

## A CASE REPORT OF VENTRICULAR SEPTAL DEFECT IN A CALF

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### Summary

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The ventricular septal defect is the most common congenital cardiac defects in sheep, cattle and horses. It occurs frequently as a subaortic defect. A 90-day-old male calf was examined because of hyperpnea and low weight gain. Clinically, depression, hyperpnea and poor weight gain were observed. The auscultation of the heart revealed a loud pan systolic murmur (grade 5/6) on both sides of thorax. Point of maximum intensity of the murmur was in the 3<sup>rd</sup> right intercostal space about 4 cm above the sternum. Through palpation of the thorax, a thrill was detected on both sides over the heart. Right parasternal long axis views of the left ventricular outflow tract and aorta were taken. A 20 mm wide defect was visualised in the ventricular septum just below the aortic valve and left atrium dilation.

**Key words:** calf, echocardiography, ventricular septal defect

The ventricular septal defect (VSD) is the most common congenital defect in domestic animals, particularly in large animals. It may be observed as an isolated lesion or in association with other cardiac defects. VSD is the result of a defect in development of the interventricular septum between the right and left ventricles (Reef & McGuirk, 1996).

Normally, during foetal development, several structures fuse in a specific fashion to form the interventricular septum. Failure in fusion of any of these structures can result in VSD. The most common VSD is a perimembranous defect result-

ing from fusion failure of the membranous and muscular components. Aortic insufficiency can also occur due to lack of aortic valve support from the position of the VSD. Generally, VSD cause systolic murmur in some cases, diastolic murmur from aortic insufficiency is presented too. (Machado *et al.*, 1989).

Numerous techniques, including echocardiography, have been described to study VSD. The main advantages of using echocardiography for diagnosis of VSD are its safety and noninvasiveness for evaluation of cardiac disorders.

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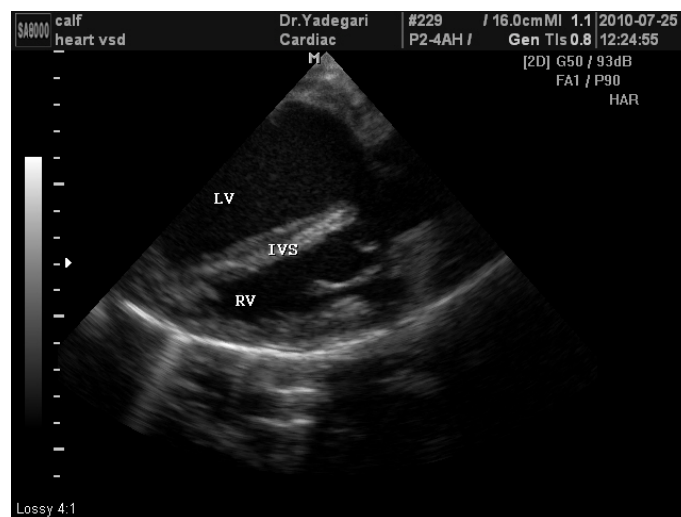
A male Holstein calf weighing 40 kg, 90 days of age, was presented to the Veterinary Teaching Hospital at Azad University of Shahrekord, with a history of depression, low weight gain and hyperpnoea. In clinical examination, depression, hyperpnea and poor weight gain were observed. The rectal temperature was 38.8°C, the heart rate was 85 beats per minute and the respiratory rate – 23 breaths per minute. Mucous membranes were pale. In auscultation, a loud pansystolic murmur (grade 5/6) was heard on both sides of thorax. Point of maximum intensity of the murmur was in the 3<sup>rd</sup> right intercostals space about 4 cm above the sternum. The palpation of thorax resulted in detection of thrill on both sides over the heart.

For final diagnosis, echocardiography was recommended. The right auxiliary space was shaved. Echocardiographic examinations were performed with an EX8000 Medison ultrasound system, using a 2–4 MHz phased array transducer.

Echocardiography was performed from the third intercostal space. The findings included a perimembranous defect, evident ventrally to the aortic root. Abnormality in septal motion and ventricular septal curvature with spontaneous volume overload of the right ventricle were detected (Fig. 1).

Right parasternal long axis views of the left ventricular out flow tract and aorta were taken. A 20 mm wide defect was visible in the ventricular septum just below the aortic valve and left atrium dilation. Because of the low weight gain and hyperpnea, it was decided that the calf should be referred to the slaughterhouse.

The VSD, being among the commonest congenital defects in large animals, results from a defect in the development of one or more of the three parts of the embryonic heart: the conotruncal ridges, the muscular portion of the septum and the membranous portion of the endocardial cushions. The latter 2 portions of the



**Fig. 1.** Long-axis echocardiogramme of the ventricular septal defect (VSD) obtained from the right cardiac window (3.5 MHz). RV= right ventricle, LV= left ventricle, IVS = interventricular septum, M= probe marker.

interventricular septum are the most frequent origins of VSD in domestic animals (Robinson & Maxie, 1993).

In cattle, a hereditary VSD etiology is suspected in Herefords (Belling, 1962) and Limousines (Gopal *et al.*, 1986). A genetic predisposition is also reported in Jersey cattle (Penrith *et al.*, 1994). In other dairy breeds, no information is currently available on possible genetic implications; although, VSD was reported in twin Holstein heifers (Besser & Knowlen, 1992).

A loud pan systolic heart murmur with maximal intensity on the right thorax, as that observed in our case, is the most characteristic clinical finding in cattle with VSD (Besser & Knowlen, 1992; Reef & McGuirk, 2002), in humans (Brickner & Hillis, 2000) and horses (Lombard *et al.*, 1983; Reef & McGuirk, 2002). However, this condition may be missed in uncomplicated examination. Optimal auscultation conditions at our hospital allowed us to identify a loud pan systolic murmur with maximal intensity on the right thoracic wall. According to previous studies about the hereditary VSD etiology, there is no link between the Holstein breed and the incidence of VSD.

The most common problem associated with VSD is pneumonia, which is diagnosed either at necropsy or on clinical examination; the primary complaint is a chronic non-responsive pneumonia. Pulmonary infection can be a complication of heart failure and pulmonary oedema. Impairment of mucociliary clearance has been suspected in asymptomatic cattle suffering from VSD (Cordy & Ribelin, 1950, Pipers *et al.*, 1985; Reef & McGuirk, 2002). Infection and the large volume of blood shunting across the VSD and into the pulmonary trunk may contribute to development of pulmonary hypertension (McGuirk *et al.*, 1984). Pulmonary infec-

tion can be a confounding factor which can mask the characteristic right sided pan systolic murmur. Cardiac ultrasonography was the procedure of choice to obtain a final diagnosis.

The prognosis for most affected calves is poor. Prognosis could have been worsened if the owner was informed that VSD could be a genetic problem or that calves with a VSD may never become productive animals, thereby influencing his decision to euthanise them.

Echocardiography is a rapid and non-invasive method for evaluation of cardiac congenital disease in animals. This diagnostic technique that can provide a wealth of helpful information, including the size and shape of the heart, its pumping strength, and the location and extent of any damage to its tissues. It is especially useful for assessing diseases of the heart valves, as it reveals abnormalities such as poorly functioning heart valves.

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