
**CONTRAST ENHANCED ULTRASONOGRAPHY OF THE
GASTROINTESTINAL TRACT USING POLYETHYLENE GLYCOL
ELECTROLYTE SOLUTION FOR THE DIAGNOSIS OF INTESTINAL
OBSTRUCTION AND ITS SURGICAL MANAGEMENT IN A DOG**

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ABSTRACT

Contrast enhanced ultrasonography (CEUS) refers to the use of ultrasound contrast medium in conventional ultrasonography to enhance the visualisation of the region under study. A two year old male Labrador Retriever, weighing 27 kg was presented with a history of anorexia and intermittent vomiting since one week. Abdominal radiography showed a radiopaque foreign body within the intestine. Conventional ultrasonography could not provide proper intestinal lumen visibility due to gas artefacts. Contrast enhanced ultrasonography was done after giving polyethylene glycol (PEG) electrolyte solution via nasogastric intubation. Gas artefacts were reduced and the segmented dilated loops with accumulated contrast medium was visible. Dilated and normal loops could be identified sonographically. Exploratory laparotomy with enterectomy and enteroanastomosis was performed to

correct the condition. The animal made an uneventful recovery. The surgical and sonographical findings were retrospectively compared.

Keywords: Contrast, Ultrasonography, Polyethylene glycol

INTRODUCTION

Intestinal obstruction was responsible for approximately 20 percent of surgical admission for acute abdominal conditions. The small bowel was involved in 60-80 percent of intestinal obstructions (Maglinte, 1997). Conventional ultrasonography has limitations in evaluating gastrointestinal tract. A contrast material can reduce the gas artefacts and enhance both intraluminal and gastrointestinal wall visibility. Filling of the stomach with water or liquids might reduce acoustic gaseous artifacts and improve evaluation of the gastric wall (Maconi, 2009). Oral contrast-enhanced

gastric ultrasonography is superior to conventional gastric ultrasonography in defining the anatomic location and extension of gastric lesions (Xiao-Zhi Zheng, 2017). The present paper reports usage of PEG for contrast enhanced ultrasonography of gastro intestinal tract in a dog for diagnosis of intestinal obstruction.

CASE HISTORY AND OBSERVATIONS

A two year old male Labrador Retriever, weighing 27 kg was presented to the Teaching Veterinary Clinics Complex, Pookode, Wayanad, with a history of anorexia and intermittent vomiting since one week. The animal was weak and dehydrated with congested mucous membrane and pain evinced while palpating the right abdomen. Complete blood count revealed

marked leucocytosis with granulocytosis. Radiography revealed radiopaque foreign body within the left cranial abdomen (Fig. 1 and 2)

CONVENTIONAL ULTRASONOGRAPHY

Conventional ultrasonography revealed air filled intestinal loops and empty stomach with no clear sonographic details (Fig. 3 and 4) Differentiating foreign bodies from shadowing of gas artefacts is a difficult task. Peristaltic movement was also found reduced.

CONTRAST ENHANCED ULTRASONOGRAPHY

The contrast agent used was isotonic PEG electrolyte solution used for bowel cleansing in humans. PEG electrolyte solution was prepared by adding 300 ml tap water to 100 ml commercial PEG electrolyte solution. Nasogastric intubation using infant feeding tube (FG-7) was done after desensitizing the nasal region using proparacaine eye drops and lignocaine

