

## Swimmer Syndrome and Pectus Excavatum in a Pup

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### Abstract

Pectus excavatum is a congenital abnormality of the sternum and costochondro cartilages that results in dorsoventral flattening and narrowing of the thorax. A 20 days old, male Rottweiler pup was presented to the Department of Veterinary Pathology, Madras Veterinary College, Chennai for the post mortem examination with a history of anorexia, dyspnea, vomiting and inability to walk properly since birth. Necropsy revealed laterally splayed hind legs, dorsal deviation of sternbrae towards spine and dorsoventral compression of thorax. Flat chest compressed the right intermediate and left cardiac lobes of lungs and were dark with adherence of thin fibrin shreds. The vertebral and frontosagittal indices were 5.6 and 2.9 respectively. This case was diagnosed as pectus excavatum and swimmer syndrome duo to congenital deformity in thoracic cavity and splaying of the limbs.

**Keywords:** Frontosagittal index ratio, Pectus excavatum, Swimmer syndrome, Vertebral index ratio

Pectus anomaly is a deformity of the thoracic wall in which several ribs and the sternum grows abnormally, producing a convex (carinatum) or concave (excavatum) appearance

to the ventral aspect of chest wall (Fossum, 2002). Pectus excavatum is an uncommon abnormality in animals, reported in cats (Crigel and Moissonnier, 2005; Risselada *et al.*, 2006) and dogs (Ellison and Halling, 2004) and commonly observed as congenital deformity of the anterior chest wall. It is characterized by the dorsal deviation of the caudal sternum and associated costal cartilages or a ventral to dorsal narrowing of the entire thorax in which several ribs and the sternum grow abnormally producing a caved-in or sunken appearance of the chest. It is also referred to as Cobbler's chest, Sunken chest, Funnel chest or simply a Dentin the chest (Fossum, 2007). Swimming puppy syndrome is the developmental abnormality observed in neonatal dogs in which the hind limbs and sometimes the front legs are splayed laterally. Affected animals often remain in sternal recumbency exhibit swimmer like movements at the time of trying to ambulate that are more pronounced on smooth surfaces. The condition is mostly seen in brachycephalic dog breeds, and an association with pectus excavatum has been previously reported in english bull dog, Basset hound and Scottish Terriers (Fossum *et al.*, 1989; Boudrieau *et al.*, 1990). Swimmer puppy syndrome is also called as twisted legs, flat-pup syndrome and turtle pup (Verhoeven *et al.*, 2006). Abnormal sternum and costal cartilage are responsible for compressive cardiopulmonary dysfunction resulting in exercise intolerance, tachypnea, cyanosis, cardiac murmur, arrhythmias, or respiratory distress. The exact mechanism involved is unknown. Unbalanced overgrowth in the costochondral regions that push the sternum inward seems to be the most prevalent theory for its pathogenesis. The

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present paper describes the anomaly of Pectus excavatum along with swimmer syndrome in a Rottweiler pup.

### Case History and Observations

Male, 20 days old, Rottweiler pup was presented to the Department of Veterinary Pathology of Madras Veterinary College, Chennai for the postmortem examination with the history of anorexia, dyspnea, vomition, inability to walk properly since birth and exhibited swimmer like movements after 10 days. Necropsy examination revealed poor body condition with rough hair coat and dehydrated. Hind legs were splayed laterally. Dorsal deviation of sternebrae towards spine (Fig 1) and dorsoventral compression of thorax were observed (Fig 3). The vertebral index was measured by height of the 10<sup>th</sup> vertebral body to the height of the thorax. The frontosagittal index ratio was measured by height of the thorax at

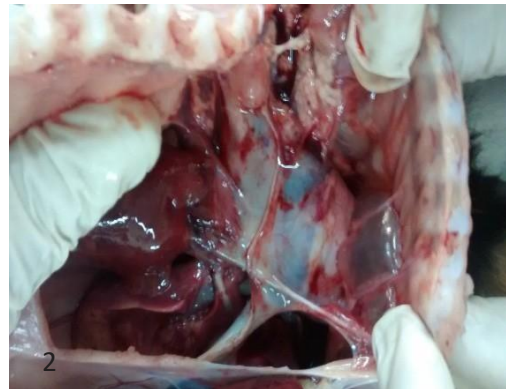
the level of 10<sup>th</sup> vertebral body to the width of the thorax. The vertebral index ratio and fronto-sagittal index ratio was 5.6 and 2.9 respectively. Pelvic cavity and thoracic cavity contained little quantity of serosanguinous fluid (Fig 2). Right intermediate and left cardiac lobes of lungs were darker and consolidated thin yellow fibrin shreds found adhered to the lung lobes (Fig 4).

