SL Journal of Anesthesia & Critical Care

Case Report

Anesthetic Experience of A Patient with Palpable Paratracheal Air Cysts in the Anterior Neck – A Case Report

Min Kyu Lee, Jeong Min Sung, Sung Min Lee, Ji Hee Chang and Mi Ae Jeong*

Department of Anesthesiology and Pain Medicine, Hanyang University Hospital, Korea

ARTICLE INFO

Received Date: February 19, 2022
Accepted Date: March 08, 2022
Published Date: March 11, 2022

KEYWORDS

Aspiration
Hiatal hernia
Paratracheal air cysts

Citation for this article: Min Kyu Lee, Jeong Min Sung, Sung Min Lee, Ji Hee Chang and Mi Ae Jeong. Anesthetic Experience of A Patient with Palpable Paratracheal Air Cysts in the Anterior Neck – A Case Report. SL Journal of Anesthesia & Critical Care. 2022; 3(1):116

Corresponding author:
Mi Ae Jeong,
Department of Anesthesiology and Pain Medicine, Hanyang University Hospital, 222-1, Wangsimni-ro, Seongdonggu, Seoul, 04673, Republic of Korea, Tel: 82-2-2290-8680; Fax: 82-2-2299-8692;
Email: macheong@hanyang.ac.kr

ABSTRACT

Paratracheal Air Cysts (PACs) are clinical entities characterized by an out pouching of the trachea that can be encountered incidentally in the operating room. Most PACs are asymptomatic, but complications, such as difficult ventilation after intubation, difficulty in lung isolation, and tracheal rupture related to PACs, have been reported. Here, we report a case of a 63-year-old female whose large PACs were palpated at the anterolateral surface of the lower neck and who was at high risk of pulmonary aspiration during general anesthesia induction. We could not apply cricoids pressure due to the potential risk of PAC rupture. This situation resulted in pulmonary aspiration of gastric juices despite other supplementary preventive management. Fortunately, the aspiration was minimal, and there were no post-operative sequelae. The authors suggest special attention should be paid to patients with PACs during general anesthesia.

INTRODUCTION

Paratracheal Air Cysts (PACs) are clinical entities characterized by an out pouching of the trachea, are lined by respiratory epithelium, and are usually detected incidentally through thoracic Computed Tomography (CT). Accompanying symptoms are nonspecific, such as pharyngeal discomfort, cough, dyspnea, stridor, throat irritation, and chronic or recurrent chest discomfort due to either effect of the mass or infection, but most PACs are asymptomatic. However, very rare but serious complications can occur.

PACs have been infrequently reported in the anesthetic literature, and the implications for anesthesia are not well established. In addition, as pulmonary aspiration during anesthetic induction may progress to aspiration syndrome, which is a major cause of morbidity and mortality in anesthesia, prevention of aspiration is a matter of serious concern. Here we report a case of large PACs that were one of the largest among previous reports and were a hindrance to applying Cricoid Pressure (CP), which was intended to reduce the risk of pulmonary aspiration during anesthetic induction.

CASE PRESENTATION

A 63-year-old female patient [height, 158cm; weight, 54kg; American Society of Anesthesiologists physical status III) was scheduled to undergo emergency surgery with a laparoscopic biopsy of peritoneal carcinomatosis. She had been previously diagnosed with asthma and rheumatoid arthritis. On the upper-chest CT, multiple incidental PACs were located along the right posterolateral aspect of the trachea at

