Halothane sedation with local anesthesia as a bailout procedure for neonate with subglottic stenosis and post-MMC repair defect for O-Z flap: a case report

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Case Report

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Abstract

Introduction:

Subglottic stenosis (SGS) can develop after intubation in children. With mild subglottic stenosis, children can be asymptomatic. Endotracheal intubation is difficult in infants with subglottic stenosis. Here is a case of subglottic stenosis in infant planned for flap wound closure managed with sedation.

Case presentation:

A 1 month-old infant for whom thoracolumbar myelomeningocele (MMC) was repaired during her 2nd week of life, then she developed a wound infection on the 4th postoperative day, and after 2 weeks she was scheduled for a wound closure. However, intubation was difficult and rescheduled but with the senior anesthesiologist it was not possible to intubate and after discussion with an anesthesiologist sedation and local anesthesia was used to proceed with wound closure with a flap.

Conclusion

Sedation with local anesthesia can be used for neonates and infants with subglottic stenosis when intubation is difficult.

Background

Subglottic stenosis (SGS) can develop after intubation in children. With mild subglottic stenosis, children can be asymptomatic. We present a case in which a neonate who underwent surgery for myelomeningocele repair presented with subglottic stenosis, and wound closure with a flap was performed with sedation and local anesthesia infiltration.

Case presentation

A 1-month-old infant for whom thoracolumbar myelomeningocele (MMC) was repaired done on her 2nd week of life after she was intubated on the 3rd attempt. The MMC defect was large and repaired in the standard manner but she developed surgical site infection with wound dehiscence on the 4th day at which point we put her on wound care until the wound sites were clean and granulating. After 2 weeks of the 1st surgery we planned to take her to the operating room for wound closure with a flap. The overall anesthesia procedure was as follows: before induction of anesthesia, the neonate was preoxygenated with 100% oxygen. SpO2 was maintained at more than 91% with a face mask, and there was no respiratory distress, use of accessory muscles, inspiratory stridor or grunting. Anesthesia was induced with 1 mg/kg fentanyl, 0.2 mg of atropine, and 1 mg/kg propofol. The baby was subsequently given 1 mg/kg fentanyl and 1 mg/kg propofol intravenously. The neonate was intubated with an endotracheal...
tube (ETT) 3 but was difficult to pass through below the cord. Intubation was performed with an ETT 2.5 cm despite resistance and the ETT was secured at 8 cm of depth. Spo2 was maintained at 88–91%, and surgery was conducted.

During the second surgery for post-MMC repair wound dehiscence and infection, neonate was induced as above. However, with a good view of the vocal cords, it was not possible to advance 3.0 mm, 2.5 mm or 2.0 mm internal diameter tubes beyond the vocal cords because of resistance. Subsequently, the Spo2 level started to decrease to the level of 60% s'. the patient was ventilated with a face mask and Spo2 was maintained above 91%. Surgery was cancelled, and the patient was transferred to the NICU.

After 4 days and put on steroids she was rescheduled for repair and taken to the OR for the third time and anesthesia was induced with fentanyl, propofol, and succinylcholine. Intubation was attempted with ETT 3 then 2.5 cm but failed to pass below the subglottic area. With subglottic stenosis as a diagnosis, family counseled, but since we do not have direct flexible fiber optic laryngoscopy and family cannot afford to be referred to the best setup where there is an otolaryngologist and flexible laryngoscope surgery was decided to proceed with sedation and local anesthesia infiltration in the lateral position. Halothane was administered via a facemask and fentanyl was given, Spo2 was maintained above 93% with a face mask throughout surgery. The patient was positioned in the right lateral position (this position was preferred because there was adequate skin to take for a flap on the left side) and was washed and draped after infiltrating 1 ml of lidocaine with adrenalin diluted in 9 ml of normal saline. The flap was fashioned as an O-Z flap and the wound was closed in 60 minutes. The patient was then awakened from the sedation and transferred to the post anesthesia care unit with stable vital signs. The family could not afford for CT scan and there was no flexible laryngoscope available to visualize or grade the subglottic stenosis.

Discussion

Subglottic stenosis is narrowing of the airway below the vocal cords. It can be congenital or acquired. One of the acquired causes is intubation. Approximately 1–2% of intubated neonates, (which can reach up to 11% for children under 5 years of age) might develop subglottic stenosis after endotracheal intubation (1). Patient with mild subglottic stenosis are usually asymptomatic with normal respiratory findings(2). The patient presented here was considered to have acquired subglottic stenosis. Stenosis can develop after intubation due to mucosal injury especially with traumatic intubation and may take weeks to develop(3). The risk factor for developing SGS after intubation include the size of the ETT in relation to the size of the airway, the number of trials, whether it was smooth intubation or traumatic intubation, number of hours/days on ETT and agitation are some of them to mention (4).

To the best of the author's knowledge this is the first case in which subglottic stenosis and neural tube defect were reported in an infant who underwent surgery and subsequent surgery was performed with local anesthesia and sedation. In resource-limited setups such as ours it might be difficult for definitive management of stenosis to proceed with general anesthesia. All methods of tracheal intubation
or other ways to proceed with surgical management should be exhausted before considering tracheostomy in infants (5).

The level and severity of neural tube defect with complete sensory loss needs to be taken into consideration when administering local anesthesia. A child similar to our patient in relation to subglottic stenosis but with inguinal hernia underwent surgery with spinal anesthesia in Japan (6) and an infant with SGS and tracheoesophageal fistula was repaired with laryngeal mask due to failed intubation (7).

Had this been in well developed countries or where ENT specialists and flexible laryngoscopes were available, it would have been easier to manage the stenosis with an endoscope and proceed with wound closure.

**Conclusion**

Subglottic stenosis can be caused by intubation and can also cause difficulty during intubation. The use of all modalities to give general anesthesia should be attempted before proceeding with tracheostomy if possible. With experienced hand sedation with LA is also an option for infants and neonates.

**Abbreviations**

CT  
Computed tomography  
ENT  
Ear Nose and Throat  
ETT  
endotracheal tube  
MMC  
Myelomeningocele  
SGS  
subglottic stenosis

**Declarations**

**Ethical approval and consent to Participate**  Not applicable

**Consent for publication**  consent for publication was obtained from the child’s legal guardian which is her father.

**Availability of data and material**  All the data generated or analyzed during this study are included in this published article [and its supplementary information files].

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Author’s contribution:

MA: Conception and design, acquisition of data, drafting and revising the article

ZG: drafted the anesthesia section and revised the manuscript

MG: revision and editing

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Authors’ information: The corresponding author, MA, is an assistant professor of neurosurgery and operated on this patient both for MMC closure and flap wound closure.

References


Figures
Figure 1 shows wound dehiscence after the primary repair.
Figure 2

A Chest x-ray which was taken before her last surgery. The Blue arrow shows site of stenosis