Temporomandibular Joint Ankylosis: “A Pediatric Difficult Airway Management”

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Abstract

Intubating a pediatric patient with temporomandibular joint ankylosis is a daunting task, and it becomes more challenging with limited mouth opening. Fiberoptic nasotracheal intubation technique is considered a gold standard. We describe an improvised technique of securing airway in the absence of appropriate-sized fiberoptic scope. The endotracheal tube inserted in the left nostril for maintaining depth of anesthesia was advanced under vision by the fiberoptic scope inserted into the right nostril, and with external laryngeal manipulation, the airway was secured without complications.

Keywords: Airway management, bronchoscopy, pediatrics, temporomandibular ankylosis

Introduction

A pediatric difficult airway can be a challenging situation for an anesthesiologist. Difficult airway leading to inadequate ventilation is a major cause of morbidity in children than adults. It is commonly encountered with congenital anomalies such as Treacher Collins syndrome, Pierre Robin syndrome, and Apert syndrome or in acquired conditions such as epiglottitis, retropharyngeal abscess, and subglottic stenosis.

Utility of Mallampati Classification in predicting pediatric difficult airway is limited and has been shown to be less sensitive. This assessment becomes more difficult in cases of limited mouth opening such as temporomandibular joint (TMJ) ankylosis. TMJ ankylosis can be congenital and idiopathic, due to trauma and infective pathology. Poor oral intake affects the nutritional status, and this usually becomes an indication for surgical intervention. We present a case of bilateral TMJ ankylosis for surgery in a pediatric age group with limited mouth opening managed in the absence of appropriate-sized fiberoptic scope.

Case Report

A 5-year-old male child, weighing 13 kg, a case of bilateral TMJ ankylosis, posted for release of ankylosis. The child had no other comorbidities. Airway examination revealed maximum mouth opening (interincisor gap) of 4 mm with mandibular hypoplasia [Figure 1]. Difficult airway was anticipated. Tracheal intubation with direct laryngoscopy and use of supraglottic airway adjuncts were ruled out. The anesthesia plan A was nasotracheal intubation under fiberoptic guidance. Emergency needle cricothyrotomy and tracheostomy set were arranged and kept ready as a plan B with the Ear-Nose-Throat team informed in advance. Anesthesia plan was explained to the parents and the consent was obtained.

Nebulization with 2 ml of 2% lignocaine and the instillation of xylometazoline nasal drops in both the nostrils were done 30 min before shifting to the operating room (OR). Premedication in the OR was done with injection glycopyrrolate 4 µg/kg and midazolam 1 mg, followed by minimum mandatory monitoring (pulse oximeter, capnograph, electrocardiography, and noninvasive blood pressure). The adequacy of the mask ventilation was checked with end-tidal carbon dioxide trace on the capnograph. Induction was done gradually in a graded fashion with sevoflurane (1%–8%) in oxygen. Adequate depth

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How to cite this article: Sharma A, Dwivedi D, Sharma RM. Temporomandibular joint ankylosis: “A pediatric difficult airway management”. Anesth Essays Res 2018;12:282-4.
of anesthesia (minimum alveolar concentration of 1.2) was achieved, and the dial settings of sevoflurane were reduced gradually and kept at 3%. A 4.5-mm (internal diameter [ID]) size cuffed endotracheal tube (ETT) was introduced through left nostril after the appropriate application of the lignocaine jelly into the nasopharynx. The ETT was then connected to the Jackson Rees circuit, and chest movements corresponding to the bag movements were confirmed. Fiberoptic bronchoscope (Pentax™ 4.95 mm in width) was only available in our hospital which did not permit threading of 4.5-mm ID ETT. We introduced the available bronchoscope through right nostril with 4.5-mm ID ETT already in situ in the left nostril. Under fiberoptic vision, once the glottic aperture was visualized, the ETT in the left nostril was advanced gently with minimal external laryngeal manipulation (ELM). However, initial two atraumatic attempts failed to insert ETT through glottic opening. The failure was on account of spontaneous breathing, vocal cords movements, and child moving in response to glottic stimulation with ETT. The third attempt was planned with muscle relaxant after excluding the trauma and adequacy of mask ventilation which was checked in the beginning. The child was administered injection fentanyl 1.5 µg/kg, injection succinylcholine 2 mg/kg intravenous (I.V.) following which ETT was passed successfully through glottic opening under fiberoptic vision. Confirmation was done by both end-tidal CO₂ trace on capnograph and auscultation. Oxygen saturation was maintained between 96% and 98% throughout the attempts. Anesthesia was maintained with O₂, N₂O, sevoflurane, and atracurium with controlled ventilation. The surgery lasted nearly 3 h. Before extubation, the surgeon confirmed mouth opening with interincisor gap of 30 mm. At the end of surgery, the child was reversed and extubated uneventfully.

