Descending Necrotizing Mediastinitis With Bilateral Pleural Empyema

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Abstract

Descending necrotizing mediastinitis (DNM) is a rare disease and mainly related to the spread of oropharyngeal and odontogenic infections into the mediastinum. Delayed diagnosis and inadequate mediastinal drainage are the primary causes of the reported high mortality rates. We report a case of DNM secondary to odontogenic infection, with bilateral thoracic cavity and mediastinal involvement. The thoracic cavity and the mediastinum were both drained by bilateral thoracotomy. The patient was discharged on the postoperative day 30 and is doing well 5 months postoperatively.

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Introduction

Acute mediastinitis is a serious infection which involves the connective mediastinal tissue that fills the pleural cavity and surrounds the median thoracic organs. The most common causes of mediastinitis are esophageal perforation and postoperative infection following surgical interventions through a sternotomy incision. Acute mediastinitis occasionally occurs as a complication of oropharyngeal infection. This condition is referred to as descending necrotizing mediastinitis (DNM) (1). DNM is the most lethal form of mediastinitis. Antibiotic therapy, cervical exploration, mediastinal drainage and debridement are the cornerstones of treatment, but mortality remains as high as 40% (2).

We are reporting a case of DNM and bilateral empyema treated with bilateral thoracotomy.

Case Report

A 18-year-old male patient was admitted with a history of extensive swelling and tenderness on the left side of the neck for the past 6 days. The patient also complained of fever and shortness of breath which had started 2 days ago. Ten days ago he had suffered toothache and gone to a dentist. He had been treated with oral penicillin for odontogenic infection.

On admission, physical examination disclosed tenderness and swelling on the left side of the neck. Caries were present in the left 5th and 6th lower molar teeth. Breath sounds were decreased bilaterally. The patient looked pale and was short of breath.

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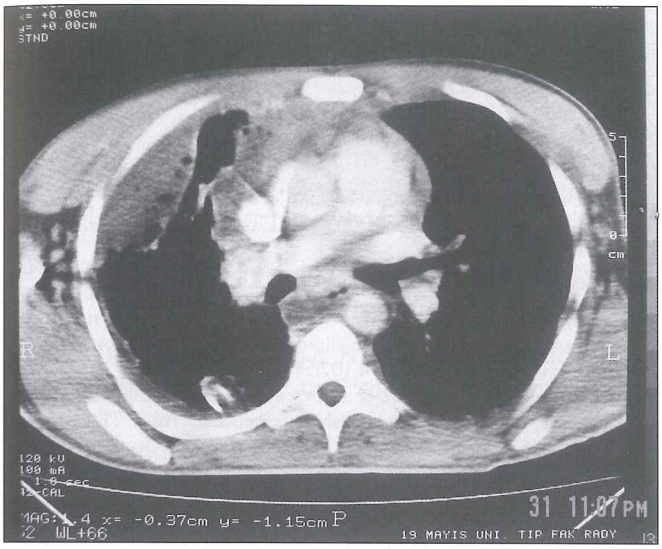

Figure 1. *Preoperative thoracic CT showing anterior and posterior mediastinal abscess, gas bubbles and effusion on the right side.*

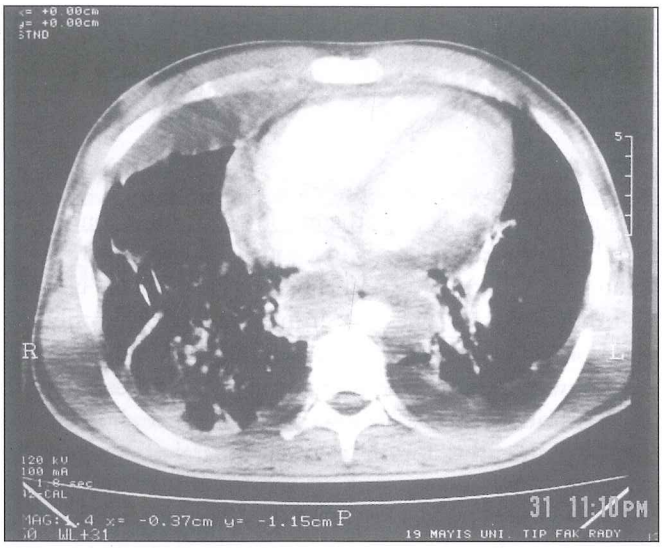

Figure 2. *Preoperative thoracic CT showing posterior mediastinal abscess and bilateral pleural effusion.*

