

ВЕТЕРИНАРИЯ И ЖИВОТНОВОДСТВА

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PATHOGENESIS AND PATHOLOGICAL CHANGES BRONCHOPNEUMONIA OF CALVES

Abstract

Autopsy dead or slaughtered animals - is one of the essential methods of diagnostics of infectious, parasitic and non-contagious animal diseases. In theoretical terms a comprehensive pathological examination of dead animals enrich science with new data about the causes of disease, gives an opportunity to assess the nature of morphological changes in all organs and systems, promotes the development of dialectical materialist conceptions of the etiology, pathogenesis and nature of animal diseases. This article studied the incidence and spread of pneumonia in young animals in the specific sector; studied the pathogenesis and functional morphology of the respiratory system in young and studied characteristic morphological changes in calves at the organ, tissue, cellular and subcellular levels.

Key words: bronchopneumonia, alveolocytes, bronchiolitis fibrosis, acini, morphology, surfactant system, the air-blood barrier interalveolar partition.

Introduction

Bronchopneumonia recorded in various parts of the country and the specific gravity is second only to gastrointestinal diseases. According to several authors, each year in the country suffer from bronchopneumonia 20-30% of the young. As a result, the animals recover reduced average daily weight gain, productive and breeding qualities of animals, so prevention of pneumonia is of paramount importance, which requires the timely and competent solutions.

The occurrence of pneumonia is caused by low natural resistance in young animals, and hence reduced resistance *gipopnevmatoznyh atelektaticheskikh* and light areas of the small number of ciliated epithelium of the mucous membrane of the airways, which is a favorable environment for the development of pathogenic microflora. Long lying underdeveloped animal striated muscle weakening tone and smooth muscles of the bronchi leading to a sharp weakening of the ventilation to decrease their respiratory surfaces and the further development of atelectasis and hypostasis where there are pockets of inflammation [1, 2, 3, 4, 5].

Kazakhstan is the most developed area of livestock. Among economic regions of Kazakhstan Raiymbek District occupies a leading position for the production of milk, meat and other products of cattle and sheep. An important objective of veterinary science and practice in the modern market economy, management is to ensure the safety of livestock, particularly young animals. The most acute problem of modern livestock disease are young, especially respiratory diseases in calves [6, 7, 8, 9, 10].

Farm "Sholadyr" physical-geographical and natural features of a unique kind of place, located in the south-east of the country with the most advanced animal husbandry, a favorable climate, which makes the development of mass respiratory diseases in young farm animals. They often are complex infectious processes, especially at different stages of disease are involved viruses, mycoplasma, bacteria and other pathogens, often in combination.

However, it should be noted that in Raiymbek district, Almaty region is not enough to learn the local pathology of pneumonia in young cattle, which does not allow to develop effective measures and means of therapy and prevention.

The aims and objectives of research. The aim of research was to study the incidence and prevalence of pneumonia in young cattle Raiymbek district, Almaty region, its pathogenesis and pathological morphology.

In this connection we were as follows:

- To examine the incidence and distribution of pneumonia in young animals;
- To study the pathogenesis and functional morphology of the respiratory organs of young animals;
- Develop a comprehensive system of protection of young veterinary;
- To study morphological changes in the bronchopneumonia in young cattle at the organ, tissue, cellular and subcellular levels

Materials and methods of research

The experimental part of the work carried out at the Department of "Clinical Veterinary Medicine" of the Kazakh National Agrarian University and the farms' Aktasty "and" Sholadyr "Raiymbek District with the total number of cattle - 144 head.

In the experimental work were studied the incidence and spread of pneumonia in young cattle in the area; morphological changes in the bronchopneumonia in young cattle at the organ, tissue, cellular and subcellular levels. The features of pulmonary surfactant system and the ultrastructural organization alveolocytes I and II types for bronchopneumonia. For the first time in calves described pneumocyte type III. Elucidated pathogenetic mechanisms of development of pneumonia in young cattle.

The material for histological and histochemical issle-dovany fixed in 10-12% solution of neutral formalin, Carnoy's fluid. Pieces of lung tissue was frozen over liquid nitrogen for enzyme reactions and research lung surfactant.

Fixation material for electron microscopic studies were performed in 2.5% - glutaraldehyde on kollidinovom buffer with post fixation in 1% - solution of osmium tetroxide, dehydrated in alcohol, embedded in Epon-812.

Paraffin sections were stained with hematoxylin-eosin and hematoxylin-pikrofuksinom.

Alveolar surfactant detected in cryostat sections of lung Hackney. in the modification of rhodamine - J. This qualitative and quantitative assessment of the surfactant was carried out in fluorescent mode microscope MBI-15 and in the microscope "Lomam I-3" under ultraviolet light. The intensity of the luminescence was determined mikrofilyuorimetrom in microvolts, which included the design of a photomultiplier, a power supply, a DC amplifier and a universal voltmeter.

