RESEARCH ARTICLE Indian Journal of Animal Research, Volume 59 Issue 10: 1756-1760 (October 2025)

Type II Vagal Indigestion and Adynamic Ileus in a Pregnant Cow with Haemato-biochemical and Blood Gas Analysis

S. Saravanan[1], R.C. Sundararajan[1], E. Madhesh[1], V. Kumar[1]

10.18805/IJAR.B-4901

ABSTRACT

Background: Vagal indigestion in cattle is an abdominal disorder resulting from mechanical or functional obstruction of the fore stomach and/or abomasum outflow. Prognosis is usually poor except in late pregnancy indigestion. A Holstein- Friesian cow in late pregnancy was presented to the Veterinary Clinical complex with the complaint of hyporexia, papple-shaped abdomen, dyschezia and voidance of pellety or dark scanty and greenish pasty dung for 8 days.

Methods: Physical examination revealed papple-shaped abdomen. Rectal examination revealed L-shaped rumen and dilated intestinal loops. Haemato-biochemical analysis revealed neutrophilia, hyperglobulinemia, hypocalcaemia and hypokalemia. Blood gas analysis revealed no alterations. Ultrasonogram revealed normal architecture and motility of abomasum and absence of impaction.

Result: Type II vagal digestion was identified as a cause in association with functional (adynamic) ileus which was due to with hypokalemic alkalosis and hypocalcaemia. The case responded to the treatment with cholinergic drugs, fluid therapy, antibiotics, antiinflammatory drugs and oral electrolytes.

Key words: Functional ileus, Hypokalemic alkalosis, Late pregnancy, Neutrophilia, Papple-haped abdomen, Treatment, Type II Vagal indigestion.

INTRODUCTION

Vagal indigestion is a gastrointestinal disorder in cattle and buffaloes resulting from mechanical or functional obstruction of the forestomach and/or abomasum outflow (Hussain *et al*., 2017). There is accumulation of ingesta in the forestomach or abomasum, anorexia, scant faeces, decreased milk production, acid base abnormalities, dehydration, weight loss and eventually weakness and recumbency. Prognosis is usually unpredictable and often considered poor except in late pregnancy indigestion. Prognosis is usually unpredictable and often considered poor except in late pregnancy indigestion (Hussain *et al*., 2014). Paralytic or adynamic ileus, one of those abdominal disorders is of great concern (Muino *et al*., 2021) and it is the functional obstruction of the intestines or failure of peristalsis due to the loss of intestinal tone and motility as a result of reflex inhibition (Constable *et al*., 2017).

The predisposing factors could be acute peritonitis, visceral surgery, prolonged distension of the intestines, enteritis, acid-base imbalance, dehydration, hypocalcemia and hypokalemia and toxemia (Kahn and Line, 2010 and Constable *et al*., 2017). Adynamic ileus results in intestinal distension, abdominal pain, dehydration, marked reduction in the amount of feces, distension of the abdomen, fluid-splashing sounds and pings on percussion of the abdomen (Constable *et al*., 2017).

Paralytic ileus is more common in pregnant, recently parturient cows (Kahn and Line, 2010) and recently in buffaloes (Tharwat, 2011). Animals with paralytic ileus show non-specific clinical signs and rectal findings (Radostits *et al*., 2007). However, reports on abdominal disorders in bovines are very scanty in veterinary literatures (Dos Santos *et al.,* 2021 and Muino *et al*., 2021). Further, reports on type II vagal indigestion (papple abdomen) and paralytic ileus with favourable prognosis is scanty. Hence, this paper reports a case of type II vagal indigestion with functional ileus due to electrolyte imbalance and its therapeutic management with favourable prognosis in a cow.

[1]Department of Veterinary Medicine, Veterinary College and Research Institute, Tamil Nadu Veterinary Animal Sciences University, Tirunelveli-627 358, Tamil Nadu, India.

