



Extra-cortical osteosynthesis in fractures of the wing and the body of the ilium in dogs

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Abstract.

Injuries of the musculoskeletal system in the form of fractures are common in the practice of a veterinarian. Modeling of bone fractures has the purpose to determine the optimal method of osteosynthesis. Subsequent application of the developed technique in practical conditions can reduce the percentage of complications and consequently improve the quality of treatment of animals. The aim of the study was the improvement of osteosynthesis in pelvic fractures, in particular, of the wing and the body of the ilium. The authors found that extra-cortical osteosynthesis in fractures of the wing and the body of the ilium with a bone plate, installed to the fracture line at an angle close to 90°, allows stable and functional osteosynthesis and achieves early recovery of the anatomical act. In this case, the plate is located ventrodorsally and is attached with two screws to the cranial fragment and two other screws are attached to the caudal one.

Key words: dogs, pelvic fractures, bone plate, osteosynthesis.

INTRODUCTION.

Recently, increased attention of veterinarians and scientists has been noted to the problems of qualitative diagnosis and improvement of methods for treating injuries of the pelvic bones complicated by peripheral nerve injury in small domestic animals due to the increase in the number and severity of injuries, including of the musculoskeletal system. [1].

Pelvic injury, as a result of the specifics of anatomical and topographic relationships, is rarely isolated. As a rule, it is accompanied by damage to the peripheral nerves, vessels, and soft tissue structures [2, 3]. It was established that fractures of the ischial bones in small domestic animals are observed in 82% of cases with multiple pelvic injuries [4, 5]. However, a number of authors believe that the surgical treatment of ischial bone fractures in some cases is impractical. It is necessary only with a significant displacement of bone fragments. [6, 7]. This opinion is controversial because systematic comparative studies of the mechanisms of the ischial bone's fragment displacement and the effect on the structures and functions of the pelvic limb of dogs under conditions of conservative and surgical treatment have not been carried out. There is a method of treating dogs with damage to the pelvic joints by the method of transosseous osteosynthesis, which consists in fixing the pelvic limb and lumbosacral part of the spinal column with the developed constructions of the external fixation device, simultaneous reposition of the pelvic bones on the operating table (if necessary, dosed reposition during animal postoperative behavior) and subsequent stable fixation throughout the entire period of treatment [8, 9, 10].

The aim of the study was to improve osteosynthesis in fractures of the pelvic bones, in particular, the wing and the body of the ilium.

MATERIALS AND METHODS.

Cadaveric material (2 cats and 2 dogs), spontaneously injured animals (4 cats, 5 dogs) with pelvic bone fractures because of cata- and autotrauma, X-ray and ultrasonography and electrocardiograms of the injured animals and data of pre- and postoperative hemobiochemical screening served as the research material.

The studies were conducted on the basis of the Dr. V. Annikov's veterinary clinic, Department of Animal Diseases and Veterinary-sanitary Inspection, Saratov State Agrarian University named after N. I. Vavilov, Educational Scientific and Technological Centre "Veterinary Hospital" (Saratov) and Peoples' Friendship University of Russia (Moscow). The

following research methods were used during the work: anatomic dissection of cadaveric material, clinical examination, X-ray, ultrasonographic, electrocardiographic, hematological and biochemical blood sample tests.

Clinical study of animals was carried out at the initial appointment, as well as during treatment by methods which are generally accepted in veterinary medicine. At the same time, examination and thermometry were conducted, anamnesic data was collected, and auscultation of the cardiac impulse and pulmonary fields and palpation of the injured part of the animal's body were carried out.

Animal's blood was aspirated by puncture of the forearm vein to conduct hematological examinations. Complete blood count was carried out on a semi-automatic hematology analyzer Mindray BC-2300 using a standard set of original reagents. At the same time, the number of leukocytes, erythrocytes, hemoglobin level, hematocrit, and platelet count were determined. Leukogram was made and the ESR was determined on the Panchenkov's apparatus after counting the formed elements.

Biochemical study of blood serum was conducted on the biochemical analyzer Sinnova BS-3000P using the Diakon DDS and Vital reagents. Aspirated blood in a volume of 4 ml was settled for an hour and then was centrifuged at 3000 rot / min for 5 min to obtain blood serum.

Liver enzymes (alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase), bilirubin, cholesterol, total protein and its fractions (albumins, globulins), glucose, creatinine and urea levels were determined in blood serum. The presence or absence of C-reactive protein was determined using Ecolab latex test systems.

X-ray studies were conducted before the operation to verify the diagnosis, as well as after 2 and 4 weeks of fixation of bone fragments on a digital X-ray apparatus "Vatel-1" in the front and side projections. If it was necessary, studies were carried out in the skew-sagittal projection.

RESULTS AND DISCUSSION.

Anatomic dissection of cadaveric material was carried out in order to clarify the localization of important anatomical structures (muscles, vessels, nerves) of the pelvic area. After that, characteristic fractures of the iliac wing and the body of ischium as the most common fractures were modeled.

Afterwards, a bone plate was placed on the skeleton, modeling it to the surface of the wing and the body of the ilium.

