Foregut Duplication Cysts

26

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Abstract

Foregut duplication cysts originate from the foetal foregut and can be oesophageal duplications or bronchogenic cyst. The majority of patients are diagnosed antenatally and are asymptomatic at birth. A postnatal CT scan will confirm the diagnosis. All foregut duplications should be removed as they will eventually cause symptoms. If the patient is asymptomatic, thoracic cysts are best excised thoracoscopically.

Keywords

Foregut duplications · Oesophageal duplication · Bronchogenic cyst · Neuroenteric cyst · Thoracoscopy

26.1 Introduction

Foregut duplication cysts are a spectrum of congenital malformations with origins from the foetal foregut [1]. They comprise oesophageal duplications and bronchogenic cysts. In the modern era, the majority of patients are diagnosed during antenatal scanning. They account for one third of all mediastinal cysts and are the main differential diagnosis for posterior mediastinal cysts. Oesophageal duplication cysts can account for up to 21% of all gastrointestinal duplications [2, 3]. The majority of children are asymptomatic at birth. Occasionally some may have acute respiratory distress, stridor, dysphagia, haematemesis, meningitis and sudden appearance of a cervical mass. They may be found incidentally on a chest X-ray. All foregut duplications should be removed as they will eventually cause symptoms.

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26.2 Technical Tips and Tricks

Symptomatic neonates should undergo urgent investigations to confirm the diagnosis. A CT scan with intravenous contrast should be done. The typical appearance is of a low attenuation, homogenous cystic mass, with a smooth border adjacent to the oesophagus or trachea (Figs. 26.1a, b and 26.2). A contrast swallow may show communication with the oesophagus in an oesophageal duplication. The spine should also be assessed for vertebral anomalies in cases of a neurenteric cyst [4]. As the majority of patients are asymptomatic, these investigations can be done between 9 and 12 months of age. Elective thoracoscopic surgery should be performed at about 1 year of age.

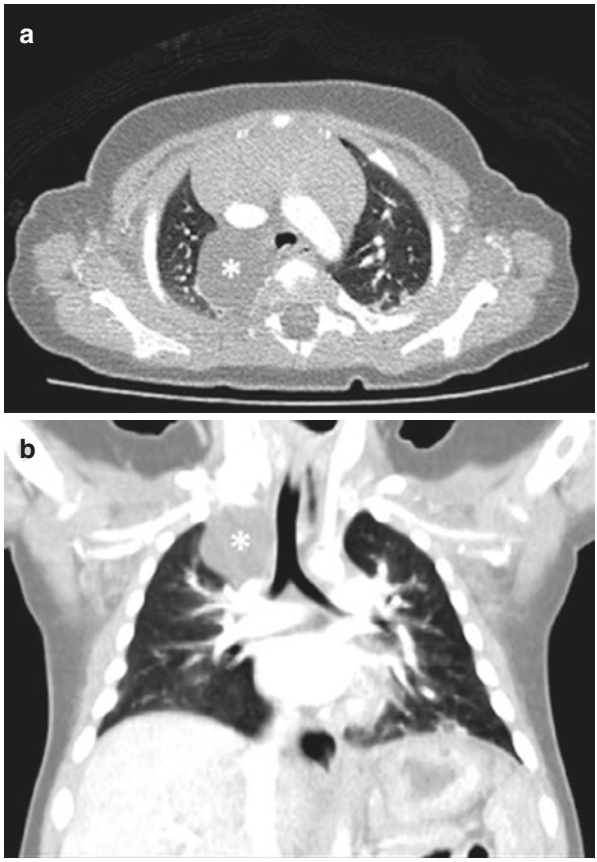

Fig. 26.1 (**a**, **b**) A CT scan of a right-sided and superior bronchogenic cyst. The typical appearance is of a low attenuation, homogenous cystic mass with a smooth border adjacent to the oesophagus (asterisk)

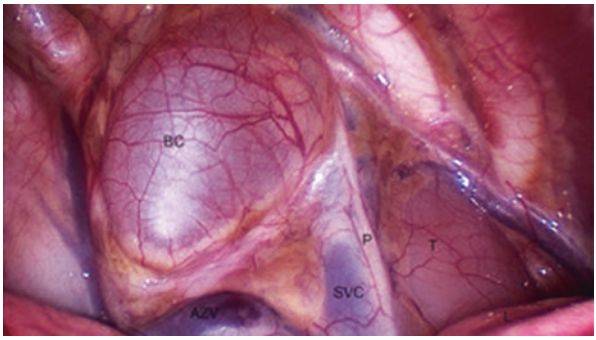

Fig. 26.2 This cyst is located in close proximity to the great vessels. Bronchogenic cyst (BC), azygos vein (AZV), superior vena cava (SVC), phrenic nerve (P), thymus (T), lung (L)

26.3 Thoracoscopic Surgery

The location of the lesion is confirmed and the chest is marked on that side. Blood loss is usually not significant; however there should be one unit of blood cross-matched. Central endotracheal intubation, with the use of a pneumothorax, is sufficient in most cases. In the older child, single-lung ventilation can be achieved by the use of bronchial blockers. A single dose of prophylactic antibiotics (co-amoxiclav) is administered.

