

ANAESTHESIA FOR CORRECTION OF STRABISMUS

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Strabismus, often known as crossed eyes or squint, is a visual condition where gaze is misaligned. It is fairly common in children and affects roughly 2% - 5% of the population.

Strabismus can affect either one or both eyes, with an eye turning in, out, up or down. Although it is never too late to try correction, the earlier this is done the better. The best results are usually obtained in children less than six years old, and especially before the age of two.

Surgery is only one of the ways of treating strabismus; other methods include wearing spectacles and wearing eye patches. Strabismus surgery is extra-ocular surgery which involves repositioning of whichever ocular muscles are misaligned. This may be either unilateral or bilateral.

Anaesthesia

Correction of strabismus is the most commonly performed paediatric ophthalmic operation. Strabismus surgery is normally carried out under general anaesthetic (always so in children), although a local anaesthetic technique may occasionally be used in adults.

There are several ways of administering a general anaesthetic in strabismus surgery. Commonly a technique involving endotracheal intubation with the use of a neuromuscular blocking agent is used, although Laryngeal Mask Airways (LMA's) are also popular.

During surgery it is very important that the eye should be immobile, as the surgeon needs an absence of muscle tone to perform the forced duction test (FDT). This involves assessing mechanical restriction to movement of the eye by moving it into each field of gaze, done by grasping the sclera near the corneal limbus with a pair of forceps. This test allows the surgeon to differentiate between a paretic muscle and a mechanical restriction limiting eye movement.

Because muscle tone may vary with changing depths of anaesthesia, some surgeons may prefer neuromuscular blockade.

Preoperatively

Children may be premedicated with paracetamol, 20mg per kg, and it is wise to obtain consent for rectal NSAID suppositories. With older patients undergoing a general anaesthetic, routine investigations should be performed. A premedication of Glycopyrrolate (200mcg in adults, 5mcg per kg in children) will reduce the amount of saliva, especially useful if you are using an LMA. It also decreases the occurrence of the oculo-cardiac reflex (see below).

Induction

This will depend on whether the patient is to be paralyzed or allowed to breathe spontaneously on a laryngeal mask.

Intravenous induction performed with fentanyl or alfentanil combined with propofol or thiopentone is common. A gas induction with either halothane or sevoflurane may also be used, especially in younger children.

The choice of whether to use an LMA or to intubate the patient will depend on several factors. Given that LMA's have a greater potential for problems in small children, some anaesthetists prefer to use an endotracheal tube here. Generally speaking when an LMA is used the patient will be allowed to breathe spontaneously, although they may be used to ventilate patients. When this is the case, high airway pressures (more than 15cm water) should be avoided to minimise gastric insufflation. Armoured LMA's are often more satisfactory than conventional ones. Normal contra-indications to the use of LMA's such as uncontrolled reflux obviously apply.

It is also worth remembering that access to the airway is difficult during strabismus surgery, so be sure of your airway before the patient is draped.

If the patient is to be intubated (usually a RAE tube is used), non-depolarising agents are normally preferred to suxamethonium. This is for two reasons; Firstly, patients who have been given suxamethonium have a prolonged increase in the extra-ocular muscle tone, which interferes with the FDT. (This effect lasts roughly 15-20 minutes) Secondly, patients undergoing correction of strabismus may be at increased risk of developing malignant hyperthermia.

Maintenance of anaesthesia

Correction of strabismus typically lasts 60 to 90 minutes, with the patient lying supine. Anaesthesia may be maintained either with volatile agents (with or without nitrous oxide) or a propofol infusion. Since this type of surgery is not particularly painful, the combination of paracetamol/NSAID with fentanyl or alfentanil is usually adequate. Supplemental local anaesthesia may also be used.

With all ocular surgery comes the risk of the oculo-cardiac reflex (OCR). This is particularly common in children and adolescents undergoing correction of strabismus. The OCR is characterised by a marked slowing of the heart rate or the occurrence of dysrhythmias in response to traction on the extra-ocular muscles or pressure on the globe. It may even result in cardiac arrest in extreme circumstances. This reflex is mediated by the trigeminal-vagal reflex arc. It tends to be more marked with sudden and sustained traction compared to slow, gentle, progressive traction. Fatigue of the OCR usually occurs with subsequent stimulation.

Because of the importance of the oculo-cardiac reflex, much attention obviously needs to be paid to its prevention and treatment. Although a dose of glycopyrrolate given at the time of induction (200mcg in adults, 5mcg per kg in children) does offer

a degree of protection from the OCR, it does not completely prevent it in every patient. Generally, however, premedication with glycopyrrolate will abolish the need for any further anticholinergic agents to be given (e.g. atropine). If the patient does experience a significant OCR with bradycardia or dysrhythmias, atropine is the drug of choice for acute intervention. In such a situation the surgeon must be informed, as relaxation of any applied traction will help return the heart rate to normal levels.

The side effects associated with anticholinergic agents, such as a dry mouth and tachycardia, also need to be taken into account.

Simple manoeuvres such as using supplementary local anaesthetic and avoiding hypercapnia also decrease the incidence of the OCR.

Postoperative

As mentioned earlier, these procedures are not particularly painful and opioids may be avoided to decrease postoperative nausea and vomiting (PONV). This is particularly common with surgery to correct strabismus, and consideration should be given to including a prophylactic anti-emetic agent.
