

Early rehabilitation treatment helpful in a case of pectus excavatum of a dog

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Abstract : A 6-week-old female cocker spaniel, with a history of abasia astasia, was referred to the Department of Laboratory Animal Medicine, Medical Research Center, Yonsei University College of Medicine on February 23, 2000. The ribs inclined downwards with a sharp slope on both lateral sides of the thorax. The animal was diagnosed as pectus excavatum. She showed no signs of dyspnea, dyschezia, or dysuria. There was no heart murmur or sign of neural disease. For rehabilitation treatment, she was given physical exercise therapy 2 to 3 times a day by bending and stretching each articulation of the hind limbs and pressing the costochondral junction in and upward with both hands placed on each lateral side. After a month of therapy, she was able to stand up and walk. The therapy continued and resulted in the slight reformation of a round thoracic wall. The flattened rib cartilages grew more round by palpation and the thoracic cavity distended. Rehabilitation therapy yielded good results, enabling the subject to walk and run normally, as the thoracic cavity was distended by the rounded rib junction.

Key words : pectus excavatum, dog, rehabilitation

Introduction

Pectus excavatum is a deformity of the sternum and costocartilages that results in a dorsal to ventral narrowing of the thorax¹. The causes of pectus excavatum in animal are unknown. Theories proposed include shortenin of the central tendon of the diaphragm, intrauterine pressure abnormalities, and congenital deficiency of the musculature in the cranial portion of the diaphragm. Abnormal respiratory gradients appear to play a role in the development of this disease in some animals, as brachycephalic dogs are most commonly affected, many of which have concurrent hypoplastic tracheas. Pectus excavatum may be associated with 'swimmer's syndrome', which the limbs tend to splay laterally, impairing ambulation. Anormalities of the joints of the limbs and the long bones may also occur. Although the ethiology of pectus excavatum is uncertain, multiple animals in some litters have been affected; thus breeding should not be taken and affected animals should be neutered.

Patients with pectus excavatum may have abnormalities of both respiratory and cardiovascular function. Circulatory disorders in animal with pectus excavatum may occur as a result of abnormal cardiac positioning resulting in kinkin of the large veins and disturbance of venous return, compression of the heart predispositioning to arrthmias, restriction of ventricular capacity, and decreased respiratory reserve. Cafdica murmurs are common in patients with pectus excavatum and appear to be associated with the cardiac malpositioning. These murmurs often disappear following surgica lcorrection of the defect or a change in the patient's position.

Pectus excavatum may occur in any breed and a sex predisposition has not been identified. Many animals with pectus excavatum are asymptomaitc; however, symptomatic animals may present for evaluation of exercise intolerance, weight loss, hyperpnea, recurrent pulmonary infections, cyanosis, vomiting, persistent and productive coughing, inappetence, and/or mild episodes of upper respiratory disease. A correlation between

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severity of clinical signs and severity of anatomic or physiologic abnormalities has not been observed.

The sternal deformity is usually palpable. Other physical examination findings may include cardiac murmur and harsh lung sounds. Dyspnea is variable, but rapid, shallow respirations may be noted.

Animals with merely a flat chest may contour to a normal or near-normal configuration without surgical intervention. However, owners should be encouraged to regularly perform medial-to-lateral compression of the chest on these young animals. Animals with severe elevation of the sternum will not benefit from this technique or from splintage that simply provides medial-to-lateral compression and does not correct the malpositioned sternum².

Case

A 6-week-old female cocker spaniel, with a history of abasia astasia, was referred to the Department of Laboratory Animal Medicine, Medical Research Center, Yonsei University College of Medicine on February 23, 2000. She showed distinct developmental malformation and was the only surviving member of a litter. By palpation, she was found to have pectus excavatum with symmetrically flattened rib cartilages. Her funnel chest was diffused and a very steep angulation had formed at the junction of rib bones and cartilages. The ribs inclined downwards with a sharp slope on both lateral sides of the thorax. The limbs tend to splay laterally, impairing ambulation. The animal was diagnosed as pectus excavatum with 'swimmer's syndrome'. However she showed no signs of dyspnea, dyschezia, or dysuria. There was no heart murmur or sign of neural disease. Radiography showed the complete displacement of the heart to the right side without pulmonary edema. Transthoracic two-dimensional echocardiography showed no abnormalities in heart function.

For rehabilitation treatment, she was given physical exercise therapy 2 to 3 times a day by bending and stretching each articulation of the hind limbs and pressing the costochondral junction in and upward with both hands placed on each lateral side. Also, the bending and stretching exercise of the hind limbs was performed in warm water bath. To encourage her to walk, she was placed with other active puppies of different species that had been separated from their mothers.

After a month of therapy, she was able to stand up



Fig 1. MRI showing of the concave sternum(white arrow) toward the xyphoid cartilage(arrow head).

