Difficult Intubation; Temporomandibular Joint Ankylosis With Limited Mouth Opening And Hypertrophied Adenoid In A Six Year Old Child- Case Report And Review

S Mishra, S lata, V kumar, G Mishra, P Ezhilarasu

Citation

S Mishra, S lata, V kumar, G Mishra, P Ezhilarasu. *Difficult Intubation; Temporomandibular Joint Ankylosis With Limited Mouth Opening And Hypertrophied Adenoid In A Six Year Old Child- Case Report And Review*. The Internet Journal of Anesthesiology. 2008 Volume 22 Number 1.

Abstract

Various methods have been described for nasal intubation in children with temporomandibular joint ankylosis with limited mouth opening. As younger children are uncooperative, they required intubation under anesthesia. When associated with hypertrophied adenoid, there is high risk of bleeding in to the unprotected airway resulting in laryngospasm and/or bronchospsm. We describe here how successful intubation was performed in a child with Magill-tipped Red rubber (Rush) cuffed tracheal tube using an adult 4.1 fibreoptic bronchoscope under intravenous anesthesia.

CASE REPORT

A six year child weighing 18 Kg with T M Joint bony ankylosis was posted for surgery for release of ankylosis. On preoperative visit, the patient had a deviated nasal septum and hypertrophied adenoid confirmed through flexible nasoendoscope by a ENT surgeon. The child has no other coexisting disease. On airway examination maximum mouth opening was 4.5 mm.

Figure 1

Figure 1 (maximum mouth opening)

The child was premedicated with IV Glycopyralate, Metoclopropamide and Ranitidine. Phenylephrine nasal drops (0.25%) were instilled into both the nasal passages thirty minutes before shifting to the operation theatre. Topical anesthesia of nasal mucosa was achieved with lignocaine 4% (nasal pack of both the nostrils). An intravenous access was secure and the following monitors were attached, pulse oximeter, electrocardiogram noninvasive blood pressure monitor. Midazolam 0.5mg IV and fentanyl 30 µg IV were given. Propofol infusion was started followed by Oxygen insufflation through the left nostril via size-3 red rubber (rush) ETT. There was no airway obstruction and the vital parameters were maintained.

Superior laryngeal nerve and transtracheal block with 2%lignocaine was carried out under anesthesia. The right nostril was lubricated with lignocaine jelly. We inserted smaller size endotracheal tube, 2.5 mm ID red rubber cuffed tube (Rush) in the right nostril and gradually increased the size up to 4mm ID to minimize injury to the adenoids. This method not only decreased the chance of bleeding and possibly helped in dilatation of the nostril. An adult size 4.1mm fiber optic bronchoscope available in our hospital did not permit threading of 4.5 ID PVC ETT but it permitted a red rubber ETT to be threaded (figure2/3), possibly because of some elasticity of the red rubber tube. Difficulty in intubation was anticipated and equipment pertaining to emergency jet ventilator (VBM Medizintechnik, Sulz, Germany) and tracheostomy was kept ready. As a back-up plan for intubation, two other options were kept ready.

Options 1 - A wire would be passed through the working port of the endoscope and used as a guide to direct the

tracheal tube through the glottis and into the trachea

Options 2-Modified fiberoptic technique (1) Video assisted fiberoptic intubation, endotracheal tube as nasopharyngeal airway in one nostril and video fiberscope in the other nostril and advancement of TT under vision as seen in monitor so that the dynamics of TT insertion can be continuously viewed on the screen until intubation is accomplished. If the TT fails to enter the trachea directly, it may be manipulated under visual control to negotiate the glottic aperture.

Procedure:-

A FOB size 4.1 was threaded with red rubber tube size 4.5 cuffed ETT. After visualization of glottis and tracheal ring 1% lignocaine was instilled through working channel of FOB, and 4.5 Magill-tipped Red rubber (Rush) cuffed tracheal tube was railroaded over insertion cord and connected to circuit. Vecuronium 2mg IV was given after confirmation of ETT position. There was very minimal oozing of blood in oral cavity during inserting of 4.5 Nasal ETT. Anaesthesia was maintained with halothane and fentanyl. After release of ankylosis throat packed with ribbon gauge and reposition arthroplasty (grafting of bone from right10th rib) was done. There was no pneumothorax during resection of the rib. Operation lasted around 3hours, extubation was uneventful

Figure 2

Figure 2 (Red rubber cuffed tracheal tube threaded to FOB)

