CF Guidelines - Preparation for Surgery

General Anaesthesia use in CF:

General anaesthesia commonly leads to lung complications even in healthy patients, a situation which is exacerbated in children and adults with CF.

Complications of General Anaesthesia (GA):

- Ineffective mask ventilation necessitating intubation
- Endotracheal tube obstruction from excessive secretions
- Bronchospasm
- Slow induction and emergence
- Cardiac arrhythmias
- Postoperative atelectasis
- Pneumothorax
- Post-operative respiratory failure

Reviews of anaesthesia in CF report a significant risk of complications (Doershuk 1972).

This list emphasises that, although CF is a multi- system disorder, pulmonary complications are of primary concern. The accumulation of bronchial secretions during anaesthesis can cause increased airways resistance, airway obstruction and gas trapping. Areas of increased V/Q mismatch result in hypoxia. Many will also manifest increased bronchial hyperactivity. There is often a short-term deterioration in pulmonary function for up to 48 hours following GA. The most significant changes are in FEV_1, resting lung volume and forced expiratory flow (Richardson 1984). GA should not cause long-term deterioration in the patient's condition (Lambert & Rubin 1985, Olsen et al 1987, Robinson & Branthwaite 1984).

History and Examination:

The pre-operative history taking and examination should cover all the standard aspects of anaesthesia as well as those concerned with CF.

Pre-Operative Evaluation and Investigations – General considerations relating to CF:

- Respiratory:
  - Respiratory examination is mandatory. The chest must be assessed for signs of wheeze or crepitations and it is important to document a baseline assessment. Pulmonary function tests need to be recorded. These are a useful indication of severity of lung disease (Kerem 1992). An FEV_1 of <30% predicted may preclude elective surgery. A recent chest X-ray, resting oxygen saturation in air and a sputum culture and sensitivities should be available. In more severe cases a blood gas should be considered. GA should be avoided during acute respiratory tract infections. Individuals are generally good judges of their respiratory status and how much, if any, scope there is for improvement. To minimise the chance of post operative chest complications we routinely give peri-operative antibiotics to all people with CF undergoing general anaesthesia, however good their lung function. It is important to ensure that surgeons and gastroenterologists are aware of this when arranging procedures. It is advisable to give antibiotic recommendations in the referral letter. People with CF should receive IV antibiotics for 24-48 hours pre-op and at least 48 hours post-op. Those with minimal lung disease

may be able to receive the pre-op antibiotics as high dose oral ones. Those with severe CF lung disease may need 7-14 days IV antibiotics pre-surgery and 7 days post-operatively. Choice of drug is determined by the latest sputum or cough swab culture. The CF consultant who oversees the care for the individual patient should advise on the choice of treatment. If the consultant is not available the on-call Paediatric or Respiratory SpR should advise on treatment. Pre-operative chest physiotherapy up to the time of anaesthesia should reduce problems associated with excessive secretion production and bronchospasm. It is therefore important that chest physiotherapy is strictly adhered to during the admission. Preoperative work up should include optimal chest physiotherapy and use of inhaled bronchodilators and mucolitics to ensure the patient goes for surgery with as clear a chest as possible. There is an ideal opportunity to clear secretions whilst the patient is intubated. This can be done using manual hyperinflation, chest shaking and suction or l lavage. In the post operative period pain control should be optimal and timed to cover physiotherapy sessions. Supplementary oxygen should be humidified. Physiotherapy might need modifying initially. Early mobilization is advised.

- Cardiovascular:
  - Cardiovascular examination is mandatory. In severe cases an ECG should be recorded.
  - Long-standing hypoxia may have lead to pulmonary hypertension and cor pulmonale.

- Blood tests.:
  - Electrolye balance and full blood count should be checked in all patients' undergoing surgery.
  - Other blood test that should be considered are liver function, magnesium and calcium and clotting.

- Gastrointestinal:
  - Nutritional status needs to be considered.
  - Gastro-oesophageal reflux is common (Scott, O'Loughlin & Gall 1985). This needs to be considered when deciding on anaesthetic management.

- Endocrine:
  - Glucose intolerance or frank diabetes might necessitate the use of dextrose and potassium regimes combined with an insulin sliding scale during the immediate peri-operative period.

- Liver Function:
  - CF related liver disease might prolong the effect of opioid analgesics and muscle relaxants.
  - Liver disease might impair clotting. Vitamin K and the availability of fresh frozen plasma need to be considered for those undergoing major surgery.

- Fluid Balance:
  - Thickened secretions will occur during periods of reduced fluid intake such as enforced 'nil by mouth' (NBM) prior to and during surgery. There is also an increased risk of sodium depletion and dehydration from hyperthermia. This can cause cardiovascular collapse.

- A good fluid intake should be maintained for as long as possible. Most patients will be able to drink clear fluids until 2 hours before anaesthesia. This should be encouraged. Also, most patients will have some form of venous access as they are likely to be having pre-operative doses of intravenous antibiotics. It therefore is advisable to give intravenous fluids to cover periods of NBM.

- Drug Treatment:
  - In general all medications should be continued until immediately prior to anaesthesia.
  - Some patients will be receiving high doses of inhaled corticosteriods and/or oral steroids. Steroid replacement therapy might be required in the peri-operative period.

Considerations during the anaesthetised period:

- If a pre-medication is required, opiates should be avoided due to their respiratory suppression effect.
- Atropine should also be avoided as it can cause thickening of respiratory secretions. (Discuss with medics)
- Intravenous induction is the preferred choice as it is generally easier and more controlled than inhalation induction. When choosing agents to use minimising airway reflexes and length of recovery time should be considered.
- Do not use agents than increase production of secretions.
- Inhalation induction might take longer than anticipated because of V/Q mismatch and there is a high incidence of coughing and laryngospasm.
- For all but the shortest surgical procedures it is preferred to paralyse, intubate and ventilate. The advantages are, reduced incidence of laryngospasm, the ability to perform endotracheal lavage and suction during and at the end of the procedure and a more rapid awakening and return of airway reflexes.

Other considerations:

- Nasal intubation should be avoided because of the risk of haemorrhage from polyps.
- All inspired gases should be humidified to facilitate the clearance of secretions.
- Repeated suction of the endotracheal tube might be required.
- Airways pressures must be monitored and adjusted to minimise the risk of barotraumas and pneumothorax.
- The end tidal carbon dioxide should be maintained at values approximating the patient's pre-operative levels where known.
- The CF physiotherapist can be asked to come and perform formal physiotherapy during the anaesthetic.
- Endotracheal suction with or without saline instillation should be performed before reversal and extubation.
- Extubation should occur only when the patient is fully awake and breathing spontaneously.

Intra-operative and post-operative analgesia:

Adequate analgesia, preferably without accompanying sedation, and good control of nausea and vomiting are paramount to enabling effective post-operative chest physiotherapy and early mobilisation.

- Opiates are often required and should be combined with other, less sedative, analgesia.
- Wherever possible the anaesthetist should incorporate a formal local block

or infiltrate with local anaesthetic.

- Patient-controlled analgesia (PCA) should be considered as this enables background analgesia to be supplemented prior to potential painful interventions such as chest physiotherapy. It must be remembered that CF patients need to carry out effective chest physiotherapy as soon as they can after their procedure. The better controlled the pain, the sooner the can resume their treatments and be up and mobile. What may be considered a fairly simple, not too painful procedure for other patients may not be for people with CF.

References:

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