Editor—Priesman and colleagues have published an interesting study showing that the Respiratory Systolic Variation Test (RSVT) is an accurate way of predicting fluid responsiveness. They state that it demands a complex respiratory manoeuvre and off-line measurements and calculations. We note that they use three airway pressures and use linear regression to calculate the slope of a line of best fit. Using linear regression with three points, the middle value has no effect on the slope of the line of best fit. The same accuracy can therefore be obtained using two ventilator pressures, at 10 and 30 cm H₂O. This then makes the respiratory manoeuvre much simpler and a screen capture can be used to measure the two lowest systolic pressures whilst switching from 10 to 30 cm H₂O breaths. The slope is then given by the equation (lowest systolic pressure at 10 cm H₂O)−(lowest systolic pressure at 30 cm H₂O)/20. Using their calculated cut-off value of −0.52 cm/H₂O gives an even easier calculation: if the lowest systolic pressure falls by greater than 10.2 mm Hg when switching from 10 to 30 cm H₂O breaths then fluid responsiveness is implied. This simple modification makes the RSVT a simple bedside test using a standard ventilator and a standard monitor which allows screen capture.

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Editor—We thank Drs Brown and Chappell for their interest in our study. They correctly state that the slope of the line of best fit for the RSVT would not be affected by the addition of a middle value and that the same accuracy may be achieved by a manoeuvre composed of two consecutive breaths. We used three consecutive incremental airway pressures in our study to avoid any erroneous blood pressure measurement resulting from occasional extrasystoles, spontaneous respiratory effort, etc. If the manoeuvre had been of only two breaths, it would have been difficult to identify such abnormalities and discard them from measurement. We did not encounter such a situation in our clinical studies but it did occur in our preliminary animal experiments.

Thus, in our opinion, it is worthwhile to use three breaths with incremental pressures during the RSVT manoeuvre to identify and reject artifacts.

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Anaesthetic management in patients with high-risk Brugada syndrome

Editor—We read with interest the case report from Dr Edge and colleagues, and would like to report the successful management of two cases with Brugada syndrome and focus on risk evaluation of proarrhythmia, postural change and neostigmine administration. During anaesthesia of Brugada syndrome, many factors may precipitate a significant risk of malignant arrhythmias and cardiac arrest.

Both patients were asymptomatic with no medical history of cardiac disease or family history of sudden death. Preoperative echocardiography was normal, and the ECG over the third intercostal space and the ECG following pilsicainide administration revealed obvious augmentation of ST segment elevation in leads V₁–V₄, without QT prolongation. Electrophysiological studies, without prior medication, induced ventricular fibrillation (VF) and systolic pressure <40 mm Hg, and defibrillation restored sinus rhythm. These findings led to a definite diagnosis as high-risk Brugada syndrome.

Before induction of general anaesthesia, the 12-lead ECG was continuously monitored, along with routine monitoring and cardioverter-defibrillator pads. An automated external defibrillator and an i.v. drip infusion of the β-stimulator isoproterenol were prepared, in case ventricular dysrhythmias developed. No pre-anaesthetic medication was
required. General anaesthesia was induced with thiopental 4 mg kg\(^{-1}\), and tracheal intubation was facilitated by vecuronium 0.1 mg kg\(^{-1}\). Anaesthesia was maintained with isoflurane and nitrous oxide 66% in oxygen.

Case 1. A 51-yr-old man with a left-sided coral-shaped calculus underwent percutaneous nephrolithotripsy twice. During the operations, three types of postural change were required—from supine to lithotomy, lithotomy to prone and prone to supine position.

Case 2. A 56-yr-old man with a mandibular fracture underwent plate fixation and plate removal procedure after 1 yr. Nasotracheal intubation was required because of previous oral surgery.

At the end of the operation, atropine 0.02 mg kg\(^{-1}\) and neostigmine 0.02 mg kg\(^{-1}\) (half of the normal neostigmine dose), were given slowly to antagonize the neuromuscular block, and the trachea extubated. In both cases, anaesthetic management was uneventful, and no abnormality was detected on the ECGs. During the 24 h postoperative period in the intensive care unit, the patients recovered successfully without any worsening of ST segment elevation on the 12-lead ECG.

Careful preoperative evaluation and anaesthetic management is essential to avoid inducing arrhythmia. The high-risk criteria for patients with Brugada syndrome requiring general anaesthesia are:\(^{3,4}\) (i) symptomatic cases with syncope or a medical history of VF; (ii) asymptomatic cases showing pathognomonic ST segment elevation on ECG and medication- or EPS-induced VF; and (iii) cases showing coved-type ST elevation on ECGs.

The mechanism of ST-segment elevation with Brugada syndrome is associated with an imbalance in action potential gradients between the right ventricular endocardial and epicardial cells.\(^{2}\) Many factors during anaesthesia, in particular the autonomic nervous system, influence this imbalance.\(^{1,3-5}\) Postural change can be regarded as a factor and depth of anaesthesia should be sufficiently controlled before postural change, in order not to disturb autonomic nerve balance.

Neostigmine may augment ST segment elevation in a dose-dependent manner without inducing coronary spasm,\(^{1,3-5}\) while atropine may reduce elevation.\(^{13}\) Therefore, it may be wise to avoid neostigmine. However, in our cases, neostigmine doses were carefully divided and did not cause any abnormalities. There have been several reports of successful neostigmine administration without problems.\(^{1,5}\) We feel, neostigmine can be administered safely by careful dose adjustment and by atropine administration before neostigmine.

Most anaesthetics have inhibitory effects on circulation. However, specific differences and safety of the depressant action in each drug at clinical concentrations remain unknown. Further studies are required to clarify the safest anaesthetic management.

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**Diffuse pulmonary embolism with bone fragments during spinal surgery**

Editor—We would like to report a case of diffuse pulmonary embolism (PE) with bone fragments during spinal surgery. The patient was a 69-yr-old man (height, 174 cm; weight, 75 kg), with ossification of the posterior longitudinal ligament (OPLL) of the thoracic area and he has a history of essential hypertension. Extensive surgery involving resection of the OPLL from T3–T9 was planned. During general anaesthesia his arterial pressure was maintained at 130–140/60–70 mm Hg. In addition to standard monitors, a radial artery catheter was placed percutaneously but a central venous catheter was not inserted. The patient was placed in the prone position onto a Hall’s frame and surgery was performed. After laminectomy, the resection of OPLL was initiated by posterior approach using surgical drill. Controlled hypotension by continuous injection of nitroglycerine at 0.5 μg kg\(^{-1}\) min\(^{-1}\) was performed at a range of 80–90/40–45 mm Hg. The blood gas analysis during the operation revealed progressive oxygen desaturation and carbon dioxide retention (Table 1). Five hours after the start of resection of OPLL, the patient’s arterial pressure suddenly decreased from 88/45 to 55/30 mm Hg and the ECG showed sinus rhythm at a rate of 70 beats min\(^{-1}\). Severe hypotension (systolic arterial pressure <35 mm Hg) and bradycardia (30–40 beats min\(^{-1}\) ) was observed despite the administration of epinephrine and the end-tidal carbon dioxide partial pressure was noted to decrease to 14 mm Hg. The surgical procedure was discontinued and the patient was turned to supine position to carry out a cardiac massage. Despite a cardiac massage the ECG revealed a standstill in electrical activity. Two hours and forty minutes later, resuscitation was discontinued.