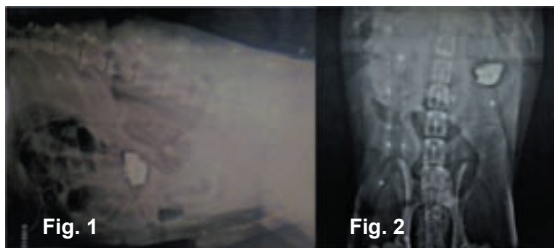


Fig. 1&2 - Lateral and ventrodorsal abdominal radiographs

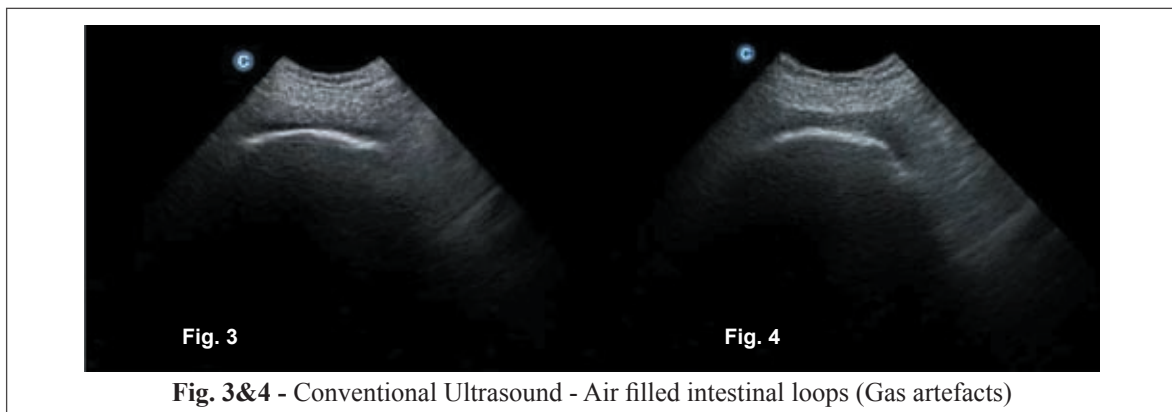


Fig. 3&4 - Conventional Ultrasound - Air filled intestinal loops (Gas artefacts)

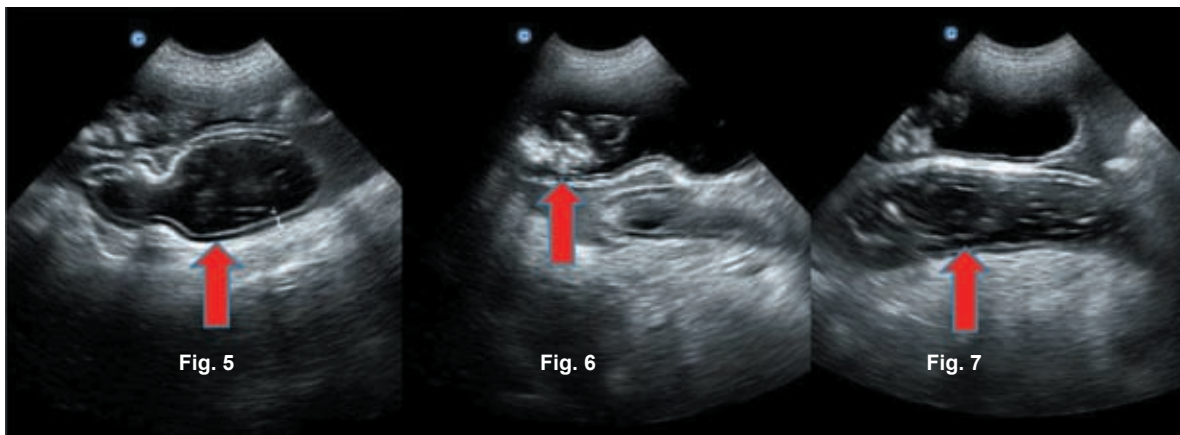


Fig.5. - Dilated and sonographically enhanced visualisation of intestinal loop with PEG. **Fig.6** - Enhanced visualisation of fluid-foreign body interface in intestinal lumen. **Fig.7** - Dilated loops with stagnant pool of PEG

