Laryngo-tracheal reconstruction is a surgical procedure where a cartilage graft is used to augment the airway to treat conditions such as subglottic stenosis, closure of a tracheocutaneous fistula after decannulation\(^1\).

The general principle is to keep children quiet and sedated for approximately five days after the surgery to allow time for wound healing, which may vary according to the complexity of an individual case.

Children should have a nasal endotracheal tube in situ and the tube position should be clarified and recorded clearly in medical and nursing records.

**Handover**

A comprehensive anaesthetic and surgical handover with a clearly written plan is necessary and any changes in the plan should be discussed during daily surgical reviews.

**Sedation and muscle relaxants**

The PICU sedation policy should be followed (See appendix B). Both over and under-sedation can be harmful and influence the outcome. Over-sedation can cause withdrawal and prolonged neuromuscular weakness\(^2\); while under-sedation could lead to graft dislodgement, accidental extubation and loss of a critical airway. To keep the graft undisturbed for the first two days, pancuronium can be used as paralyzing agent but this should be lifted on third day\(^3\).

Use of Comfort Scale (see appendix A) is important in titrating the sedatives.

The total score can range between 8 and 40. A score of 17 to 26 generally indicates adequate sedation and pain control.

In summary sedation and paralysis should be gradually reduced as follow-

1) 1st day: hourly pancuronium for muscle relaxation
2) 2nd day: regular pancuronium 1- 2 hrly as tolerated with some movement in between doses
3) Day 3- 4: no further paralysis, start weaning ventilation
4) Aim for extubation usually on day 5 unless planned otherwise.

Arm splints may be used to prevent accidental extubation

**Fluid and Nutrition**

Nasogastric feed can be started soon after surgery with the surgeon’s approval; usually 80% of the fluid requirement is given postoperatively.
Antibiotics

Postoperative antibiotics are recommended for five days as open airway surgery involves contamination of the tissue of neck with tracheal secretions that may cause infection and graft loss\(^4\). Also, the prolonged anaesthesia followed by five days of ventilation can lead to pulmonary atelectasis and consequent infection of the chest.

Authors: Dr A Gour, Mr H Daya Revised May 2016

References:


## Sedation Guideline for PICU

### Step 1
Morphine 100 mcg/kg iv bolus (maximum two) followed by infusion of 20-40 mcg /kg/hr  
Midazolam 200 mcg/kg iv bolus (maximum two) followed by infusion 120 microgram/kg/hr  
Exclude irritant factors: noise, light, secretions, full bladder, pain, itching, hypoxia, hypercarbia, soiled nappy, constipation  
Apply physical restraint: swaddling, arm splinting - as required  
**Aim for sedation level: somnolent, responsive to the environment but untroubled by it, no excessive**

### Step 2:
After reaching maximum treatment in step 1  
Comfort-B score >22: Clonidine enterally 1- 5 mcg/kg/dose 8 hourly (maximum 300 mcg/day)  
↓  
Comfort-B score >22: Clonidine infusion - commence at 1 mcg/kg/hr increase at increment of 0.5 mcg/kg/hr up to a maximum of 2 mcg/kg/hr (may increase to a max of 3 mcg/kg/hr if cardiovascularly stable).  
Reduce Midazolam infusion when Clonidine is commenced to reduce cardiovascular instability (hypotension)

### Step 3:
Comfort-B score >22: Chloral Hydrate 25-50 mg/kg, 6 hourly and/or Alimemazine 2mg/kg, 8 hourly prn, enterally

### Weaning sedation
- After sedation is optimised Comfort-B score to be performed at least 12hourly and sedation requirement reviewed.  
Comfort-B score <11 – reduce Midazolam at decrement of 60 mcg/kg/hr,  
then reduce Morphine at decrement of 10 mcg/kg/hr

### Prolonged sedation
- If sedation is required after day 4 in PICU, Midazolam infusion should be weaned over 24 hours and stopped on day 5  
Comfort-B score >22: Clonidine enterally or intravenous infusion (as in step 2).  
If already on Clonidine, commence Chloral Hydrate or Alimemazine enterally (as in step 3).  
Comfort-B score >22 with Clonidine infusion and enteral sedation: intermittent boluses of intravenous Lorazepam (0.05 - 0.1 mg/kg iv 2-4 hourly prn)  
- If sedation is required beyond day 10, consider rotation of sedation regimen.  
If target COMFORT-B score is not achieved:  
Stop Morphine infusion, commence Fentanyl infusion 1-8 mcg/kg/hr  
Consider replacing Clonidine infusion with Dexmedetomidine - load with 1mcg/kg over 10mins. Commence infusion at 0.2 mcg/kg/hr, increase in increments of 0.1 mcg/kg/hr up to a maximum of 0.7 mcg/kg/hr. Continue for maximum 4 days. Wean Clonidine infusion over 24hrs before commencing Dexmedetomidine.  
Continue intermittent Lorazepam boluses (or re-commence Midazolam infusion 60-240 mcg/kg/hr if Lorazepam is unavailable)  
Review sedation target, patient may be more tolerant to endotracheal tube and intensive care procedures and may not require as deep level of sedation as before.  
- If sedation is required beyond day 14 of PICU admission sedation is to be individualised and other sedative medications like Remifentanyl may be used for a brief period after careful consideration.