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TUBELESS FIELD IN PEDIATRIC LARYNGEAL PAPILOMATOSIS SURGERIES AT TERTIARY CARE CENTER: ANESTHETIC MANAGEMENT

ABSTRACT

Recurrent respiratory papillomatosis (RRP) is a benign disease caused by human papilloma virus. It occurs frequently in children under 10 years of age, though it affects entire airway common sites are the anterior commissure, subglottic and epiglottis. Among different modalities of treatment microdebrider has gained popularity because it allows precise debridement and selective suctioning of the affected tissue, limiting scarring, limiting injury to laryngeal structure with shorter operating time and absence of thermal injury.

Sharing of airway by surgeon and anesthesiologist is a challenge for respiratory papillomatosis surgeries. Tubeless field can be provided by both inhalation agents and total intravenous agents. Complete occlusion of larynx with inability to ventilate, difficulty in intubation, laryngospasm, aspiration, inadequate depth of anesthesia, hypercapnia during apneic oxygenation, hypoxia, airway edema, increase airway secretion, multiple exposure to anesthesia are the anesthetic concern during surgery. Smooth and better outcome during removal of recurrent respiratory papillomatosis without intubation has been possible with proper planning, good coordination and communication among anesthesia team, surgical team, nursing staffs and flexibility in decision making.

Keywords: Laryngeal papillomatosis, Pediatric, Tubeless

INTRODUCTION

Recurrent respiratory papillomatosis (RRP) is a benign disease caused by human papilloma virus. The lesions which are exophytic growth of squamous epithelium is known to affect entire airway, but larynx is the most common site involved. Common sites of occurrence are the anterior commissure, subglottis and epiglottis.¹ It occurs frequently in children under 10 years of age and in many cases, it disappears after the patient reaches adolescence. The incidence of RRP reported is 4.3/100,000 children.²

Currently, there is no cure for the disease, and treatment is primarily focused on maintaining airway patency and voice quality. Patients often require multiple surgeries in a short period of time.³ Microdebrider has gained popularity due to the possible risks associated with the use of lasers and the speed they provide when removing bulkier lesions. Microdebrider allows precise debridement and selective suctioning of the affected tissue simultaneously. Advantages of using microdebrider are shorter operating time and absence of thermal injury. It limits scarring and injury to laryngeal structure.⁴

A tracheotomy is reserved for the most aggressive cases with impending airway compromise or has the potential to occlude the airway. When a tracheotomy is unavoidable, decannulation should be considered as early as possible once the disease process is controlled and the airway is deemed stable. In fact, tracheotomy provides an additional site for rapid colonization and serves as a conduit for distal disease spread to the tracheobronchial tree.^{5,6}

Earlier delivery of general anesthesia with endotracheal intubation was a practice during removal of respiratory papillomatosis with cold steel instruments. But now with the introduction of microdebrider, tubeless surgical field has been a routine practice for delivery of anesthesia.

Anesthetic Management

Complete occlusion of larynx with inability to ventilate, difficulty in intubation, laryngospasm, aspiration, inadequate depth of anesthesia, hypercapnia during apneic oxygenation, hypoxia, airway edema, increase airway secretion, multiple exposure to anesthesia are the anesthetic concern during tubeless field surgery for respiratory

papillomatosis. Sharing of airway by surgeon and anesthesiologist is a challenge for respiratory papillomatosis surgeries. Preoperative planning and communication regarding appropriate strategy for oxygenation and anesthesia need to be discussed among team, which result in good outcome.

