TO THE MORPHOLOGY OF THE INTRAORGAN VASCULAR SYSTEM OF THE SYNOVIAL MEMBRANE OF THE DOG KNEE JOINT

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Abstract: The article investigates the angioarchitecture of various layers of the synovial membrane. The study material consisted of 493 micropreparations of the synovial membrane (including: 128 from the medial region, 107 from the lateral region, 156 from the anterior region, and 102 from the posterior region) of the knee joints of eight dogs. For impregnation, the material was fixed in 12% neutral formalin. Impregnation of the sections was carried out with silver nitrate according to the method of E. I. Rasskazova modified by V. V. Kupriyanov. The study established that vascular capillary plexuses are present in all three layers of the synovial membrane. The angioarchitecture of the vascular system differs in various regions of the synovial membrane: in the medial region, lymphatic capillaries predominate twofold over blood capillaries in number.

Keywords: dogs, knee joint, synovial membrane, blood capillaries, arterioles, venules, precapillaries, capillaries.

К МОРФОЛОГИИ ИНТРАОРГАННОЙ СОСУДИСТОЙ СИСТЕМЫ СИНОВИАЛЬНОЙ ОБОЛОЧКИ КОЛЕННОГО СУСТАВА СОБАКИ.

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Резюме: В статье изучены ангиоархитектоника различных слоев синовиальной оболочки. Материалом исследования послужили 493 микропрепарата синовиальной оболочки (в том числе: из медиального отдела - 128, латерального отдела - 107, переднего отдела - 156, заднего отдела - 102) коленных суставов восьми собак. Для импрегнации материал фиксировался в 12% нейтральном формалине. Импрегнация срезов проводилась

азотнокислым серебром по методу Е. И. Рассказовой в модификации В. В. Куприянова. При исследовании установлено, что во всех трех слоях синовиальной оболочки имеются сплетения кровеносных капилляров. Ангиоархитектоника сосудистой системы различных участков синовиальной оболочки различна: в медиальном отделе по количеству лимфатические капилляры в два раза превалируют над кровеносными.

Ключевые слова: собаки, коленный сустав, синовиальной оболочки, кровеносных капилляров, артериолы, венулы, прекапилляры, капилляры.

Introduction. Osteoarthritis (OA) is the most common rheumatologic pathology, the clinical manifestations of which are observed in more than 10–20% of the adult population. Due to the increase in average life expectancy, the prevalence of the disease is steadily rising worldwide. Severe lesions of the knee joints are detected in one quarter of patients suffering from OA [1]. Expectations regarding the structure-modifying effect of therapy with oral chondroprotectors (chondroitin sulfate, glucosamine sulfate, and glucosamine hydrochloride) have not been confirmed in controlled clinical trials. The study of the morphology of the intraorganic vascular system as a pathway of microcirculation is of considerable theoretical and practical importance, since it not only “establishes the general regularities of the structure of intraorganic vessels” [2,3], but also determines the interrelationship between angioarchitectonics and the structure of organs and tissues. The structure of the synovial membrane of the knee joint has been described in sufficient detail in the literature [4,5]. However, its microcirculatory systems remain insufficiently investigated. In the literature, there are only isolated reports concerning the blood supply of the synovial membrane of the canine joint [6], while the angioarchitectonics of the synovial membrane as a whole has not been comprehensively described. In particular, the angioarchitectonics of the different layers of the synovial membrane and the structural features of the vascular system in its various regions (medial, lateral, anterior, and posterior) have not been adequately elucidated.

Therefore, the aim of the present study was to investigate the morphology of the vascular system in the layers and different regions (medial, lateral, anterior, and posterior) of the synovial membrane of the canine knee joint under normal conditions.

Aim of the Study. To study the morphology of the intraorganic vascular system of the synovial membrane of the canine knee joint.

Materials and Methods. The study material consisted of 493 histological specimens of the synovial membrane, including: 128 specimens from the medial region, 107 from the lateral region, 156 from the anterior region, and 102 from the posterior region of the knee joints of eight dogs. In addition, functionally different regions of the synovial membrane of the knee joint from five dogs were examined using the method of macromicroscopic dissection under an MBS-2 stereomicroscope according to V. P. Vorobyev. The experimental animals (dogs) were aged between two and three years and weighed 18–20 kg. For impregnation, the material was fixed in 12% neutral formalin. Section impregnation was performed with silver nitrate according to the method of E. I. Rasskazova modified by V. V. Kupriyanov. The application of this non-injection technique provides certain advantages, as all details of the vascular wall, including the characteristics of cellular elements, become visible in the preparations.

