Transoral endoscopic thyroidectomy vestibular approach performed at the Hospital Central del Estado de Chihuahua

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ABSTRACT

Objective: To make a comparison between the transoral endoscopic thyroidectomy vestibular approach (TOETVA) and the conventional open approach of thyroidectomies performed at the Hospital Central del Estado de Chihuahua.
Materials and methods: A retrospective study was carried out on 10 patients who underwent total or partial thyroidectomies using either an endoscopic technique or conventional open surgery between March 2018 and March 2019. The study included variables such as patient demographics (age and body mass index [BMI]), indications for surgery (tumor size by ultrasound), surgical history and comorbidities, surgical time (in hours for both open and endoscopic procedures), number of conversions required, length of hospital stay, histopathological results from intraoperative and definitive biopsies, and immediate and late postoperative complications specific to both procedures. During the TOETVA, the patients were positioned supine under general anesthesia, with their necks hyperextended. The oral cavity was disinfected with hypochlorite and a horizontal incision of 1.5 to 2.0 cm was made at the frenulum, followed by dissection through the avascular space to the superior thyroid pole.
Results: The patients were female, with a mean age of 46 years; 50 % of them underwent open surgery, while the other 50 % underwent endoscopic surgery. The surgical time of the transoral approach averaged 1.2 hours, compared to 1.5 hours for the open approach. A postsurgical complication in the open surgery group included hypocalcemia due to parathyroid gland injury. In the endoscopic surgery group, two procedures required conversion to open surgery because both patients experienced intraoperative hemorrhage.
Conclusions: The TOETVA procedure is associated with lower frequency of postoperative pain, is safe and has the advantage of not leaving a visible scar. However, further studies with larger samples are recommended to clearly establish the advantages of this procedure.

Keywords: Thyroidectomy; Hypocalcemia; Thyroid Nodule (Source: MeSH NLM).

INTRODUCTION

Currently, face and neck surgery has taken a new direction with the aim of performing minimally invasive procedures that reduce visible scarring. Procedures such as conventional thyroidectomy were often a concern for patients due to its aesthetic impact, which led to the development of transoral approach, a technique that leaves no visible scars [1].

The transoral endoscopic thyroidectomy vestibular approach (TOETVA) is a minimally invasive technique used to treat thyroid disorders. This procedure seeks to reduce the aesthetic complications commonly associated with conventional open surgery. Initially conceptualized in 2002 through cadaver studies, the first clinical trials testing this technique were reported in 2014 [2,3]. In Mexico, it was introduced in 2017 [4]. Since then, the technique has been proposed, introduced and adopted in several countries, including Thailand, South Korea, India, China, Singapore, Taiwan, the United States, Mexico, Japan, Ecuador and Italy [3,18,27-30].

The TOETVA has demonstrated its safety and feasibility, offering a reasonable surgical duration and minimal postoperative pain [16]. Furthermore, endoscopic thyroid procedures have contributed to advancements in surgical techniques that improve perioperative quality of life: minimally invasive cervical incisions, video-assisted methods and extracervical approaches all contribute to a smoother postoperative recovery and enhanced aesthetics [18-26].

The discovery of a thyroid nodule is one of the primary indications for a total or partial thyroidectomy, since it helps establish a diagnosis and informs subsequent management [5]. The TOETVA is recommended for patients with specific indications, including tumor size, comorbidities, age, history of neck surgeries, among

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others [5]. Adequate patient selection is critical to reducing the risk of conversion to open surgery due to preventable intraoperative complications, as well as ensuring the adequate choice of laparoscopic approach [6]. There are several laparoscopic approaches: vestibular, axillary and retroauricular. The latter two result in larger and more visible scars, making the vestibular transoral approach more commonly preferred, yielding favorable outcomes in terms of scar concealment. Additionally, this technique offers better visualization of the anatomy, ensuring no damage to critical structures during the procedure (as long as it is performed by a skilled surgical team), since it eliminates the need to expose other critical structures such as the esophagus and carotid arteries [7].

