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Well-differentiated thyroid cancer and robotic transaxillary surgery at a North American institution



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ABSTRACT

Background: Recent studies from Asia have reported the safety and feasibility of robotic-assisted thyroid surgery. In the United States, several small series and case reports have been published, mostly regarding treatment of benign disease. The aim of our study is to report the safety and feasibility of robotic surgery for well-differentiated thyroid cancer patients at a North American institution.

Materials and Methods: We performed a retrospective cohort study using a prospectively collected single-center clinical database at Tulane University Medical Center. We included all well-differentiated thyroid cancer patients who underwent robotic-assisted or conventional cervical approach thyroid surgery with or without lymph node dissections at our institution from January 2015 to June 2017. Patient demographics and perioperative data were collected and analyzed.

Results: A total of 144 surgeries for thyroid cancer were performed; 35 (24.3%) were robotic-assisted. There were no significant differences in estimated blood loss, operative times, complication rates, specimen sizes, positive microscopic margins, number of lymph nodes removed with associated lymph node dissections, patient follow-up duration, or clinical recurrence rates between the two groups. Overall length of stay was shorter for robotic-assisted surgery, at 0.6 ± 0.9 d, versus 1.1 ± 1.2 d for conventional open surgery ($P = 0.009$). For robotic-assisted surgery, 19 patients (54.3%) were discharged on the day of procedure, and only one patient was admitted as inpatient to the hospital (2.9%).

Conclusions: Robot-assisted thyroid surgery is a safe, feasible, and oncologically sound approach for a select group of well-differentiated thyroid cancer patients. However, long-term studies are needed.

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Introduction

The incidence of thyroid cancer in the United States has increased in recent years with a tripling of cases noted over the years 1975 to 2009, from 4.9 to 14.3 per 100,000 individuals.¹ The American Cancer Society report *Cancer Facts and Figures 2017* also notes that the rate of thyroid cancer diagnosis has increased worldwide over the past few decades and in the United States increased by about 5% per year for women and men from 2004 to 2013.² An estimated 56,870 new thyroid cancer cases will be diagnosed in the United States in 2017, and it remains the most rapidly increasing cancer diagnosis in the United States, largely due to increased detection with more sensitive diagnostic procedures. It is the most commonly diagnosed malignancy among women aged 20 to 34 y.

The increasing incidence of thyroid cancer worldwide has resulted in the demand for surgical approaches with better cosmetic outcomes, since the cosmetics of the scars associated with conventional cervical approach thyroid surgery can be worrisome to patients.^{3,4} Various techniques for minimally invasive thyroidectomy, including endoscopic and robotic thyroidectomy, were introduced to address this issue.⁴ The development of endoscopic thyroidectomy has proven to be technically challenging to some groups, with limited visualization and manipulation of instruments in the surgical field.³ Other groups have reported success with endoscopy applied to thyroid surgery in the form of transoral natural orifice transluminal procedures through the sublingual or vestibular approach.⁴ The introduction of robotic-assisted technology to surgery, especially via the transaxillary approach as developed in South Korea, offers cosmetic benefits in addition to greater dexterity and a three-dimensional view, which has made even robotic-assisted lateral neck dissection feasible. Multiple studies in the Korean population have addressed outcomes and safety of robotic-assisted thyroid surgery versus conventional open procedures.³⁻⁵ Although data from Korea have demonstrated the safety and feasibility of robotic-assisted thyroid cancer surgery, few studies have addressed the utilization of robotic-assisted thyroidectomy for cancer in the North American population.

Robotic-assisted thyroid surgery was first performed at our institution in September 2009, and we first published our experience with a comparison of robotic-assisted and conventional open thyroidectomy procedures for thyroid cancer in a North American population in 2014.⁶ In recent years, robotic-assisted surgery performed at our institution has increased in complexity to include more total thyroidectomies, as well as central compartment lymph node neck dissections and modified radical neck dissections (MRNDs) for lymph nodes in the lateral neck. Data regarding surgical and oncologic outcomes of robotic-assisted thyroid cancer surgery of increasing complexity in the North American population are still sparse in the literature. Therefore, in this study, we seek to further evaluate the safety and feasibility of robotic-assisted thyroid surgery for the North American population undergoing procedures for well-differentiated thyroid cancer at our institution from 2015 to 2017.

Materials and methods

Under the approval of the Institutional Review Board, we conducted a retrospective analysis of a prospectively collected thyroid surgery database for patients undergoing procedures at our institution, Tulane University Medical Center in New Orleans, Louisiana, from January 1, 2015, through June 30, 2017. All patients who underwent robotic-assisted or conventional open cervical thyroid resection with or without central neck dissection and MRND for well-differentiated thyroid cancer during this time period were evaluated in the analysis. Patients with known cervical lymph node metastases at the time of initial diagnosis were not excluded as in the prior study.⁶ Parathyroid surgeries and surgeries for benign thyroid diseases were excluded. All procedures were performed by the same surgeon (E.K.), and at the time of surgery, there was no intention to compare the two procedure types.

Preoperative patient workup included physical examination, high-resolution surgeon-performed ultrasound, and fine needle aspiration of suspicious thyroid nodules, as described previously by the authors.⁶ Preoperative diagnosis and extent of surgery required for treatment were determined in accordance with the 2015 American Thyroid Association (ATA) Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer.⁷ Lobectomy was chosen for patients with a tumor less than 1 cm in size without clinically positive nodes and without extrathyroidal extension, unless there were clear indications to remove the contralateral lobe. Patients with tumors greater than 1 cm but less than or equal to 4 cm in size without extrathyroidal extension or clinically positive nodes were offered lobectomy or total thyroidectomy based on disease features, treatment team recommendations, and patient preferences. Total thyroidectomy was performed for patients with tumors greater than 4 cm in size, or with extrathyroidal extension or clinical evidence of nodal or distant metastases. We also prefer total thyroidectomy if the patient is hypothyroid and already on thyroid hormone replacement medication, but the final procedure selection in such instances is the patient's decision. Patients were offered central neck dissection in accordance with the ATA guidelines and the clinical judgment of the surgeon. We discuss options with the patient and potential pros and cons of the neck dissection, but generally therapeutic central neck dissection was performed for clinically positive nodes, as was therapeutic lateral neck dissection. Prophylactic central neck dissection was performed for patients without evidence of clinical involvement of the central compartment nodes, but with advanced primary tumors (T3 or T4) or clinically involved lateral neck nodes.

Patients who were offered the robotic approach were typically of young age, female, had favorable body habitus with lower body mass index (BMI) and small body frame, and did not have anatomic or pathologic contraindications to transaxillary positioning such as rotator cuff pathology or cervical spine stenosis. When surgery was performed with robotic-assisted technique, this was done with a gasless transaxillary approach, as summarized in prior work at our institution.⁶

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