Case Report

Anesthetic management of a child with recurrent laryngeal papillomatosis posted for laser ablation: A case report

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Abstract

Recurrent respiratory papillomatosis is the most common benign tumor of the larynx in childhood. Progressive formation of multiple papillomas in the respiratory tract requires surgical removal to prevent complications. We discuss perioperative management of a case, 15 year old boy, diagnosed as laryngeal papillomatosis posted for laser excision. Close cooperation and communication between anesthesiologist and surgeon is of paramount importance.
Keywords: Respiratory papillomatosis, laser surgery, pediatric anesthesia.

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INTRODUCTION

Recurrent respiratory papillomatosis (RRP) is the most common tumor of the larynx in childhood, is often initially misdiagnosed by pediatricians as asthma, croup or tracheomalacia[1,2]. It is caused by Human papilloma virus (HPV) types 6 and 11[3]. The disease, characterized by recurrent growth of benign papillomas that can affect the entire aerodigestive tract, has been recognized for more than 300 years[4]. The incidence of RRP is estimated to be 4.3 per 100,000 in the pediatric age group and 1.8 per 100,000 in adults[5]. Progressive formation of multiple papillomas in the respiratory tract requires surgical removal to prevent speech difficulties and respiratory compromise. Carbon dioxide laser ablation, while not a cure, is the current treatment of choice[6]. It allows better preservation of cord function and is associated with minimal postoperative pain and edema, a major consideration in children with small airways. The microdebrider, a new alternative to laser ablation techniques, is gaining popularity for removal of laryngeal lesions due to its ease of use and its lack of damage to surrounding tissues[7,8]. The frequent recurrence of papillomas has resulted in the use of different adjuvant treatments alongside surgical removal in an attempt to improve outcomes. Adjuvant treatments currently used include cidofovir, indole-3-carbinol, ribavirin, mumps vaccine and photodynamic therapy[9]. During the repeated visits of these children to operating room important anesthetic issues include psychological impact on the child, smooth and safe general anesthesia in compromised airway with potential for airway obstruction, sharing of airway with surgeon, avoidance of potential laser hazards and infectious disease risk to the OR personnel[10].

CASE REPORT

A 15 year old boy was posted for carbon dioxide laser ablation of laryngeal papillomas. He had history of loss of voice since 5 years. Indirect laryngoscopy revealed multiple pedunculated polyps arising from bilateral false and true vocal cords. He had history of undergoing surgery for the loss of voice 5 years ago but details of surgery were not available. Parents denied any history of sleep disturbance or snoring. Child was poorly nourished

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weighing 32 kgs, calm, cooperative and alert. Physical examination did not reveal any signs of respiratory distress. On auscultation bilateral air entry was normal and equal. Parents were explained about the risk of anesthesia and need for tracheostomy and informed written consent was taken. On the day of surgery, before shifting the child to OR, indirect laryngoscopy was performed in the presence of anesthetist, to plan airway management, which revealed multiple pedunculated polyps around the glottis. Child was taken to the OR without any sedation as he was calm and cooperative. Anticipating difficult airway smaller size endotracheal tubes (ETT), tracheostomy tubes, resuscitation equipments were kept ready. Standard monitors were connected. Surgeon and the nursing staff were requested to be ready for tracheostomy in case of emergency. After securing an intravenous (IV) access IV atropine was given before induction. Induction was done using 100% oxygen and 3% halothane. Mask ventilation was adequate. After achieving deeper plane of anesthesia direct laryngoscopy was performed followed by insertion of no. 5 Rusch lasertubus (laser-resistant tracheal tube used in our institute). Both inner and outer cuffs were inflated with saline. Bilateral equal air entry was confirmed and IV atracutium was injected. Fentanyl and hydrocortisone were injected intravenously. Vocal cords were sprayed with topical lidocaine by the surgeon before proceeding with surgery. Surgery was started after ensuring specific safety precautions for a laser case were followed by all the OR personnel. Anesthesia was maintained with oxygen, nitrous oxide and isoflurane, with intermittent doses of fentanyl and atracurium to ensure adequate depth. Inspired oxygen concentration was kept minimal to maintain oxygen saturation at or above 97%. Surgical excision of papillomas was completed without any complications. At the end of the surgery, when the child was still deep, direct laryngoscopy was performed and tube was changed to normal ET tube (no.6 cuffed). Child was reversed when attempted to breath and extubated when fully awake. He was monitored in OR for any immediate post-surgical airway complications for thirty minutes. Child was shifted to Postoperative Intensive Care Unit for further monitoring and management.

