Therapy with cefuroxime and erythromycin was started. As the patient's clinical and radiographic state deteriorated, antibiotic therapy was escalated to include ceftazidime and amoxicillin clavulanate as well.

On the 11th day, as the patient's condition deteriorated further, amiodarone therapy was discontinued, and hydrocortisone treatment was started. Immediate lysis of the fever was seen in the hours after hydrocortisone administration; this was followed by gradual improvement in the patient's respiratory symptoms. One week later, the patient had no dyspnea.

Pulmonary function tests showed a moderately severe restrictive impairment. Bronchoscopy showed diffuse inflammatory changes of the tracheobronchial system. A transbronchial lung biopsy showed alveolar foamy cells and focal fibrosis, which in some areas obliterated the alveolar structure.

On the 17th day of glucocorticoid therapy, the patient was discharged in good condition. Three weeks later, he was again admitted with fever, 7 days after he discontinued the glucocorticoid of his own accord. Prednisone therapy was re instituted, again resulting in resolution of the fever within 10 h. During continued glucocorticoid therapy for a further 3 months, there were no other clinical relapses. Subsequent chest radiograms showed gradual resolution of the infiltrates, and the lungs returned to normal at the end of this period.

DISCUSSION

Clinically significant APT occurs in approximately 5 to 10% of patients exposed to amiodarone. Two possible mechanisms have been suggested: an immune-mediated response or a direct toxic effect.

There are two distinct presentations of APT. The common one is insidious, usually presenting within 2 or more months of the start of therapy, with nonproductive cough, dyspnea, weight loss, and occasionally low-grade fever. In this form, pulmonary infiltrates tend to be interstitial, and the associated doses of amiodarone are usually 400 mg/d or more.

In about one third of cases, the disease manifests within weeks, with a more abrupt onset of dyspnea, fever, and cough, with the chest x-ray film usually showing patchy alveolar infiltrates. This presentation may mimic acute pulmonary infection, congestive heart failure, or pulmonary emboli and occurs at doses as low as 100 mg/d.

Pulmonary function testing usually reveals a restrictive pattern of disease; a decreased carbon monoxide diffusing capacity frequently is an early finding. Morphologically, the use of amiodarone is associated with the occurrence of foamy cells in lung tissue. In cases of pulmonary toxicity, this finding is accompanied by inflammatory and fibrotic changes. In some cases, alveolar hemorrhage has been demonstrated, usually without clinical hemoptysis.

The diagnosis is based on suggestive clinical and radiographic findings, the exclusion of differential diagnostic alternatives, the demonstration of pulmonary function abnormalities compatible with APT, and typical foamy cells found in a lung biopsy specimen.

In the case presented, dyspnea, fever, hemoptysis, and pulmonary infiltrates developed within days of amiodarone treatment. These symptoms were initially attributed to pulmonary infection and were treated accordingly. It was only when this approach failed that other diagnostic possibilities were seriously entertained. Diagnostic contenders such as pulmonary edema, pulmonary embolism, and lung involvement in collagen vascular diseases were excluded, and diagnostic criteria for APT were eventually satisfied. A non-Goodpasture antiglomerular basement membrane antibody was detected. Interestingly, such antibodies have recently been described in a case of lung adenocarcinoma mimicking the Goodpasture's syndrome. The significance, if any, of this finding in our case remains to be determined.

In conclusion, two distinct aspects of this case have to be noted. First, though only reported in one case previously, frank hemoptysis is a possible manifestation of APT, suggesting that this entity be included in its differential diagnosis. Second, this case shows that amiodarone can provoke the acute onset of pulmonary toxicity even as early as a few days after therapy is begun.

REFERENCES


Catamenial Hemoptysis*

Diagnosis With MRI

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Thoracic endometriosis is a rare disorder. We report a case of a 26-year-old woman with a 4-year history of catamenial hemoptysis due to thoracic endometriosis

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which was diagnosed by MRI and treated successfully by means of video-assisted thoroscopic wedge-resection of the solitary pulmonary lesion. Medical therapy with hormones was not necessary. There is no evidence of recurrence 10 months after the operation. This case demonstrates that MRI of the chest may be considered for the diagnostic work-up of patients with catamenial hemoptysis. It also shows that wedge-resection of pulmonary endometriosis foci by means of video-assisted thoracoscopy—an approach that has not been described in the literature thus far—is an effective therapy in localized peripheral pulmonary parenchymal endometriosis.

