

A case of canine patent ductus arteriosus showed favorable therapeutic response by surgery combined with needle-acupuncture therapy

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Abstract : A 6-month-old male Poodle was referred with chief complaint of dyspnea and cough. Cyanosis was not detected. This dog was diagnosed as a case of canine patent ductus arteriosus (PDA) by X-ray and ultrasonography. Diuretics and bronchodilators were administered for 4 weeks. Clinical symptoms were not improved. Thoracotomy was done at right recumbent position. The length of ductus arteriosus was 8 mm and the diameter was 6 mm, respectively. Double ligation was performed in surgery. Continuous cardiac murmur, cough and strong femoral pulsation were disappeared after surgery. The diameters of the pulmonary artery and vein found to normal by X-ray on 10 days after operation. The diameter of the aorta measured to be larger than that of the main pulmonary artery by ultrasonography. The fractional shortening (FS) on 10 days after surgery was 17.32% by ultrasonography. The needle-acupuncture therapy was used in acupoints BL-15 as local point plus PC-6, HT-7 and HT-5 as distant points for 3 days (15 min/once/a day). The FSs were increased to 21.31% and 29.44% at 1 and on 3 days after acupuncture, respectively. The present patient was a case of typical canine PDA that showed favorable therapeutic responses by surgery combined with needle-acupuncture treatment.

Key words : canine, needle-acupuncture therapy, patent ductus arteriosus

Introduction

Canine heart failure (HF) is frequently developed in old dogs along with age like human. Canine HF is defined as an impossible state for body to get sufficient blood flow due to cardiac abnormality. Clinical hypoperfusion due to decreased cardiac output may develop. Congestion and edema may develop due to increased of ventricular diastolic pressure in canine HF [1, 8, 13].

Canine HF is classified into acute and chronic, and left and right HF. Right HF may develop from congenital causes such as pulmonary stenosis, atrial

septal defect and tricuspid valvular dysplasia, and from acquired causes including dirofilariasis, chronic obstructive pulmonary disease and myxoma like degeneration of the tricuspid valve. On the other hand, left HF can be occurred by congenital causes such as aortic stenosis, patent ductus arteriosus (PDA), ventricular septal defect and aortic valvular insufficiency, and can be developed by acquired cause including myxoma like degeneration of the bicuspid valve [4, 14].

Canine PDA is a disease characterized by clinical symptoms of right or left cardiac failure due to patency of ductus arteriosus connecting between aorta and

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pulmonary artery during development stage. In addition, mechanical cardiac murmur can be characteristically heard by auscultation. As for treatment of canine PDA, surgical obstruction of ductus arteriosus must be done before combining pulmonary hypertension [6, 13].

On the other hand, acupuncture therapy had been used for the treatment of human cardiac diseases and the therapeutic effect of stimulation of AP mainly at PC-6 (Nei Guan) acupoint was investigated in various human cardiac diseases [5, 10, 15]. However, canine PDA was little reported in canine cardiac diseases.

We report a case of canine PDA showed favorable response by surgical operation combined with needle-AP therapy.

Case

History

A 6-month-old male Poodle was referred with chief complaint of dyspnea and cough. Cyanosis was not detected, but continuous mechanical cardiac murmurs and cardiac thrill were detected by auscultation and strong femoral pulsation was also found by palpation. Cardiac hypertrophy was observed in dorsoventral and lateral X-ray findings. In addition, dilatation of pulmonary artery and vein was observed. Relative narrow trachea and enlargement of cardiac apex was found. Dilatation of left ventricle, upper-sided curvature of the atrial septum and enlargement of the main pulmonary artery than that of aorta in ultrasonography (Fig. 1). This dog was diagnosed as canine PDA. Diuretics (Lasix; Handok; Korea, 2 mg/kg, SC and BID/day, PO) and bronchodilators (Aminophilline; Daewoo; Korea, 2 mg/kg, TID/day, PO) were administered for 4 weeks. Clinical symptoms of this dog were not improved.

