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MORPHOLOGICAL AND HISTOLOGICAL CHARACTERISTICS OF ENDOMETRIUM IN COWS IN CASE OF ACUTE ENDOMETRITIS

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Annotation

This article describes the morphological and histological characteristics of endometriumin cows in case of acute endometritis.

In case of acute endometritis, the wall of the uterine horns is thickened, the mucous membrane is covered with hemorrhages. Serous wall is infiltrated with hemorrhagic exudate. The horns of the uterus havean elastic consistency. The entire uterus is intensely hyperemic, of bright red colour. The right horn is much larger than the left one. When assessing the histological sections of the left horn of the cow's uterus, it was found that the horn wall is folded.

The vaginal mucosa is characterized by the predominance of desquamation and vacuolar degeneration of the superficial and intermediate layer, as well as infiltration of mononuclear cells. The upper layer of the endometrium consisted of purulent inflammatory infiltrate and cellular detritus. Necrotic processes penetrated into the cells of the functional and vascular layer.

Microscopic examination noted that signs of atrophic changes were noted in the uterine glands lined mainly by the high prismatic epithelium. The growth of fibrocytes and fibroblasts and the formation of collagen fibers, the presence of neutrophils and a large number of lymphocytes were noted around the blood vessels and mouths of the uterine glands. In the basal layer, which has an unequal width, the uterine glands are also of small diameter, some of them have an expanded fundus. The growth of dense connective tissue was observed between the uterine glands and blood vessels.

Key words: acute endometritis, morphometry, epithelium, lymphocytes, cover epithelium, histological sections, inflammatory process, anaerobes, glandular epithelium.

Introduction

The increase of livestock production is one of the most important areas of the development of agriculture in the country. For the successful development of the livestock industry, an important role is given to the activation of the reproductive function of animals. The problem of the reproduction is relevant today. The requirements to the increase of livestock production are growing, that determine the need

of comprehensive studies of reproduction problems.One of the most pressing issues is the study of the objective laws of the development and functioning of reproductive organs in animals. Uterine diseases are the most common causes of infertility in animals.

In the system of measures to increase the production of livestock products in agricultural enterprises, the intensification of cow reproduction is of great importance. The optimal level of reproduction, which allows you to get the maximum offspring and milk production, is ensured by the normal functioning of the sexual and other organs and body systems of the cows. [1, p.313]

The efforts of many domestic and foreign researchers are directed towards solving this problem. The problem of cow infertility is many-sided. In the scientific literature, the degree of study of violations of the ability of a mature organism to reproduce offspring is widely highlighted. However, at present, the issues of assessing the pathological processes of the genitals of cows require further study [2, p.51-56].

The inflammation of the uterus remains one of the most frequent nosological forms in the structure of obstetric and gynecological pathology of cows and is the leading cause of reproductive functional depression and infertility of breeding stock.However, the problem of inflammatory diseases remains one of the most important in veterinary science and practice [3, p.10]. This is due to the change of the role of non-specific conditionally pathogenic microflora, anaerobes, various types of fungi in the occurrence of inflammatory diseases, the wide spread of strains of microorganisms resistant to antibiotics and other antimicrobial agents, as well as low immunological reactivity of animals associated with malnutrition and irregularities of the livestock management technology [4, p.9-12].

As noted in the writings of a large number of scientists, diseases of the uterus and ovaries are the most common causes of infertility. Insufficiently studied issues of congenital pathology of the reproductive system. At the same time, in the literature there is information about the distribution of anomalies and deformities regarding the reproductive organs of females. In this regard, the morphology and pathology of the ovaries and uterus of heifers and cows require further study using modern research methods [5,p.41-44]

Based on the analysis of the scientific literature on this issue, we found that the information on the morphological and histological indicators of the reproductive system of cows in normal and pathological conditions does not give a complete picture of the structural changes in the genitals of cows. Moreover, data on the functional activity of cells and tissues of the reproductive system of cows are practically absent. In recent years, isolated scientific information has appeared on the functional status of the tissues of the reproductive system of cows [6, p.2-6].

