

## Thoracoscopic Removal of Ectopic Mediastinal Parathyroid Adenoma

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Ectopic mediastinal parathyroid adenomas or hyperplasias account for up to 25% of primary hyperparathyroidism cases. Most abnormal parathyroid glands are found in the superior mediastinum within the thymus and can be removed through a cervical incision; however, a few of these glands are not accessible using standard cervical surgical approaches. Surgical resection has traditionally been performed via median sternotomy or thoracotomy. However, recent advancement in video-assisted thoracic surgery techniques has decreased the need for sternotomy or thoracotomy to remove these ectopic parathyroid glands. Here, we report a successful case of video-assisted thoracoscopic removal of a mediastinal parathyroid adenoma.

Key words: 1. Parathyroid neoplasms  
2. Thoracic surgery, video-assisted  
3. Mediastinum

### CASE REPORT

A 59-year-old woman was admitted to Samsung Medical Center for suspected primary hyperparathyroidism. She had recently been experiencing constipation, irritable bowel syndrome, and bladder irritability (such as urinary urgency). Her symptoms had become more severe over time. At presentation, her biochemical levels were as follows: serum calcium, 11.4 mg/dL (range, 8.4 to 10.2 mg/dL); ionized Ca, 4.9 mg/dL (range, 3.1 to 4.8 mg/dL); alkaline phosphatase, 102 U/L (range, 42 to 98 U/L); and parathyroid hormone (PTH), 94.0 (range, 7.5 to 53.5 pg/mL). Her thyroid function test results were within the normal range. Bone densitometry showed osteopenia in the left femur (0.719 g/cm<sup>2</sup>; T score, -1.2). Abdominal ultrasonography (USG) revealed no abnormalities. A chest computed tomography (CT) scan re-

vealed a 15-mm soft tissue mass anterior to the ascending aorta (Fig. 1). Thyroid USG showed a 0.4-cm nodule in the thyroid; however, a Tc99m sestamibi parathyroid scan of the neck and mediastinum showed an increased tracer concentration in the anterior mediastinum, which suggested the presence of active parathyroid tissue, while the same activity was not observed in the neck (Fig. 2).

The patient underwent left thoracoscopic mediastinal exploration. For this procedure, she was intubated with a double lumen endotracheal tube to enable one-lung ventilation and placed in the right lateral decubitus position. We made three ports, which were located in the anterior axillary line 6th intercostal space and mid axillary line 5th and 8th intercostal spaces. Thoracoscopy revealed a mass approximately 2 cm in length in the anterior mediastinum, which was subsequently resected. The tumor was poorly encapsu-

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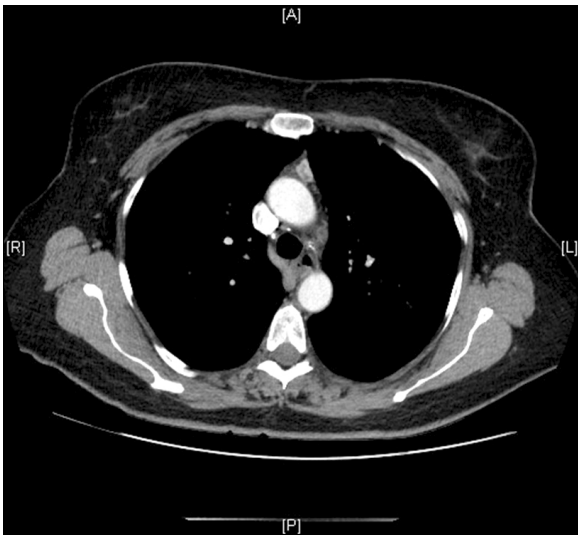
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lated and not well-defined. Thus, we removed the mediastinal mass with en bloc resection of the left-side thymus. A drop in the PTH level (from 94.0 to 6.5 pg/mL) occurred during surgery, which suggested that all the hyperfunctioning tissue was removed. A post-surgical pathology report confirmed that the patient had a 1.5-cm parathyroid tumor. On postoperative day 2, the chest tube was removed and there

