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< Case Report >

Balloon dilatation in a chow chow dog with Cor triatriatum dexter

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Abstract

A 3-year-old chow chow dog with abdominal distention was referred to the Veterinary Teaching Hospital of Chungnam National University. The dog was diagnosed as Cor triatriatum dexter based on echocardiographic results, which demonstrated an abnormal membrane partitioning the right atrium. Echocardiography also revealed turbulent intra-atrial blood flow between the two chambers of the atrium. The dog was treated with balloon dilatation to enlarge the perforation in the abnormal membrane and to improve blood flow. As a result, although the membrane remained, increased perforation reduced the turbulent intra-atrial blood flow. Clinically the patient improved and eventually was discharged. This case is the first domestic Korean clinical veterinary report on the use of balloon valvuloplasty to treat Cor triatriatum dexter in a dog.

Key words : Balloon dilation, Cor triatriatum dexter, Chow Chow, Dog

INTRODUCTION

Cor triatriatum dexter is one of rare congenital heart anomalies in dogs as well as humans that occur approximately 0.3% of congenital heart malformations (Nelson and Couto, 2014). It has been reported that Cor triatriatum dexter has breed-predisposition when occur without any other heart problems; middle to large dog breeds (Nelson and Couto, 2014; Weisse and Berent, 2015). In Cor triatriatum dexter, there is typically a single perforation in an intra-atrial septum which enables blood flow to communicate between the separated atrial chambers (Weisse and Berent, 2015).

Clinical signs depend on the severity of the obstruction. Hepatomegaly and ascites can be present if the obstruction is sufficiently severe to increase blood pressure on the caudal vena cava and hepatic vein in dogs (Weisse and Berent, 2015). Severely affected patients with Cor triatriatum dexter may present with abdominal distention (ascites), lethargy, anorexia, weight loss, and diarrhea (Nelson and Couto, 2014). Echocardiography is the method of choice for definitive diagnosis. In Cor triatriatum dexter, the septum appears as a hyperechoic structure in the right atrium in a right parasternal long axis four chamber echocardiographic view, and application of Doppler mode echocardiography allows visualization of turbulent flow in the right atrium (Albiero et al, 2004). One of treatment options for clinically significant Cor triatriatum dexter involves increasing septum perforation size by using a ballooning device (balloon dilatation) (Weisse and Berent, 2015). This report on the use of balloon dilatation to treat Cor triatriatum dexter in a dog in South Korea.

CASE

A 3 year-old male chow chow dog presented at a local animal clinic with abdominal distention. On physical examination, cardiac murmur was not heard by stetho-

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scope and body condition score was 4/9. Before being referred to the Veterinary Teaching Hospital of Chungnam National University, he was received abdominal centeses and then the condition has improved. When the patient was referred to our hospital, it was found to have no abnormalities other than the degree of dehydration by 5% and slight tachypnea. Blood analysis revealed the complete blood count, electrolyte levels, and coagulation rate were normal; however, hyperlactatemia (3.04 mg/dL; reference range, 0.5～2.5 mg/dL) and increased alanine aminotransferase (95 U/L; reference range, 19-70 U/L), creatinine (1.7 mg/dL; reference range, 0.5～1.3 mg/dL), and amylase (1,136 U/L ; reference range, 185～700 U/L) were observed.

Radiographic examination showed that cardiac enlargement was not observed, but caudal vena cava dilatation was suspected. Although the details of the abdominal organs were still obscured, the abdominal distension decreased after removal of 2 liters of ascites. Echocardiography was then performed, and the right atrium was observed to be divided into two chambers by a hyperechoic membrane visible in an oblique right parasternal four-chamber view (Fig. 1A). In color doppler mode, the membrane in the right atrium was visualized as perforated, and turbulent flow was present. In continuous wave Doppler mode, a sustained blood flow of about 1.9 m/s was observed during diastole (Fig. 2B). The dog was diagnosed as Cor triatriatum dexter. On the day of the visit and diagnosis, we performed balloon (CRE^{TM} catheter, Boston Scientific, USA) dilatation of the perforation in the right atrium membrane. We accessed the jugular vein by using the Seldinger technique. After puncturing the jugular vein with a needle, a guide wire was inserted followed by the sheath and dilator, which were passed along the guide wire.

