

Atresia coli in a Japanese black calf diagnosed by a barium sulphate enema contrast radiograph in the standing position: a case report

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ABSTRACT: A three day-old Japanese black calf was admitted with a history of abdominal distension and absence of defecation. Dilated loops of the small intestine and hypoplasia of the colon and rectum was observed upon a contrast radiographic examination in the standing position. At necropsy atresia coli with undeveloped rectum and patent anal opening was found. We conclude that a contrast radiograph in the standing position is useful for diagnosing atresia coli in such cases.

Keywords: atresia coli; contrasts radiography; enema; Japanese black calf; standing position

The gastrointestinal tract develops during embryonic life from a ventrally located tube made of endoderm and surrounded by splanchnic mesoderm. This tube is differentiated into the pharynx, foregut and hindgut by the end of embryonic life (Noden and De Lahunta 1985). Interruption of the blood supply to a localised segment of this embryonic intestine is now thought to be one of the main causes of intestinal atresia (Smith et al. 1991). However, genetic and other non-heritable factors have also been incriminated as causes of atresia in different regions of the intestinal tract in ruminants where it is associated with other congenital malformations, like lack of tail and urogenital defects (Payan-Carreira et al. 2007).

Presumptive diagnosis of intestinal atresia is usually achieved through case history and clinical signs including anorexia, depression and abdominal distension in newly born calves aged between one to six days (Kilic and Sarierler 2004). Atresia ani and recti can be diagnosed by visual inspection of the perineal region or limited digital palpation of the distended rectum especially if a vestigial anal opening is present. On the other hand, atresia coli is usually suspected in calves with signs of abdominal distension, progressive depression or weakness and

absence of faeces since birth with the presence of a patent anal opening (Constable et al. 1997).

Definitive diagnosis of intestinal atresia, especially those in more proximal locations like colon or small intestine atresia, requires further diagnostic steps such as radiography, ultrasonography and exploratory celiotomy. Radiography has been used as the sole diagnostic method for cases of atresia coli in calves (Azizi et al. 2010). However, there are no reports available regarding the use of both radiography and ultrasonography for the diagnosis of such anomalies in calves. Our report describes the radiographic and ultrasonographic finding of a congenital abnormality in the colon and rectum of a Japanese black calf.

Case description

A three day-old Japanese black calf was presented to the Veterinary Medical Teaching Hospital of Obihiro University of Agriculture and Veterinary Medicine with a history of absence of defecation and abdominal distension. Clinical examination revealed normal respiratory rate (31/min), heart rate (110/min) and temperature (38.9 °C). Finger

exploration through the rectum did not reveal the presence of muconium. Haemato-biochemical values showed revealed haemoconcentration (HGB 14.6 g/dl); dehydration (HCT 51.3%); hypoproteinaemia (TP 4.4g/dl) and hypernatraemia (Na 142 mEq/l).

Based on the history and clinical examination, intestinal atresia was suspected. Ultrasonographic examinations of the small intestine were performed using 1.7–3.8 MHz multiple frequency sector transducer (Vscan, GE health care, USA). The ultrasonogram showed dilated loops of the small intestine (2.3 cm in diameter) with anechoic to hypoechoic intestinal contents (Figure 1).

Lateral plain and contrast radiograph was obtained in the standing position at 90 kvp and 6.0 mAs by use of a X-ray exposure unit (Sirius, Hitachi Medico, Tokyo, Japan) with a computed radiograph system (Fuji Film, Tokyo, Japan). For the contrast radiograph, barium sulphate (Baritop HD, Kaigen, Japan) was injected through rectal enema. After injection of only 50 ml, barium backflow through the anus was observed. A plain radiograph revealed the presence of multiple air fluid levels and



Figure 1. Ultrasonogram showed dilated loop of small intestine in cross-section, diameter is 2.3 cm and the contents were anechoic to hypoechoic

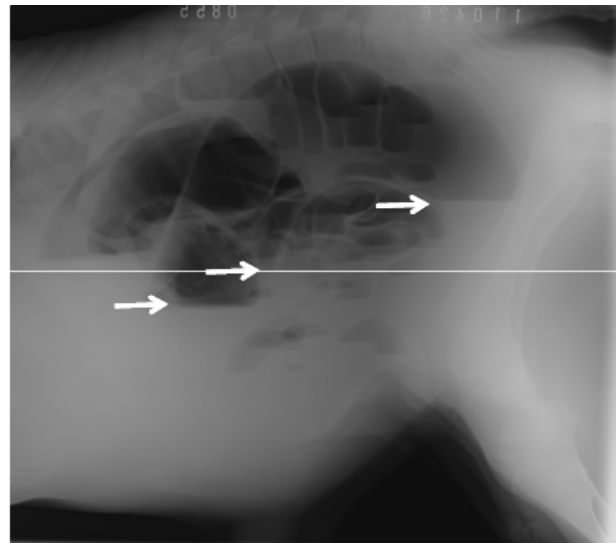


Figure 2. Plain radiograph showing the presence of multiple air fluid levels in the abdominal cavity (arrows) and gas in the rectum

a dilated small intestine (Figure 2), while the contrast radiograph revealed the presence of stenosis at the junction between the colon and the rectum and barium sulphate which was passed through a narrow canal but was then blocked (Figure 3).

