

Ultrasonographic diagnosis of liver abscess as a sequel of ruminal lactacidosis and its successful medical management in a crossbred Jersey cow

M. Venkatesan^{1*}, G. Devadharshini², K. Ramya³, K. Jayalakshmi⁴, S. Yogeshpriya⁴, D. Sumathi⁵ and K. K. Ponnuswamy⁵

¹Veterinary Clinical Complex, Veterinary College and Research Institute, TANUVAS, Salem - 636 112, Tamil Nadu, India; ²Final Year Student, Veterinary College and Research Institute, TANUVAS, Namakkal - 637 002, Tamil Nadu, India; ³Department of Veterinary Microbiology, Veterinary College and Research Institute, TANUVAS, Namakkal - 637 002, Tamil Nadu, India; ⁴Department of Veterinary Medicine, Veterinary College and Research Institute, TANUVAS, Orathanadu - 614 625, Tamil Nadu, India; ⁵Department of Veterinary Clinical Medicine, Veterinary College and Research Institute, TANUVAS, Namakkal - 637 002, Tamil Nadu, India

Abstract

A six-year crossbred Jersey cow weighing 320 kg was presented to a large animal medical outpatient unit with a history of accidental ingestion of rice gruel. From then animal was anorectic with a staggering gait and had a ruminal acidosis-induced liver abscess. Ultrasound-guided aspiration of the hepatic abscess and lavaging was done. Based on the culture and ABST results, the animal was treated with enrofloxacin and supportive therapy for 5 days. The recovery was uneventful.

Keywords: Liver Abscess, Ruminal lactacidosis, Ultrasonography

Highlights

- Liver abscess may occur secondary to ruminal acidosis in feedlot cattle
- It has an economic impact on grain-fed animals, viz., reduced weight gain, reduced feed intake and feed efficiency
- Ultrasound examination of the liver should be performed in the diagnosis and management of liver abscess

Liver abscess in bovine has a high economic impact due to reduced feed intake, reduced weight gain, decreased feed efficiency, and decreased carcass yield in grain-fed animals. (Nagaraja and Chengappa, 1988). Acute and chronic acidosis are major issues for ruminants fed on concentrate-rich diets (Owens *et al.*, 1998). *Fusobacterium necrophorum* a primary causative agent of liver abscesses, is an opportunistic pathogen and an economically important cattle disease. Liver abscesses are often secondary to ruminal acidosis and rumenitis in cattle (Tadepalli *et al.*, 2009). Ultrasonography is considered as an essential noninvasive technique in the diagnosis of liver diseases in cattle, without damaging the tissue (Vázquez *et al.*, 2019)

A six-year crossbred Jersey cow weighing 320 kg was presented to a large animal medical outpatient unit with a history of accidental ingestion of rice gruel. The animal was showed anorexia along with a staggering gait for past 2 days. Physical examination revealed elevated body temperature (40.3°C), sunken eyeballs, absence of rumen motility and fluid splashing sounds on ballotment and auscultation. Two liters of

rumen fluid were evacuated by intubation. Rumen fluid analysis revealed a sour odor, milky green in color, pH -5 and direct microscopic examination showed the absence of ruminal protozoa. Hemato-biochemical analysis showed increased PCV, neutrophilia and elevated levels of AST and bilirubin (Table 1), indicative of dehydration and hepatic damage. Based on history, clinical examination and rumen fluid analysis this case was diagnosed as ruminal lactic acidosis.

The animal was treated with Inj. sodium bicarbonate 8.4% @ 1 mL/kg body weight along with Inj. Normal saline 10 mL/kg I/V, Inj. streptopenicillin 10 mg/kg body weight I/M, Inj. chlorpheniramine maleate @ 0.5 mg/kg I/M, Inj. vit B1 B6 B12 10 mL I/M, rumenotoric bolus containing potassium antimony tartrate 2 g, ferrous sulfate 2 g, copper sulfate 50 mg, cobalt chloride 100 mg per day orally and oral ruminal alkalizing buffer enriched with metabolic boosters and yeast 200 g for 3 days (Intas Pharmaceuticals Pvt. Ltd.). Upon examination on the 9th day, the animal showed inappetence and looked dull and depressed. The animal was subjected to the ultrasonographic examination of

