

CASE REPORT

Companion or pet animals

Gastroesophageal intussusception with complete herniation of the spleen in a 12 months old dog with idiopathic megaesophagus

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Abstract

A 12 months old, castrated male, mix-breed dog was presented due to acute onset of vomiting, retching, anorexia, and tachypnoea. Idiopathic megaesophagus was diagnosed three months prior to presentation. Radiographic and CT examination revealed gastroesophageal intussusception with herniation of the complete spleen into the intussusception. After initial stabilization surgical treatment was performed. The stomach and spleen were manually reduced into the abdomen. Due to questionable viability of the gastric wall an inverting suture pattern was used to invaginate the compromised part. Left sided gastropexy was performed to reduce risk of recurrence. Additionally oesophagopexy was performed to reduce the risk of hiatal hernia due to intraoperative damage to the hiatus. The patient recovered uneventful and was discharged from hospital five days following surgery. Conservative treatment of concurrent megaesophagus was continued. At last follow up, 10 months later, the dog was clinically fine, had gained weight, and showed no signs of regurgitation.

BACKGROUND

Gastroesophageal intussusception (GEI) is a rare condition in dogs and GEI combined with herniation of the spleen into the thoracic portion of the oesophagus only described in the minority of cases.^{1–7} The pathogenesis of GEI is still unclear, but megaesophagus, oesophageal dysmotility disorders, or laxity of the oesophageal hiatus are discussed to be predisposing factors for GEI, with 36 % of patients having megaesophagus prior to GEI³ and 50% of patients with GEI showing different oesophageal disorders.^{3,8} Young, male, medium to large breed dogs, and especially German shepherd dogs are overrepresented in the literature.^{2–6,8–10} The onset of clinical signs is mostly acute and immediate surgical treatment is recommended. However, chronic gastro-intestinal signs or acute worsening of chronic signs (chronic-to-acute) are described as well.^{3,8,9}

CASE PRESENTATION

A 12 months old, castrated male, mix-breed dog was presented due to acute onset of vomiting, retching, tachypnoea, lethargy, anorexia, and abdominal pain. On presentation at the emergency service the dog's mentation was reduced and he was found to be 8% dehydrated. Clinical examination showed an increased respiratory rate (52 breaths per minute), tachycardia (152 bpm), a prolonged capillary refill time of 2 s, and the patient was hypotensive (systolic blood pressure 80 mmHg).

The dog has already been presented to the clinic three months earlier due to persistent regurgitation and not

gaining weight. The diagnosis of idiopathic megaesophagus was made following a complete clinical, neurological, endoscopic, and laboratory examination, including acetylcholine antibodies, T4 and testing for vector borne diseases (PCR for *Anaplasma phagocytophilicum*, *Babesia*, *Ehrlichia canis*, and *Leishmania*). During oesophagoscopy the oesophagus was severely distended, starting at the caudal cervical part and throughout the complete thoracic portion of the oesophagus and no peristalsis was detectable. The hiatus seemed normal at that time point and mild oesophagitis was diagnosed during endoscopy. Following the diagnosis of idiopathic megaesophagus the owner was instructed to feed small portions of food four times daily from an elevated position and recommendation was given to use a Bailey's chair. Further, omeprazole (1 mg/kg, twice daily, PO, OMEP MUT, Hexal AG, Holzkirchen, Germany), sucralfate (25 mg/kg, twice daily, PO, Sucrabest 1 mg Tabletten, Combustin GmbH, Hailtingen, Germany), and betanechol (0.5 mg/kg, three times daily, PO, Myocholin-Glenwood, Glenwood GmbH, Munich, Germany) were prescribed. After initiation of medical treatment the dog showed only mild symptoms of intermittent regurgitation and started to gain weight.

