DOI 10.7251/VETJSR040G **UDK 636.7.09:616.33-073**
Original Scientific Paper

RADIOLOGICAL DIFFERENTIATION OF GASTRIC DILATATION AND TORSION IN DOGS

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Abstract: Gastric dilation and volvulus in dogs is an acute, multifactorial, and potentially life-threatening condition, characterized by the accumulation of gas in the stomach, leading to its malposition. This syndrome requires rapid and efficient diagnosis due to frequent complications such as cardiogenic shock and animal death. The aim of this study was to describe the characteristic radiological signs of gastric dilatation and volvulus in order to enable their timely differentiation. The study was conducted from July 2020 to December 2023 and a total of 48 dogs with symptoms of gastric dilatation and volvulus were examined. On native radiographs, simple gastric dilatation was observed in 14.58% of cases, while gastric dilatation with volvulus was recorded in 85.42% of dogs. In 77.08% of dogs, a 180° torsion was diagnosed, characterized by gastric compartmentalization and malposition of the fundic and pyloric regions of the stomach. A 360° torsion was identified in 8.33% of animals, presenting as marked gastric distension but without compartmentalization**.**
Key words: dilatation, dog, radiology, stomach, volvulus

INTRODUCTION

Gastric dilatation and volvulus in dogs represents a significant problem that can have serious consequences for the animal's health. It is defined as an acute and multifactorial condition, that is, a syndrome characterized by rapid accumulation of gas in the stomach, leading to gastric malposition and increased intragastric pressure.

Consequently, often due to complications, cardiogenic shock and death of the animal may occur (Sharp and Rozanski, 2014; Hendriks et al., 2011).

For these reasons, this condition requires rapid and effective diagnosis followed by appropriate therapy. Clinical examination provides important information about the animal's condition; however, mild forms of gastric dilatation may remain undetected and, within a short period of time, progress and become life-threatening. In dogs showing signs of gastric dilatation and volvulus, radiographic examination is recommended in order to establish a definitive diagnosis. It is advised that radiography be performed prior to surgical intervention, but only after medical stabilization in life-threatened patients (Broome and Walsh, 2003).

Radiological signs of gastric dilatation and volvulus in dogs are insufficiently described, and due to the urgent nature of this condition, knowledge of their radiographic differentiation is of exceptional importance. When dilatation and volvulus occur, the stomach becomes gas-filled and twists along its longitudinal axis. The most common type of volvulus is a 180° clockwise rotation, although the degree of torsion may vary from 90° to 360°. Gastric dilatation with counterclockwise volvulus occurs rarely and has been reported only sporadically in the veterinary literature (Zweig and DeGroot, 2022; Paris et al., 2011).

Simple gastric dilatation and gastric dilatation with 360° volvulus have a similar radiographic appearance, with the main difference being the position of the pylorus. In addition, a difference in the degree of organ distension may also be observed. In animals with simple dilatation, the pylorus is located ventrally and to the right of the midline, whereas in cases of volvulus its malposition is evident. The localization of the pylorus in animals with gastric volvulus primarily depends on the degree of torsion.

The aim of this study was to describe the characteristic radiographic signs of gastric dilatation and volvulus in dogs in order to enable their timely differentiation

MATERIALS AND METHODS

The study was conducted from July 2020 to December 2023 in the territory of the city of Novi Sad, Republic of Serbia. A total of 48 dogs were presented to a veterinary clinic with clinical signs of gastric dilatation and volvulus. The animals differed in breed, sex, and age.

Following admission and collection of anamnestic data, a clinical examination of the animal was performed. Depending on the clinical condition and the time of onset of gastric dilatation and volvulus, medical stabilization of vital functions was carried out in individuals whose general condition was assessed as critical. Subsequently, radiographic diagnostics were performed, with imaging carried out without sedation of the animal. Native abdominal radiography was most commonly performed in the right lateral projection. In cases where sufficient diagnostic information was not obtained, additional imaging in the dorsoventral and left lateral projections was performed. The ventrodorsal projection was not performed due to an increased risk of aspiration of

gastric contents. Radiographic imaging was performed using a ZooMax Gold unit (Control X-Medical, Hungary).

All obtained results were processed using standard statistical methods with the application of the IBM SPSS 24.0 software package.

RESULTS AND DISCUSSION

A total of 48 dogs with clinical signs of gastric dilatation and volvulus were examined, of which 70.8% (34/48) were males and 29.2% (14/48) were females. The mean age of the examined dogs was 7.2 ± 2.6 years. Although the number of male dogs was higher in this study, no sex predisposition for the development of gastric dilatation and volvulus was observed (Monnet, 2003). In addition, other authors report that this condition is more frequently identified in older dogs, with a mean age of 7.4 ± 3.4 years (Fischetti et al., 2004).