**Discussion**

Bilateral TMJ ankylosis renders the airway difficult with no option of vocal cord visualization in wake of limited mouth opening. Problems get compounded in the presence of trismus, associated mandibular hypoplasia effecting the skeletal growth of face, and obstructive sleep apnea. Our case had mandibular hypoplasia with no history of obstructive breathing.

The options available with limited mouth opening are the nasal intubation either blind or fiberoptic assisted, retrograde intubation, and tracheostomy. The choice depends on the patient’s age, his clinical status, cooperation, expertise, and availability of the equipment. Inhalational induction of the patient before attempted intubation is preferred in majority of cases after confirming the adequacy of mask ventilation and maintaining the spontaneous ventilation.[⁵]

Kulkarni et al. in their review of 31 cases of TMJ ankylosis had successfully performed blind nasal intubation under deep plane of anesthesia in 87% cases using breath sounds as a guide with gentle neck manipulations.⁶ Shah et al. had managed TMJ ankylosis with obstructive sleep apnea by blind awake nasal tracheal intubation after the administration of superior laryngeal nerve (SLN) block and intratracheal instillation of local anesthetic solution.⁷ The chances of injuring the oral mucosa and bleeding are always high with the blind technique.⁸ Mohan et al. used total I.V. anesthesia with propofol infusion 50 µg/kg/min and kept the patient spontaneous with nasal prongs. Extraoral approach was followed and condylectomy was done after the local infiltration of the site with local anesthetic solution.⁹ However, the fiberoptic nasal intubation is a gold standard technique, but this is also fraught with challenges.¹⁰

Children generally do not cooperate while applying topical anesthesia to the airway or administering airway blocks for awake fiberoptic intubation. Therefore, it was not considered in our case. Shetty et al. in their audit of 5 years revealed that only 18.75% patients who were above 12 years were supplemented with airway blocks.¹¹ SLN block supplementation with fiberoptic nasal intubation facilitates the ventilation by avoiding laryngospasm during the attempts of intubation. Kawasak et al. used SLN block as a rescue in cannot mask ventilate scenario following failed attempt of fiberoptic nasal intubation resulting in laryngospasm.¹²

Utmost vigilance is required while attempting fiberoptic bronchoscopy in pediatrics due to the smaller space in the airways. The presence of TMJ ankylosis with poor mouth opening further increases the airway obstruction primarily because of opposition by the structures of oropharynx due to the presence of the subatmospheric intrapharyngeal pressure with reduced muscle tone of the oropharyngeal structures.¹³

Meier et al. demonstrated the effective use of continuous positive airway pressure (CPAP) along with the chin lift and jaw thrust for improving the glottic view during bronchoscopy in pediatric population.¹⁴ We administered CPAP during fiberoptic nasal intubation by inserting the ETT from the left nostril in the oropharynx which was connected to the anesthesia circuit. This helped in overcoming the subatmospheric pressure present in the oropharynx.
Fiberoptic nasotracheal intubation in difficult airway is done usually by rail loading the ETT over fiberoptic scope as one assembly and maintenance of anesthesia using either a nasopharyngeal airway or ETT inserted from the other nostril.\textsuperscript{[11,12]} We improvised our technique due to unavailability of an appropriate-sized bronchoscope. The ETT placed in the other nostril was advanced under fiberoptic guidance following muscle relaxation and with ELM the airway was secured. All India Difficult Airway Association guidelines (2016) for difficult pediatric airway were followed, and adequacy of mask ventilation was confirmed as a prerequisite before any attempts.\textsuperscript{[13]}

Difficult airway management in pediatrics is very challenging which requires expertise and good planning with readiness for tackling any complication arising due to the attempted intubation such as bleeding, trauma, laryngospasm, and hypoxemia. The situation can deteriorate and can convert into “cannot intubate and cannot ventilate” scenario. It is the closed loop functioning between the anesthesia team members which favorably affect the outcome in terms of morbidity.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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