

Blind nasal intubation in a child with ankylosis of temporomandibular joint

MN Marhatta and SP Acharya

Department of Anaesthesiology, Tribhuban University Teaching Hospital, Maharajgunj, Kathmandu, Nepal

Correspondence author: Mod Nath Marhatta, Department of Anaesthesiology, Tribhuban University Teaching Hospital, Maharajgunj, Kathmandu, Nepal marhatta@hotmail.com

ABSTRACT

Blind nasal intubation has been one of the favoured methods of intubating the trachea in patients with restricted mouth opening and thus a difficult laryngoscopy and oro-tracheal intubation. Here, we describe airway management of patient who presented with traumatic ankylosis of the right temporomandibular joint and reduced mouth opening that was planned for elective release of the ankylosis and temporalis fascia flap. Successful blind nasotracheal intubation was done and after the surgery was completed, awake extubation was done and mouth opening was significantly increased. The recovery and the post-operative periods were uneventful. -----

Keywords: Blind nasal intubation (BNI), temporomandibular joint (TMJ).

Ankylosis of Temporomandibular Joint (TMJ) basically impairs the movement between the mandibular condyles and the temporal bone. TMJ ankylosis is of two types. True ankylosis: which is usually bilateral and associated with ankylosis of other joints also (as in Ankylosing Spondylitis). False Ankylosis: which is usually unilateral and secondary to burns, trauma, irradiation, and temporal craniotomy. These patients presents to Anaesthesiologists with a challenge for airway management as mouth opening is grossly reduced. Adequate mouth opening is of prime importance for insertion of laryngoscope and subsequent glottis visualisation. Normally adults should have a mouth opening of 3-4cms (two finger breadths) or more between upper and lower incisors. Thus airway management becomes problematic and limited options are available. BNI is one of the preferred options where fiberoptic bronchoscope is not available.

CASE HISTORY

A 12 yr old boy, diagnosed as Right Temporomandibular joint ankylosis was planned for release of ankylosis and Temporalis fascia flap under general anaesthesia. On Preanaesthetic assessment, the boy had a history of fall five years back when he injured the right Temporomandibular joint (TMJ). After then he developed pain and progressive reduction in mouth opening. There was no history of any associated head or other injuries neither any significant illness, nor any previous exposure to anaesthesia. The weight of the boy was 25 kgs. There were no any significant findings on general as well as systemic examinations. On examination of the airway, mouth opening was restricted

to 1.5 cms (one finger) and Mallampatti was grade IV (Fig. 1), however Thyromental distance was adequate (6cm) and on palpation of left TMJ movement could be felt but on the right side, no movement could be perceived. On examination of the nasal cavity, there was no obvious deviation of nasal septum, no hypertrophy of turbinates, or any nasal mass.

Preoperative investigations were within normal limits. No premedications were given for the child. On the day of the surgery, the child was reassessed for management of difficult intubation and necessary instruments made ready and planned for blind nasal intubation, with set for retrograde intubation also kept ready. In the preoperative waiting area, nasal decongestant, 0.05% Xylometazoline was instilled in the bilateral nostrils three times at an interval of ten minutes. Intra-venous cannulation was done under aseptic precaution with a 20 G IV cannula and Lactated Ringer's solution infused at the rate of 65ml/hr.

In the operating room, Electrocardiogram, Heart rate, Blood pressure, Pulse oxymeter and Capnograph were attached. Injection Midazolam 1 mg was given IV to allay anxiety.

After adequate preoxygenation, General anaesthesia was induced with titrated dose of Thiopental sodium (150mg, 6mg/kg) till the child was asleep and was spontaneously breathing. Anaesthesia was maintained with Halothane 2.0% and Oxygen. Topical Lignocaine 4% was instilled into the pharynx and the larynx through a sprayer. Inj Lignocaine 40mg (1.5mg/kg) IV was given to blunt the hemodynamic response to intubation. The right nostril



Fig. 1. Restricted mouth opening, on pre operative assessment.

