

## Knock, knock, knockin' on heaven's door

John Ross, MD

A 75-year-old woman developed sudden shortness of breath at 1130. By 1400 her breathing had deteriorated, requiring her son to bring her to the emergency department (ED). Her medical history included hypertension and chronic obstructive pulmonary disease, but she had no hospitalizations in the previous 5 years. Her medications included metoprolol and hydrochlorothiazide, as well as salbutamol and ipratropium bromide by inhalers.

On examination, she was in extremis, sitting forward in the tripod position. She was alert and able to speak in 1- to 3-word sentences. Her heart rate was 140 beats/min, blood pressure 150/90 mm Hg, respiratory rate 30 breaths/min, and her oxygen saturation was 86% on high-flow oxygen by face mask. No temperature was measured. Jugular venous distention was apparent. Chest auscultation demon-

strated fine end inspiratory crackles on the right and decreased breath sounds on the left. Heart sounds were distant, but pulses were present in all limbs. There was no leg swelling, and she denied calf tenderness on palpation.

Portable chest x-ray (Fig. 1) revealed a left-sided pneumothorax.

The patient received fentanyl 50 µg intravenously, and a 12-French chest catheter was placed via the left 4th interspace at the mid-axillary line. The patient immediately felt more comfortable. Within 5 minutes, her heart rate fell to 80 beats/min, her blood pressure to 140/80 mm Hg, her respiratory rate to 16 breaths/min, and her oxygen saturation increased to 98% on nasal prongs. The chest catheter was attached to a Heimlich valve, and a post-procedure chest x-ray (Fig. 2) was taken to confirm



Fig. 1. Upright inspiratory AP chest radiograph. There is a small apical and larger basal pneumothorax on the left. The mediastinum is shifted to the right, suggesting tension.



Fig. 2. Upright AP view demonstrating radiographic resolution of the pneumothorax. A small chest tube is in place and is connected to a Heimlich valve.

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Received: Dec. 12, 2002; final submission: May 15, 2003; accepted: May 20, 2003

*This article has been peer reviewed.*

*Can J Emerg Med* 2003;5(5):361-2

tube position. It was noted at this time that there was a persistent air leak from the catheter. Several hours later the patient was stable and felt well. She was discharged with instructions to see the general surgeon on call the next day.

The next day, the patient returned to the ED as planned. She felt and looked well. No comment was made about the presence or absence of an ongoing air leak, but a repeat x-ray was "normal." The Heimlich valve was closed, and she was told to return the next day for reassessment and possi-

ble catheter removal. Six hours later the patient returned in extremis.

What is the most likely explanation?

- A. Displacement of the chest catheter
- B. Tension pneumothorax
- C. Malfunction of the Heimlich valve
- D. Catheter-induced pleural hemorrhage with hemothorax

For the Answer to this Challenge, see page 370.

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