

ULTRASOUND DIAGNOSIS

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History

A four-year-old, female, domestic short hair cat was presented at the Chulalongkorn University, Small Animal, Veterinary Teaching Hospital with a rectal prolapse for two days and a history of chronic constipation. After a reduction of the affected rectum, the cat was still depressed and anorexic. A physical examination revealed pale pink mucous membranes and about 7% dehydration. There was no evidence of an abdominal cramp. Haematological and biochemical profiles showed a marked leukocytosis ($31,700 \times 10^3$ white blood cells/ μl) and anemia (4.9×10^6 red blood cells/ μl , 7 g/dl hemoglobin, 25% haematocrit) Plain abdominal radiography was performed and revealed a focal area, 3x6 cm, of increased soft tissue opacity in the left caudal quadrant of the abdominal cavity. An abdominal ultrasonography was performed to differentiate the lesion.

Ultrasonographic Findings

Real-time, ultrasonographic images were obtained using an 8 MHz microconvex, phased array transducer with the cat in dorsal recumbency. The abdominal soft tissue opacity seen on the recent radiographs was focally localized in the left side of the caudal-abdomen, between the jejunum/ileum and distal colon. This mass was solid and elongated, about 2 by 6 cm in diameter. In longitudinal scan plane, it ultrasonographically appeared as linear streaks of multiple layers of alternating hypoechoic and hyperechoic bowel wall within the lumen of colon (intussusciens) (Figure 1A and 2A). In transverse plane through the same location, this mass contained multiple concentric hypoechoic and hyperechoic rings, representing the superimposed wall layers of the intussusceptum and intussusciens (Figure 1B and 2B). The invaginated portion (intussusceptum) involved a segment of ileum, which had a characteristic feature as the "wagon-wheel" sign. The intestinal lumen was mildly dilated with fluid because of mechanical obstruction. There was a mild wall thickening (3.5 mm thick) of the distal jejunal segment, affecting primarily the muscular layer. Ultrasonography of other abdominal organs appeared normal in echotexture.

Ultrasonographic Diagnosis

Ileocolic intussusception

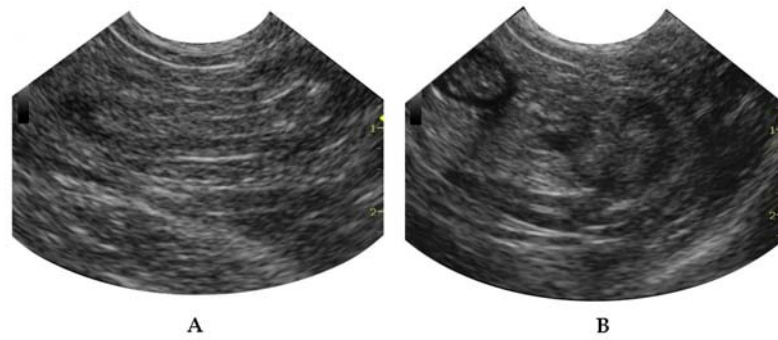


Figure 1 Ultrasonographic images of the ileocolic intussusception diagnosed in a four-year-old, female, domestic short hair cat in dorsal recumbency. A. A longitudinal sonogram illustrating multiple layers of bowel wall within the lumen of colon (intussusciens). B. A transverse sonogram through the intussusception presented in A showing the ileum (intussusceptum) displaced into the colon.

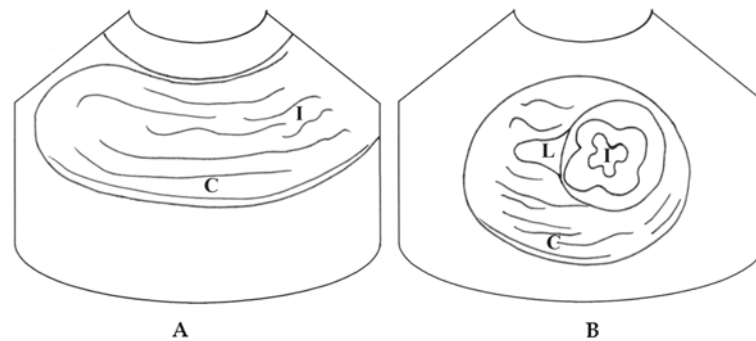


Figure 2 Schematics of the relative positions of the structures scanned in figure 1. C -colonic wall (intussusciens), I -ileum (intussusceptum); L -fluid-filled intestinal lumen.

Comments

The classic ultrasonographic sign of an intussusception in the transverse plane is the multilayered series of alternating hypoechoic and hyperechoic concentric rings of the bowel wall. These rings represent the superimposed wall layers of the intussusceptum (invaginated inner wall layer of the proximal segment) and intussusciens (outer wall layer of the distal segment). In cats, the ultrasonographic pattern depends on the orientation of the scan plane respect to the axis of intussusception, the location and length of tissue involved and the duration the animal affected (Patsikas et al., 2003). The origin of the concentric hypoechoic rings is the thickened and edematous bowel wall of the intussusciens, whereas the central hyperechoic core may represent the multiple interface of compressed mucosal and serosal surfaces of the intussusceptum, associated with some trapped luminal gas and invaginated mesenteric fat. A neoplastic mass, lymph node, pseudocyst or foreign body maybe seen within or close to the intussusception site (Penninck, 2008). The bowel wall thickness and layer of the intussusceptum may not change, as an appearance of the ileum demonstrated in this cat. Normal ileal segment in the cat has more prominent submucosa and muscularis than the remaining bowel segments, which has been characterized as the wagon-wheel sign (Goggin et al., 2000). In normal cats, the wall thickness average 2.1 mm for the small bowel (2.0-2.5 mm for the duodenum and jejunum; 2.5-3.2 mm for the ileum). A finding of muscularis thickening of jejunal segment in

this cat may be associated with a chronic enteritis or a mechanical obstruction.

Intussusception is a life-threatening condition in which the radiologist plays an important role in diagnosis. Ultrasound examination of intussusception lesion is preferential to the barium series which requires multiple x-ray exposures, more time and creates a problem of liquid barium at the surgical site when intestinal resection has to be performed.

Color Doppler to assess blood flow in entrapped mesentery has been found to be useful for predicting reducibility. Ileoceocolic intussusception was confirmed at surgery in this cat. A manual reduction of the affected segment was not possible. The intussusception of the necrotic ileum/cecum/colon was resected and an end-to-end anastomosis was performed.

References

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