the thoracic inlet level (Figure 1). They were round in shape, multi-loculated, of various sizes ranging up to 34mm in diameter on the longest axis, with mild tracheal indentation to the left. Suspicious communication to the tracheal space was identified in the largest cyst (Figure 2). On the lower-chest and abdominal CT, abdominal ascites was accompanied by a hiatal hernia. Three liters of ascites were removed through abdominal paracentesis the day before surgery. All other laboratory results were within normal ranges. The patient fasted for twelve hours, and no premedication was administered. After the patient entered the operating room, monitoring for noninvasive blood pressure, three lead electrocardiogram, and oxygen saturation were initiated. During her history taking, the patient had no symptoms related to PACs and had been unaware of the PACs before the chest CT scan. Also, the patient had no symptoms related to the hiatal hernia. No abdominal distension was observed; however, the cysts were palpable on the external surface of the anterior neck just inferolateral to the cricoids cartilage. The authors decided to induce rapid sequence induction and intubation without applying cricoids pressure. After preoxygenation in a head-up position, anesthesia was induced with 1% lidocaine (50mg), propofol (80mg), and rocuronium (50mg) with a continuous infusion of remifentanil with sevoflurane as maintenance agents. One minute later, a laryngoscope was placed into the mouth, and it was discovered that the oral cavity was filled with a small volume of regurgitated gastric fluid. After immediate oral suction, tracheal intubation was performed, the patient was placed in the head-down position, and endotracheal suction was performed before ventilation was started. Using fiber optic bronchoscopy, a small volume of gastric content was observed on the wall of the trachea and the right main bronchus. Repetitive endotracheal suction was performed using fiber optic bronchoscopy to prevent further aspiration and pneumonitis. No definite opening to the PAC was found during bronchoscopy. During the operation, all vital signs were stable without acute desaturation events, and notable airway pressure changes were unapparent on ventilator monitor. After the surgery, extubation was uneventful. The patient had no acute or chronic problems related to aspiration and were transferred to the Hemato-Oncology Department for chemotherapy. The patient was discharged 2 weeks post operation without respiratory sequelae.

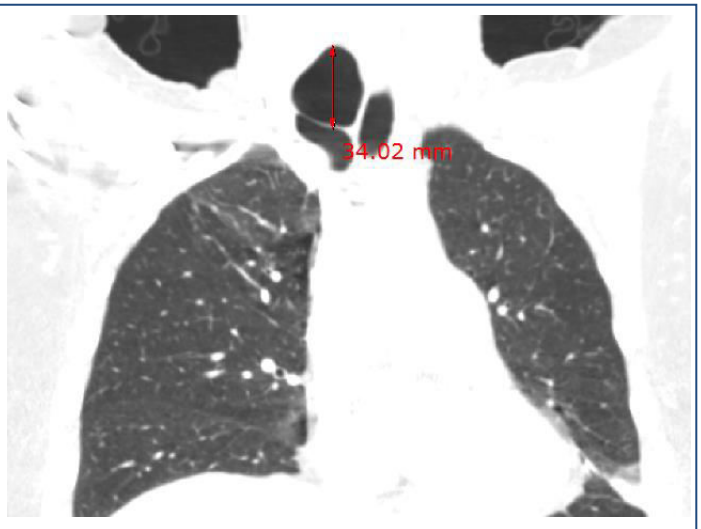

Figure1: Paratracheal air cysts located right posterolateral to the trachea

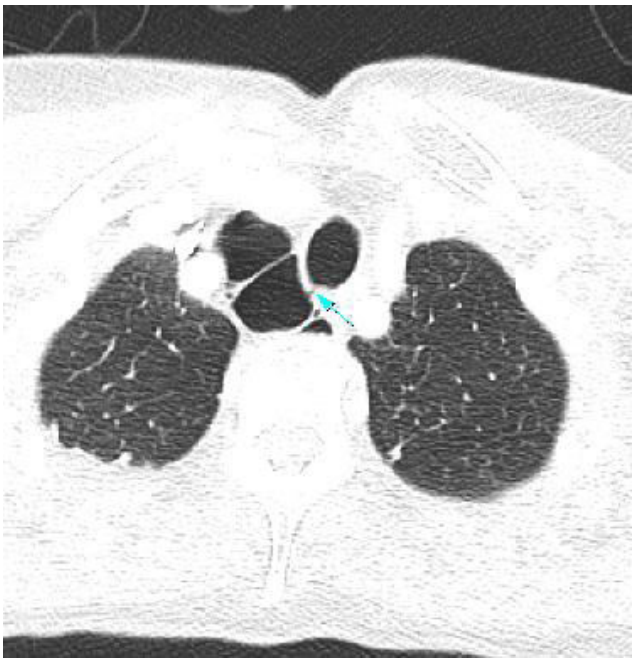

Figure 2: Suspicious communicating channel between a paratracheal air cyst and the tracheal lumen

DISCUSSION

PACs are usually detected incidentally through radiologic examination and are clinical entities characterized by an out pouching of the trachea and are lined by respiratory epithelium. Pathologic confirmation differentiates them from tracheal diverticulum [1], lymphoepithelial cysts [2], and bronchogenic cysts [3].

