Potomorphological Characteristics of Femural Head Structures in Patients of Different Ages Infected with Covid-19

Jumanov Ziyadulla Eshmamatovich

Associate Professor of the Department of Pathological Anatomy of Samarkand State Medical University, Doctor of Philosophy in Medical Sciences (PhD) omadlikun@mail.ru +998933504150 Uzbekistan

Khudayberganov Sadiq Toshtemirovich

Independent researcher of the Department of Pathological Anatomy of Samarkand State Medical University +998915554778

ABSTRACT

In the article, the photomorphological characteristics of femoral head structures of patients of different ages infected with COVID-19 were studied. Also, patient R. 28 years old, surgery was performed, hydropic dystrophy of chondrocytes in the femoral head tissue, slight thinning of the femoral head, was sufficiently studied by Hematoxylin-eosin, and conclusions and recommendations were given accordingly.

Keywords: Femoral head, COVID-19, pathomorphology, femur, blood vessels.

1. Introduction.

February 11, 2020, the World Health Organization (WHO) officially named the coronavirus infection Covid-19 ("Coronavirus disease 2019"). The place where the virus first appeared - in China - 77,000 people were infected, and more than 2,500 people died. All over the world in 2020, 60 million 894 thousand were infected with this infection, of which 1 million 430 thousand died and 42 million 90 thousand recovered (Bolekhan V.N., Ulyukin I.M., Peleshok S.A., 2020) .

The level of study of the topic. According to the information presented in the literature, osteoarthritis of the hip joint is more common in patients with Covid-19, mainly in men. The coronovirus SARS-CoV-2 enters the cells of our body through its receptors, angiotensin I-converting enzyme 2 (ACE-2). ACE-2 is expressed in type 2 alveocytes (AT2). Penetrates into lung, liver cholangocytes, colon cells, keratinocytes of esophagus, epithelial cells of ileum and rectum (Qi F. et.el., 2020; Ortega J.T. et.el., 2020). The entry cells of SARS-CoV-2 are endothelial cells, fibroblasts, erythrocytes, platelets, hippocampus, tonsils, heart, skin, monocytes, and T-lymphocytes (Wang K.et.el., 2020). COVID-19 is more common in older people than in young people, and more in men than in women (Yu F. et.el., 2020).

2. Analysis and results.

The number of patients with COVID-19, aged 22-31, who underwent endoprosthetic surgery, is 6, all of them are men. When 22-31-year-old patients undergo a macroscopic examination of the femoral head, some areas of the joint surface of the hyaline membrane of the femoral head are uneven, slightly blurred, and necrosis foci (1.5x2.0±0.4 cm) are detected in the subchondral area (Fig. 1).

