Utility of lung ultrasound

Editor—A 61-yr-old male patient was admitted to the intensive care unit (ICU) for postoperative monitoring after partial hepatectomy of segments I and VII and cholecystectomy. The patient had previously undergone right hemicolecction in 2010 and partial hepatectomy of segments IV and VIII for adenocarcinoma (pT3 N1b M1). The patient had adjuvant chemotherapy with capecitabine and oxaliplatinum. He had a history of chronic obstructive pulmonary disease and smoking (40 pack-years).

The patient was admitted to the ICU at 03:30 h after 12 h of surgery. He was analgosedated and artificially ventilated, with stable haemodynamics and a peripheral oxygen saturation of 100%. The fluid balance during surgery was −6160 ml. The first hours after surgery were uneventful. A postoperative chest X-ray (reported as ‘normal’) and standard laboratory tests were performed. Monitoring consisted of continuous invasive arterial pressure, fluid balance, and arterial blood-gas monitoring performed every 6 h.

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On postoperative day 1, at 14:30 h, the patient’s trachea was successfully extubated and a Venturi mask at $F_{I_O_2}$ of 0.5 applied. The patient remained stable haemodynamically, but $P_{O_2}$ showed a negative trend during the afternoon. At 21:45 h, the patient was dyspnoeic, agitated, and sweaty. The arterial $P_{O_2}$ was 7.3 kPa. On auscultation, there were decreased breathing sounds on the left side with rhonchi, but the right chest was normal. A chest X-ray was ordered and performed at 22 h.

A US of the lungs was immediately performed. It showed an area of consolidation involving the whole left lower lobe, with minimal pleural effusion, with an estimated volume of <100 ml, and no pneumothorax. Within the consolidation, hyperechoic punctiform areas could be seen and were interpreted as air bronchograms (Fig. 1).

A fiberoptic bronchoscopy under conscious sedation was performed at 22:30 h which showed a mucous plug completely occluding the left bronchus and causing atelectasis.

This plug was aspirated and bronchial washing was performed with normal saline. After the procedure, the patient showed full regression of symptoms, and chest auscultation showed bilateral and symmetric breathing sounds with no added sounds. A post-procedure US examination of the lungs was performed, showing remission of the consolidation area in the left lung and a normal lung pattern. Blood-gas samples acquired after bronchoscopy showed improved $P_{O_2}$ and peripheral oxygen saturation above 95%. The chest X-ray taken during the symptomatic period was reported as a left pleural effusion.

We present a case underlining the potential usefulness of performing US imaging of the lungs in a dyspnoeic patient with a rapidly worsening hypoxaemia and a unilateral reduction in breathing sounds. At the base of the left lung, we detected a ‘lung pulse’ which has a sensitivity of 93% and a specificity of 100% for the diagnosis of atelectasis. The X-ray report, which arrived 15 min after bronchoscopy, suggested a pattern compatible with minimal pleural effusion. The capacity of US to detect alveolar consolidation is high, with a sensitivity of 90% and a specificity of 98%, while chest radiography data are known to be imprecise.

We highlight the importance of US imaging of the lungs in the ICU.

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Ultrasound-guided nerve blocks in the Charcot–Marie–Tooth disease and Friedreich's ataxia

Editor—Peripheral nerve blocks (PNBs) are of concern in patients with underlying neurological disease. The response to electrical stimulation may be impaired, increasing the risk of nerve damage. The use of ultrasound has been described only in one case of neurofibromatosis. We describe here the use of ultrasound-guided PNBs in hypertrophic peripheral neuropathy (Charcot–Marie–Tooth disease type 1 (CMTD1)) and degenerative disease (Friedreich's ataxia (FRA)).

CMTDs include various genetic peripheral motor and sensory neuropathies. CMTD1 is characterized by an autosomal dominant inherited hypertrophic proliferation of Schwann cells (histological 'onion bulb'), leading to secondary demyelination. The patient was a 22-yr-old male (178 cm, 60 kg) with end-stage arthritis in the right ankle secondary to CMTD1. He had realignment surgery with multiple foot and ankle osteotomies under general anaesthesia. Despite intraoperative analgesics (paracetamol, ketoprofen, continuous i.v. ketamine) followed by morphine and ketamine titration in the recovery room, his pain remained severe. An ultrasound-guided sciatic block was proposed to the patient after a thorough explanation of the potential risks and benefits. The sciatic nerve was best seen at the mid-thigh. It appeared as a 21 × 9 mm hyperechoic structure, with some small rounded uncompressible hypoechoic areas, similar to those described in neurofibromatosis (Fig. 1). Using an in plane technique, ropivacaine 0.475% (20 ml) was injected around the nerve, without pain or nerve swelling. Pain relief occurred within 15 min and lasted 10 h. Thereafter, oral analgesics provided adequate analgesia. No neurological complications were observed at 6 month follow-up.

FRA is a recessive autosomal mutation of the frataxin gene, causing degenerative atrophy of the posterior columns of the spinal cord, pyramidal tract, dorsal root ganglia, peripheral nerve sensory fibres, and the cerebellar cortex in advanced cases. It is associated with scoliosis, hypertrophic cardiomyopathy, and diabetes. Walking generally becomes impossible within 15–20 yr. The patient was a 34-yr-old male (182 cm, 70 kg) undergoing bilateral tenotomies (Achille's tendon, toe flexor, flexor hallucis longus). There was no sensory loss in the lower limbs. General anaesthesia was considered too risky due to sleep apnoea syndrome, restrictive respiratory disease (dyspnoea after minimal effort), and severe problems with swallowing. Some cases of regional anaesthesia have been reported, but it was considered too difficult in this case due to marked kyphoscoliosis. Thus, surgery without tourniquet under bilateral popliteal blocks was proposed and accepted by the patient. Both sciatic nerves were well identified from the popliteal fossa to the midthigh, without any unusual features and no size reduction (at midthigh: 18 × 5 mm on the left and 21 × 6 mm on the right; Fig. 1). Mepivacaine 1.5% was injected around the peroneal (6 ml) and tibial nerves (13 ml), at the popliteal fossa, without pain or neurological swelling. Surgery started 35 min later, without any supplemental anaesthesia. The sciatic nerve blocks lasted ~240 min. No neurological impairment was observed at 1 month follow-up.

These cases suggest that the ultrasound dimensions of peripheral nerves with hypertrophic or degenerative nervous diseases are quite similar to normal nerves (13 ± 4.7 ± 3 mm in 40 healthy patients). Hypertrophic neuropathy may appear as small hypoechoic rounded uncompressible areas distributed in an otherwise normally shaped nervous structure. Even though no neurological complications occurred during or after these ultrasound-guided blocks, PNBs must still be reserved for patients for whom general anaesthesia presents major risks.

Fig 1 Transverse sonograms of sciatic nerves at the midthigh in a patient with a Charcot–Marie–Tooth disease (left image), and in a patient with Friedreich's ataxia (middle and right images). In each sonogram, the sciatic nerve is indicated by the white arrow.