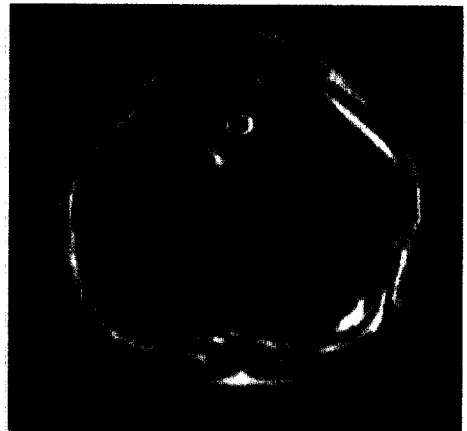


Fig 2. The rib cartilage still angulated steeply toward the sternum at the lateral side of thorax after 3 months of the rehabilitation treatment.

and walk. The therapy continued and resulted in the slight reformation of a round thoracic wall. The flattened rib cartilages grew more round by palpation and the thoracic cavity distended. The MRI, taken after three months of treatment, showed the lineage of the sterna to be straight and steeply downward at the xyphoid area (Fig 1). The lower part of the junctional cartilage near the xyphoid showed a steeper angulation than the other cartilages (Fig 2). The heart was seen on the right side and the image of the liver was opaque in parts. Rehabilitation therapy yielded good results, enabling the subject to walk and run normally, as the thoracic

cavity was distended by the rounded rib junction.

Discussion

In a human case reported in 1998 by Heitzer³, a woman with funnel chest showed increasing chest pain at the age of 56. In veterinary fields, there has been just few reports about pectus excavatum of dog. We may observe the same syndrome in dogs, that is no painful at an early age but with increasing pain in later life. Sternal depression is more common in young males and may cause heart displacement, usually to the left, in humans⁴. However this case of a female cocker spaniel showed dislocation of the heart to the right side. Almost 95% of people with pectus excavatum receive an operation for cosmetic and psychological reasons⁵. 10 years old is the optimal period for surgical correction in humans. Some believe that the best prognosis after surgical correction is expected in the 4 to 10 year aged group⁴. In the case of a mild degree of deformity or more serious malformations, surgery must be avoided⁶.

The configuration of the thoracic cage is determined by the shape and size of the spine, ribs, sternum, connecting muscles, and ligaments⁴. A mild degree of pectus excavatum is one of normal variation and is a symptomatic, though signs of chest pain, dyspnea on exertion, or palpitations may be shown⁷. Funnel chest is classified into three types in human patients. Type I is a symmetrical depression with steep walls and angulation of the costal cartilages medial to the mamillary line. Type II is a symmetrical diffused depression with sloping walls and angulation on or lateral to the mamillary line, and type III is an asymmetrical deformity with depression on one side and protrusion on the other⁶.

In this case, the dog shows the pectus excavatum with the limbs tend to splay laterally. As a result of pectus excavatum, heart was displaced laterally. However, there were no signs of kinking of the large veins and arrhythmia.

Fossum *et al.* reported that pectus excavatum in 3 dogs were treated by external application of a coaptation splint to the ventral aspect of the thorax and were within the normal range after surgery⁸. However, in this case, there were no signs associated with cardiopulmonary disorder, medial-to-lateral compression of the chest was indicated.

This case demonstrates the importance of early rehabilitation treatment in dog with pectus excavatum

with 'swimmer's syndrome' which is a poorly characterized disease of neonatal dogs in which the limbs tend to splay laterally, impairing ambulation. It corrected thoracic deformity by changing the shape of the rib cartilages towards round and by expanding the thoracic cage diameter before bone calcification.

Conclusion

A 6-week-old female cocker spaniel was referred to the Department of Laboratory Animal Medicine, Medical Research Center, Yonsei University College of Medicine on February 23, 2000. The dog was diagnosed as pectus excavatum with 'swimmer's syndrome' which the limbs tends to splay laterally, impairing ambulation. There were no signs of circulatory disorders in spite of displacement of heart laterally. For rehabilitation treatment, the dog was given physical exercise therapy 2 to 3 times a day by bending and stretching each articulation of the hind limbs and pressing the costochondral junction medial-to-lateral compression with both hands placed on each lateral side for a month. Also, the bending and stretching exercise of the hind limbs was performed in warm water bath.

After three month of therapy, lameness was resolved. The therapy continued and resulted in the slight reformation of a round thoracic wall. The flattened rib cartilages grew more round by palpation and the thoracic cavity distended. It was observed that pectus excavatum with 'swimmer's syndrome' could be recovered with physical therapy on this young dog. This is a first report about succesful healing from pectus excavatum in a dog without surgical operations.

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개에서 발생한 누두홍의 초기 재활치료의 효과

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국문초록 : 2001년 2월 23일 연세대학교 의과대학 실험동물부에 6주령의 코커스파니엘이 운동실조를 주증으로 의뢰되었다. 늑골은 흉곽의 양측에서 흉골의 내측을 향하여 안쪽으로 휘어져 있었으며 양측 후지의 관절이 내번되어 있었다. 이를 기초로 누두홍으로 진단하였다. 환측은 호흡곤란, 배뇨곤란 등의 증상을 나타내지 않았으며, 심잡음과 기타 신경증상도 관찰되지 않았다. 재활치료로는 하루에 2-3회 양측 후지를 당겨주는 처치와 양손을 이용하여 늑연골을 위로 밀어주는 처치를 실시하였다. 치료 실시 한달 후, 환측은 보행이 가능하였다. 이 후 치료를 지속하여 흉곽이 다소 둥근형태를 유지하는 것을 관찰할 수 있었다. 따라서 초기의 재활치료를 통하여 개의 누두홍이 발생 초기에 비하여 개선됨을 관찰할 수 있었다.

핵심어 : 누두홍, 개, 물리치료