Anesthetic Management of a Patient With a Giant Hemangioma Who Required Urgent Embolization for Bleeding During Third Molar Extractions

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Hemangiomas in the head and neck region, especially those that may impact the airway, require special attention perioperatively because of the potential for difficulties with airway management and bleeding control. This case report describes the management of a 31-year-old male with a large hemangioma of the tongue and pharynx undergoing surgical extraction of mandibular third molars under intubated general anesthesia. Despite taking precautions and avoiding traumatizing the hemangioma while securing the airway, massive bleeding occurred during the surgical extractions, which prompted emergent transfer for angiographic embolization and a stay in the intensive care unit until extubation. This case report highlights the additional attention needed for patients with hemangiomas within the oral cavity and upper airway because of the potential for unexpected massive bleeding that can affect airway management and cardiovascular stability.

Key Words: Oral hemangioma; Massive bleeding; Airway management; General anesthesia.

The tongue and pharynx are rich in blood vessels and lymphoid tissues and are therefore favorable sites for the development of various types of tumors, including hemangiomas. Hemangiomas extending to the posterior part of the tongue and pharynx require special attention during airway management because their presence is not directly visible and hemostasis is often difficult should bleeding occur.[1,2]

We herein report a case of a male patient with a large hemangioma that extended to include the tongue and pharynx who underwent general anesthesia for dental extractions. Extensive bleeding was encountered, and hemostasis was difficult to attain. We also discuss the anesthetic management and intraoperative bleeding risk of intraoral hemangiomas. Written consent was obtained from the patient for publication of this case report.

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CASE PRESENTATION

A 31-year-old man (height, 159 cm [62.5 in]; weight, 62 kg; body mass index, 24.5 kg/m^2) was scheduled for extraction of his mandibular third molars under general anesthesia because of his severe gag reflex, which made it difficult to tolerate oral surgery while conscious. The patient had no relevant family history, medical/surgical history, or known allergies and was taking no medications. However, he had a large hemangioma of the tongue (Figure 1).

Preoperative blood tests showed high aspartate transaminase (41 U/L; reference range, 13–30 U/L), alanine transaminase (107 U/L; reference range, 10–42 U/L), and triglyceride (278 mg/dL; reference range, 30–149 mg/dL) levels. However, his hemostatic and coagulation function test results were normal. An anteroposterior (AP) radiograph of the chest and 12-lead electrocardiography showed no abnormalities. Preoperative fiberoptic examination of his airway revealed that the hemangioma extended to the vallecula of the epiglottis (Figure 2). Magnetic resonance imaging (MRI) was obtained, showing that the hemangioma was located on the right side of the tongue and extended to the floor of the mouth, medial pterygoid muscle, soft palate, and nasopharyngeal wall (Figure 3). The patient was assigned an American Society of Anesthesiologists physical

Figure 1. Image of the Hemangioma

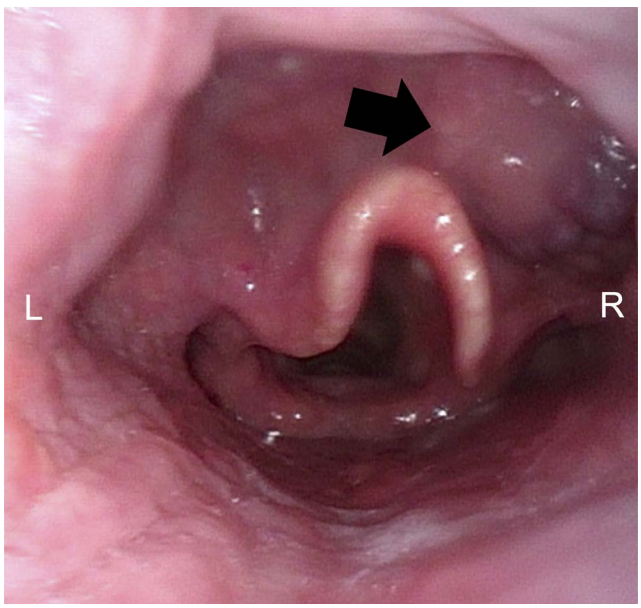
Clinical photograph taken during the preoperative interviewing showing the large hemangioma of the right tongue.

classification status of 2 due to the extensive hemangioma and his elevated liver enzymes.

