Intubation and management of a compromised airway is not an infrequent anesthetic occurrence. Cooperation between the anesthesia and surgical teams is a must. The following case report describes how effective communication and planning by everyone involved made a child's life-threatening problems much easier to manage.

The case

A 10-hour-old 3.9 kg infant, the product of a 40-week, uncomplicated, and uneventful pregnancy, presented with a large lesion which completely filled the oral cavity and extended anteriorly, compressing the left nostril (Figure 1). No other anomalies were noted. Adequate airway ventilation due to the size and location of the mass was a major concern. However, the infant was ventilating adequately, apparently through the right nostril.

The infant was premedicated with atropine 0.1 mg intramuscularly (IM) and brought to the operating room with an IV in place. Routine monitoring equipment was applied (precordial stethoscope, Dinemapp™ Neonatal Blood Pressure monitor, ECG monitor, and skin temperature monitor,) and the infant was positioned with the neck slightly extended. A flexible Olympus bronchoscope was gently passed down the left nostril, affording a clear view of the larynx and cords.

Nasotracheal intubation was believed possible. A no. 1.5 Miller blade was gently inserted on the right side of the mouth, with the tumor being gently elevated anteriorly and to the left. Then, a 3.5 mm nasotracheal tube was passed down the left nostril and through the vocal cords; this was achieved without difficulty. The tube was taped in place on the anterior surface of the nose (Figure 2). The infant remained hemodynamically stable during the procedure.
After intubation, a 6-liter flow of nitrous oxide and oxygen in a 60:40 ratio was begun, and pancuronium 0.4 mg was given IV.

The tumor “stalk” was identified and was encircled with umbilical tape to partially control hemostasis. Then, the tumor was removed. The oral cavity remained enlarged and deformed (Figure 3), so as to make voluntary closure of the mouth impossible.

Atropine 0.15 mg and neostigmine 0.20 mg were given to reverse the muscle relaxant, and after suctioning, the nasotracheal tube was removed. The infant spontaneously ventilated and cried.

Postoperatively, she progressed well and had no respiratory difficulty. Arterial blood gases remained satisfactory, and she convalesced uneventfully. Oral feedings were begun on the ninth postoperative day, and gradually advanced until the infant was discharged 16 days after surgery, at which time she was taking adequate nutrition orally for growth and development.

Discussion

Essentially, there were four major concerns facing the anesthetic/surgical team:

1. The extent of tumor infiltration through the roof of the mouth.
2. Subsequent tracheal intubation and airway management prior to and during the operative procedure.
3. Surgical hemostasis during excision.
4. Postoperative airway requirements.

The major concern facing the team was securing and maintaining an adequate airway for ventilation. Secure orotracheal intubation seemed remote because of the extent of the lesion and the subsequent manipulations expected to remove it.

Nasotracheal intubation was believed possible as the infant exhibited minimal cardiopulmonary dysfunction at rest, prior to surgery. However, respiratory compromise could be threatened at intubation because of potential inability (due to possible tumor involvement) to utilize the left nares, necessitating utilization of the right nares—the infant’s only readily apparent avenue of ventilation.

Further compounding these threatening problems was the tremendous size of the tumor, severely limiting if not excluding visualization of the oropharynx and larynx during intubation. The potential necessity for a tracheostomy was very real, and a plan for such a procedure was prepared should it become necessary. In addition, there was the potential that during manipulation with sharp-edged instruments laceration could occur, leading to uncontrollable exsanguinating hemorrhage.

Another major concern was what would be the extent of tumor infiltration into the roof of the mouth. Should compromise of the nares lumen be present, total excision would be in doubt.

Added to these concerns was the problem of control of hemostasis during the procedure. Vascular supply to the lesion was believed to be from the major palatine arteries via the sphenopalatine artery, a terminal branch of the maxillary artery off the external carotid. During the manipulation of excision, potential severe hemorrhage

![Figure 1. Pre-operatively](image1)

![Figure 2. After intubation and securing of airway](image2)
could occur from a possible laceration of an inaccessible area.

Following tumor removal, airway problems secondary to manipulation, intubation and edema were added threats.\textsuperscript{7,8} Considering these difficulties, the following plan was carefully formulated and successfully carried out.

1. With the infant medicated preoperatively only with atropine to limit secretions, the infant flexible bronchoscope was passed gently through the left nares. Following this, patency of the opening was confirmed and the absence of gross tumor infiltration was established. At the same time, easy visualization of the larynx from the posterior pharynx was achieved. Concurrently, the infant breathed freely and easily through the right nares.

2. An awake intubation was considered the safest method of tracheal approach, and utilizing the information obtained from flexible endoscopy, the no. 3.5 endotracheal tube was passed through the left nares and into the posterior pharynx. (Our original intent was to use the suction side of the endoscope and pass a metal stylet into the trachea. After removal of the endoscope, the plan was to slide the endotracheal tube over the stylet and accomplish intubation of the trachea.)

With a laryngoscope inserted in the right side of the mouth, the tumor was gently elevated anteriorly and laterally, in a manner sufficient to visualize the endotracheal tube in the posterior pharynx. With the aid of a McGill forcep, endotracheal intubation was completed, and the tube was secured with tape. (Should this have failed, a tracheostomy would have been performed.)

3. Nitrous oxide, oxygen, and pancuronium anesthesia was then utilized because we believed this would provide the least stimulus to potential respiratory problems.

4. Having accomplished airway control, our next potential problem was that of exsanguinating hemorrhage during excision. Gentle palpation around the attachment of the tumor to the hard and soft palate revealed a "stalk" approximately 2.5-3.0 cm in diameter. An umbilical tape ligature was wrapped around this stalk, and was gently but snugly tightened. The bulk of the tumor was then removed, transecting the stalk just above the encircling ligature with electrocautery.

We were fully prepared to open the neck at the angle of the mandible (bilaterally if necessary), to get control of the maxillary artery where it joins the temporal to become the external carotid artery. Fortunately, this was not necessary, and with the vast improvement in visualization of the tumor base (with removal of the bulk of the tumor), two large individual vessels were selectively suture ligated, the encircling ligature discarded, and the remainder of the tumor removed, leaving a partial cleft of the palate.

5. Immediate extubation postoperatively, with careful monitoring of continuous transcutaneous oxygen levels and intermittent arterial blood gases, was accomplished with minimal disability and dysfunction.

Aftermath

Now 3-months old, the infant is growing and developing normally. The oral cavity is progressively becoming less prominent, and the infant’s nutritional status is excellent and entirely by mouth. Palate repair is planned after 16 months, and oral reconstruction will be performed when and if necessary.

Due to the effective communication and planning by the various disciplines involved, the child’s life-threatening problems were controlled, eliminated, and an optimal result was achieved.

REFERENCES

AUTHORS

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