INVESTIGATIONS

Complete blood count revealed leucocytosis ($29.5 \times 10^9/L$) with mature neutrophilia ($27.3 \times 10^9/L$) and a packed cell volume of 66.3%. Mild hypokalaemia (3.4 mmol/L), azotaemia (creatinine 210 $\mu\text{mol/L}$, BUN 22.6 mmol/L), hyperproteinaemia (68.1 g/L), increased lactate (5.1 mmol/L), and

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mildly increased liver enzyme values (ALT 98 U/L, AP 221 U/L, AST 52 U/L) were found on blood chemistry.

Radiographs of the thorax revealed a gas filled and highly dilated oesophagus and a ovoid soft tissue opacity within the mid- and caudo-dorsal thoracic cavity extending from the fifth rib to the diaphragm. Further, severe ventral and right-sided displacement of the trachea and an alveolar lung pattern with air bronchograms within the right lung lobe were detectable (Figures 1 and 2). In the abdominal radiographs the stomach and spleen were not detectable within the abdominal cavity; the rest of the abdomen was radiologically unremarkable.

The tentative diagnosis of GEI was made based on these findings and surgical treatment recommended to the owner.

Prior to surgery a native CT scan of the thorax and abdomen was performed under general anaesthesia. CT showed severe dilatation of the oesophagus (caudal cervical and complete thoracic portion) and the oesophagus was partially fluid filled. Starting at the fourth rib, gastric tissue was detectable within the oesophageal lumen and from the seventh rib on splenic tissue was also visible within the intussusception, surrounded by gastric tissue (Figures 3 and 4). The trachea was deviated to the right side by the dilated oesophagus and the right cranial and middle lung lobes as well as the ventral part of the left cranial lung lobe showed increased density, consistent with atelectasis or pneumonia.

DIFFERENTIAL DIAGNOSIS

In accordance with the radiographic features the main differential diagnosis was GEI. Other differentials are a hiatal hernia (type 1–type 4),¹¹ a oesophageal foreign body, soft tissue mass/neoplasia, or diaphragmatic hernia.

TREATMENT

Prior to anaesthesia intravenous fluids (Sterofundin ISO 1/1 ISO, B.Braun AG, Melsungen, Germany) and flow-by oxygen were administered to stabilize the patient's cardio-vascular situation. After premedication with methadone (0.2 mg/kg

LEARNING POINTS/TAKE HOME MESSAGES

- GEI is a major differential diagnosis in dogs with megaesophagus and acute worsening of their gastro-intestinal symptoms.
- Early diagnosis, immediate patient stabilisation and surgical treatment are crucial for a successful outcome. In case of gastric wall necrosis an inverting suture pattern can be added to the surgical treatment without interference of the left-sided gastropexy.
- Long term outcome can be good in patients with GEI and concurrent megaesophagus if owners are willing to optimize feeding management and proceed with conservative treatment of megaesophagus.

IV, Comfortan, Albrecht GmbH, Aulendorf, Germany) and midazolam (0.2 mg/kg IV, Midazolam-ratiopharm, Ratiopharm GmbH, Ulm, Germany) anaesthesia was induced with propofol intravenously (2–5 mg/kg, Narcofol, CP-Pharma, Burgdorf, Germany). After endotracheal intubation anaesthesia was maintained with isoflurane in oxygen. Metamizol (30 mg/kg IV, Novacen, cp Pharma, Burgdorf, Germany) was administered as an additional analgesic. During the surgical procedure intravenous fluids were maintained at 5 ml/kg/h using sterofundin.

