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Anesthetic Management Alternative to Awake Tracheostomy for Pediatric Patient Who is Unable to Intubate via Supraglottic Approach due to a Large Oropharyngeal Mass

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Abstract

Background: We present a pediatric case who was unable to intubate via supraglottic approach for tracheostomy.

Case Presentation: A 10-year-old male presented with a large solid vascular-rich mass occupying oral cavity. To secure his airway, tracheostomy was selected over intubation via supraglottic approach due to complete obstruction risk. After discussion with the surgeon, awake procedure was planned. Intraoperatively, patient's agitation and hypoxia forced conversion to general anesthesia. While spontaneous ventilation was maintained with manual supportive positive pressure using anesthesia mask to maintain oxygenation, sevoflurane and dexmedetomidine maintained sufficient anesthesia depth. A 4.5 cuffed tracheostomy tube was successfully placed. The patient was transferred to the PICU (pediatric intensive care unit) uneventfully.

Conclusion: Although the awake tracheostomy plan for the child failed, we successfully managed the airway maintaining spontaneous ventilation with manual supportive positive pressure and dexmedetomidine/sevoflurane-based anesthesia.

Keywords: Emergent Tracheostomy; Intraoral Mass; Airway Management; Pediatric Anesthesia

Abbreviations: ENT: Ear-Nose-Throat; PICU: Pediatric Intensive Care Unit

Background

Performing tracheostomy is preferred with pre-existing endotracheal tube. However, endotracheal intubation via supraglottic approach may not be possible in patients with severely compromised airway. Awake tracheostomies are still a gold standard for such patients in both adult and pediatric practice [1,2]. Most of anesthetics including opioids, benzodiazepines, inhalation agents may cause respiratory depression or collapse of the airway in dose dependent fashion [3,4]. Pediatric patients present challenges in cooperation and there are few case reports of awake tracheostomies [5,6]. We present the anesthetic management with dexmedetomidine/sevoflurane for an emergency tracheostomy in a pediatric patient with a risk of complete airway obstruction.

Case Presentation

A 10-year-old, 50kg male with a history of biliary atresia, post Kasai procedure and subsequent liver transplant in the first year of his life. He presented with a 4-week history of progressing throat pain, oral intake intolerance, drooling and dyspnea.

Clinical Findings

He was drooling and compensating with smaller breaths and faster respiratory rate. Preoperative physical examination revealed a large vascular-rich mass protruding into the oral cavity. The oropharynx was difficult to visualize (Figure 1). The neck CT shows a 6.5 x 5.7 x 6.4 cm solid mass occupying the left palatine tonsil area (Figure 2).

Timeline

After the patient was brought to Emergency Department in our facility, he was consulted to ENT surgeon for airway evaluation. After oral examination and evaluation of head& neck CT scan, it was concluded that securing airway via supraglottic approach was impossible. A surgical airway was determined to be necessary to secure the airway. The procedure was scheduled

as a first case in the next morning, then ENT surgeon consulted with anesthesiology team. Then, airway/ anesthesia management regarding an awake tracheostomy vs. with sedation was discussed. Awake procedure was chosen for primary plan. He was observed in the floor overnight without supplemental oxygen and maintained acceptable SpO2 level. He was brought to the operation room next morning.

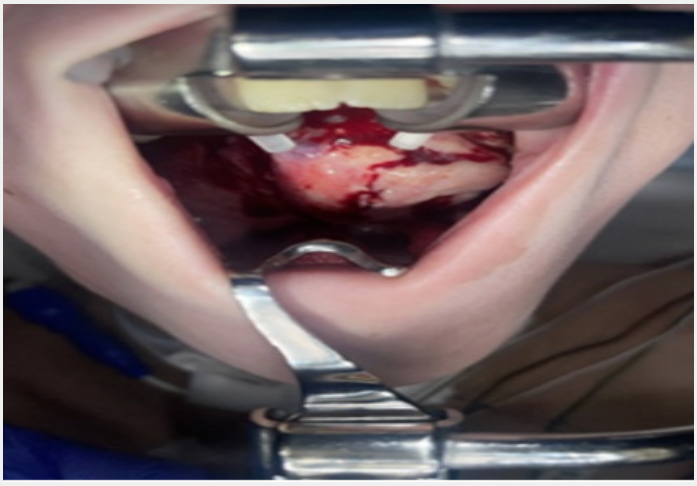

Figure 1: Intraoral examination shows a large vascular-rich mass protruding into oral cavity. Oropharynx is difficult to visualize.

