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PATHOMORPHOLOGICAL CHANGES IN THE CEREBRUM OF NEWBORNS WITH ATELECTATIC PNEUMOPATHY

Abstract. *The study examined structural changes in the cerebrum of 42 newborns who died from atelectatic pneumopathy. Histological specimens were obtained from the cerebral cortex and adjacent white matter and examined using hematoxylin and eosin, Nissl, and Mallory staining. The study also assessed the relationship between neurons and cerebral blood vessels using G.G. Avtandilov's point-counting method. The observed findings included neuronal ischemic and dystrophic changes, as well as perivascular edema. The results indicate that cerebral structural changes were more pronounced in neurons than in blood vessels.*

Keywords: *neonatal atelectasis, atelectatic pneumopathy, cerebrum, histology, morphometry, ischemic changes, perivascular edema.*

ПАТОМОРФОЛОГИЧЕСКИЕ ИЗМЕНЕНИЯ ГОЛОВНОГО МОЗГА У НОВОРОЖДЁННЫХ ПРИ АТЕЛЕКТАТИЧЕСКОЙ ПНЕВМОПАТИИ

Аннотация. *В исследовании изучены структурные изменения головного мозга у 42 новорождённых, умерших от ателектатической пневмопатии. Гистологические образцы коры головного мозга и прилежащего белого вещества исследовали с применением окраски гематоксилином и эозином, методов Ниссля и Маллори. Соотношение нейронов и сосудов головного мозга оценивали с использованием точечного метода Г.Г. Автандилова.*

Выявлены ишемические и дистрофические изменения нейронов, а также периваскулярный отёк. Полученные результаты свидетельствуют о более выраженных структурных изменениях нейронов по сравнению с сосудами.
Ключевые слова: *неонатальный ателектаз, ателектатическая пневмопатия, головной мозг, гистология, морфометрия, ишемические изменения, периваскулярный отёк.*

INTRODUCTION

According to the World Health Organization, approximately one in ten pregnancies worldwide results in preterm birth. The source manuscript reports that around 15 million preterm infants are born annually and that approximately one million die within the first day of life. These epidemiological figures require confirmation against a current, directly relevant WHO source before submission. Despite advances in perinatal medicine, respiratory disorders remain an important contributor to neonatal morbidity and mortality.

Atelectatic pneumopathy is associated with impaired pulmonary ventilation and may be accompanied by systemic and cerebral structural changes. The assessment of cerebral tissue in newborns who died with this condition may help clarify the morphological features associated with the disease.

AIM OF THE STUDY

To identify and analyse structural changes in the cerebrum of newborns who died from atelectatic pneumopathy.

MATERIALS AND METHODS

The study examined the bodies of 42 newborns who died from atelectatic pneumopathy. The infants survived for periods ranging from 3 to 15 days. The study group comprised 31 males and 11 females. For histological examination, tissue samples were collected from the cerebral cortex and adjacent white matter.

The specimens were fixed in 10% neutral buffered formalin, processed through a graded series of alcohols, and embedded in paraffin.

Histological sections were stained with hematoxylin and eosin and examined using the Nissl and Mallory methods. The ratio of neurons to cerebral blood vessels was assessed using G.G. Avtandilov's point-counting method. Statistical analysis was performed using Student's method; the arithmetic mean (M), standard error (m), and significance coefficient (t) were calculated. The source manuscript does not provide the numerical morphometric results or the exact statistical comparisons; these should be added before submission.

RESULTS AND DISCUSSION

In newborns with primary atelectasis, the lung tissue was described as unevenly aerated, with scattered haemorrhages, alveolar atelectasis, and dystelectasis. These pulmonary findings provide the pathological background for the assessment of associated cerebral changes.