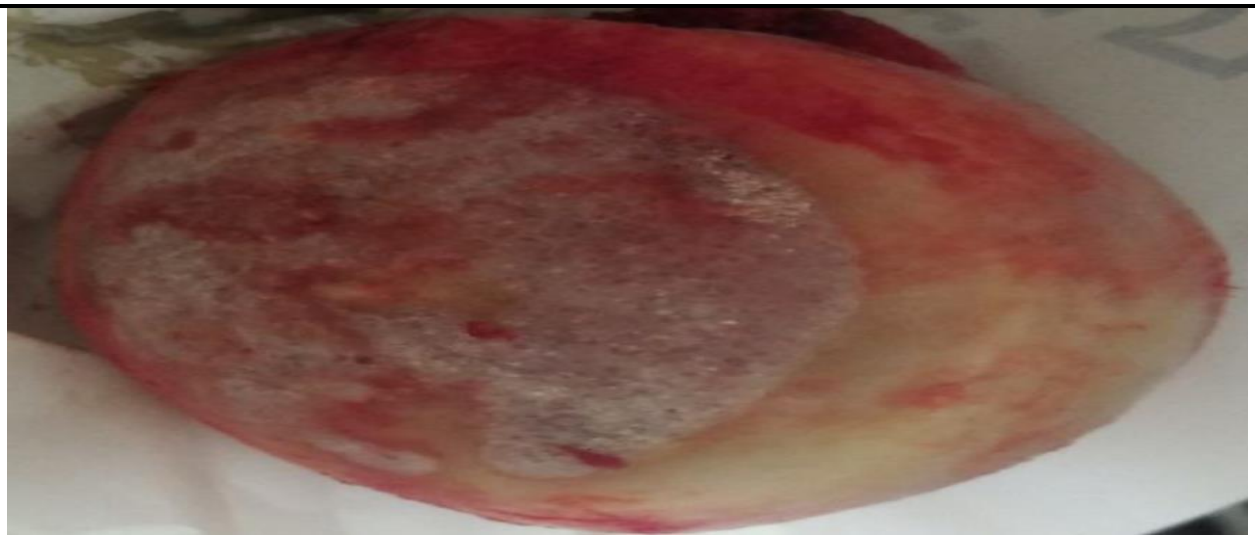

Figure 1. Patient R. 28 years old, surgery was performed. Macroscopic view of the femoral head

During this period of the disease, in the histological samples prepared from the head of the femur, the predominance of dystrophic and necrobiotic changes in the chondrocytes of the hyaline bone tissue is noted. Karyorrhexis is detected in the nucleus of chondrocytes, and karyolysis is observed in most chondrocytes. A clearly developed hydropic dystrophy is shown in the cytoplasm (Fig. 1). Proliferation of fibroblasts is evident in the areas where cytorexis and cytolysis are developed. Chondrocytes in the state of cytolysis are a deficiency in the field of vision.

Aseptic necrosis is observed in the adipose tissue and bone marrow in the subchondral area of the femoral head. Foci of necrosis appear microscopically in the same monochromatic appearance (Fig. 3). In particular, the number of osteblasts is reduced, osteocyte tumors are rare and shortened, necrobiotic changes in most osteoclasts, and destructive changes in a small number of osteoclasts. A slight thinning of the bone columns is detected (Fig. 4). Isolated broken bone fragments (sequestrum) are detected with small movements. Weak proliferation of fibroblasts is noticeable in the intermediate tissue.

Figure 2. Hydropic dystrophy of chondrocytes in the cartilage tissue of the femoral head. Stained in hematoxylin-eosin. Ob.40, ok.10

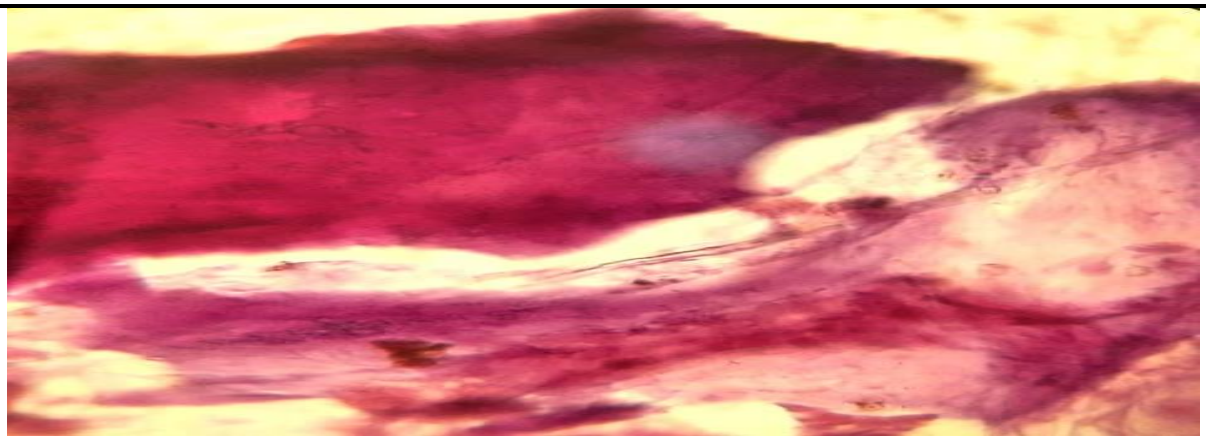

Figure 3. The process of separating the hyaline cartilage tissue of the femoral head from the bone tissue in the subchondral area. Stained in hematoxylin-eosin. Ob.40, ok.10

