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Intervention of Bacterial Diseases in Poultry

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Abstract: The organism of chicken infected with individual pathogens exhibits relatively simple pathoanatomical modifications in the presence of two or three separate bacterial pathogens. It is advised to examine these disorders pathologically because it might be quite challenging to separate these diseases from one another based just on clinical symptoms. Bacteriological infections in poultry have extremely complicated clinical symptoms and pathomorphological modifications that set them apart from other illnesses. However, if the pathologoanatomical investigations are thoroughly examined, the diseases will be accurately detected in time, making it feasible to start preventing them right away.

Keywords: Poultry, bacteria, causative agents, pathomorphology, colibacteriosis, pasteurellosis, pullorosis.

Relevance of the topic. Recent bacterial infectious infections brought on by many pathogens have arisen simultaneously in poultry factories and small farms, killing numerous birds. These illnesses cause young chicks to grow more slowly, to be fewer in number, and to produce fewer meat and egg products, which has a significant negative economic impact on the poultry industry.

Numerous bacterial infections spread among poultry, especially young chicks, and they are mixed together to cause the death of many chicks, according to some literary data and research findings.

40 two-and-a-half-month-old chicks were separated into four groups of ten by S.A. Artemiev and M. Babaeva (1970), who then infected the first, second, and third groups with five Pasteurella strains and five E. coli strains. The fourth group exercised leadership. All experimental chickens' beards and oral cavities had inflammation, a deposit of murky liquid, and a covering of fibrin fibers, according to pathoanatomical tests. The organs did not, however, exhibit any distinct disease-specific alterations. Internal azoa pathologo-anatomical samples were cultivated in various nutrient media, and during microbiological examination, Pasteurella S. pullorum and E. coli were discovered to proliferate.

Infections caused by mixed bacterial pathogens (pasteurellosis, pullorosis, and colibacteriosis) in chicken were thoroughly investigated in lab settings and in the wild.

Methodology. According to G.A. Merkulov's methodology, studies were conducted by dissecting skin tissue samples, internal parenchymatous organs (liver, lungs, spleen, lymph nodes, heart, kidney) taken from birds infected with colibacteriosis pullorosis and pasteurellosis, and pathologoanatomical changes in internal organs were examined histologically. For this, a histopreparation was made as follows for histological investigation using the paraffin method of pathological materials (slices) collected from internal organs and tissues (in 50-100 ml black glass bottles) using the paraffin method.

I. Fixation

1. Pathological samples (fragments) taken from birds infected with Pasteurellosis pullorosis and colibacteriosis were kept in 10-12 percent formalin solution for 24 hours;

2. It was kept for 24 hours in a solution of equal proportions of 96° ethyl alcohol and formalin;

3. Kept in Carnoia liquid for 2-4 hours;

4. Kept in 96°-100° alcohol for 12-24 hours.

II. Dehydration

1. To dehydrate the obtained pathological samples (pieces), they are kept in a solution of 96° alcohol for 24 hours;

2. On the next day of the experiment, it was kept in a 96° alcohol solution for another 24 hours.

III. Paraffin injection

1. Placed in a 1:1 solution of 96° alcohol and chloroform for 6-12 hours;

2. Kept in pure chloroform solution for 6-12 hours. At the end of storage, it was observed that the color of the flakes became clear;

3. For uniform and better absorption of paraffin, pieces were placed in a solution of equal proportions of melted paraffin and chloroform and left for 2-3 hours in a thermostat with a temperature of +35-40 0C. Sometimes such solutions were stored frozen when not in use;

4. Then the slices were placed in melted paraffin kept in a thermostat at +54 - +55 0C. In this case, the slices were placed first in portion I, that is, in melted paraffin in the first container for 1.5-2.5 hours, and then with the help of heated tweezers, they were placed in portion II for 0.5-1.5 hours, paying attention to the size and thickness of the slices;

5. The pieces are placed in a jar with glycerin applied to the bottom and heated to +60+70 0C using a gas burner, and melted pure paraffin is poured over it until it is covered with a thickness of 0.5 cm. The pieces were placed at free distances that were easy to separate from each other;

6. The paraffin container containing the pieces was cooled in a large container filled with cold water. It was based on the melting of paraffin moving from the bottom to the top;

7. After solidification, the paraffin was cut off from its edges, a new portion was re-poured in order to have limited flow areas in the paraffin (crushing, rubbing when broken);

8. Blocks were cut from solidified paraffin, leaving at least 2 mm of paraffin layer around the slices. In this case, the organs present in each piece were taken separately;

9. The resulting blocks were glued to the boards with paraffin on most sides using a heated spatula.

With the use of a microtome, sections were cut from the blocks, and then a micropreparation was made on a glass slide, stained with hematoxylin and eosin, and examined under a microscope. Microscopy revealed pathogistological alterations in the internal organs of birds that had been exposed to the pathogens that cause pasteurellosis, pullorosis, and colibacteriosis.

