



ORIGINAL ARTICLE

Transoral endoscopic thyroidectomy vestibular approach: initial experience and comparison with conventional thyroid surgery

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Abstract

Introduction: Recent interest of physicians and patients to prevent scars in the neck in thyroid surgery has fostered the development of several remote access techniques in recent decades. Among the various techniques developed, transoral endoscopic thyroidectomy vestibular approach (TOETVA) has shown to be a safe alternative, in selected cases, to conventional thyroidectomy. **Objective:** This study aimed to evaluate the results of TOETVA in patients with thyroid nodules and compare them with those in patients undergoing conventional thyroidectomy. **Methods:** Retrospective cohort study comparing 31 patients submitted to endoscopic versus 30 conventional thyroidectomies, regarding operative time, complications and pain scale. **Results:** Thirty-one cases of TOETVA were compared with 30 conventional thyroidectomies conducted in the same period in a tertiary care center. Similar complication rates were observed in both groups, with shorter operative time for endoscopic surgery compared with that of traditional access. **Conclusion:** TOETVA can be safely performed in selected cases, with similar complication rates, and shorter operative time compared with conventional thyroidectomy.

Keywords: thyroid neoplasms; thyroidectomy; thyroid nodules.

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Introduction

Thyroidectomies are among the most widely performed surgical procedures nowadays due to the high prevalence of nodules and malignant neoplasms of the thyroid gland¹. The better understanding of the biological behavior of thyroid neoplasms has led to changes in the treatment paradigm, with less extensive surgeries where the excellent oncological results are maintained. With the improvement in the quality of life of treated patients, we observed an increasing demand for accesses that would prevent scarring in the anterior neck region. Although numerous remote access techniques have been described in Asia in recent decades, few of them have gained strength

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in the West. In addition, it is worth noting that the surgical technique of thyroidectomy has barely developed in the past century.

Transoral endoscopic thyroidectomy vestibular approach (TOETVA) was first described in humans in Asia by Wang et al.² in 2013, demonstrating that it is a safe procedure with satisfactory cosmetic results, leaving no scars in the neck. In 2015, Anuwong published a series of 60 cases of TOETVA, with low complication rates, similar to those of conventional surgery, showing that it is indeed a safe procedure³. From this publication, TOETVA has gained followers in Europe⁴ and the Americas^{5,6}, being considered an option in selected cases (thyroid lobe <10 cm in its largest diameter, ≤4 cm nodules, and absence of cervical metastases) and, especially, in patients motivated to avoid a scar in the anterior cervical region. It is an endoscopic surgical procedure that uses materials from laparoscopic surgeries and requires a relatively short learning curve for professionals, even for those with no experience in videolaparoscopy⁶.

In the present study, we show our initial experience of the first 31 TOETVA surgeries with the largest case series reported in Brazil to date.

Methods

The study sample was composed of 31 patients who underwent the TOETVA procedure between January and October 2019 at the Head and Neck surgery department of the Cancer Institute Arnaldo Vieira de Carvalho, São Paulo, Brazil, a tertiary referral hospital for cancer treatment in the city of São Paulo.

Patients with indication for surgical treatment signed a Free and Informed Consent Form (FICF) that detailed indications, risks, most frequent complications for each surgical modality, as well as the advantages and disadvantages of each procedure. It was up to the patient to choose between conventional thyroidectomy with cervical incision or TOETVA. Thus, all patients referred to TOETVA accepted and were motivated to undergo this procedure.

The study was approved by the Research Ethics Committee of the Cancer Institute Arnaldo Vieira de Carvalho (CAAE 24363619.6.0000.5471). As inclusion criteria for performing TOETVA, patients should present ≤2 cm thyroid nodules with classification IV, V or VI, with a caudal skull diameter of the thyroid lobe <10 cm, in addition to absence of clinical and imaging exams for signs of lymph node metastasis, either in the central or lateral compartment of the neck. In addition, patients selected for such access should present motivation in avoiding scarring in the anterior neck region. Exclusion criteria comprised presence of >2 cm nodules, lymph nodes suspected of metastasis, or refusal to perform such procedure.

The patients undergoing TOETVA were operated by a single major surgeon (RDC), while other surgeons in the department and their residents assumed this role in the conventional thyroidectomy group.

A control group was created with 30 patients undergoing conventional open thyroidectomy. The selected cases were conducted in the same period as that of the patients submitted to TOETVA. For both groups, epidemiological data on sex and age, operative time in minutes, length of procedure, peri- and

post-operative complications after 30 and 60 days (vocal fold paralysis and hypoparathyroidism), and postoperative pain after 14 days using the Visual Analogue Scale (VAS) were collected. Association between the technique used and the variables collected was verified using contingency tables, and statistical significance was assessed using the Chi-squared test, or the Fisher's exact test when applicable. Comparison of the averages of the pain scale was calculated using the Student's *t*-test. Values of $p < 0.05$ were considered statistically significant.

