



Elderly woman with sharp shoulder pain

The patient denied recent trauma or any heavy lifting, but she'd lost 10 pounds over the previous month. What was causing her shoulder pain?

A **78-YEAR-OLD WOMAN** sought care at our emergency department for sudden-onset right shoulder pain that had begun 5 days earlier. She said the pain was sharp and that it radiated to the scapula, right arm, and chest. She said that nonsteroidal anti-inflammatory drugs provided pain relief.

The patient denied any recent trauma or heavy lifting, and was not experiencing extremity weakness, numbness, or tingling. She reported no fever, chills, cough, or night sweats, but said she'd lost 10 pounds over the previous month. The patient was a former smoker whose medical history included diabetes mellitus, hypertension, and hyperlipidemia. Two years ago, she was treated for recurrent right-sided

pleural effusions with pleurocentesis, which was negative for cytology and acid-fast bacilli.

Auscultation revealed crackles in the right lower lung field with decreased breath sounds. The patient had full range of motion in her right shoulder and experienced minimal pain on flexion. She had no swelling, erythema, or tenderness in her right upper extremity and there was no sign of lymphadenopathy. Her laboratory data were noncontributory. A chest radiograph was obtained (**FIGURE 1**).

- WHAT IS YOUR DIAGNOSIS?
- HOW WOULD YOU TREAT THIS PATIENT?

FIGURE 1

X-ray showed diminished volume of the right lung



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Clinical findings of malignant pleural mesothelioma are frequently nonspecific and may masquerade as innocuous shoulder pain.

Diagnosis: Malignant pleural mesothelioma

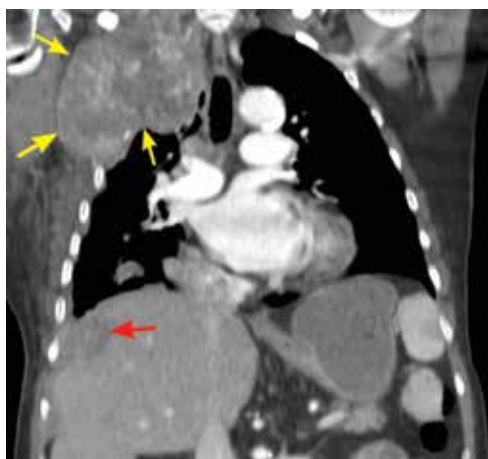
The chest radiograph revealed pleural-based masses extending along the convexity of the right chest wall. (Note the diminished volume of the right lung in **FIGURE 1**.) A coronal enhanced computed tomography (CT) scan (**FIGURE 2**) showed a large heterogeneous mass extending through the chest wall into the right axillary soft tissue and encasing the right brachial plexus (yellow arrows). Transdiaphragmatic extension was evident as an irregular mass at the hepatic dome (red arrow). The constellation of findings prompted the radiologist to suspect pleural malignancy.

The patient was then admitted to Pulmonary Services and a CT-guided pleural mass biopsy was performed. The diagnosis followed: malignant pleural mesothelioma (MPM).

An aggressive cancer

MPM is a highly aggressive neoplasm of the pleura with rising incidence around the globe.^{1,2} The annual incidence of mesothelioma in the United States is approximately 3000 cases per year, with the majority linked to asbestos exposure. The latency period is

FIGURE 2
CT scan revealed a large mass extending through chest wall



A coronal enhanced computed tomography (CT) image showed a large heterogeneous mass extending through the chest wall into the right axillary soft tissues and encasing the right brachial plexus (yellow arrows). Transdiaphragmatic extension was evident as an irregular mass at the hepatic dome (red arrow).

long, typically ranging from 35 to 40 years.¹ Our patient, however, did not have a history of asbestos exposure. She was a housewife who had no exposure to building construction or demolition.

■ **Nonspecific complaints.** Clinical findings of MPM are frequently nonspecific and may masquerade as innocuous shoulder pain, as illustrated in this case. Patients may also present with dyspnea, nonpleuritic chest pain, and incidental pleural effusions. On examination, unilateral dullness on percussion at the lung base, palpable chest wall masses, and scoliosis toward the sides of the lesion may be present.³

Differential Dx of shoulder pain includes rotator cuff disorders, tears

The differential diagnosis of shoulder pain includes rotator cuff disorders, acromioclavicular osteoarthritis, and cervical radiculopathy from degenerative spondylosis.

Rotator cuff tendinopathy and tears usually present with pain on overhead activity, positional test muscle weakness, and evidence of impingement. Acromioclavicular osteoarthritis usually causes acromioclavicular joint tenderness, which can be relieved with diagnostic intra-articular anesthetic injections. Pain from cervical spondylosis is usually accompanied by numbness and weakness in the arms and hands and muscle spasms in the neck. Also, the symptoms are usually aggravated by downward compression of the head (Spurling's test).^{4,5}

Chest radiographs are useful, but CT scans are more sensitive

Often, MPM is initially suspected because of unilateral pleural nodularity or thickening with a large, unilateral pleural effusion on a chest radiograph.⁶ Pleural plaques may also be seen. As the tumor grows, encasing the lung and invading the fissures, it leads to volume loss of the affected side, which can also be identified radiographically.¹

CT is a more sensitive way to detect pleural and pulmonary parenchymal involvement, as well as invasion of adjacent thoracic structures, including the chest wall, pericardium, diaphragm, and the mediastinal lymph nodes.¹

When mesothelioma is suspected because of clinical or radiologic data, experts recommend that cytologic findings from thoracentesis be followed by tissue confirmation from thoracoscopy or CT biopsy.²

Chemotherapy, Yes, but there are many Tx unknowns

The best approach to treatment of MPM remains controversial due to the rarity of the disease and the scarcity of randomized prospective trials. Surgical resection is most often performed when the disease is confined to the pleural space. An extrapleural pneumonectomy is usually performed for stage I disease, when the tumor is limited to one hemithorax, invading the pleura and involving the lung, endothoracic fascia, diaphragm, or pericardium.⁷

Unfortunately, mesothelioma is highly radioresistant; patients often endure severe toxicity due to large radiation fields. Chemotherapy, either as single agents or in combination, can be administered systemically or directly into the pleural space. Combination chemotherapy using cisplatin and pemetrexed is currently the standard of care, based upon a phase III trial that demonstrated prolonged overall survival with the combination compared to treatment with cisplatin alone (12.1 months vs 9.3 months).⁸

■ **Other agents used to treat MPM.** Five other chemotherapy agents are also used in the treatment of MPM. Used individually, the maximum response rates to these agents are as follows: methotrexate (37%), mitomycin

(21%), doxorubicin (16%), cyclophosphamide (13%), and carboplatin (11%).⁷

■ **Our patient.** The rest of our patient's hospital course was uncomplicated. She was not a surgical candidate because she had such extensive tumor involvement. She was discharged with a referral to an outpatient oncology clinic. Despite 2 cycles of carboplatin and pemetrexed, and palliative radiation therapy to the right upper thoracic mass, the disease progressed with worsening right upper extremity pain and neurologic deficits. **JFP**

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Combination chemotherapy, using cisplatin and pemetrexed, is currently the standard of care for malignant pleural mesothelioma.

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