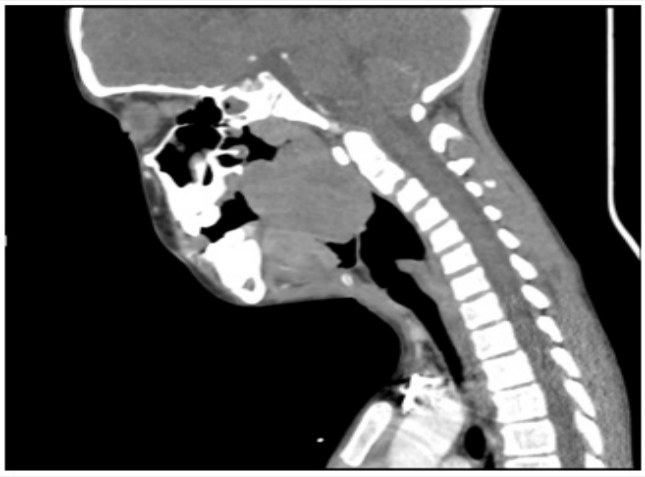

Figure 2: Sagittal view of head and neck CT scan. A 6.5 x 5.7 x 6.4 cm solid mass occupying the left palatine tonsil area.

Intraoperative Course

He was not provided any premedication coming into operation room. He was placed on supine position with 15 degrees head up position. Standard anesthesia monitors were placed. When surgical area was prepared and drapes were placed, he started agitating. The plan was modified to proceed with conscious sedation using dexmedetomidine. The patient received a bolus of dexmedetomidine (0.4 mcg/kg) followed by an infusion (1.5mcg/kg/hour). When surgeon injected local anesthetics, he started agitating further violently and propofol bolus (1mg/kg) was necessary to calm him down. Then his SpO2 suddenly dropped to 85% and anesthesia mask and manual positive pressure was applied to support oxygenation. The surgical procedure was started emergently concerning total obstruction of the airway. Spontaneous ventilation was able to be maintained with titrated sevoflurane throughout the procedure and SpO2 gradually improved to 95%. A 4.5 cuffed tracheostomy tube was successfully placed. The patient was transferred to the PICU uneventfully after the completion of the procedure.

Postoperative Course and Outcome

He was discharged from the PICU after 8 days. He underwent biopsy of the mass subsequently. The pathology report was consistent with alveolar rhabdomyosarcoma. He was consulted to Hematology and Oncology service. He has completed 5 cycles of chemotherapy, then underwent tumor resection, and began radiation treatment.

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Discussion

Pediatric awake tracheostomies are uncommon procedures and can be challenging due to the necessity of patient cooperation to remain still. Thus, there are only two case reports similar to ours described in the literature. Ahuja et al. [5] describes the case of a 10-year-old male with airway compromise due to a retropharyngeal abscess. The anesthesia technique described for this procedure included premedication with glycopyrrolate, pantoprazole, and nebulized 4% lidocaine. They allowed the patient's father to accompany him to the OR and describe a resident keeping the patient occupied with a cartoon displayed on a screen. The ENT team proceeded with local infiltration of 2% lidocaine with 1:200,000 epinephrine. Yuan et al. [6] anesthetized the neck using topical lidocaine 4% first, followed by skin infiltration of 1% lidocaine with 1:100,000 epinephrine. Intravenous glycopyrrolate, midazolam (0.05 mg/kg) and ketamine (0.5 mg/kg) were then administered slowly over 10 minutes.

Awake tracheostomies require an anesthetic technique that will provide adequate procedural sedation without respiratory depression, especially maintaining airway patency and respiratory drive. Although most of known anesthetics such as opioids, benzodiazepines, inhalational agents cause respiratory suppression in dose-dependent fashion, only dexmedetomidine's respiratory effect is least in airway collapse respiratory drive and not dose-dependent [3]. Therefore, we chose to attempt achieve these goals with dexmedetomidine alone. Due to the patient's acute agitation episode, we were forced to add sevoflurane to our anesthetic but still were able to maintain spontaneous ventilation and adequate sedation.

It is of utmost importance to achieve a deep plane of anesthesia before beginning the procedure. The strategies mentioned in previous case reports of topical lidocaine and IV benzodiazepines may have been useful in our case but use of benzodiazepines should be considered with special precaution. Intravenous propofol bolus was used in our case for quick solution for violent agitation but resulted in temporal airway collapse and hypoxia. We could have used alternative such as intravenous ketamine instead. There are different anesthetic techniques that may be used to successfully provide anesthesia for pediatric awake or sleep tracheostomies. More case reports are necessary to create a more standardized approach. Ultimately, these cases require multidisciplinary planning and collaboration for a successful outcome.

Conclusion

Dexmedetomidine based sedation/anesthesia can be an appropriate alternative to awake for children undergoing tracheostomy without supraglottic endotracheal tube for critical upper airway obstruction.

Ethics Declarations

Ethics approval and consent to participate, per institutional IRB policy, this case was exempted from IRB approval. The study was performed in accordance with the Declaration of Helsinki.

Consent for Publication

Written informed consent for publication was obtained from the patient's legal guardian.

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