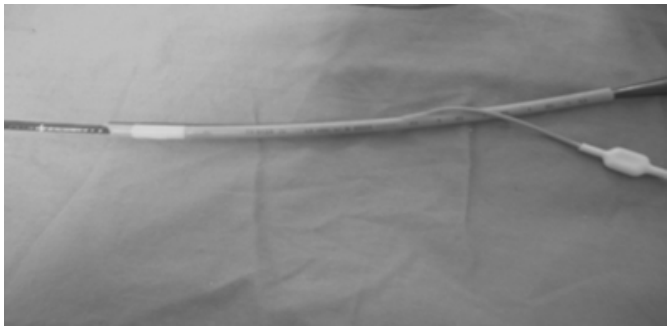

Figure 3

Figure 3(mouth opening post operative)

DISCUSSION

Awake tracheal intubation is the safest technique for anticipated difficult intubation. This is not feasible in children and hence requires general anaesthesia. Inhalation induction as well as intravenous induction has their own limitations. We preferred intravenous propofol infusion over inhalation induction, as there is risk of lighter plane of anaesthesia with inhalation technique during fiberoptic intubation procedure. (Though continuation with inhalation agent can be done with closing the mouth and then by insufflation technique through one of the nares by inserting a smaller size endotracheal tube and advancing until the point where breath sounds could be heard and connecting to breathing circuit. Still there is chance of lighter plane of anesthesia with this method). Considerable skill is required to perform fiberoptic intubation in a limited time frame as rapid emergence from inhalational agent may result in laryngospasm (2) particularly with sevoflurane. Airway obstruction due to the tongue falling back on the posterior pharyngeal wall may occur in both the methods with deeper plane of anaesthesia. Upward jaw thrust to perform a triple airway maneuver is near to impossible in children with B/L TMJ ankylosis; obstruction can be relieved by putting a smaller size nasal airway. We had kept ready size- 3.5/4mm ID red rubber tracheal tube as nasal airway.

Methods of induction in children for fiberoptic intubation

Inhalational

Sevoflurane induction followed by isoflurane
Insufflation technique through one of the nares with gas mixture of oxygen and sevoflurane/halothane
Sevoflurane/halothane induction with endoscopy mask
Halothane induction

Intravenous

- Incremental Propofol infusion with nasal airway in one of the nostril
- Ketamine with an antisialogogue premedication

Advancement of the nasotracheal tube (NETT) can traumatize nasal passages, causing bleeding, bacteremia, avulsion of a turbinate, or even retropharyngeal dissection (3, 4, 5). Lubrication, use of a vasoconstrictor, and prewarming of endotracheal tubes (ETT) for softening have been recommended to reduce trauma during nasotracheal intubation (4,5,6) Performing a preliminary fibreoptic nasoendoscopy enables the diagnosis or exclusion of intranasal abnormalities and allows the selection of the most patent nostril for intubation resulting in fewer complications(7).

We used magils tipped red rubber nasotrachaeal tube. The advantage are (1) absence of morphys eye, which can impinged on adenoid and can cause avulsion and epistaxis.(2).it is softer than PVC ETT. During nasotracheal intubation, thermosoftening (2, 5, 6) is recommended because it decreases the trauma from both the Murphy-tipped and the Magill-tipped PVC ETTs. Without thermosoftening, nasal mucosal trauma was more severe in the Murphy-tipped group than in the Magill-tipped group. Therefore, if one chooses to use a normal ETT, the Magill-tipped ETT should be used rather than a Murphy-tipped ETT. Though possibility of injury of nasal passage is more with cuffed than uncuffed tube, definitely red rubber cuffed tube has advantage over cuffed PVC tube (high volume low pressure) as it is smooth unlike rugose uneven cuff of the latter. Shinichi Kihara (8) et al described that the pharyngeal and tracheal placement phases of nasotracheal intubation require fewer attempts with the silicone tracheal tube than the PVC tracheal tube but that the glottic placement phase requires more attempts. Nasal morbidity is less common with the silicone tracheal tube. Use of a red-rubber catheter may reduce the trauma associated with nasotracheal intubation.

Many different methods are described for intubation in case of TM Joint ankylosis. Level of mouth opening is the important part of management of intubation in TM Joint ankylosis, not only for anterograde intubation but also to predict the feasibility of retrieving the catheter in retrograde intubation. Simple grading for planning intubation is described below.

