Malignant Mesothelioma Causing Transudative Pleural Effusion

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Abstract

Effusions associated with malignant mesothelioma are strongly exudative, with elevated total protein concentrations in the range of 4 to 5 g/dL. Pleural fluid lactate dehydrogenase concentrationoften exceeds those of patients with carcinomatous pleural effusions, with levels greater than 600 IU/L. However appoxiametly 5% of malignant pleural effusions can be transudates. This article describes a case of malignant pleural mesothelioma causing transudate. A 74 year-old male patient who was admitted to the clinic had a one-year history of pleuretic chest pain and exertional dyspnea. In the biochemical analysis of pleural fluid, glucose concentration was 120 mg/dL, LDH was 11 U/L, and total protein was 0.5 g/dL. Repeated biochemical analyses were consistent with transudate. The diagnosis was proved by open pleura biopsy in this patient. Malignant transudative effusions are often due either to concomitant congestive heart failure, atelectasis from bronchial obstruction or pulmonary embolism. However, no coincidental disease was found. The probable cause was trapped lung and early stages of lymphatic obstruction. To date, this is our only patient with malignant mesothelioma causing transudate.

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Key words: *malignant mesothelioma, transudate, malignant pleural effusion, transudative pleural effusion*

Indroduction

Malignant mesothelioma is the most common primary malignant tumor of the pleura. The established predominant cause of malignant mesothelioma is exposure to asbestos by inhalation. In Turkey, exceedingly high incidence of pleural mesothelioma has been observed particularly in central Anatolia. Barış et al. demonstrated that the nonasbestiform zeolite fiber known as erionite has caused epidemics of diffuse malignant mesothelioma in our region (1).

The chest radiograph may show a moderate to large pleural effusion in the early stages of malignant mesothelioma. Contralateral mediastinal shift often occurs when the pleural effusion is large; but as fluid resorbs and is replaced by tumor, the ipsilateral hemithorax shrinks in size and the mediastinal structures shift ipsilaterally. The pleural effusions associated with mesothelioma are characteristically exudative. Early in the course of malignant mesothelioma the pleural fluid may be serous; later it tends to be hemorrhagic (2).

Case Report

A 74 year-old man was admitted with pleuretic chest pain and dyspnea. History revealed an appendectomy in 1978 and a prostate

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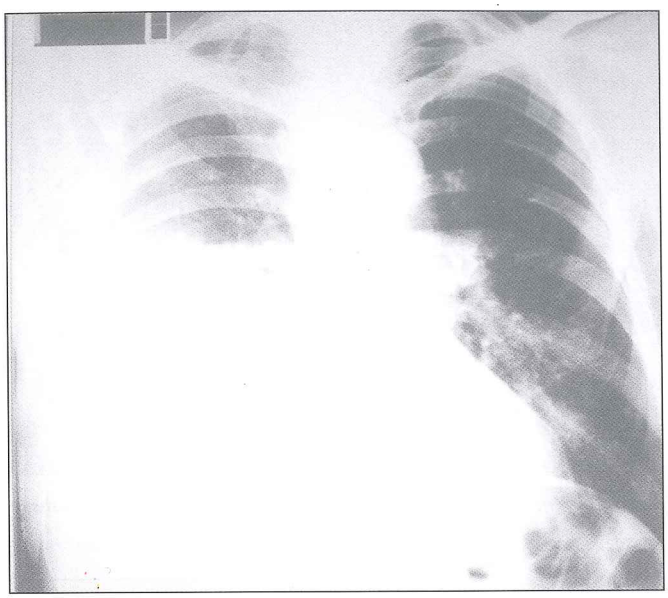

Figure 1. *Chest X-ray showing a homogenous opacity with irregular border covering half of right hemithorax*