Heart rate was 98/min, blood pressure was 140/80 mmHg, respiratory rate was 60/min and temperature was 38.1°C. Arterial blood gas analyses showed a partial pressure of oxygen (PO_2) of 54 mmHg, partial pressure of carbon dioxide (PCO_2) 38 mmHg and an oxygen saturation of 87%. Laboratory studies showed a white blood cell count of 31 960/mm^3, a haemoglobin level of 12.5 g/dL and a hematocrit level of 38%. The platelet count was 249 000/mm^3, the erythrocyte sedimentation rate was 80 mm at 1 h, total protein was 5.66 g/dL, albumin 1.89 g/dL, lactate dehydrogenase 635 U/L, and glucose 112 mg/dL. Pleural fluid results were: white blood cell count 20 000/mm^3, total protein 3.28 g/dL, albumin 1.2 g/dL, lactate dehydrogenase 41 U/L, and glucose 4 mg/dL.

The chest radiograph revealed a widened mediastinum and bilateral pleural effusion. Chest tubes were inserted and 1000 mL of purulent pleural effusion was drained on both sides. A cervicothoracic computed tomography (CT) demonstrated gas collections on the left side of the neck, multiple abscesses in the anterior and posterior compartments of the mediastinum and bilateral pleural effusion (Fig. 1,2).

Six hours after admission a right thoracotomy was performed and pus drained from the thoracic cavity and mediastinum and a 250 mL effusion from the pericardium. Wide mediastinal debridement and pleural decortication were carried out and two chest tubes were inserted on the right side and an irrigation system was established. The patient received intravenous meropenem (1 g every 8 hours) and gentamycin (500 mg every 12 hours). On the second postoperative day his clinical condition had somewhat improved, his temperature had become normal, but a chest radiograph revealed pleural effusion on the left side. Thoracic CT was repeated 48 hours after the operation and showed a posterior mediastinal abscess and pleural effusion on the left side. The patient underwent left thoracotomy and pus was drained from the mediastinum and pleural decortication was carried out, two chest tubes were inserted on the left side.

All cultures (blood, fluid of mediastinum and pleura) remained sterile. The patient recovered slowly. The chest tubes were removed on postoperative day 10 and the patient was discharged on the postoperative day 30 with no physical or roentgenographic signs of mediastinitis. He is doing well 5 months postoperatively.

Discussion

Mediastinitis occasionally occurs as a consequence of oropharyngeal infection. Because of the rapid spread of the infection along cervical fascial planes, the diagnosis is almost always delayed (3). The necrotizing mediastinal process may develop within 12 hours from the onset of the oropharyngeal infection. This time interval may sometimes be as long as two weeks, but in the majority of the cases the process develops within 48 hours (4). DNM remains a very aggressive form of mediastinitis, and mortality is reported to be around 40% (2,5). Efforts to reduce the mortality associated with DNM have been only moderately successful (6). Our patient presented with an odontogenic infection, which was treated with penicillin and which progressed rapidly to a life-threatening illness.

Established criteria for the diagnosis of DNM include 1) clinical manifestation of oropharyngeal infection; 2) demonstration of characteristic roentgenographic features of mediastinitis; 3) documentation of the necrotizing mediastinal infection at operation or postmortem examination or both; and 4) establishment of a relationship between oropharyngeal infection and development of the necrotizing mediastinal process (4).

CT scan is useful for early diagnosis of DNM. Soft tissue infiltration that surrounds the mediastinal structures and

collection of fluid density indicating mediastinal abscess with or without the presence of gas bubbles can be detected by CT scan. Postoperatively, the CT scan is a useful tool in follow up and in deciding on the duration of the irrigation or drainage or the time for possible reoperation (1,6). We performed thoracic CT empirically 48 to 72 hours after the operation to identify any progression of the infection.

Antibiotic therapy alone is inadequate and the mainstay of treatment is aggressive surgical drainage through cervical and thoracic approaches (1). If infection involves only the superior mediastinum above the level of the carina, standard transcervical mediastinal drainage may be adequate. If the mediastinitis spreads below the tracheal bifurcation anteriorly or the fourth thoracic vertebra posteriorly, mediastinal drainage is best accomplished through a transthoracic approach (4). Standard posterolateral thoracotomy has the main advantage of providing a good approach to all compartments of the mediastinum, the pleural cavity and the pericardium (1,6). In our patient, empyema was present bilaterally and we performed thoracotomy on both sides. The patient recovered after thoracotomy and adequate drainage and irrigation of the mediastinum and of the pleural cavity.

In conclusion, delayed diagnosis and inadequate surgical drainage are the primary causes of lethal DNM. CT scanning is a valuable tool in early diagnosis. Early radical surgical drainage and debridement of the necrotizing tissue via cervical and thoracic approach and intravenous broad spectrum antibiotic therapy are the cornerstones of treatment and improve survival of patients with DNM.

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