The calf was euthanised and the necropsy revealed the presence of a small undeveloped rectum. The colon appeared as a narrow tube-like structure, its blind sac terminated 65 cm from the ileocaecal fold, and small barium particles were observed at

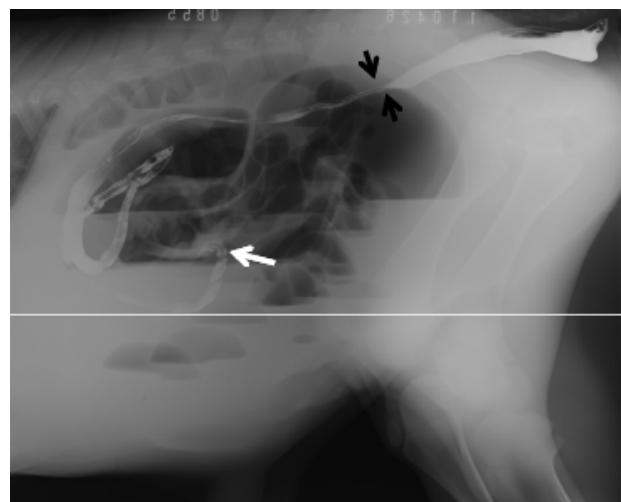


Figure 3. Contrast radiograph revealing the presence of stenosis at the junction between the colon and rectum (black arrows) and barium sulphate which was passed through a narrow canal and was then blocked at a blind sac (white arrow)

this blind end. No other anomalies were found in other organs.

DISCUSSION AND CONCLUSIONS

The history and clinical signs of abdominal distension, decreased appetite, progressive depression and failure of passing meconium are an indication of gastrointestinal obstruction (Tulleners 1981; Smith 1982). However, observation of these signs in calves less than eight days old, mainly suggests the intestinal atresia. In the present case, the presence of a patent anal opening and the absence of meconium in the rectum suggested a proximal location of the intestinal atresia either in the small intestine or colon which necessitated the use of diagnostic imaging to detect the site of obstruction. In comparison with the result of a normal ultrasonographic examination of small intestinal diameter in calves obtained by Padel-Gschwind and Stocker (2004), the 2.3 cm diameter of small intestine loops in three day old calves is considered abnormal, as the normal diameter is 1.2 to 2.1 in calves up to 10 weeks age. This dilatation of the small intestinal loops with the presence of anechoic ingesta indicates more caudal obstruction in the large intestine. However, the exact site of obstruction could not be determined by the ultrasonographic examination because of the cross sectional image.

The plain radiograph showed multiple air-fluid levels which indicate the presence of gas distension and obstruction. However, the exact site of obstruction could be determined by contrast radiography that revealed stenosis of the rectum and the blocking of barium sulfate at the blind end of colon. These discoveries illustrate the cause of the barium backflow during injection although only a small quantity of barium was injected.

Radiography in a standing position has an advantage over such a procedure performed in recumbency as the air fluid levels cannot be seen if the animal is in a recumbent position. Moreover, keeping the intestine in its normal anatomical position helps in determining the site of the defect and/or obstruction.

In most animals with intestinal atresia, especially those of proximal location, surgical treatment is not recommended due to economic considerations, low chance of postoperative survival rate and possible propagation of genetic defects if the affected calf is intended for breeding (Constable et al. 1989; Kilic and Sarierler 2004).

Colonic atresia in calves is usually associated with atresia ani and other coexisting anomalies such as lack of tail, kidney agenesis, umbilical hernia, cryptorchidism and spinal dysraphia (Leipold et al. 1976; Prieur and Dargatz 1984; Syed and Shanks 1992). The presence of colonic atresia and narrowing of the rectum on post-mortem examination with patent anal opening and without any other anomalies, as reported here, are considered uncommon findings for intestinal atresia. Vascular insufficiency of the developing spiral colon due to a faster growth rate and greater size of the colon was mentioned as a proposed cause of atresia coli in calves (Constable et al. 1997). In addition, pregnancy diagnosis by palpating the amniotic sac during the period of principal organogenesis between 36 and 42 days of gestation is another possible cause, due to interruption of the mesenteric blood supply during manipulation (Brenner and Orgad 2003). Genetic factors are another common cause of intestinal atresia associated with multiple congenital malformations (Smolec et al. 2010). The hypothesis of ischaemia and early pregnancy diagnosis is the most likely theory for explaining the pathogenesis of intestinal atresia in our case as it was not associated with other congenital anomalies.

This is the first record of duo-cecum (intestinal anomalies) in a Japanese black calf, where contrast radiography in the standing position confirmed the ultrasonographic findings. Therefore, these results suggest the usefulness of ultrasonography and contrast radiography in the standing position for the diagnosis of this clinical condition.

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