

Ruptured intrathoracic cyst during induction of anaesthesia: Anaesthetic challenges

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ABSTRACT

Congenital benign cysts are among the rare types of mediastinal masses. When symptomatic, complete surgical excision through thoracotomy is the definitive treatment. Rarely they may present with symptoms due to complications like rupture. However, rupture following the induction of general anaesthesia poses unique challenges for anaesthesiologist. We report our experience of a rare variant of intraparenchymal cyst (lung), which was subsequently found to be a bronchogenic cyst.

Key words: Anaesthetic technique, complications, cyst, general anaesthesia, induction

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INTRODUCTION

Bronchogenic and pleuro-pericardial cysts are rare, congenital benign cysts presenting as mediastinal masses.^[1] Most cysts are asymptomatic. Symptoms may arise due to compression of surrounding structures and rarely due to complications.^[2] We report a case of massive cyst causing collapse of the right middle and lower lobe of the lung, which ruptured into tracheobronchial tree following induction of anaesthesia.

CASE REPORT

A 14-year-old female weighing 32 kgs and 147 cm tall presented with complaints of exertional dyspnoea, right chest pain and cough since 6 months. Cough was non-productive in nature. Dyspnoea and cough were related to posture, being more in supine position due to which she used to sleep in sitting or prone position at night. There were few episodes of fever in the past which subsided on medical treatment. Physical examination revealed absent breath sounds in right lung fields, reduced chest expansion and dull note on percussion. Breath holding time was 10 s and pulmonary function tests showed a restrictive pattern. Systemic examination and laboratory examination were normal. Chest X-ray showed a

mass in right lung field, which almost completely filled the right thoracic cavity [Figure 1]. Computed tomography (CT) thorax revealed thin-walled cystic lesion measuring 8.2 cm × 8.4 cm × 13.5 cm showing air-fluid level with no membranous septa in right anterior hemithorax [Figure 2a and b]. The lesion was compressing right middle lobe bronchus with collapse of the right middle lobe. A provisional diagnosis of bronchogenic or pleuro-pericardial cyst was made and it was decided to remove the cyst through right lateral thoracotomy. Prophylactic antibiotic was started. Patient was kept fasting after 12 midnight and tablet ranitidine was given at midnight and 6 am.

On the day of surgery, after attaching standard monitors, an 18 gauge intravenous line was secured on the left hand. Placement of arterial line and central venous catheterisation was planned after induction

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Figure 1: Chest X-ray (posterior-anterior view)

of general anaesthesia (GA). Pre-operative oxygen saturation (SpO_2) was 97%, and respiratory rate was 20/min. An attempt to lay patient supine produced bout of dry cough with dyspnoea, which reduced in right lateral position. Pre-medication consisted of injection glycopyrolate 0.2 mg, midazolam 1 mg, fentanyl 60 μg and ondansetron 3 mg. Pre-oxygenation with 100% oxygen for 3 min was performed, and the patient induced with 150 mg thiopentone in sitting position. While the patient was being positioned supine for intubation, profuse creamy odourless watery discharge was seen emerging from oral and nasal cavity with rapid desaturation. Initially vomiting was suspected and thorough oral suction was done but drainage continued and SpO_2 dropped down. Attempts at ventilation was futile as discharge continued despite suction and there was progressive gastric distention. The patient developed bradycardia ($<20/\text{min}$) and impending cardiac arrest; chest compressions were started and trachea intubated with 7.0 mm cuffed endotracheal (ET) tube. Profuse discharge continued from ET tube arousing suspicion of cyst rupture or alternate diagnosis of lung abscess rupturing into the tracheobronchial tree. Pressure control ventilation mode (PCV) was initiated with inspiratory pressure of 30mmHg and positive end-expiratory pressure (PEEP) of 5 mmHg. SpO_2 of 80–85% only could be achieved with 100% oxygen despite increasing inspiratory pressures and manual ventilation was started. Workstation monitor displayed peak pressure of 56 mmHg during chest inflation while the patient was being ventilated manually. After thorough ET and oral suction and gastric decompression, patient was placed in left lateral position and right posterolateral thoracotomy was done. Isoflurane (0.6–1.2%) and vecuronium were used during maintenance of