Proposed Grading of TM Joint disease for airway manaegement

Mouth opening > 5mm

Fixed restriction to mouth opening

Without fixed restriction

Mouth opening 25mm-5mm

Fixed restriction to mouth opening

Without fixed restriction

Mouth opening < 0.25mm

Fixed restriction to mouth opening

Without fixed restriction

Any other airway problem like trauma to airway, difficult airway like huge thyroid, gross anatomical distortion, large tumors, hypertrophy adenoid, deviated nasal septum should be mentions along with the grade. E.g. this case grading is TMJ-3a with deviated nasal septum and hypertrophy adenoid.

Grade- 1- Laryngoscopy/LMA/retromolar /fiberoptic

Grade- 2- Bullard or Bellscope laryngoscope*/fiberoptic

Grade -3-Transnasal fibreroptic

*May or may not feasible

Other methods of intubations like blind Nasal intubation and retrograde intubation has its own limitation and comparatively more invasive. Sometimes patient with TMJ disorder may be posted for some other surgery particularly in emergency surgery. Depending upon the urgency or emergency we may have to go for tracheostomy if FOB is not feasible. Blind nasal intubation has some important limitation particularly bleeding because of injury and also in case of facial trauma and hypertrophy adenoid. Definitely it has an important role when fiberoscope is not available. various method has been described to reduced trauma to nasal passage(8-19),(Table-1)

Figure 4

Table 1

Methods to reduce trauma to the nasal passage during nasotracheal intubation	
1	Pharmacological-with vasoconstrictors and lubricants.
2	Identifying the most patent nostril by fibre-optic nasoendoscope before nasotracheal intubation.(8/9)
3	Red-rubber catheters as a guide to nasotracheal intubation.(9)
4	Thermosoftening of the nasotracheal tube(10)
5	Thermosoftened-esophageal stethoscope-obturated ETTs(11)
6	Placement of the flanged end of a red rubber catheter over the distal tip of the endotracheal tube(10)
7	Intraluminal balloon used as obturators of the endotracheal tube(17).
8	Facilitation of nasotracheal intubation with a nasopharyngeal airway (18)
9	Silicone tube(8)
10	Nasotracheal intubation under curve-tipped suction catheter guidance(14)
11	Sequential dilation(15)
12	Use of esophageal stethoscope as an introducer during nasotracheal intubation(19)

Fibreoptic intubation is the gold standard for intubation in case of TMJ ankylosis but is quite expensive and a variety of sizes are needed in pediatrics (Table-2). Fibreoptic scopes from 2.2 mm outer diameter onwards would be necessary for passing through the 3±6 mm inner diameter tubes. With financial constraints, procuring scopes of various sizes is impossible. Non availability of suitable size of flexible fiberoptic scopes should not hamper the airway management. Nasotracheal intubation can be successfully performed in children with an adult flexible fiberoptic laryngoscope by the method described earlier.

Figure 5

Table 2

Intubating fiberscope	Pediatrics size (insertion cord diameter)
Karl-storz[20]	1.8/2.8/3.7/4.5mm
Olympus[21]	2.4/3.1mm /4.1mm
Pentax[22]	2.4 /3.4/ 4.1mm

Other method like retrograde intubation is more invasive and also retrieval of the catheter from oral cavity may not possible due to limited mouth opening.

TO CONCLUDE

Various techniques of intubations are described in literature for TMJ ankylosis with limited mouth opening. Fiberoptic intubation is often the gold standard. Intravenous induction with propofol with appropriate size nasopharyngeal airway in situ is a safe method to maintain the patency of airway during fiberoptic intubation with added advantage of avoiding the lighter plane of anesthesia as in case of inhalation techniques. Non availability of suitable size of flexible fiberoptic scopes should not hamper the airway management. Nasotracheal intubation can be successfully performed in children with an adult flexible fiberoptic laryngoscope as described in various case reports. When associated with hypertrophied adenoids, preoperative assessment of patency can be done by fiber nasoendoscope. Gradual dilatation of nostril with increasing in size of tube and preferred red rubber cuffed (high pressure low volume) Magill-tipped tube decrease chance of trauma to airway.

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Author Information

Sandeep Kumar Mishra, MBBS, MD
Ex. Assistant Professor Department of Anaesthesiology IGGGH-PGI and PKMCRI

Suman lata, MBBS, DCH, MD
Ex. Assistant Professor Department of Anaesthesiology IGGGH-PGI AND PKMCRI

V Hemanth kumar, MBBS, DA, DNB
Ex. Specialist Department of Anaesthesiology IGGGH-PGI

Gayatri Mishra, MBBS, DNB trainee
Junior resident Department of Anaesthesiology IGGGH-PGI

P Ezhilarasu, MBBS, DA, MD
HOD Department of Anaesthesiology IGGGH-PGI Pondicherry India