We were confident that the patient could be ventilated by mask, so we planned to perform a rapid induction. Fiberoptic tracheal intubation was electively planned to avoid bleeding due to possibly traumatizing the hemangioma with a laryngoscope. Two units (280 mL) of concentrated red blood cells were prepared prior to surgery in case of massive bleeding.

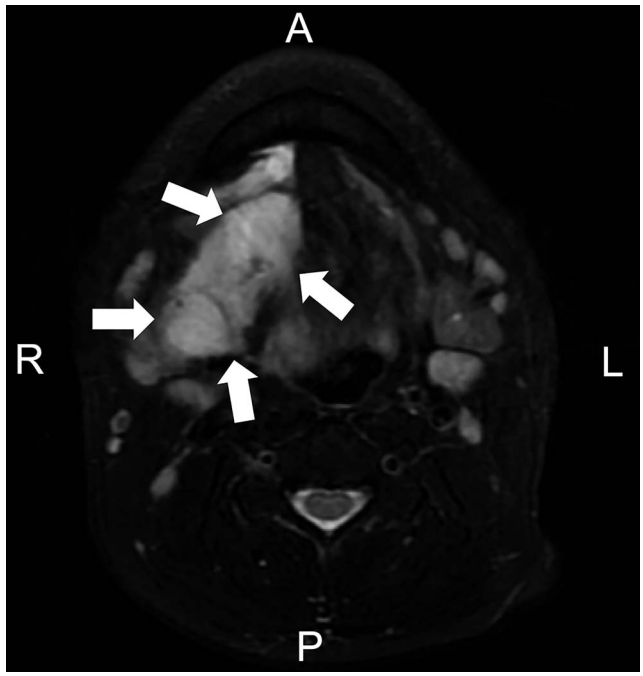
On the operative day, the patient had appropriately fasted, and no premedication was given. After entering the operating room, a 22-gauge intravenous (IV) cannula was inserted into the dorsum of his left hand, and an infusion of Ringer acetate solution was initiated. Topical anesthesia was administered using oral 4% lidocaine (4 mL, 160 mg) and 2% lidocaine intranasal spray (2 mL, 40 mg; total topical lidocaine, 200 mg), and preoxygenation was performed using a nasal high-flow system (Optiflow, Fisher and Paykel Healthcare) at 50 L/min for more than 3 minutes.

Figure 2. Preoperative Fiberoptic Airway Exam



Preop examination of the airway via a flexible fiberoptic scope revealed that the hemangioma (black arrow) extended to include the vallecula of epiglottis.

Figure 3. Preoperative MRI



MRI image of the horizontal section at the upper pharynx level. Note that the hemangioma (white arrows) extended to level of the pharynx.

After IV induction with midazolam (2.5 mg), fentanyl (50 μg), and propofol (120 mg), we were able to successfully mask ventilate the patient. Nasotracheal intubation was then performed via the left naris using a flexible fiberoptic scope and a preformed nasotracheal tube with an inner diameter of 6.5 mm (Parker Flex-Tip; Parker Medical). After successful intubation, IV rocuronium (50 mg) was administered for muscle relaxation. General anesthesia was maintained with oxygen at 1 L/min, air at 3 L/min, sevoflurane at 2%, and continuous infusion of remifentanil (0.2 μg/kg/min). IV dexamethasone (6.6 mg) was given to prevent postoperative airway edema.

A total of 3.6 mL of 1% lidocaine (36 mg) with 1:80,000 epinephrine (45 μg) was administered via local infiltration. However, during surgical extraction of the patient's right mandibular third molar, the operating surgeon declared that obtaining adequate hemostasis was difficult. Massive bleeding was noted while elevating the gingival flap around

the right side of the impacted mandibular third molar. The bleeding volume at this time was more than 700 mL.

The anesthesiologists immediately secured an additional peripheral IV line and an arterial line in the patient's right radial artery. Subsequent arterial blood gas analysis showed a hemoglobin concentration of 11.9 g/dL (preoperative hemoglobin, 15.9 g/dL). Therefore, we did not perform a blood transfusion at this time; however, we attempted to reduce the bleeding by maintaining a lower blood pressure by deepening the anesthesia. We increased the sevoflurane to 2.5% and the remifentanil to 0.4 μg/kg/min to target a systolic blood pressure range between 80 to 90 mm Hg. The actual systolic blood pressure range at that time was 90 to 100 mm Hg. We also administered carbazochrome sodium sulfonate (CSS; 100 mg), an IV hemostatic agent, and tranexamic acid (TXA; 1 g) to reduce bleeding and support hemostasis. At the same time, the oral surgeon stopped the planned surgical extractions and consulted with neurosurgeons for assistance with urgent embolization. We transferred the patient to the angiography room while maintaining general anesthesia with intermittent propofol boluses and ventilating the patient with a Jackson Rees circuit with a portable oxygen cylinder.