Hemorrhage is one of the most common intraoperative complications of the vestibular approach, posing a significant risk of conversion to open surgery. Other complications, though less frequent, are injury to the recurrent laryngeal nerve (RLN) and the superior laryngeal nerve (SLN) [8]. The most frequent postoperative complications include transient or permanent RLN paralysis, hypocalcemia, hematoma or seroma formation (collections that commonly occur due to extensive tissue dissection) and subcutaneous emphysema, which typically appears within the first hours after surgery (a known complication from CO_2 insufflation to create an air-filled cavity, usually resolving within 48 hours) [8,9]. The risk of conversion to open surgery arises from the limited space created despite CO_2 insufflation at low pressure for air-filled cavity formation, along with the difficulty in visualizing anatomical structures. However, previous studies show a low rate of conversion and intra- and postoperative complications, which are linked to the surgeon's experience and expertise [1,5,10]. In this regard, it is generally agreed that performing 10 to 12 endoscopic procedures is necessary to reach an optimal learning curve, allowing surgeons to master the technique, improve postoperative outcomes, reduce conversion rates and minimize complications [11]. Preoperative care should encompass neck imaging studies (ultrasound), laryngoscopy and dental assessments, as comprehensive management of the patient prior to surgery can help prevent complications. Postoperative care involves a 5- to 7-day course of antibiotics; follow-up by the surgeon, endocrinologist and anesthesiologist; voice monitoring; and massage of the lower lip, chin and neck to reduce soft tissue collections [12].

The objective of this study was to review partial and total thyroidectomies performed at the Hospital Central del Estado de Chihuahua, describe the vestibular approach surgical technique and compare it with the conventional open approach. The study also aimed to evaluate the postoperative outcomes, potential intraoperative complications and the results to determine the most effective treatment option for patients undergoing thyroidectomy, considering aesthetic, surgical and pathological factors.

MATERIALS AND METHODS

Study design and population

This observational, retrospective, case series study included 10 patients who underwent total or partial thyroidectomies using either an endoscopic technique or conventional open surgery between March 2018 and March 2019 at the Hospital Central del Estado de Chihuahua.

Variables and measurements

The study included variables such as patient demographics (age and body mass index [BMI]), indications for surgery (tumor size by ultrasound), surgical history and comorbidities, surgical time (in hours for both open and endoscopic procedures), number of conversions required, length of hospital stay (HS), histopathological results from intraoperative and definitive biopsies, and immediate and late postoperative complications specific to both procedures. During the TOETVA, the patients were positioned supine under general anesthesia, with their necks hyperextended. The oral cavity was disinfected with hypochlorite, and a horizontal incision measuring 1.5 to 2.0 cm was placed at the frenulum to insert a 10-mm trocar. Two additional lateral incisions were made for 5-mm trocars, which were infiltrated with saline and epinephrine 1:400:00, and a Veress needle was also used. The cavity was then insufflated with CO_2 at 5 to 6 mmHg. The procedure proceeded with dissection through the avascular space to the superior thyroid pole, incision of the superior thyroid vessels, and hemostasis while preserving the SLN. The thyroid was then retracted medially, the middle and inferior vessels were incised, an endobag was introduced, and a specimen was collected through the central trocar. If needed, the specimen is sent for intraoperative biopsy; otherwise, the same approach is applied to the contralateral side. Dissection in endoscopic surgery was performed using LigaSure technology and Maryland dissection forceps.

Statistical analysis

The sample consisted of 10 female patients with a mean age of 46 years and a mean BMI of 32.4. Five patients (50 %) underwent open surgery, while the other five (50 %) underwent transoral endoscopic surgery. The mean surgical time for the open surgery was 1.5 hours, compared to 1.2 hours for the endoscopic surgery, a difference not statistically significant. HS averaged 5.4 days for the open surgery group and 2 days for the endoscopic group (Table 1).

Table 1. Comparison between surgical procedures

	Open surgery	Endoscopic surgery
Gender (female)	5	5
Mean age (years)	46	46
Mean BMI	32.4	32.4
Number of patients	5 (50.00 %)	5 (50.00 %)
Surgical time (hours)	1.5	1.2
Length of HS (days)	5.4	2
Intraoperative complications	0	2
Postoperative complications	1	1
Conversion to open surgery		2
Postoperative pain	4	2

Ethical considerations

The authors confirm adherence to their institution's protocols for the publication of patient data. Furthermore, this study was approved by the ethics committee for the analysis and publication of routinely collected clinical data.

RESULTS

In the open surgery group, a postsurgical complication was observed: hypocalcemia due to parathyroid gland injury. In the endoscopic surgery group, two procedures were converted to open surgeries due to intraoperative hemorrhage. One patient in the endoscopic group developed a seroma, which was subsequently managed with drainage. Three total thyroidectomies, four right hemithyroidectomies and three left hemithyroidectomies were performed. The most common histopathological findings included adenomatous lesions and papillary carcinoma (Table 2).

