

## CASE REPORT

### PECTUS EXCAVATUM (FUNNEL CHEST) IN A FELINE

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#### Introduction

Pectus excavatum is a deformity of the chest, present at birth or developing shortly thereafter. It is characterized by a depression of a portion or all of the sternum and adjacent cartilages (2).

The condition is not uncommon in the human but to the best of the authors' knowledge, has not been reported in animals. In the human the cause has not been established, although some of the factors considered are: excessive traction due to the substernal ligament causing a forceful pull from the diaphragm, tracheal obstruction associated with increased negative pressure in the thorax during inspiration, rickets or a genetic factor. Once the deformity has started to develop, the inward tilt of the costo-chondral areas compel the lengthening ribs to push the sternum farther inward (2).

Afflicted children are reported to be thin and asthenic. The depth and size of the concavity vary. The sternal depression is usually symmetrical and may be fixed or may deepen with age. In the moderate case, only the cosmetic effect is of concern. Where the defect is pronounced, the concavity may cause displacement of the thoracic viscera resulting in dyspnea, fatigue, cardiac irregularity, and heart failure (2). Diagnosis is based on the clinical signs and radiographs.

#### History

On October 1, 1967, a six-pound female Siamese cat, 11½ months of age, with a history of sneezing for two days, was presented for examination. The animal had been vaccinated against feline enteritis on December 24, 1966 and on January 4, 1967, and against rabies on March 30, 1967. The owner suspected that the cat was in about mid-term of pregnancy, but no breeding date was available.

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Physical examination revealed a temperature of 102°, slight dehydration, the presence of fleas, a gravid uterus, and a deep depression of the sternum. (Figure 1). The owner had noticed this depression when the cat was about three months of

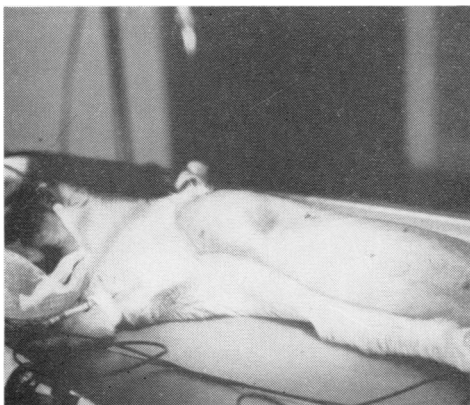


FIGURE 1. Cat in dorsal recumbancy. Note the depression of the defect in the region of the xyphoid portion of the sternum.

age. Since the owner was reluctant to hospitalize the animal for diagnostic tests pyrilamine maleate with ephedrine hydrochloride<sup>1</sup> and buffered acetylsalicylic acid<sup>2</sup> were dispensed. The cat was returned on October 5, 1967, with a history of anorexia of three days' duration. Examination revealed a temperature of 103.2° F., moderate dehydration, some expiratory dyspnea with slight cyanosis of the oral mucous membranes, depression, and lethargy. The owner had failed to administer the prescribed medication. The cat was admitted for diagnosis and treatment.

#### Clinical Findings

Fecal examination was negative for parasites. Hemogram was as follows: Total

<sup>1</sup>Antiphine Tablets, Central Sales Limited, Brampton, Ontario.

<sup>2</sup>Bufferin Tablets, Bristol-Meyers Company, Toronto, Ontario.

white blood cells 9,900, Differential count—neutrophils 84% Lymphocytes 8%, Band cells 8%. The hematocrit reading was—40%.

Sedimentation rate was 1.5 mm. in five minutes (in microhematocrit).

A blood smear showed heavy rouleaux formation, anisocytosis, crenation, and some basophilic bodies in the erythrocytes.

Urinalysis revealed pH5, Ketones negative, specific gravity 1.035, albumin 30 mgm, Blood negative, Bilirubin +, Sugar negative.

#### *Radiographic Findings*

Radiographs of the thorax and abdomen were taken while the cat was under sedation with 2.5 mgm. acepromazine maleate<sup>3</sup> intravenously.

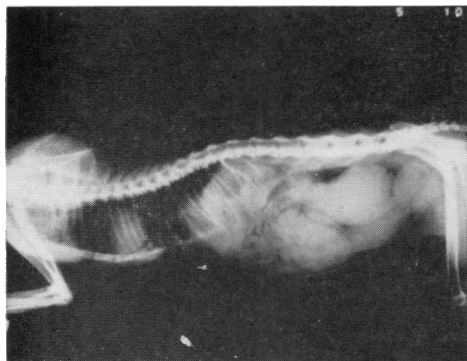


FIGURE 2. Radiograph of the animal in a lateral view. Note the inward tilting of the costochondral areas of the posterior part of the sternum, the gravid uterus, and the narrowing of the dorsal-ventral axis of the thorax with compression of heart and lung and dorsal elevation of the trachea.

