Pericardial Coelomic Cyst

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Although slightly more than 60 surgically proved cases have been reported in the English literature, pericardial coelomic cyst remains a relatively rare condition. In the interval since Pickhardt's description in 19341 of the first successful removal of such a tumor until the present, internists, surgeons, and radiologists have become more cognizant of this form of cystic disease within the chest. The reader's time will not be consumed by a lengthy review of the literature on the subject. He is referred to excellent papers by Cushing,2 Lambe,3 Bradford, Mahon and Grow,4 Lillie, McDonald and Clagett,5 Bates and Leaver,6 Forsee and Blake,7 and others. A case which recently came under our observation which was diagnosed pre-operatively, will be reported.

Case Report

N. R., a white female, age 28 years, employed as a medical secretary, complained of a moderately severe cold in her chest early in November 1951. This was accompanied by sharp, pleuritic pains in the lower right chest posteriorly and a severe non-productive cough. She had had a previous attack of pleurisy 12 to 13 years ago but could not remember on which side it has occurred. Other than this, there was no history of previous respiratory or cardiac illness. Her past history revealed an appendectomy in 1931, a tonsillectomy and adenoidectomy in 1932, and removal of an ovarian cyst with lysis of adhesions in 1947. Physical examination at the time of the current illness disclosed a few rales and a friction rub over the lower right chest posteriorly. There were no changes in breath sounds or physical signs over the anterior chest on either side. There was no fever.

Radiographic examination of the chest on November 14, 1951 in the postero-anterior and right lateral projections showed both diaphragms normal in contour. The heart was not enlarged. The left lung was clear. The right lung showed a sharply circumscribed shadow of homogeneous density, measuring about 4 x 5 x 7 cm., in the cardio-phrenic angle, lying in contact with the cardiac shadow and the anterior chest wall. The posterior border of the density was rounded and well-defined but the lateral border faded out gradually toward the periphery of the lung field. No fluid-levels or calcium densities were noted in the area involved.

The patient was sent home to bed and placed on terramycin. Re-examination on November 16, 1951 (Figure 1), showed no discernible change in the density of the lesion in the right cardio-phrenic angle but there was noted slight blunting of the costo-phrenic angle posteriorly with minimal hazy density in this area suggesting acute pleurisy. She returned to work one week after the first x-ray films were made, feeling much improved but still having some cough and slight chest pain posteriorly on the right side.

A previous single postero-anterior film of the chest (Figure 2), made sometime in the summer of 1948 was obtained. This film revealed a similar density in the same location as on the current film. It was less well-defined, however, and the chest was reported at that time as showing no abnormality. On December 24, 1951 the chest was re-x-rayed, and the tumor mass appeared unchanged. The

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minimal pleural changes posteriorly had cleared. A radiographic diagnosis of pericardial coelomic cyst was made.

On January 8, 1952 the patient was admitted to the Buffalo General Hospital, and on January 10, 1952 right thoracotomy was performed. The operative report follows:

With the patient on the left side, a right antero-lateral incision was made along the sixth interspace and the thorax was opened. Digital exploration revealed a cystic structure lying in the lower anterior mediastinum. A segment of the fifth rib at the costo-chondral junction was removed and rib spreaders inserted. The cystic structure, measuring about 2 x 5 inches, could then be visualized. It was smooth, rounded and lay over the dome of the right diaphragm, being attached at the cardio-phrenic angle. With gentle traction on the cyst, it was apparent that it was arising from the pericardium to which it was attached by a broad base measuring approximately one and one-half inches in diameter. By means of careful, sharp dissection, and after the mediastinal pleura on the anterior surface of the cyst was incised, a line of cleavage was obtained. The cyst was then gently dissected from the pericardial attachment after severing the pleura around the entire circumference of the cyst. It was removed intact and was smooth, glistening and appeared translucent. There were a few bleeding points at the edge of the pericardium. These were clamped and tied with plain catgut ligature. Inspection showed adequate hemostasis, and the thorax was closed in the usual manner. A snug dressing was applied.

The pathological examination of the specimen (Figure 3), showed an ovoid, thin-walled, transparent cystic structure which measured 8 x 5 x 4 cm. There was one small amount of fat tissue attached to the surface in one area. Microscopic sections through the wall showed a serous cyst with a thin, fibrous wall lined by simple columnar and flattened epithelium.

The early post-operative course was uneventful except for the usual discomfort in the operative region. An x-ray film on January 14, 1952 showed the left diaphragm clear and regular. The right diaphragm was elevated and there was some

![Figure 1A and 1B](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21250/)

**Figure 1A**: Postero-anterior film of the chest made November 16, 1951. The upper margin of the cyst is indicated by arrows.—**Figure 1B**: Right lateral film of the chest made November 16, 1951. The typical location of the cyst in the anterior mediastinum is clearly shown.
Figure 2: Chest film made in 1948. The margin of the cyst is poorly defined; the film was read as showing no abnormality.

