Unusual Case

Computed tomography helps pre-operative evaluation before laparoscopic resection of retroperitoneal bronchogenic cyst: A case report

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Abstract
Bronchogenic cysts are congenital foregut dysplasia that occur mostly in the lungs and mediastinum. Here, we report a rare case of retroperitoneal bronchogenic cyst, the location, relationship to adjacent structures and blood supply of which were determined by computed tomography (CT) recombination technology and resected by laparoscope. The case was a 41-year-old female patient. The patient came to the hospital because of intermittent lumbar back discomfort for 1 month. CT scanning revealed a cystic mass of 3.9 cm × 3.2 cm × 3.0 cm behind the left peritoneum. The mass was close to the left adrenal gland, and a branch artery from the left renal artery was revealed to supply the mass. The cystic mass was excised by laparoscopy and confirmed as bronchogenic cyst on histopathology.

Keywords: Bronchogenic cyst, computed tomography, laparoscopy, retroperitoneal cyst

INTRODUCTION

Bronchogenic cysts are rare in clinical cases. Due to the abnormal budding of the embryonic bronchial tree, they are usually located in the lung and mediastinum but rarely in the retroperitoneum.¹ Although the bronchial cysts are usually asymptomatic, the appearance of the symptoms depends on the location and size of the cyst.² In this article, we report the use of computed tomography (CT) reconstruction to display the location, neighbouring relationships and blood supply preoperatively. Finally, laparoscopic surgery was performed to remove the cyst.

CASE REPORT

A 41-year-old female patient (with consent form) has been reported to the clinic because of intermittent lumbar back discomfort for 1 month. The out-patient ultrasound examination showed that the cyst originated the left adrenal gland. Blood pressure, all adrenal hormones, catecholamines...
in plasma and urine and carcinoembryonic antigen 19-9 were all within the normal range. After hospitalisation, CT-enhancement examination showed a round cystic mass between the spine and the left adrenal gland. The size was about 3.9 cm × 3.2 cm × 3.0 cm, and the lesion was not enhanced (CT increased <10 HU), CT values of the cystic mass in pre-contrast, arterial, venous and delayed (2 min) phases were 46.3 HU, 51.3 HU, 47.7 HU and 46.4 HU, respectively. CT multiplane recombination [Figure 1a and b] and volume reconstruction showed an artery between the cyst and left renal artery, with a diameter of about 0.2 cm and a length of about 2.5 cm [Figure 1c and d]. After obtaining the patient's informed consent, the cyst was removed by laparoscopy. The operation was performed in the supine position. During the surgery, we found the lesion was tense/firm and it adhered to the left adrenal gland densely with poor mobility. Ultrasonic knife was used for step by step separation. We ligated the blood vessels [Figure 2a and b] before complete removal of lesion; the lesion size was 3.5 cm × 3.0 cm [Figure 2c and d]. The patient was discharged on the 3rd day after the surgery. Pathological examination supported the diagnosis of bronchial cyst, with a large amount of myxoid material inside the tumour, smooth inner wall of the cyst, wall thickness of 0.1 cm and no inflammatory cell infiltration under a light microscope. Microscopic sections showed cystic spaces lined by ciliated pseudostratified cuboid-to-columnar cells, smooth muscle [Figure 3a] and cartilage around the cysts [Figure 3b].

**DISCUSSION**

The bronchial cyst is a deformity that occurs due to the abnormal development of the early foregut (3–7 weeks) embryo.[1] Usually, 90% of bronchial cysts are located in the posterior mediastinum.[3] If complete separation occurs during abnormal sprouting, the cyst may migrate to other locations such as the sternum, shoulder, neck, pericardium and subcutaneous tissue around the diaphragm. However, the prevalence of retroperitoneal bronchial cyst is 0.03%.[4] Subdiaphragmatic bronchogenic cysts are very rare. Although their mechanism of development is unknown, Sumiyoshi et al. proposed that early in embryonic life, the pericardioperitoneal canal connects the abdominal and thoracic cavities and with closure of the pleuroperitoneal membranes, which form the future diaphragm, abnormal lung buds could be pinched off and trapped in the abdomen.[5] Often, bronchial cysts are found by chance, and most are asymptomatic. However, sometimes, back pain and upper abdominal pain may occur.[1] A cyst can lead to secondary complications. Its diameter is usually <5 cm, but sometimes, it can lead to infection, acute haemorrhage, perforation and the compression of other organs.[1,6] Our patient presented with low back discomfort.

**Figure 1:** (a and b) Were computed tomography multiplanar reconstructions images, (c and d) were computed tomography virtual-reality images. The red arrow indicated a retroperitoneal bronchogenic cyst, and the white arrow indicated a nourishing vessel from the left renal artery

**Figure 2:** In surgery, (a and b) showed that the nourishing blood vessel was pinched (c and d) showed that the cyst was removed by ultrasonic knife

**Figure 3:** (a) Microscopic sections showed cystic spaces lined by ciliated pseudostratified cuboid-to-columnar cells and smooth muscle, (b) Microscopic sections showed cartilage around the cysts (H and E, ×10)

Usually, the bronchial cyst density is uniform, with a CT value of about 20 HU and cannot be enhanced. However, the CT value of the cyst in our case is about 50 HU. There are two reasons to consider: (1) the cyst contains high level of protein and (2) haemorrhage or infection was found within the cyst. However, there
was no inflammatory cell infiltration that was found by pathology. The high CT value of the cyst may due to the excessive mucus secretion from the bronchial mucosa epithelium. The patient’s symptoms may be caused by a large cyst (approximately 3 cm in diameter) pressing on adjacent organs.

Pre-operative ultrasonography indicated that the lesion originated from the left adrenal gland. However, the CT examination revealed that the lesion was originated from the retroperitoneum. The diagnosis of CT was confirmed postoperatively. Adrenal cyst, pancreatic pseudocyst, cystic lymphangioma and cystic teratomas should be considered in the differential diagnosis of bronchogenic cyst. In addition, using CT recombination technology, we can clearly determine the size, location and blood supply of the cyst to provide accurate lesion information for the operation.

In our case, the cyst was found adhered to the left adrenal gland during the operation. Laparoscopic treatment can reduce post-operative pain, shorten hospital stay and reduce costs. The post-operative results were satisfactory, and no complications have been reported. We successfully performed laparoscopic resection of the retroperitoneal bronchogenic cyst without post-operative complications.

CONCLUSIONS

Retroperitoneal bronchogenic cysts are rare. CT recombination technology can provide accurate information of the size, location and blood supply of the cyst for the operation. Laparoscopic technique was used to remove the lesions, and no complications were found postoperatively. The diagnosis was supported by the pathology.

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.

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Conflicts of interest
There are no conflicts of interest.

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