CRICOID PRESSURE

AUTHOR Phil Jevon, PGCE, BSc, RN, is resuscitation officer/clinical skills lead, Manor Hospital, Walsall.

Applying cricoid pressure helps to prevent the passive regurgitation and aspiration of gastric contents during bag-mask ventilation and attempted tracheal intubation (Nolan et al, 2005). Cricoid pressure is also routinely used in other situations, for example during emergency induction of general anaesthesia and before anaesthesia for Caesarean section.

ANATOMY

The cricoid cartilage, the first tracheal cartilage from which it is separated by the cricothyroid membrane, is the only complete ring of cartilage in the respiratory system (Koziol et al, 2000).

The other tracheal cartilages are c-shaped (incomplete rings of cartilage), which are liable to collapse if excess pressure is applied to them (Feinstein and Owens, 1992).

INCREASED RISK OF REGURGITATION AND PULMONARY ASPIRATION

During resuscitation, gastric inflation, together with an incompetent oesophageal sphincter, increase the risk of regurgitation and pulmonary aspiration (Nolan et al, 2005).

The risk of regurgitation is higher during pregnancy, in obese patients and in patients with a ‘full stomach’.

There is even a risk for those patients who have been fasted before surgery if it is delayed gastric emptying, for example bowel obstruction, opiate administration and trauma (Koziol et al, 2000).

Impaired laryngeal function leading to diminished laryngeal sensation and protective airway reflexes will increase the risk of pulmonary aspiration.

INDICATIONS

There are several situations when it may be necessary to apply cricoid pressure and these include:
- During cardiopulmonary resuscitation (CPR) until the airway is secured by a cuffed tracheal tube;
- Immediately prior to induction of general anaesthesia in the non-fasted patient;
- Delayed gastric emptying;
- Incompetent lower oesophageal sphincter, for example in late pregnancy;
- Difficult intubation – can help with the visualisation of the vocal cords.

CALCULATING THE APPROPRIATE CRICOID PRESSURE

According to Mehrotra and Paust (1979), the appropriate amount of pressure to be applied to the cricoid is that which would cause the patient pain if it were to be applied to the bridge of the nose.

Cheek and Gutsche (1993) suggest that an inability to swallow equates to appropriate cricoid pressure.

A more scientific approach is that cricoid pressure generates a force that can be expressed in newtons (N) (Koziol et al, 2000) and 9.81N equates to the force of gravity on a mass of 1kg (Parbrook et al, 1990).

For convenience 10N approximately equates to 1kg (Vanner and Asai, 1999).
Therefore, 30N (3kg) of force needs to be applied to the cricoid in order to achieve oesophageal occlusion (Vanner and Pryle, 1992) (less when applied prior to induction).

**MODE OF ACTION**

When applied with the correct pressure, cricoid pressure compresses the proximal oesophageal lumen situated between the cricoid cartilage and the cervical vertebrae (Fig 1).

This occludes the lumen of the oesophagus, helping to prevent regurgitation and aspiration of gastric contents. This will also minimise gastric inflation, often associated with bag-mask ventilation during CPR.

**PROCEDURE**

1. Place a pillow under the patient’s head and shoulders;
2. Locate the cricoid cartilage – the first complete ring of cartilage below the thyroid cartilage (Adam’s apple) (Fig 2);
3. Using the dominant hand, place the index finger and thumb on either side of the cricoid cartilage (Fig 3);
4. Apply cricoid pressure. Following pre-oxygenation, but prior to intravenous induction, apply a force of 10N (1kg) and following loss of consciousness increase the force to 30N (3kg) (this force should also be applied during CPR) (Fig 4);
5. Apply counter pressure to the back of the patient’s neck if there is a suspected cervical spine injury (Fig 5). This will reduce movement of the cervical spine.
6. Release cricoid pressure once a cuffed tracheal tube protects the airway, if the patient actively vomits or on the anaesthetist’s request.
7. If lung inflation is not possible, either reduce the pressure that is being applied or release the pressure completely (Nolan et al, 2005).

**COMPLICATIONS**

Complications of cricoid pressure include the following:

1. Retching and death from aspiration and ruptured oesophagus if excess force is applied in an awake patient;
2. Difficult tracheal intubation;
3. Difficult ventilation;
4. Aggravation of an existing cervical spine injury.

**REFERENCES**


