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METHOD OF MORPHOMETRIC EXAMINATION IN PRIMARY LUNG ATELECTASIS OF INFANTS

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Abstract

In this study, the prevalence of risk factors and the pathogenetic mechanism of primary lung atelectasis of infants were studied in groups of premature and full-term infants. A total of 98, including 52 premature, 46 full-term, clinical and anamnestic data and risk factors of primary pulmonary atelectasis were studied. The results showed that maternal diseases such as preeclampsia, infectious diseases, endocrine pathology and various extragenital diseases, as well as complications related to the birth process, are risk factors for the development of primary atelectasis in the lungs of newborns. Mother's age less than 20 or more than 35, preeclampsia, infectious diseases, complications of childbirth, child's head and brain injury and high level of birth defects were identified as risk factors. It was observed that primary atelectasis of the lungs occurs in premature babies in most cases, and the rate of development of diseases identified as a risk factor is also high.

Keywords: baby, pulmonary atelectasis, premature birth, risk factor, maternal diseases, obstetric pathologies.

Introduction

Relevance of the topic . Diseases of the respiratory system in babies are the main current problems (1, 3, 4). Among the diseases of infants, respiratory disorders are on the 2nd place - 8.8%, and in most cases, due to the morphofunctional characteristics of the organs of the respiratory system, they occur in premature babies. For example, respiratory distress syndrome in babies makes up 6-12% in general, in premature babies - 1-1.8%, in very low birth weight babies - 0.4-0.5%. Atelectasis of the lungs of infants is the non-opening or re-closing of lung alveoli within 2 days after birth, depending on the specific structure of the broncho-alveolar tissue and central control . The literal translation of atelectasis is "incomplete opening" and refers to the anatomical condition of the lungs. Infant pulmonary atelectasis is included in the "respiratory distress syndrome (RBS)" (2, 5, 7). Its overall incidence is 1% of all babies, and it occurs in 14% of premature babies. The relevance of the problem of atelectasis

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for pediatrics is due to the fact that there are many reasons why the alveolar tissue of the lungs deteriorates at the age of one month. In atelectasis, there is a decrease in the alveolar tissue respiratory surface and the part involved in breathing. The causes of primary atelectasis in infants are as follows: slowness and slowness of the respiratory center, underdevelopment of the respiratory system, hypoxia or asphyxia, injury to the head or spinal cord. Apart from these, as the primary cause of atelectasis, the syndrome of aspiration with gastric juice takes place. This syndrome is mainly observed when the child is born late or prematurely, and develops hypoxia, hypercapnia, acidosis in the child's body, stimulates the respiratory center, the fetus starts breathing, intestinal peristalsis increases, meconium falls into the amniotic fluid, and it aspirates the respiratory tract. Risk factors leading to primary atelectasis developing in the baby mainly include diseases of the mother's body during pregnancy and pathologies that develop due to the birth process (1, 3, 6). Since the data on their level of occurrence have different number of indicators, this scientific study aimed to clarify the level of occurrence of these dangerous factors.

Materials and Methods

As material, the report of the autopsy examination, medical history and lung tissue of children who have been examined in the last 5 years in the Department of Pathology of Children, Maternal and Infectious Diseases of the UzR SSV RPAM were studied. A total of 98 infant mortality materials were received for examination, of which 46 were full-term and 52 were premature. In each case, the clinical and anamnestic data from the medical history of the mothers were studied, the risk factors causing the development of atelectasis in the child were analyzed.

Research results and their discussion

Morphometric examination of structural units of lung tissue G.G. It was carried out by Avtandilov's (1984) "point counting" method.

This method was developed by the author by placing a grid of 200 cells on the images taken from histological preparations of organs and tissues, and the points on it are counted to which structures of the tissue correspond. In order for the obtained data to be reliable, points are counted and averaged in 8-10 images from each group of material.

We modified this method by transferring it to the computer screen, i.e., we took 10 pictures from different areas of the histological preparations prepared for each group of the examined material, and we put a linear grid of 200 cells on the computer monitor corresponding to these pictures, and the points where the lines intersect, which structural structure of the tissue We counted according to the correctness. It is known from the essence of this method that the points of the mesh placed on the tissue cross-section are uniformly spaced, so that it corresponds to the tissue structures indiscriminately. G.G. It corresponds to the law of relativity that the checkered grid points of Avtandilov are distributed non-uniformly in all areas of the surface of the tissue image. The area of all existing structural units in the picture is taken as Vv, i.e. 100%, the area of each of the structural units to be calculated is determined by putting the name of this structure, for example: Vab (alveolar space), Vqt (blood vessel), Vqq (blood flow), Vao' (atelectasis foci). In this regard, the relative area of the studied structural units in the tissue is calculated as a result of counting the points. The results show the volume unit of each structural unit in the studied tissue.