Gram and Romanovsky-Giemza stains were used to view smears made from pathological samples under a microscope. The discovered bacteria's morphology and staining were noted. The varieties of bacteria and the most prevalent ones were identified; the findings were then documented in publications.

From pathological samples, bacterial inoculum was cultivated in thermometers using artificial nutritional media. The type, variety, color, and size of colonies were identified while growing bacterial cultures seeded in nutritional media. These traits were cultivated on standard GPQ, GPA, Kitt-Tarottsi, and selective Endo and Ploskirev nutritional media with a blood agar content of 5–10%. Based on the traits of the colony, bacteria were divided.

Result and Discussion

The condition of birds, modifications to the mucous membranes, the state of the body and blood, its color, the state of the skin, etc. were the main focus of pathologoanatomical investigations.

The external appearance of the subcutaneous tissue, lymph nodes, blood vessels, parenchymatous organs, liver, kidneys, lungs, heart, spleen, reproductive organs, internal excretory glands, head, and spinal cord were given consideration when examining the internal organs.

The size, density, color, and surface alterations of the organs, as well as the state, fullness, and swelling of the tissues, were the key areas of focus when studying the body's changes. The condition of the small and large intestines, the serous and mucous membranes of the digestive tract, and hemorrhage inflammations, dystrophy, atrophy, and necrotic foci.

On each study, histological exams were carried out. In one instance, organs were harvested in chunks that were 2-3 cm long and thick, including the kidneys, spleen, heart, lungs, pancreas, and all wounded and healthy liver tissues. Based on pathologoanatomical changes, a determination was made following the completion of all examinations.

Result and Discussion. The clinical indications of mixed infectious disorders of birds, such as pasteurellosis, pullorosis, and colibacteriosis, varied according to the severity of the disease and the virulence of the agents that caused it. When a condition is acute, it becomes complicated and extremely serious. Additionally, the type and number of infections in the body affect clinical symptoms in different ways. For instance, the clinical symptoms of pasteurellosis and colibacteriosis patients change to include weakness, tremors, reluctance to feed, wheezing on the second day, frequent bed rests, redness of the mucous membranes, a rise in body temperature to 42.0-42.5^{o}C, and bloody diarrhea.

These chickens and chicks also become weak, lie down with their heads down, lose their appetite, and on the second day of the illness, they refuse to eat due to their lack of appetite, their body temperature rises, and their breathing quickens when the causative agents of pasteurellosis and pullorosis are found together. They experience leg paralysis and watery blue diarrhea.

When illnesses like pasteurellosis, colibacteriosis, and pullorosis coexist in hens, it is noted that the clinical indications are a little more complex. They experience bloody diarrhea, purulent nasal discharge, chest and abdominal swellings, an increase in body temperature of up to 43.5–44.0 oC, as well as bloody and purulent diarrhea and paralysis of the legs.

Therefore, in comparison to chickens infected with a single pathogen, complicated and deep patho-anatomical alterations were seen in chickens infected with two or three viruses. It is advised to analyze these disorders pathologically and pathologically because it is very difficult to separate these diseases from one another based just on clinical symptoms.

Pathologoanatomical changes. Pathologo-anatomical changes that take place when pasteurellosis and colibacteriosis infections coexist in poultry are quite complex and vary in their durability. The bodies in this instance are very thin and have not solidified. Additionally, bloody frothy liquid leaks from the mouth and nose, hyperemia forms in the mucous membranes, particularly in the conjunctiva, the cloaca is contaminated with yellow liquid waste, and the feathers are stained. Blood vessel fullness was primarily seen in the gastrointestinal tract and subcutaneous cells. All infected chickens displayed spotted and dot hemorrhages on the serous membranes as well as blood vessels packed with blood.

The heart was enlarged, there were more punctate hemorrhages, frothy mucus gathered in the bronchial and alveolar cavities, and there were multiple sites of atelectasis.

The spleen saw the most significant and long-lasting modifications; its size rose, and patchy and spotted hemorrhages were identified on its surface. The gastrointestinal system also underwent significant changes. That instance, an essential differentiating indicator is the existence of 2–3 wounds that are 0.5 cm in size in the muscular and glandular stomach.

Pasteurellosis and pullorosis cause swellings in the subcutaneous cells surrounding the head, neck, wings, and cloaca of hens, and foamy fluid laced with blood leaks from the oral cavity.