was lubricated with Lignocaine jelly, and blind nasal intubation was tried. A 5.5 mm internal diameter, cuffed endotracheal tube was introduced through the right nares and entered into the pharynx. As nasopharynx was reached, breathing sound was listened at the endotracheal tube connector and further introduced while larynx was pushed gently to the right side externally. In the first attempt the trachea could not be intubated and the endotracheal tube was withdrawn and spontaneous ventilation resumed with face mask. After few minutes of ventilation, blind nasal intubation was tried again with the same size tube. As the nasopharynx was reached, guided by the breath sound, endotracheal tube was further introduced with repositioning of head, extending it and pressing down at the thyroid cartilage. This time it was inserted into the trachea. This was marked by coughing of the patient and further confirmed by movement of the reservoir bag, chest auscultation and with capnography. The endotracheal tube was then fixed. Pethidine 20 mg IV was given for analgesia. Anaesthesia was then maintained by the circle system with Halothane 1%, Nitrous oxide 60%, Oxygen 40% and Vecuronium 2.5 mg (0.1mg/kg). Ventilation was maintained in CMV mode with tidal volume of 300ml, Respiratory rate of 14 per min. Surgery was started and ankylosis of the right TMJ was released and temporalis fascia flap was interspersed within the TMJ to prevent further ankylosis at a later period (Fig. 2).

Surgical procedure was completed in one hour and mouth opening was found to be increased to three fingers (4.5cms) (Fig. 3). After that, halothane and nitrous oxide were stopped; spontaneous respiratory efforts were seen within few mins and muscle relaxation reversed with IV Neostigmine 1.5 mg (0.05mg/kg) and Atropine 0.6mg (0.02mg/kg). Oropharyngeal suctioning was done from the mouth as mouth opening was already increased and then the trachea was extubated when the patient was fully awake. Oxygenation was then maintained with face

mask with 100% oxygen. The patient was then shifted to the postoperative recovery area and was observed for an hour and was uneventful. The patient was then shifted to the ward and was discharged home on seventh postoperative day after the skin sutures were removed. On follow up, after two weeks, his mouth opening has significantly improved to 6cms.

DISCUSSION

Difficult airway management has been the prime responsibility of the anaesthesiologists and several conditions causes difficulties in airway management.

Ankylosis of the TMJ is one of the causes of restricted mouth opening, where limited options remain for the management of difficult airways. As mouth opening is restricted, some better options for airway management like orotracheal intubation, Laryngeal Mask Airway (LMA), Intubating LMA (ILMA), Combitube, Cuffed Oro Pharyngeal Airway (COPA) are not useful in these patients. So the limited intubating options in these patient include blind nasal intubation, retrograde intubation through a cricothyoid puncture, transtracheal ventilation, Fibreoptic bronchoscopic intubation, and surgical airways, e.g. Tracheostomy.¹ In this patient, we planned for blind nasal intubation and tracheostomy and retrograde intubation were kept as the last resort for airway management as they were more traumatic.² Fibreoptic bronchoscope was arranged and kept ready but only adult size bronchoscope (6mm) was available, through which 7mm ID endotracheal tube could be railroaded. Paediatric size bronchoscope was not available.

Blind nasal intubation (BNI) is especially valuable for intubating spontaneously breathing patients with or without sedation, or under general anaesthesia. It may be used in elective as well as selected emergent situations

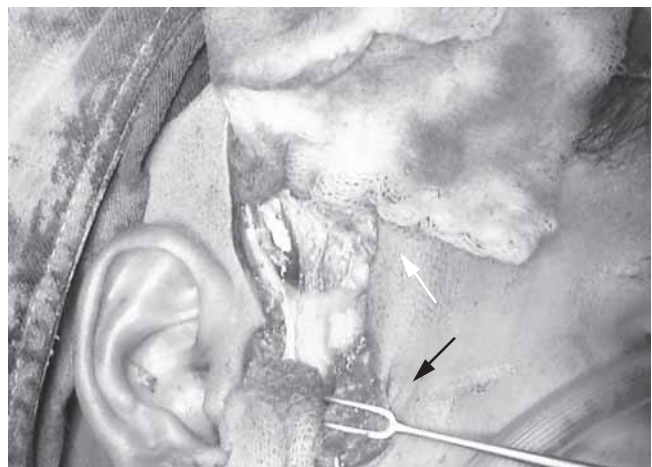


Fig. 2: Temporalis Fascia Flap (arrow) interspersed within the TMJ.

by the experienced, in the emergency departments, for maxillofacial traumas, and injuries.³⁻⁶