DISCUSSION

Recurrent respiratory papillomatosis was first described by Mackenzie in 1880 as a disease of the larynx confined to children[11] but subsequent studies have identified this disease in adults as well[12]. It is caused by infection of the mucous membranes with HPV types 6 and 11[3]. The most common symptoms are a change in voice, hoarseness, or stridor usually prior to the development of significant respiratory difficulty. Papillomas are typically located near the vocal cords but may also be found on the palate, tonsils and epiglottis[2]. Extension of the papillomas into the sub-glottic region is common, but extension into the trachea or proximal bronchi is rare. Lung involvement while also rare is often fatal[2]. The clinical course of this disease includes multiple recurrences after all modes of therapy. Adjuvant treatments like cidofovir, indole-3-carbinol, ribavarin, mumps vaccine and photodynamic therapy are used alongside surgery for better outcome[9]. Until remission of the disease, the mainstay of therapy is surgical excision of the papillomas. Carbon dioxide laser ablation is the current treatment of choice and the microdebrider being newer alternative[2,8]. Postoperative complications may range from airway stenosis, webbing and scarring to more severe forms like tracheal perforation, tracheoesophageal fistula, pneumothorax, hemorrhage, respiratory arrest and death[13]. Children are repeatedly stressed, not only by the nature of the disease, but also the need for repetitive surgical and anesthetic intervention. Anesthetic management should be tailored to the child's developmental level and stage[10]. Need for information and need to maintain control, by providing choices or individualized play therapy, are important in coping with stress[10]. It is useful to have a special file which includes detailed record of what has worked for the child and what has not, so that adjustments can be made when needed. As many of these patients have some degree of airway obstruction, sedative premedication is used after careful consideration of risks versus benefits[14]. In our patient, we explained the child about inhalational anesthesia when he was still with his parents and took him to OR without any sedative premedication. A variety of anesthetic techniques have been successfully used. Induction plan depends on the patient's airway status. In tubeless spontaneous ventilation technique inhalational anesthetics like halothane, sevoflurane alone or in combination with intravenous anesthetic propofol has been used[15]. This technique is shown to be efficacious with fewer complcations[16]. But complete control of airway is lacking. Apnea or hypoventilation, secondary cardiac arrhythmias from too deep a plane of anesthesia or laryngospasm from too light a plane of anesthesia are not uncommon[10]. Crispin Best has explained, in his article[14], providing anesthesia through a nasal tube in a spontaneously breathing patient. They use a conventional polar north endotracheal tube, and cut it short, so that the tube rests neatly in the nasal cavity without protruding beyond the soft palate when the head is in position for surgery. If an uncut tube is used, the oral cavity must be inspected to ensure that the end does not project beyond the soft palate. This avoids risk of fire to ETT during laser. Anesthetic gases are provided through this nasal

tube thus providing tubeless field to the surgeon. But the drawback is OR pollution. Total intravenous anesthesia is used in some centers for laser airway surgery with advantage of reduced theatre pollution by anesthetic gases and vapors[14]. Ventilating through a cuffed or tightly fitting ETT, either continuously or intermittently using a ventilator with apnea during episodic removal of ETT to allow unobstructed access to the surgical field [17] is used in some centers. Jet ventilation may also be used during laser surgery and is currently favored mode of ventilation. A catheter is placed above the glottic opening or through a side channel in the operating laryngoscope[18]. Total intravenous anesthesia with profound muscular relaxation using a thin transglottic catheter is the most commonly used technique with jet ventilation. Sound knowledge of respiratory physiology of children and infants is required[19]. Transtracheal catheters are also available but not preferred for papillomas. As laser-resistant catheters are available, this technique eliminates the risk of laser related fire to ETT. But barotrauma, hypercapnia, hypoxia, mucosal trauma are some of the known complications[20]. In our institute we use laser resistant tracheal tubes for airway related laser surgeries. In this case we planned to use smaller size tracheal tube, after confirming adequate mask ventilation. After inhalational induction, we did direct laryngoscopy and secured the airway by placing no. 5 Rusch lasertubus. We inflated both the cuffs of the tube with saline to avoid leak around the tube. Size of the tube was smaller when compared to the child's glottis. Specific precautions for laser surgery were undertaken as per our institutional protocol. Surgeon performed the procedure without much hindrance from the tube. Emergence from anesthesia was uneventful.

CONCLUSION

Airway difficulty, complications associated with laser surgery, pediatric patient with compromised airway are to be kept in mind when dealing with such cases. Variety of anesthetic techniques can be used successfully. Proper communication between surgeon and the anesthetist, plan to secure airway, being prepared for emergency tracheostomy, vigilant monitoring and careful extubation can avoid perioperative complications and provide pleasant experience to patient and the family.

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