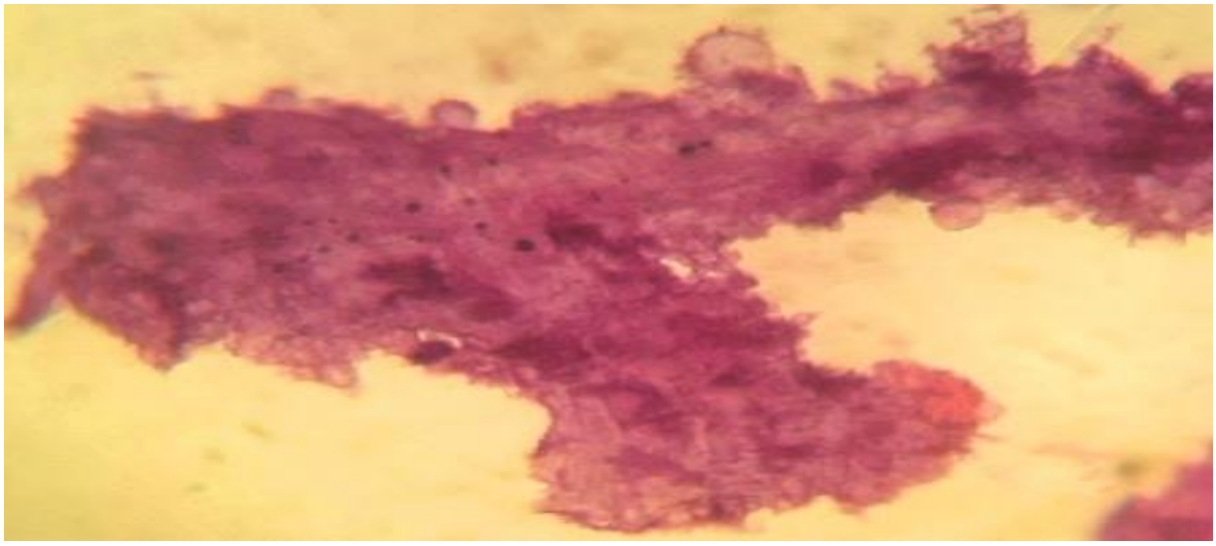

Figure 4. Slight thinning of the femoral head is stained with Hematoxylin-eosin. Ob.40, ok.10

During this period, specific changes are also noted in the blood vessels. Karyopyknotic changes in endotheliocytes, karyorrhexis and karyolysis in a small number of endotheliocytes and foci of their desquamation are determined in intraosseous blood vessels. Swelling of the wall, fibrillation of fibrous structures is determined (Fig. 5).

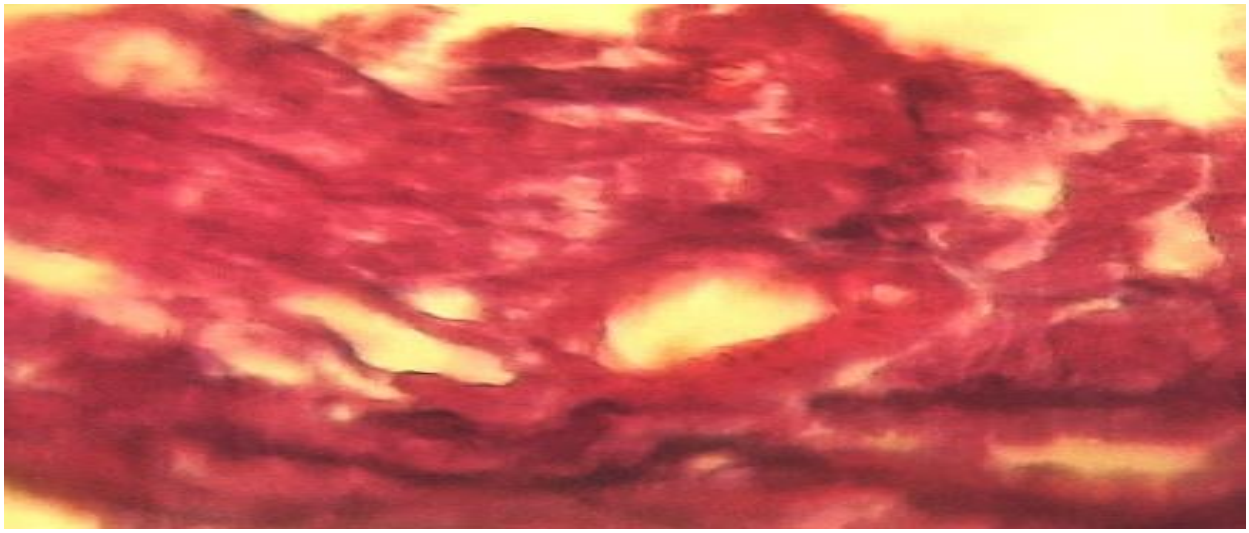

Figure 5. Morphological changes in the blood vessels of the subchondral area of the femoral head. Stained in hematoxylin-eosin. Ob.40, ok.10