### Treatment and Discussion

Pectus excavatum is a malformation of the sternum and costochondrocartilages that results in dorsoventral flattening and narrowing of the thorax (Verhoeven *et al.*, 2006). Congenital predisposition, intrauterine pressure abnormalities, shortening of central tendon of the diaphragm, thickened substernal ligament, congenital deficiency of musculature in cranial diaphragm, abnormal osteogenesis and chondrogenesis, upper respiratory obstruction,



**Fig 1.** Dog – Rottweiler – Pectus excavatum – Dorsal deviation of sternebrae towards apine.



**Fig 2.** Dog – Rottweiler – Pectus excavatum – Thoracic cavity – Serosanguinous fluid



**Fig 3.** Dog – Rottweiler – Pectus excavatum – Dorsoventral compression of thorax



**Fig 4.** Dog – Rottweiler – Pectus excavatum - Right intermediate and left cardiac lobes dark and adherence of fibrin shreds

environmental factors and posturing difficulties are possible causes for pectus excavatum (Boudrieau *et al.*, 1990). No genetic defect has been found to be directly responsible for the development of pectus excavatum (Williams and Crabbe, 2003). However, familial occurrence of the pectus anomaly has been reported in humans (Fonkalsrud, 2003; Williams and Crabbe, 2003) and in littermate dogs (Ellison and Halling, 2004; Fossum *et al.*, 1989).

The diagnosis of pectus excavatum was based on clinical signs and physical examination. Clinical signs are typically attributed to the chronic pulmonary and cardiovascular compression (Fossum *et al.*, 1989; Boudrieau *et al.*, 1990) which may include recurrent lower airway infections, exercise intolerance, coughing as observed in this case. Cardiac abnormalities like ventricular septal defect bilateral cardiac enlargement (Fossum *et al.*, 1989; Johnston *et al.*, 1993), inhalation pneumonia and regurgitation after feeding (Harkness and McCormick, 1981; Kim *et al.*, 2013) with pectus excavatum are reported in dogs. Liver lobe torsion with moderate pectus excavatum recorded in cat (Haider *et al.*, 2015). Cardiac abnormality was not observed and severe congestion, inflammation of lung lobes with fibrin and seepage of serous sanguineous fluid could probably due to dorsoventral compression of thorax recorded in this case. All other internal organs were apparently normal.

Swimmer syndrome is an uncommon developmental abnormality, with malformation of both hind legs and sometimes the front legs (Hoskins, 2001). Occasionally, only one leg is affected. In dogs and cats, clinical signs are seen in the first weeks after birth and are most obvious during the fifth or sixth week of age (Van Ham, 2002). The limbs are maintained in an abducted position and attempts to walk result in a paddling motion (Hosgood and Hoskins, 1998). In the present case, animal had exo-rotation of both hind paws, hyperextension of both tarsal joints and the inability to adduct both hind legs were noticed.

Slow development of muscular or ligament strength in relationship to the size or bodyweight are important factors in the devel-

opment of swimmer syndrome (Fossum *et al.*, 1989; Boudrieau *et al.*, 1990). Thoracic radiography revealed mild to marked deviation of caudal sternbrae, deviation of cardiac silhouette and secondary pulmonary pathology (Fossum *et al.*, 1989). Radiographic examination details were not available in this case. Vertebral index is about 11.8 to 19.6 in normal non brachycephalic breeds, but in affected patients it is between 5 to 11.6. A fronto sagittal index is 0.8 to 1.4 in normal animals but in affected it was found to be 1.3 to 3.2 (Ellison and Halling, 2004). The vertebral index and frontosagittal index ratio in this case were 5.6 and 2.9 respectively.

### Summary

Swimmers syndrome and pectus excavatum can occur independently or concurrently. It is considered as untreatable condition but there are reports on successfully treated in moderate cases with combination of intensive physiotherapy, bandaging, external splinting and hospitalization. This is a case of a typical advanced swimmers syndrome and pectus excavatum due to cranial sternal deformities along with exorotation of both hind paws.

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## Surgical Correction of Perineal Hernia in a Male Dog

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### Abstract

A male uncastrated German shepherd dog was presented with a bulging near anal region and difficulty while urinating. Upon palpation it was diagnosed as perineal hernia. Upon incision of the area the herniated mass was identified as urinary bladder. The bladder was gently compressed to evacuate the urine for easy reduction. External anal sphincter and levator ani

were sutured with simple interrupted suture pattern using 1-0 PGA sutures, ventrally the external anal sphincter and obturator muscles were opposed together. Subcutaneous tissue was closed using simple continuous suture pattern using 1-0 catgut sutures and skin was closed using nylon by simple interrupted suture pattern. Postoperative antibiotic therapy was done using ceftriaxone, analgesic meloxicam and oral administration of stool softening agent cremaffin. The suture line was dressed daily and cleaning the anal opening was performed after every defecation. Skin sutures were removed on the 14<sup>th</sup> postoperative day. Castration was performed in order to prevent the recurrence of hernia and the animal showed uneventful recovery.

**Keywords:** Perineal hernia, dog, uncastrated, herniorrhaphy

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