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Ultrasound Characteristics of Traumatic Spleen Injuries in Small Animals.

Vladimir Ivanovich Trukhachev*, Roman Aleksandrovich Tcygansky, Irina Ivanovna Nekrasova, Peter Anatol'evich Khorishko, and Angelina Nikolaevna Shulunova

Stavropol State Agrarian University, Stavropol, 355017, Russian Federation

ABSTRACT

The article presents the data of ultrasonic examinations of 96 dogs and 187 cats of different breed and ages, after abdominal traumas of various origins in the period from 2010 to 2015. Traumatic injuries in the spleen were recorded 12,5% (n = 12) cases in dogs and 10,2% (n = 19) cases in cats. Of them at the dogs - n = 10 hematoma, rupture the capsule of spleen n = 2; at the cats - hematoma n = 9, spleen rupture n = 3, bullet wounds of spleen n = 4, splenic vein thrombosis n = 3, combined pathology n = 3. The main causes traumatic injuries of the spleen were: high-rise syndrome cats, the injuries in a car accident, the bullet wounds in spleen of cats. Results of ultrasonic characterization of various traumatic injuries of the spleen. Cats, unlike dogs with traumatic injuries of the spleen were recorded thrombosis, segmental branches of splenic vein. It has been established, that the capsule tear, thrombosis, segmental branches of the splenic vein and bullet organ damage in cats are not accompanied by significant hemorrhages and did not significantly affect the overall hemodynamics.

Keywords:ultrasound diagnostics, spleen, splenic pathology, trauma, cats, dogs.

**Corresponding author*

INTRODUCTION

In clinical medical and veterinary practice, non-invasive and one of the most informative methods for diagnostic imaging of the spleen is ultrasonography (US) [1; 2].

With the traditional two-dimensional gray-scale scan, you can get information about the body's location, size, relationship to surrounding tissues and organs, and the circuit state of the parenchyma. When organ blood flow can be assessed with color Doppler mapping not only qualitatively but also quantitatively.

Of the pathologies of the spleen, diagnosed by ultrasound in small animals found a tumor splenitis, splenomegaly, hematoma.

Timely and qualitative diagnosis is important in urgent pathologies of the spleen, such as volvulus (twisting) and the gap. Inversion of the spleen - a pathology typical of large dogs [3; 4] requires urgent surgical.

In modern conditions, become available, new ultrasound imaging of the spleen options such as choelastografiya, the use of ultrasound tissue harmonic and contrast enhancement [5; 6].

Despite the fact that the spleen traumatic injury in small animals do not occur frequently, their effects can be life threatening to bear character. In the literature, it is not lighted ultrasound diagnostic questions spleen injury in small domestic animals, especially cats.

The aim of the study was to describe the characteristics of ultrasonic parameters for injuries of the spleen of various origins have small pets.

MATERIAL AND METHODS

The object of the study were different breed and ages dogs and cats after abdominal traumas of various origins, inspected in the Scientific and veterinary diagnostic and treatment center of the Stavropol State Agrarian University, Stavropol, Russia in the period from 2010 to 2015. In total 96 dogs and 187 cats. Ultrasound was performed on scanners Medison SA 800 SE, Medison R7 (Samsung MedisonBldg, Seoul, Korea), by the usual method using multifrequency c Convex, microconvex and linear transducers with a frequency range from 3.5 to 14 MHz, depending on the size of the animal. The study was conducted in two-dimensional gray-scale imaging mode (B-mode), and the color Doppler mapping.

RESULTS AND DISCUSSION

Traumatic injuries in the spleen were recorded 12,5% (n = 12) cases in dogs and 10,2% (n = 19) cases in cats. Of these dogs - n = 10 hematoma, splenic capsule tear n = 2; cats - hematoma n = 9, spleen rupture n = 3, bullet wounds spleen n = 4, splenic vein thrombosis n = 3, combined pathology n = 3.

The main causes of traumatic injuries of the spleen were cats altitude syndrome, the injuries in a car accident, gunshot wounds of the spleen in cats.

Early hematoma of spleen visualized as a limited portion of reduced echogenicity in organ parenchyma (Fig. 1, 3). If it is localized subscapular, the contour of the capsule can be deformed in a dome-like protrusion (Fig. 1). Often-uneven contour of the hematoma from the thickness of the parenchyma, and vice versa - even from the capsule. Because of the evolution of hematoma after a few days it becomes heteroehogennoy boundaries lose sharpness (Fig. 2, 5).

When you break the body of the capsule is not have visualized in the line of site of injury and a marked fragmentation of the spleen circuit (Fig. 3, 4). In the first hours after the trauma at the periphery of the body is possible to visualize the free fluid (hemoperitoneum).

