

Single incision robotic transaxillary approach to perform parathyroidectomy

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Introduction

The recent development of robotic systems provided a safe, precise, 3D magnified dissection without the need for CO₂ insufflation and has a better cosmetic result due to the invisible axillary scar in the neutral position (1). In the past two decades, significant improvements in the accuracy and reliability of preoperative localization studies have facilitated further evolution in surgical management of primary hyperparathyroidism (2). Targeted parathyroidectomy is the current preferred procedure for PHPT by most endocrine surgeons (3,4).

Herein, we are presenting a video for a patient with a typical parathyroid adenoma that required, enblock resection of parathyroid adenoma with the adjacent thyroid lobe. The robotic transaxillary approach provided a remote access to avoid a visible neck scar.

Procedure steps

Patient positioning and placement of NIMS endotracheal tube

The patients' neck was slightly extended, and the arm ipsilateral to the lesion was placed cephalad and flexed above the head as described by Ikeda (5-7). This optimized exposure of the axilla and created a short distance from the axillary skin to the thyroid gland, through which dissection was performed.

The patient was intubated under general anesthesia with a NIMS endotracheal tube (Medtronic Xomed, Jacksonville, FL, USA) to allow intraoperative monitoring

of the RLN function. Appropriate placement of the NIMS endotracheal tube was confirmed by direct laryngoscopy and by visualization of the electromyographic wave form on the NIMS monitor.

Creation of a working space

The thyroid was identified by palpation and a vertical line was drawn from the midline of the thyroid to the sternal notch, demarcating the medical boundary of dissection. The inferior limit of dissection was drawn from the sternal notch to the ipsilateral axilla in a transverse manner. The superior limit of dissection was drawn in an oblique manner from the cricoid to the axilla.

Approximately two inches incision was then made with a #15 blade. Monopolar electrocautery under direct vision was then used to dissect above the pectoralis fascia. A flap was raised in the direction of the thyroid until the sternal and clavicular heads of the sternocleidomastoid muscle were visualized, opened and a retractor is used to elevate and retract the sternal head exposing the strap muscles. A wound protector was placed to protect the axillary wound edges from any heat generated by the electrocautery or the harmonic scalpel. The triangular window between the sternal and clavicular heads was entered using the Harmonic Scalpel (Ethicon, Somerville, NJ, USA), allowing identification of the carotid sheath and omohyoid muscle. The strap muscles are then elevated off the thyroid gland providing exposure from the sternal notch to the superior pole and across the midline. Special retractor (Marina Medical, Sunrise, FL, USA) was placed under the strap

muscles and secured to the table mount lift to maintain an adequate working space without CO₂ gas insufflations.

Docking of the surgical robot system

The da Vinci Si robot was docked from the side of the bed contralateral to the operative field. The robotic instruments used were the Pro Grasp forceps (Intuitive Surgical, Sunnyvale, CA, USA), Maryland Dissector (Intuitive Surgical, Sunnyvale, CA, USA) and Harmonic scalpel (Ethicon, Somerville, NJ, USA). The 30 degree endoscope is used in a downward facing orientation. The robotic arms were equipped with the Maryland dissector, the Pro Grasp forceps and the Harmonic scalpel. The Maryland dissector and Harmonic scalpel should be as far apart as possible.

The gland was then grasped by the Pro grasp and rotated medially. The middle thyroid vein was then dissected with the Maryland dissector and divided using the harmonic scalpel.

Identification and accurate dissection of the RLN

Dissection of RLN was performed in tracheoesophageal groove and location of the RLN with identification confirmed via intraoperative nerve monitoring. Then the inferior thyroid pedicle was dissected and divided using the harmonic scalpel. The superior pedicle was also dissected and divided using the harmonic scalpel.

Resection of parathyroid adenoma and closure

The thyroid gland was at that point turned medially and with cautious dissection the parathyroid adenoma identified. The adenoma was then circumferentially dissected and excised enblock with the thyroid lobe. Intraoperative PTH monitoring was performed to ensure a successful operation. The wound was irrigated and excellent homeostasis was achieved. A Jackson-Pratt drain was coursed through the

axilla and sutured to the skin. The wound was closed with absorbable running sutures.

Comments

Patients who might have multiglandular disease are not good candidates for this surgery.

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