Short Paper

Experimental induction of left abomasal displacement: a new educational technique

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Summary

The purpose of this study was to induce abomasal displacement to the left, and to let the undergraduate and post graduate students get used to the ping sounds of abomasum and other clinical manifestations. The procedure was carried out on eight young bulls, they were sedated and a 2 m flexible tube was inserted through the nasal canal into the rumen. By laparo-rumenotomy, 20 cm of the tube was inserted into the abomasums through the omaso-abomasal groove. The rumen wall and abdominal wall were apposed routinely. The animal was casted on its right side on the floor. The abomasum was inflated through the external end of the tube which was tied to bull's horn base. Then the animal was allowed to stand on its feet. The gas filled abomasum was mobilized to the left flank between the body wall and the rumen. The left abomasal displacement was confirmed by ping and ultrasonography. Experimental induction of left abomasal displacement by inflating the abomasum using a nasal abomasal tube following rumenotomy is a safe and suitable technique for educational and research purposes.

Key words: Experimental induction, Left displaced abomasum, Bull

Introduction

The displacement of abomasum is characterized by gas filled abomasum floating in the dorsal part of the abdomen either on the right (RDA) or left side (LDA). In this situation, the animal may show anorexia, signs of colic, accompanied by a drop in milk yield and discomfort. The disorder may become fatal in some cases. Since the first report of displacement of the abomasum in a cow in 1950, this disorder in dairy cattle has become more common (Van Winden and Kuiper, 2003; Trent, 2004; Doll *et al*., 2009). The economic losses from the disease include lost milk production and the cost of the surgery (Geishauser *et al*., 2000; Van Winden and Kuiper, 2003). The incidence of abomasal displacement varies, depending on the country, from 0 to 7 percent per year (Cameron *et al*., 1998; Kelton *et al*., 1998).

The research on abomasal displacement consists mainly of epidemiological surveys, clinical assessment and treatment. Experimental works are crucial to test the speculated hypotheses involved for the underlying causes and pathogenesis, and also to give the students an educational opportunity to become familiar with the clinical signs and evaluation.

The purpose of this study was to induce temporary abomasal displacement to the left, and to let the undergraduate and post graduate students become acquainted with the ping sound of abomasum and other clinical manifestations. It would also help further and future researches on the pathogenesis of abomasal displacement in cattle.

Materials and Methods

The study was carried out on eight young Holstein bulls aged 1-2 years and weighing 300-400 kg. Institutional ethical committee guidelines were observed for this experimental study. They were held off feed for 24 h. A 2 m length flexible naso-gastric tube was inserted nasally (from ventral meatus) to the rumen. The left flank was anesthetized using lidocaine HCl 2% by proximal paravertebral technique, blocking T13, L1 and L2 nerves. An aseptic left flank laparotomy was performed. Incision was made in the middle of the flank. The wall of the dorsal blind sac of the rumen was exposed to the incision. The rumen was gently pulled out of the incision, incised and the edges fixed to the skin by 8 towel clamps using the technique described by Dehghani and Ghadrdani (1995). The tip of the tube was found inside the rumen and inserted into the abomasum through the reticular groove. More than 20 cm of the tube was inserted inside the abomasum. The presence of tube inside the abomasum confirmed via palpation through the floor of the rumen. The rumen was apposed by two layers of inverting pattern. The sutured rumen was washed off and the abdominal cavity was lavaged by large amount of normal saline and laparotomy incision

was closed routinely. The animal was casted on its right side on the floor. The abomasum was inflated through the external end of the tube which was tied to the bull's horn base. By blowing into the tube, the abomasum inflated and moved from the abdominal floor up into the left flank between the body wall and the rumen. Percussion test and ultrasonography were used to confirm the displacement. The animals were helped to stand on their feet and the clinical percussion and ultrasonographic tests were repeated in standing position. Penicillin (30,000 Iu/kg) and streptomycin (10 mg/kg) as well as analgesics and anti inflammatory drugs were administered for 3 days postoperatively. The condition was reversible, gradually, during the first 24 h, especially after abomasal deflation from the inserted gas through its normal movements.

Results

After inflating the abomasum through the tube, the organ mobilized to the left side of the abdomen which was visible by bulging of the left flank. Simultaneous percussion, using a flick of the finger and auscultation over the left ventrolateral part of the abdomen revealed the high-pitched tympanic sounds which were characteristic of induced LDA.

Ultrasonographic examination through the abdominal wall confirmed the displacement of the abomasum to the left. Abdominal wall layers, abomasal wall and its extensive gas filled lumen were remarkable on the ultrasonographic views (Fig. 1).

