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## Ultrasound Diagnosis and Pericardiocentesis under Local Analgesia for Traumatic Pericarditis in Cattle - A Clinical Study

**C Premkumar, S Dharmaceelan, N Rajendran and A Jagadeeswaran**

### Abstract

A clinical study was conducted in 27 cattle with traumatic pericarditis. A thorough physical, clinical, radiographical, ECG and ultrasound examinations were performed. A line block was done with five millilitres of 2% lignocaine hydrochloride dorsal to the point of insertion of trocar catheter from cranial to caudal direction. Pericardiocentesis was performed by making a two centimetres long vertical nick on the skin at the fifth intercostal space on the left side at the level of point of elbow with 28FG trocar catheter and 400 to 4000 ml of pericardial fluid was drained. Pericardial lavage with two litre of temperate normal saline followed by infusion of metronidazole 1500 mg using suction apparatus at a vacuum pressure of 380 mmHg was performed in all the animals for 3 to 5 days till the discharge ceased. The pericardiocentesis in the present study based on radiography and ultrasonography was found suitable to improve the clinical conditions of the animals and to prolong the life of the patient.

**Keywords:** Pericarditis, cattle, lignocaine, ultrasound in cattle, Pericardiocentesis

### Introduction

Traumatic pericarditis is one of the major problems encountered in cattle resulting in greater economic loss to the farming community and high mortality (Thangadurai *et al.*, 2016) [14]. In the past, diagnostic imaging procedures were not frequently applied in large animal practice due to lack of equipment, time and economic constraints (Elhanafy and French, 2012) [4]. Presently, the stages of pericarditis could be diagnosed using advanced diagnostic aids such as electrocardiography and ultrasonography. Pericardiocentesis has gained importance in the diagnosis and treatment option in pericarditis (Jesty *et al.*, 2005; Imran *et al.*, 2011; Kathirvel *et al.*, 2014, Shalini *et al.*, 2017) [7, 6, 9, 11]. Traumatic pericarditis cases reported to Veterinary College and Research Institute, Namakkal were analyzed retrospectively and it is found that 30 to 35 cases are treated for this condition every year. The prognosis of the disease is always considered to be unfavourable due to lack of standardized diagnostic protocol and surgical techniques. Also there is paucity of reports on pericardiocentesis in cattle with traumatic pericarditis. Appropriate and timely surgical intervention may enhance the survival rate to achieve a short time goal like calving. Hence this study was designed to evaluate the clinical, haemato-biochemical, radiographic and echocardiographic changes associated with pre and post pericardiocentesis in cattle under local analgesia.

### Materials and methods

The study was carried out at the Veterinary College and Research Institute, Namakkal, Tamilnadu from June 2010 to October 2012. A total number of 27 cases were admitted for traumatic pericarditis and out of which pericardiocentesis were performed in six cattle confirmed for serous form of traumatic pericarditis. In all the 27 animals, the history of off feed, presence of swelling in submandibular and pre sternal region, teeth grinding and laboured breathing were recorded in percentage. The results of physical examination and the presence of brisket oedema, jowl oedema, abduction of elbow, positive venous stasis were recorded. In radiographic examination, the presence of foreign body in the reticulum, piercing reticulum and in thoracic cavity was recorded. The electrocardiography was recorded while the animals were standing calm on a rubber mat with paper speed of 25 mm per sec and amplitude of one cm equal to one mV (Radostits, 2007; Kathirvel 2012) [10, 8]. The ultrasound examination was carried out by using scanner E soate-my lab 40 with 3.5 MHz transducer as described by Buczinski, (2009) [2]. In selected six animals line block was done with 5 ml of 2%

