PAEDIATRIC ANAESTHESIA

COMMON MEDICAL CONDITIONS IN CHILDREN

a. The child with runny nose
b. The wheezy child
c. The child with a murmur
d. The difficult child
e. The Autistic child
f. The Child with cerebral palsy / brain impaired
g. The Child with Down Syndrome

a) The Child with Runny Nose

The questions we have to consider are:

- What is the cause; vasomotor/allergic rhinitis or infective
- What are the risks in proceeding – risk vs benefit
- What complications might happen
- How to proceed

What is the cause?

Signs and symptoms of infection include fever, malaise, poor feeding and purulent nasal discharge. On the other hand, a history of atopy and wheezing in the absence of the above symptoms may suggest an allergic cause.

What complications may happen in the presence of a respiratory tract infection?

There is increased risk of laryngospasm, bronchospasm and hypoxaemia perioperatively. Increased secretions and mucus plugging of the airways can occur. A rare but serious complication is myocarditis and arrhythmias. The increased sensitivity of airways may persist for up to 6-8 weeks post upper respiratory tract infection.

Risks are increased with:

- Infants and toddlers
- Presence of URTI
- Airway surgery or if the child has a difficult airway
- Less experienced anaesthetists
- Asthmatics
- Passive smoking

Risk vs. Benefit: Discuss the case with the Senior Anaesthetist in charge and the surgeon. There may be the need to proceed with emergency surgery even in the face of a URTI whilst taking measures to prevent and treat complications that arise. Parents should be counseled on the risks. Elective surgery may proceed if the cause of runny nose is non infective and the child optimized as much as possible (this does not necessarily equate symptom free). This is especially so if the surgery may improve symptoms of airway obstruction. Again, the anaesthetist, surgeon and parents need to be aware of possible complications and hospital admission in event of serious complications arising, if the case was planned as day surgery.

How to proceed:

1. All children with signs and symptoms of URTI should be postponed if the surgery is not urgent. Symptoms of URTI include rhinorrhoea, nasal congestion, productive cough and systemic features of viral toxemia such as malaise, fever, myalgia, headache, irritable behaviour, problems with eating or sleeping. Surgery should be postponed for at least 2 weeks after the child recovers.
2. If the child has only a runny nose with clear discharge or nasal congestion, we may proceed if the child looks well, and the surgery is minor and will not require tracheal intubation. Laryngeal mask airway (LMA) may be used but the depth of anaesthesia must be adequate prior to placement to avoid possibility of laryngospasm.
3. If emergency surgery must proceed in a child with URTI, precautions must be taken. The maintenance of adequate anaesthetic depth in accordance with the degree of surgical stimulation is imperative. The risk is lower with:
    - the use of intravenous induction
    - maintenance of anaesthesia with inhalational agents
    - except desflurane
    - airway management by a paediatric anaesthesia specialist

- Facemask/ LMA instead of tracheal intubation
- Salbutamol premedication for kids with URTI

In the postoperative period, the child may require humidified oxygen and physiotherapy

RISK ASSESSMENT OF ADVERSE RESPIRATORY EVENTS IN PAEDIATRIC ANAESTHESIA

Children having a general anaesthetic can have various respiratory adverse events such as airway obstruction, breath holding, atelectasis, desaturation, coughing, stridor, laryngospasm and bronchospasm. These events can lead to severe hypoxia and cardiac arrest on occasions where they are not or cannot be adequately managed.

Hence it is important to identify children with risk factors that can predispose to respiratory adverse events during general anaesthesia with the aim of

- Informing the patients/parents about the risks of general
- anaesthesia
- Discussing the benefits and risks of general anaesthesia with the surgeons
- Discuss benefits and risks of rescheduling general anaesthesia
- Preoperative preparation of the patient and operating theatre to minimize the risks and manage adverse events effectively.