(CHEST 1997; 111:1447-50)

Key words: endometriosis; hemoptysis; lung; magnetic resonance imaging (MRI); video-assisted thoracoscopy

Endometriosis is defined as an extrauterine growth of endometrial tissue, and it is estimated that it affects about 10 to 15% of women of reproductive age. The pathologic findings usually are limited to the pelvis but can occur anywhere else including the thoracic cavity as well. Two types of thoracic endometriosis have been described: pleural and parenchymal disease. Pleural endometriosis, which is the more common form, usually causes chest pain and dyspnea, and may be associated with pneumothorax and/or pleural effusion. Parenchymal disease is uncommon. Since the first published case by O. H. Schwarz in 1938, fewer than 20 cases have been reported. Patients usually present with periodic hemoptysis simultaneous to their menses (catamenial hemoptysis). The diagnosis usually is based on clinical history and the exclusion of other causes of recurrent hemoptysis. CT scanning has been used to localize thoracic endometriosis, but there are no reports on the diagnostic value of MRI in this application.

CASE REPORT

A 26-year-old woman was admitted to the hospital with a 4-year history of recurrent hemoptysis always occurring on the day prior to the onset of her menses. She was otherwise asymptomatic without associated chest or abdominal discomfort, pain, or dysmenorrhea. The hemoptysis lasted for 48 h and resolved spontaneously. Her past medical history disclosed no abnormalities, particularly in that no pregnancies or gynecologic operations were reported. Clinical examination, including gynecologic examination and pelvic ultrasonography, revealed no abnormalities, ie, there was no uterine or adnexal mass or tenderness and the uterosacral ligaments were present. There was no clinical or sonographic evidence of extragenital abdominal endometriosis. Results of laboratory investigations including a CBC, liver function tests, and coagulation studies were within normal range. A chest radiograph was normal, especially also at the time of hemoptysis. A CT scan of the chest obtained at the same time revealed a 2.5 × 1-cm nonspecific peripheral plaque-like lesion in the posterior aspect of the right upper hemithorax (Fig 1). Based on the CT findings, it was impossible to differentiate whether the lesion was pleural or parenchymal in origin. An intermenstrual MRI scan of the chest disclosed a lesion identical to that seen on the CT scan with only little uptake of intravenous contrast agent (gadolinium-DTPA). The MRI, however, allowed the determination of the intrapulmonary location of the lesion as evidenced by the preserved extrapleural fat plane at the same level (Fig 2, top). A subsequent MRI scan at the time of menstruation showed that the subpleural intrapulmonary lesion had been increasing in size and that the contrast uptake was markedly more pronounced than on the initial scan (Fig 2, bottom). Bronchoscopy showed trails of blood in the right mainstem bronchus originating from the posterior segment of the upper lobe of the

Figure 1. Axial noncontrast CT scan at time of menstruation: There is a 2.5 × 1-cm nonspecific peripheral plaque-like lesion in the posterior aspect of the right upper hemithorax. It is impossible to differentiate whether the lesion is pleural or parenchymal in origin.

Figure 2. MRI scan at the time of menstruation (top: axial T2-weighted spin-echo image; bottom: axial T1-weighted spin-echo image with fat-suppression technique and after the administration of intravenous MRI contrast agent). Given the well-preserved extrapleural fat plane, this examination allows determination of the intrapulmonary origin of the lesion (arrow). Compared with the intermenstrual MRI, the subpleural intrapulmonary lesion had been increasing in size and the contrast uptake was markedly more pronounced than on the initial scan.
right lung. No endobronchial lesion was found. Assuming that the patient had pulmonary parenchymal endometriosis, she underwent complete wedge resection of the lesion by means of video-assisted thoracoscopy using a 45-mm Endo Linear Cutter (Ethicon-Endo-surgery; Johnson & Johnson Medical; Spreitenbach, Switzerland). The resected specimen was recovered from the chest cavity in a bag (Endo Catch; Auto Suture Company, USSC; Norwalk, Conn.). Intraoperatively, a 3 × 1-cm subpleural lesion with an intact visceral pleural surface was found at the location diagnosed on the cross-sectional imaging studies. There was surrounding parenchymal consolidation of 2 cm thickness. No other parenchymal or pleural lesions were found at closer inspection. An apical chest tube was placed and could be removed after 1 day. The postoperative course was uneventful, and the patient was discharged 3 days after the operation. The patient has been asymptomatic now for 10 months with no recurrence of hemoptysis.

Histopathologic examination of the resected specimen revealed typical findings of parenchymal endometriosis with intimal hyperplasia within pulmonary artery branches (Fig 3). The vessel lumina were covered with endometrium (Fig 4). Some arterial branches were obliterated by fibrous tissue.