Lignocaine hydrochloride at the fifth intercostal space on the left side at the level of point of elbow dorsal to the point of insertion of trocar from cranial to caudal direction. Pericardiocentesis was carried out in all the six cattle confirmed for serous form of traumatic pericarditis by ultrasonography. A two centimetres long vertical nick was made on the skin at the fifth intercostal space on the left side at the level of point of elbow. Trocar catheter 28FG (Romsons Scientific and Surgical Industry Pvt. Ltd, India) was passed through this nick with digital pressure and slowly advanced till the pericardial exudates were evident and the trocar was withdrawn. The catheter was fixed to the skin using Chinese finger trap suture (Fossum, 2007) [5] using cotton thread no. 2 and the pericardial fluid was allowed to drain. The catheter was maintained *in situ* for three to five days, for passive drainage till the discharge ceased and for active pericardial lavage procedure. Pericardial lavage with two litre temperate normal saline as described by Jesty *et al.* (2005) [7] and Kathirvel (2012) [8] followed by infusion of Metronidazole 1500 mg using suction apparatus at a vacuum pressure of 380 mmHg was performed in all the animals. The lavage continued daily once for 3 to 5 days till the discharge ceased. The surgical wound was cleaned and dressed daily with povidone iodine until the healing was completed. After removal of catheter, the skin wound were cleaned with povidone iodine, wound edges were debrided and sutured with cotton thread. The helpfulness of x-ray machine, ultra sound machine, surgical instrumentation, trocar and catheter, suction apparatus, suture technique and suture materials was assessed based on their effectiveness and suitability in surgical procedure in all the animals.

**Results and Discussion**

Among the 27 cattle diagnosed for traumatic pericarditis, the predominant anamnesis revealed off feed in cent per cent, oedema in presternal region in 92.59 per cent, teeth grinding in 77.77 per cent and laboured breathing in 74.07 per cent of animals (Table 1). The prominent clinical signs recorded were brisket oedema in 92.59 per cent, submandibular oedema in 74.07 per cent, positive venous stasis in 88.88 per cent, abduction of elbow in 70.37 per cent, tachycardia noticed in 100.00 per cent and muffled heart sounds in 66.66 per cent of animals. Similar observations were also reported by Tharwat, (2011) [15] and Kathirvel, (2012) [8]. The Radiological examination revealed 44.44 per cent of total number of cattle with pericarditis had sharp potential radiopaque foreign bodies in the reticulum, piercing reticulum and in thoracic cavity. This concurred with the findings of Braun (2009) [1] and Chaudhary *et al.* (2009) [3]. Electrocardiography of animals with traumatic pericarditis revealed ST prolongation in comparison with healthy cattle. A uniform ST segment elevation of about 0.3 to 0.4mV (Fig. 1) was noticed in all the animals with traumatic pericarditis. (Jesty *et al.* 2005;

Radostits *et al.* 2007; Kathirvel 2012) [7, 10, 8]. In six animals, ultrasound examination revealed, hypoechogenic pericardial fluid (Fig. 2) accumulation of about 400 to 4000ml and was considered as serous form of pericarditis. In eight animals, hyper echoic strands within pericardium (Fig. 3) were noticed. Pericardial fluid accumulation of about 1000 ml with echogenic deposits were also noticed and were considered as fibrinous form of pericarditis. In seven animals, echogenic fluid with fibrin deposits and strands (Fig. 4) were noticed and were considered as suppurative or purulent form of pericarditis. In six animals, ultrasonography revealed extensive fibrous proliferation with pericardial thickening (Fig. 5) suggestive of constrictive pericarditis. The local anaesthesia using 5 millilitres of two per cent Lignocaine hydrochloride was adequate for performing pericardiocentesis in all the six animals.