The lateral view showed a gravid uterus, narrowing of the thorax dorso ventrally with compression of the heart and lung, dorsal elevation of the trachea, and a marked inward tilting of the costochondral areas of the posterior part of the sternum (Figure 2).

#### *Diagnosis*

Based upon the physical examination and radiographic findings and after con-

<sup>3</sup>Atravet, Ayerst Laboratories Limited, Don Mills, Ontario.

sultation with a staff member of the Hospital for Sick Children (1) a diagnosis of pectus excavatum was made.

#### *Treatment*

The authors theorized that the patient might have continued to enjoy reasonable health in the presence of the defect had it not been for the added stress of pregnancy, therefore they decided to terminate the pregnancy by ovariohysterectomy. Consideration of surgical correction of the defect was postponed pending recovery from this procedure.

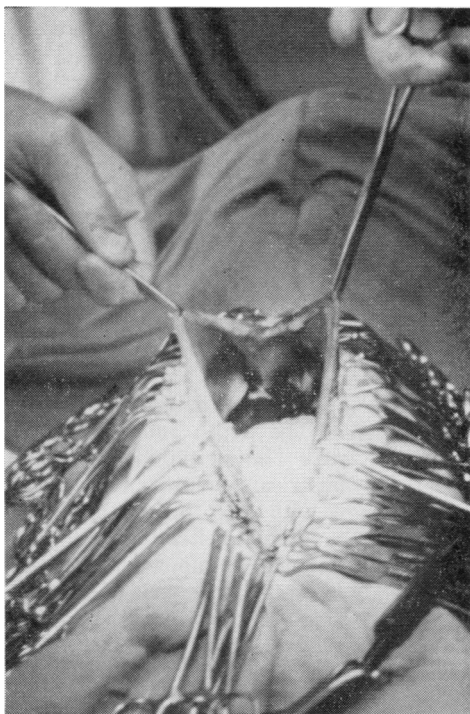


FIGURE 3. Demonstrates the defect at the time of surgery showing especially the depression and inward tilting of the costochondral areas of the posterior part of the sternum.

A routine ovariohysterectomy was performed on October 6, 1967 under Methoxyflurane<sup>4</sup> and oxygen anaesthesia, at which time the defect was explored (Figure 3). The immediate post-operative condition was good.

<sup>4</sup>Metrothane, Pitman-Moore, Division of Dow Chemical Company, Don Mills, Ontario.

From October 7 to 24, 1967, the cat was hospitalized and given supportive treatment.<sup>5,6,7,8</sup> A steam vaporizer utilizing a medicated solution<sup>9</sup> was employed intermittently along with oxygen therapy as required. Forced oral feedings of protein hydrolysate,<sup>10</sup> canned baby food lamb and water were administered daily. Throughout the course of treatment, periodic remission and exacerbations were frequent. Rectal temperatures ranged from 99° to 103°. Dry rales were noted on auscultation, dehydration persisted, and there was hemo concentration.

On October 24, 1967, the animal's condition began to decline, and it died on the morning of October 26, 1967.

#### *Necropsy Findings*

Gross: The lungs showed multiple areas of consolidation hemorrhage and emphysema. The sternal defect was as described under radiographic findings. Histopathological Examination: The kidney, spleen, and myocardium were normal. The fat around the pancreas had a large area in which soap crystals had formed, indicating degeneration of fat. The cords of liver cells were dissociated to a moderate degree. The lungs had extensive recent hemorrhage throughout, accompanied by edema and a degree of emphysema. The hemorrhage filled many bronchi, bronchioles, and most alveoli. One bronchus contained what appeared to be ingesta.

The immediate cause of death was pulmonary hemorrhage due to aspiration. The liver lesion was suggestive of panleucopenia but intestine was not sectioned.

#### *Comment*

In the human, five different corrective operative procedures are performed for pectus excavatum (2).

<sup>5</sup>Chloromycetin Succinate, Parke Davis and Company Limited, Toronto, Ontario.

<sup>6</sup>Viplex and B<sub>12</sub>, Evsco Pharmaceutical Company, Long Island, New York, U.S.A.

<sup>7</sup>Amino Acid Solution, Ormond Veterinary Supply Limited, Hamilton, Ontario.

<sup>8</sup>Dialyte, Diamond Laboratories Incorporated, Des Moines Iowa, U.S.A.

<sup>9</sup>Bronchalent, Pitman-Moore, Division of Dow Chemical Company, Don Mills, Ontario.

<sup>10</sup>Protogest, Burroughs Wellcome and Company Limited, Montreal, Quebec.

