Complete portal robotic resection of a giant mediastinal parathyroid cyst; A case report

Jie Yang MD1,2 | Jing-Sheng Cai MD1,2 | Gang Wang MD3 | Mu-Zi Yang MD1,2
Hao-Xian Yang MD1,2

1Department of Thoracic Surgery, Sun Yat-sen University Cancer Center, Guangzhou, China
2State Key Laboratory of Oncology in South China, Collaborative Innovation Center for Cancer Medicine, Sun Yat-sen University Cancer Center, Guangzhou, China
3Department of Thoracic Surgery, Ganzhou Cancer Hospital, Ganzhou, China

Correspondence
Hao-Xian Yang, Sun Yat-sen University Cancer Center, No. 651, Dongfeng East Road, 510060 Guangzhou City, Guangdong Province, China.
Email: yanghx@sysucc.org.cn

Funding information
National Natural Science Foundation of China, Grant/Award Number: 82072572; Sun Yat-sen University Clinical Research 5010 Program, Grant/Award Number: 2019012

INTRODUCTION

Parathyroid cysts (PCs) are benign lesions which are very rare, accounting for only 0.075% of parathyroid gland pathologies. PCs that occur in the thoracic cavity or mediastinum (mediastinal parathyroid cysts [MPC]) are even more rare. MPC was first reported by de Quervain in 1925, and since then only about 120 cases have been reported worldwide. PCs can be functional, presenting as the clinical manifestations of hyperparathyroidism. More frequently, MPC is nonfunctional and asymptomatic. Surgical resection is recommended for MPC, whether it is functional or nonfunctional. Sternotomy, thoracotomy, and thoracoscopic approaches are the most common methods for resection of MPCs. Herein, we report a case of robotic right portal minimally invasive resection of a giant nonfunctional MPC in the right anterosuperior mediastinum.

CASE REPORT

A 55-year-old female reported occasional dyspnea during the previous five months prior to admission. Results of laboratory studies were normal, including serum calcium and phosphate levels. However, computed tomography (CT) scan and X-ray of the chest revealed an 8.5 × 6.5 cm cystic tumor of uniform isodensity with a well-defined border in the right anterosuperior mediastinum adjacent to the trachea (Figure 1(a)–(e)). Taking into account the narrow anatomic space and complicated surrounding structures around the tumor, a complete resection was carried out using robotic surgery.

We applied a complete portal robotic resection approach with carbon dioxide (CO2) insufflation to the patient. Double-lumen endotracheal tube insertion and single-lung ventilation were applied for anesthesia. The patient was placed in a left lateral-prone decubitus position (Figure 2(a)). Four arms of a da Vinci Si system (Intuitive Surgical Inc) combined with an assistant port were used (Figure 2(a)). CO2 was insufflated to a pressure of 6 mmHg. Three 8-mm ports were used for the robotic instruments, and one 12-mm port was used for the robotic camera combined with a 12-mm assistant port. The five portal incisions were only large enough for the size of their individual trocars (Figure 2(a)). The camera port was set in the eighth intercostal space at the posterior...
axillary line. Each adjacent port was made 10 cm apart to avoid obstruction between instruments. Once the trocars were all placed, the robot was docked over the head of the patient. Under the surgical view, the cyst compressed the azygous vein, was densely adherent to the superior vena cava and the phrenic nerve, extending upward into the neck area (Figure 2(b)). The trachea, esophagus and right subclavian artery were covered by the mass but were successfully dissected and preserved (Figure 2(c)). A careful sharp dissection using a harmonic scalpel and electrical hook was performed to avoid rupture of the tumor capsule. After resection, the tumor was placed in a specimen sac and punctured, and the fluid from the cyst was suctioned out to make the specimen small enough to be moved out through the assistant port. Operative blood loss was negligible. The total surgical time from skin-to-skin was 1.5 h, with 50 min spent at the console. The chest X-ray on postoperative day one suggested a postoperative change without severe complications (Figure 1(f)). The patient was discharged on postoperative day five without remarkable complications. In the gross specimen, the cyst measured 8.5 × 6.5 cm (Figure 2(d)).

Histopathology of the resected specimen confirmed a benign PC (Figure 3).

DISCUSSION

The exact mechanism of the origin of PCs is still not well elucidated. Preoperative diagnosis of PCs are difficult, especially in the nonfunctional type. CT, magnetic resonance imaging (MRI), and ultrasonography can be used to identify a mass if it is cystic. MPCs should be distinguished from bronchogenic cysts, teratomas, thymomas, cysts and tumors of esophagus, trachea, nerves, lymphatics, and thyroid glands. In this case, the patient was misdiagnosed as having a bronchogenic cyst by CT scan because the cyst was densely adherent to the trachea. However, preoperative fine-needle aspiration or CT-guided biopsy is not indicated for MPCs because of the high risk of cyst rupture with cellular dissemination into the pleural space in cases of malignant disease.

