up to 10 mg of i.v. midazolam for the above procedures, administered by non-anaesthetists. Yet, diazepam seems to be the drug of choice for treating seizures on the ward, when lorazepam is unavailable. Patients are at increased risk of a lowered consciousness/prolonged post-ictal phase after receiving bolus doses of i.v. diazepam 10 mg. Midazolam may be a better choice in these situations because of its shorter half-life when compared with diazepam, especially if advanced airway support can be avoided in the absence of other indications.

Declaration of interest

None declared.

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Reply from the authors

Editor—We thank Dr Patle for bringing our attention to the recent publication of results from the RAMPART study.1 We were unable to include these results in our review,2 as this trial was published after the review article was accepted for publication. The RAMPART study randomized 1023 patients with status epilepticus (SE) treated before arrival in emergency departments by emergency medical services to treatment with i.v. lorazepam and i.m. midazolam. Of these, 893 were included in the intention-to-treat analysis. The primary outcome measure, cessation of treatment without need for rescue therapy, was achieved in 329 of 448 subjects (73.4%) in the i.m. midazolam group and in 282 of 445 (63.4%) in the i.v. lorazepam group (absolute difference, 10%; 95% confidence interval, 4.0–16.1; P<0.001 for both non-inferiority and superiority). The two treatment groups had similar incidence of recurrence of seizures and need for tracheal intubation. The time to administration of medication was shorter with i.m. midazolam, and the time from administration to cessation of seizures was shorter with i.v. lorazepam. Adverse event rates were similar in the two groups.

We agree that the results of the RAMPART study should have a significant impact on the early management of seizures. As Dr Patle points out, lorazepam is not readily available in many UK hospitals, and i.v. diazepam is traditionally used as an alternative. The results of this study, while supporting the use of i.m. midazolam as a possible alternative, do not provide any information about the safety of this form of treatment compared with i.v. diazepam in the inpatient setting. However, a previous meta-analysis has suggested that midazolam by any route is superior to diazepam in terminating SE in children and young adults, with similar rates of respiratory suppression.3 We agree that i.m. midazolam should be considered as the first-line therapy for convulsive SE, especially in patients where i.v. access is difficult or delayed.

Declaration of interest

None declared.

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Continuous spinal anaesthesia and non-invasive ventilation for total knee replacement in a patient on home ventilation

Editor—We report the case of a complex patient requiring anaesthesia for total knee arthroplasty. The 66-yr-old male has a history of childhood poliomyelitis resulting in partial paralysis and significant kyphoscoliosis with subsequent restrictive lung disease. His lung disease left him breathless at rest, unable to lie flat, and he required non-invasive ventilation (NIV) overnight. The forced expiratory volume was 0.9 litre in 1 s and forced vital capacity was 1.1 litre. The patient had also undergone spinal fusion surgery in the past. In order to investigate the possibility of central neuraxial block, a computed tomography (CT) with three-dimensional reconstruction of the lumbar spine was performed. This revealed complete fusion of T12–L2 spinous processes and left aspects of vertebral bodies, but the anatomy at L3–4 was relatively preserved (Fig. 1).

After a case conference, we decided that the insertion of an intrathecal catheter under X-ray guidance would be the safest option. This could also be continued into the postoperative period, therefore avoiding the need for opioids. In order to lie flat for the operation, the patient would use NIV. Should the insertion of a spinal catheter be unsuccessful, the procedure would be abandoned. The risk of a general anaesthetic was deemed too high in view of the uncertainty of prolonged postoperative ventilation and ability in weaning. A level 2 bed was booked for postoperative care.

Correspondence
I.V. access was obtained and ECG, pulse oximetry, and continuous invasive arterial pressure monitoring were established. The patient was placed in the right lateral position and commenced on NIV. The insertion of the intrathecal catheter was technically difficult, and the epidural space was located with a 16 G Tuohy and the use of the image intensifier and contrast. A dural tap was achieved at 7 cm and an intrathecal catheter inserted to 11 cm. After incremental titration with 5 ml of levobupivacaine 0.25%, a block to T12 provided conditions suitable for surgery, which was completed without incident.

After operation, NIV was continued. An infusion of bupivacaine 0.1% was commenced intrathecally at 1–1.5 ml h⁻¹, providing excellent analgesia and was continued for the following 4 days. The infusion was titrated to block height of T10–11 which provided good analgesia with no respiratory problems or motor block. The catheter was removed on day 5, following which the patient’s analgesia requirement were met with paracetamol and nefopam. The patient was discharged home on day 11.

The heterogeneity of ventilator-dependent patients and small number of studies of perioperative care makes the prediction of risk difficult. Patients now focus on psychosocial factors, rather than survival, leading to the concept of prolonged survival and acceptable exposure to risk. In this patient cohort, preoperative assessment and risk stratification is complex. Symptoms such as dyspnoea and orthopnoea are often late findings and physical evaluation is essential to detect accessory muscle recruitment, supine abdominal paradox, and encumbrance of upper or lower airways.¹ A substantial loss of respiratory muscle strength is typically accompanied by little or no change in spirometry or arterial blood gases.² Lung function tests can reveal a characteristically low vital capacity, reduced total lung capacity, and preserved residual volume. Transfer factor is normal when adjusted for lung volume.

Evaluation of respiratory muscle strength is extremely useful, and has been shown to be sensitive and prognostic.³ Peak expiratory flow during cough gives an overall evaluation of cough efficiency, values below 160–270 litre min⁻¹ suggesting poor airway clearance. Evaluation of respiratory muscle strength is achieved by measuring maximal inspiratory pressure (PImax) and sniff nasal inspiratory pressure. A maximal expiratory pressure (PEmax) below 45 cm H₂O may indicate compromised cough efficiency.

There are few reports of the use of Bipap in the operating theatre.⁴–⁷ Our case highlights that using intraoperative NIV can be useful, and avoid the need for general anaesthesia and invasive ventilation.

**Declaration of interest**
None declared.

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**Ultrasound description of a superior laryngeal nerve space as an anatomical basis for echoguided regional anaesthesia**

Editor—The superior laryngeal nerve (SLN) bifurcates near the pharynx into the external and internal sensory (SLNinternal) branches.¹ ² The bilateral SLNinternal block can be used to obtain airway anaesthesia, using a percutaneous

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**Fig 1** CT reconstruction of the lumbar spine, demonstrating relatively preserved anatomy at L3/L4.