Figure 3: Photograph of the surgical specimen removed from the right hemithorax January 10, 1952. Note its relative size.—Figure 4: Follow-up film of the chest made August 9, 1952.
pleural density overlying which probably represented a small amount of pleural fluid. The lung above was expanded and clear. The left chest was clear. On January 19, 1952 the pain in the right chest became severe and knife-like in character. An x-ray film on January 21, 1952 showed a slight increase in the amount of pleural density at the right base but there was no appreciable mediastinal shift. The left lung remained clear. The temperature curve was essentially normal except between January 22 and January 26, when it varied between normal and 101 degrees F. A blood count on January 24, 1952 showed 4,000,500 erythrocytes, 15.6 gms. of hemoglobin, and 10,000 leukocytes with a differential count of 12 bands, 76 filaments, 11 lymphocytes, and one monocyte. A chest film made on January 26, 1952 showed considerable increase in the amount of fluid in the right pleural space which filled in almost half of the hemi-thorax. There was no appreciable mediastinal shift. The left lung remained clear. On the same day 750 cc. of clear, amber fluid were removed from the right chest. This was cultured but showed no growth of organisms. After the thoracocentesis, she gradually became afebrile, breathing became less labored, and her chest pain diminished. She was discharged on February 2, 1952 feeling much improved but still having some residual pleural pain on the right side. A follow-up film of the chest made on August 4, 1952 showed slight elevation of the right diaphragm and minimal blunting of the costo-phrenic angle (Figure 4). Both lung fields were clear and the heart and mediastinum were not displaced.

Discussion

Pericardial coelomic cyst is more often than not a silent lesion. It is usually disclosed, as in this case, by radiographic examination of the chest as a routine measure or in search of evidence of other forms of disease or injury. Earlier writers stated that the condition produced no symptoms. However, as more and more cases were reported, it became apparent that many patients not only gave a history of one or more symptoms but that they also experienced partial to complete relief after surgical removal of the tumor. Lillie, et al. reviewed 12 cases from the Mayo Clinic between 1941 and 1947, of whom six were asymptomatic. The remainder had such complaints as dyspnea, sub-ternal pain on exertion, “fluttering” of the heart, a tight feeling in the chest, tachycardia and precordial pressure, dull intra thoracic pain of long duration, and pressure over the heart after eating. Bradford, et al. reported eight cases, of which three had varying symptoms of pain in the chest, dyspnea, productive cough, and vague pains in the left upper quadrant of the abdomen which occurred after eating and became more severe on lying down. In Forsee and Blake's series of 11 cases, six had symptoms referable to mediastinal pressure or alteration in the normal pulmonary or cardiac physiology. Lam's case, in which the tumor was unusually large, had a 10 year history of dyspnea, fatigue and angina pectoris, and was thought to have congenital heart disease. She made an excellent recovery after removal of the cyst with disappearance of symptoms. Reports of other authors describe symptom-complexes of a similar nature as those mentioned above.

Except in those cases with extremely large tumors, physical signs are notably lacking, even though the shadow on the roentgenogram is of sufficient size to be clearly visualized. Changes in percussion note are minimized because of the lesion's proximity to the heart, and are therefore
of little help in physical diagnosis. Auscultation is valueless, as any tumor or mass containing static fluid precludes the production of a bruit or adventitious sound.

It is, therefore, the chest roentgenogram which gives us the most valuable signs from which the condition may be suspected. Postero-anterior and lateral films usually suffice for good visualization of the lesion, but oblique and lateral decubitus projections may yield additional and helpful information. The exposures should be made at the point of maximum inspiration. Even a slight elevation of the diaphragm may minimize the density cast by the cyst, resulting in its being unobserved. This was the experience in our case, as the condition was not suspected from the film made in 1948.

Most characteristically, a pericardial coelomic cyst appears on the chest film as a round or ovoid shadow of homogeneous density, lacking in any calcific elements, which is situated in the anterior mediastinum at one of the cardio-phrenic angles. The mass is sharply defined on at least one projection even though it may appear to blend with the lung parenchyma in other views. It intimately approximates the anterior chest wall or diaphragm, or both, resembling a localized collection of encapsulated fluid. A most important feature is that it is always in contact with the cardiac silhouette. Lillie, et al.\(^5\) state that two-thirds of the cases reported occurred at the cardio-phrenic angles, with the remainder lying at a higher level in the anterior mediastinum. Twice as many occur on the right side as on the left. Of the right-sided lesions, 75 per cent or more are situated at the angle. Of the left-sided lesions only about 40 per cent show a predilection for this same location.