Most PACs are positioned on the right posterior aspect of the trachea at the thoracic inlet level, and the sizes vary from millimeters to centimeters. The majority are elongated in shape on the coronal axis, and the rest are round or irregularly shaped with larger PAC stending to be more loculated and communicated to the tracheal lumen [4,5]. The prevalence has been reported to range from 2 to 8% [4,6], although the true incidence according to race, sex, and age is not well understood yet. Accompanying symptoms are rare and nonspecific such as pharyngeal discomfort, cough, dyspnea, stridor, throat irritation, and chronic or recurrent chest discomfort due to either effect of the mass effect or infection. Although very rare, complications related to PACs, such as difficult ventilation after intubation, difficulty in lung isolation, and tracheal rupture, have been reported [7,8]. The rupture of a PAC is thought to be caused by high airway pressure during ventilation [9], one-sided intubation, inappropriate cuff inflation with high cuff pressure, tube replacement without deflation of the cuff, and coughing against a blocked tube or a closed expiratory valve, which are also common pathomechanics for Tracheo bronchial Rupture (TBR) [8]. And as numerous PACs are communicated to the tracheal lumen without being visible on CT scans, tracheal rupture can also be caused by PAC rupture [7]. The clinical results are similar to that of a TBR such as subcutaneous emphysema, pneumo mediastinum, and respiratory distress [7,8]. Symptoms and signs of rupture may occur immediately or gradually postoperatively. As rupture of PACs that are not communicated to the trachea does not result in TBR, preoperative assessment of whether the PAC is communicated to the tracheal lumen or not may be helpful to stratify the risk of TBR following rupture of PACs. However, it is difficult to detect all communications using the current diagnostic tools. According to some studies, 8% to 56.1% of PACs are connected to the trachea as determined using chest CT. Additionally, thinner sections and higher-resolution CT leads to a higher proportion of communicating PACs being found [6,10]. Even though channels undetected through CT might be identified with fiberoptic bronchoscopy. However, perceiving all PACs as possibly being connected to the tracheal lumen and paying special attention to possible rupture complications may be a better way to cope with PACs in clinical situations. The treatment of TBR is not well established yet, but the trend is towards medical rather than surgical treatment [11], and the decision should be individualized to the patient's current state. After rupture of PACs, supplemental methods for ventilation during maintenance of anesthesia include positioning of the tube distal to the ruptured lesion, pressure controlled ventilation, alveolar recruitment using positive end-expiratory pressure, and reduction of airway pressure [8]. In our case, there were two main points of concern regarding patient before the induction of anesthesia. One was the possibility of tracheal rupture because the PACs were communicated to the tracheal lumen. Second, the possibility of aspiration of gastric juices was high because it was judged that cricoids pressure could not be applied because the PACs were palpated on the external surface of the anterior neck just inferolateral to the cricoids cartilage.

PAC rupture caused by external pressure has not yet been reported in literature. When Cricoid Pressure (CP) is applied to patients who are at risk of aspiration during induction of anesthesia, the force is approximately 30 newtons. Our patient's cysts were palpated inferolateral to the cricoids cartilage of the anterior neck surface, and it was assumed that they were large in size. Consequently, we assumed that the combined effects of the large size of the PACs and the forceful strength of external pressure may cause a tracheal rupture. Fortunately, the patient had no symptoms associated with her hiatal hernia, and 3L of ascitic fluid was removed through abdominal paracentesis the day before surgery. Therefore, the risk of aspiration was considered to be low. Additionally, many of the recent, yet controversial, updated guidelines for airway management published by various professional societies no longer recommend the routine application of CP because of the lack of scientific evidence for its effectiveness in reducing the risk of pulmonary aspiration [12]. Weighing the risks and benefits of applying CP, we decided to induce anesthesia using

rapid sequence induction without applying CP and a head-up position to minimize regurgitation. Unfortunately, pulmonary aspiration of gastric juices occurred. Therefore, it was considered that the amount of gastric juice should be measured using gastric ultrasonography prior to induction of anesthesia. So, if the amount of gastric juices was large, we should delay the operation or remove gastric juice by using a Levin tube before induction.

In the case of large cysts that are grossly distinguishable on the neck surface, procedures applied to cervical regions, such as catheterization of the internal or external jugular vein, should be carefully performed. Due to the preponderant right-sided location, procedures on the left cervical space rather than the right could prevent accidental penetration of large PACs with a needle during the procedure.