Results. The investigation demonstrated that all three layers of the synovial membrane contain plexuses of polygonal blood capillaries of various sizes, among which numerous collapsed capillaries (2–3 μm in diameter) were identified. Within the capillary network, the diameter of postcapillaries exceeded that of precapillaries.

The first, covering layer contained precapillaries, capillaries, and postcapillaries measuring 5–14 μm in diameter, which formed a dense capillary network.

The second layer of the synovial membrane, represented by closely adjacent oriented collagen bundles, contained relatively large vessels measuring 60–80 μm in diameter, running predominantly along the collagen bundles. The third layer,

consisting of looser collagen bundles and numerous fat inclusions, contained larger vessels (90–130 μm in diameter) than those observed in the second layer. The large vessels of this layer were arranged parallel to the collagen fibers, while their branches (medium and small vessels) crossed the collagen bundles at various angles.

In the second and third layers, numerous arteriovenous anastomoses were observed between adjacent venous and arterial vessels. The vessels in all layers divided dichotomously at various angles, whereas bush-like branching patterns were encountered only rarely. The diameter of venous vessels consistently exceeded that of arterial vessels. Comparison of the vascular systems in different regions of the synovial membrane revealed several distinctive features. In the medial region, the arterial component of the vascular system exhibited more extensive branching than in other regions, and the number of lymphatic capillaries was twice as high as in the remaining regions. In the lateral region of the synovial membrane, both blood vessels and lymphatic capillaries were significantly less numerous than in other regions.

In the anterior region, the vessels formed numerous very fine capillary networks compared with other regions, with abundant collapsed capillaries located between them (approximately twice as many as in the other regions). In the posterior region, predominance of the venous component of the circulatory system was noted compared with the other regions. The large vessels in this region were generally tortuous, and the number of lymphatic capillaries exceeded that of blood capillaries by two to three times per unit area. Collapsed capillaries were present in the capillary networks of all regions of the synovial membrane.

Conclusion. Thus, vessels are distributed throughout all layers of the synovial membrane, where they form characteristic capillary plexuses in each layer. The angioarchitectonics of the vascular system differs among the various regions of the synovial membrane: in the medial region, lymphatic capillaries predominate over blood capillaries by twofold; in the anterior region, blood capillaries form

numerous fine networks containing a large number of collapsed capillaries; whereas in the lateral region, lymphatic capillaries are fewer than in the remaining regions.

The presence of collapsed, non-functioning capillaries indicates the existence of specific functional compensatory adaptations within the vascular system.

References

1. Антониади Ю.В., с соав. Лечение переломов лодыжек с применением современных технологий АО/Международная пироговская конференция "Остеосинтез и эндопротезирование". — М. . 2008. -С. 7 - 8
2. Авраменко, В.В. Артроскопия при внутренних повреждениях коленного сустава у детей и подростков [Текст] / В.В. Авраменко, И.А. Кузнецов// Травматология и ортопедия России. - 2011 - № 4. - С. 131-132.
3. Витько Н.К., Зубанов А.Г. Магнитно-резонансная томография а диагностике повреждений костей голеностопного сустава //Мед. визуал.-2002. №3. С. 22-28.
4. Mamataliyev A. R., Sh R. S., Zohidova S. H. EKSPERIMENTAL JIGAR SIRROZI SHAROITIDA PASTKI PORTO KAVAL VENOZ TIZIMI MORFOLOGIYASINING ORGANILGANLIK DARAJASI //Экономика и социум. – 2024. – №. 4-1 (119). – С. 1346-1350.
5. Юлдашева Ф.И. Features and algorithm of treatment of bacterial vaginitis // "Science and Education" Scientific Journal . February 2023 / Volume 4 Issue 2
6. Narbayev, S., Minzhanova, G., Zubova, O., Toshbekov, B., Rasulovich, M. A., Sapaev, B., ... & Khudaynazarovna, T. I. (2024). Behavioral adaptations of Arctic fox, Vulpes lagopus in response to climate change. *Caspian Journal of Environmental Sciences*, *22*(5), 1011-1019.