obtained, as shown in Figures 3 and 4; however, it was not possible to obtain satisfactory echoes of either the left atrium or aortic root.

DISCUSSION

This woman with congenital unilateral absence of the left pulmonary artery had the usual associated alterations, including hypoplasia of the left lung, with apparent atelectasis and a shift of the cardiac shadow into the left side of the chest, with some posterior displacement. This resulted in a large air interface between the anterior wall of the chest and the heart, with close approximation of the heart to the posterior wall of the chest. It was not possible to obtain views of any cardiac structures from the anterior wall of the chest, but as shown herein, echoes of a quality sufficient for interpretation were obtained from the posterior wall of the chest; however, it is important to note that this method resulted in a reversal of the presentation of cardiac structures, compared to that seen from the standard anterior view.

This case again demonstrates that in the patient at sea level, pulmonary arterial pressure is normal when there is absence of the left pulmonary artery, and when there are no associated cardiac abnormalities.

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Catamenial Pneumothorax Associated with Endometriosis of the Diaphragm*

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A case of catamenial pneumothorax is documented. At thoracotomy, there was a small black mass measuring 10 x 6 mm associated with surrounding petechiae on the top of the dome of the right diaphragm. Microscopic examination revealed the presence of endometrial tissue. We could not find any diaphragmatic defect in this case.

Recurring pneumothorax during menstruation was first described by Maurer1 in 1958. Since that time, 41 additional cases have been reported and reviewed in the literature.2,3

Although it has been postulated by many authors that endometriosis might be an important factor in most

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cases, there are few case reports in which intrathoracic endometrial tissues could be proven by exploratory thoracotomy.

This report describes a case of catamenial pneumothorax with endometrial tissue on the diaphragm.

**Case Report**

A married woman first noted right-sided pleuritic pain at the age of 38 years in 1974. The presence of right pneumothorax was revealed by x-ray examination. The pain which recurred four times during the next two years always began two or three days before menstruation and each time, the presence of right-sided pneumothorax was verified (Fig 1). Thoracotomy was performed in August, 1976. No blebs or bullae of the lung were found. A small black mass measuring 10 × 6 mm surrounded by petechiae on top of the dome of the right diaphragm was noted (Fig 2). No air leakage, however, was present in this area. The mass was excised with the surrounding diaphragmatic tissues and apical pleurec-

**Discussion**

No conclusion has yet been reached concerning the etiology and pathogenesis of catamenial pneumothorax. According to the recent review of Soderberg and Dahlquist, this disease is complicated by endometriosis of pelvic or intrathoracic organs, and therefore endometriosis seems to play a role in the pathogenesis. In that review, which included 41 cases, endometrial tissues could be proved in the lung and diaphragm in only nine cases and the complication of pelvic endometriosis was diagnosed in 12 cases. One of the characteristics of catamenial pneumothorax is that it develops predominantly in woman in their thirties, older than the age at which spontaneous pneumothorax develops. As described by Davies, pelvic endometriosis also develops in a high percentage at this age, also suggesting that this disease is related to endometriosis. According to the Yeh's review of 19 cases with thoracic endometriosis, they developed predominantly on the pleura, diaphragm and lung, i.e., in the pleura in six cases, in the diaphragm in six, in the lung parenchyma in six, in the bronchus in one and in the myocardium in one case. Thoracic endometriosis occurring on the pleura is characterized by hemothorax and in the lung parenchyma by repeated bloody sputum. It is to be noted that pneumothorax developed in three out of five cases with diaphragmatic endometriosis. This fact seems to indicate that endometriosis tends to cause pneumothorax in a higher percentage of cases when it develops on the diaphragm rather than in the lung. Catamenial pneumothorax generally develops on the right side, and it is interesting that in all
reported cases, pleural and diaphragmatic endometriosis occurred on the right side.

There are a variety of views regarding the source of intrapleural air. Maurer et al. inferred that the air entered the abdominal cavity through the uterus and salpinx and then went to the thoracic cavity via the diaphragmatic defect caused by endometriosis. However, many cases have since been reported which disprove this theory. For example, this disease developed in eight women who had already undergone hysterectomy. Congenital diaphragmatic defects and implants of endometrial tissues of the visceral pleura are also considered to cause pneumothorax. In our case, endometrial tissue was found on the diaphragm, but no perforated portion permitting air from the abdominal cavity was observed. In the literature, there were only four case reports in which both endometrial tissues and defects were recognized on the diaphragm.

Ovarian function-suppressing hormones are considered to be effective for this condition. When a patient with catamenial pneumothorax undergoes thoracotomy, pleurodesis is recommended by some authors to prevent the recurrence of pneumothorax.

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Early Detection of Pleural Fluid*

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Displacement of a sharp “costophrenic angle,” rather than blunting of the “costophrenic angle,” is emphasized as one of the earliest signs of pleural fluid. Examples of this sign are illustrated, and its pathophysiology is discussed.

In recent years, several articles have appeared pertaining to the roentgenographic diagnosis of pleural fluid. In the posteroanterior projection, much emphasis has been placed on the concave meniscus which appears in the lateral costoophrenic sulcus (blunting). Subpulmonic fluid can be diagnosed by apparent elevation of one hemidiaphragm.

Other signs seen in the posteroanterior projection include lateral displacement of the apparent diaphragmatic peak, a sign which may be exaggerated on expiratory views. Occasionally, a clue may be absence of the normally seen lower lobe vessels as they course posteriorly below the anterior hump of the diaphragm. On the left, excessive separation of gastric air from pulmonic air may alert one to the presence of pleural fluid.

In the lateral view, blunting may be observed posteriorly, which is usually held to be the earliest sign of pleural fluid, since the posterior costoophrenic sulcus is the most dependent portion of the pleural space in the upright patient. Subpulmonic fluid may be diagnosed by straightening of the anterior edge of the apparent hemidiaphragm. Fluid dissecting into the major fissure (or into an inferior accessory fissure in a posteroanterior projection) is also a finding.

Seemingly lost in recent discussions is a sign first described by Fleischner in 1927 and reemphasized by Hessen in 1951. Originally called lamellar pleurisy, “displacement of the costoophrenic angle” is a more descriptive phrase. That is to say, the angle is not blunted; it retains its normal sharp angulation but is displaced from its location along the lateral wall of the chest.

ANATOMIC FINDINGS

Anatomy

In a normal patient the visceral and parietal pleural surfaces are apposed to one another. When in certain diseases, pleural fluid accumulates within this “potential space,” the retracible force of the lung will cause these pleural surfaces to separate.

Radiographically, the parietal surface cannot be seen on a posteroanterior chest x-ray film. The parietal pleura is too thin to absorb sufficient radiation to cast an image on the film; however, it can be located precisely on a posteroanterior chest x-ray film. Examination of the inside of a hemithorax (in a cadaver or at surgery or by computerized tomographic scanning) demonstrates that the parietal pleura is adherent to the inner surface of the ribs. Even in obese persons the fat may protrude between the ribs but usually does not insert itself between the rib and the parietal pleura. Therefore, if a dot is placed on the inner curve of each rib on a posteroanterior chest x-ray film, then connecting these dots creates a line that exactly corresponds to the parietal pleural surface (seen in tangent as it goes from the anterior portion of the thorax to the posterior portion of the thorax).

Likewise, the visceral pleural surface cannot be seen on a posteroanterior chest x-ray film. In the normal patient, this surface is too thin to cast a density on the

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