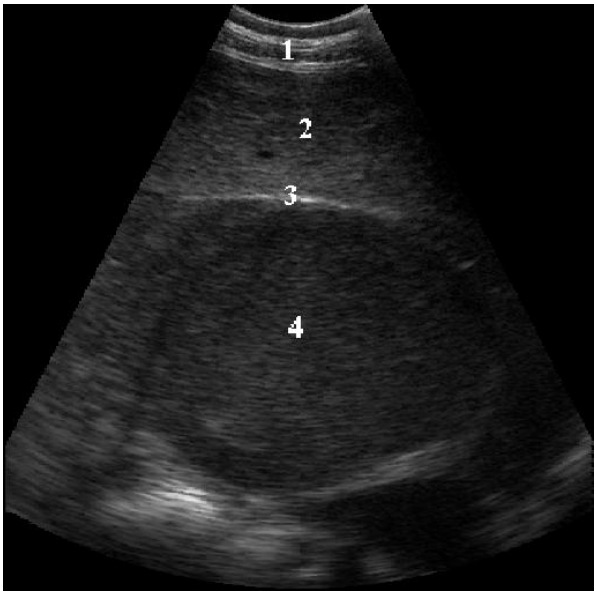

Fig. 1: Ultrasonogram of left displacement of the abomasum viewed from the left ventral region of the 12th intercostal space. (1) Abdominal wall, (2) abomasum with hypoechogenic ingesta, (3) rumen wall, and (4) ruminal content

Discussion

In cases of left abomasal displacement, the abomasum is displaced from its normal position on the abdominal floor to the left side of the abdomen between the rumen and abdominal wall (Trent, 2004). By reviewing the pathophysiology of abomasal displacement, there is a general agreement in the literature that accumulation of gas in the abomasum is crucial for its displacement (Sexton *et al*., 2005; Meimandi Parizi *et al*., 2008; Doll *et al*., 2009). The large volume of gas (CO_2 and methane) produced in the abomasum following grain feeding may become trapped in the already atonic abomasum, causing its distension and displacement (Doll *et al*., 2009). In the present study, inflation of the abomasum provides similar conditions as following heavily grain or concentrate feeding, which predispose the abomasum to displacement. In clinical experiences the ping sound could be heard up to the lumbar transverse process on the left side which indicates the severity of the atonicity and the extent of gas filled viscus. But in this experimental induction of LDA, the abomasum could be mobilized half way on the left flank. Inflation of the abomasum was achieved by a tube, entered through ventral meatus of the nose, and inserted into the abomasum manually following rumenotomy. This procedure can be used in collegiate educational programs to teach the students, for advanced perception of the disease pathogenesis and its surgical correction.

Abomasal displacements rarely occur in calves and bulls (Trent, 2004). Due to the educational purpose in the present study, eight bulls were used. The disease is uncommon in countries where grain is not normally fed to dairy cattle and the animals are usually out on pasture for most of their life, which proves the role of grain feeding and gas accumulation for displacement of the abomasums. It is also possible to induce the right abomasal displacement by casting the animal on their left side and then inflating the abomasums. Previously, left and right abomasal displacements were induced in Iranian crossbred rams to study abomasal ulceration following its displacement through fixing greater curvature of abomasum to the abdominal wall (Hajimohammadi *et al*., 2010).

An ultrasonographic examination was useful to confirm the diagnosis of left abomasal displacement in unclear cases. Naturally, the rumen is seen immediately adjacent to the left abdominal wall, while in LDA cases the abomasum is visualized between the abdominal wall and rumen (Braun, 2003). In the present study left abomasal displacement is confirmed by auscultation pings and ultrasonographically.

In conclusion, experimental induction of displacement of the abomasum to the left by inflating the abomasum using a nasal abomasal flexible tube following rumenotomy is a safe and suitable technique for teaching, educational and research purposes.

References

Braun, U (2003). Ultrasonography in gastrointestinal disease in cattle. Vet. J., 166: 112-124.

Cameron, RE; Dyk, PB; Herdt, TH; Kaneene, JB; Miller,

R; Bucholtz, HF; Liesman, JS; Vandehaar, MJ and Emery, RS (1998). Dry cow diet, management, and energy balance as risk factors for displaced abomasum in high producing dairy herds. J. Dairy Sci., 81: 132-139.

Dehghani, SN and Ghadrdani, AM (1995). Bovine rumenotomy: comparison of four surgical techniques. Can. Vet. J., 36: 693-697.

Doll, K; Sickinger, M and Seeger, T (2009). New aspects in the pathogenesis of abomasal displacement. Vet. J., 181: 90-96.

Geishauser, T; Leslie, K and Duffield, T (2000). Metabolic aspects in the etiology of displaced abomasums. Vet. Clin. North Am. Food Anim. Pract., 16: 255-265.

Hajimohammadi, A; Badiei, K; Mostaghni, K and Pourjafar, M (2010). Serum pepsinogen level and abomasal ulcerations in experimental abomasal displacement in sheep. Vet. Med-Czech. 55: 311-317.

Kelton, DF; Lissemore, KD and Martin, RE (1998). Recommendations for recording and calculating the incidence of selected clinical diseases of dairy cattle. J. Dairy Sci., 81: 2502-2509.

Meimandi Parizi, A; Bigham, A and Ghasrodashti, AR (2008). Displacement of the abomasum to the left side and pyloric obstruction in a goat. Iranian J. Vet. Res., 9: 81-83.

Sexton, M; Buckley, W and Ryan, E (2007). A study of 54 cases of left displacement of the abomasum: February to July 2005. Ir. Vet J., 60: 605-609.

Trent, AM (2004). Surgery of the abomasum. In: Fubini, SL and Ducharme, NG (Eds.), *Farm animal surgery*. Elsevier. PP: 196-240.

Van Winden, SC and Kuiper, R (2003). Left displacement of the abomasum in dairy cattle: recent developments in epidemiological and etiological aspects. Vet. Res., 34: 47-56.