Endotracheal Intubation

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Abstract: This article deals with the endotracheal intubation in pediatric age group. It gives in depth information regarding its indication, contraindication, equipment, procedure and the importance of documentation. It also elaborates on cuffed and uncuffed endotracheal tubes. It also explains about the various calculations of measurements which have to be taken care while fixing the endotracheal tube.

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Introduction:-

Endotracheal intubation is the procedure which every pediatrician and nurse working at intensive care units must be well conversant with. The critically ill patients often require endotracheal intubation. It secures patent airway. It is a pre-requisite for artificial ventilation endotracheal suction can most efficiently be done through an endotracheal tube. In resuscitation of an asphyxiated newborn, it is indicated when bag and mask ventilation fails.

Indications:-

1. In neonatal asphyxia
2. Bag & mask ventilation fails to improve cardiac status or heart rate falls below 80beats/min
3. Infants with diaphragmatic hernia
4. Thick meconium stained babies
5. Babies requiring prolonged Positive Pressure ventilation
6. As a pre-requisite for artificial ventilation
7. Cardio-respiratory arrest due to any cause
8. Central venous system depression e.g. head injury, diabetic coma, barbiturate poisoning etc.
9. Diseases of peripheral nervous system e.g. tetanus, organophosphorous poisoning poliomyelitis etc.
10. Administration of general anesthesia

Equipment:-

1. Laryngoscope with straight blades for neonates and with extra set of batteries and extra bulbs.
2. Blades of various size
3. Endotracheal tube of various size
4. Stylet for endotracheal tube
5. Suction catheters

6. Ryles tube
7. Magill forceps
8. Self – inflating (AMBU) bag
9. Yankauer sucker
10. Oral airway
11. Scissor
12. Endotracheal tube securing device
13. Stethoscope
14. Drugs
   a. Muscle relaxant- Vecuronium – 0.1-0.2mg/kg
      Rocuronium – 0.6-1.2mg/kg
   b. Atropine (1ml=0.6mg), usual dose 10mcg/kg minimum – 100mcg
   c. Adrenaline add 1ml=1mg to 10 ml water to make up a 1:10,000 solution usual dose 0.1ml/kg
   d. Endotracheal tube:-

1. Cuffed versus uncuffed tubes:-
   ➢ Traditional teaching emphasized the need to use uncuffed tubes in children< 8 years in view of narrow sub-glottis area (physiologic cuff).
   ➢ As per the current PALS guidelines (Pediatric Advanced Life Support) in the in-hospital setting, a cuffed endotracheal tube is as safe as an uncuffed tube for infants and children.
   ➢ In certain circumference (e.g. poor lung compliance, high airway resistance, or a large glottis air leak) a cuffed tube may be preferable provided that attention is paid to endotracheal tube size, position, and cuff
Endotracheal Intubation

inflation pressure. < 20cm of water

NOTE: verify presence of leak and check cuff inflation pressure thrice daily.

Size and Depth of the tube:

1. Uncuffed endotracheal tube size (mm internal diameter) = age in years divided by 4 + 4
2. Cuffed endotracheal tube size (mm ID) = age in years divided by 4 + 3

Ensure that an endotracheal tube with ID 0.5mm smaller and 0.5mm larger is also available.

3. Endotracheal tube depth – ( use the black line) = age in years divided by 2 + 12

TECHNIQUE:

Position:

- The patient is placed in a supine position; the operator stands beyond the patient's head. Patient's neck is slightly extended with the head in midline
- Head tilt chin lift.
- Towels (older children place it under the head, younger children place it under the shoulder).

Holding the laryngoscope:

- Turn on the laryngoscope light and hold it in your left hand between your thumb and first two or three fingers, with the blade pointing away from you.
- One or two fingers should be left free to rest on the baby's face to provide stability.

Note: if the laryngoscope is held in the right hand the closed curved part of the blade will block your view of the glottis, as well as make insertion of the tube impossible.