Some authors prefer fiberoptic nasal endoscopy prior to nasal intubation.¹ The patient should not suffer from a bleeding diathesis or taking oral anticoagulants, or else moderate to severe epistaxis may result.⁷ Other complications of BNI include middle or inferior turbinatectomy, infection, nasal mucosal tears.⁷

The nasal mucosa should be gently prepared with vasoconstrictors (phenylephrine, oxymetazone) and local anaesthetic agents like lignocaine, or cocaine should be considered, especially in the awake, sedated patient.⁸ Intravenous induction agents, infused continuously, to allow for controlled sedation that does not affect airway and breathing. The patient's head and neck is then placed in the "sniffing position" if not contraindicated.^{3,9} It is a bit easier for right handed operators to use the right naris, though either may be used. However clinical tests to identify more patent nostrils can be erroneous.⁸ The same size endotracheal tube selected for oral intubation is appropriate, especially in children.^{3,9} The endotracheal tube is passed along the floor (inferior aspect) of the nose and oriented to "aim" at the larynx making an anterior curve in the endotracheal tube.^{3,9} The breath sounds are listened for and the tube is advanced into the trachea through the glottis. If unsuccessful, the patient's head is then repositioned and tube is facilitated with BURP manoeuvre or with optimal external laryngeal manipulation.⁹⁻¹¹

One method has been suggested to identify proper nasotracheal intubation, and this includes identification of five different positions once the tube reaches the supraglottic region.³ Once one of the five response positions are reached, one has to decide which position has been reached, then make the appropriate response.



Fig.3. Increased mouth opening, immediately after surgical correction, intraoperative.

Position T (Trachea): This is the required position! Signs are: breath sounds continue through tube, tube continues to advance, patient coughs through tube. *Response T:* Secure tube. Confirmation can be done by auscultation of breath sounds bilaterally, use of self inflating bag, use of SCOTI device, use of capnography, or through fiberoptic endoscope.¹²⁻¹⁵ Proper endotracheal intubation can also be indirectly confirmed by monitoring cardiovascular changes to naso-tracheal intubation.¹⁶ Some have also described the use of suction catheter nasotracheal intubation.¹⁷

Position A (Anterior): Signs: breath sounds continue through the tube, the tube stops (unable to advance further), and the patient coughs (mostly through the tube). *Response A:* Position A can almost always be converted directly to Position T by slight withdrawal and re-advance of tube while the patient's head and neck are gradually *flexed* toward the chin-on-chest position.

Position L or R (Left or Right pyriform sinus): Signs are: breath sounds through tube STOPS, tube stops (unable to advance), there is NO coughing. Occasionally the tube may be palpable on one side of the neck. *Response L or R:* Position L or R can invariably be converted into one of the other three (T, A or E) by slight withdrawal (to the point where breath sounds through tube resume) and slow rotation (back toward midline) and re-advance.

Position E (Esophagus): Signs: breath sounds through tube STOPS, tube continues to advance, there is NO coughing. *Response E:* Position E can most often be converted to position T by withdrawing the tube until breath sounds through tube resume and then employing one or more of the following (separately or together):

1. *Extend* patient's head and re-advance.
2. Largely *inflate cuff* with 10-15 ml of air, advance tube until resistance is felt, maintain some advancing pressure on tube while cuff is *slowly deflated* (to avoid injury to glottis).^{3,9}
3. Apply posterior pressure on the larynx and re-advance tube. Most often, position T can be achieved. It only takes a few minutes to find out the position.

However in patients whose mouth opening are not restricted but require nasotracheal intubation, laryngoscopy and intubation of the trachea can be done under direct visualisation or with the aid of Magills forceps.

Once the tube placement is confirmed, the anaesthesia is deepened and long acting muscle relaxants given. The anaesthesia is then continued as usual depending on the

requirement and the preferences of the anaesthesiologists. At the end of surgery, adequate suctioning and clearing of secretions, bloods, should be done and extubation done when the patient is awake and able to maintain airway.⁹

BNI is a best alternative for management of difficult airway like in patients with marked ankylosis of TMJ and remains the technique of choice in places or conditions where expensive instruments like fiberoptic bronchoscopes are not available. It is less traumatic, less expensive option which has high success rate in the hand of expertise. Adequate preparation, monitoring, positioning and a coordinated team is mandatory for the success of the procedure.

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