Figure 1 shows the occurrence of gastric dilatation and volvulus among different dog breeds, with the highest incidence diagnosed in German Shepherd Dogs (43.75%) and Doberman Pinschers (16.67%). These findings are consistent with reports by other authors indicating that purebred dogs, as well as dogs with deep chests, are more predisposed to the development of this pathological condition. Gastric dilatation with volvulus affects all breeds; however, it is more commonly diagnosed in large and giant dog breeds, highlighting breed size as an important risk factor in the development of this condition (O'Neill et al., 2017; Glickman et al., 2000).

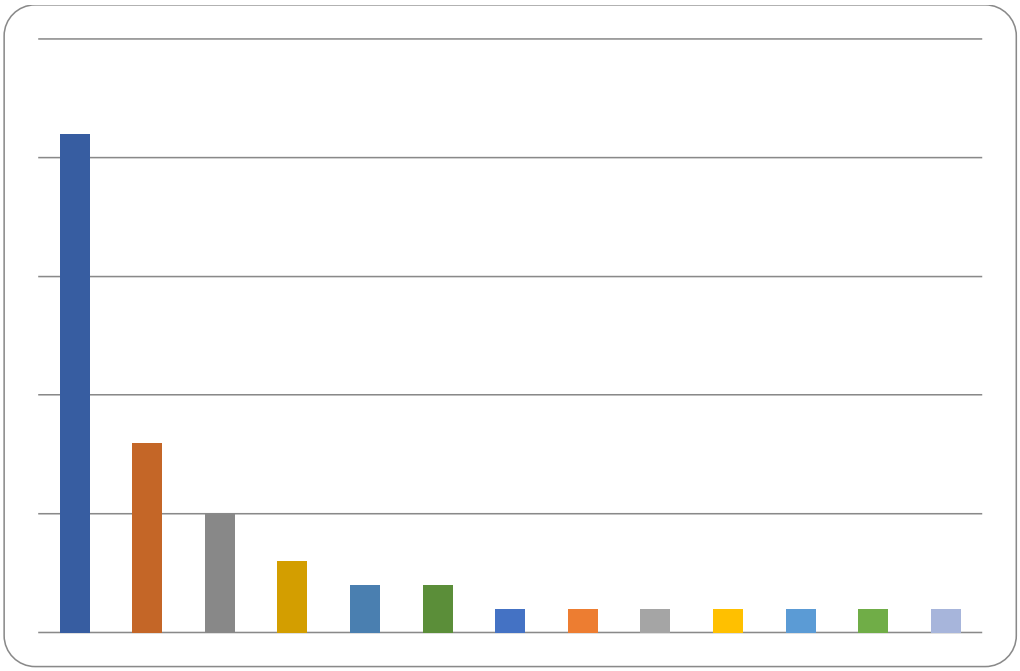
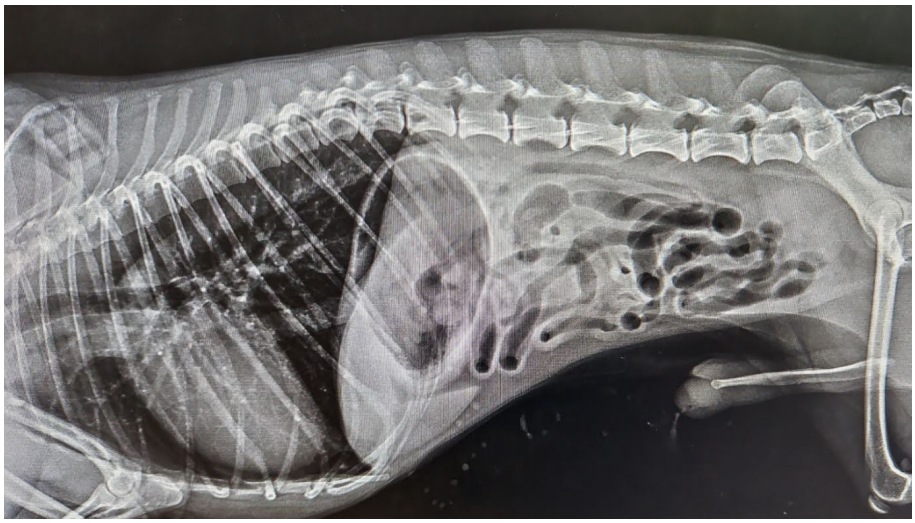