According to Jubb Kennedy, epyrecovery from the acute phase of infection often leads to endometritis with more or less endometrial

destruction and scar tissue replacement. These changes depend on the duration and severity of inflammation, but essentially consist of fibrosis and leukocytosis, which are dominated by lymphocytes and plasma cells. The endometrium became thicker, the tissues become inflamed,the glands are depleted, atrophy and become flat and weakened. Exudate in the lumen can be serous, catarrhal or purulent. Dystrophic and necrotic areas of the endometrium can sometimes be quite extensive, the mucous membrane of the uterus is felt to touch as the cartilage [7, p.467-470].

According to a number of studies hemorrhagic endometritis occurs in infectious diseases. Herewith, in many cases, the uterine wall is thickened, the mucosa is covered with hemorrhages, and the wall is infiltrated with serous hemorrhagic exudate [8].

The consequence of gynecological pathologies is infertility, which inhibits the development of animal husbandry and causes significant economic damage. This, in turn, poses new challenges for veterinary science and practice in the development of early diagnostics for the prevention and treatment of cow infertility [9, p. 31-36].

Objective:to study the morphological and histological characteristics of the cows endometrium in case of hemorrhagic endometritis.

Tasks:

1. To study the morphological changes of endometrium in cows in case of hemorrhagic endometritis.
2. To study the histological changes of endometrium in cows in case of hemorrhagic endometritis.

Materials and methods

Reproductive organs of three animals diagnosed with acute endometritis were used for morphometric studies.

The pathological material was treated to a thorough study in the histopatological laboratory of the Department for Veterinary Medicine of the faculty for Veterinary and Technology of animal husbandry in A. Baitursynov Kostanay state University. Morphometric studies were performed according to the standard technique.For this purpose they determined the length and width of individual organs on the fresh material with the help of measuring wire and measured the marked areas with calipers accurate to 1.0 mm. Obtained data were processed with the help of variation statistics methods (Microsoft office Excel 2003)[10, p. 26].

For histological studies, after morphometric measurements, the material was fixed in 10% neutral formalin. The seal material is produced by pouring in paraffin.

To reveal the General histological characteristics of the organs, the sections were stained with hematoxylin-eosin according to the conventional method (G. A. Merkulov, 1969). On the basis of General histological studies, the description of micromorphological features of the structure of the sexual organs of cows with hemorrhagic endometritis was carried out.

Photographing of anatomical and histological preparations of the reproductive system organs was carried out by the camera Nicon cool pix 4500.

During the post-mortem inspection, the uterus is slightly enlarged, pink with a yellowish tinge, flabby consistency, the walls are thickened. In the uterus sometimes a small amount of exudate, the surface of the endometrium is light pink, dull.

A morphometric study revealed that with endometritis, the reproductive organs undergo significant changes, both in linear measurements and in the structure of tissues. The serous wall is infiltrated with hemorrhagic exudate. The horns of the uterushave an elastic consistency. The entire uterus is intensely hyperemic, of bright red colour. The right horn is much larger than the left one.

The endometrium was edematous, reddened, and had numerous foci of hemorrhage.

Its wall with hemorrhagic endometritis of loose consistency, thickened, dirty brown, in places of light pink color, has the general laws of structural organization.

Its wall in case of hemorrhagic endometritis has common characteristics of structural organization. It has clear differentiation of mucosa, powerful, muscular and serous membranes. The lumen of the uterus is constantly flooded with a mass containing purulent bodies, desquamated epithelium and leukocytes.

Their length is shortened, there are plaques of small diameterin lumens. The mucous membrane of the uterine horns is covered with an exudate of viscous consistency, the size of the caruncles, arranged in rows, exceeds the average data. The folds of the mucous membrane are formed by epithelial andmucous layers of the mucous membrane. In the mucous membrane the glands are very close to each other. The muscular coat consists of three layers: annular, oblique and longitudinal. In the annular and longitudinal layers the cells tightly adjoin to each other. The oblique layer is formed by incoherently located smooth muscle cells and large blood vessels. The body and the cervix of the uterus is of a loose consistency. Striated muscles are hardly distinguishable. The wall thickness of the cervix and uterine horns always increased. Linear measurements of caruncles decreased in comparison with those in healthy cows. Some caruncles in general completely destroyed and merged with the general pathologically changed surface. In the cavityof the uterusbody some exudate was found. The liquid had an unpleasant stenchful smell.

