mineralized aspect of the ischio-pubic branches and fracture of the right ilio-pubic branch. A 2.5-cm segment of trachea was resected and primary anastomosis was performed. The approach was a transverse cervical incision using jet ventilation. Frozen section suggested a benign neoplasm, but a specific tissue diagnosis was not available. Immediately the patient was extubated, and intravenous dexamethasone and tuberculous therapy were given postoperatively. The postoperative course was uneventful with no evidence of recurrence 1 year after the operation. The bony fractures healed and the patient was able to walk again.

Comment
In the development of tracheal tuberculosis, the first mechanism is the spread along the peribronchial lymphatic channels or the direct trachea spread by infected sputum. The second mechanism is local extension from adjacent mediastinal tuberculous lymphadenitis [2, 3]. In our patient, the history of cervical tuberculous lymphadenitis, the normal chest roentgenogram without lung parenchymal abnormality, and the contiguous of the trachea and lymphadenopathy on computed tomographic scans suggested that local extension was the most likely mechanism. Patients with central airway lesions can be classified into two different groups: (1) an active disease group and (2) a fibrotic disease group.

Stenosis in active disease occurs by hyperplastic changes and inflammatory edema. On computed tomographic scans, irregular luminal narrowing with wall thickening, contrast enhancement, and enlarged adjacent mediastinal nodes were the findings in our patient. The bony fractures healed and the patient was able to walk again.

Acute ulcerative tuberculous tracheitis is treated medically. Polypoid tissue and then cicatrical stenosis may result as the tracheitis heals. This can occur despite adequate treatment of the tuberculosis. Stenosis in fibrotic disease is resistant to medical treatment and radiologic or surgical intervention is usually needed to restore the luminal patency. The helical computed tomographic scan with two-dimensional or three-dimensional images of the tracheobronchial tree gives more information in the evaluation of the central airways stenosis, which may be useful in evaluations before surgical resection, balloon bronchoplasty, or insertion of stents [4]. When the stenosis is more limited in extent, surgical excision and reconstruction can be performed, with the high likelihood of a good result. The linear extent of the tracheal stenosis may be such that excision and reconstruction may not be possible [1]. This leaves the possibility of dilatation and stenting [5]. In our patient, the inflammatory stenosis was limited to 2 cm and was considered a favorable situation for surgical treatment followed by corticotherapy and anti-tuberculous therapy.

In the active form of tracheal tuberculosis, antituberculous therapy is the treatment of choice, but in some cases resection is needed because of acute dyspnea.

References
from either infarction or hemorrhage of the tumor. This rare presentation usually leads the clinician initially away from the diagnosis of thymoma. We present 4 patients who presented with infarction (3 patients) and hemorrhage (1 patient) who were initially believed to have a lymphoma. Preoperative biopsies were unrevealing. All had a complete resection and were in the early Masaoka stage. There have been no recurrences in follow-up. The astute clinician should be aware of this unusual presentation. The prognosis seems to be good in patients who present with infarction or hemorrhage.

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Most thymomas are asymptomatic [1]. Symptoms referable to thymomas are usually due to either mass effect (ie, compression of the superior vena cava or expansion beneath the sternum) or a parathyroid syndrome (eg, myasthenia gravis). Rarely thymomas may undergo infarction or hemorrhage, which leads to acute, atypical presentations with acute severe chest pain. This may lead the clinician away from thymoma or suggest a more aggressive tumor, which is not the case. There are several case reports on infarction and hemorrhage in thymomas, but no clinically oriented reviews of this unusual presentation [2–5].

From 1976 to 2006, 190 patients with thymoma underwent resection at the Massachusetts General Hospital, of which 4 presented clinically with chest pain and either infarction or hemorrhage (2%). The patient characteristics are shown in Table 1. Permission to review these patients was obtained from the Human Studies Committee on November 7, 2005, and individual consent was waived because this was a retrospective study. All 4 patients presented with acute chest pain. Standard roentgenograms suggested an anterior mediastinal mass in all, and 2 patients had pleural effusions (Fig 1). A malignant tumor other than thymoma was originally suspected in all 4 cases, either a lymphoma or a germ cell tumor in the men (Fig 2). All men had serum tumor markers sent and were normal. All patients had a preliminary biopsy first, prior to a resection due to the suspicion of lymphoma. Three patients had an anterior mediastinotomy and biopsy done and all were nondiagnostic. One biopsy showed necrotic tissue only, and two had normal thymic tissue with one also having areas of hemorrhage and granulation tissue. One patient had a core needle biopsy that just showed normal thymic elements (patient 4) (Fig 3). Both pleural effusions were sampled and had reactive cells only. The 4 patients went on to have resections performed through a median sternotomy. All the tumors seemed to be inflamed and edematous, and one was hemorrhagic as well. In 2 patients there was adherence of the tumor to the pericardium; thus the pericardium underneath the tumor was excised. Patient 2 also had pericarditis clinically and at operation. Her pericardium had changes consistent with fibrinous pericarditis on histologic examination. Patient 2, with an abscess in the
necrotic tumor, had apparent invasion into the lung requiring partial lung resection to obtain a clean margin. Final pathology showed inflammatory adherence to the lung only. All patients were believed to have undergone a complete resection. Our preoperative diagnosis was infarcted and hemorrhagic thymoma in our four cases, because preliminary biopsies did not suggest lymphoma despite apparent adequate tumor sampling. All cases seemed readily resectable at exploration and were resected without further tissue sampling. Frozen sections were obtained on all four resected specimens and three (ie, the infarcted thymomas) were nondiagnostic, with 1 showing hemorrhage and thymoma. There were no postoperative complications. Two patients with Masaoka stage II tumors were referred to radiation oncologists who proceeded to administer adjuvant radiation. All patients remain free of disease so far.

