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Anesthetic Management of Nasopharyngeal Angiofibroma Resection with Carotid Invasion in a Pediatric Patient

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Abstract

The nasopharyngeal angiofibroma is an aggressive, vascular tumor that may represent a challenge for the anesthesiologist by the risk of profuse bleeding. We report the case of a 13 years old, 52 kg, ASA1, who was scheduled for the resection of an angiofibroma invading facial sinuses and internal carotid artery, and submitted to external carotid and internal maxillary arteries embolization one day before surgery. Mallampati 2, previous successful intubation reported. Induction was made with propofol, fentanyl, lidocaine and rocuronium, followed by intubation by direct laringoscopy. Sevoflurane and remifentanyl were used for maintenance. Central venous access and arterial catheterization were provided. Inicial arterial gasometry was normal. During tumor resection close to the ethmoidal cells, there was profuse bleeding that required intensive volemic resuscitation and hemotransfusion. The cavernous part of the angiofibroma was resected by a neurosurgery team. During the whole procedure, the patient received 3500 ml of Saline Solution 0.9%, 4000 ml of RL, 1000 ml of hydroxyethyl starch, four RBC units, two plasma units and 4 platelets units. Serial arterial blood gas analysis revealed Hb = 6 g/dL as the minor value of hemoglobin and pH was physiological all the time. Fenylephrine, adrenaline and noradrenaline were infused. Even after the massive volume restitution, responsiveness to hydration was verified by the delta pulse pressure curve. Total diuresis was 300 ml. The total duration of the procedure was 9 hours. The patient was sent to the ICU after a tracheostomy. Transthoracic US revealed collapsed cava vein leading to new volume resuscitation.

Keywords

Nasopharyngeal Angiofibroma, Anesthetic Management, Hemodynamic Instability

Subject Areas: **Anaesthesiology & Pain Management**

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1. Introduction

The juvenile nasopharyngeal angiofibroma (JNA) is a histological benign tumor, almost exclusive of male adolescents, with an incidence of 1:150,000 [1].

Despite its benign character, it is locally aggressive and vascular. Common symptoms include epistaxis and nasal obstruction. Gold-standard treatment consists in surgical removal, which represents a challenge due to the risk of profuse bleeding [1]. Some techniques such as preoperative embolization, controlled hypotension and/or endoscopic resection are helpful in reducing the morbidity and mortality of this pathology.

The endoscopic removal is a less invasive procedure, well indicated for smaller tumors [2]. However, bleeding may interfere with the endoscopic vision and surgeons may face more difficulties in controlling homeostasis. Other treatment options include radiotherapy, chemotherapy and hormones such as flutamide.

In this article we report the case of a young male with a tumor invading noble structures with successful anesthesiological management.

2. Case Report

MAM, 13 years old, ASA1. The informed consent was obtained from the patient's family to report this case. The adolescent had a juvenile nasopharyngeal angiofibroma occupying maxillary, sphenoid and cavernous sinuses, nasal fossa and ethmoid bone, with bilateral carotid artery invasion. He was submitted to embolization of internal maxillary artery and external carotid on the previous day. Mallampati 2, previous successful intubation reported. Preoperative tests revealed anemia (Hb = 9.2 g/dL) and hypoalbuminemia (2.6 g/Dl). Admitted to the OR with BP = 110/70 mmHg, StO2 = 99% breathing ambient air. He was monitored with standard monitors (5-lead electrocardiogram, non-invasive blood pressure, pulse oximetry, and expiratory capnography; Infinity Vista XL monitor, Drager, Lubeck, Germany), bispectral index (BIS; A-2000 BIS Monitoring System, Aspect Medical Systems, Newton, USA), and neuromuscular transmission monitor (TOF-Watch SX, Organon Ireland, Dublin, Ireland). A 16 G intravenous catheter was placed in the right upper limb.

After preoxygenation with 100% oxygen, anesthesia was induced with propofol 200 mg, fentanyl 200 mcg, lidocaine 80 mg and rocuronium 40 mg, followed by endotracheal. Intubation by direct laryngoscopy, with a cuffed, reinforced size 6.5 tube. After induction, a central line was placed in the right subclavian vein, and invasive blood pressure was measured by catheterization of the left radial artery. Sevoflurane and remifentanyl 0.1 mcg/kg/min were used for maintenance. Urinary output was measured and a heating blanket was used for temperature control. The initial blood gas analysis was normal. Surgical access was performed via left facial incision and cervicotomy, and the patient remained in dorsal decubitus.