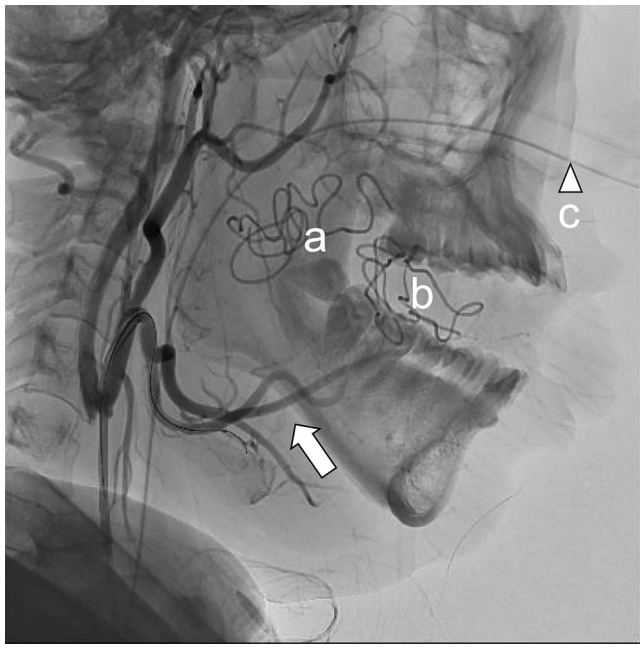
General anesthesia throughout the embolization surgery was maintained with sevoflurane (1.0%–1.5%), oxygen (1 L/min), air (3 L/min), and a continuous infusion of remifentanil (0.2 μg/kg/min). We gave 5000 units of heparin intravenously, and the activated clotting time (ACT) was adjusted to around 200 seconds, which was approximately twice the control value. After successful vascular embolization of the lingual artery and inferior alveolar artery with 33% n-butyl-2-cyano-acrylate (NBCA; Figure 4), the systemic heparinization was antagonized by administering IV protamine (15 mg). The patient's hemodynamics, respiratory condition, and other vital signs were stable. Total duration of the oral surgery and embolization procedures was 90 minutes, and the total duration of anesthesia including the transfer time was 4 hours and 24 minutes.

The patient was transferred to the intensive care unit while intubated and sedated with a continuous infusion of dexmedetomidine (0.4 μg/kg/h) and fentanyl (1 μg/kg/h). On postoperative day 2, the patient was extubated with the assistance of emergency doctors after airway patency had been confirmed by otolaryngologists. The patient was discharged with no other complications on postoperative day 10.

DISCUSSION

A hemangioma is a benign proliferation of blood vessels. Hemangiomas in the oral and maxillofacial regions are common entities and represent 14% of all hemangiomas.[3] They may occur within the gingiva,[4] palatal mucosa,[5] intranasal areas,[6] mandible,[7–9] submandibular glands,[10] lips,[11] and tongue.[12] Accurate diagnosis and evaluation of the lesion is an important aspect of preoperative planning.[13] In this case, we diagnosed a hemangioma and determined via MRI that the lesion extended into the vallecula of the epiglottis, posterior tongue, floor of the mouth, medial pterygoid muscle, soft palate, and nasopharyngeal wall. However, we still encountered perioperative challenges in the following 2 areas.

Figure 4. Angiogram During Vascular Embolization



White arrow shows the side branches of the right lingual artery; (a), (b): gauze packings with X-ray contrast thread; and the arrowhead (c): the endotracheal tube.

