

# Nasal Endotracheal Intubation under Fiberoptic Endoscopic Control in Difficult Oral Intubation, Two Pediatric Cases of Submandibular Abscess

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## Abstract

Securing an airway in children with trismus is challenging and dangerous. Sound clinical judgment is critical for timing and for selecting the method for airway intervention. We present two pediatric cases of submandibular abscess with difficult oral intubation who underwent incision and drainage. Large facial (jaw) swelling, trismus-limited mouth opening, edema, protruding teeth, and altered airway anatomy makes airway management more difficult. Chances of rupture of abscess intraorally and aspiration under General Anesthesia (GA) is a major threat. Loss of airway under muscle relaxation, difficult to ventilate, difficult to intubate and unwillingness for awake intubation in the pediatric age group makes

these cases most challenging. On the basis of our experience, both cases were successfully intubated in anaesthetized, spontaneously breathing children with visual-guided fiberoptic intubation.

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Patients with difficult oral access in deep neck infections are challenging for an anesthesiologist. A common cause of death in patients with difficult intubation is acute loss of the airway during interventions to control it. Various techniques are available to secure the airway in adults, but success and safety of these techniques in the pediatric age group with trismus has not been established. Tracheostomy is impractical in early stages and awake, fiberoptic intubation is not manageable in children.<sup>1-8</sup>

Deep neck infections are formed from untreated dental caries. Infection spreads in the bone and submandibular, submental, retropharyngeal or lateral pharyngeal spaces.<sup>1-3, 9</sup> Sometimes it may present with fistula on skin with restricted TM joint mobility. Advanced cases of abscess formations lead to narrowing and eventually to loss of airway.<sup>1,2</sup>

Fiberoptic-guided nasal intubation in a spontaneously breathing pediatric patient through an ET tube, which is placed in the nose along with topical anesthesia, is indicated in various clinical situations with difficult oral intubation.<sup>2, 3-8</sup>

The 10 and 11 year old girls (ASA-I) presented to Al-Nahdha Hospital with complaints of fever, facial swelling with trismus, – restricted mouth opening, redness, and severe pain, dysphagia and fistula formation in one patient. Both patients' weights were 40 and 42 kg, respectively. On general examination, fever and tachycardia were there. Airway examination revealed mouth opening of just less than 1 finger with protruding teeth. Neck movement, mento-thyroid and mento-hyoid distance were adequate. Nasal patency was checked and found adequate. Systemic examination and blood investigations were within normal limits.

Looking at clinical airway examination, we planned for fiberoptic-guided nasal intubation under anesthesia. Consent

was taken and explained about fiberoptic intubation. Oral premedication consisted of Midazolam 0.5 mg/kg oral 1 hour before the start of anesthesia. Topical anesthesia was achieved by nasal packing with Lignocaine 4% and Xylometazoline 0.1% nasal drops. Injectable Glycopyrrolate 0.2 mg IV was given. Routine monitoring was used. Difficult intubation cart was kept ready.

The pharynx was sprayed with 4–6 puffs of Lidocaine aerosol. Then, inhaled induction of anesthesia was started with Sevoflurane 8% in 100% oxygen (fresh gas flow 6 L/min) via face mask. According to depth of anesthesia, the inspiratory concentration of Sevoflurane was reduced to 4-5%. A nasal endotracheal tube (one size smaller than the predicted size) was lubricated well and inserted as soon as deemed appropriate. Length of the nasal tube was measured by traditional method; from tip of the nose to the external auditory meatus. General anesthesia was maintained through it. Depth of anesthesia was assessed and was considered adequate for FOI when pupils were miotic, no eyeball activity was noted, and when a vigorous anterior displacement of the mandible did not evoke a motor response. The bronchoscope was then inserted through the other nostril. When the tip of the bronchoscope was positioned immediately above the epiglottis, topical anesthesia of the larynx was applied through the suction channel of the bronchoscope using 2 ml of Lidocaine 4%. Advancement of the fiberscope into the trachea was withheld for 1 minute to allow for the drug's anesthetic effect. In both patients, fiberoptic airway instrumentation was performed with the patients' jaw elevated in order to open the retropharyngeal space. A Portex endotracheal tube, railroaded to Karl Storz fiber bronchoscope was used in both patients.

Anesthesia was maintained with Sevoflurane and Atracurium. Analgesia provided by Fentanyl 1.5 mcg/kg in titrated dose.

Anesthesia was reversed at the end of surgery with Neostigmine 50 mcg/kg and atropine 20 mcg/kg. Both patients were extubated in lateral position in the awake state. Postoperative analgesia provided with Diclofenac 1.5 mg/kg IM 20 min. before extubation.