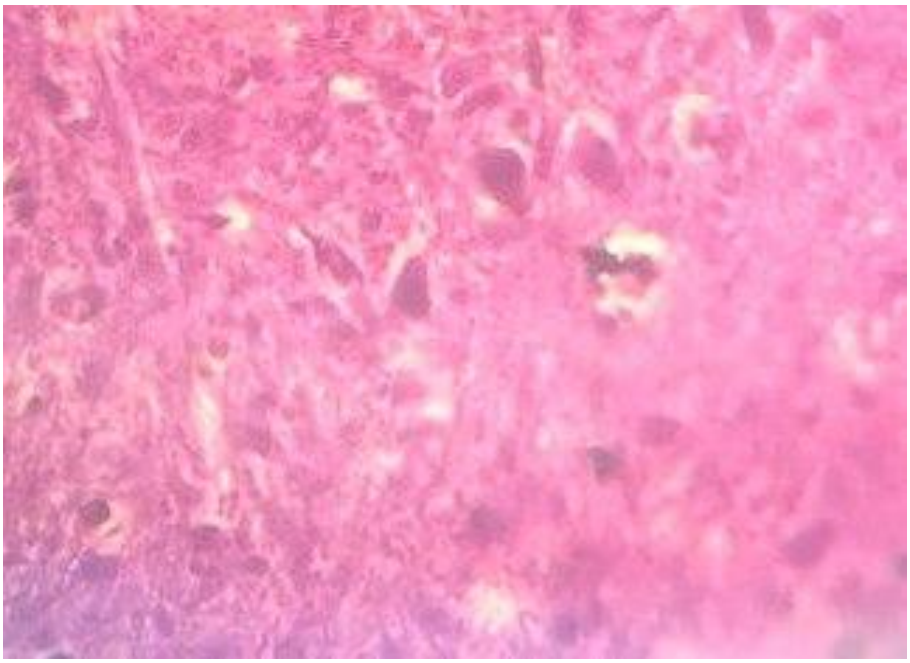


Figure 1. Microscopic changes in cerebral structures (hematoxylin and eosin staining).

The original manuscript describes swelling and oedema in the cerebral tissue. It also reports changes in the walls of blood vessels, swelling of blood cells, moderate dilation of perivascular spaces, blood cells within microvascular lumina,

and perivascular oedema. The phrase “pleural effusion” appears in the source text in the description of the cerebrum; this anatomical term requires author verification and has not been reproduced as a confirmed cerebral finding.