Following the CT scan the patient was positioned in dorsal recumbency and the abdomen was routinely prepared and draped for a midline celiotomy. A midline incision was made from the xyphoid to just cranial to the prepuce. The stomach was completely invaginated into the oesophagus up to the pyloric antrum. The complete spleen and parts of the omentum were invaginated into the stomach. The oesophageal hiatus seemed anatomically normal. Reduction of the spleen into the abdomen was easy to perform, but reduction of the stomach was only possible after incising the diaphragm and enlargement of the hiatus using a Metzzenbaum scissor. Short gastric vessels between the stomach and

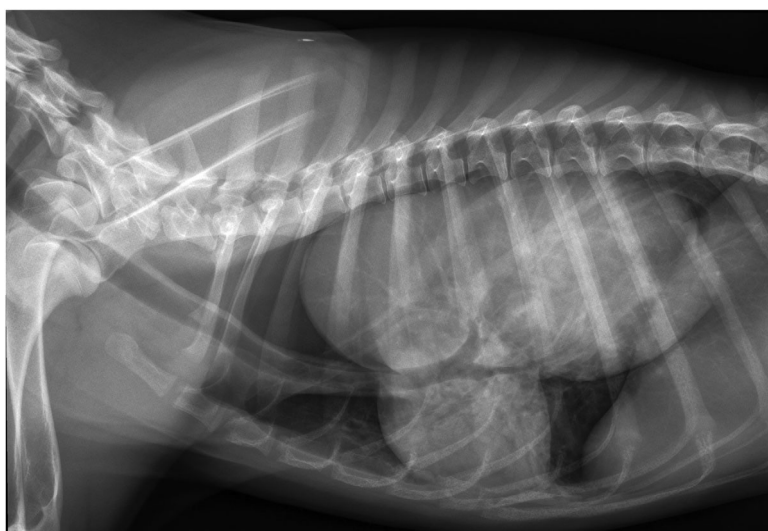


FIGURE 1 Left lateral thoracic radiograph: Gas filled and highly dilated oesophagus and a ovoid soft tissue opacity within the mid- and caudo-dorsal thoracic cavity, extending from the fifth rib to the diaphragm, is visible. The trachea is displaced towards ventral, an alveolar lung pattern with air bronchograms is present ventrally to the tracheal bifurcation



FIGURE 2 Ventro-dorsal thoracic radiograph: Gas filled and highly dilated oesophagus is visible cranially to the heart silhouette. The trachea is deviated towards the right side and the right middle and right cranial lung lobe show increased density and air bronchograms. The ovoid soft tissue opacity is extending from the diaphragm towards cranial



FIGURE 4 Coronal CT image (soft tissue window): a hypo- and iso-dense soft tissue mass is visible within the thoracic cavity extending from the oesophageal hiatus towards cranial. The spleen, splenic vessels, and omentum are detectable within the intussusception (gastric tissue). Stomach and spleen are not visible within the abdomen



FIGURE 3 Axial CT image at the level of the seventh thoracic vertebra (soft tissue window): A large roundish hypo- and iso-dense opacity is visible occupying the right dorsal and dorso-lateral hemithorax. Gastric mucosa (asterisk) is detectable within the soft tissue mass. The tracheal bifurcation is deviated towards ventral and the heart silhouette seems compressed. The right middle lung lobe shows increased density

the spleen were partially torn, but the spleen seemed viable, only mildly congested and remaining vessels showed good pulsation. The stomach was dilated, hyperaemic, and showed no peristalsis and along the fundus and the lesser curvature the serosal surface was dark purple and the gastric wall seemed palpatorily thinner than normal (Figure 5). Therefore,

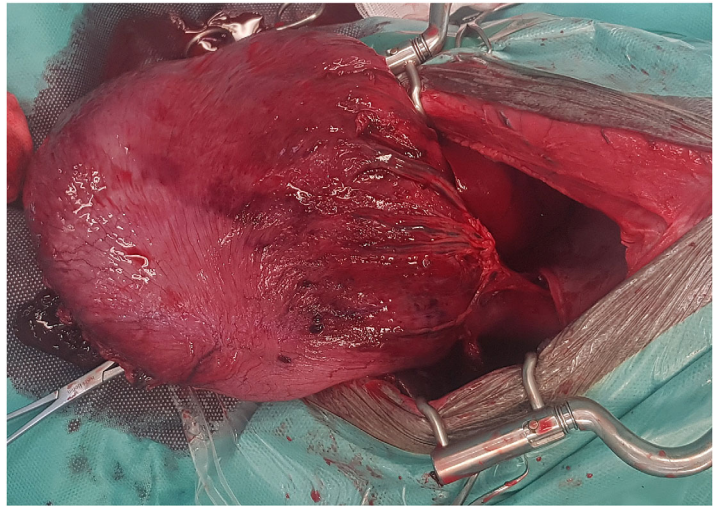
invagination of the probably necrotic gastric wall was performed using a Cushing suture pattern and resorbable suture material (Monocryl 2-0 USP, Ethicon, Johnson & Johnson Medical GmbH, Norderstedt, Germany).