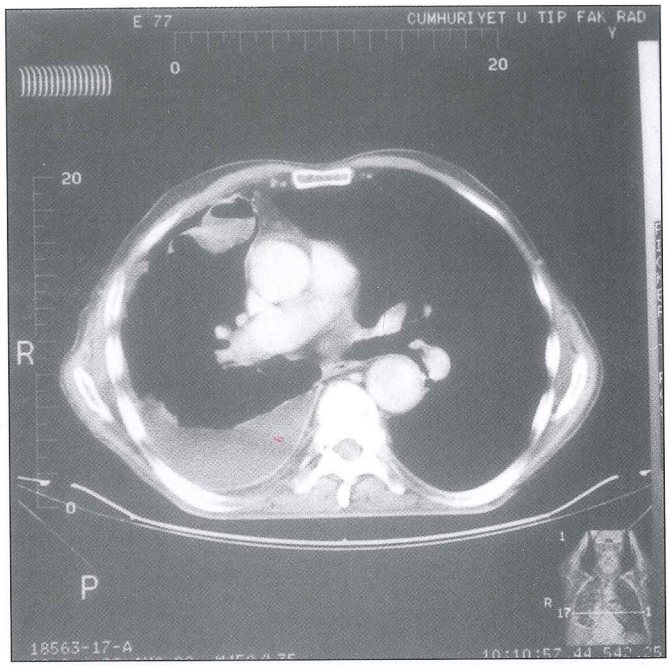

Figure 2. *Chest CT demonstrating a cavitary lesion in anterior pleural surface, free pleural surface, free pleural effusion, pleural thickening, and loss of volume in right hemithorax*

operation 8 years ago and smoking one packet of cigarettes a day for 50 years, but for the last 5 years he has stopped smoking. The patient was hospitalized in December 1999 with complaints of right pleuretic chest pain in another university hospital. The chest radiography had showed right massive pleural effusion. Pleural biopsy specimen had showed chronic nonspecific pleuritis and microbiological examination indicated the presence of acid-fast bacilli in the pleural fluid. Antituberculous therapy had been started accordingly. Radiological regression was not observed in spite of antituberculous therapy for ten months, and the patient was rehospitalized with progressive dyspnea in our clinic. On physical examination, respiratory sounds were decreased over the right lower lung on auscultration, and basal lung expansion was restricted. Erythrocyte sedimentation rate was 69 mm/h, and hemoglobine concentration was 10.5 g/dl. Pulmonary function tests showed restrictive pattern. There was bifascicular block in electrocardiography, and left ventricular wall motion was normal in echocardiographic examination. In the first presentation, the chest X-ray showed a homogenous opacity with irregular border, which covered half of the right hemithorax (Figure 1). Thorax CT indicated a cavitary lesion in anterior pleural surface, free pleural effusion, pleural thickening, and loss of volume in right hemithorax (Figure 2). In the lower sections, a collapsed right lower lobe and an iatrogenic pneumothorax can be seen (Figure 3). In the biochemical analysis of pleural fluid, glucose concentrations were 110-120 mg/dL, LDH 11-26 U/L, albumin 0.3-0.4 g/dL and total protein 0.5-0.6 g/dL. Serum glucose, LDH, albumin, and total protein levels were 95-125 mg/dL, 380-420 mg/dL, 3.1-3.3 g/dL, 5.8-6.1 g/dL, respectively. In the pleural fluid, 95% of cells were lymphocytes. There was no endobronchial pathology in the bronchoscopic examination, and any acid-fast bacilli or malignancy in the bronchoalveolar lavage fluid. No agent was identified in microbiologial cultures in both pleural fluid and bronchoalveolar lavage fluid. Lymphocytes and mesothelial cells were observed with no malignant cells in the cytological examination of pleural fluid. Closed pleura biyopsy was not used to establish the diagnosis. There were nodular thickenings both visceral and parietal pleural surfaces in the lateral thoracotomy. Multiple specimens were obtained both from pleura and pulmonary parenchyma. The open pleura biopsy speciment revealed malignant mesothelioma cells invading neighbouring pulmonary tissue (Figure 4). Tumor cells expressed HBME-1, pH 2.5 Alcian Blue, vimentin, PAS, and PAS with diastase positivity, and B72.3, CEA, and CD15 negativity.

Discussion

Malignant pleural effusions are usually exudates with a protein concentration of about 4 g/dL. (range: 1.5-8.0 g/dL). On rare occasions, the glucose is as low as 5 mg/dL; but as a rule the concentrations are in the range of 30 to 55 mg/dL. Pleural fluid lactate dehydrogenase (LDH) concentrations often exceed those of patients with carcinomatous pleural effusions, with levels greater than 600 IU/L. In 60% of patients with malignant mesothelioma, at the time that the diagnosis is made, the pleural gluid glucose is low; in contrast, the incidence of low glucose concentration in carcinoma of the pleura is about 30%. The natural progression of malignant mesothelioma resulting in large tumor masses and concomitant fibrosis that obliterate the pleural membrane provides a reasonable explanation for this biochemical finding (3,6).

