

Safety and effectiveness of transoral endoscopic thyroidectomy vestibular approach (TOETVA) for benign thyroid tumors: A cross-sectional descriptive study

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ABSTRACT

Background: Transoral endoscopic thyroidectomy vestibular approach (TOETVA) has emerged as a minimally invasive surgical technique that offers excellent cosmetic results by avoiding visible neck scars. However, evidence on its safety, effectiveness, and feasibility in clinical practice, particularly in Vietnam, remains limited. This study aimed to evaluate the clinical outcomes, surgical safety, and feasibility of TOETVA for the treatment of benign thyroid tumors. **Materials and methods:** This was a descriptive cross-sectional study on 100 patients who underwent TOETVA between June 2023 and June 2024. Patients were selected based on preoperative diagnoses of benign thyroid nodules confirmed by ultrasound and fine-needle aspiration cytology. Data collected included patient demographics, clinical and paraclinical characteristics, surgical procedures, operative time, postoperative histopathology, complications, and recovery outcomes. **Results:** The study included 100 patients, with a mean age of 37.4 ± 9.2 years; 88% were female. The mean nodule size was 22.1 ± 8.5 mm, with 69% of patients having a single nodule. Lobectomy was performed in 97% of cases, and total thyroidectomy in 3%. The mean operative time was 92.1 ± 10.4 minutes for lobectomy and 125 ± 7.1 minutes for total thyroidectomy. Postoperative histopathology confirmed benign lesions in 96% of cases. The complication rate was low, with one case (1%) of postoperative bleeding and one case (1%) of infection; no permanent complications were recorded. The average hospital stay was 5.4 ± 1.8 days. **Conclusion:** TOETVA can be a safe, feasible, and cosmetically favorable surgical technique for the management of benign thyroid tumors.

Keywords: Benign thyroid tumor, cosmetic outcomes, minimally invasive surgery, transoral endoscopic thyroidectomy (TOETVA), thyroid nodule

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INTRODUCTION

Thyroid diseases, particularly thyroid nodules, are becoming increasingly prevalent worldwide, with a noticeable trend toward affecting younger populations. Along with the rising incidence, the demand for surgical techniques that prioritize both clinical efficacy and cosmetic outcomes has

also grown. Traditional open thyroidectomy, while effective, often leaves visible neck scars, which can negatively impact patients' quality of life, particularly in young and female patients.

To address these cosmetic concerns, various minimally invasive approaches have been developed. Among them, endoscopic thyroidectomy techniques, such as the

bilateral axillo-breast approach (BABA) and the transoral approaches, have gained significant attention. However, many early endoscopic methods still required external incisions, leaving some degree of visible scarring [1].

Since 2008, natural orifice transluminal endoscopic surgery (NOTES) has been introduced for thyroid surgery, enabling scar-free procedures by accessing the thyroid through natural orifices such as the oral cavity. Among these, the transoral endoscopic thyroidectomy vestibular approach (TOETVA), pioneered by Anuwong in 2016, has emerged as a safe, feasible, and cosmetically superior alternative. TOETVA allows complete endoscopic thyroid resection without external scars, offering significant psychological and aesthetic benefits to patients, particularly those concerned with postoperative appearance [2,3].

Several international studies have demonstrated that TOETVA offers comparable oncological outcomes to conventional open thyroidectomy, with additional advantages of reduced postoperative pain, faster recovery times, and higher patient satisfaction. In Vietnam, preliminary experiences reported by authors such as Le Van Quang have also confirmed the feasibility, safety, and excellent cosmetic outcomes of TOETVA for both benign and malignant thyroid diseases [4-6].

However, successful application of TOETVA requires careful patient selection, advanced surgical skills, and experience with endoscopic techniques to minimize complications such as recurrent laryngeal nerve injury, mental nerve injury, and postoperative infections. This study aimed to evaluate the clinical outcomes, surgical safety, and feasibility of the transoral

endoscopic thyroidectomy vestibular approach (TOETVA) for the treatment of benign thyroid tumors. Through this research, we aim to contribute further evidence supporting TOETVA as a safe, effective, and cosmetically advantageous alternative to conventional open thyroidectomy for the management of benign thyroid disease.

MATERIALS AND METHOD

Study design and subjects

This was a descriptive cross-sectional study conducted at the Department of Surgical Oncology, Viet Tiep Friendship Hospital, Hai Phong, Vietnam, from June 2023 to June 2024. The study enrolled 100 patients diagnosed with benign thyroid nodules who underwent transoral endoscopic thyroidectomy via the vestibular approach (TOETVA) during the study period.

Inclusion criteria

- Patients with thyroid nodules preoperatively diagnosed as benign based on cervical ultrasound and fine-needle aspiration cytology (FNAC).
- Thyroid nodule size less than 6 cm and thyroid lobe size less than 10 cm.

Exclusion criteria

- Patients diagnosed with thyroid carcinoma.
- Nodules exceeding the specified size limits.
- History of prior neck surgery or radiotherapy.
- Presence of acute systemic or cervical infections.
- General contraindications to surgery or general anesthesia.

Surgical procedure

All patients underwent TOETVA performed by experienced endocrine surgeons. The procedure involved three incisions within the oral vestibule to insert endoscopic

instruments, with complete endoscopic dissection and resection of the thyroid gland or lobes as indicated. Central neck dissection was performed when clinically indicated.

