

## Mini Review

# Airway Management and Fiberoptic Intubation in Dental Pediatric Patients with Special Needs

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Pediatric patients with special needs often present unique challenges for anesthesiologists. These children may have underlying medical conditions, developmental disabilities, or behavioral issues that can affect their ability to tolerate anesthesia and surgery. It is important for anesthesiologists to have a thorough understanding of the child's medical history, special needs, and any specific concerns related to the anesthetic management. In this review, we will discuss the perioperative anesthetic management of pediatric patients with special needs [1].

A comprehensive preoperative assessment is essential for pediatric patients with special needs. The anesthesiologist should review the patient's medical history, including any underlying medical conditions, medications, allergies, and previous anesthetic experiences. A thorough physical examination should be performed, including an assessment of airway and breathing. It may be necessary to obtain additional laboratory or imaging studies, depending on the child's medical condition.

Effective communication is essential when managing pediatric patients with special needs [2]. The anesthesiologist should establish a rapport with the child and their family, and discuss the anesthetic plan in a manner that is appropriate for the child's level of understanding. It may be necessary to use visual aids or other communication tools to help the child understand what will happen during the anesthesia and surgery.

Airway management can be challenging in pediatric patients with special needs, particularly those with developmental disabilities or

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craniofacial abnormalities. Normal pediatric upper airway anatomy, along with the differences in physiology can present a challenge to many practitioners who have limited exposure to children on a regular basis. The superiorly located larynx, short neck and trachea, coupled with a large tongue that sits higher in the palate can create difficulties for the anesthesiologist. These difficulties are increased in patients with craniofacial anomalies and can lead to greater risk of obstruction and desaturation.

Aside from standard direct laryngoscopy the anesthesiologist should be prepared to use alternative airway techniques, such as Glide Scope intubation, fiber-optic bronchoscope intubation through laryngeal mask airway (LMA), or a combination of techniques. Emergency surgical backup is recommended during the management and it is necessary to consult with a pediatric otolaryngologist or craniofacial surgeon for complex airway management [3].

Fiberoptic Intubation (FOI) is a technique that has become increasingly popular for managing difficult airways in pediatric patients. FOI allows for a direct view of the airway, which can be especially helpful in cases where the patient has an abnormal airway or when there is limited access to the patient's airway. It can be performed nasally, orally with through a LMA. In pediatric patients with special needs, FOI can be particularly useful due to their unique airway characteristics and the need for a more gentle approach to airway management.

## Indications for FOI in Pediatric Dental Patients

FOI may be indicated in pediatric dental patients with a difficult airway due to anatomical abnormalities or comorbidities that increase the risk of airway complications [4]. These patients may include those with craniofacial abnormalities, such as cleft palate or Pierre Robin Sequence, or those with neuromuscular disorders, such as cerebral palsy or muscular dystrophy. Additionally, FOI may be indicated in patients with a history of difficult intubation or those undergoing procedures that may cause airway obstruction or compromise, such as tonsillectomy or adenoidectomy.

## Advantages of FOI in Pediatric Dental Patients

The advantages of FOI in pediatric dental patients include the ability to achieve a secure airway while minimizing the risk of airway trauma or bleeding. FOI allows for a more gentle approach to airway management, which is particularly important in pediatric patients with special needs who may be more prone to anxiety or agitation during dental procedures. Additionally, FOI provides a direct view of the airway, which can be especially helpful in cases where there is limited access to the patient's airway or when there is significant airway edema or bleeding.

## Technique of FOI in Pediatric Dental Patients

Before performing FOI in a pediatric dental patient, it is important to ensure that appropriate preoperative assessment and preparation have been carried out. This includes a thorough medical history and physical examination, as well as a review of any previous anesthetic records. Patients with special needs may require additional

preparation to reduce anxiety and minimize the risk of adverse events. During FOI, the anesthesiologist must take into consideration the child's developmental level and emotional state, as well as the type of dental procedure being performed. It may be helpful to explain the procedure to the child using simple language and visual aids, such as pictures or videos. In some cases, premedication with anxiolytic medications may be necessary to help calm the child. The FOI procedure itself involves the insertion of a flexible fiberoptic scope into the patient's airway through the nose or mouth. The scope is advanced until the glottis is visualized, and the endotracheal tube is then threaded over the scope into the trachea. It is important to use the smallest possible Endotracheal Tube (ETT) to minimize trauma to the airway, and to lubricate the ETT to facilitate passage [5].

