Case Report

Anesthetic management of vallecular cyst excision in an infant: An airway challenge

ABSTRACT

Vallecular cyst is uncommon but well-recognized cause of upper airway obstruction in newborn and infants. We hereby present anesthetic management of a case of vallecular cyst in an infant posted for excision and marsupialization. A 4-month-old female infant weighing 3.5 kg presented with inspiratory stridor progressively worsening over 2 months. Anesthesia plan was to carry out inhalational induction maintaining spontaneous respiration and keeping tracheostomy as standby option. In this case, laryngoscopy was challenging due to the size and extent of the cyst thus necessitating gentle laryngoscopy to prevent cyst rupture and pulmonary aspiration. On performing laryngoscopy, epiglottis was not visualized, which made intubation difficult. At the end of surgery, extubation was not carried out as the possibility of laryngomalacia could not be eliminated and also in view of intraoperative airway manipulation. The patient was electively ventilated postoperatively and extubated on the 2nd postoperative day.

Key words: Difficult airway; difficult laryngoscopy; no tracheostomy; vallecular cyst

Introduction

Vallecular cyst is uncommon but well-recognized cause of upper airway obstruction in newborn and infants. Stridor with or without respiratory distress is the most common presentation secondary to narrowing of the upper airway. Vallecular cyst is associated with laryngomalacia in 90% of patients. Although benign in nature, it may cause severe airway obstruction and even death. We hereby present anesthetic management of a case of vallecular cyst in an infant posted for excision and marsupialization of the cyst.

Case Report

A 4-month-old female infant weighing 3.5 kg presented with stridor progressively worsening over 2 months. Computed tomography (CT) scan of neck and thorax revealed ill-defined cystic lesion 1.4 cm by 1.5 cm in posterior aspect of the base of tongue in midline which caused narrowing of oropharynx [Figure 1]. Patient was posted for direct laryngoscopy and marsupialization of cyst.

Preoperatively patient’s baseline parameters were as follows:

- Heart rate – 130/min;
- Respiratory rate – 34/min; chest indrawing and inspiratory stridor present.
- Capillary refill – <3 s.
- Investigations – ABG-pH = 7.40/PCO$_2$ = 41.5/PO$_2$ = 65.3/SaO$_2$ = 91.2%/HCO$_3$ = 26.1.

Anesthesia plan was to carry out inhalational induction maintaining spontaneous respiration and keeping

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tracheostomy as standby option. The patient was kept nil by mouth for 6 h during which Ringer lactate fluid was given intravenously (IV) at 4 ml/kg/h. In operation theater, patient was premedicated with IV atropine 0.02 mg/kg. The following monitors were attached: Pulse oximeter, electrocardiogram, noninvasive blood pressure, capnograph. Ringer lactate fluid was started as per Holliday–Segar method as shown in Table 1.

Table 1: Holliday Segar method for calculating maintenance fluid requirements in children

| Weight in kg (kilogram) | Holliday Segar method (mL/kg/day) | Holliday Segar estimate (mL/kg/h) |
|------------------------|-----------------------------------|----------------------------------|
| First 10 kg            | 100                               | 4                                |
| Second 10 kg           | 50                                | 2                                |
| Every kg thereafter    | 20                                | 1                                |

Inhalational induction was carried out using upward titration of sevoflurane from 1% to 8% in 100% oxygen. After loss of skeletal muscle tone, trial laryngoscopy was performed using Macintosh blade size zero with the following objectives in mind:

a. To determine whether glottis opening would be seen with conventional laryngoscopy.
b. To note the position, size and extent of the cyst which would help in placement of laryngoscope blade carefully avoiding any pressure on the wall of the cyst.
c. To visualize the epiglottis which helps in guiding the tip of the blade into the vallecula.

The cyst was visualized in the midline at the base of the tongue. The laryngoscope blade was introduced over the right lateral position of the larynx avoiding any contact with the superior portion just lateral to the right side of the cyst wall. Any forceful contact of the blade with the cyst wall or any attempt made to create space for laryngoscope blade by pushing the cyst to the left with the blade could cause rupture of the cyst hence being patient, careful and gentle at this stage was of utmost importance.