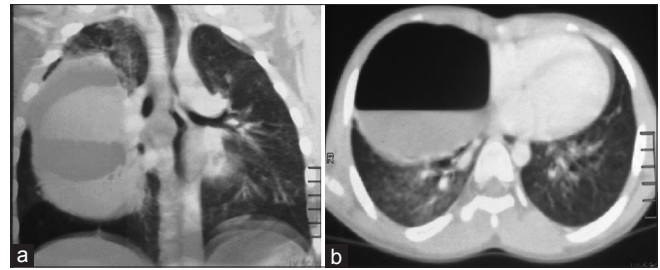


Figure 2: (a) Computed tomography thorax showing well-defined cyst in right hemithorax. (b) Computed tomography thorax showing air-fluid level in cyst

anaesthesia. Cyst wall was identified, and location confirmed as intraparenchymal. Thoracic lavage was done with saline and povidone-iodine to wash off any residual spillage. This was accompanied with rapid desaturation and aggravation of coarse sounds in the dependent left lung. Injection furosemide 40 mg, IPPV, Trendelenberg position and turning operating table to right lateral position improved the situation. The cyst wall was resected: There were fluctuations in SpO_2 and ventilating pressures intraoperatively. Bilateral chest drains were inserted. After surgical closure, patient was shifted to intensive care unit and kept in right lateral position with continued sedation, analgesia and ventilatory support. Patient was paralysed using injection vecuronium for first 24 h and ventilated on PCV with initial inspiratory pressure of 40 mmHg, PEEP of 5 mmHg, 100% oxygen, inspiratory expiratory ratio 1:2 and respiratory rate 18/min. This was followed by synchronised intermittent mandatory ventilation (with PCV) for next 2 days and continuous positive airway pressure on day 4. Patient was extubated on the 5th post-operative day. The patient developed subcutaneous emphysema extending up to groin region on day one which resolved subsequent days once the patient was weaned from the ventilator. Histopathological examination of excised specimen revealed pseudostratified ciliated columnar epithelial lining with mucous glands suggesting bronchogenic cyst.

DISCUSSION

A variety of cysts occur in the mediastinum namely bronchogenic, duplication, neurenteric or pleuro-pericardial cysts and can be differential diagnoses for cystic structures in right hemithorax. Primary mediastinal cysts comprise 19–25% of all mediastinal masses.^[3]

Bronchogenic cysts result from abnormalities in the development of the tracheobronchial system. They

are one of the most common bronchopulmonary malformations.^[4] Though more commonly mediastinal in location, cysts arising at a later stage of development may be intraparenchymal.^[5] These usually do not communicate with the tracheobronchial tree and are filled with serous or mucoid fluid.^[1] Pleuro-pericardial cysts are the second most common type of primary mediastinal cysts constituting about 7% of all mediastinal tumours^[6], majority being localised in right cardiophrenic angle. They are usually unilocular, well-marginated cysts varying from 2 to 28 cm^[7] in dimension. The air-fluid level is suggestive of secondary infection of cyst and communication with the tracheobronchial tree.^[8] These cysts may remain asymptomatic and discovered as an incidental radiographic finding.^[9,10] When symptoms do occur, they are due to pressure of the cyst on adjacent organs. Patients may present with retrosternal chest pain, dyspnoea and cough^[2] with decrease or absence of breath sounds on the affected side. In few cases, complications have been reported which include cyst rupture, compression of heart or main bronchus, cardiac tamponade and even sudden death.^[11] Classically, chest radiograph of these cysts reveals well-demarcated mass with a homogenous density.^[12] However, unusual radiologic features caused by air trapping, infection or rupture of the cyst with development of air-fluid level or variations in density of cyst caused by calcification, surrounding atelectasis or pneumonia may contribute to diagnostic uncertainty.^[13] The final diagnosis is thus based on histopathological examination.

