



Transoral thyroidectomy and parathyroidectomy – A North American series of robotic and endoscopic transoral approaches to the central neck



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ABSTRACT

Objective: Most thyroid surgery in North America is completed via a cervical incision, which leaves a permanent scar. Approaches without cutaneous incisions offer aesthetic advantages. This series represents the largest series of transoral vestibular approaches to the central neck in North America, and the first published reports of robotic transoral vestibular thyroidectomy for thyroid carcinoma.

Materials and methods: Data was prospectively collected for patients that underwent transoral vestibular approach thyroidectomy and/or parathyroidectomy between April 2016 and February 2017.

Results: Fifteen patients underwent the procedure for removal of the thyroid (n = 12), parathyroid (n = 2) or both thyroid and parathyroid glands (n = 1). The first case was converted to an open procedure. Fourteen were completed through these remote access incisions, including patients with a body mass index as high as 44. There were no permanent complications. The postoperative median Dermatology Life Quality Index score was 3, which indicates a small effect on quality of life.

Conclusion: The transoral vestibular approach to the central neck is a promising technique for patients who desire to optimize aesthetics.

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Introduction

Since its description by Kocher in the late 1880's, the transcervical incision has constituted the primary surgical approach to the thyroid and parathyroid glands [1]. The utility of this incision design is clear, as it provides the surgeon with excellent exposure and a direct route to the central neck. Despite meticulous closure of the incision, a scar of variable prominence is inevitable and patients can find it disagreeable [2–4].

The increasing incidence of thyroid pathology, the young average age at presentation, a female predominance, and a societal emphasis on physical appearances have provided impetus to develop aesthetically favorable alternative approaches [5,6]. Minimally invasive surgery and remote access approaches are alternative methods that respect surgical planes, minimize surgical trauma and avoid visible scarring [7,8]. Since 1997, over 20 differ-

ent thyroidectomy techniques have been proposed as alternatives to the conventional transcervical incision, but none has gained prominence or been widely adopted in a Western population [8,9]. Each represents surgical compromise between exposure and aesthetics, necessitating either a small but visible scar [10] or extensive tissue dissection with a remote, hidden scar [11–18]. Application of these techniques to Western patients with a higher body mass index (BMI) has also been difficult in some cases [5].

To address these concerns, authors have previously attempted transoral approaches [7]. A transoral vestibular approach avoiding the floor of mouth was described by Richmon et al. [19], and modifications of this technique have gained favor particularly in Asia, where it continues to evolve with refinement of incision placement [20,21]. When contrasted with other remote access approaches, the transoral vestibular approach offers the potential for limited dissection and a completely hidden incision. Here, we describe our experience using the transoral vestibular approach for thyroidectomy and parathyroidectomy in a Western population. To our knowledge, this single institution series represents the largest

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patient cohort reported in the Western Hemisphere, and the first to report robotic assistance. It is also the first to report robotic assistance via a transoral approach for a known thyroid carcinoma.

Materials and methods

Study population

All cases were performed at the Johns Hopkins Hospital between April 2016 and February 2016 by the Head and Neck Endocrine Surgery team, and data was collected prospectively. Patients were offered a transoral vestibular approach if they had a history of hypertrophic scarring or were otherwise motivated to avoid a cervical incision, did not have a known history of thyroiditis or external beam radiation, and had a thyroid nodule that was smaller than 6 centimeters (cm) on preoperative ultrasound. Informed consent was obtained from all patients, including a review of the novel nature of this procedure and the associated risks. Patients were offered robotic or endoscopic transoral vestibular approaches as per robot availability, with no set criteria being established to differentiate between the two groups. The procedure was approved by the operating room privileging committee as well as risk management. Johns Hopkins Institutional Review Board approval was obtained to review the collected data.

Surgical technique

The surgical approach is based on the technique described by Anuwong [20]. The patient is positioned supine and intubated with a 6-0 nerve monitoring endotracheal tube (Medtronic, etc). A 1.5 centimeter (cm) incision is marked out in the midline of the lower lip at approximately 1 cm above the gingivobuccal sulcus (Fig. 1A). Electrocautery and blunt dissection are then used to approach the mandible. Once the periosteum is identified, the neck is injected with 1:500,000 epinephrine using a fat injection syringe. Next, a dilator is used to develop the submental and subplatysmal plane bluntly in the midline. Lateral stab incisions are made and injected with the epinephrine solution at the lateral aspect of the lower lip (Fig. 1C). The endoscopic ports are brought into the field and insufflation begins at a pressure of 5–7 mmHg (Fig. 1D).