During the approach of the tumor close to the ethmoidal cells, profuse bleeding was reported, and massive volume restitution was needed, including blood transfusion. The cavernous part of the resection was made by the neurosurgeons, and the doctors decided towards cytoreduction after visualizing invasion of the internal carotid. During the whole procedure, 3500 ml of saline solution, 4000 ml of RL, 1000 of hydroxyethyl starch, four RBC units, two plasma units and 4 platelets units were infused. Serial blood gas analysis revealed 6 g/dL as the minor value of hemoglobin and pH was physiological all the time. Fenylephrine (total of 800 mcg), adrenaline (total of 500 mcg) and noradrenaline 0.05 - 1 mcg/kg/min were infused. Even after massive volume restitution, there was responsiveness to hydration by the delta pulse pressure curve. The total duration of the procedure was of 9 hours. The patient was sent to the ICU unit after tracheostomy and a bolus dose of 100 mcg of fentanyl and 5 mg of midazolam, with a noradrenaline 0.1 mcg/kg/min infusion. BP was 114/65 (82) mmHg and FC = 88 bpm. Total diuresis was 300 ml. A transthoracic echocardiogram revealed a collapsed cava vein leading again to fluid resuscitation. The patient was discharged from the ICU after seven days, tracheostomy was removed and he was able to leave the hospital after two weeks.

3. Discussion

The treatment of the juvenile nasopharyngeal angiofibroma is primarily surgical. The tumor may be accessed via lateral rhinotomy, transpalatal incision or endoscopy, depending on the surgeon`s ability and on the tumor's size. Vascular supply comes from the carotidal system via maxillary arteries or directly via internal carotid as the tumor invades the orbit or another cranial structure [3]. Due to its rich vascular supply, hemorrhage is the most common and important complication associated with surgery. The preoperative embolization, as done in this

case, helps to diminish the risk of significant bleeding. Previous publications consider a reduction of 80% on that risk [4]. Surgery is usually performed 24 - 48 hours after the procedure, and one publication suggests even greater benefit after four days [5]. Some complications are described such as temporomandibular joint pain, headache, vomiting or even stroke or blindness [6]. Our patient reported no symptoms associated to the procedure. Other benefits of the embolization include shortening of the operation time, easier resection of the tumor and the possibility to predict the intraoperative blood loss by the angiogram [6].

Managing a nasopharyngeal angiofibroma may be challenging in every stage of anesthesia. For induction, the right intubation technique must be chosen, as the tumor usually invades the patient's airway, even though most patients are categorized as Mallampatti I and II [1]. Rapid sequence intubation or the use of a bronchofiberscope are some choices described [3]. In this case, there was a description of successful intubation for the embolization on the previous day, which, in association with the adolescent's anxiety led to the choice for venous induction.

The intraoperative hemorrhage during resection threatens patients' lives constantly. The use of amines and invasive monitoring are well recommended. Some techniques for minimizing blood loss include the noninvasive anti-trendelemburg position, and induced hypotension. Labetalol in boluses, esmolol and propofol in continuous infusion, isoflurane and nitroglycerine have been tested as hypotensive strategies in a previous study [1]. A mean arterial pressure of 60 mmHg was targeted and there was no need for hypotensive drugs. A previous work aimed a hemoglobin value of 10 mg/dL to guide volume replacement [1]. We chose to aim at Hb = 8 mg/dL and did serial blood gas analysis to observe lactate values. It is recommended to save at least ten blood units for surgery [3]. Urinary output is ideally measured and must be between 0.5 - 1 ml/kg/h, helping to guide volemic restitution.

Another relevant concern is extubation. The surgical manipulation may cause traumatic airway edema. A tracheotomy was performed to ensure patient's airway and to reduce the need of sedatives as compared to intubated patients. Dexamethasone (0.1 mg/kg) may be used to minimise tissue oedema [1]. Extubation must be carefully planned after assuring the absence of active bleeding.

4. Conclusion

The conclusion is that the management of juvenile nasopharyngeal angiofibroma is a challenge for the anesthesiologist. There are potential risks throughout all stages of anesthesia: bronchoaspiration and/or difficult airway access during induction, intra-operative massive bleeding and airway obstruction after extubation [7].

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