



2024

Section: Onco-surgery

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Mohamad Adel

*Surgical Oncology Department, Al-Azhar University, Cairo, Egypt*

Abd El-Fattah Al Sheikh

*Surgical Oncology Department, Al-Azhar University, Cairo, Egypt, drelshiek@azhar.edu.eg*

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### How to Cite This Article

Adel, Mohamad and Sheikh, Abd El-Fattah Al (2024) "Transoral Endoscopic Thyroidectomy through Vestibular Approach; Report of Initial Experience," *Al-Azhar International Medical Journal*: Vol. 5: Iss. 1, Article 12.

DOI: <https://doi.org/10.58675/2682-339X.2239>

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# Transoral Endoscopic Thyroidectomy Through Vestibular Approach: Report of Initial Experience

Mohamad Adel, Abd El-Fattah El Sheikh\*

Department of Surgical Oncology, Al-Azhar University, Cairo, Egypt

## Abstract

**Background:** Endoscopic thyroidectomy is a minimally invasive approach with a rising popularity due to favorable esthetic outcome. Transoral vestibular approach endoscopic thyroidectomy (TOVET) was progressively adopted for many thyroid pathologies. We, herein report our initial experience utilizing TOVET for benign thyroid lesions.

**Patients and methods:** This prospective study was conducted from December 2020 and February 2023, 15 patients with benign thyroid nodules were selected. All patients considered scarless thyroidectomy as their preferred surgical approach and were operated on for TOVET. Clinicopathological data and surgical outcomes were reported.

**Results:** Fifteen patients comprising one male and 14 female underwent TOVET. Of these patients, 12 (80%) patients for thyroid lobectomy, and three (20%) for total thyroidectomy. All thyroidectomies were completed endoscopically except a single case of conversion to open cervical incision. No cervical incision for specimen retrieval after the complete endoscopic dissection. None of the patients was reported with temporary or permanent recurrent laryngeal nerves injury, or postoperative hypocalcemia. We reported two cases of temporary mental nerve numbness, two cases of surgical emphysema, and one case of flap hematoma.

**Conclusion:** TOVET is a feasible and safe procedure, with higher satisfaction after surgery in esthetic, short-term, and long-term outcomes. Tumor size is important in the decision regarding considering the approach.

**Keywords:** Endoscopic thyroidectomy, Thyroidectomy, Vestibular approach

## 1. Introduction

Currently, there is a focus on developing alternative, cosmetically favorable surgical methods in thyroid surgery, avoiding the anterior neck incision.<sup>1</sup> Many extracervical endoscopic approaches for thyroidectomy have been applied, such as the anterior chest wall approach, axillary bilateral breast approach, and transaxillary approach.<sup>2-4</sup>

Endoscopic thyroidectomy through transoral approach has been first described by Witzel *et al.*<sup>5</sup> as an experimental procedure on human cadavers and pig models, as a sublingual transoral approach. In 2014, Wang *et al.*<sup>6</sup> were the first to report the transoral vestibular approach endoscopic thyroidectomy (TOVET) in humans.

TOVET is less invasive in creating a dissection space, with less pain, a faster recovery, lower

morbidity outcome, and better cosmetic results achieved by invisible neck scars.<sup>7,8</sup> This study aims to evaluate the utilization of endoscopic vestibular approach in thyroid surgery for benign nodules.

## 2. Patients and methods

### 2.1. Patient enrollment

The ethical approval was obtained from the Al-Azhar University ethical committee.

This series was conducted on 15 patients with benign thyroid nodules subjected to thyroidectomy (hemi or total) at Al-Azhar University Hospitals and Al-Haram Specialized Hospital. Patients were submitted for thyroidectomy via the vestibular approach. All are concerned with scarless neck surgery and choose transoral thyroidectomy as the

Accepted 26 December 2023.  
Available online 14 March 2024

\* Corresponding author.  
E-mail address: [drelshiek@azhar.edu.eg](mailto:drelshiek@azhar.edu.eg) (A.E.-F. El Sheikh).

<https://doi.org/10.58675/2682-339X.2239>

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preferred one. All patients were evaluated preoperatively for routine assessment, thyroid ultrasound, and fine-needle aspiration cytology (FNAC) from the concerning thyroid lesion.

The patient criteria for inclusion in the study: age more than 18 years, no suspicion of malignancy based on FNAC, goiter or nodules less than or equals 5 cm in diameter, patients must have no history of previous neck surgery or neck irradiation.

Patients with at least one of the following conditions were considered ineligible for the study: patients with a previous history of neck surgery or neck irradiation, patients who have suspicious thyroid nodules for malignancy, based on FNAC, patients who have a history of hypocalcemia, and patients with toxic goiter. All patients consented to the procedure and accepted to participate in the study.