When dental caries attacks a tooth, the nerve can die and a periapical abscess may develop. If left untreated, might spread through the bone to the submandibular region. After 3-5 days, large facial swelling with pus formation will start.<sup>1,2,9-10</sup> Ludwig angina is a bilateral inflammation of submandibular, sublingual, submental regions.<sup>1,2,4</sup> Advanced cases lead to swelling of the floor of the mouth, airway edema with narrowing and eventually to the respiratory distress.<sup>1,2,10</sup>

Medical management with antibiotics, improved dental care and Dexamethasone in the early stages of the disease has minimized the need for surgical intervention to control the airway.<sup>1,2</sup> If swelling does not subside, then removal of cause is needed, but trismus may interfere with this.<sup>1,5,9</sup>

Tracheal intubation in pediatric age group patient with difficult intubation is challenging. Limited access to mouth, edema, distorted anatomy, tissue immobility and uncooperative pediatric age group make orotracheal intubation with rigid laryngoscopy very difficult.<sup>1,2,6,10</sup> In the early stages of the disease, general anesthesia may overcome trismus and allow the mouth to be opened for rigid laryngoscopy; it is like the tip of the iceberg.<sup>2</sup> Under anesthesia, a potentially life-threatening condition as rupture of abscess can result in pulmonary aspiration and in inability to secure the airway due to blood, pus and secretions.<sup>2,-5,10</sup> Children may not have symptoms of airway obstruction in awake state, but it can manifest under anesthesia with muscle relaxation. Thus, inhalation induction of anesthesia should be the right choice in spontaneously breathing child.<sup>3-6</sup> Even inability to ventilate in spite of securing the airway under vision can cause unforeseen challenges. In advanced cases, induction of general anesthesia is dangerous because it may precipitate complete airway closure, make facemask ventilation and tracheal intubation impossible, thus necessitating emergency tracheostomy.<sup>1,2,5,6,10</sup> Rupture of an abscess and aspiration of pus have been reported during an attempted orotracheal intubation under general anesthesia.<sup>2,5-7</sup> The surgical airway should always be kept ready which can be lifesaving in such circumstances.<sup>2,5</sup>

Tracheostomy under local anesthesia has been considered gold standard of airway management in advanced adult cases of difficult oral route.<sup>1,2</sup> But in pediatric patients and in-between stages, tracheostomy is impractical and must be under general anesthesia. Blind Nasal intubation is a simple technique with two major drawbacks: infrequent success on the first pass and increased trauma with repeated attempts, precipitating complete airway obstruction that necessitates emergent cricothyrotomy.<sup>2,7</sup>

Awake fiberoptic intubation has been recommended for airway management in adult patients with an airway compromised by infections and tumors, but it is not possible in pediatric patients.<sup>2,8,11</sup> The success is attributed to a well-organized approach and expertise in flexible bronchoscopy. Distorted airway, copious secretions and tissue edema contributes to the difficulty of fiberoptic intubation.<sup>8,11</sup> Avoiding airway irritation and laryngeal spasm by using topical anesthesia in general anesthesia increases the success rate. Maximum allowable dose of Lignocaine is 4.5 mg/kg. In patients with difficult airways, the standard of care involves fiberoptic intubation under spontaneous ventilation. However, the safety and feasibility of a fiberoptic intubation teaching program has only been documented in paralyzed and apneic patients, whereas data obtained in patients under spontaneous respiration are limited and conflicting.<sup>2,8</sup> To avoid risk of aspiration and loss of airway, it is mandatory to keep patient spontaneously breathing by various means.<sup>8,11-13</sup> Midazolam and Fentanyl increase risk of respiratory depression. Therefore, these drugs must be titrated carefully.<sup>2</sup>

Spontaneous breathing with GA is well-maintained during fiberoptic intubation by the use of Endoscopy mask, MNT (Modified Nasal Trumpet) and if both are not available, simple plain endotracheal nasal tube can be used.<sup>12-15</sup> Simple nasopharyngeal endotracheal tube through another nostril is very useful and simple devices for maintaining a patent airway, spontaneous ventilation and general anesthesia during fiberoptic intubation. It establishes patent airway. It also permits delivery of inhaled general anesthetic and allow monitoring by the use of capnography and reservoir bag. It provides greater inspired oxygen concentration needed. It has potential for rapid conversion to positive pressure ventilation.<sup>14,15</sup> Experienced anesthesiologist in awake fiberoptic intubation can intubate most patients with difficult airway smoothly, expeditiously, and with minimal complications.



Figure 1: Showing Submandibular abscess with fistula formation



**Figure 2:** showing swelling of lt. face with restricted mouth opening



**Figure 3:** Showing Technique of Rt. Nasal Fiberoptic intubation with Lt. Nasal ET tube for maintaining GA

Death from loss of an airway still occurs in patients with difficult intubation of advanced deep neck infections. Sound clinical judgment is critical for timing and for selecting the method for airway intervention. The data suggest that practising fiberoptic intubation is safe and effective in pediatric patients with difficult airway, but it requires additional skills and practice.

On the basis of our experience, both cases were successfully intubated in anaesthetized, spontaneously breathing patients with visual-guided fiberoptic intubation. Spontaneous respiration was maintained with plain nasopharyngeal endotracheal tube through another nostril.

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