnostics included chest radiography on the second day of life.

The dynamic observation showed that tachypnea was not expected to regress in the first 48 hours of life, which is not characteristic of non-complicated transient tachypnea of the newborn. Rather, continued respiratory distress, ongoing oxygen dependence, and an increase in the levels of C-reactive proteins (0-3 mg/L to 2030 mg/L) were reported.

Diagnosis and Therapy

Diagnostic assessment was conducted through clinical, laboratory, and radiological examination. Radiography of the chest at the age of two days revealed focal infiltrative changes in the lung parenchyma and pulmonary enhancements. When used in conjunction with the presence of tachypnea after 48 hours of life and the rise of inflammatory markers, the findings do allow the diagnosis of early neonatal pneumonia as opposed to isolated transient tachypnea of the newborn.

Therapeutic management involved oxygen support using a nasal cannula and non-invasive ventilation, and empirical antibacterial therapy was started according to national clinical guidelines. Vital signs and respiratory parameters were constantly observed. A favorable positive course is observed during the next 72 hours, with tachypnea gradually remitting, oxygen saturation levels improving, and a reduction in the inflammatory markers. It was progressively discontinued, and the neonate was moved to rooming-in with the mother. This patient was discharged well on day 5-6 of life.

Ethical Considerations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. The study was approved by the Biomedical Ethics Committee of Osh State University in Osh, Kyrgyzstan, with reference No. 7629-ФХД/24 31.12.2024). On anonymized data, the clinical case was retrospectively evaluated, which guarantees confidentiality and patient identity protection. No personal information is revealed. Diagnostic and therapeutic interventions related to all the examinations had been carried out according to the national clinical guidelines and the general practices of the most qualified neonatal care.

Results and Discussion

The clinical course of the neonate was characterized by early-onset respiratory distress with persistence beyond the expected timeframe for transient tachypnea of the newborn. Despite initial supportive management, no significant improvement in respiratory status was observed during the first 48 hours of life. Dynamic monitoring demonstrated a gradual decrease in respiratory rate over time; however, tachypnea remained clinically significant during the first three days. Oxygen saturation levels without respiratory support remained suboptimal (88-92%) in the early period, necessitating continued oxygen therapy. Stabilization of oxygenation parameters was achieved only after initiation of antibacterial therapy.

A progressive increase in inflammatory markers was observed during the first 72 hours of life. C-reactive protein levels rose from baseline values of 0-3 mg/L on the first day to 20-30 mg/L by days 2-3, indicating the development of an inflammatory process. This trend corresponded temporally with the persistence of respiratory symptoms and lack of expected clinical improvement. Chest radiography performed on the second day of life revealed focal infiltrative changes in the lung tissue, supporting the presence of an infectious component. The combination of persistent tachypnea, elevated inflammatory markers, and radiographic abnormalities allowed for the differentiation of early neonatal pneumonia from isolated transient tachypnea.

Following the initiation of empirical antibacterial therapy, a positive clinical response was observed. By days 3-4, respiratory rate decreased to 50-55 breaths per minute, oxygen saturation improved to 96-98% with minimal support, and inflammatory markers began to decline (CRP 8-12 mg/L). By days 5-6, the neonate demonstrated clinical stabilization, with respiratory rate within near-normal limits (40-50 breaths per minute), oxygen

saturation maintained at 96–98% in room air, and normalization of inflammatory parameters (CRP <5 mg/L). The dynamics of the

main clinical and laboratory parameters are summarized in **Table 1**.

Table 1. Dynamics of respiratory rate (RR), SpO₂, and CRP in a newborn

A day of life	Respiratory rate (in min)	SpO ₂ without O ₂ (%)	SpO ₂ to O ₂ (%)	CRP (mg/L)	Clinical interpretation
0–1	80–100	88–90	92–95	0–3	Early respiratory distress, clinical picture consistent with TTN
1–2	70–75	88–92	92–95	10–20	No regression of tachypnea, increase in inflammatory markers
2–3	60–70	90–93	94–96	20–30	Confirmation of the infectious component, infiltrates on X-ray
3–4	50–55	94–96	96–98	8–12	Positive dynamics against the background of ABT
5–6	40–50	96–98	—	<5	Clinical stabilization

Altogether, the clinical course revealed that the fact that respiratory distress persisted longer than the anticipated time frame of the transient tachypnea and was accompanied by an increasing number of inflammatory markers and radiographic pulmonary infiltration were correlated with the occurrence of early neonatal pneumonia. The following favorable reaction to antibacterial treatment, in the form of the disappearance of respiratory symptoms and the restoration of laboratory values, proves the diagnostic explanation and the significance of dynamic clinical and laboratory monitoring during the early neonatal stage.

One of the most prevalent causes of early respiratory distress in term and near-term infants is transient tachypnea of the newborn, especially when there was an elective cesarean section without a prior labor. The current case is consistent with the current body of evidence that lack of physiological processes associated with labor, such as catecholamine surge and epithelial sodium channel activation, is a contributing factor to the delay in clearance of fetal lung fluid and poor postnatal respiratory adaptation (Daley *et al.*, 2026). This is the pathophysiological process that accounts for why TTN is higher in babies born through elective cesarean delivery.