Afterwards the incision in the diaphragm was closed with three interrupted cruciate mattress sutures using Monocryl 2-0. A feeding tube was used as a temporary thoracic drain to evacuate free air and establish negative pressure within the thoracic cavity. The tube was removed after the diaphragm has been closed and negative pressure was established. Oesophagopexy was performed as described in the literature¹² to reduce the risk of a postoperative hiatal hernia due to iatrogenic damage of the hiatus while repositioning of the stomach. A left-sided incisional gastropexy was added to the surgical treatment using PDS 0 suture material to prevent recurrent GEI. The potentially necrotic area of the gastric fundus did not interfere with the left-sided incisional gastropexy procedure. Abdominal closure was performed routinely in three layers.

Postoperatively a latero-lateral thoracic radiograph was taken to evaluate lung tissue and the thoracic cavity for potential pneumothorax. The radiograph showed a mild pneumothorax and mild alveolar lung pattern with air bronchograms over the heart base and around the tracheal bifurcation. Severe dilatation of the oesophagus and deviation of the trachea towards ventral was still visible.

The patient recovered uneventfully from anaesthesia, but oxygen supply was necessary within the first 24 hours following surgery due to decreased arterial oxygen partial pressure while breathing room air. Arterial oxygen partial

FIGURE 5 Intraoperative view onto the stomach after reduction from the oesophagus (cranial is to the right). The cardia, parts of the fundus, and lesser curvature are reddish to dark purple in colour. Gastric wall thickness was palpatorily reduced compared to other areas of the stomach



pressure normalized during the first two days following general anaesthesia. Medical treatment consisted of omeprazole, sucralfate, maropitant (1 mg/kg, once daily, IV, Emex, cp Pharma, Burgdorf, Germany), and amoxicillin clavulanic acid (15 mg/kg, twice daily, IV, AmoxClav Hexal, Hexal AG, Holzkirchen, Germany). Analgesia was maintained using a fentanyl-ketamin CRI during the first two days following surgery (2–5 $\mu\text{g}/\text{kg}/\text{h}$, Fentadon, Dechra Veterinary Products Deutschland GmbH, Aulendorf, Germany; 0.2 $\mu\text{g}/\text{kg}/\text{h}$, Anesketin, Albrecht GmbH, Aulendorf) and continued with Novaminsulfon (30 mg/kg, three times daily, PO, Novaminsulfon-ratiopharm, Ratiopharm GmbH, Ulm, Germany). Twelve hours postoperatively oral feeding was initiated with small portions fed five times daily in an elevated position, to support passage of food into the stomach and reduce the risk of regurgitation.

Orthogonal radiographs of the thorax were taken five days following surgery and showed a physiologic lung pattern without signs of aspiration pneumonia or atelectasis; the oesophagus was still severely dilated and gas filled throughout the complete thoracic portion. Antibiotic treatment was discontinued by that time and the dog was discharged and gastroprotective drugs were prescribed for another two weeks.

