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CASE FOR DIAGNOSIS

A 26-yr-old female with persistent cough

S. Baser*, F.E. Fisekci*, S. Ozkurt*, G. Kiter*, S. Kirac#, H. Alper¶

Case history

A 26-yr-old female was referred to the Chest Dept of the Pamukkale University Medical School, Turkey, for the investigation of coughing and abnormal chest roentgenogram. She suffered flu 3 weeks prior to this and her coughing was persisting since then. She denied fever, phlegm, dyspnoea, wheeze, night sweats and haemoptysis. Before a splenectomy at aged 18 yrs, blood transfusions had been applied monthly.

Physical examination revealed a blood pressure of 120/80 mmHg, pulse rate of 96 beats per min, respiratory rate of 21 breaths per min and marked hepatomegaly. Chest examination results were normal.

Haematological examination showed a haemoglobin level of 1.38 mmol·L^{-1} (89.3 g·L^{-1}), haematocrit value of 0.19, mean corpuscular volume of 91.4 fL, mean corpuscular haemoglobin concentration of 466 g·L^{-1}, red blood cell count of 2.1×10^{12} cells·L^{-1}, reticulocyte count of 0.14, white blood cell count of 23×10^{9} cells·L^{-1}, and platelet count of 1072×10^{9} platelets·L^{-1}. Serum biochemical findings were as follows: aspartate aminotransferase 85 U·L^{-1}, alanine aminotransferase 84 U·L^{-1}, blood urea nitrogen 1.33 mmol urea·L^{-1}, total protein 73 g·L^{-1}, total bilirubin 30.8 μmol·L^{-1}, iron 36.7 μmol·L^{-1}, ferritin 2.3 g·L^{-1}, and total iron binding capacity 40.3 μmol·L^{-1}.

The chest radiographs (fig. 1a and 1b), computed tomography (CT) of the chest (fig. 2), thoracic single photon emission computed tomography (SPECT) study with TC-99M (fig. 3) and peripheral blood smear (fig. 4) were as shown.

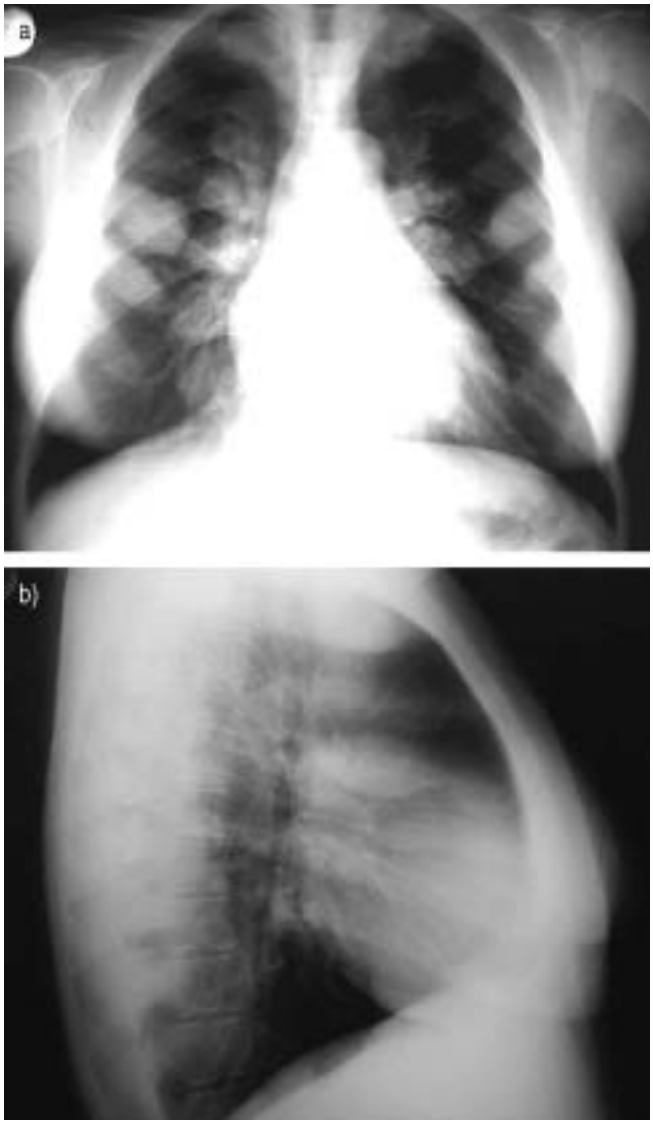

Fig. 1. – Chest radiograph showing: a) posteroanterior and b) lateral view.