Surgical excision is recommended for functional or non-functional MPCs, especially when local symptoms occur. The optimal surgical approach depends on the location and

FIGURE 1  Computed tomography (CT) scan and X-ray showed an 8.5 × 6.5 cm diameter cystic tumor in the mediastinum. (a) Coronal section showing a paratracheal cystic tumor with a well-defined border. (b) Sagittal section showing that the posterior margin of the cyst was adjacent to the right intervertebral foramen. (c) Cross section and mediastinal window. (d) Cross section and lung window. (e) Preoperative chest X-ray. (f) Chest X-ray of postoperative day 1.
size of the cyst, as well as the individual experience of surgeons. Go et al. reported a robotic resection of an MPC of 4.5 h, using four arms of the da Vinci Si system with two assistant ports. In order to facilitate the operation, the patient twice underwent endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) and a total of 520 ml of fluid was aspirated from the cyst. In this case, we also used the da Vinci Si system but with only one port for assistance. The cyst was completely separated without being ruptured, thus avoiding potential malignant cellular dissemination. Moreover, the resection duration from skin-to-skin was only 1.5 h and was much shorter than that reported previously. We used a complete robotic portal technique to relieve additional trauma caused by a 3–5 cm assistant incision. CO₂ insufflation enables a larger surgical space and a better anatomic distinction during surgery. We are of the opinion that these techniques enabled completion of the resection more quickly and safely with minor trauma to the chest.

In conclusion, here, we demonstrated a rare case of giant nonfunctional MPC which was resected via a complete portal robotic approach with CO₂ insufflation. Although MPCs are rare lesions, they should be taken into consideration when mediastinal cysts are identified. The complete portal robotic approach with CO₂ insufflation is an effective procedure to resect MPCs in selected cases.

ACKNOWLEDGMENTS
This work was supported by the Sun Yat-sen University Clinical Research 5010 Program (2019012, ChiCTR2000034737), and the National Natural Science Foundation of China (82072572).

CONFLICT OF INTEREST
The authors have no conflict of interest to disclose.

ORCID
Jie Yang https://orcid.org/0000-0001-6604-7811
Jing-Sheng Cai https://orcid.org/0000-0002-4678-4037
REFERENCES

1. De Quervain F. Epithel-Körperchen-Cysti. Schweiz Med Wochenschr. 1925;55:1169.

2. Papavramidis TS, Chorti A, Pliakos I, Panidis S, Michalopoulos A. Parathyroid cysts: a review of 359 patients reported in the international literature. Medicine. 2018;97:e11399.

3. Gurbuz AT, Peetz ME. Giant mediastinal parathyroid cyst: an unusual cause of hypercalcemic crisis - case report and review of the literature. Surgery. 1996;120:795–800.

4. Wirowski D, Wicke C, Boehner H, Lammers BJ, Pohl P, Schwarz K, et al. Presentation of 6 cases with parathyroid cysts and discussion of the literature. Exp Clin Endocrinol Diabetes. 2008;116:501–6.

5. Agrawal D, Lahiri TK, Agrawal A, Singh MK. Uncommon parathyroid mediastinal cyst compressing the trachea. Indian J Chest Dis Allied Sci. 2006;48:279–81.

6. Dell’Amore A, Asadi N, Bartalena T, Bini A, Stella F. Thoracoscopic resection of a giant mediastinal parathyroid cyst. Gen Thorac Cardiovasc Surg. 2014;62:444–50.

7. Shields TW, Immerman SC. Mediastinal parathyroid cysts revisited. Ann Thorac Surg. 1999;67:581–90.

8. Matsuoka K, Ueda M, Miyamoto Y. Mediastinal parathyroid cyst resected via a cervical incision using video-mediastinoscopy. Indian J Thorac Cardiovasc Surg. 2018;34:388–90.

9. Go P, Watson J, Lu Z, Carlin A, Hammoud Z. Robotic resection of a mediastinal parathyroid cyst. Gen Thorac Cardiovasc Surg. 2015;63:52–5.

How to cite this article: Yang J, Cai J-S, Wang G, Yang M-Z, Yang H-X. Complete portal robotic resection of a giant mediastinal parathyroid cyst; A case report. Thorac Cancer. 2021;12:1118–1121. https://doi.org/10.1111/1759-7714.13879