Histological characteristics of the left horn of the uterus in cows in case of acute endometritis (surface epithelium)

When assessing the histological sections of the left horn of the cow's uterus (figure 1), it was found that the horn wall is folded. The folds are formed by epithelial and mucous layers of mucous membrane. In the mucous membrane the glands are very close to each otherascompared tothe glands of the uterus. The muscular coat of the horn is formed by three layers: annular, oblique and

longitudinal. In the annular and longitudinal layers the cells tightly adjoin to each other. The oblique layer is formed by incoherently located smooth muscle cells and large blood vessels. The serous membrane has a typical structure.

Observed purulent-fibrinous and purulent-necrotic phenomena, while in the exudate fibrin clots and leukocytes were observed, which was explained by an increase in fibrin exudation through the vascular wall. Fibrinous deposits were established both in the lumen of the uterine glands and under the epithelial lining.

The endometrial epithelium is completely destroyed or partially preserved; however, epithelial cells in such sites were lysed by pathoexudate. Often, areas of exudate excretion on the surface of the endometrium were noted, which indicated self-purification of mucosal structures. Alterative and infiltrative processes were observed in sections, extending up to the myometrium. In all layers of the mucous membrane, focal and diffuse infiltration with polymorphonuclear leukocytes, edema of the endometrial intercellular space and proliferation of loose connective tissue were noted.

These phenomena were due, above all, a significant vascular reaction caused by the action of metabolites and biogenic amines. Leukocyte infiltration was more intense in the places of formation of pustules and around the modified uterine glands.

Thus, microscopically the wall of the uterine horns has commoncaracteristics of structural organization. It has clear differentiation of mucosa, powerful muscular and serous membranes. However, there is a difference in the density of the glands position in the uterus and its horns.

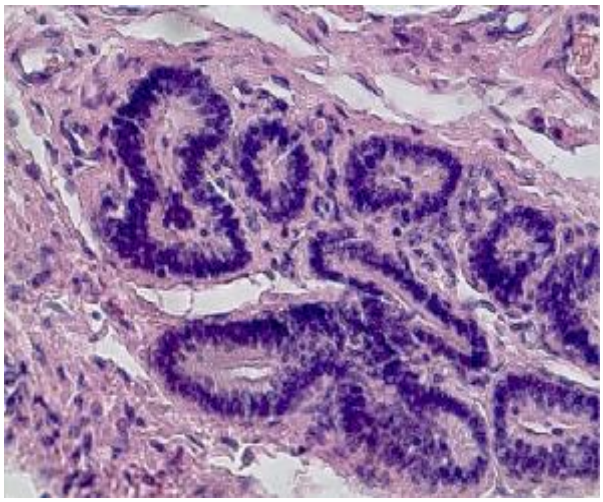

Figure 1-Surface epithelium of the left horn of the cow uterus in case of hemorrhagic endometritis (hemotoxylin-eosin, x 400)

Histological characteristics of the left horn of the uterus in cows in case of acute endometritis (glandular epithelium)

The surface of the glandular epithelium of the left horn in the cow's uterus is formed by two membranes: mucous, muscular. In the mucous membrane the glands are very close to each other as compared to the uterine glands (figure 2). A vascular reaction was established at which the

dilation of the vascular wall and the increase in lumen were observed.

