Successful Thoracoscopic Excision of Complex Supracardiac Middle Mediastinal Bronchogenic Cyst in an Infant

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Abstract

Introduction: We report the first case of complex supracardiac middle mediastinal foregut duplication lesion compressing and adherent to the heart, managed successfully thoracoscopically in an infant, in an innovative way. **Materials and Surgical Technique:** A 1-year-old girl was diagnosed as having supracardiac middle mediastinal foregut duplication lesion. It was completely overlying and adherent to her heart giving transmitted pulsations to the lesion, causing indentation over the left atrium and surrounded by all vital structures such as aorta, pulmonary artery, bronchi and phrenic nerve. After proper counselling of parents and relatives, the patient was posted for surgery. After proper positioning, thoracoscopic access was gained, difficulty here was neither bulge nor surface marking of the lesion was seen in thoracic cavity anywhere, considering the anatomical relations. The mediastinal pleura was opened, through a very narrow window for accessing the lesion, which was surrounded by vital structures in the middle mediastinum. A gentle dissection of the lesion was done to relieve it from adjacent adhered thoracic vitals structures successfully. Histopathological examination confirmed it as a bronchogenic cyst. **Discussion:** Foregut duplication cyst, especially bronchogenic cysts, have been reported at various locations, however, supracardiac middle mediastinal bronchogenic cyst completely sitting on the heart, adherent to it causing compression of the left atrium and left bronchus and surrounded completely by the aorta, pulmonary artery and bronchus, has not been reported till date. Also, successful thoracoscopic excision of such rarely located lesion moving with heart, in a 1-year-old girl, has not been reported yet.

Keywords: Foregut duplication cyst, infant, supracardiac lesion, thoracoscopic surgery

Background

We report a rare case of complex supracardiac middle mediastinal foregut duplication cyst adherent to the heart, compressing and moving with heart, managed successfully thoracoscopically in an infant in an innovative way.

Procedure/Surgical Technique

A 1-year-old girl was brought by parents with chief complaints of recurrent respiratory tract infections for which she was admitted four times at outside hospitals previous to visiting us. Upon clinical evaluation, she was found to have mild-to-moderate respiratory distress. Chest radiograph revealed loss of lung volume on the left side, which prompted us to do high-resolution computed tomography (HRCT). It revealed a supracardiac lesion 4 cm × 3.8 cm × 3.4 cm, likely to be a foregut duplication lesion, almost 75% of her heart size. It was completely overlying and adherent to her heart giving transmitted pulsations to the lesion, causing indentation over the left atrium, abutting aorta, pulmonary artery and oesophagus and thus surrounded by all vital structures such as heart below, aorta and pulmonary artery above, bronchi and phrenic nerve laterally [Figure 1]. After proper counselling of parents and relatives, the patient was posted for surgery. This lesion was completely lying within the right and left vertical limits of the heart [Figure 2]. Left thoracoscopic approach was preferred, as according to HRCT, the lesion was more inclined on the left side and within limits of the heart with more on the left side. Anaesthetists were aware of complexity of the lesion and were prepared for it, and a semi-right lateral

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Received: 10-07-2021 **Revised:** 09-09-2021 **Accepted:** 25-10-2021 **Available Online:** 19-08-2022

Access this article online

Quick Response Code:

Website: www.afrjpaedsurg.org

DOI: 10.4103/ajps.ajps_108_21

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How to cite this article: Raut A, Parakh S, Parakh A, Mukhi N. Successful thoracoscopic excision of complex supracardiac middle mediastinal bronchogenic cyst in an infant. Afr J Paediatr Surg 2022;19:274-6.

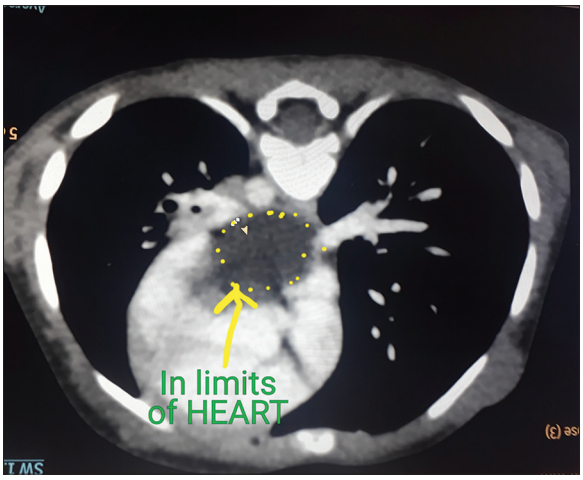


Figure 1: Supracardiac lesion surrounded by all vital mediastinal/thoracic structures



Figure 2: Supracardiac lesion within limits of heart, adherent to heart, compressing heart, L-lesion