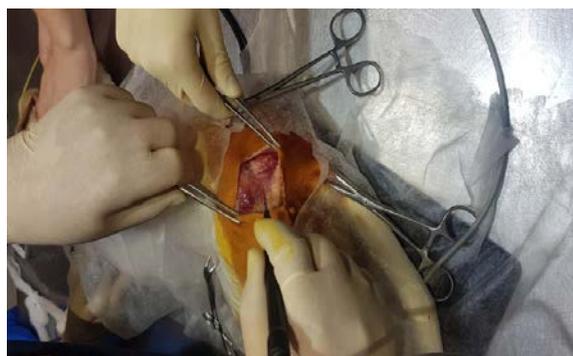


Fig. 1 - Soft tissue incision and sciatic nerve dislocation



Fig. 2 - Detachment of the cranial fragment of the wing of the ilium



Fig. 3 - Dislocation of the sciatic nerve



Fig. 4 - Fixation of bone fragments



Fig. 5 - Replacement of bone fragments in position



Fig. 6 - Installed bone plate on the body of the ilium

The plate was fixed on the wing of the ilium in the direction from the wing to the body of the bone in the ventrodorsal direction, trying to create an angle between the fracture line and the plate close to 90°. At the same time, bone plates were used which were fixed with cortical screws M 2 -3, depending on the somatic parameters of the animal. Before twisting-in of the screws, the channel was drilled beforehand with a Kirschner's wire or a drill, depending on the diameter of the holes in the plate.

Before application of the plate on the body of the Ilium, the plate was modeled, bending it lateromedially on the transverse axis. Then it was attached to the body of the bone in the cranio-caudal direction according to the technology described above.

85 animals were received at the initial appointment because of bone injuries during the research period. Of these, there were 35 animals – 41.2% (15 dogs and 20 cats) with pelvic bone fractures, and 50 animals – 58.8% (22 dogs, 28 cats) with tubular bone fractures.

The reasons were autotraumas – 40% (14 cases), catatraumas – 55% (19), accidental traumas – 3% (2), inhuman attitude to an animal – 2% (1).

In most cases there was unsatisfactory/unstable clinical (shortness of breath, tremor, low temperature (less than 37.5 ° C), anemia or cyanotic mucous membranes, low blood pressure (85.4 / 62.4 mm Hg) vomiting, hypersalivation) hemobiochemical state of animals (low hematocrit, anemia, increased transaminase activity, elevated creatinine and urea levels). In addition to that, crepitation of fragments of pubic, ischial and iliac bones, compression or dislocation of the bladder, compression of the rectum and the body of the uterus (in the case of females) were noted with additional rectal examination.

After stabilization of the patients' condition, confirmed by clinical and laboratory, and ultrasonographic data and clarification of the localization of the fracture, osteosynthesis was conducted radiographically.

The patient was fixed in the lateral position at the fracture of the wing or the body of the ilium. The operative field was prepared according to Pirogov after neuroleptanalgesia with 2% xyla and zoletil. Soft tissue incision and sciatic nerve dislocation were performed (Fig. 1). Then, using the blunt method, the sciatic nerve was detached (Fig.2). Bone fragments (wing or body of the Ilium) were replaced in position (Fig.3). After that, the bone fragments were fixed with the towel clips (Fig.4). They were replaced in position (Fig.5). And the bone plate was set according to the method described above (Fig. 6).

The surgical wound was sutured layer-by-layer. In the postoperative period, standard therapeutic measures were carried out (sanitation of sutures, antibiotic therapy, dosed loads, physiotherapy). X-ray monitoring was performed immediately after surgery and after three weeks of fixation. Support ability began to appear by the 2-3 days after surgery, indicating a rigid

and stable fixation of fragments. Stato-locomotor act was restored in animals depending on body weight, the degree of muscle compression, the nature and severity of the fracture 3-4 weeks after the operation.

Analysis of the work done suggests that the extra-cortical osteosynthesis in fractures of the wing and the body of the ilium, the body of the ischium allows creating a rigid and stable fixation throughout the rehabilitation period. This ultimately creates the prerequisites for the rapid and full restoration of the stato-locomotor act. Our data complement the existing vast experience in the use of extra-cortical osteosynthesis in fractures, including pelvic bones. However, the location of the plate on the body and the wing of the ilium at an angle close to 90°, modeling the plate to the plane of the body of the sciatic bone make it possible to conduct osteosynthesis itself more efficiently and to obtain excellent or good anatomical and functional results.

CONCLUSION.

Thus, analyzing the obtained material, it can be confirmed that in the structure of fractures in dogs, fractures of the pelvic bones comprise 41.2%. The main reasons are auto- and catatraumas. The location of the bone plate in fractures of the wing and the body of the ilium at an angle close to 90° allows to conduct stable and functional osteosynthesis and to achieve early recovery of the stato-locomotor act. With that, the plate is located ventrodorsally and is attached with two screws to the cranial fragment and with two screws to the caudal one. In case of fractures of the ischial body, the plate must first be modeled to the plane of the body of the current bone, and then, having installed it craniocaudally, also fix it with two screws to the cranial fragment and with two screws to the caudal one.

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