The fifth intercostal space on the left side at the level of point of elbow was found ideal to perform pericardiocentesis in all the cattle. This concurred with the findings of Kathirvel (2012) [8]. However, Sobti *et al.* (1989) [13] performed pericardiocentesis in third intercostal space on left side. The ultrasonography revealed evidence of 500 to 4000 ml serous pericardial fluid accumulation which was drained using 28 FG trocar catheters (Fig. 6) Simon *et al.* (2010) [12] performed pericardiocentesis using blunt metallic catheter initially followed by a stillet guided flexible fenestrated PVC pipe fixed through subcutaneous tunnelling. The catheter fixation by Chinese finger trap suture in the present study was effective in securing the catheter in situ for seven days (Fig. 7) and concurred with the report of Kathirvel (2012) [8]. However, Jesty *et al.* (2005) [7] reported dislodgement of catheter on third and fourth post-operative day and concluded that the simple suturing failed to retain the catheter in position. Based on the cessation of pericardial effusion, ultrasonography evidence of pericardial fluid reduction and clinical improvement the catheter was removed at 24 to 48 h all animals following pericardiocentesis. This concurred with the recommendations of Jesty *et al.* (2005) [7]. The early clinical improvement noticed in the present study by pericardiocentesis could be attributed to the pericardial lavage and suction with two litre of temperate normal saline followed with infusion of 1500 mg metronidazole. The active suction employed with a vacuum pressure up to 380 mmHg was adequate and aided complete evacuation of the pericardial exudates (Fig 8). Trocar catheter blockade was noticed in three animals. Catheter dislodgement, sepsis and mortality were not noticed in any of the animals. Blockade of trocar catheter was managed by using suction apparatus with the pressure of 380 mmHg to remove the fibrin block followed with pericardial lavage. The pericardiocentesis in the present study based on radiography and ultrasonography (Fig. 9) was found suitable to improve the clinical conditions of the animals and to prolong the life of the patient.

**Table 1:** Result of anamnesis, clinical signs and radiography in animals with Traumatic pericarditis (n= 27)

S. No	Parameter		Numbers
1	Anamnesis	Off feed	27 (100%)
		Swelling in pre sternal region	25 (92.59%)
		Teeth grinding	21 (77.77%)
		Laboured breathing	20 (74.07%)
2	Clinical Signs	Brisket oedema	25 (92.59%)
		Submandibular oedema	20 (74.07%)
		Positive jugular venous stasis	24 (88.88)
		Abduction of elbow	19 (70.37%)

		Tachycardia	27 (100%)
		Muffled heart sounds	18 (66.66%)
3	Radiography	Absence of foreign body (FB)	15 (55.55%)
		Presence of foreign body	12 (44.44%)
		a) FB in reticulum	4 (33.33%)
		b) FB piercing reticulum	3 (25.00%)
		c) FB in thoracic cavity	5 (41.66%)

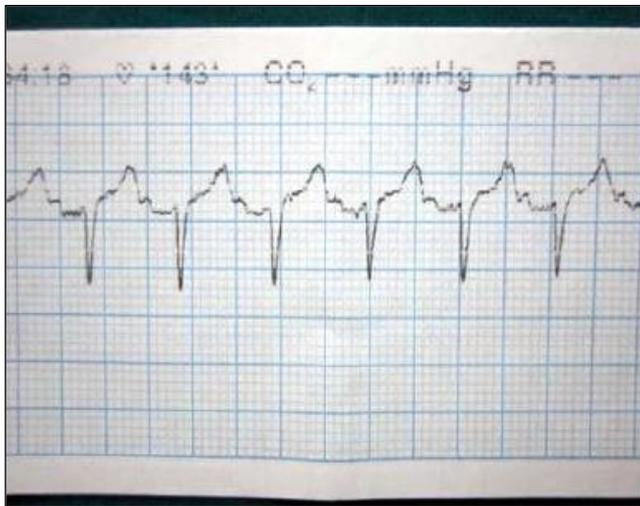


Fig 1: ECG-ST segment elevation



Fig 4: Echogenic fluid with fibrin deposits and strands- Suppurative/ Purulent form



Fig 2: Hyper echogenic pericardial fluid-Serous form



Fig 5: Extensive fibrous proliferation with pericardial thickening- Constrictive form



Fig 3: Hyper echogenic strands within pericardium- Fibrinous form



Fig 6: Recovered Pericardial fluid



**Fig 7:** Catheter 28FG *in situ*



**Fig 8:** Active suction employed with a vacuum pressure up to 380 mmHg



**Fig 9:** Post pericardiocentesis ultrasonography

the trocar catheter from cranial to caudal direction provided adequate analgesia in all the animals for pericardiocentesis.

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**Conflict of interest**

Authors declare that there is no conflict of interests regarding the publication of this article.

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**Conclusion**

Ultrasonography using 3.5MHz transducer was found effective in characterizing the pathological changes associated with traumatic pericarditis and to differentiate various forms of pericarditis. The line block with 5 millilitres of two percent Lignocaine hydrochloride just above the point of insertion of

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