The subplatysmal pocket is developed with endoscopic instrumentation to the level of the sternum and laterally to the sternocleidomastoid muscles. When utilized, the robot is docked and used for the remainder of the surgery; otherwise, the surgery proceeds with endoscopic visualization. The median raphe of the strap muscles is identified and divided. The thyroid isthmus is divided and the trachea serves as a landmark for identification of the RLN. A capsular dissection begins around the thyroid itself and the superior pole is taken down with the Harmonic scalpel. The nerve stimulator probe is used to stimulate the RLN and to test neurophysiologic integrity during and after the procedure. The parathyroid glands are readily appreciated if they are in the capsular plane. A parathyroid adenoma may also be removed in a similar fashion.

The RLN is dissected distally after identification as it proceeds laterally and caudally from the point of insertion. The thyroid is delivered off of the trachea. The contralateral lobectomy can be completed via the same incisions if necessary [20]. The specimen is retrieved via the central incision using an endocatch bag (Fig. 2A). Hemostasis is achieved and the wound is irrigated. The oral vestibule incisions are closed with layered absorbable sutures. A compression dressing is placed across the neck and chin after the patient has been extubated. Flexible fiberoptic laryngoscopy is completed to confirm vocal fold function.

Postoperative care

All patients are discharged home within 23 h with a 5-day course of Augmentin (875 mg twice daily), and clindamycin (300 mg three times daily) is substituted if allergic to penicillin. It is our practice to complete the first postoperative follow up for all patients 5–14 days from surgery (Fig. 3), at which time a flexible fiberoptic laryngoscopy is again performed to evaluate vocal fold function. Patients also completed the Dermatology Life Quality Index (DLQI) survey at this visit, at each subsequent visit, and again at 6 months [22]. The DLQI survey has 10 questions with each containing a score of 0–3; a maximum possible score of 30 indicates dermatologic issues resulting in severely impaired quality of life. In our series, the first and the last DLQI from each patient were used to calculate the mean and median.

Results

A total of 15 transoral vestibular approaches were attempted between April 2016 and February 2016: Six of these cases were for cytologically benign thyroid nodules, five were for indeterminate thyroid nodules, two were for parathyroid adenomas, one was for papillary thyroid carcinoma, and one was for both a parathyroid adenoma and an indeterminate behavior thyroid nodule. The first case was converted to an open procedure, but all of the subsequent 14 cases were successfully completed without a cervical incision. The characteristics of all patients who completed the transoral vestibular approach are summarized in Table 1. The BMI ranged from 19.9 to 44, with a median of 28 and a mean of 30.3. The papillary thyroid carcinoma was unifocal with a size of 1.3 cm, and final pathology demonstrated negative margins.

Of the 14 transoral vestibular surgeries, six (42.9%) were performed using the da Vinci Si robot (Intuitive Surgical, Inc, Sunnyvale, CA) and eight (57.1%) were performed with endoscopic instrumentation alone (Table 2). The first three specimens (21.4%) were divided within the specimen bag to facilitate delivery via the transoral incision, while the remainder were removed en bloc. The median maximal dimension of the removed thyroid lobes was 6.5 cm (range 2.6–6.5 cm). The median operative time was 288.5 min (range 189–448 min). The first procedure took 322 min, while the last took 189 min. Robotic procedures had a median duration of 344 min (range 287–448 min), while endoscopic procedures required a median of 235 min (range 189–343 min). Surgical drains were used in 3 of 14 patients (21.4%). One (7.2%) of the fourteen patients was discharged on the same day, while the remaining 13 (92.8%) were discharged within 23 h. Only one intrathyroidal parathyroid was identified in the 12 thyroid lobectomies completed. Estimated blood loss was minimal in all 14 cases. The recurrent laryngeal nerve was visually identified, stimulated and formally dissected in 5 cases (35.7%). Five patients (35.7%) with benign nodules had the nerve protected anatomically by leaving a cuff of normal thyroid at Berry's ligament.

Table 3 shows the DLQI scores for 14 patients. The median and mean DLQI scores were 3 and 3.9 (out of a possible 30), respectively, corresponding to minimal effect. The score was lower on subsequent administrations of the survey in all cases in which the questionnaire was administered more than once.

No patients had permanent complications. One (7.1%) robotic procedure was converted to an endoscopic approach, with the thyroid lobe removed via the transoral incision. Post-operatively, one patient (7.1%) had self-limiting numbness over the mental nerve lasting for less than 1 month. One (7.1%) patient had a temporary left vocal fold palsy and underwent injection medialization before regaining full vocal fold function within 3 months of surgery. Our

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