

# 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 5×5 cm<sup>2</sup> shadow in the right lower lobe. A computed tomographic (CT) scan (fig 1) confirmed a 4×3.5 cm<sup>2</sup> 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 2×2 cm<sup>2</sup> 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.<sup>1,2</sup> Other aetiologies include pulmonary arteriovenous malformation, pulmonary infarction, blood dyscrasias, pleural endometriosis, and a ruptured thoracic aortic aneurysm.<sup>3</sup>

In 1974 DeFrance *et al*<sup>4</sup> 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*<sup>5</sup> 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.<sup>6</sup> Furthermore, in 1991 a case of metastatic choriocarcinoma of the lung presented with a haemothorax.<sup>7</sup> Other rare causes such as hepatocellular carcinoma metastasising to the chest wall<sup>8</sup> and solitary costal exostosis<sup>9</sup> 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 "rup-

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Reprint requests to:  
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Received 23 October 1992

Returned to authors

11 December 1992

Revised version received

12 January 1993

Accepted 20 January 1993

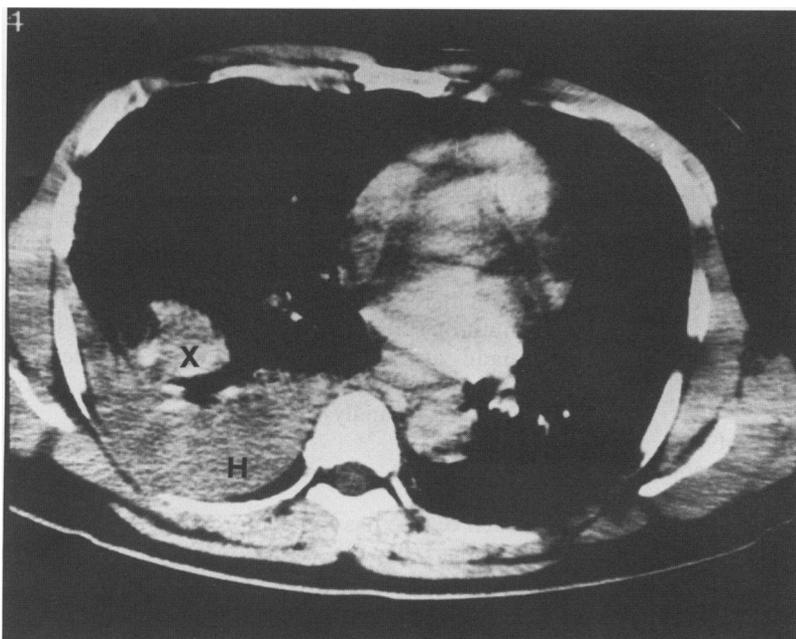


Figure 1 Computed tomographic scan showing a right lower lobe subpleural mass (X) and residual haemothorax (H).



Figure 2 Tumour invading the pleura (\*, arrows) 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.

tured" into the pleural cavity causing the haemothorax. The latter possibility appears likely as examination of the resected specimen showed a small perforation in the vis-

ceral 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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*Thorax* 1993;48:1186-1187

## 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.<sup>1-4</sup> All standard pulmonary function tests are poor predictors of the inspiratory flow rate that patients can

generate through these devices.<sup>5</sup> To demonstrate the wide differences between the devices we have measured the resistance of the Turbohaler, Diskhaler (four and eight plate), Rotahaler, and Spinhaler.

### Methods

The resistance of each DPI was assessed using a static tube and water manometer employing the method described by Cotes<sup>6</sup> (fig 1). Each DPI was loaded and actuated as described in the written instructions and then attached to one end of the static tube. The air flow was generated by an electrically driven blower, adjusted via a choke valve, and measured by a rotameter. One end of a water manometer was inserted into the static tube with the other end being open to the atmosphere, enabling the pressure drop caused by each device to be measured at specific flow rates. Each device was assessed from 10 l/min with increasing increments of 10 to a maximum of 100 l/min. Three measurements were made at each flow rate for each device. Differences between the data points were assessed by analysis of variance.

### Results

Each device has its own pressure/flow characteristics (fig 2). Variation in the measurements were minimal with all standard deviations being under 12 mm H<sub>2</sub>O. The device with the least resistance was the Spinhaler which, at 60 l/min, had a mean (SD) deflection of only 35 (0.58) mm H<sub>2</sub>O. All the other devices had significantly greater

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