Radiological assessment of pectus excavatum in a Pekingese dog

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Abstract

Pectus excavatum (PE) is a ventral chest wall deformity, also known as funnel chest, sunken chest, chondrosternal depression or koilosternia. The 4 months old, 1.3 kg intact-female Pekingese dog was evaluated for acute semicoma and convulsion. The client reported that this patient have had chronic loss of appetite, intermittent dyspnea and palpable sunken breast. The other littermates did not show any abnormalities. On physical examination, cachexia (BCS 1/5), concave sternum, flatten thoracic cavity and cardiac murmur were observed. On radiographic study, the caudal sternum cave to vertebrae and narrowing thoracic cavity. The severities of thoracic deformity were evaluated by deformation indices such as-Frontosagittal index (FSI) and vertebral index (VI). Moderate to severe PE was founded by the radiological measurements.

Key words : Pectus excavatum, Funnel chest, Sunken chest, Koilosternia, Dog

INTRODUCTION

Pectus anomaly is a deformity of the thoracic wall in which several ribs and sternums grow abnormally, producing a convex (carinatum) or concave (excavatum) appearance to the ventral aspect of chest wall (Fossum, 2002; Williams and Crabbe, 2003). Pectus excavatum (PE) is a ventral chest wall deformity, also known as funnel chest, sunken chest, chondrosternal depression or koilosternia. PE has been reported in animals, most frequently in cats (Crigel and Moissonnier, 2005; Fossum et al, 1989a; Fossum et al, 1989b; Green and Lindo, 1968; McAnulty and Harvey, 1989; Risselada et al, 2006) and dogs (Ellison and Halling, 2004; Fossum et al, 1989a; Fossum et al, 1989b; Pearson, 1973), but it is considered to be an uncommon abnormality. The exact mechanism involved is unknown (Boudrieau et al, 1990; Fossum, 2002; Fossum et al, 1989a; Smallwood and Beaver, 1977). Unbalanced overgrowth in the costochondral regions that push the sternum inward seems to be the most prevalent theory for its pathogenesis in humans (Crump, 1992; Fonkalsrud, 2003). A postmortem dissection performed on a cat with PE showed that the primary abnormality involved the ventral portion of the diaphragm (Smallwood and Beaver, 1977).

No genetic defect has been found to be directly responsible for the development of PE (Boudrieau et al, 1990; Williams and Crabbe, 2003). However, familial occurrence of the pectus anomaly has been reported in humans (Creswick et al, 2006; Fonkalsrud, 2003; Williams and Crabbe, 2003) and in littermate dogs (Ellison and Halling, 2004; Fossum et al, 1989a; Pearson, 1973). Among the littermates that have been reported, 3 were setter cross breed (Pearson, 1973), 2 were pugs (Fossum et al, 1989a), and 2 were Welsh terriers (Ellison and Halling, 2004). A pedigree study of 34 human families provided evidence of an inherited disorder, probably multi-factorial, although some families showed apparent Mendelian inheritance (Creswick et al, 2006). In a retrospective study, 7 of 8 affected dogs
were brachycephalic breeds; no predisposition was evident (Fossum et al, 1989a). In addition, an association between flat chest and PE has been suggested in cats (Sturgess et al, 1997). Because of the potential for heritability, some authors have recommended that animals with PE be neutered (Shires et al, 1988). The deformity is usually congenital (Fossum, 2002; Fossum et al, 1989a).

Respiratory distress is the clinical sign most frequently observed by the owner (Fossum et al, 1989a), probably because the deformity becomes more pronounced during growth (Smallwood and Beaver, 1977). Chest asymmetry is quite variable (Fonkalsrud, 2003; Shires et al, 1988) and respiratory distress may be associated with displacement of the organs or restriction of ventilation (Fonkalsrud, 2003). The deformity is generally in the caudal part of the sternum (Fossum, 2002; Fossum et al, 1989a), but it was also reported in the cranial part in 2 dogs (Ellison and Halling, 2004).

Vertebral deformities, cardiomegaly, and malposition of the heart may be detected (Boudrieau et al, 1990; Fossum, 2002; Fossum et al, 1989a; McAnulty and Harvey, 1989) in association with PE. In humans, PE may occur as the only abnormality or in association with other syndromes, such as that of Marfan and Ehlers-Danlos (Crump, 1992; Fonkalsrud, 2003). In a retrospective study, the heart was displaced to the right in 2 dogs and to the left in 3 dogs and 4 cats (Fossum et al, 1989a). In another reported case in a cat, the cardiac silhouette was shifted into the right hemithorax (Risselada et al, 2006). In humans, heart murmurs and electrocardiogram (ECG) abnormalities, such as right-axis deviation and depressed ST segments have been associated with displacement and rotation of the heart in PE (Crump, 1992; Fonkalsrud, 2003). Elevation of the ST segment could have been secondary to the ventricle hypertrophy and the sinus tachycardia could have been associated with stress (Tilley, 1992). However, in this report, no cardiac murmurs, ECG and echocardiographic abnormalities were detected.

The pre- and post operation frontosagittal and vertebral indices of the chest are measured according to Fossum and Ohno’s method and widely employed in quantitative assessment of the degree of surgical correction (Fossum et al, 1989b). 3 common chest wall deformities (CWD) are known. 1) PE is sternal depression and concave chest; 2) Pectus carinatum (PC) is sternal protrusion and convex chest; 3) Flat chest (FC) is flattening rib cage. CWD result from costochondral unbalanced overgrowth, but the exact mechanism is unknown. CWD can be corrected surgically (Fossum et al, 1989b).

Here, we describe the usefulness of radiological assessment of thoracic deformity in a dog. This case was diagnosed as PE in a Pekingese dog.

**CASE REPORT**

The 4 months old, 1.3 kg intact-female Pekingese dog was evaluated for acute semicoma and convulsion. The client also explained that this patient had chronic loss of...