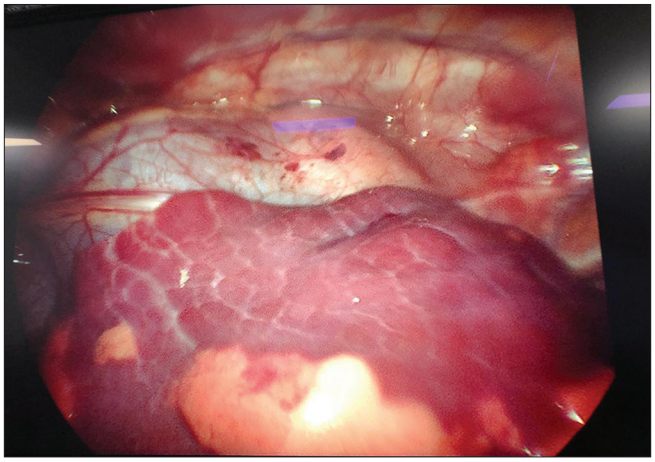


Figure 3: Lesion or its impression not seen in the thoracic cavity

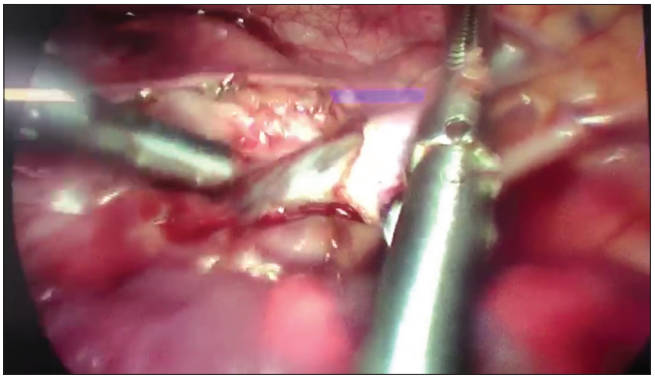


Figure 4: Intraoperative photo showing lesion adherent to heart and adherent to surrounding structures

position was given accordingly. Thoracoscopic access was gained using a 5-mm camera port placed in the midaxillary line and two 5-mm working ports placed on either side of the camera port with 4-cm distance in triangle formation pattern, the difficulty here was that the lesion or its surface marking was not seen in thoracic cavity anywhere [Figure 3] and the second difficulty was in accessing the lesion as it was surrounded by all vital structures. Considering the anatomical relations, the mediastinal pleura was opened over the heart to expose the pericardium; this pleura was opened at a very small window of 4-mm region between all the vital thoracic structures surrounding the lesion. Gentle dissection was done to reach the upper border of the heart near pulsating pulmonary artery. Beneath the pulmonary artery and superior pulmonary vein, the lesion could be seen moving or pulsating with heart through a small 4-mm window. Through this small window, initially, the lesion was cleared of its attachments with pulmonary artery, pulmonary vein and pericardium [Figure 4]. Then, further gentle dissection was done to separate the lesion from the heart to which it was adherent, which was possible after opening in the pericardium. Then, it was gently separated from the left bronchus, oesophagus and arch of the aorta which was completely encircling the lesion. Video-assisted thoracoscopic surgery (VATS) excision of the lesion was done successfully. The operative time was 90 min. Intercostal drain was placed *in situ* and removed on day 3 post-operatively. The patient was discharged in stable condition on day 6 post-operatively. Histopathological report confirmed it as a bronchogenic cyst. Considering all the above points of presentation, location and complexity of lesion, adherent and moving with heart, successful thoracoscopic excision in infant done in a unique way, our case is rare and first of its kind along with this surgical technique, reported first time in literature for infant especially.

Conclusion and Discussion

Foregut duplication cysts are a rare type of mediastinal mass, bronchogenic variety more so rare. They originate from disturbances in budding of the tracheobronchial tree or ventral portion of the foregut. Two-thirds are located in lung parenchyma with reminder in mediastinum.[1] They can be found in a variety of locations from para-oesophageal, paratracheal, perihilar or intra-parenchymal depending on the level at which abnormal budding occurred in the development

of foregut.[2] In our case, it was located over the heart causing indentation of the left atrium and completely surrounded by all thoracic vital structures originating from the heart and tracheobronchial tree. They do not have communication with trachea-bronchial tree however may develop communication secondary to infection. Infants usually present with respiratory distress;[3] in our case, recurrent chest infections were the presentation. Differential diagnoses included foreign body, pneumonia, lobar emphysema and bronchial obstruction. Diagnosis depends on the identification of abnormal mass or soft-tissue shadow on chest radiograph done for some unrelated purposes.[4] However, in our case, no such mass was found on chest radiograph, but chest X-ray showed abnormal findings like decreased lung volume on the left side which prompted us to do chest HRCT. Then, it was picked up on chest HRCT as supracardiac middle mediastinal lesion. In majority of cases, mediastinal cysts are amenable for thoracoscopic resection.[5] VATS was chosen as a surgical approach for excision of supracardiac lesion in our case, Also being female, with intention of scarless surgery, VATS was chosen as surgical procedure of choice for treatment of this supracardiac lesion. Difficulty here was firstly lesion was supracardiac, adherent and moving with heart, secondly completely surrounded by all thoracic vital structures originating from heart and tracheobronchial tree, also that lesion was not seen in any way when scope was introduced in the thoracic cavity. However, VATS was done successfully in our case. Thoracoscopic excision has added advantages over thoracotomy including fast recovery, lesser injury, much clearer operative vision of the lesion and almost scarless surgery. Thoracoscopic excision of supracardiac located bronchogenic cyst moving with heart, with completely surrounded by vital structures, in an infant has rarely been reported in literature yet, in a different way we managed it successfully.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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