

Difficult Mask Ventilation in 5-Year-Old Due to Submental Hypertrophic Scar: A Case Report

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Airway evaluation and management are of critical importance to providing safe and effective anesthesia. Burn injuries in and around the airway are of particular concern to anesthesia providers.

The following is a case report of a 5-year-old patient who had neck contractures and a large hypertrophic scar on his chin secondary to a burn injury. The patient initially was easy to mask ventilate, but ventilation

became difficult when muscle relaxants were given and positive-pressure ventilation was attempted. An alteration of conventional hand placement during mask ventilation enabled the anesthesia provider to maintain a patent airway and the surgical procedure to proceed.

Keywords: Difficult airway, hypertrophic scar, keloid, mask ventilation.

Mask ventilation is an integral part of airway management during the induction of general anesthesia. There are numerous well-described scenarios and anatomical abnormalities that predispose a patient to difficult mask ventilation and, possibly, difficult intubation. Large masses in and around the airway can pose a particular threat to adequate mask ventilation.

Case Report

A 5-year-old, 23-kg boy was admitted to the operating room for excision and split-thickness skin graft to the anterior portion of the neck and the chin following a burn injury incurred 6 months earlier. The burn was the result of the patient's shirt catching fire and was localized to the upper part of the chest, neck, and less than 5% body surface area on the patient's left arm. There were no inhalational injuries associated with the initial insult. The patient was previously healthy, and physical examination revealed lungs clear to auscultation and regular heart sounds. The airway was Mallampati class I; however, neck extension was somewhat limited due to large amounts of scar encompassing the entire anterior portion of the neck, upper part of the chest, and the chin. The thyromental distance could not be determined due to neck contractures and localized scarring. A large (5 × 3 cm) hypertrophic scar was noted on the submentum (Figure).

The patient was brought to the operating room, and anesthesia was induced via mask induction with 6% sevoflurane in 60% nitrous oxide and oxygen. A peripheral intravenous line was inserted, with a 20-gauge catheter, in the left saphenous vein. Spontaneous respirations were maintained throughout induction. Then, 20 mg of propofol, 25 µg of fentanyl, and 20 mg of rocuronium were given. Positive pressure mask ventilation was noted to be difficult due to limited neck extension and the large mass on the chin. Alteration of hand position

during mask ventilation enabled the anesthesia provider to maintain an adequate airway. This alteration consisted of moving the middle and index fingers to the right of the mass and the other 2 fingers to the left, thus placing the hypertrophic scar between the middle and ring fingers. The thumb remained at the superior angle of the mask. The patient was then intubated by using a No. 2 Miller blade without difficulty, and a 4.5-mm cuffed endotracheal tube was inserted and secured at 16 cm at the lips. Oxygen saturation remained 95% to 100% throughout the induction phase. The anesthesia was maintained with 0.8% end-tidal isoflurane in 50% nitrous oxide and 50% oxygen. The heart rate was 85 to 110/min and in sinus rhythm. The patient's systolic blood pressure was 90 to 130 mm Hg throughout the case, and the oxygen saturation remained at more than 98%.

The patient received 2,700 mL of lactated Ringer's solution for the procedure, and blood loss was estimated at 300 mL. The procedure lasted approximately 6 hours, and the patient was taken to the pediatric intensive care unit



Figure. Excised Hypertrophic Scar Mass

while still intubated and was sedated with propofol at 75 µg/kg per minute. Vital signs remained stable during transport and on admission to the intensive care unit. The patient remained intubated, sedated, and pharmacologically paralyzed with midazolam, fentanyl, and vecuronium at the request of the surgeon due to wound graft healing and tissue swelling. The patient was extubated on postoperative day 5 and discharged to home 3 days later.

Discussion

Hypertrophic scars and keloids are the result of excessive fibrous tissue formation in response to tissue injury. Both have a higher incidence in dark-skinned people. Keloids can occur spontaneously. Hypertrophic scars differ from keloids in that hypertrophic scars remain at the initial site of injury, whereas keloids extend beyond the site.¹ The patient described in the present case report had extensive neck and chest contractures in addition to the large hypertrophic scar on the submentum.

Scar contractures and large scar masses can present a challenge for anesthesia providers. Scar tissue can make intravenous access difficult, impede chest wall excursion, and make positioning difficult. Difficult mask ventilation and difficult intubation can also be encountered when the scar tissue involves the face, neck, and upper airway. Various techniques and airway devices can be used to aid

in airway management, including laryngeal mask airway, fiberoptic bronchoscope, light wand, and pediatric glide scope. Khan et al² used a “styleted” laryngeal mask airway with an upside-down insertion technique to successfully manage an airway in a pediatric patient with neck contracture and limited mouth opening secondary to burns.²

The case described here proved not to involve difficult intubation but difficult mask ventilation. The change in hand position during mask ventilation described herein allowed for better face-mask seal and prevented the hypertrophic scar from impeding positive-pressure mask ventilation. This alteration in conventional hand placement allowed the anesthesia provider to maintain adequate mask ventilation and, thus, a patent airway.

REFERENCES

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