Altered airway anatomy but challenges remains same

ABSTRACT
The altered pediatric airway is a nightmare for an anesthesiologist. Managing such cases with limited resources makes it more challenging. Here, we report a case of pediatric patient with altered airway anatomy posted for gastroscopy and feeding tube insertion. This case highlights the management of pediatric difficult airway and discusses the various choices of anesthesia technique.

Key words: Altered; airway; difficult; pediatric

Introduction
The pediatric airway is a different airway. But altered anatomy makes it difficult airway. The standard principles for managing the difficult airway in adults cannot be applied in pediatric patients. Here, we describe a case of relatively uncommon pediatric altered airway anatomy posted for gastroscopy and feeding tube insertion.

Case Report
A 3-year-old boy weighing 6 kg came with history of accidental removal of a nasogastric tube (NGT). The child was a case of global developmental delay with spastic quadriparesis. As he had difficulty in swallowing since childhood he was on NGT feeding. There was a history of multiple nasogastric feeding tube insertions since childhood. At present patient came with history of accidental removal of NGT and inability to eat solid food.

On examination, the child was severely malnourished. There was global developmental delay and head lag with muscle wasting. His cardiovascular system was normal. Auscultation revealed bilateral equal air entry with fine basal crepts. Child had hoarse voice. His respiratory rate was 14/min. Room air saturation was 96%. His biochemical profile was within normal limits. Chest X-ray showed features suggestive of bronchopneumonia. He was posted for endoscopic NGT insertion under monitored anesthesia care in an endoscopic suite. All ASA monitors were attached and sedation was provided with fentanyl and midazolam. Supplemental oxygen was given through nasal prongs. Endoscopist noted abnormal pharyngeal anatomy. [Video 1 and Figure 1] There was scarring in the posterior pharyngeal wall with no identifiable epiglottis and aryepiglottic fold. Vocal cords were compressed. An attempt was made to pass NGT across the esophagus but the child developed respiratory distress. Hence, the procedure was abandoned. The child was now posted for surgical gastrotomy and feeding tube insertion.
Preoperatively thorough workup was done. 2D echo revealed a normal study. Direct laryngoscopy by otorhinologist revealed maldeveloped epiglottis. There was a scarring/stenosis present in supraglottic area. There was a weakness in the left vocal cord with severely narrowed vocal cord chink.

The patient was kept fasting for 6 h. Informed anesthesia consent was taken. IV cannula was placed. Appropriate size tracheostomy tubes (3 and 3.5) were kept ready. The child was shifted inside the operation theater. All ASA monitors were attached. Appropriate landmarks were marked for the emergency front of neck access.

Sevoflurane induction was done with 100% oxygen. After achieving adequate depth, an attempt of laryngoscopy was done. It revealed a single opening with severe scarring of pharyngeal tissue and unidentifiable epiglottis or laryngeal anatomy. As the depth of anesthesia was not adequate for further attempts, we paralyzed with atracurium. The second attempt of laryngoscopy revealed a single opening and after extensive burp maneuver revealed another narrowed opening which we assumed to be vocal cord chink. A three-number uncuffed endotracheal tube was passed through that opening. An anesthesia circuit was connected and tube position was confirmed with capnography. A surgery was carried over uneventfully. A short course of dexamethasone and hydrocortisone was given as antioedema agents. After completion of the surgery, the patient was extubated once he became awake. His postoperative course was uneventful.

**Discussion**

This case represents a rare finding of pediatric altered airway anatomy, and multiple intubation attempts are known risk factors to cause severe complications such as cardiac arrest in the pediatric difficult airway. Altered anatomy rules out the use of laryngeal mask airways which are lifesaving types of equipment in case of can not ventilate, can not intubate situation. In a setting with limited resources, this can be a nightmare for an anesthesiologist.

The principles of difficult airway management are to have all necessary working types of equipment, skilled assistance, and plan C, i.e., wake up or surgical airway. Unfortunately, all setups do not have the necessary working types of equipment or assistance available to overcome this difficulty.

The golden technique to manage pediatric difficult airway is inhalational induction and maintenance of spontaneous ventilation. The ideal equipment to manage this case would have been a fiberoptic bronchoscope (FOB). The advantage with FOB is one does not require a very deeper level of anesthesia like direct laryngoscopy which elicits very noxious stimuli. The recent addition to anesthesiologist armamentarium is a video laryngoscope. The biggest advantage is that they offer a panoramic view of the glottis.

In our institute, we lacked ultrathin FOB and pediatric video laryngoscope. In the present case, we attempted direct laryngoscopy with inhalational induction. As it revealed very anteriorly placed larynx, we decided to give atracurium. Although succinylcholine, a short-acting muscle relaxant is ideal in the difficult airway, history of quadriparesis excludes its use in this case. Another rationale for the use of atracurium was established good mask ventilation and availability of back up plan (tracheostomy and cricothyroidotomy). The literature has proved that muscle relaxants increase the quality of mask ventilation, improve laryngoscopy view and thus reduce the intubation attempts. In our case, we could successfully intubate the child after achieving excellent intubating conditions. This case did not have any landmark for intubation like epiglottis which made conventional laryngoscopy challenging.

There are various types of equipment and intubation techniques available for the management of the pediatric difficult airway. In our opinion, the key points of pediatric airway management are careful planning, adequate depth of anesthesia, and availability of skills.

We conclude that altered pediatric airway anatomy needs special attention as narrowed airway in an anxious, distress child makes it more challenging.
Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form, the parents/guardians have given their consent for their child images and other clinical information to be reported in the journal. The parents/guardians understand that their child’s name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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