Safely Securing the Airway

A hemangioma can act as a physical obstacle during tracheal intubation, and bleeding from trauma to the hemangioma by intubation maneuvers can be hard to manage and lead to difficulties in ventilation and/or intubation.[14]

With respect to tracheal intubation after general anesthesia induction, the tip of a conventional Macintosh laryngoscope blade is usually positioned within the vallecula of the epiglottis. In our case, however, a hemangioma was also present in the vallecula. Therefore, considering the risk of injury and potential for extensive bleeding, we planned to perform endotracheal intubation with a fiberoptic scope after inducing the patient. Sufficient preoxygenation was required during the fiberoptic intubation procedure to increase the time to desaturation. Previous reports have indicated that preoxygenation

with a nasal high-flow system is useful.[15–18] Therefore, we utilized the Optiflow (Fisher & Paykel Healthcare) system to preoxygenate the patient prior to induction. While using a full facemask with an FiO_2 of 100% would have accomplished the same goal, we happened to rent the device for trial at that time, so we utilized it instead.

Anesthesia providers should be prepared in case intubation fails and emergency airway access is required. Preparations should be made (eg, marking the patient's neck) prior to induction of general anesthesia in case a cricothyrotomy is needed emergently.[19]

Managing Extensive Surgical Bleeding

Several methods are available for stopping extensive and life-threatening bleeding during surgery. Primary local measures such as packing the wound with a gelatin sponge, topical application of tranexamic acid or aminocaproic acid, surgical vascular ligation, electrocautery, or application of bone wax may be used to stop the bleeding. Ligation of the external carotid artery or common carotid artery may be needed to manage major uncontrolled bleeding.[20] Embolization (interventional radiographic blockage of feeder vessels) has shown high success in the management of life-threatening bleeding compared with all previously mentioned techniques.[21] An alternative strategy would be to treat the hemangioma by embolization before oral surgery to reduce the risk of bleeding.[22–28] However, our patient was unwilling to undergo such treatment. In retrospect, we should have persuaded the patient to undergo hemangioma embolization prior to the dental extractions.[29]

We cooperatively worked with the oral surgeons to stop the bleeding in this case. The oral surgeons attempted local hemostasis by injecting local anesthetic with epinephrine, packing the surgical wound with oxidized cellulose, and applying pressure with epinephrine-soaked gauze.[30] We also attempted to lower the patient's blood pressure[31,32] and administered IV CSS[33] and TXA[34] to help promote hemostasis. CSS is a hemostatic agent that increases platelet aggregation and acts on capillaries to inhibit increased vascular permeability and increase vascular resistance. It is utilized to treat bleeding tendencies due to decreased capillary resistance or increased permeability (eg, purpura); bleeding from the skin, mucous membranes, or endometrium; fundal, renal, or uterine bleeding; and abnormal bleeding during or after surgery.

Because this was an emergency, we were unable to obtain consent for angiographic embolization and decided to obtain the relevant consent forms later from the patient's family. Blood transfusions were not required because the hemoglobin concentration did not decrease dangerously and instead remained at 10.2 g/dL. In general, the use of heparin during difficult hemostasis or bleeding is dangerous. We had to make a difficult choice in this case between possibly increasing bleeding due to the heparin and preventing catheter-induced thrombosis during the embolization. We ensured that protamine was on hand to antagonize the effects of heparin at any time during the embolization and carefully monitored the patient's general condition including bleeding status throughout.

Few reports have addressed the risk of abnormal bleeding in patients with oral hemangiomas. A previous study showed that high-resolution 3-headed single photon emission computed tomography can detect lesions 0.5 to 0.9 cm at only 20% sensitivity.[35] This suggests that we must prepare for unexpected surgical bleeding even if a hemangioma is not detected in the operative region during diagnostic and preoperative examinations. Regarding the origin of the bleeding, the oral surgeon explained that the massive bleeding occurred while raising the gingival flap around the right mandibular impacted third molar. We assume that a branch of the hemangioma extended into the gingiva and/or the periosteum around the third molar site. Thus, it is important to make careful preparations in case of massive bleeding in patients with hemangiomas even when a hemangioma is not thought to extend into the surgical area.

CONCLUSION

This case report highlights the close attention patients with hemangiomas, particularly those involving the oral cavity and/or upper airway, require because of the risk for unexpected massive bleeding which can affect airway management and cardiovascular stability. This serves as a reminder of the significance of careful anesthetic and surgical planning and management along with ensuring an accurate diagnosis and assessing risk preoperatively. Considerations for managing patients with hemangiomas involving the head and neck region should include planning for extensive bleeding if lesions are near the surgical field or airway as well as having the hemangioma definitively treated first if possible.

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