Operation

Analgesic (Rimadyl; Pfizer, USA, 2.2 mg/kg, PO) was administered previously one day before surgery. Antibiotics (Cephadoxin; New Gem Pharm, Korea, 30 mg/kg, IV), anti-inflammatory and anti-shock drug (Boren; Korea, 0.1 mg/kg, IV) and analgesic (Butorphanol; Myungmun, Korea, 0.2 mg/kg, IV) were given just before operation. After induction anesthesia with atropine (Atropine sulfate; Jaeil, Korea, 0.04 mg/kg, SC) and ketamine hydrochloride (Ketamine; Yuhan, Korea, 5 mg/kg, IV), anesthesia was continued with isoflurane under

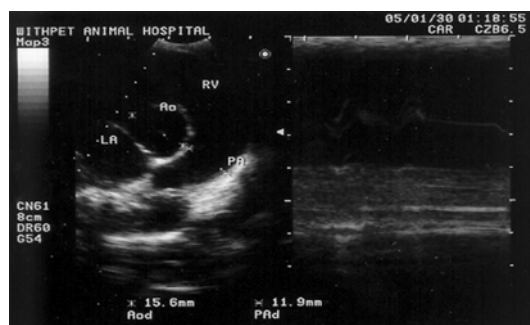


Fig. 1. Ultrasonographic finding of PDA patient.

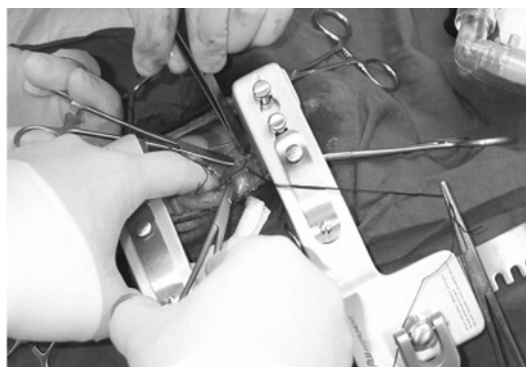


Fig. 2. Ductus Arteriosus is seen (Operation finding of Patent Ductus Arteriosus (PDA)).

tracheal intubation. Thoracotomy was made at right recumbent position. Operation was done according to the general surgical rules. The left 6th intercostal space was incised and thoracic retractor (Burnford-finocchio) was placed into the intercostals space. Vagus nerve was dissected bluntly and pulled to the direction of the spine using with silk (1-0). The length of ductus arteriosus was 8 mm and the diameter was 6 mm, respectively in this dog (Fig. 2). Double ligation was done with silk in ductus in the aorta first and that in the main pulmonary artery later, respectively. Because abnormal findings were not detected, chest tube was placed into the 7th intercostal space and then incised areas were sutured. Negative pressure was made by using of three-bottle system and placed chest tube. It took for 30 minutes from thoracotomy to removal of the chest tube. Analgesic (Rimadyl; Pfizer, USA, 2.2 mg/kg, PO), antibiotics (Clabamox; Pfizer, USA, 12.5 mg/kg, PO), diuretics (Lasix; Handok, Korea, 2 mg/kg, SC) and antihypertensive drug (Enalaphril; Hankuk Pharma,

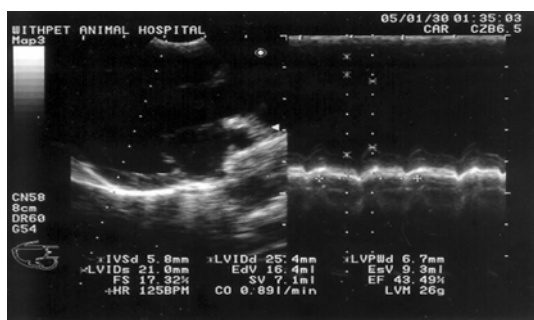


Fig. 3. Ultrasonographic finding on 10 days after operation.

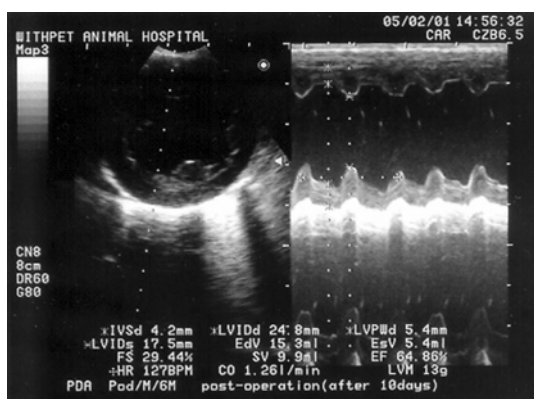


Fig. 4. Ultrasonographic finding of 10 days after needle acupuncture.

Korea, 0.5 mg/kg, PO) were administered to this dog. Continuous cardiac murmur, cough and strong femoral pulsation were disappeared after surgery. Suture material was removed on 10 days after operation. The diameters of the pulmonary artery and vein measured to be normal by X-ray. The diameter of the aorta gauged to be larger than that of the main pulmonary artery by ultrasonography (Fig. 3). The fractional shortening (FS) of 10 days after surgery was 17.32% by ultrasonography.

