

# Anesthesia in ROP

## Introduction

- Inpatient preterm infants often require serial exams under anesthesia (**EUAs**) to monitor the development and progress of retinopathy of prematurity (ROP) and the response of the disease to surgery.
- These examinations may be performed in the neonatal intensive care unit or operating room and may require sedation or general anesthesia
- Ophthalmologic procedures that require an absolutely immobile child for maximal safety include :surgery in which the globe is open (e.g., cataract removal), vitrectomy, laser or cryotherapy for retinopathy, retinal detachment repair, anterior chamber paracentesis,
- Although the ophthalmologist may be able to tolerate small movements by the child during an EUA, unnecessary head or eye globe movement during an ophthalmologic procedure should be prevented

## Preoperative Evaluation

- . Before an elective ophthalmologic procedure, the patient undergoes a thorough physical examination
- including a review of all systems, and a complete medical history is obtained, including a surgical and anesthesia history, list of current medications, known allergies, and complications
- **Particular points to ascertain are:**
  - Gestational age at birth and the current gestational age • Weight
  - Periods of mechanical ventilation, CPAP and oxygen therapy and the duration
  - Apneas – frequency, duration, possible triggers
  - Co-morbidities, particularly cardiac • General health, growth and development • Previous operations • Medications including oxygen

- the preoperative assessment should determine the pattern and frequency of apnea before the planned surgical procedure and anesthesia
- Lab tests
- haemoglobin, haematocrit, platelets, electrolytes and a coagulation profile
- A crossmatch should be taken where blood loss is anticipated to be greater than 10% of blood volume
  
- All premature babies should have an echocardiogram performed before surgery, which should be noted as well as current medication including inotropic support
  
- intravenous access should be obtained before the surgical procedure or any examination that may involve traction on the extraocular muscles or pressure on the globe

# Common complications of prematurity

- acute and chronic pulmonary disease
- respiratory failure and pulmonary hypertension
- congenital heart disease
  
- intraventricular hemorrhage, with or without obstructive hydrocephalus
  
- Examination must include airway assessment – this can warn of potential difficult intubation
  
- Flexible planning for possible postoperative ventilatory support is essential, and families should be informed of this possibility preoperatively

- the anesthesiologist should determine whether pulmonary hypertension or right ventricular dysfunction is or was present. Because pulmonary hypertension is exacerbated by hypoxia and hypercarbia
- Preoperative consultation with the infant's pediatric cardiologist can provide useful information on the infant's current ventricular function and the risk of dysrhythmias associated with cardiac defects
- Some procedures and examinations can be performed without insertion of an artificial airway; however, communication with the ophthalmologist about requirements is essential in planning anesthesia

# Considerations during operation

- The perioperative environment should be welcoming to the child and family
- Preterm and small infants rapidly lose heat when anesthetized. Prevention of hypothermia is essential in the perioperative environment.
- Hypothermia can decrease metabolism of most drugs and depresses respiratory drive in preterm infants
- Pharmacological measures In the case of Ret Cam screening: apply local anesthesia with oxybuprocaine 0.4% or tetracaine 1% eye drops and consider a slow i.v. opiate bolus or ketamine
- Without tracheal intubation, the operation was performed in light sedation under topical anesthesia using oxybuprocain hydrochlorid eye drops

# Considerations during operation

- In the NICU, a combination of Fentanyl and Propofol-without administration of muscle relaxants— is a safe, useful technique for treatment of preterm neonates undergoing brief surgical procedures such as laser photocoagulation.
- The rapid recovery associated to this technique helps to meet the increasing demand for ROP surgeries and reduces the length of hospitalization
- The most common anesthetic regimens reported were either sedation with analgesia, paralysis and ventilation in the neonatal unit or general anesthesia in an operating room
- Because of the delicacy and exacting accuracy required in laser procedures, we routinely intubate the trachea and use neuromuscular relaxants

# Considerations during operation

- Endotracheal tube size for babies of various weights and gestational ages

Weight (gr)	Gestational Age (wk)	Endotracheal Tube Size (mm)
Below 1000 gr	Below 28	2,5
1000-2000 gr	28-34	3
>2000gr	>34	3,5

## Considerations during operation

- Initial endotracheal tube insertion depth (“tip to lip”) for orotracheal intubation

Gestation (weeks)	Endotracheal tube insertion depth at lips(cm)	Baby'sWeight (grams)
23-24	5,5	500-600
25-26	6	700-800
27-29	6,5	900-1000
30-32	7	1100-1400
33-34	7,5	1500-1800
35-37	8	1900-2400
38-40	8,5	2500-3100
41-42	9	3200-4200

## Considerations during operation

- The appropriate laryngoscope blade for a term newborn is size No. 1. The correct blade for a preterm newborn is size No. 0 (size No. 00 optional for very preterm newborn).
- In preterm infants whose airways are already intubated and whose lungs are ventilated mechanically, the anesthesiologist should confirm the position of the tube with chest auscultation, transport the infant safely to the operating room, and limit the exposure to high concentrations of oxygen
- Because most inhalational anesthetics impair hypoxic pulmonary vasoconstriction, a greater fraction of inspired oxygen ( $FIO_2$ ) may be necessary to maintain the targeted hemoglobin saturation.

## Considerations during operation

- . Hypercarbia and hypoxia may increase choroidal blood volume and increase IOP. Partial pressures of carbon dioxide ( $PCO_2$ ) and oxygen ( $PO_2$ ) should be controlled
- Sevoflurane is the inhalational induction agent of choice in most neonates. It has a rapid onset with cardiovascular stability

## Post operation care

- If the infant does not appear to have a stable respiratory drive and strength after anesthesia, assisted ventilation should be provided postoperatively and weaned during recovery
- Perioperative apnea may preclude tracheal extubation or require close postoperative monitoring after anesthesia. Perioperative apnea in the preterm infant is widely described
- If the child has been discharged, the current use of respiratory stimulants (i.e., caffeine or theophylline) and oxygen should be determined.
- infants who continue to require supplemental oxygen, who are younger than 60 weeks postconceptional age, or who are monitored for apnea or bradycardia should have continuous cardiorespiratory and oxygen saturation monitoring postoperatively for at least 48 hours or until they are apnea free.

## Post operation care

- The risk of apnea is independent of opioid use; its multifactorial origins include the presence of general and neuroaxial anesthetics and the immature central nervous system and respiratory center in the preterm infant
- Anticipation and prevention of postoperative nausea and vomiting (PONV) and understanding of anesthesia emergence and postoperative analgesia are essential