A Rare Case of Patent Ductus Arteriosus in a Dog with Glomerular Mesangiolysis

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ABSTRACT. Rare case of patent ductus arteriosus (PDA) was observed in a 2-year and 9 month-old Miniature Dachshund which had been diagnosed as severe cardiac failure. Pulmonary artery from the right ventricle connected to dilated ductus arteriosus, and pulmonary artery-ductus arteriosus-descending aorta formed a continuous duct, which seemed to be the main route of bloodstream. Ascending aorta from the left ventricle was hypoplastic, and connected to the dilated ductus arteriosus. Glomerular mesangiolysis due to heart failure was also observed in the kidney. — KEY WORDS: hypoplastic aorta, mesangiolysis, patent ductus arteriosus.


Fig. 2. Dissection of the ventricle. Dilation of the right ventricular chamber and thickening of the right ventricular wall was prominent (Fig. 2). Pulmonary artery from the right ventricle connected to dilated ductus arteriosus, and pulmonary artery-ductus arteriosus-descending aorta formed a continuous duct, which seemed to be the main route of bloodstream (Fig. 3). Ascending aorta from the left ventricle was hypoplastic, and connected to the dilated ductus arteriosus (Fig. 4). Valves and ventricular septum were normal.

Tissues were fixed in 10% neutral buffered formalin. Paraffin sections (2–6 µm) were stained with hematoxylin and eosin. Histologically, the wall of ductus arteriosus was rich in elastic fibers as compared with normal one [3], and fragmented elastic fibers were observed in some parts of the aortic and pulmonary arterial walls. Cardiac muscle cells were slightly hypertrophic and showed lipofuscin accumulation. Hemorrhage, organized thrombi and their recanalization were observed in the lungs. In the kidney, anemic infarct was observed. Glomeruli were congested and enlarged as a whole, and mesangial areas of about 10% of glomeruli were partially expanded with accumulations of blood cells and fibrillar debris, indicating mesangiolysis (Fig. 5).

In the present case, a large part of venous blood from the right ventricle was thought to be directly supplied to the
body instead of entering the lungs, causing severe systemic hypoxia. Neurologic symptoms observed before death would be caused by brain hypoxia. Aortic transposition detected by ultrasonography corresponded to the duct consisting of pulmonary artery and dilated ductus arteriosus. It might be due to increased blood pressure as the main bloodstream that the wall of the ductus arteriosus was rich in elastic fibers.

PDA is the most common congenital cardiovascular defect in dogs [1, 4]. In the present case, ductus arteriosus was dilated and the aorta from the left ventricle was hypoplastic, being very rare and classified as type 4 according to the classification in human [3]. This type of PDA has been reported in the horse [6], dog [7], cattle[9], and sheep [9]. The canine case was 14-week-old female Siberian Husky [7], and a right-to-left shunt through a wide ductus arteriosus, hypertrophy of right ventricular free wall, dilation of the right ventricular chamber, and tortuosity of the pulmonary artery were reported in that case. In this type of PDA, surgical treatment would be excluded, because ligation of ductus arteriosus would cause acute pulmonary hypertension.

It is reported that glomerular abnormalities including mesangiolysis, mesangial proliferation, glomerulosclerosis, and hyalinization of both afferent and efferent arterioles occur in animals and human beings with cyanotic congenital heart diseases [2, 5, 8]. The present canine case also showed cyanosis before death and glomerular mesangiolysis was observed. Hypoxemia, polycythemia, high venous pressure and hyperviscosity due to circulation failure would cause an increase of vascular permeability and local intravascular coagulation, resulting in mesangiolysis [8].

REFERENCES