Corresponding Author: S. Saravanan, Department of Veterinary Medicine, Veterinary College and Research Institute, Tamil Nadu Veterinary Animal Sciences University, Namakkal-637 002, Tamil Nadu, India. Email: sarvet.25@gmail.com

How to cite this article: Saravanan, S., Sundararajan, R.C., Madhesh, E. and Kumar, V. (2025). Type II Vagal Indigestion and Adynamic Ileus in a Pregnant Cow with Haemato-biochemical and Blood Gas Analysis. *Indian Journal of Animal Research*. **59(10):** 1756-1760. doi: 10.18805/IJAR.B-4901.

Submitted: 17-03-2022 **Accepted:** 20-06-2022 **Online:** 13-07-2022

MATERIALS AND METHODS

A cross bred Holstein Friesian cow of six years old was presented to the Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli with the complaint of hyporexia, severely distended abdomen, arched back, dyschezia and voidance of mucus coated pellety dung and then dark scanty, greenish pasty mucus coated dung (Fig 1) since 8 days in 2021. The abdomen was found to be distended on the left paralumbar fossa and right ventral abdomen giving rise to 'Papple shaped abdomen (Fig 2). The cow was pregnant about 7 months with normal viable

foetus. Clinical examination revealed congested conjunctival mucosa, temperature (39.1°C), heart rate (86/min), respiration rate (28/min), mildly sunken eyeball, absence of rumen motility and percussion revealed fluid sounds on right ventral abdomen. Rectal examination also revealed very scant dark greenish watery dung and distended 'L -shaped' rumen occupying the right ventral quadrant of the abdomen and dilated intestinal loops.

Examination of rumen fluid collected by passing rumen tube revealed normal pH (6.5), greenish brown colour, aromatic odour and a very few small motile protozoa. Radiological examination was performed to rule out the presence of any foreign body in the reticulum or traumatic reticuloperitonitis. Ultrasonogram of abomasum revealed normal architecture and motility of abomasum (Fig 3). Abdominal palpation revealed normal consistency of abomasum and the abomasal fluid collected by abomasocentesis revealed a pH of 2.0 (Fig 4). Examination of Giemsa stained peripheral blood smears revealed no haemoparasites.

Haematological analysis revealed an elevated packed cell volume (49.0%), leukocytes (16,400/cmm) and neutrophils (72.0 %), whereas, hemoglobin (13.6 g/dl), haematocrit (30.0%), total erythrocyte count (7.29 m/cmm) and platelets (6,71,000/µl), lymphocytes (23.0%), monocytes (2.0%) and eosinophils (3.0%) were within range. Serum biochemical analysis revealed a reduction in potassium (1.45 mmol/lit), calcium (6.9 mg/dl), phosphorus levels (4.5 mg/dl), total protein (5.4 mg/dl) and albumin (1.2 mg/dl) with elevated globulin (4.2 mg/dl), sodium (219.0 mmol/dl) and blood urea nitrogen (74.02 mg/dl) levels. Whereas, serum levels of creatinine (1.2 mg/dl), aspartate aminotransferase (116.0 IU/ dl), alkaline phophatase (51.0 IU/ dl), magnesium (1.7 mg/dl), sodium (142 mmol/L) and chloride (104 mmol/L), glucose (69.0 mg/dl) and lactate (0.9 mmol/L) were within range.

Venous blood gas analysis revealed blood pH-7.5, concentration of bicarbonates ($cHCo_3$)-27.6 mm/Hg, concentration of oxygen saturation (cSO_2)-85.1%, partial pressure of partial pressure of O_2 (pO_2)-44.1 mmHg, CO_2 (pCO_2)-35.6 mmHg, base excess (BE)-4.7 mmol/L were within range (Hagemosert and Lofstedttt, 1981 and Sung-hwan Lee *et al*., 2015).