The absence of shivering and night sweats with fever, foul smelling purulent sputum, finger clubbing and other features of chronic illness was against diagnosis of lung abscess. Duplication cysts are indistinguishable from bronchogenic cysts on CT and magnetic resonance imaging. Mediastinal neuro enteric cysts are associated with multiple vertebral anomalies and with neurofibromatosis.^[14] Thus clinical profile, laboratory investigations and CT findings narrowed our differential diagnosis to pleuro-pericardial or bronchogenic cyst. Definitive treatment of symptomatic cysts remains complete surgical excision usually via posterolateral thoracotomy.^[15] In present case, after cyst rupture, thoracotomy was performed to confirm the diagnosis, remove residual contents and excise cyst wall. Cyst rupture might have occurred due to weight of left thoracic contents or reflex contraction of right part of diaphragm on turning patient to right lateral position for intubation or it may be due to inherent tendency of lung to collapse on induction of GA.

Cyst rupture during induction and subsequent release of contents into a tracheobronchial tree has not been reported. The case was a challenge due to the involvement of healthy left lung and rapid desaturation, which was difficult to overcome because of airway passage being filled with fluid, the situation mimicking drowning. Washing right thoracic cavity in left lateral position had two consequences. On one hand, it was accompanied with rapid desaturation. This deterioration might be due to seepage of fluid to the dependent left lung (confirming communicating of the cyst to the tracheobronchial tree). Improvement in SpO₂ in Trendelenburg and right lateral position may be due to gravity dependent drainage of collections in the tracheobronchial tree. On other hand, it was blessing in disguise in that it might have diluted spillage in left lung and lavaged it out on repositioning.

Additional challenge was that while ventilating pressures had to be maintained well above those known to cause pneumothorax, ventilation was continued in an attempt to increase SpO₂ taking care of possible pneumothorax subsequently with chest drain insertion. Alternative approaches may include either awake intubation or cyst decompression percutaneously followed by thoracotomy to remove cyst wall (which may also carry the risk of rupture and contamination of thoracic cavity).

CONCLUSION

Intrathoracic cysts carry the risk of rupture on induction. Positioning, drainage of fluid, securing airway and maintenance of oxygenation and ventilation with pressure support resulted in successful outcome.

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Conflicts of interest

There are no conflicts of interest.

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Announcement

Conference Calendar - 2015

Name of the conference: 63rd Annual National Conference of the Indian Society of Anaesthesiologists, ISACON 2015

Date: 25th to 29th December 2015

Venue: B. M. Birla Auditorium & Convention Centre, Jaipur, India

Organising Secretary: Dr. Suresh Bhargava

Contact: +91 98290 63830

E-mail: suresh3559@yahoo.com

Website: www.isacon2015jaipur.com

Name of the conference: 16th North Zone ISACON 2015

Date: 16th to 18th October 2015

Venue: Dr. Rajendra Prasad Govt. Medical College, Kangra, TANDA (HP)

Organising Chairman: Dr. Sudarshan Kumar

Name of the conference: 7th Central Zone Conference & 29th MP State Conference 2015