The volume fractions of tissue structures were determined by point counting. At the same eyepiece used grating, counting was conducted in a 225-node intersections. Counts 3375 units, accounting for the different structures in the lung tissue. The relative proportions determined by the formula: $p = m / n \cdot 100$, where m - the number of units attributable to the studied tissue sections; n - the total number of nodes.

When conducting experiments in laboratory and domestic animals respected the requirements for medical and biological experiments for setting controls the selection of analogues, which are identical feeding and keeping the animals during the study period

Results and discussion

Results of studies have shown that the structural organization of the respiratory system in clinically healthy calves comply with the species and age parameters, which are known from the available literature.

Thus, when gistoissledovaniі noted that in healthy calves aged 1,5 - 2 months, the system of airways and parenchyma of the lung tissue was well developed.

Acini, as structural unit of the lung were clearly expressed (Figure 1a). It was also noted that in light calves no distinct respiratory bronchioles, and was characterized by a rather sharp transition from terminal bronchioles into the alveolar ducts. The thickness of the mucosal epithelium was uniform. In the lumen of the bronchi, bronchioles and alveoli missing any content. They were clean, not sticky (Fig. 1b). Integrity interalveolar walls had not been violated.

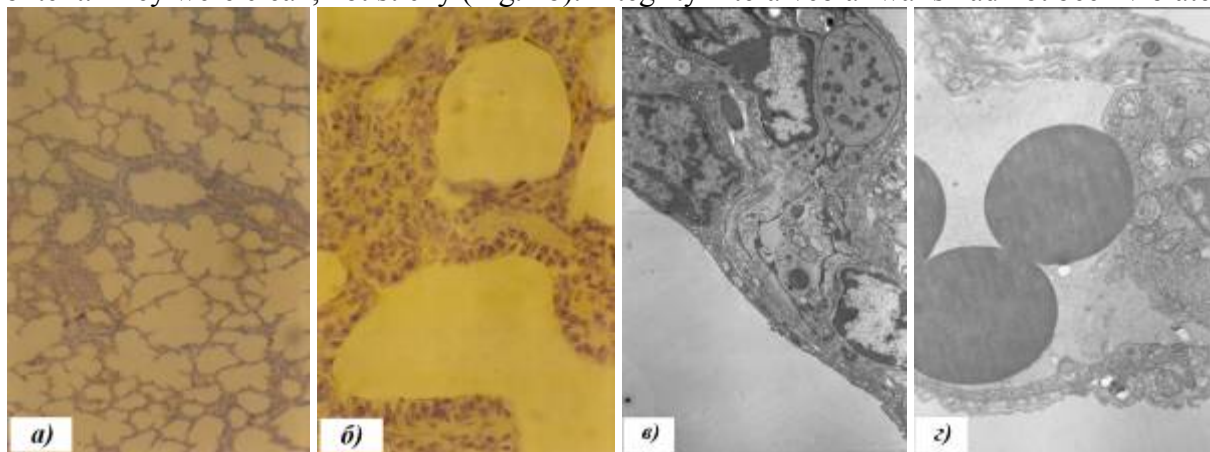


Figure 1. The structural organization of the alveoli and bronchioles in the lungs of healthy calf: a) the bronchial tubes deep in the lung tissue; b) the terminal bronchioles; c) interalveolar partition; d) the air-blood barrier.

It can be traced to the ultrastructural level (Fig. 1c). Blood barrier was well formed. Its thickness throughout was approximately the same. In capillaries it noted a moderate amount of red blood cells (Ris.1g). Alveolocytes types I and II maintained a characteristic ultrastructure (Fig. 2a, b). In type II alveolocytes clearly identified osmiophil plate calf with an average of 2-3 in each cell (Fig. 2b)

During the study the ultrastructural organization of lung tissue in normal and pathological conditions we have identified a cell type previously described in calves. Apparently, this alveolocytes type III, or so-called "brush alveolocytes" (brush-cells). Alveolocytes type III characterized by the presence of a free surface facing the lumen of the alveoli, the "hard" cylindrical microvilli, like a "brush". They localize in the alveolar wall at the boundary of adjacent alveoli, at the entrance of alveoli, and then Cohn. According to [5; 6]., The proportion of these cells - about 5%, which is considerably less than the number alveolocytes types I and II. In the lungs of calves cell type described by us as by other authors, it was not previously detected

It is known that microvilli on the apical surface and has alveolocytes type II. However, the above described cells were not detected plate calf that does not speak in favor of their belonging to alveolocytes type II. Furthermore, the microvilli were more numerous and pronounced than alveolocytes type II (Figure 2, d).

