Anaesthetic Management of A Paediatric Patient with Bilateral Temporomandibular Joint Ankylosis: A Case Report

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ABSTRACT

Introduction: The role of fibreoptic bronchoscopy (FOB) in patients with difficult airway is well established, however in paediatric patients it becomes very difficult due to lack of cooperation and decreased lung reserve.

Case report: We report a case of successful management of a difficult paediatric airway due to bilateral temporomandibular joint ankylosis with fibreoptic bronchoscopy under general anaesthesia (GA) using nasopharyngeal airway.

Conclusion: In paediatric patients with TMJ ankylosis, a well lubricated nasopharyngeal airway inserted after induction helps to achieve adequate oxygenation and depth of anaesthesia.

Key words: Temporomandibular joint ankylosis, paediatric fibreoptic bronchoscopy, nasopharyngeal airway.

INTRODUCTION

Trauma is the major cause of temporomandibular joint (TMJ) ankylosis globally.[1,2] The anaesthetic management of paediatric patients with TMJ ankylosis presents a real challenge to the anaesthesiologist. Technically it encompasses both: management of paediatric patients, and difficult airway scenario. Awake fibreoptic intubation with topical anaesthesia is regarded as the safest approach in anticipated difficult intubation. However, in a paediatric patient, awake FOB is hardly ever possible. The safest option probably is FOB under deep sedation or GA with maintenance of spontaneous ventilation.[3]

In this article, we look at the predicted, elective difficult airway management of a paediatric patient with TMJ ankylosis.

CASE REPORT

A 7 years old, 14 kg, boy presented with chief complaint of inability to open his mouth since 4 years. He had a history of fall from 1st floor of a building, at the age of 3 years following which he sustained bilateral mandibular condyle fracture. He had progressive decrease in mouth opening after this accident, resulting in a mouth opening of only 0.5 cm at the time of presentation. Rest of the history was unremarkable.

The child was playful and afebrile. In view of poor oral intake, his weight percentile was lower than his peers. HR: 104/min, BP: 96/60 mm Hg, RS and CVS examination were normal. All biochemical investigations were within normal limits.

Airway assessment: Neck flexion and extension were normal. Mouth opening was severely restricted with inter incisor gap of 0.5 cm. Upper central incisors were missing. Superficial nasal endoscopy showed right nostril to be more patent than left (figure 1,2).

Flexible fibreoptic: Guided nasal intubation under general anaesthesia was planned. The procedure and the need for the same was explained to the child's parents and written informed consent, including the consent for emergency tracheostomy, was taken pre-operatively. The patient fasted for 8 hours preoperatively (figure 3).

Preparation

Patient was taken to PACU. An intravenous access was obtained and infusion of ringer lactate with 10% dextrose was started at 2ml/kg/hour.

Monitoring included ECG, pulse oximetry and non-invasive arterial blood pressure (NIBP).

IV glycopyrrolate 0.04 mg/kg was given to reduce secretions. All resuscitation equipments and difficult airway cart, including cricothyroidotomy device and high-pressure ventilating device, were kept ready. Xylometazoline drops were put in both nostrils. Lignocaine 2% nebulization was started 30 min before surgery (Total dose 5mg/kg).

Patient was taken in the OR. Monitoring included ECG, pulse oximetry, capnography and NIBP. IV fentanyl 0.5 ug/kg, hydrocortisone 2mg/kg, and dexamethasone 0.1mg/kg were given. Gaseous induction with sevoflurane in 100% O_2 was started using Jackson Rees (JR) circuit. Titrated dose of Inj. Propofol 0.5-1 mg/kg was given taking care to preserve spontaneous respiration. After confirming the ease of mask ventilation, plane of anaesthesia was deepened with gradual increase in inspired sevoflurane concentration to achieve MAC of 1-1.2%.