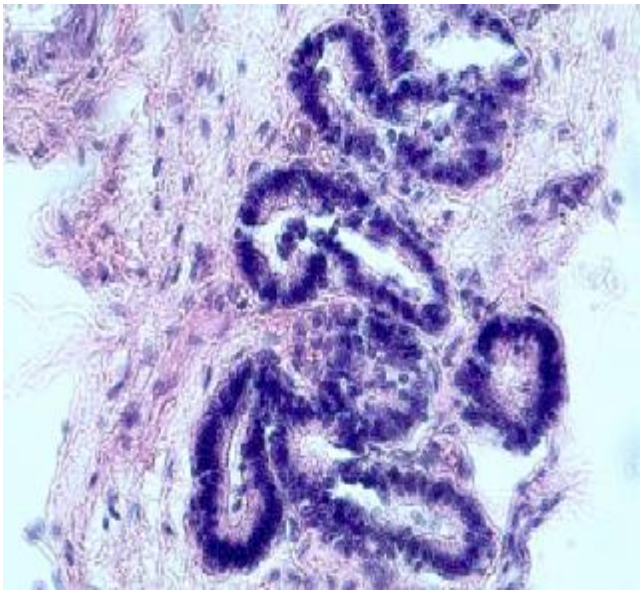

Figure 2-the surface of the glandular epithelium of the left horn in the cow's uterus (hematoxylin-eosin x 400)

In addition, in acute inflammation, the vessels are filled with blood, and plasmorrhagia, perivascular edema, and infiltration were established, which, in turn, indicated an increase in the permeability of the vascular membrane and the general reaction of the body. Fibrinous-purulent foci were observed in the mucous layer. The submucosal layer is always thickened and loosened. Well viewed edema of the endometrial stroma, while the nuclei of the cells of its own plate occupy two thirds of the cytoplasm. The uterine glands underwent destructive changes, and the glandular epithelium is desquamy or thinned. The glands of the mucous layer itself are constantly enlarged. In case of a purulent-necrotic process, necrosis of the uterine crypts was established with the formation of ulcers in their own cavity.

In the submucosal layer, the glands are atrophied, the glandular epithelium is destroyed, and the nuclei of the preserved cells are located in the basal part of the cytoplasm. Thrombosis of small vessels, hemorrhages around them and cellular infiltration of the intermuscular space were found in the muscle membrane. In some cases, the serous membrane was characterized by varicose veins and cyanotic hue, which, in turn, is associated with impaired hemodynamics in the organ.

Histological characteristics of the uterus right horn of cows in case of acute endometritis (glandular epithelium)

The wall of the right horn in the cow's uterus is folded. The folds are formed by epithelial and mucous layers of mucous membrane. In the mucous membrane the glands are very close to each other, as compared to the glands of the uterus. The muscular coat of the horn is formed by three layers: annular, oblique and longitudinal. In the annular and longitudinal layers the cells tightly adjoin to each other. The oblique

layer is formed by incoherently located smooth muscle cells and large blood vessels (figure 3).

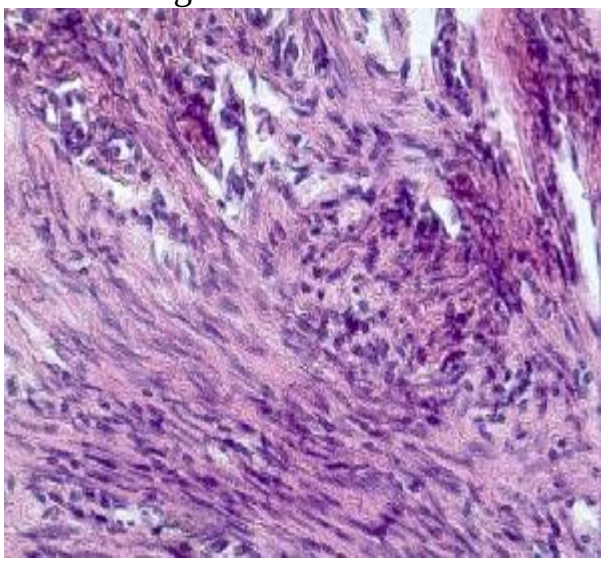

Figure 3-Glandular epithelium of the right horn in the cow's uterus(hematoxylin-eosin,X400)

Histologically, endometritis was characterized by the thinning and compaction of the endometrium, the absence or partial preservation of the epithelial lining, and purulent-necrotic and dystrophic phenomena that occur deep into the underlying layers of the uterine wall. At the same time, in the remaining areas, the epithelium was represented by cubic or prismatic epithelial cells.

