Gastrointestinal (GI) obstruction is a life-threatening condition that should always be considered in the differential diagnosis of dog and cat diseases involving acute and chronic GI symptoms. Mechanical or functional obstruction leads to local circulatory obstruction, water-electrolyte abnormalities, hypovolemia and shock. Complications may include intestinal perforation, tissue necrosis, peritonitis, toxaemia and death. GI obstruction in dogs and cats is often caused by the anatomical predisposition in the intestinal structure of small animals and their constant presence in a human environment, one conducive to the swallowing of inappropriate and inedible objects (1, 2, 7, 8, 19).

An early diagnosis of GI obstruction improves prognosis. Clinical symptoms of obstruction are not specific and depend on the location, degree of obstruction and developing disorders in fluid circulation. In order to make the final diagnosis, imaging methods are used: x-ray and/or ultrasound. The only effective solution is surgical or endoscopic removal of the cause of the obstruction (1, 12, 13, 19).

The aim of the study is a clinical analysis of animals with GI symptoms, determination of GI obstruction frequency and evaluation of the diagnostic value of ultrasound examinations in the determination of such diagnosis.

Material and methods

The study was performed on 38 animals (31 dogs and 7 cats) of different breeds, including mixed breeds of both
The animals were brought in for examination due to clear symptoms from the GI tract. The animals were subjected to a full clinical examination. On the basis of the history and physical examination, the animals were referred in an outpatient procedure, without prior preparation, for an abdominal ultrasound examination, which indicated a GI obstruction. The examination was performed by an experienced radiologist using MyLab™ Class C – Esaote, Aloka ProSound SSD 4000 equipment. A 7.5 MHz linear probe was used in most animals, while a low frequency < 6 MHz convex and microconvex probe was used in 2 cats. The study was performed after the animals had been placed in a supine position in accordance with the existing recommendations.

The main ultrasound criteria for the diagnosis of GI obstruction were: presumed image of a foreign body, presence of a “target sign”, presence of a pendulous flow of content within the dilated intestine, the “accordion sign”, segmental dilatation of the intestine, gas or fluid-filled intestine, presence of free peritoneal fluid and presence of cholestasis. The ultrasound examination also indicated the presence of pain caused by the compression of the probe on the abdominal wall.

The animals with the ultrasound-confirmed presence of obstruction were referred for surgical treatment. The animals in which obstruction was excluded were subjected to clinical re-evaluation and further diagnostics followed by intense conservative treatment.

**Results and discussion**

The examined dogs and cats showed acute and chronic symptoms from the GI tract. The clinical trial analysed the main and accompanying symptoms. The evaluated primary symptoms included vomiting (34/38), constipation lasting more than 3 days (20/38), diarrhoea (19/38), abdominal distension (5/38), abdominal pain (4/38), rectal pressure (3/38) and dark coloured stools (3/38). At least three or more primary symptoms were present in 38 animals, as shown in Table 1. GI obstruction was suspected in all animals out of 38 animals were affected by gastric and/or intestinal obstruction. This represents 39.5% of animals admitted with vomiting, diarrhoea and/or constipation. The presence of foreign bodies was the cause of obstruction in 80% of cases, with intussusception accounting for the remaining 20% of the cases.

| Tab. 1. The incidence of clinical manifestations of major clinical symptoms in dogs and cats suspected of gastrointestinal obstruction (n = 38) |
|-----------------|-----------------|
| Analysed GI symptoms | Incidence |
|-----------------|-----------------|
| Vomiting | 34/38 |
| Constipation for longer than 24 hours | 20/38 |
| Diarrhoea | 19/38 |
| Abdominal distension | 5/38 |
| Abdominal pain | 4/38 |
| Rectal pressure | 3/38 |
| Dark coloured stools | 3/38 |

Tab. 2. Frequency of the occurrence of relevant ultrasound symptoms in animals with and without obstruction after laparoscopic confirmation

| Ultrasound symptom   | Number of animals with the symptom | Animals with surgically confirmed obstruction | Animals without obstruction |
|----------------------|------------------------------------|---------------------------------------------|-----------------------------|
| “Target sign”        | 5                                  | 4                                           | 1                           |
| Presumed outline of a foreign body | 14                                | 6                                           | 8                           |
| “Accordion sign”     | 1                                  | 1                                           | 0                           |
| Segmental intestinal dilations | 18                                | 12                                          | 6                           |
| Fluid-filled loops in bowel | 7                                  | 6                                           | 1                           |
| Free peritoneal fluid | 8                                  | 6                                           | 1                           |
| Cholestasis          | 5                                  | 1                                           | 4                           |

Explanations: “Target sign” – intussusception, the appearance is generated by concentric alternating echogenic and hypoechogenic bands.
The evaluation of the diagnostic value of ultrasound imaging indicates 88.2% (15/17) effectiveness and, by taking into account the correct diagnosis of subsiding obstruction before surgery, the result increases to 94.1% (16/17).