Date: 3rd to 4th October 2015

Venue: Motel Shiraz, MP Nagar, Bhopal

Organising Secretary: Dr. Surendra Raikwar

Contact: +91 94065 33300, +91 89591 13801

E-mail: mpisaconcentzone2015@gmail.com, drskraikwar@gmail.com,

centralzonempisacon2015@gmail.com

Website: www.isampchapter.com

Name of the conference: ISA JAC 25th East Zone Conference

Date: 6th to 8th November 2015

Venue: Hotel The Stadel, Kolkata

Organising Secretary: Dr. Subhendu Sarkar

Contact: +91 98311 71162

E-mail: subhendusarkar757@gmail.com, sarkar_subhendu@yahoo.com

Name of the conference: 7th Annual Conference of ICA

Date: 13th to 15th November 2015

Venue: Hotel Savera, Dr. Radhakrishnan Road, Chennai 600004

Organising Secretary: Dr. K. Balakrishnan

Contact: +91 98410 29259

E-mail: ica2015@gmail.com (visit isaweb.in ISA > ICACON2015)

Name of the conference: KISACON2015, 31st Annual Conference of Indian Society of Anaesthesiologists, Karnataka State Chapter

Date: 9th to 11th October 2015

Venue: S N Medical College, Bagalkot

Organising Secretary: Dr. Ramesh Koppal

Contact: +91 98455 04515

E-mail: rameshkoppaldr@gmail.com

Website: www.kisacon2015.com

Name of the conference: 48th Gujarat State Conference of Indian Society of Anaesthesiologists 2015 (GISACON 2015)

Date: 9th to 11th October 2015

Venue: Shanku's Water World Resort (Ahmedabad-Mehsana Highway)

Organising Chairman: Dr. R G Agrawal

Organising Secretary: Dr. H G Bhavsar

Contact: +91 98242 33694

E-mail: info@gisacon2015.com

Website: www.gisacon2015.com

Name of the conference: ukisacon 2015 Uttarakhand State ISA Conference 2015

Date: 27th to 29th November 2015

Venue: Max Hospital, Dehradun

Organising Secretary: Dr. Sanjeev Nivargi

Contact: +91 78959 00714

E-mail: sanjeev.nivargi@maxhealthcare.com

Name of the conference: 28th Assam State Branch ISA Conference ABISACON 2015

Date: 3rd to 4th October 2015

Venue: NEDFi Building, Guwahati

Organising Secretary: Dr. Jogendra Narayan Goswami

Contact: +91 98640 23709

E-mail: jogengo74@gmail.com

Name of the conference: 6th National Airway Conference 2015 (NAC 2015)

Date: 18th to 20th September 2015

Venue: Workshop: Srinagar, Conference: Gulmarg (J&K)

Organising Secretary: Dr. Zulfiqar Ali

Contact: +91 94190 86761

E-mail: nacsrinagar2015@gmail.com

Website: http://aidiaa.org/NAC2015/NAC_home.html

Name of the conference: AORA 2015 5th National Conference of Academy of Regional Anaesthesia of India

Date: 25th to 27th September 2015

Venue: J N Tata Auditorium, Near IISC, Bengaluru

Organising Secretary: Dr. Kumar M V

Contact: +91 98450 25236

E-mail: aoraindia2015@gmail.com

Website: http://www.aora2015.com

Name of the conference: AOACON

Date: 11th to 13th September 2015

Venue: Hotel Marriot, Hyderabad

Organising Secretary: Dr. Sunil T Pandya

Contact: +91 98483 10000, +91 98487 42426

E-mail: aoahyderabad2015@gmail.com, suniltp05@gmail.com

Website: http://www.prernaanaesthesia.com

Name of the conference: 25th Joint Annual Conference of ISA East Zone & 36th Annual State Conference of ISA West Bengal State Branch - ISAJAC 2015

Date: 6th to 8th November 2015

Venue: Hotel The Stadel, Kolkata

Organising Chairperson: Dr. Sumanta Dasgupta, Mobile: 9002080513

Organising Secretary: Dr. Subhrndu Sarkar

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Website: www.isawb.in

Name of the conference: 8th National Conference of Paediatric Anaesthesia 2016

Date: 28th to 30th January 2016

Venue: Scudder Auditorium, Christian Medical College, Vellore

Organising Chairperson: Dr. Sajan Philip George

Organising Secretary: Dr. Ekta Rai

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