Visualized Surgery

Robotic transaxillary parathyroidectomy

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Abstract: We recently reported on the safety and feasibility of robotic transaxillary approaches for parathyroid surgeries with benefit of avoiding a visible cervical scar. Herein, we demonstrate our technique with utilization of intraoperative nerve monitoring and indocyanine green (ICG) imaging. The patient was discharged a few hours after the surgery.

Keywords: Robotic transaxillary parathyroidectomy; scarless parathyroidectomy; robot-assisted parathyroidectomy; indocyanine green imaging (ICG imaging); gamma probe; intraoperative PTH

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Introduction

Endoscopic surgery has been adopted in most institutions for parathyroid gland removal, and several studies have demonstrated reduced postoperative pain and improved cosmetic outcome as compared to traditional open approach (1). Application of robotic technology for parathyroid removal has been less extensively studied and its use has not been widely adopted. Previous studies have documented the safety of the procedure with the advantages of greater image magnification, gasless technique, and a hidden axillary incision (1-4). Herein we present our technique of robotic transaxillary parathyroidectomy at an academic institution.

Our patient was a 48-year-old female who presented with primary hyperparathyroidism. She had complaints of fatigue, weight loss, thin hair, cold intolerance, and loss of concentration. She had past medical history of diabetes, hypertension, attention deficit disorder and depression. She had surgical history of a multiple abdominal operations including cholecystectomy and gastric sleeve placement. Her calcium level was elevated at 10.9 mg/dL, and PTH was 79.4 pg/mL. Vitamin D level was normal at 44.6 ng/mL. Ultrasound of the neck in our clinic showed a 0.76 cm × 0.35 cm hypoechoic lesion suggestive of right inferior parathyroid gland adenoma, and nuclear sestamibi scan showed a hyperactive lesion inferior to the right lobe consistent with parathyroid adenoma. Our patient was interested in remote access surgery to avoid a cervical scar.

Operative technique (*Figure 1*)

The patient was placed supine on operative table, while sequential compressive devices were placed on the patient's legs. The patient was intubated with a size 6.5 endotracheal tube with special electrodes for nerve monitoring. Intraoperative ultrasound was performed using a 15-megahertz linear transducer. We identified the hypoechoic lesion suggestive of parathyroid gland at inferior pole of the lower pole of the right thyroid lobe as shown in the video.

The right arm was then placed flexed over the forehead and padded appropriately to prevent brachial plexus injury. The entire neck, chest, and axilla were prepped and draped in standard surgical fashion. Using the sternal notch as a landmark, we drew a horizontal line to the anterior axillary border, marking the inferior incision limit. A diagonal line at a 60-degree angle was then drawn from the thyrohyoid membrane to the anterior axillary border, which marked the superior limit of the incision. A final straight line was then drawn between the inferior and superior points to demarcate the incision path. The axillary incision was then

Figure 1 Video of robotic transaxillary parathyroidectomy (5). Available online: http://www.asvide.com/articles/1623

made. A subcutaneous flap was raised using monopolar electrocautery in a subplatysmal plane anterior to the pectoralis fasciae up to the clavicle. A window was made between the sternal head and clavicular head of the sternocleidomastoid muscle. A special retractor was then used to elevate the sternal head and the strap muscles, creating operative space superficial to the thyroid. The da Vinci Si Robot (Intuitive Surgical, Sunnyvale, CA, USA) was then docked and robotic arms were attached. Two surgeons were able to simultaneously operate at individual consoles. Harmonic scalpel (Ethicon, Somerville, NJ, USA), Maryland dissector (Intuitive Surgical, Sunnyvale, CA, USA), and ProGrasp (Intuitive Surgical, Sunnyvale, CA, USA) were used as well as a 30-degree endoscope in the camera port. We identified the parathyroid gland at the inferior pole with use of indocyanine green (ICG) imaging, and circumferential dissection was performed with Harmonic scalpel. The blood supply of the parathyroid gland was divided with good protection and then reattached to the thyroid. Specimen was then extracted in an EndoCatch bag. Gamma probe was used on the extracted specimen, and showed levels of 198, which confirmed presence of parathyroid tissue. Specimen was sent for frozen section pathology with results showing hyperplastic parathyroid tissue. Total specimen weight was 486 mg.

Initial PTH baseline was 109.2 and dropped to 39.1 within 10 minutes of gland removal, which confirmed evidence of curative surgery. We placed a drain sutured to the skin with 3-0 silk. Valsalva maneuver was performed to confirm absence of bleeding. Subdermal closure was performed using interrupted 3-0 vicryl suture and subcuticular closure was performed with 4-0 Monocryl suture. Sterile dressing was then placed on the incision. Our patient tolerated the procedure well and was discharged home a couple of hours following the surgery. Flexible laryngoscopy scope was passed through the right nostril and both vocal cords were confirmed to be mobile and intact bilaterally.

Comment

Robotic transaxillary parathyroidectomy is a viable and safe option for patients interested to avoid a visible neck scar, mainly in cases with a history of developing a hypertrophic scar or keloid.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Informed Consent: Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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