Until the publication of Lambert's paper in 1940,\(^3\) in which he presented two cases of Dr. Frank Berry and one of Dr. E. F. Butler, the pathogenesis of pericardial coelomic cysts was not well understood. His theory as to their origin is currently accepted as the most plausible, and, undoubtedly, is the correct one. A verbatim reiteration of what he has so precisely written is superfluous but his thought might be crystallized in a few words. When one of the primitive lacunae, which develops from the mesenchymn both lateral and ventral to the primordial ectodermal plate, fails to fuse with the remainder to form the pericardial coelom, it develops into an independent cavity or cystic structure attached to the pericardial coelom. Grossly, such a cyst appears as a smooth, thin-walled, glistening tumor mass, spherical in shape, and containing a watery, serous fluid which renders it almost transparent. The mass is covered with mediastinal pleura and is attached to the pericardium by a pedicle or base of varying size through which it receives its blood supply. At surgery, the cyst is seen to be entirely free of the adjacent portion of the lung and a distinct line of cleavage may be found between it and the pericardium, making enucleation an easy procedure. The significance of this fact will be mentioned in the discussion of a differential diagnosis. Microscopically, the cyst wall is composed of fibrous or collagenous tissue containing a few scattered
lymphocytes and vascular channels. The lining membrane consists of a single layer of cuboidal to flattened epithelial cells morphologically similar to the mesothelial cells lining the pericardium.

As many cystic tumors are located in the mediastinum a differential diagnosis is worthy of mention. To be considered are all the congenital lesions, namely, epidermoid, dermoid, teratoid, bronchial, esophageal, gastro-enteric cysts and cystic lymphangioma as well as the more common varieties of lipoma, echinococcus cyst and eventration of the diaphragm. Occasionally rare malignant lesions produce somewhat similar shadows on the roentgenogram. Bates and Leaver6 reported two such cases, one of which proved to be a spindle-cell endothelioma and the other a probable papillary adenocarcinoma of undetermined origin.

The epidermoids are lined with stratified epithelium and their walls are made up of dense fibrous tissue, with or without glands of ectodermal origin. They are filled with a clear or milky fluid, or with a gelatinous material frequently mixed with hair. Dermoids are of a similar nature but in addition to the ectodermal structures exhibit tissues of mesodermal origin such as cartilage, bone, teeth, or smooth muscle. The teratomas are usually more solid in nature, and show histological elements of all three primary germ layers. Glandular elements of the alimentary and respiratory tract, as well as ectopic thyroid and thymic tissue may be found in addition to the contents of dermoids as mentioned above. Bronchial, esophageal and gastro-enteric cysts show a histological structure resembling that of the normal viscus. Cystic lymphangioma differs little microscopically from pericardial coelomic cyst except that on occasions cholesterol crystals are found in the fibrous wall. Grossly, there are singular differences. The lymphangiomas are multilocular tumors, intimately adherent to all surrounding structures, especially the pulmonary tissue. They receive their blood supply from adjacent tissues over their entire surface area. This fact makes complete exterpation almost impossible because the profusely bleeding vascular bed produces a serious surgical problem. Echinococcus cysts show a characteristic lining membrane which readily identifies them. They too, are often multilocular. Lipoma and eventration of the diaphragm often cannot be differentiated from a cystic structure.9

Of all the above mentioned lesions, only the dermoids and teratomas may, on occasion, show roentgen evidence of their contents. One can readily understand then, that a positive pre-operative is impossible. This can be achieved only by removal of the tumor and pathological examination of the specimen. With intra-tracheal anaesthesia, in which intra-pulmonary pressures may be accurately controlled and varied at will, giving the surgeon ample operating room, such cysts may be easily and safely removed. Even though all the evidence at hand is strongly presumptive of a pericardial cyst, and even though such a lesion is always benign, the low morbidity and mortality rate makes exploration imperative. The error of procrastination, should the suspected lesion be malignant, can never be rectified and may cost the patient his life.
SUMMARY

A case of pericardial coelomic cyst which was diagnosed pre-operatively is reported. The varied symptomatology, the paucity of physical signs and the importance of the roentgen findings are discussed. The pathogenesis of such cysts and their differential diagnosis is briefly reviewed. Inability to establish a positive diagnosis in all cases stresses the fact that surgical removal should be the only accepted form of treatment.

RESUMEN

Se relata un caso de quiste pericárdico celómico que fue diagnosticado antes de la operación. Se discuten la sintomatología variada, la escasez de signos físicos y la importancia de los hallazgos radiológicos. La incapacidad de hacer el diagnóstico en todos los casos recalca el hecho de que extirpación quirúrgica es la única forma de tratamiento.

REFERENCES