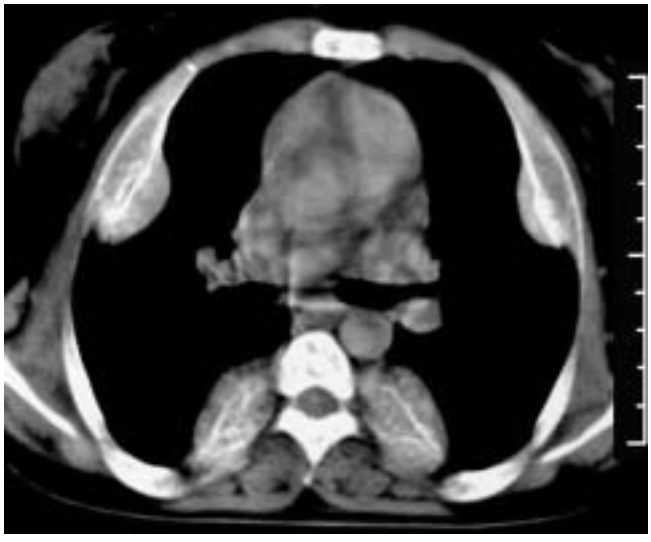

Fig. 2. – Computed tomography of the chest.

*Pulmonology Dept and #Nuclear Medicine Dept, Pamukkale University Medical Faculty, Denizli and ¶Radiology Dept, Ege University Medical Faculty, ýzmir, Turkey.

Correspondence: S. Baser, Pulmonology Dept, Pamukkale University Medical Faculty, Ataturk Cad., Tuna Apt. No:16 D:1 20100, Denizli, Turkey. Fax: 90 2582652733. E-mail: sevinb@hotmail.com

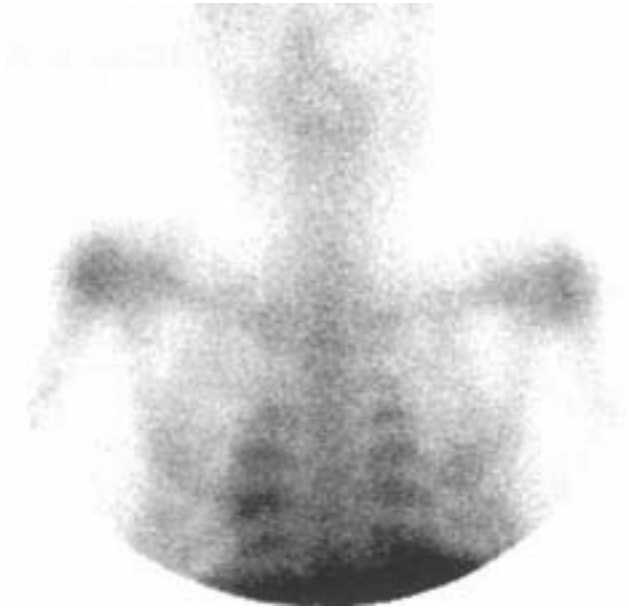

Fig. 3. – Posterior thorax image with technetium 99M nanocolloid.

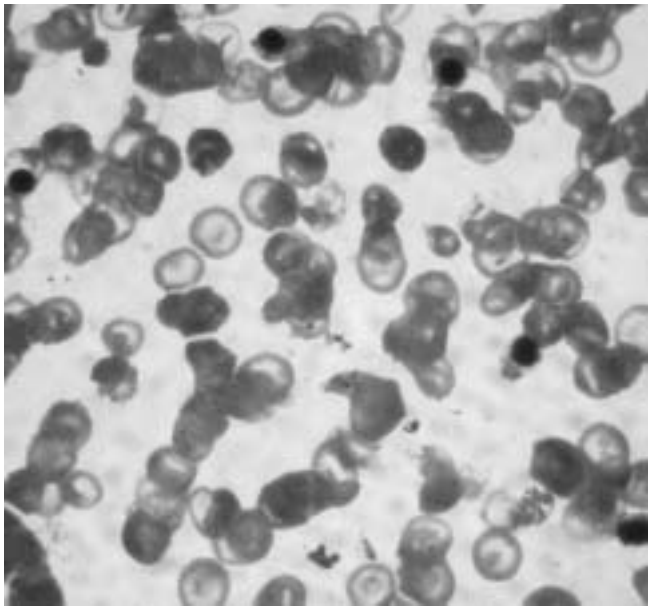

Fig. 4. – Peripheral blood smear (May-Grunwald Giemsa stain).

BEFORE TURNING THE PAGE, INTERPRET THE CHEST RADIOGRAPHS, CT SCAN, SCINTIGRAPHY AND PERIPHERAL BLOOD SMEAR AND SUGGEST A DIAGNOSIS.

Interpretation

Chest radiography

The posteroanterior and lateral chest roentgenogram revealed widening of the 4th and 5th anterior ribs, retrocardiac lobulated mass and increased trabecular pattern at ribs and scapula (fig. 1a and 1b).

