Spontaneous haemothorax: an unusual presentation of primary lung cancer

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Abstract
An unusual case of spontaneous haemothorax caused by a subpleural primary lung cancer is reported. Tumour invasion of the pulmonary vessels and visceral pleura was the possible cause.

(Thorax 1993;48:1185-1186)

Case report
A 52 year old man had experienced a sudden attack of right chest and shoulder pain, haemoptysis, dyspnoea, cold sweat, and syncope about one hour before arriving at the hospital. His blood pressure was 80/45 mm Hg and his pulse rate was 97 beats/minute. Physical examination revealed a conscious man without pallor. Breath sounds were significantly decreased over the right chest with dullness to percussion. Laboratory tests showed nothing abnormal and a chest radiograph showed an opaque right hemithorax. Aspiration of the effusion revealed fresh, whole blood (haematocrit 40%). The patient was immediately admitted to the intensive care unit and an intercostal drain was inserted, draining 1200 ml of fresh blood. The bleeding rate was below 40 ml/hour and an emergency thoracotomy was not considered. The patient received two units of blood and his condition improved significantly. The bleeding stopped two days later. Follow up chest radiographs revealed a $5 \times 5 \text{ cm}^2$ shadow in the right lower lobe. A computed tomographic (CT) scan (fig 1) confirmed a $4 \times 3.5 \text{ cm}^2$ mass in the right lower lobe with mediastinal lymph nodes of normal size. The radiodensity of the mass was similar to that of blood. A needle biopsy of the mass revealed adenocarcinoma, but no malignant cells were detected by cytological examination of the effusion fluid. Bronchoscopy revealed a normal tracheobronchial tree except for some blood-tinged sputum in the right lower lobe bronchi. Thoracoscopy was performed to rule out pleural seeding. The pleura appeared normal. A $2 \times 2 \text{ cm}^2$ fibrin patch was found over the posterior surface of the lower lobe which was compatible with the CT findings. Further scans identified no extrathoracic metastases. A month later the patient underwent a right thoracotomy and a small amount of straw coloured pleural effusion was found. A lower lobe lobectomy and mediastinal node dissection was performed. Pathological examination revealed a bronchoalveolar carcinoma (fig 2) with ipsilateral mediastinal node metastases.

Discussion
Spontaneous haemothorax occurs most commonly as a result of the tearing of pleural adhesions secondary to pneumothorax. Other aetiologies include pulmonary arteriovenous malformation, pulmonary infarction, blood dyscrasias, pleural endometriosis, and a ruptured thoracic aortic aneurysm.

In 1974 DeFrance et al reported two unusual cases of massive haemothorax. The first was caused by a trophoblastic tumour metastasis in the lung, and the second resulted from rupture of a splenic artery aneurysm that had eroded through the left diaphragm. In 1979 Johnson et al reported a trophoblastic tumour metastasising to the pleura and causing a haemothorax. In 1988 two cases of mediastinal tumours presenting as spontaneous haemothorax were reported. Furthermore, in 1991 a case of metastatic choriocarcinoma of the lung presented with a haemothorax. Other rare causes such as hepatocellular carcinoma metastasising to the chest wall and solitary costal exostosis have also been reported.

Primary lung tumours are sometimes associated with spontaneous pneumothorax and this is, in turn, sometimes associated with spontaneous haemothorax, thought to be due to torn adhesions. In our case there was no evidence of a pneumothorax nor of adhesive bands. A possible mechanism for the haemothorax may be compression and ischaemic necrosis of the adjacent lung tissue as the subpleural tumour grew. It may also have invaded pulmonary vessels or...
Need for a comparative performance standard for dry powder inhalers

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Abstract
The efficacy of dry powder inhalers is dependent on the inspiratory flow rate at which they are used. The resistance to airflow through five different dry powder inhaler devices was measured. The devices were shown to vary significantly, with the Turbohaler having the highest resistance. We suggest that the performance of dry powder inhalers should be assessed at comparable pressure drops producing clinically relevant inspiratory flow rates for each device.

(Thorax 1993;48:1186–1187)

There are now five types of dry powder inhaler (DPI) available for prescription in the United Kingdom. At present there is no measure of performance by which comparisons of DPIs can be made and no official guidelines have been published.

Most DPIs are sensitive to inspiratory flow rate, the higher the flow rate the greater the efficacy of drug delivery.1,4 All standard pulmonary function tests are poor predictors of the inspiratory flow rate that patients can tolerate” into the pleural cavity causing the haemothorax. The latter possibility appears likely as examination of the resected specimen showed a small perforation in the visceral pleura which was covered by a fibrin clot, and microscopic examination revealed tumour invasion of the pulmonary vessels and visceral pleura (fig 2).

To our knowledge this is the first report of primary lung cancer causing haemothorax.


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Reprint requests to: Dr R Richards
Received 21 July 1992
Returned to authors 15 September 1992
Revised version received 25 November 1992
Accepted 16 February 1993

Figure 2 Tumour invading the pleura (*, arrow) and encroaching the blood vessel (BV, arrowheads). The tumour cells (insert) are columnar or cuboidal in shape and arranged in a typical bronchioloalveolar pattern. Stain: haematoxylin and eosin.