During the medical examination, the animals showed GI symptoms. Vomiting, diarrhoea and constipation dominated in more than half of all the animals (19-34/38). Other symptoms described in the course of obstruction were relatively rare: abdominal distension, increased tension of the abdominal wall with rectal pressure and pain during palpation with the possibility of indicating the area of obstruction (3-5/38). The outlined clinical picture, with the prevalence of three highly non-specific symptoms, did not enable a precise diagnosis. Apart from obstruction, the list of differential diagnoses included local inflammations and general metabolic, infectious and neoplastic diseases. The dominance of vomiting, diarrhoea and constipation in the course of obstruction in the dogs and cats observed in the studies is consistent with previous observations (1, 7, 8, 12, 13). However, on the basis of deep palpation, it is rare to find pain and indication of the area of obstruction, which was only possible in individual cases. This observation confirms that pain is only “occasional”, “sporadic”, or “rare”, which is confirmed by other authors (1, 17, 19). It is also worth noting that the number of pain reactions increased from 4 to 7 animals after the abdominal ultrasound, involving compression exerted by the probe. Ultimately, obstruction was only confirmed in 4 of them. The results indicate the rare incidence and low specificity of pain as a symptom of GI obstruction.

The decision to perform a quick ultrasound examination in the surgery was made because of the advantages of this method over conventional radiography, which is indicated by numerous authors. These advantages include: lack of ionising radiation, no need for anaesthesia, shortened examination time, ability to observe intestinal mobility, visualization of intestinal wall layers and examination of adjacent structures such as lymph nodes, pancreas, liver and spleen, which are usually not visible radiologically (6, 9, 14, 15, 18).

The ultrasound examination was performed in accordance with existing guidelines for imaging of abdominal organs in dogs and cats with suspected obstruction (4, 5, 10, 11, 15, 16). In this study, 33 out of the 38 examined animals showed at least one ultrasound sign of GI obstruction. In many animals several ultrasound symptoms were observed. Eventually, it was decided that 17 animals had GI obstruction, which were then referred for surgery. In one of these animals the obstruction subsided during the preoperative therapy. In the ultrasound image of this animal, a “target sign” was observed, suggesting an intussusception of the intestine. In this case, however, it should be assumed that the diagnosed obstruction was functional rather than mechanical, and the improvement took place after the water-electrolyte imbalance was corrected and proper intestinal motility was restored.

Surgical procedures were performed in 16 animals, the presence of obstruction was confirmed in 15 animals while in 1 animal it was not. In the case of the animal with unconfirmed obstruction, the ultrasound image also showed a “target sign”. However, laparotomy showed that the lesions were inflammatory and also a segmental, acute, diffuse swelling of the small intestine wall. Macroscopic changes could explain the possibility of the formation of an ultrasound image with many concentric circles resembling the “target sign” symptom to some extent. This lesion was the reason for the diagnostic error.

Foreign bodies were found in 12 animals: 4 in the stomach (33.3%) and 8 in the intestines (66.7%). The anatomical distribution of foreign bodies observed coincides with the observations of other authors (1, 3, 7, 12, 13). After a study on a large group of animals, Hayes, similarly to other authors, stated that 63% of all foreign bodies in dogs are located in the jejunum.

The clinical analysis of the animals with symptoms of vomiting, diarrhoea and constipation indicates that GI obstruction occurred in as many as 39.5% of the animals. The obtained result is higher than the results previously demonstrated. Manczur et al. (9) showed obstruction in 29.5% of animals, Sharma et al. (15) in 33% and Fromme et al. (5) in 24.6% in a recent study. The result of the study indicates that serious, life-threatening obstruction in dogs and cats persists, even with a tendency for quantitative growth. It seems therefore appropriate that this phenomenon be monitored and its importance periodically referred to as a clinical, diagnostic and therapeutic problem in the treatment of small animals.

The ultrasound examination performed during these studies showed an efficacy of 88.2% and thus its clinical usefulness in the diagnosis of GI obstruction was confirmed. Similar results were obtained by other authors (5, 9, 14, 15, 17). Among them, Sharma et al. (15) reported up to 97% efficacy. The result of these studies should therefore be considered satisfactory and the examination itself safe and effective for diagnosing GI obstruction in dogs and cats.

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