1. 5 mm instruments are used in patients 7 kg or more. The instruments used include 0 degree scope, straight and curved graspers, needle holders, monopolar hook diathermy, suction irrigation and a sealing device such as the LigaSure© (Valley Lab, Boulder, CO, USA). A thoracotomy tray should be on standby if a thoracotomy is needed.
2. The patient is placed on an axillary roll, in the lateral position with the affected side up. For a superior lesion, the patient's hip is flexed, and the surgeon stands at the foot of the table. For an inferior lesion, the surgeon stands at the head end of the table. The monitor is positioned directly over the patient's head or pelvis.
3. The first port (optical) is inserted just anterior to the inferior angle of the scapula. A pneumothorax of 5–6 mmHg with flows of 1–2 L/min is created.
4. Following lung collapse, the two other working ports are inserted under direct vision in the same intercostal space, at the anterior axillary line and posteriorly. There should be adequate triangulation so as to create ergonomic and efficient working.
5. Large cysts can be aspirated by using a spinal needle. The cyst is grasped, and the mediastinal pleura at its base is incised with the monopolar hook (Figs. 26.3 and 26.4). Progressive dissection is continued with the hook by staying close to the surface of the cyst. The monopolar diathermy should be used sparingly so

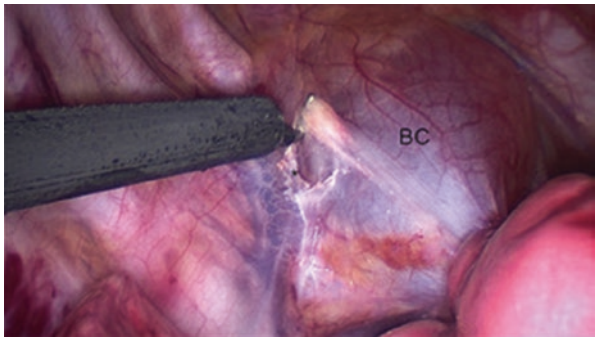

Fig. 26.3 The cyst (BC) is grasped, and the mediastinal pleura (asterisk) at its base is incised with a monopolar hook

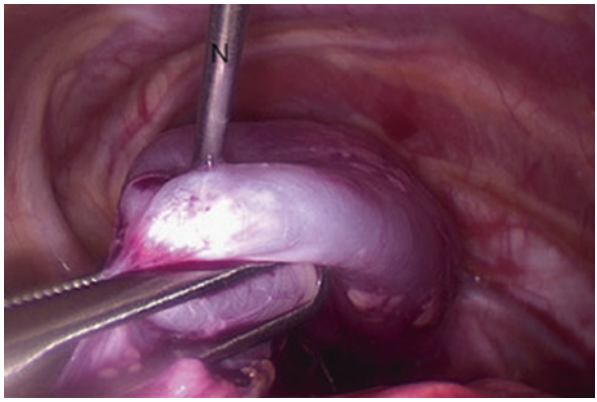

Fig. 26.4 The cyst can be aspirated with a spinal needle (N) to facilitate dissection and removal

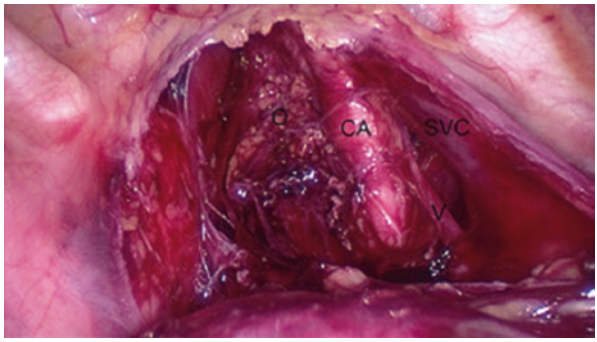

Fig. 26.5 The bed of the cyst after removal is shown: oesophagus (O), carotid artery (CA), vagus nerve (V), superior vena cava (SVC)

as to avoid inadvertent electrical or thermal injury to the phrenic and vagus nerves and the oesophagus.

6. Oesophageal duplication cysts can have a common wall with the native oesophagus. The cyst should be carefully excised and the oesophageal mucosa left intact (Fig. 26.5). The muscular defect is then sutured with absorbable sutures.
7. Marsupialisation of the cyst should be avoided as recurrence will occur.