RESULTS AND DISCUSSION

The distension on the left is more diffuse and located in the middle to dorsal region of the flank ("apple" shaped), whereas the distension on the right is in the ventral flank ("pear" shaped) resulting in papple shaped abdomen due to asymmetric bilateral distension in type II, III and IV vagal indigestion (Hussain *et al.*, 2017). The case was diagnosed as type II vagal indigestion as the rectal examination could reveal the L-shaped rumen due to gradual expansion of fluid filled ventral sac resulting in bilateral distension occupying the right ventral quadrant of the abdomen. In type II vagal indigestion associated with failure of rumen outflow, cases may have fluid distension only on the left, but most commonly they are distended bilaterally (Derek Foster, 2017). Functional failure in this case could be associated with most commonly peritonitis or inflammations and adhesions around the reticulum, resulting in achalasia of the reticulo-omasal orifice, omasal transport failure (OTF) and thereby type II vagal indigestion (Dore *et al*., 2007), as this could be supported by the haemato-biochemical changes like leukocytosis, neutrophilia and hyperglobulinemia and absence of mechanical obstruction was confirmed by the radiological examination. In this case, normal architecture of omasum was observed as Braun *et al.* (2007) also reported normal sonographic appearance of the omasum in cows with paralytic ileus.

Absence of type I vagal indigestion was recognized by the unilateral distension only on the left side which is almost always due to enlargement of the rumen, due to failure of eructation associated with an inability to clear the cardia of fluid, failure of the cardia to open, or esophageal obstruction (Derek Foster, 2017). In this case, absence of the type III vagus indigestion due to failure of abomasal outflow was indicated by the normal serum chloride level as animals with a type III vagal indigestion will have a severe hypochloremic metabolic alkalosis due to internal vomiting of chloride abomasum into rumen, not entering into duodenum for



Fig 1: Pellety dung, watery greenish dung and dark mucus coated dung.



Fig 2: Papple-shaped abdomen and arched back of the HF cow in late pregnancy-rear view and top view.

absorption (Derek Foster, 2017). Further, abomasocentesis and ultrasonogram of abomasum indicated absence of impaction and hypomotility (Fig 3). Absence of type IV vagus indigestion associated with failure of pyloric outflow in late pregnancy indigestion (LPI) was indicated by the response to the therapy with normal appetite, defecation and normal contour of the abdomen bilaterally before parturition.

This study concurred with that of Braun (2009), Khalphallah *et al.* (2016), Saravanan *et al.* (2019) and Dos Santos *et al.* (2021) who by transrectal palpation observed anorexia, depression, arched back, dilated intestinal loops, empty rectum, scant/tarry/mucous coated foul smelling feces in ileus and other gastrointestinal disorders. Muino *et al.* (2021) observed moderate abdominal distension in lower right abdomen, fluids sounds by auscultation in right side of the abdomen in bovine paralytic ileus.

In this case, the incidence of paralytic ileus in late pregnancy could be attributed to the deficiency of calcium and potassium, as hypocalcemia (Callan *et al*., 2017), hypokalemia (Constable *et al*., 2017) and hypochloremia (Elhanafy *et al.,* 2013) are reported to be the risk factors for functional ileus and gastro-intestinal reflux in cattle. Vagal indigestion and ileus resulted in no changes in the acid-base balance. Ileo-gastric reflex could also lead to inhibition of gastric motility when the ileum is distended (Constable



Fig 3: Ultrasonogram of abomasum showing normal architecture and absence of impaction.

et al., 2017). In this case, toxemic signs like congested mucosa and enlarged prescapular lymph node, leukocytosis, neutrophilia and hyperglobulinemia levels indicated the presence of systemic inflammation which could also result in paralytic ileus (Derek Foster, 2017). In this case, chronic vagal indigestion could also lead to functional ileus as prolonged illness could turn in a cranial disorder into a caudal functional disorder due to intestinal ileus (Hussain *et al*., 2017).

Previously, Yogeshpriya *et al*. (2011) reported paralytic ileus associated with enteritis due to amphistomosis in a cross bred cow, however with normal serum sodium and potassium values.