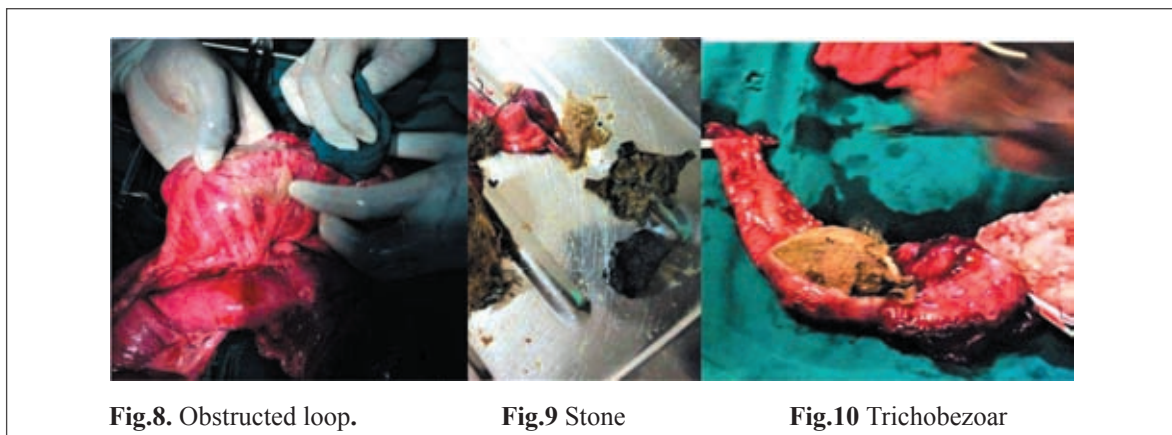
gel. Contrast agent was given through the nasogastric tube using a 50ml syringe at the dose rate of 20ml per kg body weight. Abdominal ultrasound of the gastrointestinal tract (GI) was performed immediately and at 15 minutes interval.

TREATMENT AND DISCUSSION

The stomach was dilated with anechoic contrast medium. The contrast medium entered small intestine (duodenum, identified by thickened mucosal layer)

within 20 minutes of administration.

The contrast enhancement of the gastrointestinal tract enabled clear visualisation of intestinal loops, luminal margins and its walls. The wall layers became clearer (Fig.5, 6 and 7). Foreign body –fluid interface could be delineated. The segmented dilated loops in sagittal and transverse section with pooling of contrast agent was clearly visible. Lack of peristaltic movement and resultant pooling indicated



atony of loops and a possible obstruction.

SURGICAL INTERVENTION

Exploratory laparotomy revealed a trichobezoar and a stone in the duodenum and jejunum, respectively. The duodenum and jejunum was found dilated and filled with fluid anterior to the site of obstruction. Enterotomy was done to remove the stone. Enterectomy and enteroanastomosis of duodenum was performed to correct the obstruction due to trichobezoar . The animal made an uneventful recovery.

Ultrasonography of the gastrointestinal tract is an important tool in diagnostic workup of gastrointestinal affections. The presence of gas in dilated loops of intestine during gastrointestinal obstruction is a major hindrance for effective sonographic evaluation. Filling of the gastrointestinal tract with echo poor liquids can overcome the problem of gaseous artefacts.

Contrast enhanced ultrasonography is widely used and studied extensively in human practice. The objective of this procedure is to diagnose or visualize pathological lesions inside the gastric or intestinal lumen. Seldom researches have been conducted in the case of animals. In the case of gastrointestinal tract, conventional ultrasonography has its own limitations, considering the gas artefacts within the

lumen. An ideal G.I contrast agent should not get absorbed within the stomach or intestine. It should pass the entire GI tract, with minimum absorption and side effects. Studies have been conducted using water as a contrast agent for better visualization of stomach. Since water is absorbed, the use of water as contrast agent for sequential examination of gastro intestinal tract is questionable. PEG, being non absorbable and laxative, is a contrast agent of choice which can be used to conduct contrast enhanced ultrasonographic studies of gastro intestinal tract. Each 25 ml PEG electrolyte solution contains-

PEG (3350 IU) = 13.12g, NaCl = .035g, NaHCO₃ = 0.17g, KCl = 0.04g

SUMMARY

A two year old Labrador Retriever was presented with symptoms of acute abdominal signs. Conventional ultrasonography did not provide significant details and visibility, owing to gas artefacts. Contrast enhanced ultrasonography was done to visualize the intestinal lumen using PEG electrolyte solution. The results were correlated with surgical outcome. The present article discusses the use of PEG as luminal contrast agent that may prove useful for bowel sonography for identifying gastrointestinal obstructions and bowel wall lesions. Exploratory laparotomy with

enterectomy and enteroanastomosis was performed to correct the condition. The animal made an uneventful recovery.

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