OUTCOME AND FOLLOW-UP

The owner continued elevated feeding using a Bailey's chair. Gastroprotective medication was discontinued two weeks after hospital discharge. Approximately one month following surgery the dog showed an episode of regurgitation and treatment with metoclopramide (0.2 mg/kg, three times daily, PO, MCP-ratiopharm, Ratiopharm GmbH, Ulm, Germany) and omeprazole was initiated. Radiographically megaesophagus was still present by that time, but no signs of aspiration pneumonia visible. At the last follow up, ten months following surgery, no clinical signs of regurgitation or vomiting were present. The dog had gained weight and the owner reported normal activity levels. Thoracic radiographs showed unchanged radiographic findings compared to former radiographs.

DISCUSSION

This case report describes the positive outcome of an adult mix-breed dog with complete intussusception of the stomach and the spleen into the oesophagus. GEI is a rare condition, mostly observed in immature patients younger than three months of age.^{4,6,8,9} Adult patients, like in the present case report, are seen less common.

Megaesophagus is discussed to be one potential factor leading to GEI⁹ and was present in 36% of dogs prior to GEI in one recent multicentre study.³ Recurrent regurgitation and vomiting can lead to reflux oesophagitis, dilatation of the lower oesophageal sphincter and increases intraabdominal pressure, what might cause intussusception of the stomach into the oesophagus. Severe idiopathic megaesophagus was diagnosed in the dog of this present case report three months prior to acute GEI. Endoscopic examination of the oesophagus, as part of the clinical work up of suspected megaesophagus, revealed mild oesophagitis. The lower oesophageal sphincter seemed normal at that time. Elevated feeding and medical treatment, which was started after diagnosis of idiopathic megaesophagus, reduced the frequency of regurgitation, but symptoms remained, what might have led to GEI in our patient.

Besides the stomach, displacement of the spleen or other abdominal organs can occur, but is reported less common^{1,3,7} and often the spleen is herniated only partially into the oesophagus. In one case report the spleen was displaced next to the oesophagus through the oesophageal hiatus (paraesophageal hiatal hernia).¹³ In our case the whole spleen was invaginated into the intussusception. This has been described in only a few cases so far.^{1,7} Splenectomy was not necessary in the present case due to only mild signs of congestion and preserved viability of the spleen. Gastric wall viability was questionable along the gastric fundus during surgery and an inverting Cushing suture pattern was used to invaginate the affected area of the gastric wall. Left-sided incisional gastropexy was not affected by the inverting suture and was performed routinely. Therefore, combination of an inverting suture and left-sided gastropexy seems feasible in these kind of patients, reducing the risk of surgical field contamination compared to a partial gastrectomy. Oesophagopexy,

as described for surgical treatment of hiatal hernias,¹² was performed in the present case after the hiatus and part of the diaphragm had to be incised to facilitate reposition of the stomach. Iatrogenic damage to the oesophageal hiatus might lead to increased hiatal laxity and secondary to hiatal hernia. Only one case report can be found in the veterinary literature describing surgical treatment of GEI combined with a oesophagopexy.¹⁴ In this case increased hiatal laxity was diagnosed. If this naturally occurring laxity is comparable to iatrogenic damage to the hiatus and if this surgical step was necessary in the present case remains unclear. No complications associated with the oesophagopexy could be detected during the follow-up period.

Increased lung tissue opacity, which was seen in the preoperative thoracic radiographs, was rather due to compression and atelectasis secondary to the GEI, than due to aspiration pneumonia. In the postoperative period the dog showed no signs of infection like fever or lethargy, and thoracic radiographs were unremarkable five days postoperatively.

Tentative diagnosis of GEI can be made by radiography in most cases. Other diagnostic procedures are contrast enhanced radiographs, oesophagoscopy, and ultrasonography.^{2,4,7,10} Computed tomography has not been described as an diagnostic procedure in dogs with GEI in the veterinary literature so far. It allows for the differentiation between a hiatal hernia and GEI and allows identification and evaluation of the invaginated abdominal organs.

Postoperative feeding management is an important factor for successful long term outcome in patients with concurrent megaesophagus.³ Good owner compliance led to a significant reduction in the frequency of regurgitation in the present case and no signs of aspirations pneumonia occurred during the follow up period of months following surgery.

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