*Corresponding Author, E-mail: drvenksmvsc88@gmail.com

the abdomen (Braun, 2003) by using a 2.5 to 5.0 MHz convex transducer at the 11th intercostal on the right side to examine the liver. Ultrasonography revealed an abscess with a thick wall and irregular surface with contents of mixed echogenicity (Fig.1). Earlier reports described that ultrasonography of hepatic abscesses appeared as hyperechoic centers surrounded by hypoechoic or anechoic areas in experimentally induced hepatic abscesses in cattle (Lechtenberg and Nagaraja, 1991). A normal liver sonography can be used as a good diagnostic reference in animals with liver diseases (Osamah *et al.*, 2020). An accurate assessment of liver abscessation in cattle can only be undertaken by ultrasonographic examination which can be completed in a short period of time (Scott, 2013). Ultrasonography of the liver helps image the discrete or diffuse lesions and also guides to aspirate and collect biopsies (Braun, 2009).

Ultrasound-guided aspiration of the hepatic abscess was performed and lavaged with 300 mL of normal saline and 100 mL of metronidazole. Pus was yellowish with a foul odour. The gram staining of the pus smear revealed

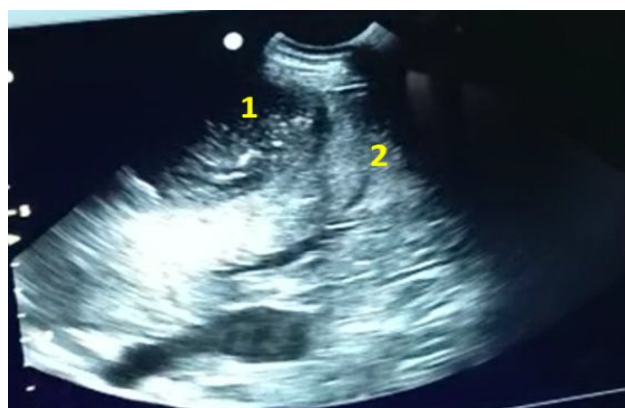


Fig. 1. Ultrasonography of liver on right-side 11th intercostal space shows abscess cavity with heterogeneous echogenic content



Fig. 2a. Ultrasound-guided aspiration of liver abscess at 11th intercostal space

gram-positive cocci bacteria. Upon cultural examination and ABST, *Staphylococcus* spp., were identified, which was sensitive to enrofloxacin, gentamicin, and cloxacillin and resistant to oxytetracycline and amoxicillin (Fig. 2a & b). Then the animal was treated parentally with Inj. enrofloxacin 5 mg/kg I/M, Inj. meloxicam 10 mL I/M, Inj. vit B1 B6 B12 10 mL I/M for 5 days. Liver abscesses are generally a sequel to ruminal acidosis and rumenitis in cattle-fed diets high in readily fermentable carbohydrates and low in roughages (Amachawadi and Nagaraja, 2016). Earlier literature reported that *Fusobacterium necrophorum* is the primary etiological agent for liver abscesses in bovine (Nagaraja and Chengappa, 1988). Other bacteria were also involved in liver abscesses viz., *Staphylococcus* spp., *Streptococcus* spp. (Lechtenberg *et al.*, 1988). After 5 days of treatment, the size of the abscess was reduced on ultrasonographic examination.

Table 1. Hemato-biochemical change in cow affected with ruminal acidosis cum hepatic abscess

Parameters	Observed Values	Reference Values *
Hemoglobin (g/dL)	16.3	8 - 15
PCV (%)	48	24 - 46
RBC x 10 ⁶ / μ L	7.35	5-10
WBC x 10 ³ / μ L	11	4000 - 12000
Neutrophils (%)	58.2	15 - 45
Lymphocytes (%)	47.7	45 - 75
Monocytes (%)	3.1	2 - 7
Platelet count (x 10 ⁵ / μ L)	5	2 - 6
Total protein (g/dL)	6.1	6 - 8
Albumin (g /dL)	2.7	2.8 -3.9
AST (mg/dL)	232	45 - 110
Creatinine (mg/dL)	0.8	0.8 - 1.8
Bilirubin (mg / dL)	1.2	0 - 0.1
Glucose (mg/dL)	89	42 -74

*Radostits *et al.*, 2010



Fig. 2b. Pus aspirated from the liver abscess (500 mL)

The animal recovered completely and uneventfully.