Data collection

Collected data included patient demographics (age, gender, history of thyroid disease), clinical characteristics, ultrasound findings (nodule size, number, and TIRADS classification), type of surgery

performed, operative time, intraoperative and postoperative complications, histopathological results, and postoperative hospital stay.

Descriptive statistics were used to summarize the data. Continuous variables were presented as mean \pm standard deviation (SD), while categorical variables were expressed as frequencies and percentages.

RESULTS

Patient characteristics

A total of 100 patients were included in the study. The mean age was 37.4 ± 9.2 years, ranging from 14 to 65 years. The majority of the patients were female (88%) and 12% were male. Regarding thyroid disease history, 75% had a known history of thyroid nodules, while 33% had no prior thyroid-related conditions. Hyperthyroidism was present in 2% of the patients, and no cases of hypothyroidism were recorded.

Ultrasound findings

The mean nodule size was 22.1 ± 8.5 mm (range: 10–45 mm). Most patients had a single nodule (69%), while 31% presented with multiple nodules. According to the TIRADS classification, the highest TIRADS scores observed were: TIRADS 2 in 8 patients, TIRADS 3 in 63 patients, TIRADS 4 in 23 patients, and TIRADS 5 in 6 patients (Table 1).

Table 1. Ultrasound findings

Characteristics	No.
Nodule size (mm)	22.1 ± 8.5
Number of nodules	
Single nodule	69
Multiple nodules	31
Highest TIRADS score	
TIRADS 2	8
TIRADS 3	63
TIRADS 4	23
TIRADS 5	6

Surgical characteristics

Lobectomy was performed in 97% of cases, while total thyroidectomy was carried out in 3% of patients.

The mean operative times were:

- 92.1 ± 10.4 minutes for lobectomy
- 125 ± 7.1 minutes for total thyroidectomy

No intraoperative conversions to open surgery were required.

Postoperative outcomes

Histopathological analysis confirmed benign lesions in 96% of patients, while 4% were found to have malignant pathology postoperatively.

Postoperative complications were minimal:

- One case (1%) of postoperative bleeding, which was managed conservatively without reoperation.
- One case (1%) of surgical site infection, treated successfully with aspiration and antibiotics.
- No cases of postoperative hoarseness or limb paresthesia were recorded.

The average postoperative hospital stay was 5.4 ± 1.8 days (range: 3–8 days). No permanent complications were observed during the follow-up period (Table 2).

Table 2. *Surgical outcomes*

Outcomes	No. (%)
Postoperative histopathology	
Benign lesions	96 (96%)
Malignant lesions	4 (4%)
Complications	
Hoarseness	0 (0%)
Bleeding	1 (1%)
Infection	1 (1%)
Paresthesia	0 (0%)

DISCUSSION

Although our study supported TOETVA as a safe and effective method for treating benign thyroid nodules, additional research is needed to validate these findings in larger, more varied populations and to assess the long-term outcomes and quality of life for patients undergoing this minimally invasive procedure.

The mean operative time for lobectomy in our study was 92.1 ± 10.4 minutes, which was shorter than the operative times reported by Fernandez (149 ± 40.0 minutes) [7]. These differences in surgical duration can be attributed to improvements in surgical technique, especially the adoption of minimally invasive approaches such as TOETVA (transoral endoscopic thyroidectomy vestibular approach). The learning curve associated with this technique has decreased over time as surgeons have

gained more experience, leading to shorter operative times and less invasive procedures. Moreover, the use of advanced endoscopic equipment, along with refined surgical strategies, has likely contributed to the reduction in operating time.

Our study also noted no intraoperative complications, including no cases of recurrent laryngeal nerve injury, which are common concerns in thyroid surgery. This can likely be attributed to the superior visualization provided by the endoscopic approach, which allows for a more precise dissection of the thyroid gland and its surrounding structures. The ability to visualize the surgical field in greater detail may reduce the risk of damaging critical structures such as the recurrent laryngeal nerve. Postoperatively, we observed a minimal rate of complications, with only one case (1%) of surgical site infection, which was successfully managed conservatively

with aspiration and antibiotics. This low complication rate is consistent with the findings of other studies employing minimally invasive thyroidectomy techniques, which generally report fewer postoperative complications compared to traditional open thyroidectomy. The reduced trauma to the surrounding tissues, shorter hospital stays, and faster recovery times associated with TOETVA have been well-documented in the literature and align with our findings [8].

The study had several limitations. The sample size was relatively small, and larger multicenter studies with more diverse populations are needed to confirm our findings. The lack of long-term follow-up prevents assessment of the durability of surgical outcomes, recurrence, and thyroid function. The study focused only on benign thyroid nodules, limiting the applicability to patients with malignant nodules. The retrospective design also introduces potential selection bias, and a prospective, randomized controlled trial would provide stronger evidence of the efficacy and safety of TOETVA compared to traditional thyroidectomy methods.

CONCLUSION

While our study contributed to the growing body of evidence supporting TOETVA as a safe and effective technique for benign thyroid nodules, further research is required to confirm these findings in larger, more diverse populations, and to evaluate the long-term effectiveness and quality of life outcomes for patients undergoing this minimally invasive surgery.

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