All hens' lungs and digestive tracts were found to be full of blood vessels at autopsy, and serous membranes had point and spot hemorrhages. The liver was noticeably enlarged, with point and spot hemorrhages on the surface, and hyperemia and hemorrhagic processes were seen in the kidneys. The lungs were enlarged, pale red in color, and had point hemorrhages on the surface.

It showed up as little dot hemorrhages, erosions, and ulcers in the muscular stomach's mucous membranes. Small surface hemorrhages were seen, the spleen's size was somewhat increased, and the pulp was dark crimson when sliced.

There were several ulcers of 1-2 cm in size, catarrhal-hemorrhagic irritation of the mucous membranes of the intestines, patchy hemorrhages, and more.

The bird's body is thin, the outer mucous membranes are hyperemic, the cloaca area is contaminated with liquid excrement, and the lymph nodes under the wings are enlarged when diseases like pasteurellosis, pullorosis, and colibacteriosis occur simultaneously. Blood stasis in the blood vessels, multiple surface hemorrhages, paratyphoid nodules diagnostic of pullorosis were developed in the liver, and there were spotty hemorrhages on the surface of the enlarged kidneys throughout the acute course of the disease.

The lungs' diphtheritic inflammation, its densification, the liver's and spleen's shrinkage, spotty hemorrhages in the stomach and intestines, a significant buildup of mucus in the rennet, dystrophic-necrotic changes, hemorrhagic inflammations, and ulcers were all characteristics of the disease's chronic course.

Small hemorrhages can be seen in some splenic regions, intestinal mesenteric lymph nodes are inflamed, the kidneys have highly developed hemodynamic and dystrophic alterations, and the capsule is swollen and filled with fibrinous fluid.

As a result, the clinical symptoms and pathologoanatomical alterations in mixed-type pasteurellosis, pullosis, and colibacteriosis in chicken are extremely complex and fundamentally distinct from those in other bacterial infections. However, with rigorous patho-anatomical and histological investigation, the correct diagnosis of these disorders can be obtained, allowing for the implementation of preventive measures.

Pathohistological changes. Blood arteries widened, filled with blood, and different hemorrhages around muscle fibers were seen in the myocardium of birds with pasteurellosis and colibacteriosis. The vein gaps are significantly expanded and bulging. The pulmonary capillaries are also dilated and filled with shaped blood components, and in some areas, there is blood stagnation and focal hemorrhages. The cavities of most alveoli are filled with erythrocytes. There are loose, partially homogenized connective tissues. Fibroblasts, leukocytes, and in rare cases bacterial collections are present in the interstitial tissue. The liver underwent rather profound histological changes, which were manifested by vascular inflammation, dystrophy, and blood flow issues. The spleen's vascular walls have an adventitial layer that thickens them, and their fibers have become homogenized. Also visible are little bloody foci. The lymph nodes have well developed hyperplastic processes. It develops perivascular malignancies. Diapause hemorrhages, which are characteristic histological abnormalities in the kidneys, are frequently characterized by blood vessel expansion and filling. The primary alterations in the gastrointestinal tract are perivascular serous edema, localized extravasates, vascular enlargement, and fullness. The intestinal mucous membranes have well developed catarrhal inflammatory processes. Numerous areas of the intestines have focal erosion and necrosis.

Compared to chickens infected with pasteurellosis and colibacteriosis, hens with mixed diseases of pasteurellosis and pullorosis have enlarged cardiac blood arteries and larger cell clusters made up of histiocytes, lymphocytes, and leukocytes around some vessels where the endothelium is displaced. Although the liver's histological abnormalities resembled those of pasteurellosis and colibacteriosis, they were distinguished from both conditions by the presence of necrotic nodules in the parenchyma of the liver. In some regions of the spleen, there are small hemorrhages and lymphoid aggregates that

can be seen. It was discovered that the trabeculae are swollen, the fibers' appearance is ambiguous, the kidneys have highly developed hemodynamic and dystrophic alterations, the capsule has also expanded, and it is filled with fibrinous fluid.

In the gastrointestinal tract, there were significant and intricate pathohistological alterations. Because it was discovered during the studies that these organs were mostly affected more by both stimuli. These alterations include necrotic and dystrophic processes in the mucous membranes of the glandular stomach and intestines, serous-catarrhal, catarrhal-hemorrhagic inflammations, and dystrophic processes.

Conclusion. Pasteurellosis, pullorosis, and colibacteriosis in poultry are examples of mixed bacterial infections with distinctive clinical symptoms, pathomorphological changes, and histological changes that set them apart from other diseases.

A drop of blood is occasionally used in poultry farms to conduct an indirect hemagglutination reaction to determine the health or unhealthiness of the flock in terms of pasteurellosis, pullorosis, and colibacteriosis diseases. Paying attention to zoohygienic standards also aids in the prevention of these illnesses.

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