Besides the mode of delivery, maternal obstetric history is also significant. Here, the existence of several scars on the uterus required a scheduled operative delivery before labor commenced, thus increasing the chances of respiratory maladaptation. Cohort studies have reported similar findings with repeat cesarean section having been positively linked to increased neonatal respiratory morbidity, in part due to earlier gestational age, and due to lack of hormone preparation to the extrauterine environment (Jian *et al.*, 2025). These results indicate that the risk posed by cesarean delivery is not limited to the procedure but indicates more perinatal issues.

The clinical problem that has been identified in this case is that there is a clinical overlap between TTN and neonatal early pneumonia. In spite of the fact that TTN is conventionally viewed as a benign and self-limiting disease, during its first appearance, this disease can be confused with the respiratory pathology of infection, as shown in the study by MT Aslan *et al.* (2025). The continuation of tachypnea after 48 hours, coupled with the gradual increase in C-reactive protein and radiographic appearance of pulmonary infiltrates, was vital in the diagnosis of early neonatal pneumonia in the present case. It also aligns with the earlier reports

that the lack of clinical progress over a period of time should trigger reevaluation of the initial diagnosis (Li & Chen, 2021).

Notably, TTN has not been considered as a direct causal agent in the pathogenesis of neonatal pneumonia. Instead, these two conditions have similar perinatal risk factors such as operative birth, possible intrauterine stress, and disturbed early exposure to microbes (Xu *et al.*, 2025). The combination of these aspects can lead to the general susceptibility of the respiratory system, which makes the clinical course and diagnostic process more complicated. In this regard, TTN can be seen not just as an isolated condition but as an indication of a greater exposure to more severe respiratory conditions.

The dynamic monitoring is also essential, as seen in the clinical course of this case. The fact that the presumed TTN may advance to the confirmed infectious pathology shows the necessity of constant reassessment based on a mixture of clinical, lab, and imaging factors. Recognition of adverse clinical processes in an early stage of development allows for the start of the administration of antibacterial therapy in time, which, as seen in this case, results in the rapid amelioration of clinical conditions and positive results.

Clinically, these results support the importance of cautious and personalized care of the babies delivered through a repeat cesarean birth. TTN cannot be deemed benign in such patients, especially when they experience persistent symptoms or changing laboratory abnormalities. Rather, there is a need to have a systematic approach to diagnosis that could distinguish between transient and pathological processes.

On the whole, this case correlates with the existing literature in terms of the need to focus on the fact that TTN, especially among high-risk groups, is a dynamic clinical condition that must be closely monitored. To minimize the risk of late detection of neonatal pneumonia, early identification of variations in the anticipated clinical progression is necessary to maximize the treatment and response.

Future Perspectives and Recommendations

Future research should focus on conducting prospective, multicenter studies to further the link between transient tachypnea of the newborn and early neonatal pneumonia, especially in areas where the rate of repeat cesarean sections is high (Babatunde *et al.*,

2022). Such investigations would enable more accurate risk assessments and provide better insights into the common mechanisms of disease development. We must improve clinical decision-making algorithms for the early differentiation of neonatal respiratory distress. Combining clinical signs, laboratory data, and imaging findings in standardized diagnostic pathways might increase the early detection of infectious complications and decrease the level of diagnostic uncertainty during the initial days of life (Popa *et al.*, 2024). Adjusting obstetric practices, such as carefully scheduling elective cesarean deliveries and considering fetal maturity, could play a role in lowering the frequency of respiratory malfunctions (Prodanovic *et al.*, 2024). Additionally, if possible, methods that encourage physiological readiness for birth should be given more attention. At the same time, in everyday work, it is very important to stress the routine use of structured monitoring protocols for neonates at risk, especially those infants delivered by repeat cesarean section (Riley *et al.*, 2025). Recognition of unusual clinical developments at an early stage, for instance, continuous tachypnea at 48 hours or increasing inflammatory markers, should lead to timely intensification of diagnostic and therapeutic interventions. Moreover, in-depth research on the impact of early perinatal exposures, such as maternal microbiota, antibiotic usage, and early postnatal adaptation practices, is needed (Siddiqui *et al.*, 2023). Gaining more knowledge about these aspects might open doors to novel preventive measures to decrease neonatal respiratory morbidity and enhance both short-term and long-term results.

Conclusion

The transient tachypnea of the newborn is still the most common cause of early neonatal respiratory distress, especially in groups where the elective cesarean section delivery before the onset of labor is common. In infants born to mothers with multiple uterine scars, there is an additional risk of poor postnatal respiratory adaptation because obstetric history and perinatal factors of birth, including the time and mode of delivery, interact with each other. As the clinical case presented shows, early signs of transient tachypnea can be confused with early neonatal pneumonia, or even postpone its detection. This highlights the need to conduct ongoing clinical and dynamic diagnostic assessments of high-risk babies. The persistence of tachypnea after 48 hours of life, the necessity of constant oxygenation, the existence of inflammatory processes in the body, and the appearance of infiltration changes on radiographs of the chest are the clinical aspects that need to be considered to recognize the infectious lung pathology and make timely adjustments in the treatment. Hence, the transient tachypnea among babies resulting from repeated cesarean delivery cannot be seen as a condition that could be excluded as a self-resolving disorder. Instead, it could be a clinical sign of greater respiratory susceptibility, requiring greater attention in the early neonatal period. Early identification of adverse clinical course, in combination with a systematic differentiation diagnostic plan, can enhance clinical outcomes and minimize the risk of adverse neonatal consequences.

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