In all layers of the endometrium, diffuse lymphocytic and neutrophilic infiltration was detected. Sometimes viewed lymphocytic infiltrates, indicating the duration of the inflammatory process. The endometrium became thinner and thickened, while the uterine wall itself thickened due to destructive changes in the myometrium and the serous membrane. Depth of the lying areas of the mucous membrane are loosened, and in the myometrium was established the wrinkling of smooth muscle structures, as well as the proliferation of loose connective tissue between the bundles of smooth muscles. This state covered vast areas of myometrium. Sometimes the tissue elements of the epidometry are spread apart by light pink collagen bundles, which in the chronic process always swell. Serous membrane in a state of deep edema, significantly thickened and was covered with thin single-layer mesothelium. In the mucous layer itself, we found purulent-necrotic lesions, which were located in groups and had clear outlines. A small amount of uterine glands, which were in a state of necrosis or atrophy, were always installed in the field of view of the lens. The glands were located in the deep layers of the endometrium in groups of 2-4 glands.

The glandular epithelium is always necrotized, and purulent foci were formed in the secretory cavities, while the glands were always compressed by connective tissue. Often cystic dilation and hyperplasia of the uterine glands were found, and the epithelium was destroyed or

acquired a flat shape, while the stroma of the glands was preserved as an edematous connective tissue sheath. As a sign of inflammation of the endometrium, with chronic necrotic chronic processes, arterial and venous hyperemia was established, and vascular walls due to hyalinization and fibrosis thickened until complete obliteration.

Histological characteristics of the uterus right horn of cows in case of acute endometritis (surface epithelium)

The wall of the right uterine horn in case of hemorrhagic endometritis has common characteristics of structural organization. It has clear differentiation of mucosa, powerful muscular and serous membranes. The high density of the glands position in the uterine horns was noted. In the analysis of the cytometric characteristics of the integumentary epithelium of the right uterine horn it was concluded the data reduction of the areaof the protoplasm of the epithelial cells and their nuclei, in comparison with those of clinically healthy cows.

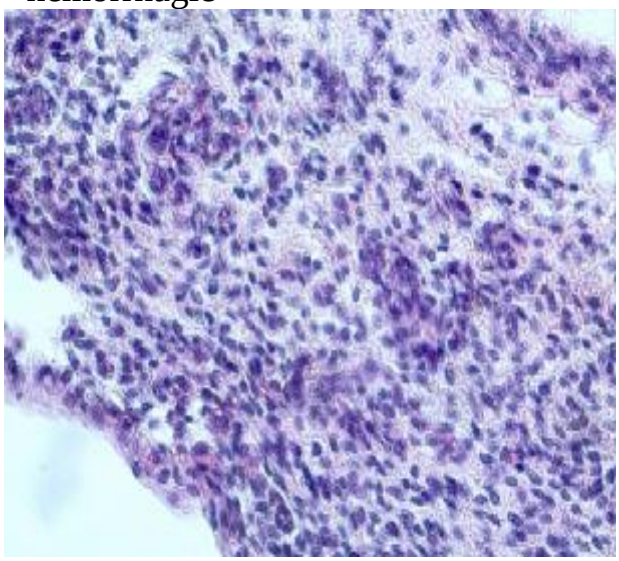

Figure 4-surface epithelium of the right horn in the cow's uterus (hemotoxylin-eosin, X400)

The area of protoplasm of epithelialcellsand epithelial nuclei of the right uterine horn in case of hemorrhagic endometritis is reduced in comparisonwith that in clinically healthy animals (4).

Microscopic examination noted that signs of atrophic changes were noted in the uterine glands lined mainly by the high prismatic epithelium. The growth of fibrocytes and fibroblasts and the formation of collagen fibers, the presence of neutrophils and a large number of lymphocytes were noted around the blood vessels and mouths of the uterine glands. In the basal layer, which has an unequal width, the uterine glands are also of small diameter, some of them have an expanded fundus. The growth of dense connective tissue was observed between the uterine glands and blood vessels.