When the bullet wounds of the spleen can be visualize wound channel in the form of a linear strip with indistinct contours slightly increased echogenicity. On the «input» and "output" are registered heterogeneous areas extending beyond the contour of the body and are thrombi (Fig. 6).

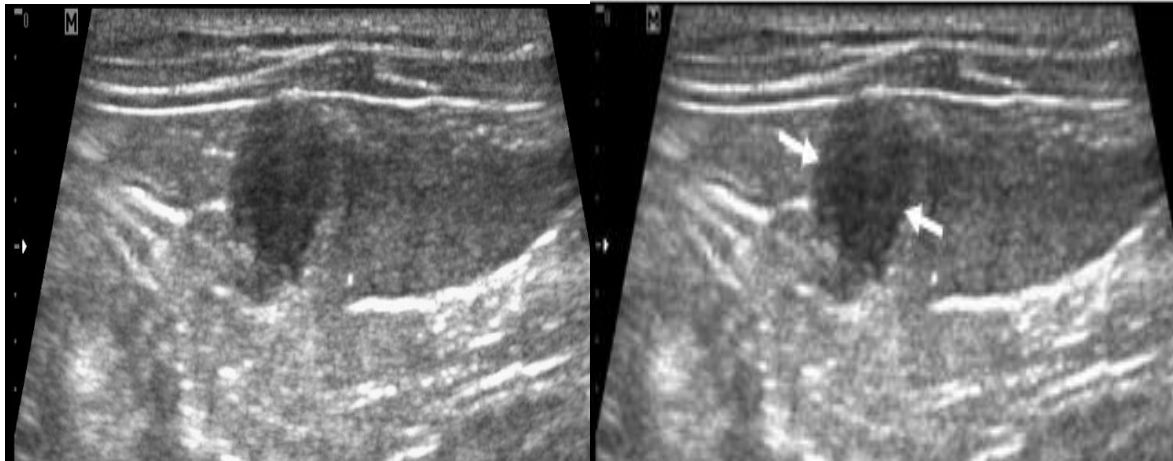


Figure 1: Left: early hematoma Spleen 8-10 hours after injury (purebred cat 2 years); Right: the same, with the symbols. Hematoma (→ ←) is have visualized in the form of a rounded education, hypochoic, close to anehogennoe, with a clear, smooth contour.

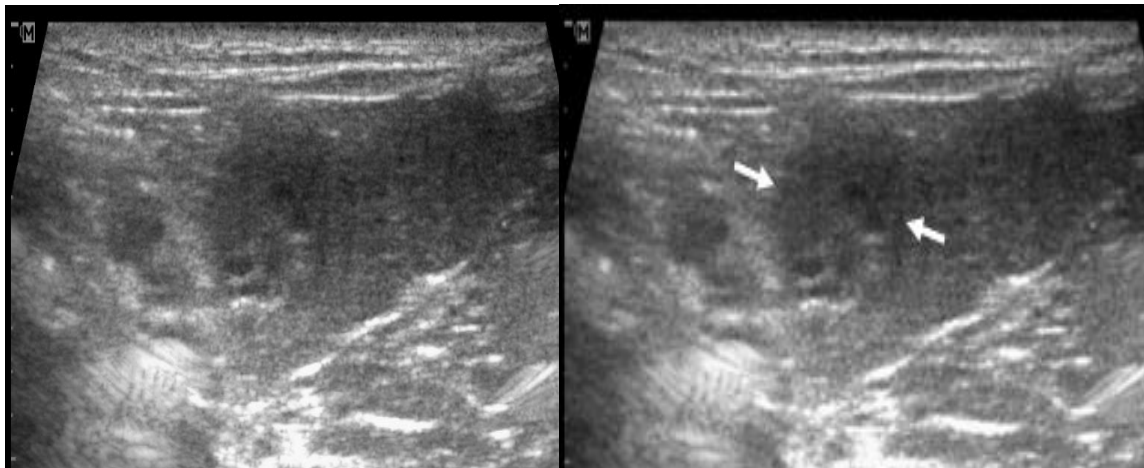


Figure 2: On the left: the same hematoma (Figure 1), 2 days after the injury (purebred cat 2 years); Right: the same, with the symbols. Ehogennost hematoma (→ ←) tends to increase, there is the heterogeneity, and the boundaries are have poorly expressed.