Surgical description

Patients are placed in the supine position with a pad in the subscapular region, with slight cervical extension. The neck remains exposed up to below the sternal furcula. The oral cavity is prepared with aqueous chlorhexidine solution.

An incision of approximately 1 cm is made in the midline of the oral vestibule just above the labial frenulum using a scalpel, followed by electrocautery dissection to divide the submucosa of the musculature until close to the edge of the mandible, without exposing the cortical bone. Two 5 mm transversal incisions are made close to the labial commissure to avoid damage to the mental nerve (Figure 1). After the incisions, blunt dissection of the subplatysmal plane is performed, using Hegar candles, up to the sternal furcula, followed by one 11 mm central and two 5 mm lateral trocar insertions and insufflation with CO₂ with pressure maintained at 6 mmHg, with a flow of 15 mmHg, to obtain a working space.



Figure 1. Marking of vestibular incisions for insertion of ports.

A 30° laparoscopic optical system is inserted into the 10 mm trocar and two dissection clamps are inserted into the 5 mm lateral trocars. After preparing the workspace, dissection occurs similarly to that in the conventional access, with visualization and opening of the pre-thyroid musculature through the median raphe.

After identification of the thyroid gland, thyroidectomy is initiated by sectioning the isthmus, followed by identification and dissection of the upper pole, with ligation of the vessels with the aid of a power clamp (harmonic scalpel). The upper and lower parathyroid glands are easily identified, probably due to the magnification provided by the endoscopic material. The same is true of both recurrent laryngeal nerves (Figure 2). Care should be taken when using the harmonic scalpel during manipulation near the entrance of the recurrent laryngeal nerves. Thyroid lobes are removed through the central incision using an appropriate endoscopic pouch.

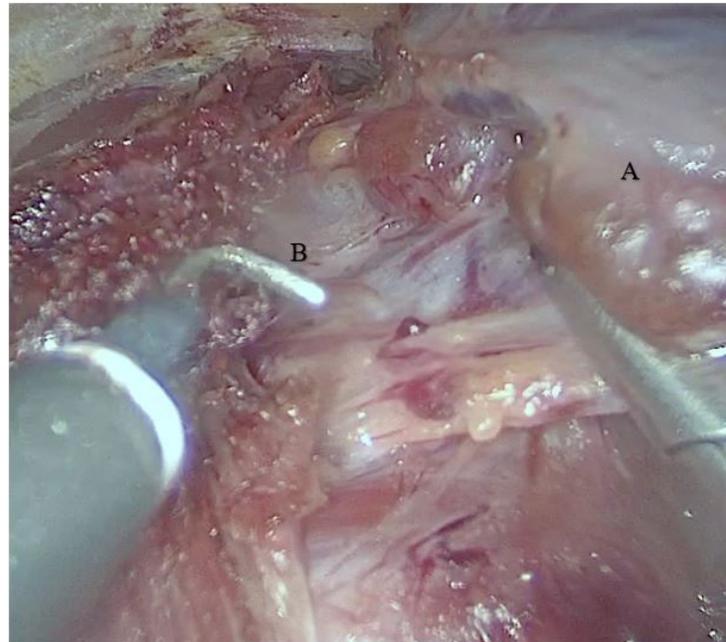


Figure 2. Visualization of the operative field, with signaling of the left lobe of the thyroid (A) and recurrent laryngeal nerve being stimulated (B).

Results

Sixty-one patients were evaluated in this study: 30 undergoing partial thyroidectomy (control group) and 31 undergoing TOETVA (case group). Thirty-five lobectomies and 26 total thyroidectomies were performed, with lobectomies performed in the majority of patients undergoing TOETVA (22-71%) and total thyroidectomy performed in most of those undergoing conventional thyroidectomy (17-56.7%) ($p=0.02$) (Table 1). The average time for conventional thyroidectomies was 133.83 min, while the average time for endoscopic surgeries was 83.45 min ($p=0.01$). A progressive decrease in the procedure duration was observed over time in both groups (Figure 3).

As for the complications observed in both groups, hematomas that should require surgical reintervention were not identified, nor were cases of TOETVA converted to transcervical access. There were also no cases of definitive vocal fold paralysis, or definitive hypoparathyroidism in the postoperative period of both groups. However, three cases of transient vocal fold paralysis were observed in TOETVA, with all cases showing complete recovery within

Table 1. Surgery extension according to access employed.