Next, an angiocatheter was placed near the right atrium by following the guide wire, and a contrast agent was injected to determine membrane status under C-arm (BV Pulsera, mobile X-ray unit R.2.3, Philips, USA) monitoring. The balloon catheter was then placed with the existing perforation of the membrane, filled with contrast medium, and expanded three times for 10 sec-

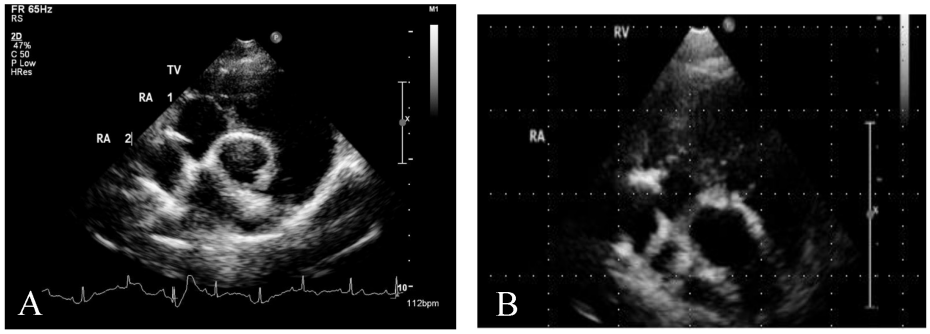

Fig. 1. Echocardiographic images before (A) and after (B) balloon dilatation. The widened membrane was observed after balloon dilatation (B).

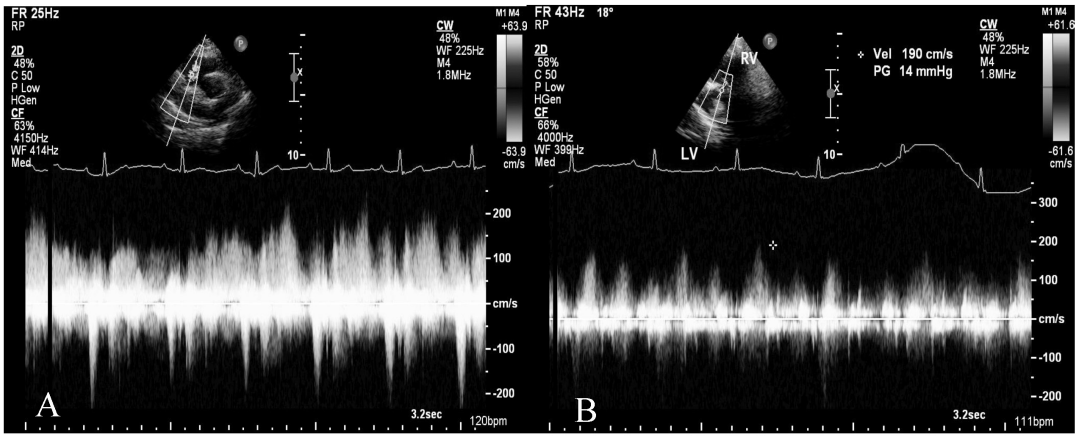

Fig. 2. Continuous wave doppler examination showed that the velocity decreased from 2.4 m/s (A) to 1.9 m/s (B) after balloon dilatation.

onds each. After procedure completion, it was observed that the perforation in the right atrium membrane had widened from the initial 4 mm to 9 mm (Fig. 1B). In addition, color Doppler echocardiography revealed that the turbulence in the intra-atrial flow had decreased. The dog was discharged five days after the procedure. Residual ascites were removed at the local clinic, and the degree of subsequent recurrence of ascites decreased significantly. In addition, breathing subsequently stabilized and exercise intolerance improved significantly.

