

# AN OVERVIEW OF TRANSORAL ENDOSCOPIC THYROIDECTOMY VESTIBULAR APPROACH (TOETVA) FOR THYROID SURGERY

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## ABSTRACT

### INTRODUCTION

Transoral endoscopic thyroidectomy vestibular approach (TOETVA) is an innovative scarless thyroid surgery technique.

### AIMS & OBJECTIVES

This mini review aims to summarize the current status of TOETVA and evaluate evidence on its feasibility, safety, and patient-centered outcomes.

### OBSERVATIONS

Multiple studies have demonstrated TOETVA is safe and effective for thyroid lobectomy and total thyroidectomy in selected patients. It provides excellent cosmetic results compared to open surgery.

### DISCUSSION

TOETVA is still evolving and has limitations including technical difficulty and narrow patient criteria. Larger studies with long-term follow up can better establish its role.

### CONCLUSION

TOETVA is a promising new technique for scarless thyroid surgery, but requires further studies to determine long-term outcomes.

**KEY WORDS:** Thyroidectomy, Endoscopic surgery, Transoral surgical procedures, Minimally invasive surgical procedures

## INTRODUCTION

Thyroid surgery has transitioned from conventional open thyroidectomy to minimally invasive approaches over the past decades. Various remote-access endoscopic thyroidectomy techniques have been developed to avoid neck scars, including axillary, breast and transoral approaches [1,2]. Transoral endoscopic thyroidectomy vestibular approach (TOETVA) is one of the latest minimally invasive innovations in thyroid surgery first described in 2016 [3]. It uses the oral vestibule and floor of mouth mucosa as the access port for endoscopic thyroidectomy. This eliminates cervical scars altogether and is truly “scarless” thyroid surgery. TOETVA also avoids the extensive tissue dissection involved in other remote-access endoscopic techniques. This mini review provides an overview of the TOETVA technique, its current applications, feasibility, safety and patient-centered outcomes based on existing evidence.

## LITERATURE OVERVIEW

The TOETVA technique was first described by Anuwong in 2016 [3]. The initial series of 60 patients showed TOETVA was safe and effective for lobectomy and total thyroidectomy for small to moderate nodules [3]. The technique has since been adopted by thyroid surgeons globally and continues to evolve.

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TOETVA uses three circumferential mucosal incisions in the oral vestibule to create an access port [4]. The central port is the main 30-40mm incision through which the endoscope and instruments are introduced. Two additional 5mm ports allow insertion of retraction instruments [4]. Following tunnel creation and insufflation, a 30° endoscope and articulating instruments are used to perform thyroid resection [5]. The resected specimen is extracted transorally. Intraoperative neuromonitoring is highly recommended during TOETVA [4].

Indications for TOETVA include benign thyroid nodules <5cm, indeterminate nodules, low-risk differentiated thyroid cancer ≤2cm without suspected lymph node metastases [5]. Relative contraindications are large goiters, Graves' disease, advanced malignancy, and prior neck surgery/irradiation [5]. TOETVA can be offered as an alternative to conventional open thyroidectomy for suitable patients who wish to avoid a neck scar.

Multiple case series from China, Thailand, Korea and India have demonstrated TOETVA is safe and effective when performed by experienced surgeons [4]. Operative time ranges 60-161 minutes for lobectomy, and 128-185 minutes for total thyroidectomy [4]. An international multicenter study of 339 cases reported average nodule size of 2.8cm, with 2.7% conversion rate and no permanent complications [6]. Systematic reviews have found TOETVA has acceptable outcomes compared to open thyroidectomy, with reduction in pain and better cosmetic satisfaction [7,8].

As TOETVA avoids strap muscle division, concerns were raised about adequacy of surgical resection and oncological safety. However, studies using intraoperative ultrasound during

TOETVA have confirmed complete thyroid resection is achievable for small tumors [10]. No locoregional recurrences were reported in a series of 61 papillary thyroid cancers over 40 months follow-up [10]. These results indicate TOETVA can achieve equivalent oncological outcomes to open thyroidectomy for low-risk cancers.

The main limitations of TOETVA are the technical difficulty and associated learning curve. The procedure requires advanced endoscopic skills which can be challenging even for experienced thyroid surgeons. A study analyzing the learning curve for TOETVA lobectomy found operative time stabilized after 20 cases [11]. Another limitation is good patient selection is crucial, as TOETVA is only suitable for small thyroid nodules without extensive lymph node disease. Despite this, large nodules up to 7cm have been resected by TOETVA in individual cases [12].

Patient-reported outcomes show TOETVA results in significantly less pain, greater cosmetic satisfaction, and improved quality of life compared to conventional thyroidectomy [13,14]. Patients also return to work and normal diet earlier after TOETVA [14]. These benefits highlight the significant advantages of TOETVA over open surgery from a patient perspective.

## **DISCUSSION**

TOETVA is still a relatively new technique which has rapidly gained popularity for scarless thyroid surgery. Current evidence from multiple case series and systematic reviews indicate TOETVA is safe and effective when performed by surgeons proficient in endoscopic techniques [4,6-8]. TOETVA can achieve equivalent oncological outcomes to open thyroidectomy for small, low-risk cancers [10]. It results in less pain, quicker recovery and greater patient satisfaction

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compared to open surgery [13,14].

However, larger studies with long-term follow-up are still needed to definitively establish the role of TOETVA. There is a lack of high-quality randomized controlled trials comparing TOETVA to other minimal access or open techniques. Surgeons' learning curve and training for TOETVA also warrants further evaluation [11]. Other limitations like narrow surgical space and two-dimensional views need to be overcome with improved instrumentation [15].

Ongoing innovations like addition of robotics may expand the applications of TOETVA and compensate for the limitations of human performance [15]. Other emerging modifications include using a sublingual approach or combining TOETVA with axillary access to enable thyroidectomy for larger goitres [16].

In summary, TOETVA is a promising new technique that provides a truly scarless option for thyroid surgery. It has proven short-term feasibility but long-term data is still lacking. TOETVA technology and techniques continue to progress rapidly. Further studies should focus on multi-center experiences, randomized trials, long-term oncological outcomes and cost-effectiveness analysis. TOETVA currently requires advanced surgical skills and its potential for wider adoption remains to be determined. Further advances addressing limitations like surgical space may expand its feasibility and safety.

## CONCLUSION

TOETVA is a novel scarless technique for thyroid surgery that continues to evolve. Further studies are warranted to establish long-term outcomes.

## Future Prospects

Future advances in TOETVA technology may

increase its applications and address current limitations. Improved 3D visualization systems and flexible endoscopic instruments with articulation could help overcome the narrow surgical space. Robot-assisted TOETVA is also being explored to enhance precision and ergonomics. TOETVA may be combined with other remote-access techniques like axillary thyroidectomy for larger resection volumes. Long-term studies should evaluate outcomes like voice, swallowing, and recurrent laryngeal nerve function. TOETVA also needs to be compared with other minimal access thyroidectomy techniques through high-quality randomized controlled trials.

## DECLARATION

Ethics approval and consent to participate: The study doesn't require ethical clearance as it's a review article

Availability of data and material: The datasets during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

**Author's contribution:** VMS is the major contributor in writing the manuscript. KR participated in editing and interpretation along with VMS.

**Competing interests:** The authors declare that they have no competing interests

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