The main surgical outcomes were recorded: visual identification of recurrent laryngeal nerves (RLN) and parathyroid glands, conversion to an open surgical procedure, and postoperative hospital stay. Assessment of postoperative complications includes transient or permanent hoarseness of voice, incidence of surgical emphysema, hypocalcemia (temporary or permanent), skin or intraoral hypoesthesia or paresthesia, postoperative hematoma or seroma collection, reoperation for hemorrhage, and surgical site infection.

Patients have been tested for hypocalcemia preoperatively and on postoperative days 1 and 30. All patients with postoperative calcium level below the lower limit of the normal range (8.2–10.6 mg/dl) will be considered as having hypocalcemia.

## 2.2. Surgical technique

Under general anesthesia, the patient is placed supine with the neck extended. The mouth is prepared with 0.05% chlorhexidine, and the patient is given a broad-spectrum antibiotic. Using three

laparoscopic ports through the oral vestibule, one 10 mm central camera port, and two 5 mm lateral working ports (Fig. 1 a). Care must be taken to prevent the incision for the working port from extending beyond the canines to avoid direct injury to mental nerves. We preferred blunt dissection during the raising of subplatysmal neck flaps, helped by hydrodissection (after local injection of 20 ml solution of 1 mg adrenaline diluted with 300 ml normal saline). We used carbon dioxide for insufflation at a pressure of 14 mmHg.

The primary surgeon stands at the patient's head facing the monitor. The first assistant stands to the patient's left. Keeping the borders of dissection are as following: the larynx as the superior border, the suprasternal notch as the inferior border, and the anteromedial borders of the sternocleidomastoid muscles bilaterally as lateral borders. Strap muscles are divided at the midline. Holding the strap muscles by external sutures helps widen the working space, and gives better visualization and instrumentation. First, the thyroid isthmus is divided. Superior thyroid vessels are sealed as close as possible to the thyroid gland. In all cases, the superior laryngeal nerve, RLN, and parathyroid glands are identified and preserved. The thyroid specimen is freed from the trachea and is retrieved in an Endobag. The operative bed is irrigated with saline and the suction drain is inserted from the neck. Strap muscles are approximated with 2–0 absorbable sutures. The vestibular wounds are closed with an absorbable 3-0 suture. Fig. 1 b shows the healed oral vestibular wound two weeks postoperatively.

## 3. Results

Between December 2020 and February 2023, 15 patients (one male and 14 females) were operated on for TOVET (12 cases for hemithyroidectomy and three cases for total thyroidectomy) at Sayed Galal

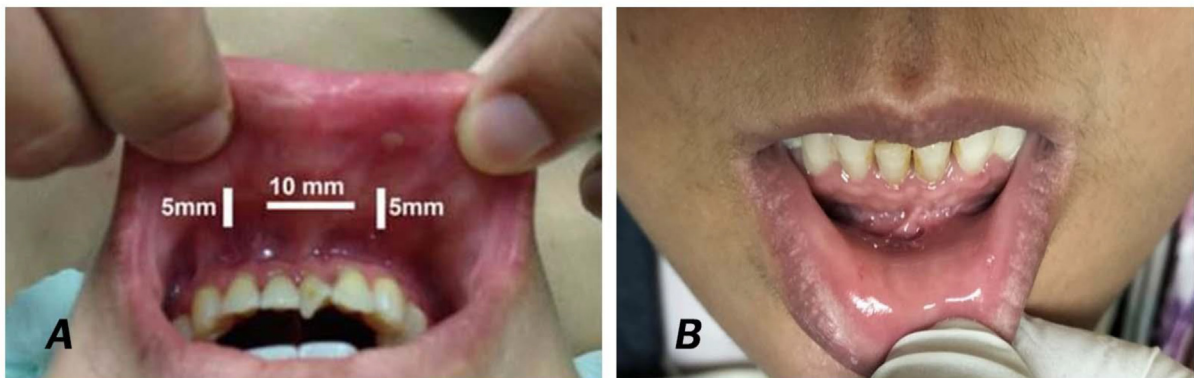


Fig. 1. (a) The designed surgical approach through oral vestibule, (b) the oral vestibular wound after healing (2 weeks postoperatively).

Table 1. Clinicopathological data and surgical outcomes.

Patients	Age	Sex	Operation	Operation time	Hospital stay	Complications	Pathology
1	28	F	Lobectomy	125	2	–	Adenomatoid nodule
2	33	F	Lobectomy	120	5	Surgical emphysema	Adenomatoid nodule
3	35	F	Lobectomy	115	2	–	Adenomatoid nodule
4	32	F	Lobectomy	110	2	–	Adenomatoid nodule
5	41	F	Lobectomy	125	2	Mental nerve numbness	Adenomatoid nodule
6	27	F	Lobectomy	110	2	–	Adenomatoid nodule
7	25	F	Total Thyroidectomy	150	4	Surgical emphysema	MNG
8	32	F	Lobectomy	115	3	–	Adenomatoid nodule
9	26	F	Lobectomy	130	2	Flaps hematoma	Adenomatoid nodule
10	28	F	Total thyroidectomy	165	3	–	MNG
11	32	M	Lobectomy	110	3	–	Adenomatoid nodule
12	33	F	Lobectomy	110	3	Mental nerve numbness	Adenomatoid nodule
13	26	F	Total thyroidectomy	155	4	–	MNG
14	41	F	Lobectomy	125	2	–	Adenomatoid nodule
15	33	F	Lobectomy	115	2	–	Adenomatoid nodule

F, female; M, male; MNG, multinodular goiter.

