Anaesthetic Guidelines for Rural Hospitals

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This series is also being produced as a booklet for the use of doctors in rural hospitals and will be obtainable from SA Family Practice in 1997.

SOME COMMON COMPLICATIONS DURING ANAESTHESIA

NO. 9

The series will have the following sections:

1. Introduction to anaesthetics and anaesthetic safety checklist
2. Anaesthesia, intubation and extubation
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INTRODUCTION

Despite careful preparation, complications during anaesthesia occur fairly commonly. It is therefore important that you are capable of responding to a problem quickly and effectively. Below is a list of some of the complications that occur in anaesthesia, and how they can be prevented or managed.

This is not an exhaustive list, and guidelines on the management of cardiac arrhythmias, air emboli, hypothermia and malignant hyperpyrexia should be obtained from a standard textbook. A future chapter will deal specifically with the complications of blood transfusion and cardiac arrest.

Respiratory obstruction

Respiratory obstruction can lead to hypoxia, hypercapnia, coughing, awakening of the patient, and regurgitation. The signs of obstruction are snoring, a paradoxical chest movement (a see-saw motion between the chest and abdomen), stridor and little movement of the reservoir/inflation bag.

Often the obstruction is caused by the tongue falling back and blocking the larynx (especially in overweight and short-necked patients). The remedy for this is to lift the angle of the mandible forward and up, or to insert a Guedel's airway.

Even with an endotracheal tube, obstruction may occur if the tube becomes kinked, if it becomes blocked by blood and secretions, or if the end is blocked off by the wall of the trachea or bronchus. Blockage of the tube will also be accompanied by excessive inflation pressures being required to inflate the patient's lung.

To prevent the tube from being kinked it is advisable to cut it to the correct length so that there is less chance of it bending over itself. Many endotracheal tubes are designed to be long enough for both nasal and oral intubation, so for oral intubation, you need to cut several centimetres off the tube (look for the mark on the tube).

Blockage with secretions and blood can usually be remedied by inserting a suction catheter down the tube, and if obstruction is caused by blockage at the end of the tube by the wall of the trachea, gently pull the tube back by about a centimetre to relieve this.

Bronchial intubation

If the endotracheal tube is pushed too far down the trachea, it will enter the right bronchus (especially in children). The left lung will then be unventilated, and will eventually collapse. This will cause hypoxia and increase the risk of post-operative infection. Therefore, when you intubate, insert the tube up to the point where the top of the cuff/balloon lies just beyond the vocal cords.

Laryngeal spasm

This complication has been discussed previously under the section on extubation. However, be aware that laryngeal spasm can also occur at induction or intra-operatively. The following are situations that predispose to laryngeal spasm:

- the premature insertion of the laryngoscope without paralysis;
- the presence of secretions and vomit in the larynx;
- surgical and laryngeal stimulation in a lightly anaesthetised patient; and

- cervical dilatation and anal stretching, especially in a lightly anaesthetised patient.

Usually, laryngeal spasm is self-limiting, and requires time and 100% oxygen before it resolves. However, on rare occasions you will need to abolish the spasm by paralysing the patient with suxamethonium, and then intubating him/her.

Bronchospasm

The development of bronchospasm during anaesthesia may be the consequence of a patient's poorly controlled asthma. Asthmatic patients should never be anaesthetised unless they have had their respiratory function optimised to the maximum pre-operatively.

Bronchospasm may also be triggered in both asthmatic *and* non-asthmatic patients by irritation of the larynx and airways with secretions, by laryngoscopy, and by the endotracheal tube itself (especially if the carina is irritated). Other triggers of bronchospasm include surgical stimulation in a lightly anaesthetised patient, drug-induced anaphylactic reactions, and gastric aspiration. If a patient suddenly develops the signs of bronchospasm during anaesthesia, remember that a pneumothorax can cause this, and must be excluded.

The severity of bronchospasm can vary from a mild wheeze to severe obstruction with stiff lungs, hypoxaemia and death. In moderate to severe cases, the patient should be intubated, paralysed and ventilated. Use high concentrations of halothane (a potent bronchodilator) combined with 100% oxygen. Ketamine is also a good bronchodilator which can be used. You can then continue to treat the patient using standard asthmatic drugs, such as intravenous salbutamol or aminophylline, steroids and adrenaline, according to the need.