Conflict of interest: Authors have no conflict of interest in this study.

Author's contribution: MV: Involved in case diagnosis, treatment and preparation of the manuscript; GD: Involved in sample collection, treatment and case follow-up; KJ: Assisted in Diagnosis and treatment of the case; SY: Treatment of the case, manuscript

formation and editing; KR: Involved in culture and ABST supervision of the microbiological part of the manuscript; DS: Assisted in the preparation of the manuscript and guided in the diagnosis of the case; KKP: Involved in the overall designing of the study and assisted in the preparation of the manuscript.

Data availability statement: The corresponding author is willing to provide the raw data upon reasonable request.

REFERENCES

- Amachawadi RG and Nagaraja TG, 2016. Liver abscesses in cattle: A review of incidence in Holsteins and of bacteriology and vaccine approaches to control in feedlot cattle. *J Anim Sci*, 94 (4): 1620-1632, doi: 10.2527/jas.2015-0261
- Braun U, 2003. Ultrasonography in gastrointestinal disease in cattle. *Vet J*, 166(2): 112-24, doi: 10.1016/s1090-0233(02)00301-5
- Braun U, 2009. Ultrasonography of the liver in cattle. *Vet Clin North Am Food Anim Pract*, 25(3): 591-609, doi: 10.1016/j.cvfa.2009.07.003
- Lechtenberg KF and Nagaraja TG, 1991. Hepatic ultrasonography and blood changes in cattle with experimentally induced hepatic abscesses. *Am J Vet Res*, 52(6): 803-9, doi: 10.2460/ajvr.1991.52.06.803
- Lechtenberg KF, Nagaraja TG, Leipold HW and Chengappa MM, 1988. Bacteriologic and histologic studies of hepatic abscesses in cattle. *Am J Vet Res*, 49 (1): 58-62
- Nagaraja TG and Chengappa MM, 1988. Liver abscesses in feedlot cattle: A review. *J Anim Sci*, 76 (1): 287-298, doi: 10.2527/1998.761287x
- Osamah MA, Medhat K and Younis M, 2020. Ultrasonographic examination of liver of cattle in Mosul, Iraq. *Proceeding of the 7th International Conference, College of Veterinary Medicine, University of Basrah. Iraq Basra J Vet Res*, 19(3): 56-65, doi: 10.23975/bjvetr.2020.174097
- Owens FN, Secrist DS, Hill WJ and Gill DR, 1998. Acidosis in cattle: A review. *J Anim Sci*, 76(1): 275-286, doi: 10.2527/1998.761275x
- Radostits OM, Gay CC, Hinchcliff KW and Constable PD, 2010. *Veterinary Medicine. A text book of the diseases of cattle, sheep, goats, pigs and horses*. 10th edn, Elsevier publication, pp2047-49
- Scott P, 2013. Diagnosis and treatment of liver abscesses in cattle. *Livestock*, 18 (2): 20-23, doi: 10.12968/live.2013.18.2.20
- Tadepalli S, Narayanan SK, Stewart GC, Chengappa MM and Nagaraja TG, 2009. *Fusobacterium necrophorum*: A ruminal bacterium that invades liver to cause abscesses in cattle. *Anaerobe*, 15(1-2): 36-43, doi: 10.1016/j.anaerobe.2008.05.005
- Vázquez JD, Miranda M, Barreiro-Vilanova MI, Javier DF and Barreiro LA, 2019. Characterization of the normal portal and hepatic blood flow of adult Holstein-Friesian cows. *Animal*, 9(6): 386, doi: 10.3390/ani9060386