However, the epiglottis was not seen. Patient was ventilated with 100% oxygen using Jackson Rees circuit with which we could maintain SpO₂ of 100%. Although the skeletal muscle relaxation was adequate with sevoflurane, the patient was breathing spontaneously, but with hypoapnea. Patient could be ventilated without any difficulty; to avoid any trauma to the larynx or mobile cords during intubation, IV succinylcholine 6 mg was given. Laryngoscopy was performed keeping the tip of blade to right side of midline superior to the vallecula, however, we confess that this could not be confirmed since the anatomy was distorted by the presence of cyst and nonvisualization of the epiglottis. The inferior most portion of the base of the tongue served as a guide for the placement of the tip of the laryngoscope blade. Laryngeal inlet including arytenoids and epiglottis was not seen. Laryngoscopy in this situation was very challenging since, the epiglottis which serves as an important landmark during this procedure was not visualized at all.

Furthermore, the size and extent of the cyst added to our woes thus necessitating gentle laryngoscopy to prevent cyst rupture and pulmonary aspiration. The assistant was asked to give cricoid pressure and push the larynx downward and toward the right side which brought arytenoids and posterior part of glottis into view. Trachea was intubated using uncuffed oral endotracheal tube number 3. We would like to emphasize that the ability of the assistant in giving cricoid pressure improper manner is of utmost importance.

Anesthesia was maintained using oxygen (50%) + nitrous oxide (50%) + sevoflurane (2%); intermittent positive pressure ventilation given using Jackson Rees circuit. IV vecuronium 0.1 mg/kg and IV fentanyl 1 mcg/kg was used for muscle relaxation and analgesia respectively.

ENT surgeon performed laryngoscopy and experienced difficulty in locating epiglottis as it was flushed with the cyst wall. Marsupialization of the cyst was carried out. Epiglottis was ultimately located when most of the cyst wall was removed. At the end of surgery, patient was shifted to intensive care unit for gradual weaning as the possibility of laryngomalacia could not be ruled out. Furthermore, development of edema at the site of surgery was expected. Patient was extubated on the 2nd postoperative day. Following extubation, patient had no stridor or difficulty in breathing. Hospital stay was uneventful.
Discussion

Vallecular cyst is an uncommon cause of stridor in infants.\(^2\) It causes airway obstruction as a result of mass effect in the hypopharynx and by posterior and inferior displacement of the epiglottis. It may be associated with laryngomalacia where there may be flaccid epiglottis, poorly supported arytenoids or short epiglottic folds.\(^3\) The airway collapse is thus exacerbated by inspiration resulting in inspiratory stridor. Anesthetic management of airway is challenging as these patients are at increased risk of airway occlusion resulting in hypoventilation, hypoxemia, or death.

Preoperative assessment of these patients should include careful history to identify obstructive symptoms and detailed respiratory system examination. CT scan of neck and thorax must be carried out to determine the size, location and contents of a cyst in order to plan anesthesia and surgical management.

In this case, patient presented with inspiratory stridor and CT scan showed a midline vallecular cyst causing narrowing of oropharynx. Our anesthetic plan was to carry out inhalational induction using sevoflurane; perform a check laryngoscopy and to give IV succinylcholine after confirming mask ventilation. We preferred using succinylcholine as it facilitated mask ventilation and improved the conditions for laryngoscopy in this patient. Positioning of laryngoscope blade to one side of midline and external laryngeal manipulation facilitated intubation in our case.

ENT surgeons were ready for emergency tracheostomy if required. Batra et al. have reported a case of vallecular cyst in a 3 months old infant, in which the airway could not be secured by any of the conventional techniques described for such cases, thus, necessitating tracheostomy.\(^4\) Other options for tracheal intubation in such a case would be the use of paraglossal straight blade laryngoscopy or fiberoptic intubation.\(^5\) Use of fiberoptic bronchoscope in such a case can encounter hurdles due to cyst location and distortion of laryngeal anatomy.\(^6\) A large bore needle with attached syringe should be available if emergency cyst aspiration is needed.\(^7\) However, cyst aspiration carries the risk of pulmonary aspiration of cyst contents, recurrence and difficulty in identifying cyst margins subsequently. Gandhi et al. have reported two cases of vallecular cyst with laryngomalacia where cyst aspiration was carried out prior to endotracheal intubation.\(^8\) Problems with direct laryngoscopy include cyst rupture, loss of airway, airway edema, and bleeding.

To conclude, careful preoperative assessment with investigations like CT scan help in planning anesthetic management of such a case of vallecular cyst with backup plan for airway crisis management.

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Conflicts of interest
There are no conflicts of interest.

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