Hospital and Al-Haram Specialized Hospital. All patients underwent subsequent regular follow-up for at least 6 months. All cases have been completed endoscopically except one case converted to a minicervical incision for specimen retrieval after the complete endoscopic dissection. None of the patients was reported with RLN injury, either temporary or permanent. None of the patients reported hypocalcemic symptoms, regardless of the type of operation (hemithyroidectomy or total thyroidectomy). Serum calcium (ionized and total) has not shown any significant change postoperatively.

Two patients have reported transient numbness on the mental nerve mucosal territory (one patient for 1 month and the other for 3 months) with complete recovery in both. Limited surgical emphysema was observed in two patients (on the lower neck and upper part of the anterior chest wall), both were managed conservatively with complete recovery in the first week. Mild facial and mental area edema was observed in five patients, which subsided gradually within a week postoperatively. Flap hematoma was detected in one patient and managed conservatively. Table 1 shows the clinicopathological data of the patients and complication outcomes.

#### 4. Discussion

TOVET is becoming a popular surgical approach owing to its good safety profile, relatively short-learning curve, and superior cosmetic outcome.<sup>9</sup> The quality of life parameters (include physical activity, psychosocial impairment, swallowing impairment, and psychosocial impairment) in TOVET group is significantly better than in the conventional surgery group.<sup>10,11</sup> Although this series was directed to the application of TOVET in

benign nodular goiter, this technique was applied successfully for malignant thyroid nodules, central and lateral cervical nodal dissection related to thyroid malignancies, and Grave's disease.<sup>12–14</sup>

As TOVET is a challenging technique in terms of surgical access and dissection, the conversion to open thyroidectomy is expected. In a review of 15 TOVET series, the conversion to open thyroidectomy was reported as 1.3%.<sup>15</sup> In our series, all cases have been completed endoscopically except one case converted to a mini-cervical incision for specimen retrieval after the complete endoscopic dissection. Notably, the patient selection and the surgical experience are important in defining the rate of conversion.

TOVET is associated with longer operative time, for total thyroidectomy and lobectomy compared with open thyroidectomy.<sup>12,16</sup> The median operative time in this series is 132 min for total thyroidectomy. This is in line with the average operative time reported in other series.

Hospital stay was longer in TOVET patients than in those who underwent open thyroidectomy.<sup>12,17</sup> Most of our patients were discharged on day 2 postoperatively and after removal of the suction drain. One patient was discharged on day 5 to follow neck and upper chest area surgical emphysema.

There is a controversy between TOVET and open thyroidectomy in regard the postoperative pain. While some studies reported less postoperative pain in TOVET group,<sup>11,18</sup> others showed no significant difference in postoperative pain outcome.<sup>10</sup>

The cut-off point of the size of goiter that is eligible for TOVET is controversial. In a series of 200 TOVET cases, Anuwong *et al.*<sup>19</sup> reported excision of thyroid tumors as large as 10 cm. However, they recommended the 6–8 cm tumor size as the upper

limit. In a single case of this series in which the conversion into a minicervical incision was necessary for retrieval of the specimen, the lesion was 5 cm. We may attribute this difference to surgical experience and advancement of learning curve. The specimen retrieval may be helped by the extension of the central incision to 3 cm and the ‘push and pull technique’ of the specimen.<sup>19</sup>

Many complications that occur during endoscopic thyroidectomy are unprecedented in open thyroidectomy, such as carbon dioxide embolism, mental nerve injury, drooling, and skin flap perforation.<sup>19,20</sup>

In this small series, we did not encounter RLN injury or postoperative hypocalcemia. In all patients, we easily identified RLN and meticulously dissected it from the specimen. A systematic review of 16 TOVET studies by Camenzuli *et al.*<sup>15</sup> concluded the incidence of RLN injury to be 4.3%, and the incidence of postoperative hypocalcemia was 7.4%. Another systematic review reported no significant difference between TOVET groups and open thyroidectomy groups in the incidence of RLN injury, and temporary or permanent hypocalcemia.<sup>16</sup>

#### 4.1. Conclusion

TOVET is a safe and feasible approach for lobectomy and thyroidectomy. It provides higher satisfaction after surgery in esthetic, short-term and long-term outcomes than conventional open technique. Tumor size is important in the decision regarding considering the approach.

#### Conflicts of interest

There are no conflicts of interest.

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