pleural thickening might also be diagnosed on the basis of CT scans.

Compared with pulmonary actinomycosis, the bacteriologic diagnosis is easily obtained by means of thoracentesis in case of pleural involvement. However, diagnosis might be obscured by previous antibiotic therapy and a lack of anaerobic conditions for culture. At direct microbiologic examination, actinomycosis has to be suspected if gram-positive filamentous germs are discovered. An anaerobic enriched environment is needed for appropriate culture.

Penicillin G still remains the drug of choice, and the mainstay of treatment is the administration of high-dose intravenous penicillin. Eighteen to 24 millions units of penicillin per day are given for 2 to 6 weeks, followed by oral penicillin V administration for another 6 to 12 months. The evolution should be monitored by use of plain radiographs or CT.

In stage I empyema, indication for surgical intervention is uncommon, but the efficacy of antibiotic therapy depends on the onset of diagnosis. If the treatment is delayed, stage II and III empyemas can develop, and decortication is required. Chest-wall fistulization has to be resected during the intervention. A VATS approach is usually unrewarding because of the chronicity of

empyema at the time of the operation. After the operation, penicillin administration is recommended.

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Thoracic endometriosis: A case report and literature review

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Thoracic endometriosis is a rare disorder characterized by the presence of functioning endometrial tissue within the pleura, the lung parenchyma, or the airways. In this report we describe a case of catamenial hemothorax and review the various presentations, pathogenesis, diagnosis, and therapies of thoracic endometriosis.

Clinical Summary

A 28-year-old woman was seen for cough, right-sided pleuritic chest pain, and dyspnea. During the previous 3 years she had had multiple hospitalizations for right-sided pneumothorax, hemo-

pneumothorax, and hemothorax. She had negative results of a workup for pulmonary embolism and of a pleural biopsy. The symptoms occurred within 24 to 48 hours after the onset of menses. Danazol therapy was unsuccessful and she refused hysterectomy with oophorectomy. Examination revealed a pale, mildly dyspneic woman with decreased breath sounds at the right base of the lungs. Chest radiography demonstrated a right-sided air-fluid level. Thoracentesis drained hemorrhagic fluid. Culture results were negative, and cytologic examination demonstrated endometrial epithelial cells with no evidence of malignancy. The postthoracentesis chest radiograph showed a small rounded pleural density and gas-liquid level on the right side. The patient subsequently underwent pleurectomy, with removal of the pleural implant (Figures 1 and 2) and talc pleurodesis. One year later, she was free of symptoms.

Discussion

Thoracic endometriosis is a rare disorder with varying clinical presentations. The largest series reviewed 112 cases of thoracic pathology associated with menstruation presenting as hemoptysis, hemothorax, pneumothorax, or pulmonary nodules.¹ The term *thoracic endometriosis syndrome* (TES) was proposed. The mean age at diagnosis was 35 years, with a range from 19 to 54 years. Pneumothorax occurred in 73% of the cases, hemothorax in 14%, hemoptysis in 7%, and nodules in 6%. Patients had chest pain in 90% of the cases and dyspnea in 31%. In 90% of patients, the symptoms occurred within 2 days after the onset of menstruation.

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Figure 1. Removed pleural implant (exterior).

Figure 2. Removed pleural implant (interior).

The diagnosis of TES is challenging, and it is often delayed until the symptoms' temporal relationship with menses is recognized. Chest radiographic findings are nonspecific and vary with menstrual cycle. Catamenial pneumothoraces and hemothoraces are typically unilateral and predominantly right sided.¹ Computed tomographic findings include opacities, nodular lesions, thin-walled cavities, and bullous formations.² Pleural fluid cytologic examination is rarely helpful. The utility of bronchoscopy is limited, because most cases of TES involve the distal parenchyma. In tracheobronchial endometriosis, multiple friable, purplish-red, submucosal patches may be seen. Surgery is frequently needed to establish the diagnosis, and more than 60% of affected patients require thoracotomy or thoracoscopy as part of diagnostic approach.¹

The pathogenesis of TES remains elusive. Three different theories have been proposed³: migration of air through the uterus and

Fallopian tubes into the abdomen and through diaphragmatic fenestrations into the thorax; endometrial tissue microembolization; and high levels of serum prostaglandins causing vasospasm and bronchospasm, thus resulting in alveolar rupture and a pneumothorax.

The most effective treatment strategy remains controversial because of the anecdotal nature of reports of the disorder and lack of therapeutic trials. Medical approaches focus on the suppression of endometrial tissue by blocking the action of estrogen. Although oral contraceptives, progesterone, and danazol have been noted to be effective in anecdotal reports, recurrence rates greater than 50% have been reported.¹ The high failure rates may be due to incomplete suppression of thoracic endometrial tissue and recurrent embolization from pelvic foci. Hormonal manipulation may be unacceptable to some women, because it precludes pregnancy. Furthermore, virilization, weight gain, and climacteric symptoms make hormonal therapy a less attractive option.⁴

Hysterectomy with bilateral salpingo-oophorectomy remains the definitive treatment for TES, but it may be ineffective for patients receiving estrogen replacement therapy, which may reactivate thoracic endometrial tissue.⁵ Chemical pleurodesis has been shown to be effective in the treatment of TES complicated by hemothorax or pneumothorax. It can be achieved by tube thoracostomy with the application of talc or doxycycline or by thoracoscopic pleural abrasion and partial pleurectomy. In patients with a chronic and a relatively benign course of the disease, chemical pleurodesis is recommended before more aggressive surgical procedures.

Lung-sparing segmentectomy or wedge resection can be potentially curative.⁴ Because of its invasive nature and associated morbidity, however, surgery has not been generally used as a first line of approach. It is limited to patients with a single focus of thoracic endometrial tissue or foci confined to a small area where a tissue-sparing procedure can be performed. Careful evaluation with chest computed tomography is therefore essential before patient selection. When nodules are multiple or not detected, hormonal therapy should be considered.

Video-assisted thoracoscopic surgery has become a safer and less invasive method of therapy. The bleeding lesions in the lung can be visualized clearly with video-assisted thoracoscopic surgery. Partial resection with the removal of all pigmented lesions by video-assisted thoracoscopic surgery can be effective in the treatment of TES.⁶ This modality, however, requires evaluation in larger patient series.

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