Factors predisposing to higher risk of peri-operative respiratory adverse events in children having a general anaesthetic:

A. Patient factors:

- Upper respiratory tract infection – ongoing or within 2 weeks of general anaesthesia
- Dry nocturnal cough
- Obstructive sleep apneoa
- Current or previous history of eczema
- Asthma
- Prematurity and bronchopulmonary dysplasia
- Cystic fibrosis
- Pulmonary hypertension
- RSV bronchiolitis

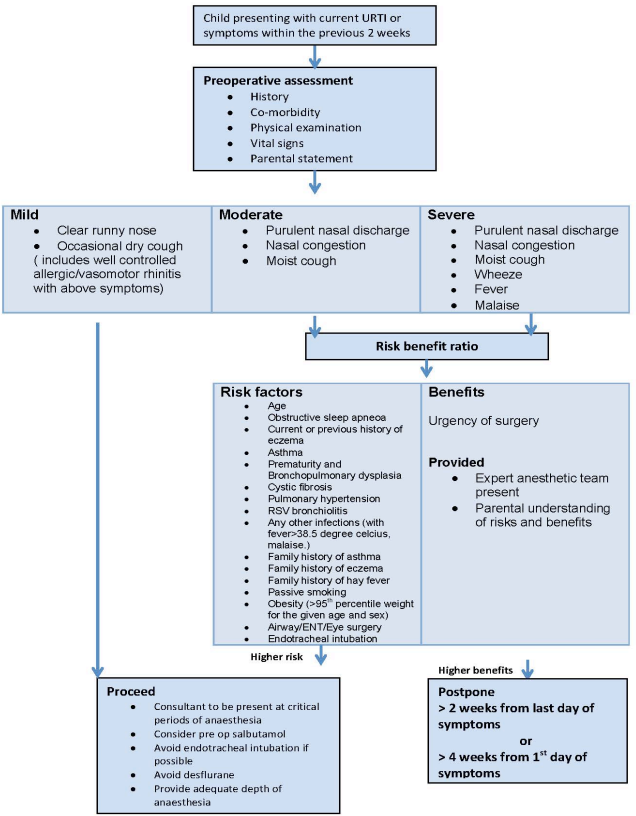
- Any other infections (with fever>38.5 degree centigrade, malaise.)
- Family history of asthma
- Family history of eczema
- Family history of hay fever
- Passive smoking
- Obesity (>95th percentile weight for the given age and sex)
- Younger age (< 6 years, particularly < 1 year, decreasing age by each year increases the risk by 11%)

B. Surgical factors:
- Urgent/emergent procedures
- Airway, ear nose throat, eye surgeries

C. Anaesthetic factors:
- Inexperience
- Anaesthetic agents (desflurane> sevoflurane> propofol)
- Airway management (Endotracheal tube > LMA > Facemask)

If the child you assess has any of the above risk factors, it is prudent to discuss your case with your consultant prior to proceeding with the general anaesthetic.

Child with a runny nose: Algorithm for management of a child with current or past upper respiratory tract infection



b) The Wheezy Child

All children coming for elective surgery must be free from signs and symptoms of acute asthma. Ex-premies with Chronic Lung Disease may have hyperactive airways and may be still on home oxygen therapy. Ascertain the frequency of attacks, severity of disease and current medical management. The majority of cases are mild. Severe asthmatics should be reviewed and may need to be admitted for optimization of their condition by the Respiratory Physician before coming to the operating theatre. Respiratory function tests may be difficult to administer in younger children. The child may benefit from pre-operative bronchodilator (MDI or nebuliser as appropriate) administration. Depending on the severity of the disease, they may require monitoring and/or care in a High Dependency Unit postoperatively.

c) Cardiac murmur

An incidental murmur may be picked up during the pre-operative visit. There is the need to differentiate between an innocent and pathological murmur.