A well lubricated 6.5 number nasopharyngeal airway fitted with a 5 mm ID ETT universal connector was inserted blindly through the left nostril. JR circuit was connected to the nasopharyngeal airway through the connector and

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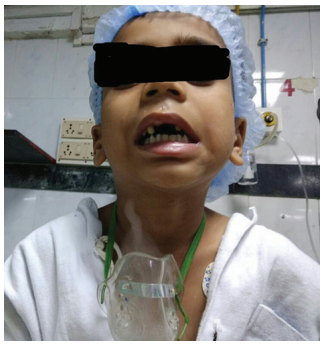

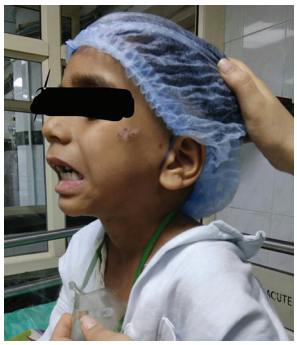

Figure-1: Airway assessment; **Figure-2:** Airway assessment

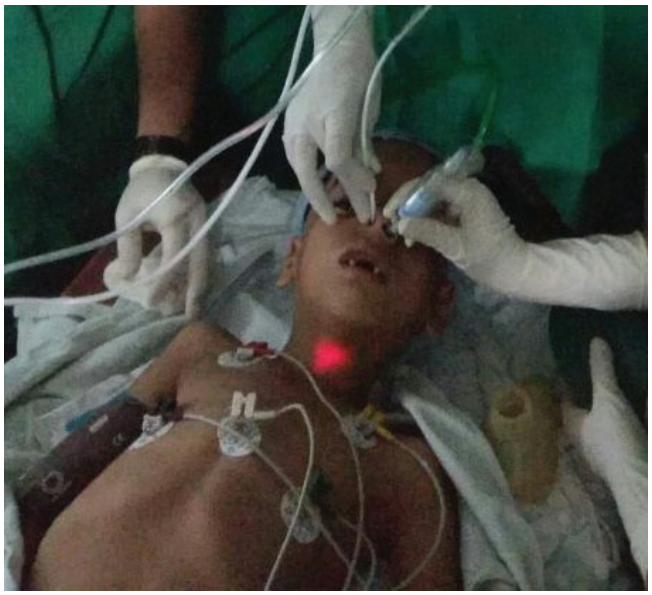

Figure-3: Guided nasal intubation

a good trace of end-tidal carbon dioxide was obtained. It was used to maintain the plane of anaesthesia as well as to assist spontaneous breaths intermittently. Anaesthesia was maintained on oxygen and sevoflurane (MAC 0.8 to 1%) using JR circuit. Plane of anaesthesia was kept deep enough to allow the passage of FOB (figure-3).

Paediatric flexible fibreoptic bronchoscope (OD 3.8 mm and length 60 cm) was used for intubation (A-Scope AMBU). After checking the FOB, a cuffed endotracheal tube 5mm ID was lubricated and loaded over the bronchoscope and inserted through the right nostril. The FOB was gradually advanced and 1 ml of 2% lignocaine was sprayed through the suction channel on visualization of vocal cords. Intermittent suction through the suction channel of FOB facilitated the procedure. After FOB guided intubation, JR circuit was attached to the ETT and tube position was confirmed by capnography and chest auscultation. Inj. Atracurium 0.75mg/ kg was given. Heart rate, ECG, NIBP and oxygen saturation were monitored continuously throughout the procedure. Anaesthesia was maintained with sevoflurane, O_2 and air (50:50) and intermittent dose of atracurium with JR circuit using intermittent positive pressure ventilation.

The patient underwent release of unilateral temporomandibular joint ankylosis with gap arthroplasty which resulted in the mouth opening of 2 fingers at the end of the surgery. At the end of the procedure, residual neuromuscular blockade was antagonised using Inj. Neostigmine 0.05 mg/kg and Inj. Glycopyrrolate 0.08 mg/kg. Extubation was done successfully after return of adequate muscle tone, power and spontaneous breathing.

A smooth recovery without any complications in the form of nasal bleeding, desaturation, sore throat, and voice change were noted. Inj. Paracetamol 15mg/ kg was given 8 hourly for pain relief.

DISCUSSION

TMJ ankylosis is a unique disease characterised by bony or fibrous union between the head of mandibular condyle and glenoid cavity leading to reduced mouth opening. The most common causes of TMJ ankylosis in paediatric age group are trauma (13-100%), local or systemic infections (10-49%), systemic diseases (10%) like ankylosing spondylitis, rheumatoid arthritis and psoriasis or surgery. The most common causes of bilateral TMJ ankylosis are congenital or post traumatic. [4] If not treated in time, TMJ ankylosis can lead to multiple problems like poor nutrition due to feeding difficulty, poor oral hygiene, alteration in speech development, poor facial and dentoalveolar development leading to psychological trauma. Children with longstanding bilateral TMJ ankylosis during the active growth phase may have severe bird face deformity due to hypoplastic and retrognathic mandible leading to obstructive sleep apnoea, a potentially fatal disorder.

