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Postoperative airway obstruction after airway tumor debulking

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Abstract
Postoperative airway obstruction is a relatively common complication after anesthesia, occurring most often after head and neck surgery. We present a case of postoperative airway obstruction in a patient who underwent airway tumor debulking. This case demonstrates that, in high-risk patients, despite the traditional methods of determining eligibility for extubation, postoperative airway obstruction can still occur, and alternative means of extubation should be considered.

Key words Airway tumor · Airway obstruction · Ball-valve obstruction

Case report

A 45-year-old man presented with a 1-month history of a sore throat, hoarseness, and a more recent history of hemoptysis. His past medical history was otherwise unremarkable, except for a 60-pack-year history of smoking. Outpatient endoscopy by the otolaryngology service was performed, which revealed a supraglottic mass obstructing nearly his entire airway. He was scheduled for tumor debulking. Immediate preoperative assessment revealed a cooperative patient, but unable to lie flat. He had a Mallimpati class IV airway. Room air peripheral oxygen saturation (S_{PO_2}) was 94%. An awake fiberoptic intubation was planned.

The airway was topicalized with 4% lidocaine and the patient was intubated using a fiberscope with a 7.5-mm armored nasotracheal tube. The tumor was debulked and a 4% lidocaine spray was applied to the vocal cords to prevent laryngospasm. Dexamethasone 10 mg was administered. Analgesia was attained with 200 μg of IV fentanyl. Pre- and postoperative images are shown in Figs. 1 and 2. Figure 1 shows the tumor obliterating the epiglottis and obscuring the view of the glottis. Figure 2 shows the glottis after debulking of the tumor.

Once the patient was fully awake, and following commands, including strong hand grips bilaterally, the trachea was extubated. The patient was transferred to the postanesthesia care unit (PACU). Racemic epinephrine was nebulized prophylactically. Ninety minutes later, the patient was awake, frightened, and unable to ventilate. Oxygen saturation fell to 60%–70%, and the patient became bradycardic. Mask ventilation was not possible. Atropine was given, and as the otolaryngology service was preparing for a tracheostomy, anesthesia was induced with etomidate and succinylcholine. Direct laryngoscopy was attempted, a gum elastic bougie was passed into the trachea, and the patient was intubated. Oxygen saturation quickly returned to the high 90% level. The patient was transferred to the intensive care unit (ICU), and underwent further debulking 2 days later. During this procedure, it was noted by the surgeon that a remnant of the original tumor was functioning as a "ball valve," being sucked in and obstructing the glottis with each inspiration, but allowing air out during expiration. This remnant was removed. The patient was awakened in the operating room and observed for airway obstruction. Significant inspiratory stridor was noted, and awake nasal flexible fiberoscopy showed significant arytenoids edema and a 0.5-mm airway. Hence, a tracheostomy was performed with a no. 6 cuffed Shiley. The patient was admitted to the ward, discharged 1 week later, and returned to the clinic to have his tracheostomy decannulated 1 week later.

Discussion

The postoperative respiratory complication rate in the PACU is estimated to be 1%–2%, with upper airway

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Fig. 1. The Tumor obliterating the epiglottis and obscuring the view of the glottis

Fig. 2. The glottis after debulking of the tumor. The blue cuff of the armored endotracheal tube can now be seen through the cords

obstruction being the most common complication. Prospective surveys used to ascertain complications in the PACU have demonstrated an incidence of upper airway obstruction of 3.8%–6.9% [1,2]. Head and neck surgery carries the highest risk. The incidence of reintubation in the recovery room ranges from 0.02% to 0.2% [1,3,4].

Several options might have enabled us to avoid this complication. First, we could have kept the patient intubated overnight. This option, however, might not have been helpful, as edema was not the cause of the obstruction. Furthermore, the remnant of the tumor that was causing the ball-valve mechanism would have still been in the airway, and thus might well have caused the same type of obstruction in the ICU after the patient was extubated. Second, we could have performed an elective tracheostomy at the time of the initial surgery. This would not have been an ideal option, however, as tracheostomy increases the chances of tumor recurrence at the stoma site [5]. Furthermore, laryngoscopy performed by the surgeon after the debulking revealed an apparently patent airway, and it was felt that tracheostomy was neither necessary nor indicated. Finally, we could have used an alternative means to extubation, such as an airway exchange catheter.

In consultation with the surgical team, we decided to extubate the patient, as his airway obstruction was nearly completely relieved by the surgical procedure and it appeared that the patient was awake enough to maintain and protect his airway. It remains unclear why the patient initially maintained his own airway, and did not manifest the ball-valve obstruction for 90 min. It is impossible to determine if any of the options above would have avoided this complication. Therefore, we emphasize the importance of close observation of patients following airway surgery.

Because of the relatively higher incidence of postoperative airway complications, the decision on how, and if, to extubate after otolaryngologic surgery should be a major component of the anesthetic plan. Patients undergoing lengthy airway surgeries often remain intubated overnight [4]. If the patient is to be extubated, the decision must be made whether to extubate traditionally, or by an alternative means [6]. Either way, it must be appreciated that the potential for reintubation is real, and any equipment that was deemed necessary during intubation should be immediately available at extubation. Furthermore, if reintubation is required, it will frequently be more difficult than the initial intubation, as edema, secretions, and blood are likely to obscure the view. This can render fiberoptic intubation useless.

The majority of alternative means to extubation focus on extubation over a guide. Options include a fiberoptic bronchoscope, Cook Airway Exchange Catheter (CAEC), gum elastic bougie, or a jet ventilating stylet [4]. These are among several recommendations the American Society of Anesthesiologists (ASA) Task Force on Management of the Difficult Airway makes for the extubation of the patient with a difficult airway [7].

The use of a pediatric CAEC in the extubation of ICU patients with difficult airways has been described [8]. This technique has been advocated because it is tolerated better by the ICU patients. This, or a number

of devices which serve as an intubating "guidewire", could have been used in the present patient. However, the optimal length of time that the CAEC should be left in situ remains unknown. In our patient, even if we had used a CAEC, we would have probably removed it by 90 min postoperatively, the time at which his obstruction occurred.

In conclusion, delayed airway obstruction can occur in patients with airway tumors, even if the tumor appears to have been completely debulked. We have reported the case of a patient who developed a ball-valve type obstruction despite being fully awake after recovering from anesthesia.

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