Although rare, PACs with large communicating channels have been linked to difficulty in ventilation after intubation [13] or in lung isolation [14] in which dilated tracheal lumen and misinterpretation of the large channel as a bronchus were the cause, respectively. In these cases, fiberoptic bronchoscopy aided diagnosis during or after induction so that appropriate management, such as applying laryngeal mask airway to the patient or repositioning the DLT into the left main bronchus with the guidance of fiberoptic bronchoscopy, was accomplished without complication. In the case of a large diverticulum combined with cervical lordosis, the bent trachea interrupted advancement of the endotracheal tube in the tracheal lumen, and a laryngeal mask was eventually used for proper ventilation during surgery [15]. Consequently, assuming it as a risk factor for difficulty in airway management, being aware of the curvature and diameter of the airway near large PACs and being prepared for failed intubation prior to induction are of great importance.

CONCLUSION

We suggest that clinicians who are engaged in airway management, especially anesthesiologists, should be aware of PACs as a possible cause of unexpected airway-related complications. Due to the low incidence of PAC-related complications during anesthesia, a further series of case reports would contribute to a deeper understanding of its implications for anesthesia.

REFERENCES

1. Mackinnon D. (1953). Tracheal diverticula. J Pathol Bacteriol. 65: 513-517.
2. Tanaka H, Igarashi T, Teramoto S, Yoshida Y, Abe S. (1995). Lymphoepithelial cysts in the mediastinum with an opening to the trachea. Respiration. 62: 110-113.
3. St-Georges R, Deslauriers J, Duranceau A, Vaillancourt R, Deschamps C, et al. (1991). Clinical spectrum of bronchogenic cysts of the mediastinum and lung in the adult. Ann Thorac Surg. 52: 6-13.
4. Bae HJ, Kang EY, Yong HS, Kim YK, Woo OH, et al. (2013). Paratracheal air cysts on thoracic multidetector CT: incidence, morphological characteristics and relevance to pulmonary emphysema. Br J Radiol. 86: 20120218.
5. Buterbaugh JE, Erly WK. (2008). Paratracheal air cysts: a common finding on routine CT examinations of the cervical spine and neck that may mimic pneumomediastinum in patients with traumatic injuries. AJNR Am J Neuroradiol. 29: 1218-1221.
6. Goo JM, Im JG, Ahn JM, Moon WK, Chung JW, et al. (1999). Right paratracheal air cysts in the thoracic inlet: clinical and radiologic significance. AJR Am J Roentgenol. 173: 65-70.
7. Marques J, Henriques AR, Azevedo L, Chalo D, Almeida A. (2017). Paratracheal cyst rupture: a differential diagnosis for tracheal rupture. Braz J Anesthesiol. 267: 214-216.
8. Chauhan G, Nayar P, Diwan S, Mir FA. (2013). Paratracheal cyst rupture: A false alarm for tracheal rupture. J Anaesthesiol Clin Pharmacol. 29: 276-278.
9. O'Leary CN, Ryan JW, Corbett G, Ridge CA. (2016). Barotrauma induced tracheal diverticulum rupture: imaging findings. BMJ Case Rep. 2016-217528.
10. Boyaci N, Sen Dokumaci D, Karakas E, Yalcin F, Oney Kurnaz AG. (2015). Paratracheal air cysts: prevalence and relevance to pulmonary emphysema and bronchiectasis using thoracic multidetector CT. Diagn Interv Radiol. 21: 42-46.
11. Conti M, Fournier C, Hysi I, Ramon PP, Wurtz A. (2010). Conservative management of postintubation tracheal membrane ruptures. Intensive Care Med. 36: 1622-1633.

12. Priebe HJ. (2016). Evidence no longer supports use of cricoid pressure. Br J Anaesth. 117: 537-538.
13. Carmona Soto P, Congregado M, Loscertales J. (2012). Acquired tracheal diverticulum as the cause of complicated orotracheal intubation. Arch Bronconeumol. 48: 64-65.
14. Ching SL, Chow MY, Ng HN. (2003). Difficult lung isolation in a patient with an undiagnosed tracheal diverticulum. J Cardiothorac Vasc Anesth. 17: 355-356.
15. Davies R. (2000). Difficult tracheal intubation secondary to a tracheal diverticulum and a 90 degree deviation in the trachea. Anaesthesia. 55: 923-935.