Thus, 22-30-year-old patients with Covid-19 who underwent endoprosthetic surgery have focal necrobiotic changes in the hyaline membrane of the femoral head, and the development of destructive processes in the bone tissue of the subchondral area. Swelling and focal desquamation of endotheliocytes are detected in the vascular wall.

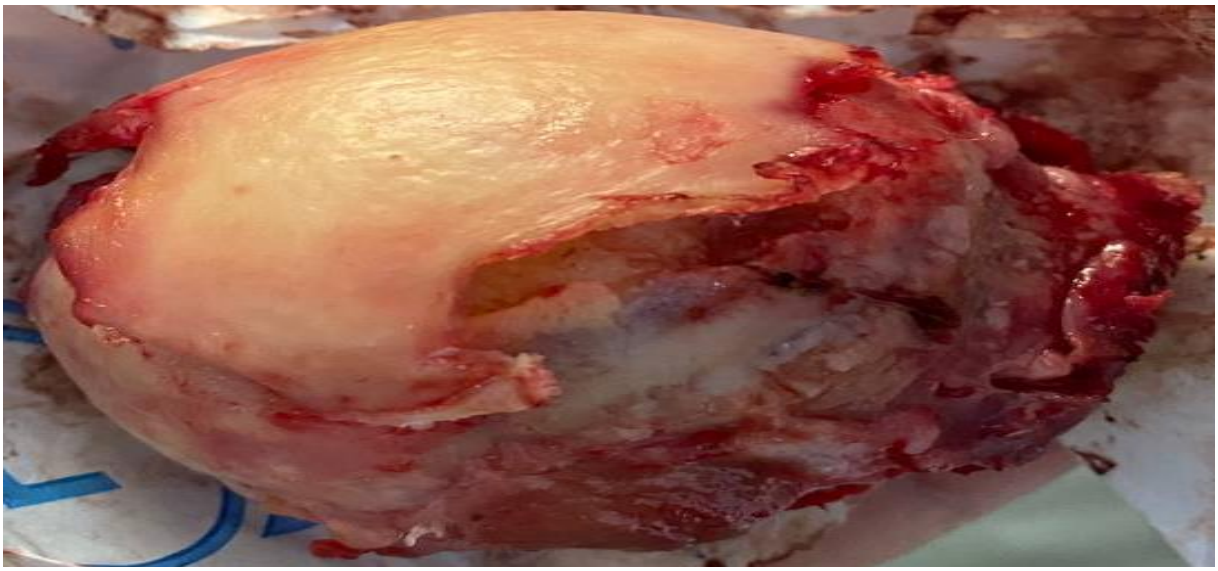

Figure 6. Patient M. Surgery was performed 24 months after the disease. Macroscopic view of the femoral head

During this period of the disease, in the histological samples prepared from the head of the femur, the predominance of dystrophic and necrobiotic changes in the chondrocytes of the hyaline bone tissue is noted. Karyorrhexis is detected in the nucleus of chondrocytes, and karyolysis is observed in most chondrocytes. A clearly developed hydropic dystrophy is shown in the cytoplasm (Fig.1). Proliferation of fibroblasts is evident in the areas where cytorexis and cytolysis are developed. Chondrocytes in the state of cytolysis are a deficiency in the field of vision.

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3. Conclusion.

Changes in the head of the femur of patients with Covid-19, as the duration of the disease increases, their morphometric indicators increase, and destructive changes, the intensity of the sclerotic process increases, the vascular component, as well as changes in the femur and bone tissue are related to different ages and duration of the disease.

The increase in dystrophic and necrotic changes in the structures of the femoral head is proportional to the age and duration of the disease in patients with Covid-19.

In patients with Covid-19, ischemic type changes in the femoral head, diapedesis hemorrhages as a result of increased permeability of the blood vessel wall, and destructive changes in the tendon and bone tissue do not change.

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