The case was treated with parentral administration of streptopenicillin @ 5 gm to combat the inflammatory process/ peritonitis (Hussain *et al*., 2014), IM, 5% dextrose normal saline@10 ml/kg bwt, Ringer's lactate@ 10 ml/kg bwt as a source of electrolytes, pheniramine maleate @ 0.5 mg/kg bwt, as an antihistaminic, metoclopromide @ 0.2 mg/kg bwt as cholinergic drug, B-complex (Tribivet®) and oral administration of oral potassium chloride solution (POTKLOR®) @ 0.4 gm/kg bwt (Constable *et al*., 2014) at 12 hrs interval rumenotorics (Blusacc®) with lactobacillus yeast.



Fig 4: Abomasocentesis revealing normal pH of abomasal fluid.

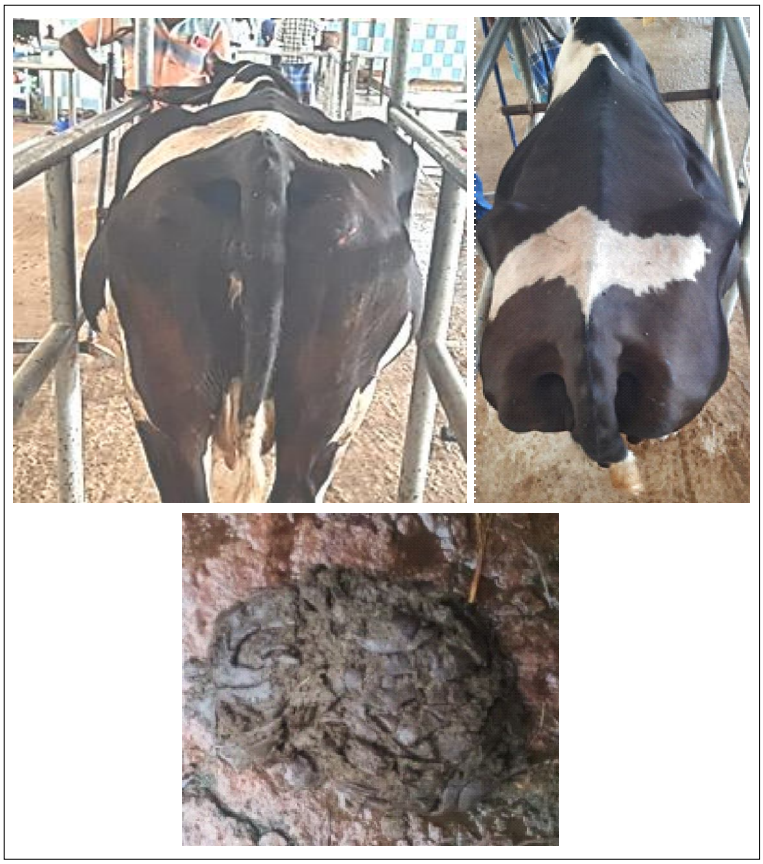

Fig 5: Normal abdomen contour of the cow 5 days post treatment- rear view and top view.



Fig 6: Normal parturition by the cow after recovery.

The cow showed gradual reduction in the abdominal distension on both sides on day 3 post treatment and returned to normal appetite, abdominal contour and colour and consistency of the dung on day 5 post treatment (Fig 5). The cow gave rise to normal parturition for a healthy calf (Fig 6) after 30 days of treatment.

CONCLUSION

The diseases of the digestive tract in cattle and buffaloes constitute a major clinical problem worldwide and deciding the option for medical or surgical treatment is often difficult especially in vagal indigestion. Hence, shape of the abdomen complete physical examination, transrectal examination, haemato-biochemical analysis, ultrasonogram and response to the treatment would be of highly useful in deciding the type and outcome of the vagal indigestion.

ACKNOWLEDGEMENT

The Authors are grateful to The Director of Clinics, TANUVAS, Chennai, Tirunelveli for providing necessary facilities to carry out this study.

Conflict of interest

All authors declare that they have no conflict of interest.

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