# Anaesthesia for a patient with severe cardiorespiratory disease

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A 76-year-old, 45 kg female, with severe aortic stenosis, angina, paroxysmal atrial fibrillation (AF), osteoporosis and asthma presented for a left dynamic hip screw for a fractured neck of femur. She was short of breath at rest with audible wheeze. She had 3 pillow orthopnoea and a hiatus hernia. She was taking frusemide 80 mg daily, amiodarone 200 mg daily, isosorbide mononitrate 25 mg daily, salbutamol and steroid inhalers, and gaviscon. She had an $O_2$ saturation of 88% on air, biventricular cardiac failure, an ejection systolic heart murmur loudest in the aortic area radiating to the carotids, widespread expiratory wheeze and severe kyphosis.

Full blood count was normal and urea and electrolytes showed moderate renal impairment. Her chest X-ray showed cardiomegaly and electrocardiogram showed AF with left ventricular hypertrophy. An echocardiogram showed an ejection fraction of 40%, aortic stenosis with a gradient of 60 mmHg across the aortic valve and aortic regurgitation. Her peak expiratory flow was 85 litres/min (28% of predicted) and her $FEV_1$ was 600 ml (40% of predicted).

We were presented with the dilemma of providing anaesthesia for a patient with severe asthma and cardiac disease including fixed outflow obstruction. The following options were considered:

1. Classify her as unsuitable for surgery and manage the fracture conservatively
2. General anaesthesia
3. Sedation and a 3-in-1 nerve block
4. Epidural anaesthesia
5. Spinal anaesthesia.

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The first option was rejected after discussion with the patient, as she declined conservative management. We decided to avoid option 2. A laryngeal mask airway was not appropriate because of the risk of aspiration due to her hiatus hernia. Spontaneous ventilation via an endotracheal tube (ETT) was likely to be inadequate because of her severe airways disease, and controlled ventilation via ETT could have been difficult because of high airway pressures and problems with weaning and extubation.

A 3-in-1 nerve block was considered but rejected because we were uncertain about its reliability. Option 4 was considered as a slow onset block would allow any fall in systemic vascular resistance to be corrected with fluids and vasoconstricting agents, but we rejected this in favour of option 5. The onset, spread and density of epidural block is less predictable than spinal anaesthesia and clinical assessment of the patients' lumbar spine indicated that insertion of an epidural catheter would be difficult.

Ketamine was used as it offers cardiovascular stability (Hemmingsen and Nielsen, 1991), analgesia, sedation, bronchodilation (Corssen et al, 1972), and airway protection.

$O_2$ was delivered at 4 litres/min via a Hudson face mask, giving an $O_2$ saturation of 100%. Intravenous access was established and a radial arterial cannula inserted for continuous blood pressure monitoring. Ketamine in three 10 mg increments at 2-minute intervals and midazolam 0.25 mg were injected. The patient was turned into the left lateral position (i.e. fractured side down). Hyperbaric bupivacaine 0.5% 2 ml was injected into the subarachnoid space via a 22G Quinke spinal needle using a paramedian approach. The patient was kept in the left lateral position for 5 minutes before being placed supine for surgery. Her blood pressure was 160/70 initially, 180/70 after ketamine and 160/70 after spinal bupivacaine. N-saline 500 ml was infused intravenously and vasoconstrictors were not needed. Surgery took 35 minutes and was uneventful. The patient remained sedated but easily rousable throughout. Postoperatively she was awake and orientated with minimal confusion. She progressed well after surgery with no complications.

Spinal anaesthesia is commonly used for fractured neck of femur surgery in elderly patients with respiratory disease (Sutcliffe and Parker, 1994). Regional anaesthesia is avoided in patients with aortic stenosis because the fall in systemic vascular resistance reduces cardiac output and coronary perfusion (Collard et al, 1995). Ketamine helped maintain haemodynamic stability as well as having other advantages, and its dysphoric effects were minimized by use of midazolam. Sympathetic blockade was lessened by a small dose of heavy bupivacaine and maintaining the patient in the left lateral position to achieve a unilateral block. HM

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