In the circular and longitudinal muscle layer, a dense arrangement of

myocytes was noted. The thickness of the intermuscular layer is significant due to the proliferation of fibrous connective tissue, the walls of blood vessels are hypertrophied.

Perimetry was distinguished by structural homogeneity, moderate filling of vessels. Lymphatic vessels, small veins and arteries were often recorded under perimetry. Separate neutrophils were found in the blood vessels of all layers of the uterus and on the surface of the endometrium. The epithelium of the vaginal mucosa of cows with latent endometritis of unequal thickness. Superficial epithelium is completely desquamous in some places.

Sinusoid dilated venous and lymphatic capillaries were observed in the basement membrane. The cells of the basal layer had an elongated spindle-shaped form, were located perpendicular to the basement membrane and in some areas were introduced into it. The thickness of the intermediate and surface layers of the epithelium in different parts of the mucous membrane was different. Intermediate and superficial cells in a state of vacuolar degeneration.In some areas, the basal cells were absent, while the intermediate and superficial cells are represented in one or two rows, in others, the intermediate and superficial layers of the mucosa are more pronounced, the cells and nuclei are oriented parallel to the basement membrane. Among the epithelial cells found a small number of lymphocytes. On some, adjacent to an epithelium, sites of a basal membrane there are accumulations of macrophages and lymphocytes. Observed areas where in the surface and intermediate layers of many lymphocytes, keratogyalin grains were absent. Histological examination revealed that in the mucous membrane of the uterus of cows with symptoms of endometritis, the epithelium lining the endometrium is almost completely squatted. In the remaining areas, the epithelium is prismatic, without an apical rim. In the subepithelial areas of the surface layer of the endometrium, edema was recorded.

Conclusion

Thus, in the morphological and histological study of the genital organs in cows with acute endometritis, pathomorphological changes were established, indicating a chronic inflammatory process. In the uterus, such processes as desquamation of the endometrial epithelium, edema and infiltration of its surface layer, proliferation of connective tissue in the endometrium and in the intermuscular layer, narrowing of the lumen of the uterine glands and myometrial proliferation occurred.The signsof atrophic catarrhdominated in uterus.This is characterized by proliferation of fibroblasts and fibrocytes with the formation of collagen fibers, atrophy of the uterine glands, infiltration of the endometrium by neutrophils and lymphocytes. In semi-thin sections, acute purulent-catarrhal dystrophic processes were observed.They were characterized by the presence of significant bloody mucus containing bacteria and desquamated cells on the exposed surface of the endometrium.

The vaginal mucosa is characterized by the predominance of

desquamation and vacuolar degeneration of the superficial and intermediate layer, as well as infiltration of mononuclear cells. The upper layer of the endometrium consisted of purulent inflammatory infiltrate and cellular detritus. Necrotic processes penetrated into the cells of the functional and vascular layer. In the vagina, the mucous membrane is thinned as a result of intense desquamation and dystrophy of the cells of the surface and intermediate layer; in the thickness of the epithelium a large number of macrophages and lymphocytes. Intermediate and basal cells prevailed in vaginal smears, while those from the cervix - intermediate and superficial, often vacuolized.

Vaginal mucosa is characterized by the predominance of desquamation and vacuolar dystrophy of the surface and intermediate layers and infiltration with mononuclear cells.

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ЖЕДЕЛ ЭНДОМЕТРИТ КЕЗІНДЕГІ СИЫРЛАР ЭНДОМЕТРИЯСЫНЫҢ МОРФОЛОГИЯЛЫҚ ЖӘНЕ ГИСТОЛОГИЯЛЫҚ СИПАТТАМАСЫ

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Түйін

Бұл мақалада жедел эндометритте сиыр эндометриясының морфологиялық және гистологиялық сипаттамасы сипатталған. Морфометриялық зерттеулер үшін геморрагиялық эндометрит диагнозы бар 3 жануарлардың репродуктивті жүйесінің органдары пайдаланылды.