Procedure:

- Clear oropharynx with gentle suctioning
- In case of emergency intubation empty the stomach by putting Ryle's tube.
- Hold the handle of laryngoscope in left hand with thumb and first three fingers; stabilize hand with fifth finger resting on patient's cheek. (the blade should be pointing away from oneself)
- While visualizing insert the blade midline until tip is between base of tongue and epiglottis with in the vallecula.
- If the infant is making respiratory effort, free flow oxygen with an oxygen tubing held close to the infants' mouth and nose is to be provided during intubation.
- Open the mouth further by pulling on laryngoscope handle, simultaneously tilt blade tip upward slightly to elevate epiglottis and visualize glottis. Avoid extreme tension or tilt on laryngoscope.
- Suction is needed.
- Have assistant to palpate suprasternal notch with index finger, applying gentle pressure if desired.
- Hold the tube with concave curve anterior & pass it down right side of the mouth, outside the blade, while maintaining visualization.
- As the patient inspires, pass the tube through cords 2cm into trachea or until immediately after tip passes under assistant's finger in suprasternal notch.
- The tube is then firmly at the lips with the right hand and the laryngoscope and Stylet are carefully removed.
- Initially confirmation of the tube placement is accomplished by attaching a resuscitation bag with the connector and ventilating the infant, with correctly placed tube, the air entry is heard on both the sides of chest, breath sounds are of equal intensity and air is not heard entering the stomach may signify esophageal intubation pull tube and hyperventilate. While listening to the breath sounds, the stethoscope is to be placed approximately the nipple line.

Note: - the cm marks on the tube at the level of the upper lip and then secures the tube to the infants face.

- Final confirmation of placement of the tube can be obtained by a chest X-ray.
- To minimize hypoxia, intubation should be completed within 20 seconds.
- Use pulse oximetry to confirm
- If more attempts are required, infants should be stabilized between the attempts by ventilating with bag and mask and then the procedure should began again.

Complications:

1. Hypoxia
2. Bradycardia
3. Apnea
4. Pneumothorax
5. Contusions or laceration of tongue, gums, pharynx, epiglottis, trachea, vocal cords or esophagus
6. Infections
7. Obstructed endotracheal tube

Documentation:

- Inform the patient’s family about completion of procedure and present status of the patient.
Endotracheal Intubation

- Record vital signs before during and after intubation, including oxygen saturation.
- Write about route of intubation
- Record use of ant sedation
- Record size of intubation tube
- Depth of endotracheal tube insertion at lip
- If cuffed endotracheal tube is used the measurement of the cuff pressure as to be specified.
- Assessment of the breath sounds
- Confirmation tube placement including chest radiograph.
- Occurrence of complication at the time of intubation
- Nursing measures taken to prevent complications
- Amount of secretions.

Monitoring patients and care of patients with endotracheal tube:

- Auscultate breath sounds on insertion of endotracheal tube to check respiratory rate, rhythm, depth and equality of chest expansion; this will help the nurse to detect the movement or dislodgement of endotracheal tube.
- Maintain the tube in its position with the help of twill tape or adhesive tape; this will prevent movements and dislodgement of the tube.
- Monitor and record the position of the tube at tip off the mouth with centimeter marking on the tube.
- This will help to identify if the tube has moved in and out of its place.
- If cuff tube is used for children maintain tube cuff pressure at 20 to 25 mmHg this pressure provides adequate inflation if the pressure decreases it causes risk of aspiration and if pressure increases it will cause tracheal damage.
- Perform oxygenation and suctioning
- Inspect nares and oral cavity once per shift while patients are intubated to detect breakdown and necrosis of skin.
- Move oral endotracheal tube to the opposite side of the mouth every 24 hours with care to maintain the position of the tube in the trachea, this prevents irritation to the oral mucosa and breakdown of skin at the angles of the mouth.
- Position the patient at 30º angle head elevation with neck extension.
- Change position of the patient every 2 hourly, and do suctioning before and after the change of position.
- Provide oral care every 4 hourly.

Report the following conditions:

These conditions should be reported if they persist despite nursing interventions

1. Absent or unequal breath sounds
2. Change in the ABG levels
3. Unplanned extubation
4. Tube movement from original position
5. If cuff tube used check the pressure <20 or >25 mmHg
6. Inability to pass a suction catheter
7. Redness, necrosis, skin breakdown

Reference: