

# Different surgical approaches in parathyroid adenoma resections

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**Abstract:** Three patients were referred to our clinic for the management of a persistent symptomatic primary hyperparathyroidism. Pre-operative imageological localization revealed evidence of an adenoma. Here we are presenting three video demonstrating the different surgical approaches of parathyroid adenoma resection, with the use of an intraoperative gamma probe and nerve monitoring.

**Keywords:** Video-assisted thoracoscopic approach parathyroidectomy; robotic trans-axillary parathyroidectomy; remote access parathyroidectomy; scarless parathyroidectomy



Submitted Aug 08, 2013. Accepted for publication Oct 14, 2013.

doi: 10.3978/j.issn.2227-684X.2013.10.03

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The first patient presented is a 76-year-old that had previously undergone two prior parathyroid surgeries, presented to our clinic with an elevated calcium and parathyroid hormone (PTH) level (*Video 1*). A Tc-99m sestamibi-computed tomography scan was performed which revealed a mass in the anterior mediastinum consistent with a parathyroid adenoma. We subsequently performed a radioguided parathyroidectomy via video-assisted thoracoscopic surgery (VATS) with the use of three ports. An intraoperative gamma probe and nerve monitoring was used to assist the exploration and localization of the adenoma. Circumferential dissection and resection was performed with the use of simple electrocautery. No further elevations in gamma counts were noted on inspection of the mediastinum. Intraoperative PTH testing was used to confirm cure. Since the intraoperative PTH levels confirmed surgical cure, the operation was terminated. The patient was followed for one year postoperatively and had remained eucalcemic. In conclusion, radioguided parathyroidectomy via VATS combined with intraoperative PTH testing is an effective approach for patients with ectopic mediastinal parathyroid adenomas (1).

The second patient underwent a robotic transaxillary resection of a retroesophageal parathyroid adenoma in the thymus (*Video 2*). The patient was placed in a supine position on the operating room table, and a wedge was

placed under the patient's shoulder blades to allow slight hyperextension of the neck. The patient's ipsilateral arm was positioned so that the shoulder was flexed to approximately 160°, and internally rotated. The elbow was flexed to approximately 90°. The upper arm was positioned parallel to the head, and the forearm was placed immediately superior to the head (2,3).

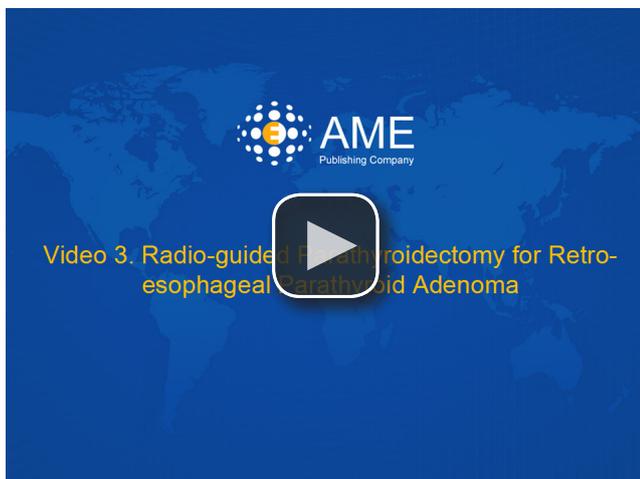
Located on the contralateral operative side, the center console of the da Vinci Si system was aligned to the level of the thyroid gland. A 5-6-cm longitudinal incision was made along the outer border of the pectoralis major muscle. The avascular plane between the sternal and clavicular heads of the sternocleidomastoid muscle was identified and separated. The lateral border of the strap musculature was raised off the anterior surface of the thyroid parenchyma and extended cranially to the level of the cricothyroid cartilage and inferiorly to the lower border of the inferior pole. The robot was positioned over the patient, and the robotic arms were extended to attain maximal range of motion. A 5-mm curved harmonic scalpel, a 5-mm Maryland retractor, and an 8-mm Prograsp dissector were secured into the robotic arms. The arms were aligned along the incision while keeping the robotic arms maximally separated. The camera was placed at the inferior border of the incision directly below the bladed retractor at a 20° angle pointed downward. The camera and instruments were



**Video 1** Video-assisted thoracoscopic approach parathyroidectomy.



**Video 2** Robotic transaxillary resection of retro-esophageal parathyroid adenoma in thymus.



**Video 3** Radio-guided parathyroidectomy for retro-esophageal parathyroid adenoma.

deployed under direct visualization. The assistant surgeon also maintained a clear field with laparoscopic suction as needed. The parathyroid adenoma was identified in the inferior pole of the left thyroid lobe. The console surgeon then proceeded to perform a parathyroid adenoma resection robotically in a conventional fashion. The specimen was removed with a laparoscopic grasper through the axilla. The function of the nerve was confirmed intraoperatively using an extended tip nerve monitor (4,5). Intraoperative PTH testing was used to confirm cure. The patient remained eucalcemic one year postoperatively.

The third patient presented underwent radioguided parathyroidectomy for a parathyroid adenoma in the retroesophageal groove (6) (*Video 3*). Intraoperative ultrasound was used to mark the incision superficial to the adenoma. A 1-inch incision was made at the base of the neck. The platysma was then identified and divided. The sternothyroid, and sternohyoid muscles were identified and separated from the thyroid lobe. An intraoperative gamma probe was used to confirm the location of the parathyroid adenoma in the retroesophageal groove. Intraoperative nerve monitoring was used to identify and stimulate the recurrent laryngeal nerve. Circumferential dissection and resection of the adenoma was performed using simple electrocautery and a harmonic scalpel. The patient's PTH level at the time of incision was 229 pg/mL. The level decreased to 153, 104, and 78 pg/mL when measured at 5, 10, and 15 minutes, respectively, after excision of the adenoma, confirming that no other hyperfunctioning parathyroid glands were present. The patient was found eucalcemic one year postoperatively.

### Acknowledgements

*Financial disclosure:* (I) This research and work was fully supported by Tulane University Medical Center; (II) The authors have no financial interest in companies or other entities that have an interest in the information included in the contribution; (III) The authors declare no conflict of interest.

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**Cite this article as:** Mohamed SE, Li X, Khadra H, Saeed A, Mohamed H, Kandil E. Different surgical approaches in parathyroid adenoma resections. *Gland Surg* 2013;2(4):227-229. doi: 10.3978/j.issn.2227-684X.2013.10.03