

## Under pressure

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A 37-year-old male was involved in a high-speed motor vehicle accident. He was a front-seat passenger, unbelted, in a stolen truck being chased by the police, when the driver lost control and struck a tree. After being extricated from the vehicle, the patient was found to be unconscious with a Glasgow Coma Scale score of 5, and was bleeding from the mouth. A nasopharyngeal airway was inserted, and he was taken to a nearby community hospital.

At the hospital, his respiratory rate was 28 breaths/min, blood pressure 127/82 mm Hg and heart rate 131 beats/min. He was intubated using an 8-mm endotracheal tube (ETT). The patient had an obvious head injury and an open jaw fracture, so was transferred by land ambulance to a level one trauma centre 50 minutes away. His past medical history, current medications and possible allergies were unknown.

On arrival at the trauma centre there was difficulty ventilating the patient, associated with a high inspiratory pressure (40 cm H<sub>2</sub>O). On auscultation, there was a decreased air entry on the left side of the chest. The ETT was noted to be secured at the 28-cm mark at the lip and so was pulled back 3 cm to rest at the 25-cm level. There was no kinking in the tube and the patient was not biting, and yet, the air entry to the left side was still not improving. The inspiratory pressure remained at 40 cm H<sub>2</sub>O. The ventilator, tidal volume, tubing system and filter were all checked. All the equipment appeared to be functioning properly.

While attempting to suction through the ETT, a blockage was found at the level of the carina. At this point, a routine chest x-ray was done. The patient was given salbutamol, although no wheezing was heard. There was no improvement. Chest movements were minimal, and there was hyperinflation on the right side. The ETT position was checked and visualized by direct laryngoscopy to confirm that it was passing through the vocal cords. The ETT cuff was deflated and re-inflated with 10 cc of air, but still there was no change in the inspiratory pressure. Finally, the

chest x-ray was available for review. The ETT was 2 cm above the carina and there was no hemothorax, but a right pneumothorax was identified. Bilateral chest tubes were inserted, and a gush of air was felt on the right side (see Fig. 1). The patient's ventilation improved, however his inspiratory pressure remained in the 40 cm H<sub>2</sub>O range.

At this point Anesthesia was consulted to check the position of the ETT. A new 8-mm tube was inserted, and the patient's ventilation vastly improved. The inspiratory pressure immediately decreased to 20 cm H<sub>2</sub>O.

What is the most likely cause of the elevated airway pressure?

- A. right mainstem intubation
- B. ETT obstruction
- C. severe bronchospasm
- D. endotracheal tube cuff herniation

For the Answer to this Challenge, see page 289.



Fig. 1. Portable chest x-ray showing bilateral chest tubes.

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