Comment

These four cases illustrate rare presentations of thymomas with either infarction or hemorrhage. The combination of the symptoms and computed tomographic scan findings seem to suggest a clinically, very malignant tumor, such as an aggressive lymphoma that can be misleading for the clinician. All patients had early-stage tumors that should have a good prognosis in contradistinction to the supposition at the original presentation. Astute clinicians should recognize this rare presentation to treat these types of patients in a proper fashion.

There have been several case reports of infarction of thymoma [3–5]. The key feature is the acute presentation with chest pain. Two of the cases were Masaoka stage I, and the stage was not recorded in the other case. Follow-up information was not provided. Hemorrhage of a thymoma is also quite rare with only three prior case reports, again with presentations of chest pain [2]. Two of these cases were Masaoka stage I and one case was stage II. Follow-up information was not provided. The differ-
ential diagnosis of an anterior mediastinal mass and acute chest pain includes thymic carcinoma (World Health Organization type C), lymphoma, germ cell tumors, hemorrhagic cystic substernal goiters, hemorrhagic ectopic parathyroid adenomas [6], and a hemorrhagic hemangiopericytoma [7].

A large series of thymomas with cystic, hemorrhagic, and infarcted areas were recently reported, concentrating on the pathologic aspects of these cases [8]. Twenty-five cases among 600 thymomas had these pathologic findings with no symptoms, but only 13 presented with chest pain (2%, 13 of 600). The areas of infarction were associated with ischemic necrosis and were always associated with vaso-occlusive and thrombotic changes in the adjacent tissue. Hemorrhagic areas were associated with cystic areas that showed severe acute and chronic inflammation with granulation tissue. Twenty-three of these cases were Masaoka stage I and 2 cases were stage III. The prognosis was excellent in the 14 patients who had recorded follow-up with no recurrences with a median follow-up of 9 years.

The issue arises as to whether induction therapy should be given to thymomas such as these as the computed tomography suggests an apparently invasive lesion. We would suggest if there is unequivocal evidence of invasion (ie, a cutoff of the innominate vein surrounded by tumor) and tissue diagnosis of at least a B type of thymoma, then induction therapy be given. However if a ready tissue diagnosis can not be achieved (which seems to be common), or if the computed tomography only shows indistinct margins (falsely suggesting invasion) in the setting of acute chest pain, then resection for diagnosis and treatment is appropriate. In the end, this is a difficult call to make, but this report should alert clinicians when faced with patients who present with severe acute chest pain to search for signs of infarction and hemorrhage that greatly diminish the ability of the computed tomographic scan to predict subtle signs of invasion.

The spectrum of the presentation of thymomas is quite broad, not only including anterior mediastinal tumors, but also other locations such as cervical, pleural, pericardial, and within the lung. Thymomas are commonly found as an incidental finding, but they may compress mediastinal structures causing cough, superior vena cava syndrome, and chronic dull chest pain. Various autoimmune syndromes may be present as well, such as myasthenia gravis, red cell aplasia, or hypogammaglobulinemia. Finally, one must keep in mind a rare presentation of thymoma that can be either with infarction or hemorrhage leading to a presentation as an emergency with severe acute chest pain.

References

Autocrine Growth by Granulocyte Colony-Stimulating Factor in Malignant Mesothelioma
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We report the first case of a malignant mesothelioma expressing not only granulocyte-colony stimulating factor (G-CSF), but also its receptor. A 59-year-old male carpenter underwent a panpleuroperoneumectomy, but the tumor relapsed and spread rapidly, accompanied by leukocytosis. The white blood cell count reached 147,000/ mm³ (96.2% neutrophils), and the concentration of serum G-CSF was 77 pg/mL. An autopsy demonstrated that some of the tumor cells produced G-CSF, but more tumor cells and endothelial cells in the tumor expressed G-CSF receptor. It was hypothesized that an autocrine loop involving G-CSF and the G-CSF receptor greatly accelerated the tumor growth.


Granulocyte-colony stimulating factor (G-CSF) is produced by a variety of human cell types including monocytes, macrophages, endothelial cells, fibroblasts, and neutrophils. It is well known that some malignant tumors produce G-CSF. Six cases of malignant mesotheliomas producing G-CSF have been previously reported, but the expression of G-CSF receptor has not been documented. Here we report the first case of a malignant mesothelioma expressing not only G-CSF but also its receptor.