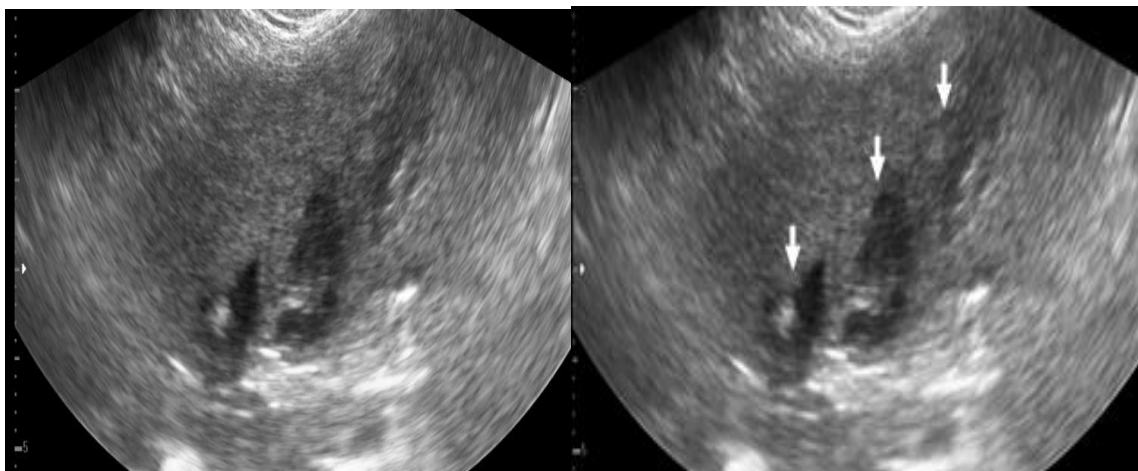


Figure 3: Left: multiple hematomas of the spleen (a dog of 2.5 years, kurzhaar, female); Right: the same with the notation.

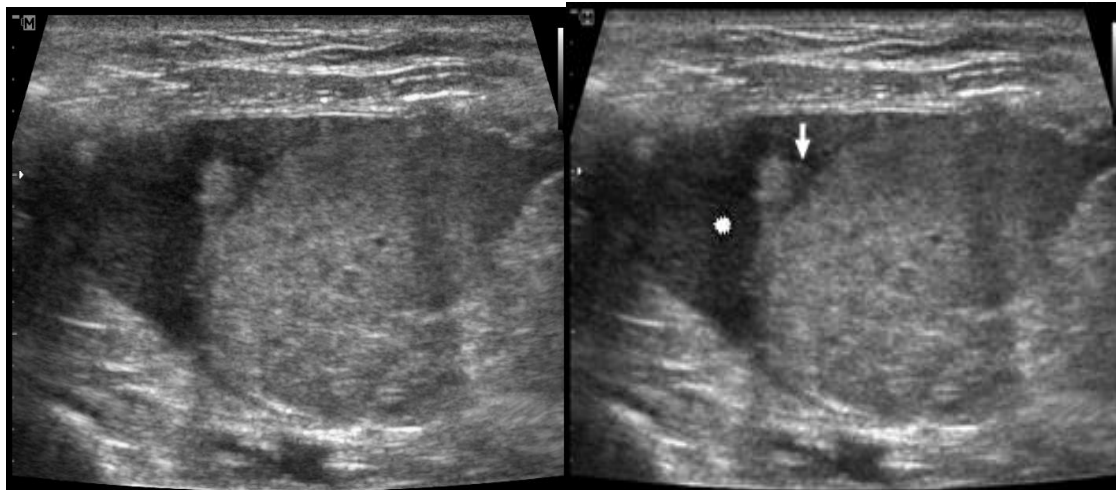


Figure 4: Left: splenic rupture, hemoperitoneum (purebred cat, 3 years); Right: the same with the notation. spleen contour at the fracture is fragmented (↓), the capsule is not visualized circuit in place of rupture hypoechoic fluid being blood (*).