So, if the area occupied by all structural units in the studied tissue is Vv, i.e. 100%, the evenly distributed points in it are denoted by z, and if the ratio of each point to the structural unit is taken as R, its formula is as follows: P = Vv/100.

Correspondence of points to other structural units is determined by the following formula: Q = 100-Vv/100.

If we take the points corresponding to the studied structural units as x, then its error rate is calculated by this formula: x/z – P, the percentage indicator of the absolute error is calculated by this formula:

$e = (x/z – R) . 100 = 100\, x/z – Vv$

The error rate of calculation according to the theory of relativity - x/z – R, is calculated as follows in a different formula: $= t . \sqrt{Rq/z}$.

In this formula: x is the number of points corresponding to the studied structural units; z is the total number of all points in the test system; R is the unit of relativity of the points falling on the studied structures; q is the unit of relativity of the points falling into the bled structural units; t is the normalized difference of indicators from each other.

Based on the above, the absolute error of quantitative indicators is calculated by this formula: $e = t \sqrt{Vv\,(100 – Vv)\,/\,z}$.

G.G. 3 forms of primary lung atelectasis of infants were selected using the morphometric method of self-testing: 1) acinar atelectasis, 2) segmental atelectasis, 3) segmental atelectasis. To compare the quantitative indicators of these forms of atelectasis, as a control group, lung tissue structures of children who died from extrapulmonary brain injury were calculated. These groups of atelectasis were taken from histological sections of lung tissue stained with hematoxylin and eosin, and the points corresponding to the structural units indicated below were counted. Points were counted in the average of 10 images from each group:

- Alveolar cavity – Rab;
- Blood vessels - Rqt;
- Bleeding centers – Rqq;
- Foci of atelectasis - Rao';
- Alveolar wall - Rad.

For each structural unit, 10 points listed in the picture were added, the average was calculated, and the occupied area (V) of the structural unit was calculated based on the following formula, for example: the area occupied by the alveolar cavity - Vab = Rab/Rx100. Accordingly, the areas occupied by all structural units of lung tissue were calculated: Vab, Vqt, Vqq, Vao'.

The following coefficients can be calculated based on the quantitative data obtained on these indicators:

1) The coefficient of the ratio of the area of the alveolar cavity to the area occupied by the alveolar wall or foci of atelectasis - the coefficient of activity of the alveolar cavity (ABFK);

1) Control group

Photomicrograph number	Number of points				Total number of points
	Rab	Rqt	Rqq	Ref	
1	96	34	8	61	200
2	102	30	7	60	
3	104	28	5	63	
4	94	36	9	61	
5	98	35	8	59	
6	101	29	10	60	
7	103	28	7	62	
8	95	35	8	62	
9	103	31	6	60	
10	99	33	8	60	
∑	995	321	76	608	2000
M ± m %	**49.7 ± 2.23**	**16.1 ± 1.64**	**3.8 ± 0.85**	**30.4 ± 2.08**	

V ab = R ab /R x 100 = 995 / 200 0 x 100 = 49.7 %, e ab = 2.0 x √ 49.7 (100 – 49.7) / 200 0 = 2.23 % (R =0.05)

V qt = R qt /R x 100 = 321 / 200 0 x 100 = 16.1 % e qt = 2.0 x √ 16.1 (100 – 16.1) / 200 0 = 1.64 % (R= 0.05)

V qq = R qq /R x 100 = 76/ 2000 x 100 = 3.8 % e qq = 2.0 x √ 3.8 (100 – 3.8) / 200 0 = 0.85 % (R=0.05)

V ad = R gm /R x 100 = 608/ 200 0 x 100 = 30.4 % e ad = 2.0 x √ 30.4 (100 – 30.4) / 200 0 = 2.08 % (R=0.01)

ABFK – 49.7 : 30.4 = 1.63 (ratio of the alveolar space to the area occupied by the wall)

2) Acinar atelectasis group

Photomicrograph number	Number of points				Total number of points
	Rab	Rqt	Rqq	Rao'	
1	43	48	29	80	200
2	42	50	27	78	
3	44	46	31	82	
4	44	49	29	81	
5	38	47	28	79	
6	41	49	30	84	
7	43	46	27	76	
8	45	48	28	82	
9	43	45	32	78	
10	44	48	29	78	
∑	432	476	294	798	2000
M ± m %	**21.6 ± 1.84**	**23.8.1 ± 1.90**	**14.7 ± 1.58**	**39.9 ± 2.18**	

