

Surgery for Ectopic Parathyroid Adenoma in Lower Part of Superior Mediastinum through a Transcervical Incision

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INTRODUCTION

Ectopically located hyperfunctioning parathyroid gland(s) are responsible for approximately 6–16% of hyperparathyroidism cases, in which about 6% can be ascribed to ectopic growth in the mediastinal site.^[1] Treatment of ectopic adenomas usually requires resection. There are various techniques to resect ectopic parathyroid glands, which are mainly depended on the ectopic gland's location. However, choosing the correct type of treatment for cases can be difficult since there are no commonly accepted guidelines for treatment selection.

Here, we reported a male patient, whose imaging studies revealed an ectopic parathyroid gland, located in the lower part of the superior mediastinum, below the innominate vein. We performed parathyroidectomy, through a traditional transcervical incision, avoiding more invasive procedures and reducing the cost of treatment.

CASE REPORT

A 58-year-old native Chinese man was presented with nephrolithiasis, his serological tests demonstrated explicit hyperparathyroidism with parathormone levels dramatically elevated to 314.80 pg/ml (reference value: 15.00–65.00 pg/ml) and calcium concentration increased to 3.23 mmol/L (reference value: 2.10–2.60 mmol/L). A 24-h urine collection revealed high levels of urinary calcium at 11.50 mmol/24 h (reference value: 2.50–7.50 mmol/24 h); meanwhile, the bone mineral density test results ($Z = -2.96$, $T = -3.69$) showed that the patient had osteoporosis. Altogether, the tests indicated high-functioning parathyroid. Therefore, to locate the parathyroid gland(s) and identify any abnormalities, we applied several imaging techniques, including cervical ultrasound, contrast computed tomography (CT) of the

neck and chest [Figure 1a], and ^{99m}Tc-Sestamibi scan. The combination of radionuclide tomography and CT scan revealed a soft-tissue density mass, which was located inferior to the innominate vein and the aortic arch in the superior mediastinum [Figure 1b]. Another nodule, located posterior to the right lobe of thyroid, was also detected by ultrasound and CT.

An ectopic parathyroidectomy was then performed with a traditional transcervical collar incision. When the space between the ascending aorta and sternum, inferior to the left innominate vein, was exposed, an abnormal mass, just left to the confluence of bilateral innominate vein, was identified. The location of the mass was in agreement with the location identified by the preoperative scans. Following, the mass was “dragged” out with the thymus, through the cervical incision, by gradually separating it from the surrounding normal tissues [Figure 1c]. The nodule posterior to the right lobe of the thyroid was excised simultaneously. Later on, pathological examination identified the masses as parathyroid adenoma (retrosternal mass) and parathyroid cyst (nodule posterior to the right lobe of thyroid). Postoperative serology tests showed that the patient's calcium, phosphate, and parathormone levels were greatly reduced (2.55 mmol/L, 0.57 mmol/L, and 5.90 pg/ml, respectively) on the 1st day.

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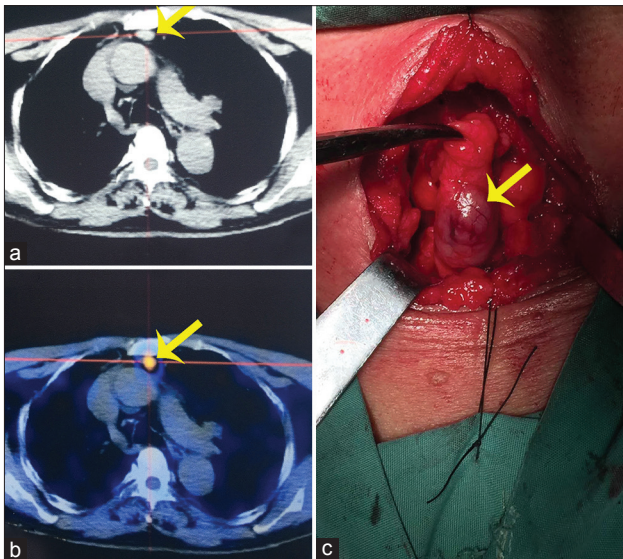


Figure 1: Preoperative imaging and intraoperative photograph. (a) The axial computed tomography indicated an abnormal mass in the lower part of superior mediastinum. (b) The ectopic parathyroid adenoma was demonstrated through the fusion imaging of radionuclide tomography and computed tomography scan. (c) The ectopic parathyroid adenoma was exposed to the cervical incision by dragging with thymus and separating surrounding tissue. All the arrows were point to the ectopic parathyroid adenoma.

DISCUSSION

When the position of ectopic mediastinal parathyroid glands is deeper, parathyroidectomy through conventional cervical incision is more difficult to perform. Conventionally, deeply located parathyroid glands required a median sternotomy. However, due to their significant complications, nowadays, these techniques are only used as alternative procedures. In recent years, advanced technologies such as video-assisted thoracoscopic surgery (VATS), video-assisted mediastinoscopic surgery, and robotic system surgery are used to resect ectopic parathyroid glands located deeply in the mediastinum.

Choosing the best approach for each patient can be really difficult since there are no consented guidelines concerning the selection of the appropriate treatment method. Few authors have given suggestions, mainly based on a limited number of reviewed cases. Iihara *et al.*^[2] regarded the level of the aortic arch, on the preoperative chest CT images, as a useful landmark for guiding a suitable surgical approach. Specifically, the authors recommended a traditional transcervical approach for the successful removal of those masses found above the aortic arch in the superior mediastinum, and a thoracoscopic approach for those found below the level of the aortic arch. A study by Nilubol *et al.*^[3] concluded that if the mediastinal parathyroid gland(s) was located below the innominate vein, a VATS or sternotomy was necessary. Iacobone *et al.*^[4] reported that conventional cervicotomy was successful in 88.20% of mediastinal parathyroid tumors cases. In the unsuccessful cases, the glands were located in the lower part of the anterior mediastinum, below the innominate vein, and could not be

retrieved through a transcervical thymectomy because the glands were not inside the thymus or because of leakage of the thymic tissue during the procedure. A 10-year-long review by Callender *et al.*,^[5] which included 60 patients with descending parathyroid gland into the mediastinum, suggested a distance of 6 cm below the clavicle as the optimal empirical dissection location. In particular, the authors demonstrated that when the target parathyroid glands were located <6 cm below the superior aspect of the clavicular head, the lesions were successfully resected through a cervical approach. In contrast, when the glands were located more than 6 cm below the head of the clavicle, the transcervical approach was effective only in two cases (25%).

In the case, preoperative imaging identified the location of a suspicious parathyroid mass below the aortic arch and the innominate vein, and an abnormal mass, posterior to the right lobe of the thyroid. To remove both masses in one operation and one incision, we decided to select the traditional transcervical incision approach. According to the postoperative results, the surgery was successful, without the assistance of any special tools, and saving the complications and costs of a more invasive treatment procedure. Meanwhile, this case indicates that the mediastinal space below the aortic arch and the innominate vein might not be an out-of-bounds area for the traditional transcervical incision.

Declaration of patient consent

The authors certify that they have obtained appropriate patient consent form. In the form the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understand that his name 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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