

ANESTHETIC CONSIDERATIONS IN STRABISMUS SURGERY

INTRODUCTION

Strabismus is the most common pediatric ophthalmic surgical procedure performed at Hasbro Children's Hospital, with an overall incidence of approximately 4%. Although it may occur as part of a constellation of findings associated with a syndrome or neuromuscular problems, such as cerebral palsy or myelomeningocele, *most* children with esotropia are otherwise healthy.

SURGICAL CONSIDERATIONS

Strabismus surgery is performed on patients with ocular malalignment, and involves lengthening or shortening individual muscles or pairs of muscles to achieve cosmetically straightened eyes and binocular vision. Muscles may either be recessed (sewing further back on the globe) or resected (remove a segment of the muscle) which increases tension.

The surgery is performed in the supine position, with head at 90°. Surgical time will depend on the number of muscles to be adjusted, but varies between 30 and 90 minutes. Blood loss is minimal. Complications include continued malalignment (30%) and infection (<1%). Post-operative pain is mild-moderate.

ANESTHETIC CONSIDERATIONS

Preoperative

Although most esotropia is idiopathic, certain patients may have an associated syndrome and/or a history of neurological problems or prematurity. Routine anesthetic preoperative evaluation is performed, including the use of systemically acting ophthalmic medications, such as echothiophate iodide (plasma cholinesterase inhibitor). If a syndrome is present, careful airway evaluation and review of old records for difficult airway management is indicated. If chronic reactive airway disease is identified, ensure that patients are in optimal condition, as this surgery is entirely elective (see chapter 9). A good family history is crucial to identify possible malignant hyperthermia susceptibility. No specific lab testing is indicated, unless suggested by underlying medical issues.

The use of preoperative medication is as for any ambulatory surgical patient. Many of these children are presenting for a re-do operation, and anxiety levels may be higher, especially if the previous experience was less than optimal. I do not generally premedicate with an anticholinergic (see below).

Intraoperative

Unlike many adult eye surgeries, pediatric strabismus surgery is always performed under general anesthesia. Induction is as for any pediatric patient -

that is, usually by the inhalation technique. A 22 or 20 ga IV is inserted, and airway secured by either an endotracheal tube (younger patients) or laryngeal mask airway (older patients). A flexible LMA works nicely, but either a flexible or standard LMA is certainly acceptable. For endotracheal intubation, an oral RAE or standard oral ett may be used. Intubation may be facilitated with a non-depolarizing muscle relaxant of appropriate duration.

Special Considerations

(I) Oculocardiac reflex

The oculocardiac reflex has trigeminal afferent and vagal efferent pathways. It is triggered by pressure on the globe or traction of the extraocular muscles, especially the medial rectus. It is commonly manifested by sinus bradycardia; however, any dysrhythmia, including junctional rhythm, multifocal PVC's, AV block, V tach and sinus arrest, may occur. The reflex fatigues rapidly, and initial response to stimulation is usually the most severe. The necessity (and efficacy) of routine pre-treatment with vagolytics is controversial, and generally not our practice. Some authors will recommend IV atropine (0.02 mg/kg) or glycopyrrolate (0.01 mg/kg) IV after induction. In any event, using a vagolytic drug *during* a dysrhythmia is not recommended, as it may precipitate a more dangerous rhythm. Treatment generally consists of temporary cessation of traction and ensuring adequate depth of anesthesia. Other helpful maneuvers include the avoidance of hypercarbia (this reduces the threshold) and possibly the local infiltration of lidocaine. A recent study by Allison supports the advantage of sevoflurane maintenance vs halothane in children 1-7 years of age breathing spontaneously through an LMA. Incidence of oculocardiic reflex was significantly reduced with sevoflurane (38% vs 79%) and minute ventilation and end-tidal carbon dioxide was better maintained with sevoflurane, as well (*Anesth Analg* 2000;90:306). The role of intravenous induction was investigated by Ki-Young Lee and his findings presented at the 2005 ASA meeting. 120 children were randomized to either propofol 3 mg/kg, ketamine 1 mg/kg or ketamine 2 mg/kg. The incidence of OCR was 35%, 10% and 2.5% in the 3 groups respectively, with no difference in PACU stay or incidence of PONV.

(II) Oculogastric reflex

Nausea and vomiting after strabismus surgery is common (34-88%), and mandates routine anti-emetic therapy. Treatment modalities include metoclopramide (0.25 mg/kg - 10 mg max), droperidol (0.075 mg/kg - 0.625 mg max) and ondansetron (0.1 mg/kg). Of note, in this time of cost-containment, we recently reviewed an abstract which found promethazine (0.5 mg/kg) as effective as droperidol or ondansetron (Birch et al. *Anesth Analg* S394, 1998). Other intraoperative approaches to ameliorate postoperative nausea might include opioid sparing (generally through the use of ketorolac), gastric suctioning, substitution of propofol anesthesia for inhalational agents, and avoidance of nitrous oxide. Unfortunately, none of these modalities is fool-proof, and

postoperative nausea is still a major problem after strabismus surgery, especially associated with motion sickness. From my own point of view, I avoid opioids (other than children < 3 years of age where complete opioid sparing generally results in emergence excitement), use ketorolac, administer standard dose metoclopramide as well as a combination of high-dose steroid (e.g. dexamethasone) with low dose ondansetron (0.05 mg/kg).

(III) Pain Control

As noted above, opioids may increase nausea and vomiting (Mendel et al. *Anesth Analg* 80:1129, 1995), and are generally not needed for adequate pain control in strabismus patients. Ketorolac (0.5 mg/kg) is generally administered intra-op and postoperative patients receive acetaminophen. Small doses of an opioid such as fentanyl, however, may be useful in preventing emergence agitation in small children.

(IV) Malignant Hyperthermia

Individuals at risk for MH have a higher incidence of ptosis or strabismus. This does *not* mean that patients with esotropia are all MH susceptible; however, unexplained tachycardia, rising ETCO₂, masseter spasm, muscle rigidity or rising temperature (late sign) must be evaluated promptly and appropriately (see Chapter 11-1).

Postoperative

As noted, postoperative nausea and vomiting is the major cause of delayed discharge or (rarely) admission. Along with pharmacological intervention, gentle movement and conservative reinstatement of oral fluids is the best approach. Rescue antiemetics may be indicated in PACU. Late onset malignant hyperthermia or postoperative oculocardiac reflex is very rare, but patients must be monitored appropriately.