Percussion — a new way to diagnose a pneumothorax

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We describe a new clinical sign in a case series of three patients who developed pneumothoraces during mechanical ventilation in the intensive care unit. All three patients were in the supine position. Two patients had x-rays that were inconclusive before insertion of chest drains and the third had a pneumothorax diagnosed on clinical findings alone. On each occasion we were able to diagnose pneumothorax using sternal percussion and simultaneous auscultation. The method relies on percussion of the sternum while simultaneously auscultating the anterior (superior) chest on the side of the suspected pneumothorax. The stethoscope is then placed on the other side of the chest. The percussion sound on the affected side has an exaggerated, resonant and booming quality. The percussion note is exaggerated partly because a stethoscope is used and partly because, in the supine patient, air localizes upwards to the anterior thorax.

Patient No. 1
This male patient had adult respiratory distress syndrome and required mechanical ventilation in the intensive care unit for 26 days. On day 14, an x-ray of his chest showed an area of decreased opacification in the left upper zone. A pneumothorax was suspected and the described method used. A difference in percussion note between sides was heard and placement of a left apical chest drain released air under tension. Arterial oxygenation improved, ventilation requirements became less and a subsequent chest x-ray showed re-inflation of the left apical zone.

Patient No. 2
A young female with a spinal injury developed a severe chest infection and required mechanical ventilation of the lungs. A tracheostomy was performed and despite bronchoscopic guidance she suffered a tracheal tear leading to bilateral, consecutive tension pneumothoraces 18 h after procedure. Auscultative percussion was used to rapidly confirm both pneumothoraces consecutively and this method accurately identified the side of the lesion, as shown by the response to insertion of intercostal chest drains (Fig. 1).

Patient No. 3
This female patient underwent oesophagectomy for adenocarcinoma of the lower end of her oesophagus. After operation she remained pyrexial with an increased white cell count but no obvious site of infection. After discharge from the intensive care unit she became hypoxic and had a cardiac arrest which resulted in return to the intensive care unit and further mechanical ventilation and support. A chest x-ray showed an area of abnormal linear shadowing across the left lung border which suggested a left-sided pneumothorax. Percussion with auscultation was performed and a difference between the left- and right-sided sounds was noted. A left-sided chest drain was placed which confirmed a left-sided pneumothorax. Subsequent postmortem examination showed a bronchopleural fistula.

Discussion
A pneumothorax may be diagnosed clinically using several techniques, including observation, percussion and auscultation. With improved technology, changes in respiratory system compliance, lung volumes and ventilator pressures may support the suspicion of pneumothorax. X-ray investigations may be helpful, although several studies have shown that plain radiographs are unreliable. Despite looking for subtle changes such as diaphragmatic depression increased radiolucency of the deep sulcus sign (air curving around the posterior border of the heart), pneumothoraces may still be missed. Computed tomography is a superior investi-
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gation although probably not possible in most settings. Pneumothoraces therefore still prove difficult to diagnose. We found that this rapid and simple method was a good way to confirm the presence of a pneumothorax. Our three patients had definite findings when percussed while using the stethoscope when other methods of diagnosis were inconclusive, and a pneumothorax was confirmed in all three. We believe that this previously unpublished method is worthy of communication and will continue to use it.

References
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3 Horne NW. Spontaneous pneumothorax: diagnosis and management. BMJ 1966; 281–4

Fig 1 Chest radiograph of patient No. 2 showing bilateral pneumothoraces (diagnosed before radiography) and intercostal drains.