Innocent murmurs are common can be detected in children who are thriving well, active with no evidence of cyanosis, breathlessness at rest or on exertion. They are not associated with anatomical or physiological abnormalities. It is *usually* soft, grade 1-3, early systolic and disappears with body positioning. It can also be continuous as in a venous hum.

Pathological murmurs are diastolic, pansystolic, late systolic, very loud murmurs, associated signs of cardiac disease or continuous murmurs (except venous hums) that persist regardless of body position. Clinically it may be difficult to unequivocally differentiate between the two and referral to a cardiologist should be made preoperatively for elective surgery. Under emergency conditions, because it is often difficult *clinically* to rule out small structural lesions, all children with murmurs should receive antibiotic prophylaxis prior to surgery that is likely to cause significant bacteraemia (dental, genitourinary, oral or gastrointestinal) unless cardiac review has determined otherwise.

* Children less than 1 year old with murmur should be evaluated by cardiologist before operation.

Features of Cardiac Murmurs in Children	
INNOCENT	**PATHOLOGICAL**
Asymptomatic	Symptomatic
Soft, Gr 1-3	Loud
*Early Systolic	Pan / Late Systolic, Diastolic
No Thrill	Thrill
Disappears with body positioning	Remains constant body positioning

* With the exception of venous hums which are continuous murmurs

d) The Difficult Child

These children may be uncooperative and aggressive for various reasons (bad past anaesthesia experience, behavioural issues, mental retardation). It is useful to review the medical/ anaesthetic history of the child. Discuss with the parents / caregiver what factors affect behavior and what methods have worked in past anaesthetics (if any). If the child is very anxious due to multiple surgeries and anaesthetics, premedication given under direct supervision of the attending anaesthetist in the Children's OT waiting area may be useful. Please refer to section under "premedication".

e) The Autistic Child

They usually react badly to any change in routine and may have very special likes and dislikes. Certain stimuli (sounds / sights) may also trigger severe distress. Discuss with parents / caregiver about the factors that affect behaviour and about the methods that have worked in past anaesthetics. Special considerations e.g. wearing their own clothes, having 2 parents at induction (especially for the older, larger child), early removal of IV cannulae, recovery with parental presence in a quiet side area should be considered.

f) The Child with Cerebral Palsy / Brain damaged Child

Children with CP may or may not have mental handicap. Assess the level of the child's intelligence. In both categories, venous access and patient positioning may be problematic due to disuse of limbs and contractures. Difficulty in swallowing, repeated episodes of pulmonary aspiration and possible kyphoscoliosis require careful assessment of the child's respiratory status. Special measures to prevent pressure sores should be taken. Children with seizures should have their anti-epileptic medications continued in the perioperative period as far as possible.

g) The Child with Down's Syndrome

Children with Down's syndrome or Trisomy 21 present with multiple problems. Although some with this condition may be difficult at induction (see The Difficult Child), it is important to realize that these children have varying degrees of cognitive function. Indeed, some are capable of holding intelligent conversations and cooperating with their doctors. The anaesthetic plan therefore needs to be tailored to the individual. Trisomy 21 children are often "floppy" (hypotonic) as infants and more prone to delayed recovery and airway obstruction. A considerable number of them have endocrine problems, notably hypothyroidism. They are at higher risk of hematological malignancies, immunodeficiency and central obesity. Vascular access can be challenging. Some other problems are listed in table below:

Pathophysiology & Clinical Manifestation	Anaesthetic Implications
microcephaly, macroglossia hypotonia	potential difficult airway exaggerated response to NMBDs
obstructive sleep apnoea atlantoaxial instability	loss of airway in post-op period C spine XR; caution with neck manipulation
congenital subglottic stenosis	May need to downsize ETT
recurrent pulmonary infection CHD: VSD, TOF, PDA	frequent cancellation of surgery preop cardiac evaluation prophylactic antibiotics
duodenal atresia, gastrooesophageal reflux	Emergency neonatal surgery pulmonary aspiration risk

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