Variable	TOETVA (%)	Conventional (%)	<i>p</i>
Surgery extension			
Lobectomy	22 (71%)	13 (43.3%)	0.02
Total thyroidectomy	9 (29%)	17 (56.7%)	

TOETVA = Transoral endoscopic thyroidectomy vestibular approach.

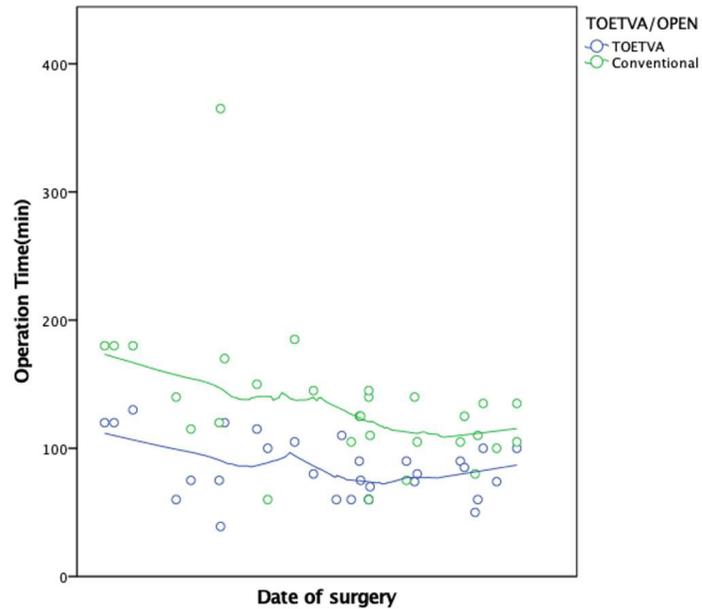


Figure 3. Operative time according to the access technique employed. TOETVA = Transoral endoscopic thyroidectomy vestibular approach.

30 days after the procedure, documented by direct laryngoscopy at follow-up. Two cases of transient unilateral vocal fold paralysis were also observed in cases of conventional thyroidectomy, both with favorable evolution after the 13th postoperative day. Symptoms of hypocalcemia in the first week after surgery were observed in one case in each group. Both cases evolved with complete remission of symptoms, with no need for calcium replacement 30 days after surgery. There was one case of infection in the thyroid site after TOETVA, requiring a 5 mm incision in the sternal furcula and placement of a Penrose drain, in addition to broad-spectrum antibiotic therapy. One case of surgical wound infection after conventional thyroidectomy was also verified, being treated with antibiotics and local care, with no need for a new approach. (Table 2).

In the endoscopic thyroidectomy group, unusual events were observed in conventional thyroidectomies, such as ecchymosis and even a burn area in the anterior cervical region, probably caused by the use of harmonic scissors to create the workspace. Postoperative pain reported 14 days after surgery using the VAS scale was significantly greater in the TOETVA group (3.58) than in the conventional thyroidectomy group (2.53) (Table 2).

Table 2. Distribution of complications according to access used for thyroidectomy.

Complications	TOETVA (%)	Conventional (%)	
Bruise	0 (0%)	0 (0%)	0.74
Transient VF paralysis	3 (9.7%)	2 (6.7%)	0.51
Definitive VF paralysis	0 (0%)	0 (0%)	0.74
Transient hypoparathyroidism	1 (3.2%)	1 (3.3%)	0.74
Definitive hypoparathyroidism	0 (0%)	0 (0%)	0.74
Infection	1 (3.2%)	1 (3.3%)	0.74
Postoperative pain (VAS)	3.58	2.53	0.01

TOETVA = Transoral endoscopic thyroidectomy vestibular approach; VF = Vocal fold; VAS = Visual analogue scale.

Discussion

Thyroidectomy is considered a safe procedure, with low complication rates. Technologies such as intraoperative monitoring and use of hemostatic agents have been incorporated into this procedure, providing it with greater safety; however, few innovations in the surgical technique *per se* have been presented. Remote access thyroidectomy techniques have been introduced in the past few decades, and have been spread mainly in Asia^{2,3,7,8}. TOETVA was first described in 2008 by Witzel et al.⁹, after studying cadavers and pigs. The first series described in humans by Wang et al.² dates from 2013, being compared to the periareolar Bilateral Axillo-breast Approach (BABA), with no reported complications. In 2015, Anuwong³ reported the largest series till then, with 60 operated cases, and complication rates similar to those of conventional thyroidectomy. Their study assisted with spreading the technique throughout Europe and the Americas, and in 2017¹⁰ they published the largest case series (n=200), with transient hypoparathyroidism rates of 5%, transient vocal fold paralysis of 3.3%, and only one case of hematoma. No further complications were reported, and the technique was considered by the authors as feasible and safe, with complication rates similar to those of conventional thyroidectomy. Razavi et al.⁶ defined in a prospective study that the learning curve for the procedure is 11 cases, a relatively small number, considering in their study that the surgeon had no experience in this surgery and laparoscopic materials. The same authors reported the possibility of re-approaching the neck for a complementary thyroidectomy, without difficulties. The largest series reported to date consists of 425 patients, in which comparison between the results of conventional thyroidectomy and TOETVA showed that the latter presented longer operative time and lower rate of postoperative pain. The other complications, such as hypocalcemia, transient or permanent lesion of the recurrent laryngeal nerve, comparatively did not present higher rates in relation to the conventional access¹⁰. Patients have reported a high degree of satisfaction with this procedure, both from the aesthetic and functional points of view, returning to their usual activities earlier^{3,7,10,11}. Another advantage observed is the low complexity of the procedure, with a learning curve of 11 cases⁶. As it is a transoral procedure, there is fear of greater risk of infection in TOETVA cases. However, in a