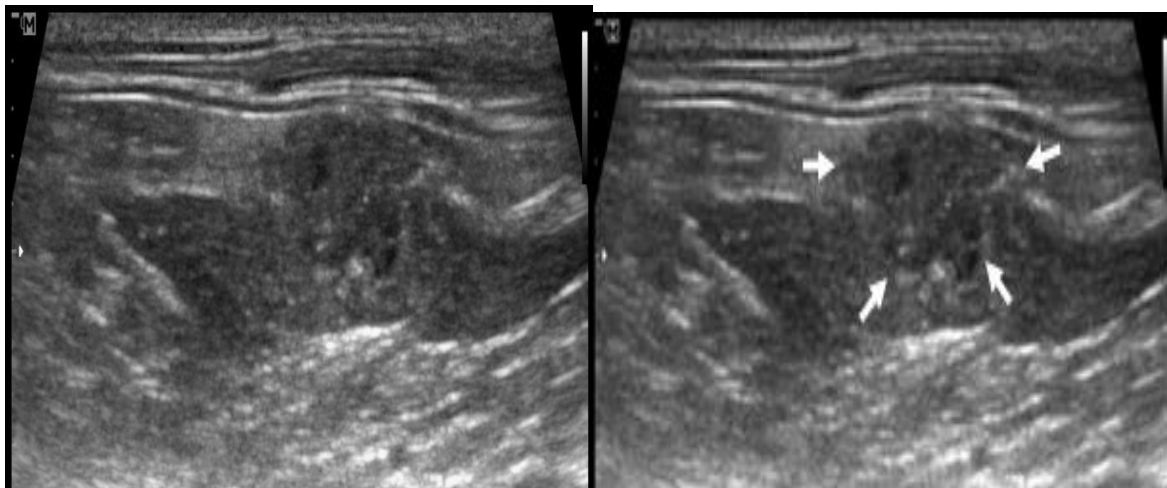


Figure 5: Left: hematoma of the spleen to rupture the capsules 3rd day after injury (cat 3 years, Don Sphynx); Right: the same with the notation. In the place there is no gap contour of the capsule. Hematoma and hemorrhage (→ ←) heteroechoicly presented thrombotic masses.

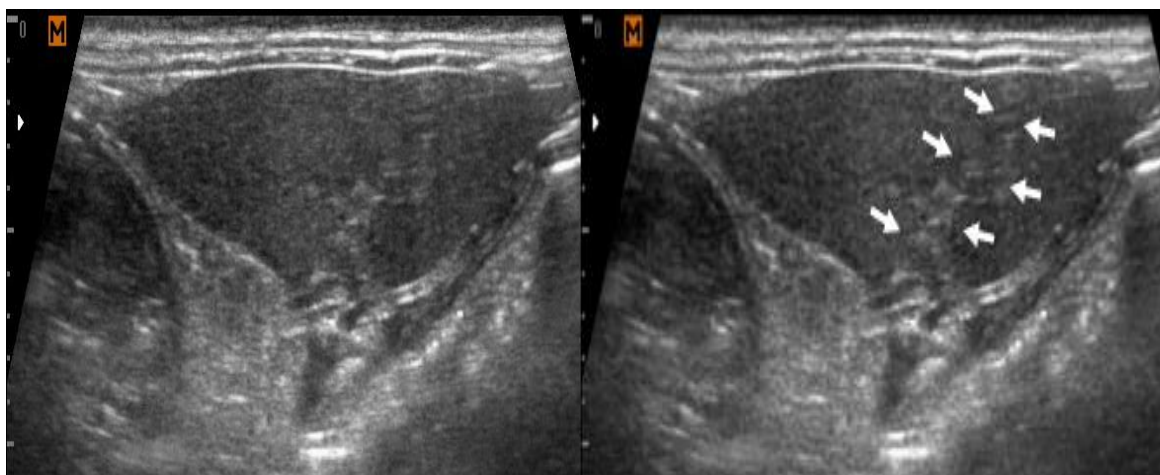


Figure 6: Left: The wound channel on the visceral surface of the spleen with a bullet wound (cat 5 years old, Siamese); Right: the same with the notation. After the body of the spleen has been uneven, slightly hyperechoic band (→ ←).