Figure 1. Breed predisposition for gastric dilatation and volvulus in dogs

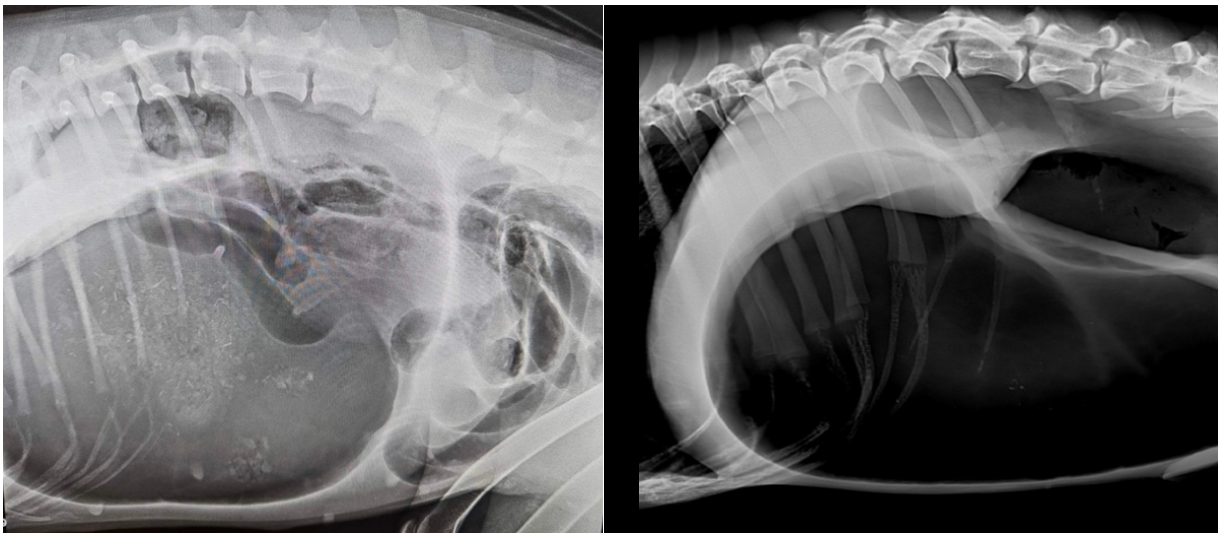
On native radiographs, simple gastric dilatation was observed in 7 (14.58%) individuals (Figure 1), while gastric dilatation with volvulus was recorded in 41 (85.42%) dogs.



Picture 1. Simple gastric dilatation in a small-breed mixed-breed dog. The radiograph shows gastric distension resulting from gas accumulation.

In 77.08% (37/48) of dogs, a 180° clockwise torsion was diagnosed, characterized by gastric compartmentalization and malposition of the fundic and pyloric regions of the stomach (Figure 2). In 180° torsion, the pylorus is displaced dorsally, to the left of the midline. On lateral radiographs, a single soft-tissue shadow can be clearly seen, representing the wall of the pyloric and fundic regions. Gastric compartmentalization is visible due to this soft-tissue shadow, giving a characteristic appearance resembling a reversed Cyrillic letter "c."

A 360° clockwise torsion was identified in 4 animals (8.33%), presenting as marked gastric distension but without compartmentalization. Heterogeneous granular shading within the body of the stomach, resembling the presence of "gravel" (gravel sign), was observed in 11 (22.92%) dogs (Figure 2). Studies have shown that such granular opacities in the gastrointestinal tract may indicate poor motility and delayed gastric emptying, suggesting chronic partial obstruction (Altuzarra et al., 2018). According to these authors, dogs with chronic partial obstruction may be predisposed to developing gastric dilatation and dilatation with torsion. Gastric dilatation with counterclockwise torsion was not diagnosed.



Picture 2. Radiographic appearance of gastric dilatation with volvulus in a dog. The left radiograph shows granular opacities indicating the presence of "gravel," while the right radiograph displays the characteristic radiographic appearance resembling a reversed Cyrillic letter "c."

In addition to gastric dilatation and volvulus, the presence of a foreign body in the stomach (6.25%), esophageal dilatation (37.5%), splenomegaly (29.17%), and loss of serosal detail (64.58%) were diagnosed, while signs of gastric pneumatosis and pneumoperitoneum were not observed. According to Altuzarra et al. (2018), loss of serosal detail is more frequently observed in animals with chronic gastrointestinal pathology.

The presence of a foreign body in the stomach represents a significant risk factor for the development of gastric dilatation with volvulus in dogs. de Battisti et al. (2012) noted that the risk of this condition increases in predisposed dogs if a foreign body is present in the stomach. The presence of free gas in the abdomen indicates gastric perforation, which can be detected on radiographs as signs of pneumoperitoneum. Gastric wall perforation most commonly occurs in cases of severe dilatation or in 360° gastric torsion (Broome and Walsh, 2003). Research by Fischetti et al. (2004) highlighted the difficulty in detecting radiographic signs of gastric pneumatosis, emphasizing the importance of proper radiographic technique.

CONCLUSION

In practice, failures in the radiographic differentiation between simple gastric dilatation and gastric dilatation with volvulus are common, which is why a thorough understanding of their visualization on radiographs is essential. The main radiographic sign of a 180° clockwise torsion is the presence of gastric compartmentalization, whereas in 360° torsion, only signs of marked organ distension are observed.

Conflict of Interest: The authors declare that there is no conflict of interest.

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