**Discussion**

Catamenial hemoptysis is a very rare condition and the leading clinical symptom of pulmonary parenchymal endometriosis, although histopathologic confirmation of the diagnosis has been obtained in only one third of the cases.\(^2\) The pathogenesis of pulmonary endometriosis is still a matter of discussion.\(^3,4\) Different hypotheses have been postulated in the medical literature.\(^5\) Pleural endometriosis may result either from local metaplasia of celomic epithelium (metaplasia theory) or from a retrograde menstruation with transdiaphragmatic passage and subsequent implantation of endometrium inside the thoracic cavity (transplantation theory). In contrast, parenchyma endometriosis is thought to be the result of the filter function of the pulmonary vascular network with trapping of endometrial particles, which is a process similar to pulmonary embolism.\(^6\) This hypothesis of hematogenous dissemination is supported by the histopathologic finding of endovascular endometrial epithelium in our case. Hemoptysis would then result from rupture of capillaries within the

![Figure 3. Intimal proliferation in a small muscular pulmonary artery including a tubular epithelial fragment (arrow) (immunohistochemical stain for pancytokeratin, original ×200).](image)

![Figure 4. Endometrial epithelium lining the lumen of a muscular pulmonary artery (hematoxylin-eosin, original ×300).](image)
lesion due to fluid shift at the time of menstruation. Diagnosis of pulmonary endometriosis usually is suspected by the patients’ typical clinical history with recurrent cyclic hemoptysis synchronous to their menstruation and corroborated by a demonstrable parenchymal lesion or consolidation seen on a chest CT scan that changes in appearance during the menstrual cycle. MRI has been reported to be a useful diagnostic tool in patients with suspected pelvic endometriosis. To the best of our knowledge, there is, however, no previous report on the value of MRI in thoracic endometriosis. This case shows that MRI has the same accuracy as CT in detecting such lesions in the chest cavity and that it is in fact superior over CT in distinguishing a parenchymal from a pleural lesion. The typical findings at MRI consist of a hyperintense lesion on T2-weighted spin-echo images that increases in size at the time of menstruation and shows a more pronounced uptake of intravenous MRI contrast agent as compared with that in the intermenstrual period.

The option of hormonal therapy with danazol or gonadotropin-releasing hormone agonists was considered, but the local extent of the disease and additionally the often observed side effects of a hormone treatment led us to perform surgery as the treatment of first choice. The follow-up in this patient supports this therapeutic approach, although the symptom-free observation period is still relatively short.

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REFERENCES

Immediate Transcatheter Embolization of Swan-Ganz Catheter-Induced Pulmonary Artery Pseudoaneurysm*

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Digital subtraction angiography is an indispensable complement to cut film studies for the detection of pulmonary artery injury. Immediate transcatheter embolization of catheter-induced pulmonary artery pseudoaneurysm is a safe, minimally invasive, fast, and cost-effective alternative to surgical treatment. (CHEST 1997; 111:1450-52)

Key words: pseudoaneurysm; pulmonary embolization; Swan-Ganz catheter

Rupture of the pulmonary artery is an uncommon complication of Swan-Ganz catheter placement with a reported incidence of 0.05 to 0.2%. Mortality from this complication, however, is considerable with a reported occurrence rate as high as 50%. We report a case of emergency embolization of a Swan-Ganz catheter-induced pseudoaneurysm detected by digital pulmonary arteriography and review of the literature.

CASE REPORT
A 56-year-old woman was admitted to the University of Alabama at Birmingham Hospital with severe cerebral anoxia secondary to cardiopulmonary arrest. Prior to admission, the patient had required resuscitation including cardiacversion. The patient’s past medical history was significant for hypertension and cardiomegaly. She was not receiving steroid or anticoagulant therapy. The event precipitating the patient’s cardiopulmonary arrest was not determined. Prior to nursing home discharge, the patient underwent insertion of a Swan-Ganz catheter via right internal jugular venous approach in the ICU. This catheter was to be placed for purposes of monitoring pulmonary arterial pressures during general anesthesia for placement of a tracheostomy and percutaneous gastrostomy tube. Immediately during the insertion of the Swan-Ganz catheter, the patient experienced an episode of hemoptysis of 30 to 40 mL from the endotracheal tube. The pulmonary arterial pressure was normal (30/12 mm Hg with a mean of 18 mm Hg). The possibility of an arterial injury was considered clinically, and pulmonary arteriography was requested.

Initial anteroposterior cut film angiography of the right lung was performed with a 7FP pigtail catheter with 50 mL of low osmolar contrast medium (Hexabrix; Mallinckrodt Medical, St. Louis) injected at 25 mL/s. No abnormality was initially disclosed. A selective right descending pulmonary digital angiogram in a slight right anterior oblique position then clearly demonstrated a small persistent collection of contrast medium arising from the anterior basal segmental artery (Fig 1). No contrast extravasation into the airways, pulmonary emboli, or early venous filling was identified. Retrospective examination of the initial cut film study revealed a rounded

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