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## Echocardiography in diagnosing heart diseases in cattle

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#### Abstract

The study was conducted to assess the usefulness of echocardiography in diagnosing heart diseases in cattle. The study was carried out at large animal outpatient Medicine Unit of Madras Veterinary College Teaching Hospital with relevant signs were included for the study. Cattle presented with signs suggestive of cardiac diseases were included for the study. Suspected cases were subjected to general clinical examination and system wise examination. Echocardiography was performed to diagnose heart diseases and various patterns of ultrasound patterns were documented. Result showed that echocardiography was very much useful in diagnosing cardiac disease at earlier stage and was also useful as a prognostic tool.

**Keywords:** Echocardiography, thoracic ultrasound, cattle, cardiac diseases, TRP, TANUVAS, pericarditis, effusion

#### Introduction

The bovine heart can be divided into three parts pericardium, myocardium and endocardium. Though many heart diseases have been recorded in cattle, the most common disease encountered is traumatic reticulo pericarditis. This is caused due to indiscriminate feeding nature of cattle and by penetration of ingested foreign objects. Septicaemic condition due to contamination of external wounds, spreading to lung, pleura, liver and other parts of the body is another cause of pericarditis, but rare [12]. Pericarditis consists of three types they are effusive, constrictive and fibrinous pericarditis. Presence of protein rich fluid in pericardium is called effusive pericarditis which may lead to fibrinous pericarditis in unattended cases. Later the fibrin becomes fibrous tissue and fibrosis cause constrictive pericarditis [12]. Lack of a consistent diagnostic methodology and surgical approaches, the disease's prognosis was always believed to be poor. Currently, modern diagnostic tool such as ultrasonography is being practiced in diagnosing diseases of internal organs [1]. In this article, the various ultrasonographic changes observed in heart diseases in cattle were documented.

#### Materials and Methods

The study was carried out at the Madras Veterinary College Teaching Hospital, Chennai. In this cattle reported with clinical signs such as respiratory distress, brisket edema, reluctance to move, nasal discharge, cough and allied signs were included for the study [11, 13]. Advanced system wise examination, Radiologic and Ultrasonographic examinations were also done [1]. Apparently normal animals were taken as control. Ultrasonography was carried out by using transducer of 2.5 to 5.0 MHz frequency from dorsal to ventral aspect of each intercostals space on both the sides using suitable coupling gel [19]. Pericardiocentesis was done in selected cases where 2% lignocaine hydrochloride was administered locally at 5<sup>th</sup> intercostal space on the left side of the animal at the level of point of elbow dorsal to the point of insertion of trocar from cranial to caudal direction. A two-centimetre-long vertical nick was made and trocar catheter was inserted through this nick and gradually progressed until pericardial exudates were seen, at which point the trocar was withdrawn [10].

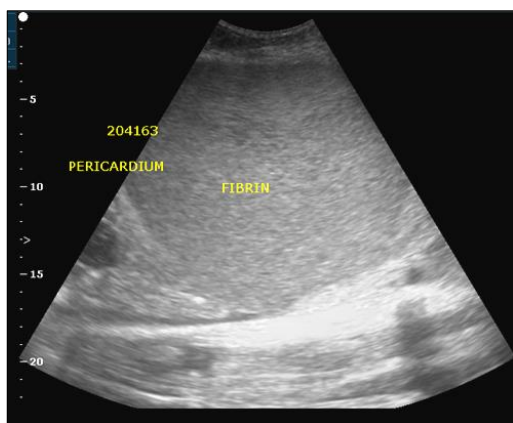
#### Results and Discussion

Totally eight animals showed variation in ultrasonography. Hypoechoic area, surrounding the heart was seen in 37.5 percent of cases (Picture 1). This indicates effusive pericarditis.



**Picture 1:** Hypo to anechoic area, surrounding the heart

Hyperechoic particles suspended in hypoechoic pattern was seen in 25.0 percent of cases. This pattern was seen mainly in hemorrhagic and suppurative pericarditis (Picture 2).



**Picture 2:** Echogenic structure, surrounding the heart

Hyperechoic undulating structures surrounding and attached between epicardium and pericardium were observed in 37.5 percent of cases. This pattern was seen in delayed cases. Fibrinous adhesion between pericardium and surrounding structures / reticulum was seen in 50.0 percent of cases. This pattern usually indicates the possibility of foreign object migrated from reticulum to pericardium, which may remain there or migrated again to some other place. Severe effusion, surrounding and compressing the heart was seen in 25.0 percent of cases. This could be classified as constrictive effusive pericarditis <sup>[19]</sup> (Picture 3).



**Picture 3:** Constrictive pericarditis

Fibrinous adhesion of ventral wall of reticulum to sternal region was seen in 37.5 percent of animals which indicated possible migration of foreign object to ventral region, probably sternum through suppuration and fistulous tract <sup>[19]</sup>. Pericardial effusion with peritonitis was seen in 50.0 percent of animals. Pericardial effusion with pleural effusion was seen in 50.0 percent of animals <sup>[7]</sup>. Pericardial effusion with peritonitis, extending adhesion to abdomen and fibrinous strands attached to liver were seen in 12.50 percent of animals which indicate the extensiveness of inflammation and usually bears a poor prognosis. Foreign body could not be identified with ultrasonography, but could be located with the help of radiography in 37.5 percent of cases. Out of these, one was in thoracic cavity, the other in reticulum itself and the third case, penetrating from reticulum to heart <sup>[3]</sup>. Ultrasound guided pericardiocentesis was done in 37.5 percent of cases, but could successfully drain pericardial effusion in 12.5 percent of cases and they were serosanguinous/ hemorrhagic in nature <sup>[8, 10, 15]</sup>. Other ultrasound findings were hepatomegaly, collapsed small intestine, distended gall bladder, pleural effusion, reticular adhesions to sternum, local and diffuse peritonitis <sup>[1]</sup>.

### Conclusion

The echocardiographic examination was useful in diagnosing different types of pericarditis in cattle, but was not much useful in locating or identifying any foreign bodies. Ultrasonography with a 2.5 – 5 MHz transducer itself was found to be helpful in identifying the pathological alterations associated with traumatic pericarditis and distinguishing between different types of pericarditis. In few cases, the very narrow intercostal space at the level of heart has obscured the detailed view of heart and surroundings. Echocardiography was useful as a diagnostic, therapeutic and prognostic aid.

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