V ab = R ab /R x 100 = 432 / 200 0 x 100 = 21.6 %, e ab = 2.0 x √ 21.6 (100 – 21.6) / 200 0 = 1.84 % (R =0.05)
V qt = R qt /R x 100 = 476 / 200 0 x 100 = 23.8 % e qt = 2.0 x √ 23.8 (100 – 23.8) / 200 0 = 1.90 % (R= 0.05)
V qq = R qq /R x 100 = 294/ 2000 x 100 = 14.7 %   e qq = 2.0 x √ 14.7 (100 – 14.7) / 200 0 = 1.58 % (R=0.05)
V ao' = R ao' /R x 100 = 798/ 200 0 x 100 = 39.9 % e ad = 2.0 x √ 39.9 (100 – 39.9) / 200 0 = 2.18 % (R=0.01)

ABFK – 21.6 : 39.9 = 0.54↓ (ratio of the alveolar space to the area of atelectasis)

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3) Segmental atelectasis group

Photomicrograph number	Number of points				Total number of points
	Rab	Rqt	Rqq	Rao'	
1	28	44	19	108	200
2	29	48	17	118	
3	31	42	21	102	
4	26	43	19	101	
5	28	47	18	109	
6	31	44	20	114	
7	33	42	17	106	
8	25	41	18	112	
9	28	45	22	108	
10	29	43	19	106	
∑	286	436	194	1084	2000
M ± m %	**14.3 ± 1.56**	**21.8.1 ± 1.71**	**9.7 ± 1.32**	**54.2 ± 2.22**	

V ab = R ab /R x 100 = 286 / 200 0 x 100 = 14.3 %, e ab = 2.0 x √ 14.3 (100 – 14.3) / 200 0 = 1.56 % (R =0.05)
V qt = R qt /R x 100 = 436 / 200 0 x 100 = 21.8 % e qt = 2.0 x √ 21.8 (100 – 21.8) / 200 0 = 1.71 % (R= 0.05)
V qq = R qq /R x 100 = 194/ 2000 x 100 = 9.7 % e qq = 2.0 x √ 9.7 (100 – 9.7) / 200 0 = 1 .32 % (R=0.05)
V ao' = R ao' /R x 100 = 1084/ 200 0 x 100 = 54.2 % e ad = 2.0 x √ 54.2 (100 – 54.2) / 200 0 = 2.22 % (R=0.01)
ABFK – 14.3 : 54.2 = 0.26↓ (ratio of the alveolar space to the area of atelectasis)

4) Lumpy atelectasis group

Photomicrograph number	Number of points				Total number of points
	Rab	Rqt	Rqq	Rao'	
1	18	47	29	108	200
2	19	48	27	108	
3	21	46	21	102	
4	16	49	29	101	
5	18	47	28	109	
6	21	46	28	114	
7	19	45	27	106	
8	21	46	28	112	
9	18	47	22	108	
10	19	47	29	106	
∑	190	468	268	1074	2000
M ± m %	**9.5 ± 1.31**	**23.4.1 ± 1.89**	**13.4 ± 1.52**	**53.7 ± 2.21**	

V ab = R ab /R x 100 = 190 / 200 0 x 100 = 9.5 %, e ab = 2.0 x √ 9.5 (100 – 9.5) / 200 0 = 1.31 % (R =0.05)
V qt = R qt /R x 100 = 468 / 200 0 x 100 = 23.4 % e qt = 2.0 x √ 23.4 (100 – 23.4) / 200 0 = 1.89 % (R= 0.05)
V qq = R qq /R x 100 = 268/ 2000 x 100 = 13.4 % e qq = 2.0 x √ 13.4 (100 – 13.4) / 200 0 = 1.52 % (R=0.05)
V ao' = R ao' /R x 100 = 1074/ 200 0 x 100 = 53.7 % e ad = 2.0 x √ 53.7 (100 – 53.7) / 200 0 = 2.21 % (R=0.01)

ABFK – 9.5 : 53.7 = 0.17↓ (ratio of the alveolar space to the area of atelectasis)

Summary

1. Atelectasis of the lungs of infants is included in the "respiratory disorder syndrome (NBS)" and its general incidence rate is 1% of all infants, and it occurs in 14% of premature babies. The relevance of the problem of atelectasis for pediatrics is due to the fact that there are many reasons why the alveolar tissue of the lungs deteriorates at the age of one month.
2. G.G. 3 forms of primary lung atelectasis of infants were selected using the morphometric method of self-testing: 1) acinar atelectasis, 2) segmental atelectasis, 3) segmental atelectasis. To compare the quantitative indicators of these forms of atelectasis, as a control group, lung tissue structures of children who died from extrapulmonary brain injury were calculated. 3. It is observed that the tissue of the interalveolar space consists of dense tissue and cellular bundles, the blood vessels are wide and full, and it has a structure in which blood clots appear around it.

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