

Paediatric airway and challenges during COVID

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Abstract

Paediatric airway brings some unique challenges to anaesthesiologist. Anaesthesiologists are at particularly high risk of being exposed to Covid cases because airway management, particularly tracheal intubation, positive pressure ventilation through a mask, and management of tracheostomy tubes, causes widespread aerosolization of the virus. But these cases cannot be deferred. The aim of our presentation is to discuss the various challenges we faced managing these presumptive COVID positive pediatric airway cases, not only because of logistic issues but also to optimize the airway and work in a coordinated way with ENT surgeons in the common airway. We present the anaesthetic management of few challenging paediatric cases of tracheobronchial foreign body aspiration, Laryngeal web presenting with stridor, laryngeal papillomatosis during this period April 2020 to September 2021 in our institute.

Keywords: Paediatric airway; Pandemic; COVID; Airway emergencies; tracheobronchial foreign body; laryngeal papilloma; laryngeal web.

Introduction

Airway management of patients during this pandemic of COVID times is a great challenging task. Pediatric patients are even more challenging due to less available guidance and protocols. Many routine pre-COVID-19 practices, such as mask induction of general anaesthesia in anxious, crying, and agitated children or carrying them into the operating room (OR), may be less desirable because of the risk of viral exposure to the OT staff. Though the virus appears to have its most damaging clinical effects in adult patients, infection does occur in children [1-3].

Case Preparation and Anaesthesia [10]

Motivation of parents for these cases, routine investigation, preparing the cases by weighing the patient and preparing drugs, premedication with atropine to aid management of hypoxia induced bradycardia and to decrease the secretion was done. Adequate equipments with difficult airway armamentarium were kept ready so that the first intubation be the best one. Preoperatively nebulization in all cases was done. Operating room team wore PPE, N95 MASKS, goggles, face shield, Bronchoscopy instruments and appropriate optical forceps were selected. Preoperative nebulization of the child

was done with the bronchodilators and steroids in almost every case as in this COVID era chest congestion and cough was present in almost every cases. 2% lignocaine sprayed in oropharyngeal cavity before instrumentation [18]. In the OT temperature was maintained and regulated with warm blankets and fluid warmers [11-12]. According to the guidelines monitors like ECG, Capnography, SpO₂, temperature was connected to every cases [13]. Breathing circuits -Ayers T Piece breathing circuits with HME filters (<20kg) was used [14-15]. Endotracheal tubes of proper size appropriate to the case are kept ready. Supraglottic airways were kept ready. Second-generation supraglottic airway devices have higher leak pressures than first-generation masks so that was considered [5]. For controlled ventilation and smooth intubation Neuromuscular blocking agents were preferred [16]. Adequate oxygenation and ventilation was maintained with nasal cannula or Ayers T-piece connection in scope side port.

These patients received gentle positive pressure ventilation with the goal of using just enough tidal volume to achieve chest rise while maintaining a tight mask seal. We considered deep extubation using techniques that minimize coughing and bucking during emergence [6, 17].

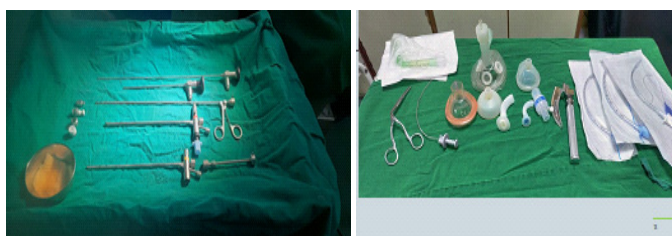
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AGE/SEX	INGESTION OF FB	O2 Saturation	CXRAY/CT	Duration from history	Foreign body
9 months	Yes history	89-90%	Ct scan done- a calcified object seen	3 months	Shell(ingestion of snail)
1.5 yrs	No history	90%	CXRAY-Opaque mass at level of right bronchus	2 months	bead
1.2 yrs	No history	93-94%	Mass in the right bronchus	2 months	LED blub from toy car
2 yrs 1.5yrs	Yes history Yes	90% 85-86%	In Bronchus Carinal level	10 days 1 day	Peanut Fish bone