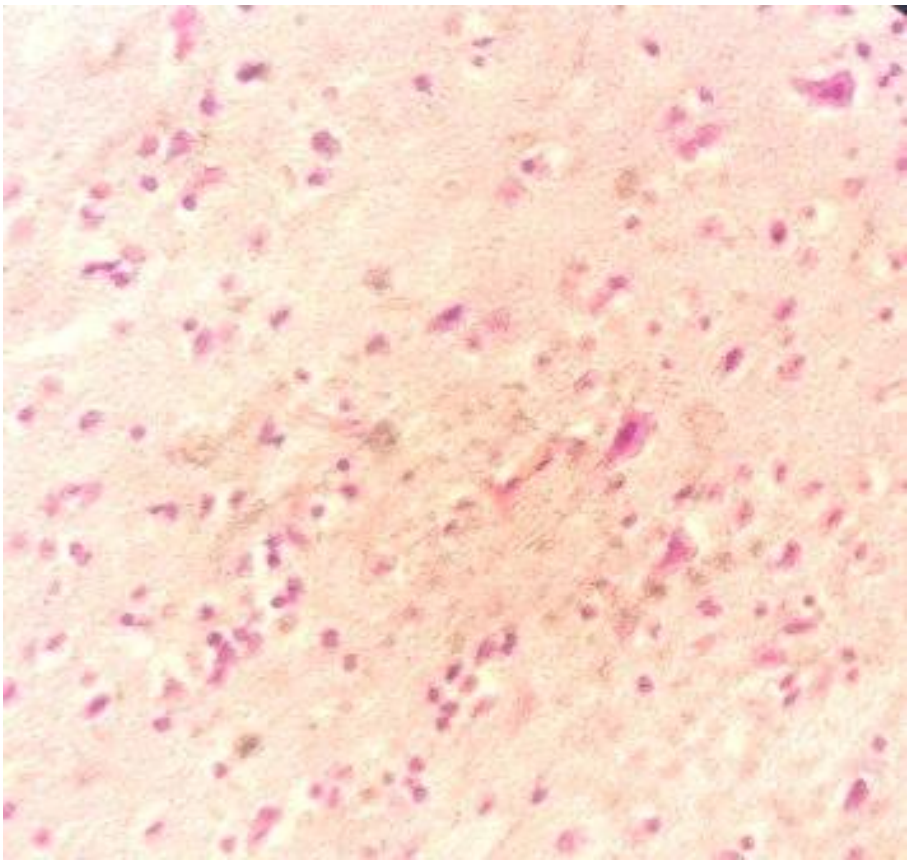


Figure 2. Microscopic changes in cerebral structures (hematoxylin and eosin staining).

In newborns who died from the atelectatic form of pneumopathy, stasis in the microvasculature was not observed. The neurons were described as small and showing signs of ischemic and dystrophic alterations. The manuscript states that the morphometric findings corresponded to the developmental characteristics of the brain in this age group; however, the numerical measurements supporting this statement are not included in the submitted text.

The neonatal brain is characterised by a relatively high water content and an immature organisation of fibrillar components. Glial membranes, glial elements, and neuronal processes are incompletely developed, contributing to the soft consistency of the newborn brain. The cerebral grey matter is relatively thin, and neurons are densely arranged. The source manuscript also notes that neurons

are poorly differentiated at this stage of development; pyramidal cells may lack a regular shape because of their small size and limited number of processes [2].

CONCLUSION

The study indicates that structural changes in the cerebrum of newborns with atelectatic pneumopathy are more pronounced in neurons than in blood vessels. The reported neuronal changes include ischemic and dystrophic alterations, while vascular findings include perivascular oedema and moderate dilation of perivascular spaces. Further studies with clearly presented morphometric measurements and statistical comparisons are needed to establish the diagnostic and clinical significance of these changes.

REFERENCES

1. Gasymova E.A., Mirzoeva I.A. Modern aspects of the etiopathogenesis, diagnosis and treatment of neonatal respiratory distress syndrome. European Journal of Biomedical and Life Sciences. 2018;(4):3–10. DOI: 10.29013/ELBLS-18-3-3-10.

2. Course of Age Histology: A Textbook for Medical University Students. Edited by A.S. Pulikov. Krasnoyarsk: Versh; 2006. 132 p.

3. Jumanov Z.E., Indiaminov S.I. Significance of morphological and entomological studies for establishing the remoteness of death in the conditions of a hot arid zone. American Journal of Medicine and Medical Sciences. 2020;10(6):434–436.

4. Jumanov Z.E., Indiaminov S.I. The state of the structure of the brain cortex at different times of the postmortal period after massive blood loss and blood loss complicated by hemorrhagic shock. Journal of Advances in Medicine and Medical Research. 2021;33(11):65–71. Article no. JAMMR.61759.

5. Gattinoni L., Van Haren F., Larsson A., et al. Epidemiology, patterns of care and mortality for patients with acute respiratory distress syndrome in intensive care units in 50 countries. JAMA. 2016;315(8):788–806.

6. Sweet D.G., Carnelli V., Greisen G., et al. European consensus guidelines on the management of neonatal respiratory distress syndrome in preterm infants – 2013 update. Neonatology. 2013;99:353–368.

7. Mehrabadi A., Lisonkova S., Joseph K.S. Heterogeneity of respiratory distress syndrome: risk factors and morbidity associated with early and late gestation disease. BMC Pregnancy and Childbirth. 2016;16:281.

8. Patel R.M. Short- and long-term outcomes for extremely preterm infants. American Journal of Perinatology. 2016;33(3):318–328.

9. Ranieri V.M., Rubenfeld G.D., Thompson B.T., et al. Acute respiratory distress syndrome: The Berlin definition. JAMA. 2012;307(23):2526–2533.