Fiber Optic Intubation (FOI) in pediatric dental patients with special needs requires careful attention to several additional considerations. For instance, it is important to thoroughly assess the patient's airway anatomy and inspect the frontal and side profiles for micrognathia, deficiencies in the midface, limited mouth opening or cervical mobility and tonsillar size as these can present potential difficulties during the intubation process. Also, a history of difficult intubations or obstructive sleep apnea, as well as any facial or cranial abnormalities that may affect airway patency.

The anesthesiologist should choose an appropriate sedation and/or anesthesia protocol that is tailored to the patient's unique needs. The use of intravenous sedatives in plan A: induction using IV sedatives—such as propofol infusions with boluses of ketamine or dexmedetomidine or general anesthesia such as mask induction in plan B: inhalation induction with sevoflurane may be required to facilitate the procedure and minimize discomfort for the patient [6]. Induction of anesthesia with preservation of spontaneous breathing is the cornerstone for a safe airway management especially in patients with craniofacial syndromes and suspected difficult airway.

It is noteworthy to keep in mind that different techniques should be applied in your carefully designed plan of intubation. Antimuscarinics, such as atropine and glycopyrrolate are useful to dry secretions and support the heart rate during induction. The antisialogogue property remains the main property for their use today in children. Atropine can be used either orally or intramuscularly and is recommended to use prior to the use of succinylcholine.

Finally, the anesthesiologist should closely monitor the patient during and after the procedure to ensure that the airway remains patent and that oxygen saturation levels are maintained. Any signs of airway obstruction or other complications should be promptly addressed to minimize the risk of adverse outcomes [7]. A spontaneous breathing technique retains muscle tone in the upper airway and allows the anesthesiologist time to use alternative equipment such as flexible fiberoptic scopes to gain a view of the structures and intubate the patient. Use of a muscle relaxants to take over ventilation in a difficult airway can potentially result in difficulty in ventilation and hypoxia in a patient who cannot be intubated. This scenario can rapidly degenerate into the 'Can't ventilate, Can't intubate scenario'. It cannot be emphasized enough that adequate time is an important factor for success in these situations and a spontaneous ventilation technique is recommended.

Here is a detailed step-by-step guide on how to perform fiberoptic intubation (FOI) in dental pediatric patients with special needs:

- 1. Patient Positioning:** Begin by positioning the patient in a way that allows for optimal visualization of the airway. This may involve placing the patient in a supine position with the neck extended and the head supported with a rolled towel or other device.
- 2. Sedation and Anesthesia:** Administer an appropriate level of general anesthesia to facilitate the procedure and minimize discomfort for the patient. This may involve the use of intravenous sedatives or general anesthesia, depending on the patient's unique needs. Preserve spontaneous breathing.
- 3. Oral airway:** Insert an appropriately sized oral airway to facilitate visualization of the glottis during the intubation process. This can help to minimize airway trauma and improve the success rate of the procedure.
- 4. Lubrication:** Apply a generous amount of lubrication to the scope and endotracheal tube to facilitate insertion.
- 5. Scope insertion:** Insert the fiberoptic scope through the oral airway and advance it slowly and carefully toward the glottis. Use gentle pressure to avoid trauma to the airway.
- 6. Visualization:** Once the scope has reached the glottis, use the fiberoptic camera to visualize the vocal cords and guide the insertion of the endotracheal tube. Use a gentle technique and the smallest possible endotracheal tube size to minimize airway trauma.
- 7. Tube insertion:** Slowly advance the endotracheal tube through the vocal cords and into the trachea. Use gentle pressure and frequent visualization to guide the tube into place.
- 8. Confirm placement:** Confirm proper placement of the endotracheal tube using capnography or other appropriate monitoring techniques.
- 9. Monitoring:** Monitor the patient closely during and after the procedure to ensure that the airway remains patent and that oxygen saturation levels are maintained. Any signs of airway obstruction or other complications should be promptly addressed to minimize the risk of adverse outcomes.

## Complications of FOI in Pediatric Dental Patients

Complications of FOI in pediatric dental patients may include bleeding, airway trauma, and hypoxia. To minimize the risk of complications, the anesthesiologist should use a gentle technique and avoid excessive manipulation of the airway. In cases where there is significant bleeding or airway edema, the anesthesiologist may need to consider alternative airway management techniques, such as a supraglottic airway device or an emergency surgical airway.

In summary, FOI in pediatric dental patients with special needs requires a careful and individualized approach that takes into account the patient's unique anatomy and medical history. The use of appropriate sedation and anesthesia, airway adjuncts, and advanced visualization technology can help to improve the success rate of the procedure and minimize the risk of complications.

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