Case scenario 1-Tracheobronchial Foreign Bodies Case scenario 1-Tracheobronchial Foreign Bodies

Foreign body aspiration is a potentially critical airway emergency in children. The state of art in our institute for this case is endoscopic foreign body retrieval using rigid bronchoscopes and optical forceps for optimal imaging and surgical removal. We have done few cases of tracheobronchial foreign bodies in pediatric age group. Most of the patients presented as elective surgeries.

Airway Equipments



Anaesthesia Management

In most of the foreign bodies retrieval cases controlled ventilation was used with proper airway instruments. Premedication was done with glycopyrrolate, dexamethasone .Induction was done with sevoflurane 2-6 % dial concentration, oxygen, Intermittent propofol 1 mg/kg, Inj fentanyl0.5microgram per kg, ANALGESIC – inj Ketanov, Inj paracetamol 10-15 mg/kg IV. Maintenance of anaesthesia and oxygenation with Jackson - Rees anaesthesia circuit in the side stream of the Karl Stroz optical bronchoscope and continuous nasal cannulation using prongs@2lts/hour was considered. Succinylcholine (3mg/kg for infants and 2 mg/kg for children) for induction [19] and atracurium (0.5mg/kg) so as to obtund the reflexes in pandemic times. Prompt recovery in all age groups makes atracurium an attractive drug for use in paediatric anaesthesia. After removal of foreign bodies with 2.5mm bronchoscope, mask ventilation was applied until spontaneous respiration was reached.

Discussion

Retrieval of foreign bodies by bronchoscopy can be done under both spontaneous and controlled ventilation [7].

Advantages of controlled ventilation are Decreased atelectasis, Associated with shorter operative times.

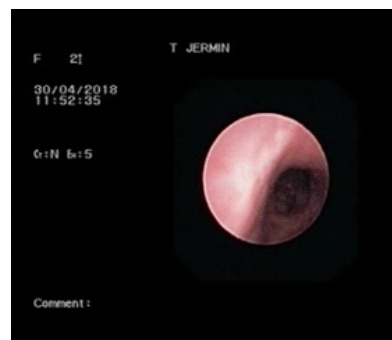
Disadvantage are Prolonged emergence from anaesthesia, Increased risk of foreign –body dislodgement with positive pressure ventilation, Intermittent apnea during removal.

Advantages of spontaneous ventilation -Decreased risk of foreign body dislodgment, better V/Q matching, less air trapping, easier to oxygenate /ventilate through bronchoscope.

Disadvantage being increased risk of reflex activation of the airway and hypercapnia.

Case Scenario 2-JUVENILE ONSET RECURRENT LARYNGEAL PAPILOMATOSIS

Recurrent respiratory papillomatosis is a rare, benign and chronic disease caused by human papilloma virus (serotype 6 and 11) [8]. We had 2 cases of laryngeal papillomatosis during this duration, both cases presented as severe stridor. 3 Yrs. and half months old child presented with stridor and dysphonia from last 2 months Diagnosed as Dinckers’ grade 3 JORRP.



Goal of the preparation

Provide ventilation, vocal cord relaxation, avoid trauma and laryngospasm, provide good surgical access. Tracheostomy was

avoided as it carries the risk of virus spread. Jet ventilation is also invasive procedure.

Problems

In case of recurrent laryngeal papillomatosis, papilloma which may occlude endotracheal tube. Smaller endotracheal tube are needed for surgical access but it hampers the ventilation as well as concentration of volatile agents. Loss of airway control after induction occurs.