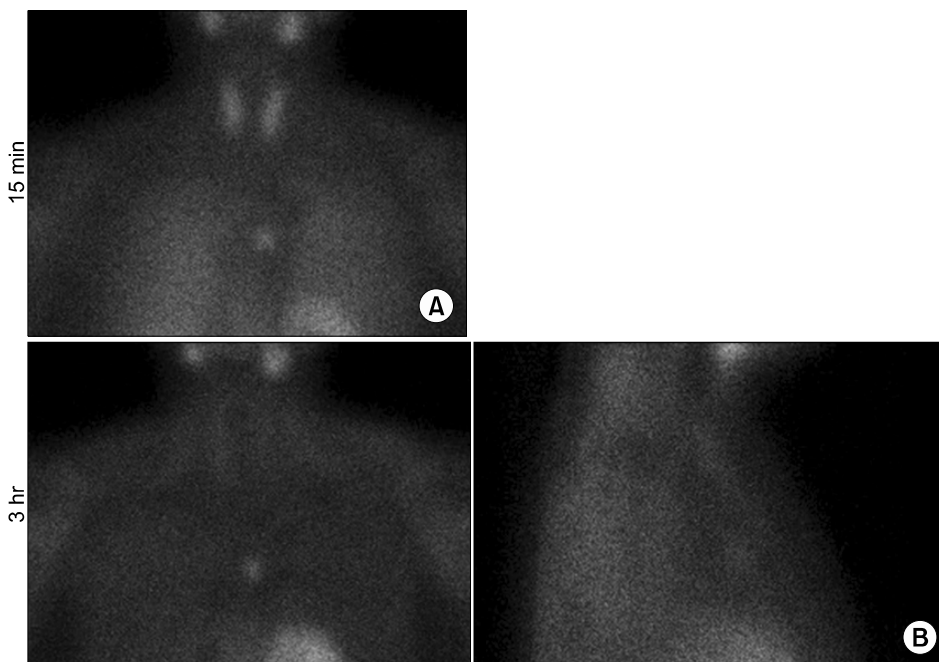
were no surgical complications. Histopathological examination confirmed the lesion to be an ectopic parathyroid adenoma. At a follow-up appointment two weeks after surgery, the patient had normal serum and ionized calcium levels and no complications.

## DISCUSSION

Primary hyperparathyroidism is the most common cause of hypercalcemia in an outpatient clinic setting [1]. Approximately 80% of all primary hyperparathyroidisms are caused by parathyroid adenomas. Surgical resection is indicated for symptomatic ectopic parathyroid adenoma, but surgery is also required for an asymptomatic patient when the serum calcium level exceeds the normal reference range by 0.25 mmol/L or 1.0 mg/dL, creatinine clearance is reduced to <60 mL/min, bone mineral density is below -1.0, or patients are unable to participate in appropriate follow-ups. The involvement of mediastinal ectopic parathyroid glands in primary hyperparathyroidism accounts for up to 20% of all cases [2]. Approximately 6% to 16% of the entire parathyroid gland can become ectopic in these cases, and proliferation of the tissue usually occurs in the retroesophageal space, paraesophageal space, mediastinum, intrathymic space, or carotid sheath, among other locations [3,4].



**Fig. 1.** Chest computed tomography shows a 15-mm soft tissue mass at the anterior mediastinum just in front of the ascending aorta.



**Fig. 2.** (A) A image obtained 15 minutes after intravenous injection of <sup>99m</sup>Tc-sestamibi show focal uptake in the anterior mediastinum. (B) A delayed image after 3 hours confirms that this area of uptake corresponds to an ectopic parathyroid gland in the anterior mediastinum.