systematic review published by Chen et al.¹², only one study, conducted by Yang et al.⁸, showed a case of infection, with no major implications for the patient. Still, the use of antibiotic therapy is recommended for five to seven days after discharge.

In our series, which is the largest reported in Brazil so far, with 31 cases, we did not observe cases of hypoparathyroidism or definitive vocal fold paralysis. There were three cases of transient vocal fold paralysis, with complete mobility improvement documented in a direct laryngoscopy exam 30 days after the procedure. We did not observe a higher rate of vocal fold paralysis in TOETVA compared with that of conventional surgery. Advanced ultrasound and bipolar scissors were used to perform TOETVA, and all cases that evolved to vocal fold paralysis occurred in patients submitted to advanced bipolar electrocautery dissection. Operative time ranged from 45 to 187 min (Figure 3), showing an acceptable time for surgery performance, even shorter than that of conventional thyroidectomy. The fact that a single surgeon, previously qualified and trained for this procedure (RDC), performed all endoscopic thyroidectomies, while conventional thyroidectomies were performed by resident doctors under supervision, can explain this difference in time between the procedure modalities.

As this is a new procedure, with a surgical technique different from that of conventional surgery, new peri- and post-operative complications may arise. One case of postoperative infection after TOETVA was observed, with an abscess restricted to the thyroid bed, requiring transcervical drainage with a 5 mm incision and placement of a Penrose drain, in addition to broad-spectrum antibiotic therapy, and interestingly the patient reported not having used the antibiotic prescribed after hospital discharge. However, a case of wound infection was observed in the postoperative period of conventional total thyroidectomy within the same cohort, with treatment restricted to antibiotic therapy, but with no the need for readmission for drainage. In two cases of TOETVA, small burns in the anterior cervical region were observed, which were associated with the heat transmitted by the use of harmonic scissors and by the light of the laparoscopic optical system. Both lesions healed properly within 14 days after the procedure, with satisfactory aesthetic results. Bruises and chin paresthesia were also observed, with complete resolution of symptoms within two weeks after the procedure. It is worth mentioning that the aforementioned complications (infection, burns, and bruises/hematomas) appeared in the first 20 operated cases. No complications of this nature were reported in the 11 subsequent cases. We believe that, as with any surgical technique, with increased experience, we are able to identify and predict pitfalls and, consequently, plan strategies for an increasingly safe procedure.

Antibiotics were used therapeutically for 7 days after hospital discharge in cases of TOETVA, and the antibiotic used was Amoxicillin/Clavulanate. In cases of conventional thyroidectomy, postoperative antibiotic therapy was not prescribed.

For postoperative analgesia, weak analgesic and non-steroidal anti-inflammatory cases and controls were also used. Greater complaint of postoperative pain was verified in patients undergoing TOETVA; however, despite the statistically significant difference, it did not change the degree of pain intensity in the

VAS scale, and there was no need to introduce opioids to control analgesia in any of the cases.

As limitations to this study, we highlight that it is a retrospective analysis conducted with a still small number of cases and paired controls. The cases that were referred to TOETVA were selected, as it was an initial experience. Therefore, patients undergoing the endoscopic procedure had small nodules, normal volume thyroid, and nodules located in a lower portion of the gland, which did not occur in the control group. In addition, the fact that endoscopic surgeries were performed by a single surgeon trained in TOETVA (RDC), whereas conventional thyroidectomies were performed by residents under training with the supervision of assistant surgeons (because the Cancer Institute Arnaldo Vieira de Carvalho is a training center), can generate a selection bias, if we consider the complication rate and the differences in operative time.

Conclusion

Transoral endoscopic thyroidectomy vestibular approach (TOETVA) is a feasible and safe procedure with excellent cosmetic and functional results and an alternative, in selected cases, to treat nodules and neoplasms of the thyroid gland.

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