Preparation

Preoperatively flexible laryngoscopy examination done. Smaller size ETT was kept ready, Resuscitation equipments were kept ready. Monitors ECG, SpO₂, NIBP were connected. Premedication done with Atropine 20 microgram, Induction done with 100% oxygen and 6% sevoflurane was done. Endotracheal intubation with 3.5 mm tube was done. Maintenance done with Oxygen, nitrous oxide and Sevoflurane. Intravenous Fentanyl and hydrocortisone was given. Atracurium was used as muscle relaxant. During the excision of papilloma intermittent withdrawal of endotracheal tube was done for proper excision of the papilloma.

Procedure

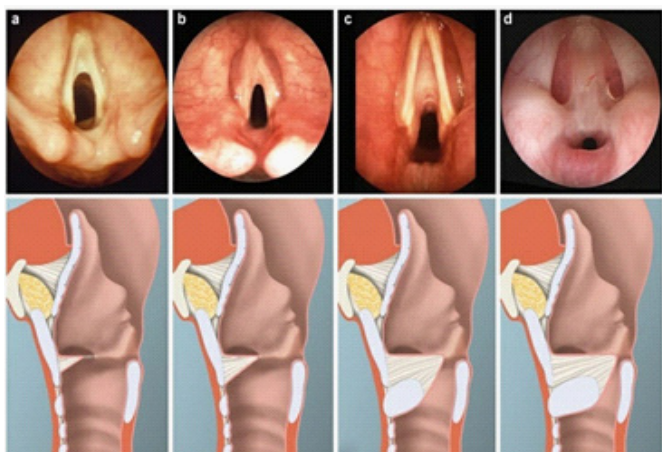
Excision using coblation was done and in between during excision, we had to negotiate the ETT for access to the polyp.

Reversal

Child was stable and reversed with spontaneous ventilation. Post operatively maintained 98% saturation with T piece.

Case scenario 3-LARYNGEAL WEB

Congenital laryngeal web is a rare anomaly with incidence of 1 in 10,000 births. It is a membrane like structure that extends across the laryngeal lumen close to the level of vocal cord. Its clinical presentation may range from asymptomatic patients or mild hoarseness of voice to severe respiratory stridor [19]. There are four grades type I-IV of glottic webbing according to Cohens classification.



Symptoms depend highly on web's severity.

Mild hoarseness to aphonia to severe obstructive dyspnoea

CASE 1-A 5days old baby presented with respiratory distress on bronchoscopy grade III laryngeal web was diagnosed. We have induced the case with sevoflurane 6-8% dial concentration and the airway was maintained by neonatal tube size 2

mm held at the available orifice of the glottis with maintenance of spontaneous respiration under general anaesthesia till emergency tracheostomy was performed. The problem we faced was intermittent desaturation till we have done the tracheostomy.

CASE 2-A 10days old baby presented to us with severe respiratory distress, cyanosis during feed and aphonia on crying. On bronchoscopy our patient had a laryngeal web type III, having marked vocal dysfunction.



After nebulization and premedication, Baby was induced with sevoflurane and paralysed with atracurium and put the LMA of size 1 and maintained by Intermittent positive pressure ventilation. Tracheostomy was performed with 2.5 ID tracheostomy tube placement. Excision of the whole laryngeal web was done with MLS scissor and placement of silastic sheet was done to prevent adhesion. Stenting was done to prevent adhesion.

Conclusion

In airway cases greatest challenge during anaesthesia is to secure adequate ventilation and good surgical field visibility throughout the procedure. Inhalation induction of anaesthesia is a firmly established but in COVID era we preferred to do under controlled ventilation to prevent coughing and laryngospasm intraoperatively. The surgical triaging or categorization which was initially followed were adopted and eventually adapted according to the changing COVID 19 trend. Advanced planning of workflows and procedures for emergent intubations outside the operating room is critical and representatives from anaesthesiology, critical care, respiratory therapists, hospitalists and nursing, and respiratory therapists were also needed.

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