Acupuncture treatment

We decided to apply the needle-AP therapy on the acupoints such as BL-15 (Shen Shu) as a local point plus PC-6 (Nei Guan), HT-7 (Shen Men) and HT-5 (Tong Li) as distant points for 3 days (15 min/once/day). The FSs were increased to 21.31% and 29.44% on the first AP and on 3 days after AP stimulation (Fig. 4) by ultrasonography, respectively.

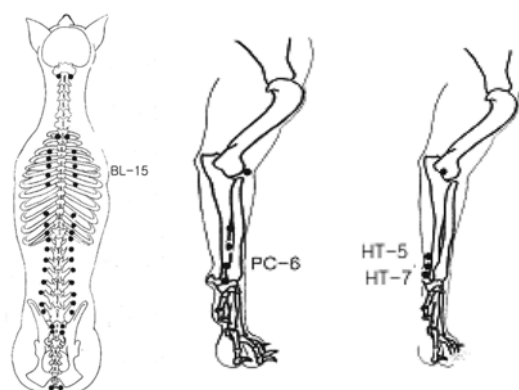


Fig. 5. The acupoints used in the present study.

Discussion

It is well known that canine PDA is one of common congenital cardiac anomalies, occurred by persistent communication between the descending aorta and pulmonary artery due to the patency of the ductus arteriosus after birth [2]. PDA patients generally reveal continuous left to right shunting of blood flow due to higher aortic pressure than that of the pulmonary artery [7]. In addition, it is commonly occurred in breeds including colli, Maltese, poodle, Pomeranian, English springer spaniel and Yorkshire terrier etc. [2]. Continuous cardiac murmur by physical examination and left sided cardiomegaly, pulmonary overcirculation, dilatations of the main pulmonary artery and descending aorta by thoracic radiography can be detected [7].

The present dog was a case of typical PDA based on clinical symptoms, physical examination, radiography and ultrasonography. In general surgical ligation of the ductus arteriosus is recommended for treatment of canine PDA patients less than 2 years old and prognosis with surgery is favorable in case without advanced heart failure and atrial fibrillation [7]. PDA was confirmed by operation in this dog.

This dog showed favorable therapeutic responses including disappearances of continuous coughing and cardiac murmurs after operation for PDA. In spite of the surgery, cardiac FS (17.32%) was not improved on 10 days after operation in this dog. However, this dog revealed complete recovery of cardiac FS (29.44%) by needle-AP at BL-15, PC-6, HT-7 and HT-5 for 3 days. It is not clear whether increase of the cardiac FS is

caused by natural procedure by operation for PDA or caused by addition of needle-AP treatment in this dog. The present paper is considered to be first description on needle-AP with successful treatment of after surgery for canine PDA in veterinary literature.

As for AP treatment in human medicine, Meng [10] described that electro-acupuncture at PC-6 could decrease the elevated ST segment and reduced the infarct areas induced by coronary ligation as an animal model. Zhang *et al.* [15] reported that needling at bilateral PC-6 might enhance the therapeutic effect for frequent ventricular extrasystole based on the results of needling at PC-6 plus oral administration of mexiletine in sixty of human patients. In addition, Middlekauff *et al.* [11] mentioned that acute acupuncture attenuated sympathoexcitation during mental stress in advanced HF patients and Middlekauff [12] described that acupuncture could be sympatholytic in HF. In addition, Bueno *et al.* [3] suggested a possible benefit from acupuncture, electrical stimulation and spinal cord stimulation in the treatment of angina pectoris and coronary artery disease. As described in the literatures, the therapeutic effects by AP at PC-6 were mainly investigated for treatment of human cardiac diseases. On the other hand, laser-acupuncture (laser-AP) is commonly used for the treatment of various diseases including cardiac disease in human [5, 15, 10]. Because restraint stress can make such a problem as development of cyanosis during treatment with AP especially in canine cardiac disease, non-invasive laser-AP is considered to be better than needle-AP and injection-AP. Further research using with laser-AP for treatment of canine HF will be necessary in near future.

In conclusion, this dog was a case of typical canine PDA that showed favorable therapeutic responses by surgery combined with needle-AP treatment.

Conclusion

A 6-month-old male Poodle was referred with chief complaint of dyspnea and cough. This dog was diagnosed as a case of canine patent ductus arteriosus (PDA) by X-ray and ultrasonography. Operation and needle acupuncture was applied in this patient. The present patient was a case of typical canine PDA that showed favorable therapeutic responses by surgery combined with needle-acupuncture treatment.

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