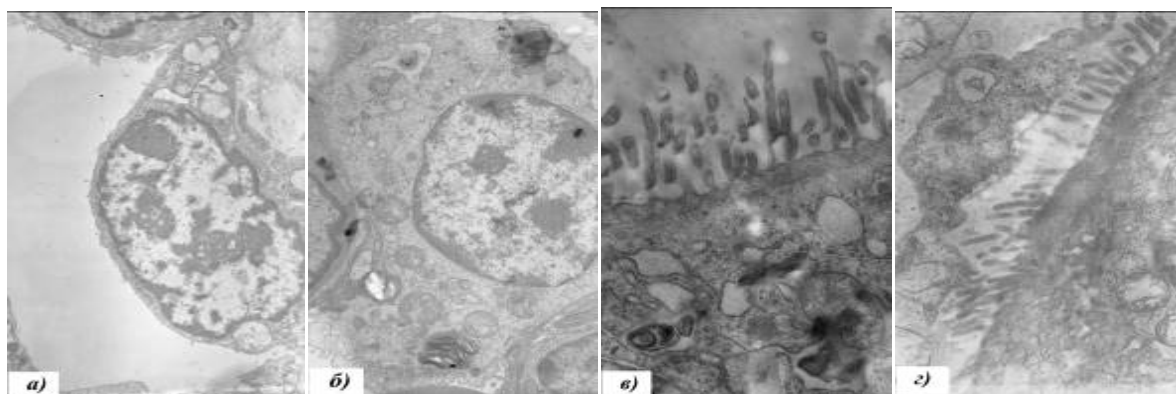


Figure 2. The ultrastructure of alveolocytes in clinically healthy calf: a) type I pneumocyte; b) type II pneumocyte; and d) alveolocytes type III and microvilli.

Changes in this period were characterized by inflammatory and hyperplastic reaction in the peribronchial tissue, mucoid swelling, edema, peribronchial and perivascular interstitial (Figure 2a).

It noted swelling of the mucosal epithelium of the bronchioles, its basement membrane, cell desquamation of mucosal epithelium, vascular congestion.

Some bronchioles was noticeable accumulation of mucous and serous fluid with a mixture of desquamated epithelial cells. Thus, in the adjacent pulmonary parenchyma any changes have not yet observed.

In the long catarrhal-purulent pneumonia in the absence of treatment outcomes observed such options as the transition to the chronic form, splenification, the development of abscesses, necrosis, carnification (pulmonary fibrosis)

Conclusions

Thus, the results of their own research and analysis of data in the literature suggest that we have identified the cell type can be assigned to alveolocytes type III.

Histomorphological examination of the lungs of calves in the very early stages of pneumonia has been found that in addition to serous-catarrhal processes in the upper respiratory tract (rhinitis, laryngitis, tracheitis) primary changes begin to come to light in the end regions of the respiratory tract (bronchial tubes of a different order), peribronchial tissue in the lung alveoli. Moreover, the changes in these structures are developed at the time when the disease is still clinically hardly seen. The main, sometimes the only clinical sign in this stage can only be a serous catarrh of the upper respiratory tract. Therefore, this step can be considered a subclinical pneumonia.

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БҰЗАУЛАР БРОНХОПНЕВМОНИЯСЫНЫҢ ПАТОГЕНЕЗІ ЖӘНЕ ПАТОЛОГИЯЛЫҚ ӨЗГЕРІСТЕРІ

Андатпа

Бұзаулар бронхопневмониясының ең алғашқы кезеңінде жүргізілген гистоморфологиялық зерттеулер барысында, жоғары тыныстану жолдарындағы серозды-катаралдық процесстермен қатар (ринит, ларингит, трахеит) алғашқы өзгерістер респираторлық жолдың (әр түрлі кезектегі бронхиолдар) соңғы бөлімінде, перибронхиальды ұлпада және өкпе альвеолдарында пайда бола бастайтындығы анықталды. Катаралды-іріңді бронхопневмонияның ұзаққа созылатын ағымында, егерде емдеу жұмыстары жүргізілмеген жағдайда мынадай түрлерге ұшырайтындығы анықталды: созылмалы формаға ауысуы, спленизация, абсцестердің пайда болуы, өліеттену, карнификация (пневмосклероз).

Кілт сөздер: бронхопневмония, абсцесс, өліеттену, гистоморфология, альвеола, альвеоцит, эпителий, процесс, ұлпа, карнификация, ақыры.

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ПАТОГЕНЕЗ И ПАТОЛОГИЧЕСКИЕ ИЗМЕНЕНИЯ ПРИ БРОНХОПНЕВМОНИИ ТЕЛЯТ

Аннотация

Гистоморфологическими исследованиями легких телят в самой ранней стадии бронхопневмонии было установлено, что наряду с серозно-катаральным процессом в верхних дыхательных путях (ринит, ларингит, трахеит), первичные изменения начинают выявляться в концевых отделах респираторного тракта (бронхиолы разного порядка), перибронхиальной ткани и в легочных альвеолах. При длительном течении катаральной бронхопневмонии при отсутствии лечения отмечали такие варианты исходов, как