Because the main cause of primary hyperparathyroidism is the presence of a parathyroid tumor, surgery is the treatment of choice. Thus, imaging plays a very important role in pre-operative evaluation. Although neck exploration alone yields high rates of complete recovery, reoperation is sometimes necessary when there is an ectopic lesion [5]. Therefore, accurate localization of ectopic parathyroid adenomas can increase the success rate of treatment and decrease the recurrence rate. Various types of imaging tools, such as USG and CT, are used for diagnosis and localization. Technetium-99m sestamibi scanning is the gold standard for localization [6,7].

Surgical approaches for mediastinal ectopic parathyroid adenoma removal are diverse. Sternotomy and thoracotomy are the traditional methods for adenoma cases of the upper mediastinum, and cervicotomy is also a popular option. There are other approaches that can be used depending on the particular circumstances of the case. In the present case, we employed a thoracoscopic approach, which is widely used because it is minimally invasive and the lesion is located in a proper spot on the CT scan for a thoracoscopic procedure. Recent attempts at surgical refinement have focused on reducing the size of the incision and minimizing surgical dissection. The reported advantages of the video-assisted techniques include small incisions and reduced soft tissue dissection. By following these procedures, highly effective and safe results can be obtained along with patient satisfaction in terms of the cosmetic outcome [8].

Additionally, since the development of the rapid PTH assay, surgeons have used this technology in an attempt to confirm successful removal of ectopic parathyroid adenoma intraoperatively. Because the intact form of PTH has a half-life of less than 5 minutes, rapid intraoperative measurements are possible. The Miami criteria for a successful parathyroidectomy require a drop of more than 50% in PTH levels 10 minutes after removal of the suspected abnormal gland as compared to the highest preoperative PTH level. In addition to the Miami guidelines, other criteria have been developed to improve accuracy that use various combinations of preoperative, preincision, postincision, and premanipulation comparative measures. The temporal reduction in intraoperative PTH (IOPTH) concentration at sequential timed intervals after removal of the suspected diseased tissue has also

been suggested as a better indicator of surgical success. The IOPTH test may be needed in complicated cases, where pre-operative imaging is unclear, or to exclude multiglandular disease. In these instances, the IOPTH measurement may provide useful guidance to the surgeon that no additional hyperfunctioning parathyroid tissue remains.

We present our case of a successful thoracoscopic removal of the ectopic hyperfunctioning parathyroid adenoma located in the mediastinum, and suggest that this approach is a viable alternative in patients with this affliction.

### CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

### REFERENCES

1. Khan A, Grey A, Shoback D. *Medical management of asymptomatic primary hyperparathyroidism: proceedings of the third international workshop*. J Clin Endocrinol Metab 2009;94:373-81.
2. Harvey A, Bohacek L, Neumann D, Mihaljevic T, Berber E. *Robotic thoracoscopic mediastinal parathyroidectomy for persistent hyperparathyroidism: case report and review of the literature*. Surg Laparosc Endosc Percutan Tech 2011;21:e24-7.
3. Phitayakorn R, McHenry CR. *Incidence and location of ectopic abnormal parathyroid glands*. Am J Surg 2006;191:418-23.
4. Hamidi S, Soltani A, Hedayat A, Kamalian N. *Primary hyperparathyroidism: a review of 177 cases*. Med Sci Monit 2006;12:CR86-9.
5. Van Heerden JA, Grant CS. *Surgical treatment of primary hyperparathyroidism: an institutional perspective*. World J Surg 1991;15:688-92.
6. Taillefer R, Boucher Y, Potvin C, Lambert R. *Detection and localization of parathyroid adenomas in patients with hyperparathyroidism using a single radionuclide imaging procedure with technetium-99m-sestamibi (double-phase study)*. J Nucl Med 1992;33:1801-7.
7. Ahuja AT, Wong KT, Ching AS, et al. *Imaging for primary hyperparathyroidism: what beginners should know*. Clin Radiol 2004;59:967-76.
8. Alesina PF, Moka D, Mahlstedt J, Walz MK. *Thoracoscopic removal of mediastinal hyperfunctioning parathyroid glands: personal experience and review of the literature*. World J Surg 2008;32:224-31.