The treatment of TMJ Ankylosis is stretching exercises in the early stages of the cartilagenous calcification and later, surgery, to restore the jaw movement.[5] The surgical corrections include condylectomy, gap arthoplasty, interposition arthroplasty and artificial replacement of joint.[6] Children with TMJ ankylosis present with difficult intubation because of reduced mouth opening and limited protrusion of lower jaw.

The various options available for securing airway in a patient with TMJ ankylosis include awake nasal fibreoptic intubation, blind or semi-blinded nasal intubation, retrograde endotracheal intubation, and tracheostomy. The selection of the technique depends on the clinical condition of the patient, availability of equipment, and the expertise of the Anaesthesiologist.

Blind nasal technique has a high failure rate, is potentially traumatic, and may lead to_edema and further airway complications on repeated attempts. Retrograde intubation is very difficult in children and in view of reduced mouth opening, one may have difficulty in retrieving the catheter orally. However, a modified technique of retrograde intubation under general anaesthesia has been described in children.[7] Tracheostomy is an invasive procedure with a high post operative morbidity and so it was reserved for emergency in our case.

Since clinical tests to identify the more patent nostril can be erroneous, it is our practice to routinely perform a fibreoptic nasal endoscopy for all patients requiring nasal intubation. Inadvertent intubaton of nostrils with septal or

other deformities may be associated with an increased risk of complications like mucosal tearing or avulsions of inferior and middle turbinates. Our patient had a more patent right nostril, so we decided to perform a right nasal intubation.[8]

Awake nasal fibreoptic intubation with topical anaesthesia is regarded as the safest approach in patients with TMJ ankylosis but patient's cooperation is essential. If the child is cooperative, topical anesthesia to the airway together with titrated sedation and gentle communication with the child and the parents may suffice. But, most of the time this is not possible in children. For uncooperative children, general anaesthesia or deep sedation is mandatory along with topical anesthesia. However, the principle is to maintain spontaneous ventilation till the airway is secured. Due to higher rate of oxygen consumption and reduced FRC, children cannot tolerate apnoea for a long time. Maintenance of good oxygenation and adequate depth of anaesthesia allowing anaesthetist time to use FOB and good topical anaesthesia to prevent laryngospasm are essential for successful paediatric fibreoptic intubation.[9]

Maintenance of anaesthesia can be achieved either by inhalational or intravenous technique (TIVA). TIVA requires infusion pump for smooth delivery of anaesthetic agent so as to maintain adequate depth of anaesthesia. Infusion pumps may not be available in all the centres. In inhalational technique, maintenance can be achieved by a paediatric endoscopy mask[10] or a nasopharyngeal airway (as was used in our case) and the depth of anaesthesia can be easily monitored with the help of MAC of an inhalational agent used.

Unique problems encountered during paediatric fibreoptic intubation:

1. Smaller airways of pediatric patients can be easily touched during fiberoptic intubation leading to difficult visualization;
2. A big tube can get caught on the arytenoids, whereas repeated bronchoscopy may be required to find the correct size of uncuffed tube. Hence, a small cuffed ETT is the best choice for "tube over scope technique" as we did in our case, to avoid this problem.

The incidence of laryngospasm during anaesthesia is reported to be 8.6/1000 in adults and 27.6/1000 in children. Topical anaesthesia of airway reduces the incidence of laryngospasm. Hence, preoperatively, we gave lignocaine nebulization to our patient. During the procedure, lignocaine can be injected directly down the suction channel of the bronchoscope as was done in our case or through an epidural catheter inserted down the suction channel. Simultaneous administration of a volatile anaesthetic (sevoflurane) with nebulised lignocaine via a small volume nebulizer that is connected to the inspiratory limb of the circle system via a T piece adapter can also be used for fiberoptic intubation.[11] There is also a case report of bilateral superior laryngeal nerve block to prevent laryngospasm at the time of negotiation of the tube through the vocal cords.[12]

Conclusion: In paediatric patients with TMJ ankylosis, a well lubricated nasopharyngeal airway inserted after induction can be used to maintain anaesthesia for nasal fibreoptic bronchoscopy. It helps to achieve adequate oxygenation and depth of anaesthesia as well as allows the Anaesthetist enough time to use fibreoptic bronchoscope.

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