

Anaesthesia in a patient with tracheal diverticulum: a case report

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Abstract:

Tracheal Diverticulum(TD), or paratracheal cyst, is an uncommonly encountered and reported clinical entity. The incidence of TD is approximately 1% in adults and 0.3% in children.^{1,2} There are 2 types of TD- acquired and congenital. Acquired diverticula are thought to be outpouchings at weaknesses in the posterior tracheal wall due to coughing or blunt injury.^{1,3,4,5} While congenital TD, are thought to be malformed supernumerary branches of the trachea.¹ Patients may present with chronic cough, dyspnoea, stridor, hoarseness of voice, stridor, and repetitive episodes of tracheobronchitis.^{2,3,5} Case reports have reported difficulties in intubation, lung isolation, ventilation and pneumomediastinum secondary to accidental perforation of a diverticulum caused by tracheal intubation.^{3,6,7,8}


We present a case of a patient who underwent an uneventful excision of his TD. Written consent was obtained from the patient for publishing this case report. Based on local ethical board requirements, no ethical review was needed.

INTRODUCTION

Tracheal Diverticulum (TD), or

paratracheal cyst, is an uncommonly encountered and reported clinical entity. The incidence of TD is approximately 1% in adults and 0.3% in children.^{1,2} There are 2 types of TD- acquired and congenital. Acquired diverticula are thought to be outpouchings at weaknesses in the posterior tracheal wall due to coughing or blunt injury.^{1,3,4,5} While congenital TD, are thought to be malformed supernumerary branches of the trachea.¹ Patients may present with chronic cough, dyspnoea, stridor, hoarseness of voice, stridor, and repetitive episodes of tracheobronchitis.^{2,3,5}

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CASE REPORT

A 40-year-old Nepalese male, 70kg, body mass index 26kg/m², ex-smoker presented with 6 months of chronic cough. He was initially treated for allergic rhinitis and laryngopharyngeal reflux without improvement. There was no dysphagia, hoarseness, stridor or neck swelling. Physical examination, pulmonary function test and cardiovascular fitness were unremarkable. A Computed Tomography (CT) Thorax (Fig 1) revealed a small right paratracheal diverticulum 7.5cm above the carina and mild pulmonary emphysematous changes.

He underwent a right tracheal diverticulum(TD) excision via transcervical approach. He was induced uneventfully, with mask ventilation minimised and a size 7 Portex® Suction Above the Cuff Endotracheal Tube (SACETT®) was inserted using direct laryngoscopy. It was an easy intubation with a grade 1 larynx. As the CT Thorax showed that the TD was 7.5cm above the carina, the endotracheal tube(ETT) was then adjusted under fiberoptic bronchoscopy (FOB) until the ETT tip was 3cm above the carina so that its

cuff occluded the tracheal diverticulum opening. This was to avoid ventilation and possible perforation of the diverticulum. Dexamethasone was given to decrease airway swelling as well as anti-emesis. He had positive pressure ventilation via volume control mode, with airway pressures 14-17cmH₂O, generating tidal volumes of 500-545mls.

After the surgeon mobilised the recurrent laryngeal nerve (RLN) and dissected down to the TD and just before its excision, the subglottic evacuation opening of the ETT was suctioned to remove secretions above the ETT cuff. The ETT was then uncuffed and advanced under FOB guidance into the left main bronchus till its tip was just proximal to the left superior and inferior lobar bronchi, then recuffed again. This was to prevent the surgeon from accidentally passing sutures through the ETT cuff during their work on the trachea/tracheal diverticulum. One-lung-ventilation was needed for about 8 minutes while the surgeon excised and sutured the diverticulum neck closed. The ETT was then withdrawn to its original position under FOB guidance and the patient reverted to two-lung-ventilation. Anaesthesia was reversed with neostigmine and atropine after wound closure and patient extubated awake with a total operation time of 4 hours. There were no anaesthetic or surgical complications post-operatively and the patient's symptom of cough resolved.

DISCUSSION

Indication for surgery

The treatment for TD is generally conservative unless patient is symptomatic, such as our patient who presented with chronic cough.^{1,4} Resection of the TD is

necessary to eliminate "dumping" of purulent secretions into the tracheobronchial tree, and to avoid aspiration pneumonias.⁶

Complications of tracheal diverticulum

There have been a few case reports discussing perioperative airway complications, including preoperative RLN compression, intraoperative difficult intubation, ventilation and lung isolation. Postoperatively, pneumomediastinum and subcutaneous emphysema have been reported.^{3,4,5,6,7,8}

Intraoperative complications that have been described are difficult intubation, ventilation and lung isolation. It was also reported of a case where perforation of the diverticulum during endotracheal intubation leading to postoperative pneumomediastinum.^{3,6,7,8}

The presence of a TD may give rise to incorrect double lumen tube placement even with the use of a FOB because its opening can resemble (and be mistaken for) the right mainstem bronchus, leading to suboptimal lung isolation.⁸ Difficulty in intubation may arise when the tracheal tube lodges in the diverticulum making intubation even less likely to be successful.³ Postoperatively, patients may present with subcutaneous emphysema due to positive pressure ventilation.⁴

Anaesthetic considerations

Anaesthetic considerations for patients undergoing an excision of the TD include avoiding positive pressure ventilation prior to ETT insertion, bronchoscopic guidance during endotracheal intubation, and consideration of one lung ventilation during excision.⁴

Preoperatively, the patient's CT Thorax was reviewed and we measured the distance the

diverticulum was from the carina to allow us, with the aid of the FOB, to position the ETT so that its cuff occluded the diverticulum opening while its tip was still proximal to the carina for two lung ventilation. As positive pressure ventilation was used intraoperatively, this would avoid ventilation and subsequent perforation of the diverticulum leading to complications of subcutaneous emphysema and pneumomediastinum as mentioned.³ Difficulty in endotracheal intubation and ventilation have been reported, however this patient had neither.^{3,7} The Portex® SACETT® is commonly used in the intensive care setting in our institution as it has been specifically designed to reduce ventilator associated pneumonia. It has the ability to remove secretions from above the cuff while leaving the tube in position. This is done through the incorporation of an additional posterior lumen with subglottic evacuation opening above the cuff, enabling continuous aspiration of subglottic secretions. This particular ETT was used as it provided the capability of suctioning secretions above the cuff prior to cuff deflation and re-inflation during ETT repositioning.

Before the surgeon entered the trachea, we switched to endobronchial intubation by pushing the ETT into the left main bronchus as the right had the possibility of occluding the right upper lobe. This was done to prevent the surgeons from damaging the ETT cuff during their work on the trachea/TD.

In conclusion, the Portex® SACETT® is useful in this procedure. Close communication between the surgeon and anaesthetist both pre-operatively for planning of ETT cuff placement and intraoperatively to reposition the ETT to

prevent accidental rupture of the cuff is required. FOB guidance of ETT is required during intubation to avoid perforation of the diverticulum.

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