Preoperative Evaluation

Following history and investigation are of great importance for anesthesia

- Severity of Dyspnea, any dyspnea with positional variation (increase in symptoms or relief of symptoms)
- Hoarseness or aphonia, use of accessory muscles
- History of previous surgery done for RRP, when was the last time patient had excision of papillomatosis. If the patient had come for routine follow up then the size of mass may be smaller but if they have come only after worsening of symptoms then the size of mass may be bigger and obstructing major portion of larynx. Despite successful excision, recurrence is common with complications such as airway scarring, edema and stenosis.
- History of associated upper or lower respiratory tract infection worsen the scenario
- Room air oxygen saturation need to be noted
- Nasopharyngeal endoscopic images are the dynamic assessment of the preoperative airway. Images taken immediately prior to surgery are often valuable information. Although nasal endoscopy provides information, it does not inform the clinician how the airway will react to GA. Ability to view the glottis endoscopically does not always equate to an ability to ventilate or obtain a similar laryngoscopic view under GA.
- As RRP can cause pulmonary hypertension, an echocardiogram should be done if there is a suspicion⁷

Types of Anesthesia

General anesthesia with smaller size cuffed endotracheal intubation is a preferred practice by any anesthesiologists. Pitfall of this technique is difficulty to remove papillomatosis of glottic and subglottic area. Surgical desire is for a tubeless field in patients which has now been successful with the introduction of microdebrider.

Strategy

Tubeless field anesthesia can be provided in a variety of ways and the techniques used should be discussed with team for airway management. It will optimize the outcome and limit error.

Preoperative preparation

Patient is fasted 2 hr. for clear fluid, 4 hr. for breast milk and 6 hr. for solid food or formula milk. About 15 to 20 minutes prior intravenous glycopyrrolate 0.01mg/kg given to decrease secretion and intravenous hydrocortisone 3-4mg/kg given to minimize airway inflammation due to manipulation.

Gaseous induction

Induction is done with sevoflurane. It is preferred for iv. cannulation and also safer in patient having difficult ventilation or intubation. Level of anesthesia deepened by oxygen and sevoflurane.^{8,9} Once level of anesthesia is deepened a small sized ETT is inserted through nose and kept in nasopharynx. 100% oxygen and sevoflurane or isoflurane is delivered via this nasopharyngeal tube for maintenance of anesthesia. Lignocaine 2% or 4% sprayed topically in the airway which minimizes airway reflexes. Spray should not be done in lighter plane of anesthesia as it cause coughing, laryngospasm and desaturation. No muscle relaxant is given and surgery is carried out in spontaneously ventilating patient. Disadvantages of this technique is environmental pollution as high concentration of inhalation agents is required and is open to surgical area. Similarly other difficulty is in end tidal CO₂ monitoring to ensure patency of the airway. In this technique patient has control on their own depth of anesthesia. If depth of anesthesia decrease, it decreases the respiratory drive and if they lighten they breathe more.

Total intravenous anesthesia (TIVA) and spontaneous respiration

Induction is done by inhalation agents or by giving iv. propofol (dose of 1-3mg/kg) and maintenance is with iv infusion of propofol. TIVA provides unobstructed surgical access, maintenance of spontaneous breathing while providing adequate surgical plane. Benefits are depth of anesthesia is not dependent on airway and there is no environmental pollution.

Provision of good suctioning during surgery is

equally important. Continuous monitor of ECG, SpO₂, heart rate and pattern of respiration is required. If patient is desaturated during the procedure, either ventilation by bag and mask or insertion endotracheal tube and ventilating till SpO₂ normalize are the options. Once surgery is completed, visualization of the surgical field for any active bleeding or collection and proper suctioning is needed. If growth is huge, initially gaseous induction with sevoflurane is done, then intubated with smaller size endotracheal tube after giving depolarizing muscle relaxant. With tube in situ peripheral growth is excised.¹⁰ Then ETT is removed for the excision of growth around the vocal cord and in subglottic area.¹¹

Post-operative period

Close observation in the postoperative period is required. Obstruction of airway can occur due to secretion or swelling. It can be minimized with proper suctioning of airway and by intravenous hydrocortisone.

CONCLUSION

Giving anesthesia to pediatric patient with respiratory papillomatosis is really a challenge. With introduction of newer technique and expertise of team, removal of recurrent respiratory papillomatosis without intubation has been possible. Proper planning, good coordination and communication among anesthesia team, surgical team, nursing staffs and flexibility in decision making are required which will result in smooth and better outcome.¹²

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