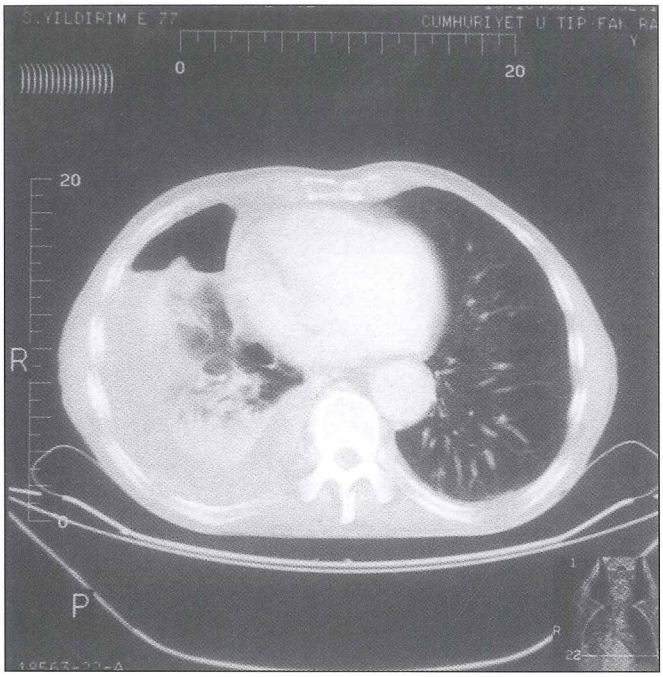

Figure 3. *In the lower sections, a collapsed right lower lobe and iatrogenic pneumothorax can be seen*

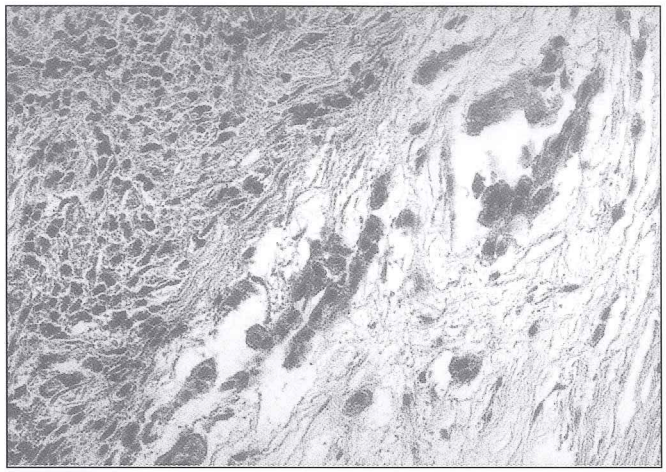

Figure 4. *Malignant mesothelioma cells invading neighbouring pulmonary tissue*

In our patient, pleural fluid LDH (11 U/L) and total protein concentration (0.5 g/dL) was strikingly low but glucose concentration (120 mg/dL) was nearly equal to serum value. The pleural fluid was accepted as "transudate" according to these findings. Thereafter, the etiology of transudative pleural effusion was investigated. There was no vena cava superior syndrome in the physical examination and no hypoalbuminemia in the biochemical analysis. Left ventricle functions were normal in the echocardiographic examination. He was not exposed to radiation therapy. Constrictive pericarditis, vena caval obstruction or fibrosis of mediastinum were not observed in the thorax CT sections. Matzel has observed only one transudative pleural effusion in 55 cases, but it may well be due to another concomitant disease (4). Contrary to this, no etiological factor for transudate was observed in our patient.

The cause of transudative effusion in this patient is probably related to trapped lung. Malignant mesothelioma often involves both visceral and parietal surfaces. It extends into lobar fissures and usually obliterates the pleural space (3,6). The accumulation of the fluid can be expected with blockage of lymphatic stomata of the parietal pleura. The lymphatic system of the parietal pleura plays a major role in the resorption of pleural liquid and proteins; the lymphatics drain to the mediastinum. Interference with the integrity of the lymphatic system anywhere between the parietal pleura and the mediastinal lymph nodes can result in a pleural effusion. Autopsy series have indicated that impaired lymphatic drainage from the pleural space is the predominant mechanism for the accumulation of fluid associated with malignancy. Appoximately 5-10% of malignant pleural effusions can be transudate (5,6). Interesting enough, this patient who had transudate had primary (not secondary) malignant tumor of the pleura.

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