1. In early cases, simple division of the substernal ligament may be corrective.
2. Radical removal of the dished sternum and the attached costochondral cartilages followed by inversion and resuturing it in place, may be undertaken.
3. Another procedure is excision of the medial portions of the depressed costo-chondral cartilages and suturing the remaining lateral ends to the borders of the sternum.
4. The ensiform cartilage may be removed from the sternum, and depressed cartilages excised and discarded. Following this the sternum is transected at the upper end of the depression and pulled forward into a normal position.
5. The sternum and adjacent cartilages, may be mobilized, realigned and anchored by stabilizing sutures. This insures stability until fibrosis and healing fixes them in the new position.

The latter approach is deemed the best, but is difficult and may be accompanied by much blood loss.

#### *Summary*

A case of pectus excavatum (funnel chest) in an 11½-month-old female Siamese cat is reported. The defect which was probably present at birth appeared to be the cause of some respiratory distress at mid-term pregnancy. Ovariohysterectomy was performed to alleviate pressure causing secondary respiratory distress. During prolonged intensive post-operative treatment the animal succumbed. The cause of death was pulmonary hemorrhage due to aspiration of ingesta. No surgical correction of the pectus excavatum was undertaken.

#### *Résumé*

Les auteurs rapportent et décrivent un cas de pectus excavatum chez une chatte siamoise âgée de 11½ mois. L'anomalie, qui était probablement congénitale, a sans doute été à l'origine d'une certaine difficulté respiratoire au cours de la première moitié d'une gestation. On pratiqua une hystérovarectomie dans le but d'alléger la pression qui entravait la respiration. L'animal succomba au cours du traitement post-opératoire intensif et prolongé. La cause immédiate de la mort du sujet fut une hémorragie pulmonaire provoquée par

l'aspiration d'ingesta. Aucune tentative de correction chirurgicale du pectus excavatum ne fut effectuée.

#### Acknowledgments

The authors wish to express their thanks to Dr. R. G. Thomson, Pathology Department, Ontario Veterinary College, Guelph, for the histopathological report on the tissues submitted.

We also thank Mrs. Valerie Harrison for her assistance in the preparation and typing of this manuscript.

#### References

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## ABSTRACTS

Frank, A. H., Bryner, J. H., and O'Berry, P. A. (1967). The effect of *Vibrio fetus* vaccination on the breeding efficiency of cows bred to *Vibrio fetus*-infected bulls.—Am. J. vet. Res. 28, 1237–1242 (Natl. Anim. Dis. Lab., Ames, Iowa 50010).

Live- and killed-vibrio vaccines were prepared from two strains of *V. fetus* Type 1 differing in virulence. Cows vaccinated with the strain of high virulence and bred to bulls infected with the same strain required more services per pregnancy, lost more time from first service to pregnancy, and were non-pregnant more days during *V. fetus* infection than were

those vaccinated with a strain of low virulence and bred to bulls infected with the same strain. Non-vaccinated, control cows bred to infected bulls were non-pregnant more days, lost more time from first service to pregnancy, and were infected longer than vaccinated cows. Little difference was found in immunogenicity between the live- and killed-vibrio vaccines. In the two experiments reported here, vaccination produced significant improvement in breeding efficiency, although protection against infection was not attained.

Reprinted from "The Veterinary Bulletin", Vol. 38, No. 4, April, 1968.

Pike, R. M. (1967). Antibody heterogeneity and serological reactions.—Bact. Rev. 31, 157–174 (Univ. Texas Southwestern Med. Sch., Dallas, Texas 75235).

The three major classes of immunoglobulins known to have antibody activity are gamma-G (IgG, 7 S) usually mercaptoethanol-resistant, gamma-M (IgM, 19 S) mercaptoethanol-sensitive, and gamma-A (IgA, 7–17 S). They have antigenically distinct heavy chains. Subclasses and allotypes have been described. The gamma-G and gamma-M are the most readily isolated and identified. The gamma-G antibodies are usually more apparent in the later stages of immunization, though this may be partly an artefact due to their greater antigen-binding power and to the tests used. They are highly effective precipitins and in most cases

account for the major portion of the complement-fixing ability of serum. They are effective in neutralizing viruses, exotoxins and enzymes; they induce the Arthus reaction and their avidity increases with time after immunization. In contrast, gamma-M antibodies, which are often the first to be detected, are most active in agglutination and lytic reactions. They are less readily detected by precipitation and complement fixation than the gamma-G. They apparently fail to neutralize toxins and enzymes and do not give passive cutaneous anaphylaxis. The gamma-A antibody has usually been demonstrated by agglutination. It is able to neutralize viruses, and is found in high concentration in the secretions.

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