Table 2. Histopathological findings of each procedure

Open surgery	Patients (*n*)	Endoscopic surgery	Patients (*n*)
Follicular inflammation	1	Thyroid adenoma	1
Adenomatous lesion	1	Adenomatous lesion	1
Follicular carcinoma	1	Papillary carcinoma	1
Papillary carcinoma	1	No results	2
No results	1		

DISCUSSION

The transoral approach has shown significant advancements in recent times, as well as excellent aesthetic results. Anuwong et al. reported that the TOETVA enables surgeons to offer this surgical alternative to patients meeting the criteria for its indication, highlighting its aesthetic advantages over those provided by conventional open surgery [1]. Traditional open thyroidectomy typically leaves a prominent scar on the anterior cervical region, which is a particular concern, especially among young women [17].

In the present study, patients who underwent the endoscopic procedure with no conversion to open surgery expressed satisfaction with the aesthetic results, as no visible scars were observed. Similarly, in the study by Tae et al., which compared robotic and endoscopic techniques, most participants were satisfied with the procedure's outcome [13].

Our research also analyzed surgical time. Studies comparing the vestibular and open approaches have consistently exhibited shorter surgical times for the endoscopic procedure. In a cohort study, Russell et al. found a mean surgical time of 188 minutes for the TOETVA [14], while Tae et al. observed a mean surgical time of 172 minutes [13]. Anuwong et al. reported a mean duration of 60 minutes in their review of 425 patients undergoing this procedure [1]. Additionally, Sun et al. reported a mean surgical time of 148 minutes in their cohort of 100 patients undergoing transoral endoscopic surgery [15]. In the present review, the average surgical time for the endoscopic approach was 1.2 hours. Based on the findings of Anuwong et al., we consider our surgical time falls within acceptable ranges [1].

Wang et al. conducted a study where the TOETVA was applied to 24 patients, whose average HS was five days [2]. In contrast, the meta-analysis performed by Chen et al. in 2018 in China reported an average HS of two to four days [8]. In the present study, the average HS was two days, which aligns with the results of previous studies. Navarra et al. in Italy found that initiating diet on the first postoperative day, allowing ambulation four hours after discharge from recovery, and applying a compression bandage within the first 12 to 24 hours were effective strategies for reducing HS, which also had a direct positive impact on the patient's financial burden [12].

An important finding in the literature is the specific criteria to select candidates for the endoscopic procedure. Zhang et al. outlined the requirements for patients wishing to undergo a TOETVA. These include uncomplicated thyroid nodule, no obesity, no excessively short neck, an American Society of Anesthesiologists (ASA) classification 1, no contraindications to nasotracheal intubation, and a preoperative laryngeal examination [5]. In our study, patients were carefully screened to avoid potential complications related to obesity.

Upon comparing the procedures, complications were identified, including postoperative seroma formation—managed with drainage—and intraoperative bleeding, which required conversion to open surgery in two cases. In the study by Chen et al., the TOETVA was associated with complications, such as longer surgical time, extended HS and injury to the RLN. However, Chen et al. also noted no significant differences between the TOETVA and the open approach regarding other complications such as intraoperative bleeding, hypocalcemia and seroma formation [8]. Notably, in our study, none of the patients experienced RLN injury, prolonged surgical or HS times or respiratory difficulties related to CO_2 insufflation into the surgical cavity. Additionally, while Bakkar et al. reported that all five patients in their study developed subcutaneous emphysema due to CO_2 application, this complication was not observed in our cohort [9].

This case series highlights that, when comparing the procedures performed at the Hospital Central del Estado de Chihuahua, in Mexico, with those conducted in hospitals in the United States, China and Italy, similar characteristics were observed in terms of surgical time, HS and types of complications. This suggests that the TOETVA is a viable option for implementation, provided that patient selection adheres to the specific indications for the procedure.

In conclusion, the TOETVA is associated with lower frequency of postoperative pain, is safe and has the advantage of not leaving a visible scar. The main limitation of this study was the sample size, as it was conducted in a single-center setting. Thus, it would be beneficial to conduct a comparative study with a larger sample size, along with more comprehensive documentation and follow-up.

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