Жедел эндометрит кезінде жатыр мүйіздерінің қабырғасы қалыңдатылған, шырышты қабығы қан құйылулармен жабылған. Серозды қабырға жедел экссудатпен инфильтрленген. Жатырдың мүйізі қатты консистенциялы. Барлық жатыр қарқынды гиперемирленген, ашық қызыл түсті. Оң мүйіз солға қарағанда мөлшері бойынша әлдеқайда үлкен. Жануарлардың геморрагиялық эндометриясы кезінде эндометрия қабырғасы жұмсақ консистенциялы, қалың, лас-қоңыр, кей жерлерде ашық-қызғылт түсті. Жедел эндометритте оның қабырғасы құрылымдық ұйымның жалпы заңдылықтарына ие. Оның шырышты, қуатты бұлшықет және серозды қабығына нақты дифференциациясы байқалады.

Сиырдың сол жақ мүйізінің гистологиялық кесінділерін бағалағанда мүйізінің қабырғасы қатпарлы екендігі анықталды. Қатпарлар эпителиальді және шырышты қабаттың шырышты қабатынан түзілген. Бездің шырышты қабығында жатыр безіне қарағанда, бір-біріне өте тығыз орналасқан.

Мүйіздің бұлшықет қабығы үш қабаттан тұрады: сақиналы, қиғаш және бойлық.

Осылайша, жатыр мүйіздерінің микроскопиялық қабырғасы құрылымдық ұйымның жалпы заңдылықтарына ие. Оның шырышты, қуатты бұлшықет және серозды қабығына нақты дифференциациясы байқалады. Алайда жатыр және оның мүйіздерінде бездердің орналасу тығыздығының айырмашылығы байқалады.

Кілттік сөздер: жедел эндометрит, бұлшық ет қабығы, шырышты қабығы, жатыр мүйізі, жатыр денесі, қан кету, гистологиялық зерттеулер, жатыр мойыны, диагностика, патогендік микрофлора.

МОРФОЛОГИЧЕСКАЯ И ГИСТОЛОГИЧЕСКАЯ ХАРАКТЕРИСТИКА ЭНДОМЕТРИЯ КОРОВ ПРИ ОСТРОМ ЭНДОМЕТРИТЕ

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Резюме В данной статье описаны морфологическая и гистологическая характеристики эндометрия коров при остром эндометрите. Для морфометрических исследований использованы органы репродуктивной системы 3-х животных с диагнозом геморрагический эндометрит.

При остром эндометрите стенка рогов матки утолщенная, слизистая оболочка покрыта кровоизлияниями. Серозная стенка геморрагически инфильтрирована экссудатом. Рога матки упругой консистенции. Вся матка интенсивно гиперемирована, ярко-красного цвета. Правый рог значительно больше по размеру, чем левый. Стенка эндометрия при данном заболевании животных рыхлой консистенции, утолщена, грязно-коричневого, местами светло-розового цвета. Ее стенка имеет общие закономерности структурной организации. Отмечается ее четкая дифференциация на слизистую, мощную мышечную и серозную оболочки.

При оценке гистологических срезов левого рога матки коровы было выявлено, что стенка рога складчатая. Складки образованы эпителиальным и собственно слизистым слоями слизистой оболочки. В слизистой оболочке железы располагаются очень плотно друг к другу, в отличие от желез матки. Мышечная оболочка рога образована тремя слоями: кольцевым, косым и продольным.

Таким образом, микроскопически стенка рогов матки имеют общие закономерности структурной организации. Отмечается ее четкая

дифференциация на слизистую, мощную мышечную и серозную оболочки. Однако наблюдается различие в плотности расположения желез в матке и ее рогах.

Ключевые слова: острый эндометрит, мышечная оболочка, слизистая оболочка, рога матки, тело матки, кровоизлияния, гистологические исследования, шейка матки, диагностика, патогенная микрофлора.