Computed tomography of the chest

The CT of the chest revealed subpleural masses located at the anterior paracostal region without bone erosion (fig. 2), widening of the posterior ribs (fig. 2) and well-circumscribed paravertebral soft tissue mass located at the 9th thoracic vertebra.

Thoracic single photon emission computed tomography study with technetium 99M

Whole body skeletal and thoracic SPECT studies with TC-99M nanocolloid demonstrated bone marrow expansion in the ribs, proximal humeri and calvarium (fig. 3). Additionally, increased focal radiopharmaceutical uptake in the mass located at 9th dorsal vertebra was detected.

Peripheral blood smear and haemoglobin electrophoresis

The peripheral blood smear showed marked anisopoikilocytosis, microcytosis, hypochromia, normoblasts and target cells (fig. 4). The haemoglobin electrophoresis findings revealed the diagnosis of beta-thalassemia intermedia.

Diagnosis: "Intrathoracic extramedullary haematopoiesis in a patient with beta-thalassemia intermedia"

Clinical course and treatment

Results of pulmonary function studies revealed a mild restrictive pattern. The patient's cough disappeared during the examinations. Her anemia was controlled by transfusion of packed red blood cells. Since complications due to extramedullary haematopoiesis (EMH), such as spinal cord compression, haemothorax or pleural effusion were not determined, no additional radiotherapy or hydroxyure therapy was applied, due to their myelotoxic, cytostatic or hepatotoxic side-effects. Because her serum ferritin was very high, the patient was given chelation therapy. She was recommended for periodic controls.

Discussion

Intrathoracic EMH is a rare condition that is usually asymptomatic [1]. EMH is due to the production of blood cells outside the bone marrow and is a compensatory mechanism for bone marrow dysfunction [2].

EMH develops as a reactive process in various chronic anaemias, especially thalassemia [1–3], sickle cell anaemia [4], and hereditary spherocytosis [5]. It is rarely seen in Gaucher's disease [6], Paget's disease [7], alcohol-related macrocytosis [8] and congenital dyserythyropoietic anaemia [9].

EMH usually occurs as a compensatory phenomenon with chronic anemia [3]. This erythroid response is most often microscopic but can result in organomegaly or the development of tumour-like masses usually involving the liver, spleen and lymph nodes. Less frequently involved sites include the kidney, adrenal glands, breasts, spinal cord, intrathoracic cavity, pleura, pericardium and intracranial cavity [2].

When the bone marrow dysfunction is obvious and intrathoracic EMH is suspected, the presence of the characteristic findings on a chest roentgenogram and chest CT scan should suffice to make the diagnosis [2]. These characteristic findings are: widening of the ribs, unilateral or bilateral well-circumscribed lobulated paravertebral mass lesions usually located caudal to the sixth thoracic vertebrae, subpleural paracostal masses without bony erosion, absence of calcification, and the presence of adipose tissue within the mass [2, 7, 10].

Intrathoracic EMH is most often asymptomatic and treatment is usually unnecessary, except in the presence of complications [1, 2]. Massive haemothorax [1, 5], symptomatic pleural effusion [2, 9], and spinal cord compression [11] are complications of intrathoracic EMH.

Since the haematopoietic tissue is highly radiosensitive, low-dose radiation has been suggested as an effective method for controlling symptomatic pleural effusion or masses [1]. The management of spinal cord compression remains controversial. Radiotherapy with blood transfusions [12], hypertransfusion with hydroxyurea therapy [13, 14], or only blood transfusions [11, 15] were found to be successful in the complete regression of haematopoietic masses. The different treatment strategies for symptomatic pleural effusion and haemothorax at intrathoracic EMH include pleurocentesis [9], tube thoracostomy [1], pleurodesis with tetracycline [16], and low-dose radiation [17].

Noninvasive studies, including chest roentgenograms, CT and magnetic resonance imaging, can establish the EMH in most cases [10, 11, 18]. Bone marrow scanning with TC-99M sulfur colloid is a convenient noninvasive method of further establishing the diagnosis [2, 8, 19]. Tissue biopsy, surgical resection, or both are reserved for those cases where EMH is not suspected or when complications require surgical intervention [2].

In conclusion, based on characteristic radiographic findings and bone marrow scanning with technetium 99M sulfur colloid, it is important to recognise intrathoracic extramedullary haematopoiesis as a differential diagnosis of mediastinal masses. In geographical areas where thalassemia is prevalent, to avoid unnecessary surgical interventions, intrathoracic extramedullary haematopoiesis should be considered in differential diagnosis of patients who have chronic anaemia with asymptomatic intrathoracic masses and abnormal chest roentgenogram.

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