Gastric aspiration

Severe gastric aspiration can be fatal, and all precautions should be routinely taken to prevent it from happening (see earlier chapters). If it does occur, the two main factors that determine its severity are the PH of the gastric contents, and the volume of the material aspirated. If a patient vomits during an anaesthetic without the airway being protected, you must react quickly and do the following:

First of all turn the patient over to his/her side (you may have to disrupt whatever surgery is going on), place the patient head down and suck out as much of the vomit as you can. Turn the oxygen to 100%, ventilate gently, and treat any bronchospasm as above.

Next, intubate the patient, and once this has been done, place a urinary catheter to the end of the suction apparatus and gently pass this down the tube to try and suck out remaining gastric contents. Immediately start the patient on Flagyl and ampicillin, and continue with standard asthma therapy for bronchospasm. In severe cases, the patient may need to remain ventilated in an intensive care unit until the following day.

Pneumothorax

This may occur during any anaesthesia, but especially if there is mechanical ventilation, and if the patient has suffered a chest injury, or is undergoing thoracic or cervical surgery. Patients with chest injuries may already have a small undetected pneumothorax present which would become severe during anaesthesia. These patients require the insertion of an intercostal drain *before* anaesthesia and surgery. Therefore, some patients may need a pre-operative X-ray to exclude the presence of a pneumothorax.

The typical signs of a pneumothorax are tachycardia, hypotension, bronchospasm, cyanosis, hypoxaemia and surgical emphysema. If the patient is being ventilated, the risk of a tension pneumothorax is high and you will have to act quickly.

First of all, if you think there is a tension pneumothorax, stick a needle (16G) into the second intercostal space along the mid-clavicular line, turn off the N_2O (which will worsen the pneumothorax) and give 100% oxygen. You may want to turn off the ventilator and bag the patient manually to give yourself more control while the patient settles down, and preparations are made to insert an intercostal drain.

Hypotension

Hypotension is a frequent complication of anaesthesia, and is usually due to multiple causes. The prevention of hypotension is through careful patient preparation, and safe anaesthetic practice.

The management of hypotension is related to the cause(s) of it. Hypovolaemia may suddenly manifest itself with crashing hypotension after the administration of anaes-

What to do when oxygen saturation drops

- Exclude airway obstruction (see above).
- Look at the patient's chest and make sure it is moving air in and out.
- Check that everything is connected up from machine to patient, and that there are no leaks in the breathing system.
- Check that there is oxygen available and being delivered to the patient.
- Listen to the chest on both sides, and exclude bronchial intubation, bronchospasm, blockage of the tube, aspiration or pneumothorax.

Never ignore a falling oxygen saturation – it should always be above 95%.

thesia. It is often due to poor pre-operative fluid management and an underestimation of fluid loss, such as with haemorrhage in fit patients, abdominal obstruction and concealed intra-abdominal haemorrhage.

Remember that the elderly, the hypertensive and the sick are especially prone to the hypotensive effects of many anaesthetic agents. Techniques for increasing the filling pressure on the right side of the heart are to infuse fluids intravenously, tilting the patient's head down, and lifting up the legs of the patient. Other less obvious causes of hypotension include pneumothorax, bradycardia, aorto-caval compression, pulmonary embolism and cardiac arrhythmias, all of which require specific intervention.

Hypertension

Hypertension is best prevented by avoiding light anaesthesia, and by ensuring that normally hypertensive patients are well controlled before surgery. Both Ketamine and laryngoscopy are also potent causes of hypertension.

An important complication that can manifest itself as hypertension is the 'paralysed but awake' patient. This is a patient who is fully paralysed but who is not fully anaesthetised and asleep. It may occur when a patient is paralysed and ventilated, and you do not realise that the vaporiser is empty of halothane. The patient will eventually become awake during the operation despite being paralysed – a terrifying experience!

Eventually, the patient will be able to respond through a massive surge of adrenaline which manifests as hypertension, tachycardia, dilated pupils and sweating. Although quickly administering a barbiturate like midazolam may help to cause some retrospective amnesia, the mainstay of management is to quickly turn up the halothane to 5% until the patient is anaesthetised, and to provide honest post-operative counselling afterwards.