DISCUSSION

The embryogenesis of Cor triatriatum dexter has been described as resulting from persistence of the right valve of the sinus venosus generating a division within the right atrium (López-Alvarez et al, 2011). Echocardiography is especially useful for diagnosing Cor triatriatum dexter in dogs, not only for the initial diagnosis and confirmation of the intra-atrial obstruction, but also for monitoring of the pressure gradient reduction and visualizing increased mobility of the perforated membrane after dilation (Boon, 2011). We diagnosed Cor triatriatum dexter in this dog by using echocardiography, which in oblique right parasternal four-chamber view, revealed two chambers in the right atrium separated by a fenestrated echogenic membrane. Compared to performing thoracotomy and cardiotomy, balloon dilatation of less invasive, moreover, it is associated with low morbidity and mortality, and results in little postoperative discomfort (Adin and Thomas, 1999). Thus, in this case, we treated by using balloon dilatation. There are case reports that have successfully treated Cor triatriatum dexter with balloon dilatation, but there have also been unsuccessful cases (LeBlanc et al, 2012). These inconsistency in results may be to the nature of the membranes, in the right atrium, which, when very fibrous, is presumed to be less favorable for dilatation (LeBlanc et al, 2012). Recently, a procedure using a cutting balloon was reported (Weisse and Berent, 2015). When the cutting balloon is not expanded a small micotome blade is hidden within the cleft of the balloon, but when the balloon is expanded the blade's cutting edge protrudes and the surrounding tissue can be resected (Albiero et al, 2004).

In a comparison of conventional balloon and cutting balloon dilatation for stenotic vessels in human in-stent restenosis, balloon type did not significantly affect prognosis, but the conventional balloon procedure was more convenient and less damaging to tissue than the cutting balloon procedure (Albiero et al, 2004). If the operator perceives a fibrous membrane that is resistant to conventional ballooning, a cutting balloon application may be more effective and successful (Albiero et al, 2004).

In the present case, we treated Cor triatriatum dexter with balloon dilatation, and successfully expanded the existing opening in the membrane in the right atrium.

In conclusion, this case report describes a successful application of balloon dilatation in a dog with Cor triatriatum dexter in South Korea. Based on the successful outcome, balloon dilatation should be considered as a potential treatment for dogs with Cor triatriatum dexter.

REFERENCES

Adin DB, Thomas WP. Balloon dilation of Cor triatriatum dexter in a dog. J Vet Intern Med 1999; 13: 617-619.

Albiero R, Silber S, DiMario C, Cemigliaro C, Battaglia S, Reimers B, Frasheri A, Klauss V, Auge JM. Cutting balloon versus conventional balloon angioplasty for the treatment of in-stent restenosis: results of the restenosis cutting balloon evaluation trial (RESCUT). J Am Coll Cardiol 2004; 43: 943-949.

Boon JA. Veterinary echocardiography. 2nd ed. New Jersey: Wiley-Blackwell. 2011; 516-517.

LeBlanc L, DeFrancesco TC, Adams AK, Atkins CE, Tou SP, Fudge JC, Keene BW. Cutting balloon catheterization for interventional treatment of Cor triatriatum dexter : 2 cases. J Vet Cardiol. 2012; 14: 525-530.

López-Alvarez J, Dukes-McEwan J, Martin MW, Killick D, Fonfara S, Fraser McConnell J. Balloon dilation of an imperforate cor triatriatum dexter in a Golden Retriever with concurrent double-chambered right ventricle and subsequent evaluation by cardiac magnetic resonance imaging. J Vet Cardiol 2011; 13: 211-218.

Nelson RW, Couto CG. Small animal internal medicine. In: Congenital cardiac disease. 4th ed. St. Louis: Elsevier. 2014: 112-123.

Weisse C, Berent A. Veterinary image-guided interventions. In: Cor Triatriatum. New Jersey: Wiley-Blackwell. 2015: 604-608.