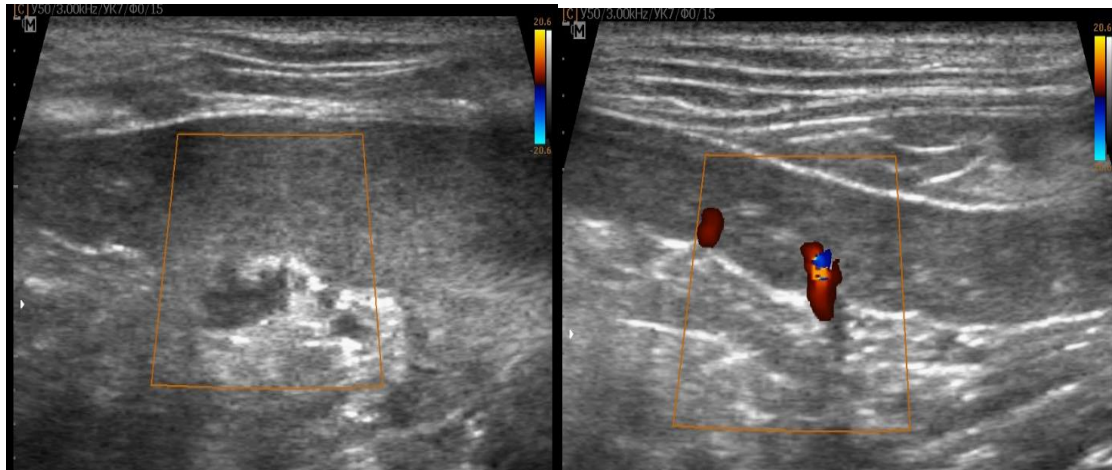


Figure 7: Left: thrombosis, segmental branches of the splenic vein in the cranial part of the spleen. No Doppler signal in the DRC mode. Right: visualization of blood flow in the vessels intact segmental branches of the splenic vein to the caudal part of the body to the DRC (cat 3 years purebred).

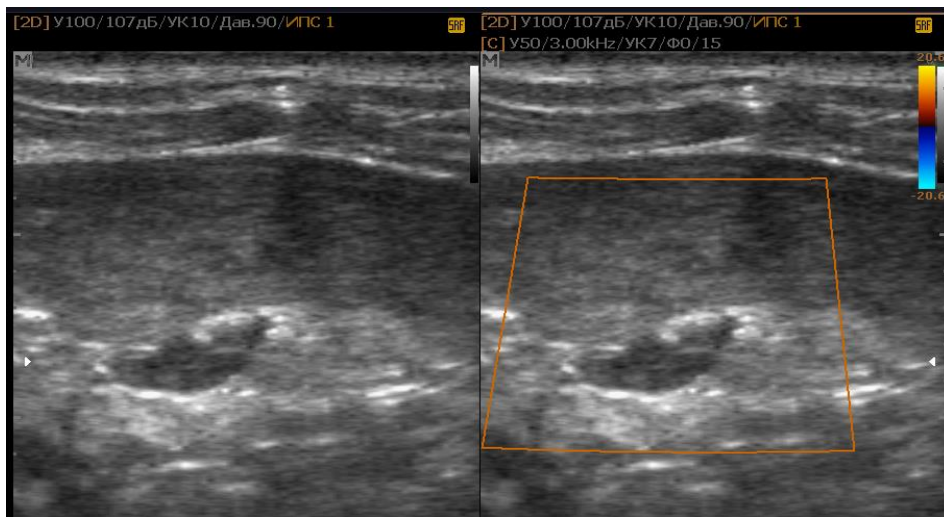


Figure 8: 2B scan mode + duplex mode with the DRC on the right. Thrombosis of segmental branches of the splenic vein (11 months cat purebred), the absence 'of Doppler signal.

Color Doppler (DRC) Mapping to diagnose hemodynamic abnormalities in the blood vessels of the spleen. Therefore, we recorded blood flow disturbance in some segmental branches of the splenic vein of cats after injury (Fig. 7, 8).

Traumatic injuries of the spleen in small domestic animals according to the results of our observations are have presented hematomas, anguish body, bullet wounds, and venous thrombosis of the spleen.

Visualization hematoma depends on the statute of limitations. Early hematoma more homogeneous, hypo- or anechoic usually have a pronounced flat or uneven contour. Evolution hematomas, even within 48 hours results in a change in the ultrasound picture and upward heterogeneity echogenicity hematoma, with the smaller hematoma, the more pronounced these changes.

We did not observe deviations in the overall deterioration of hemodynamics and general condition of the cat thrombosis segmental branches of the splenic vein. Perhaps the compensatory mechanisms that determine the characteristics of the morphology of the splenic vessels cats, allow support of blood circulation in the body without major violations. [1]

We have not recorded splenic vein thrombosis in dogs with injuries of the spleen accompanied by rupture of the capsule body or entity intraorganic hematomas. During the observation period (2010-2015

years), we have not registered any case of twisting of the spleen in dogs. In the study of 80 dogs with splenic vein thrombosis, the authors found that the causes of thrombosis were neoplasia (mainly lymphomas), corticosteroids, systemic inflammatory response syndrome, disseminated intravascular coagulation syndrome, pancreatitis and immune-mediated diseases system (mainly hemolytic anemia).

Bullet wounds of the spleen, which we have seen, were made from airguns, apparently teenagers. Wound channel from a bullet in the thickness of the parenchyma of the spleen has no clear contours and presented a slightly uneven hyperechoic band, the thickness of which is comparable with the diameter of the bullet. We did not observe significant hemorrhage and local hemodynamics in disorders of the spleen injuries gunshot wounds.

CONCLUSION

Thus, the ultrasound diagnosis of the spleen is a highly non-invasive method of investigation, including urgent pathology organ.

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