8. The specimen is extracted via the anterior port site, and the pneumothorax is aspirated with a temporary under water seal. There is no need to insert a chest drain if the lung is re-expanded and the resection is straight forward.
9. If there is injury to the lung, trachea or oesophagus, a 16 Fr chest drain should be inserted via the anterior port.
10. A chest X-ray is done the following day. A contrast swallow can be performed to check for an oesophageal leak if necessary.

26.4 Thoracotomy

1. Thoracotomy and resection is indicated for the following reasons:
   - Thoracoscopic expertise is not available.
   - A large infected cyst.
   - Inability to clearly visualise the base of the cyst.
   - Complications during thoracoscopic resection.
2. The patient is positioned as for a thoracoscopic resection, and the surgeon stands towards the patient's back.
3. The posterolateral muscle-cutting thoracotomy is performed. Subperiosteal resection of the fourth or fifth rib is performed, and the pleura is opened.
4. The cyst is excised in a similar way as in a thoracoscopic resection.
5. The periosteum is closed with absorbable sutures, and the chest muscles are closed in layers.

26.5 Cervical Excision

1. This is indicated if the cyst is palpable at the base of the neck, in the anterior triangle.
2. A roll is placed under the patients shoulder to extend the neck.
3. The skin and platysma muscle are incised. Blunt dissection is then used until the surface of the cyst is reached.
4. The vagus and recurrent laryngeal nerves can be pushed onto the anterior surface of the cyst. Careful dissection by staying on the surface of the cyst is carried out with the minimal use of diathermy.
5. The cyst is excised and the oesophagus is repaired. The neck muscles are closed.

26.6 Intraoperative Anticipated and Unanticipated Complications

1. Bleeding
   (a) Careful dissection, staying close to the cyst wall, should not result in significant bleeding. Crossmatched blood should be available if there is a large infected oesophageal duplication or the cyst is adjacent to the large mediastinal vessels.

2. Injury to the phrenic and vagus nerves
   (a) The surgeon should aim to stay close to the surface of the cyst during its dissection. Minimal use of electrosurgical devices would reduce the risk of conduction and thermal injuries to the adjacent structures.
3. Oesophageal and thoracic duct injury
   (a) Both can present as a postoperative pleural effusion or increased output from the chest drain.
   (b) An oesophageal leak is suspected if frothy liquid (saliva) is draining from the chest drain. There may be associated sepsis. As small leak that is adequately draining via the chest drain can be managed conservatively. This includes: intravenous antibiotics, nil by mouth and total parenteral nutrition. A contrast swallow or tube oesophagogram is performed after 10 days. Oral diet can be started if no continued leakage is demonstrated. However, if an empyema develops than a thoracotomy, debridement and oesophageal repair are necessary.
   (c) If a thoracic duct injury is recognised intraoperatively, then it should be ligated or clipped. Fibrin glue can also be applied over the area. Postoperatively, it presents as the typical milky effusion, draining via the chest drain. Conservative management can include: nil by mouth and total parenteral nutrition, medium chain triglyceride feeds and subcutaneous octreotide. A persistent chylothorax can also be managed by thoracoscopic clipping of the injured duct or clipping as it comes through the right diaphragm.
4. Tracheal injury
   (a) This can occur if the bronchogenic cyst shares a common wall with the trachea. It requires rapid conversion to a thoracotomy for repair. The anaesthetist may have to advance the endotracheal tube beyond the defect in order to maintain ventilation. The trachea is sutured using a continuous polypropylene suture. A chest drain should be inserted.

Conclusions

The majority of patients with foregut duplications are diagnosed antenatally and are asymptomatic at birth. In asymptomatic patients, an elective CT scan should be done at 9–12 months of age. Elective thoracoscopic excision should be planned at about 1 year of age. Surgical complications can be avoided with careful dissection, staying close to the cyst surface and the minimal use of electrosurgical instruments.

References

1. Ponski TA, Rothenberg SS. Foregut duplication cysts. In: Parikh DH, Crabb D, Aldist A, Rothenberg SS, editors. Paediatric thoracic surgery. London: Springer; 2009. p. 383–90.
2. Stringer MD, Spitz L, Abel R, et al. Management of alimentary tract duplication in children. Br J Surg. 1995;82:74–8.
3. Holcomb GW III, Gheissari A, O'Neill JA Jr, et al. Surgical management of alimentary tract duplications. Ann Surg. 1989;209:167–74.
4. Weiss LM, Fagelman D, Warhit JM. CT demonstration of an esophageal duplication cyst. J Comput Assist Tomogr. 1983;7:716–8.