

Patient and Surgeon Candidacy for Transoral Endoscopic Thyroid Surgery

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Invited Review 

Abstract

The transoral thyroidectomy (TT) is a feasible novel surgical procedure that does not need visible incisions, a truly cutaneous scar-free surgery. Inclusion criteria are (a) patients who have a ultrasonographically (US) estimated thyroid diameter not larger than 10 cm, (b) US estimated gland volume ≤ 45 mL, (c) nodule size ≤ 50 mm, (d) a benign tumor, such as a thyroid cyst, single-nodular goiter, or multinodular goiter, (e) follicular neoplasm, and (f) papillary microcarcinoma without evidence of metastasis. The procedure is carried out through a three-port technique placed at the

oral vestibule; one 10-mm port for a 30° endoscope and two additional 5-mm ports for dissecting and coagulating instruments. CO₂ insufflation pressure is set at 6 mmHg. An anterior cervical subplatysmal space is created from the oral vestibule down to the sternal notch, laterally to the sternocleidomastoid muscle medial edges. TT is done fully endoscopically using conventional endoscopic instruments.

Keywords: Transoral endoscopic thyroidectomy, patient and surgeon candidacy, vestibular approach, learning curve

Introduction

Transoral thyroid surgery represents the new frontier in this subset of endocrine surgery. Aesthetic results have a more important role day by day and the request for scar-less surgery or natural orifice transluminal endoscopic surgery (NOTES) is increasing.

Technical advantages

The transoral endoscopic thyroidectomy by vestibular approach (TOETVA) seems to show a greater feasibility related to a limited complication rate compared to the other approaches such as Mini-Invasive Video-Assisted Thyroidectomy (MIVAT) and retroauricular, axillary or bilateral axillo-breast approach (BABA) which are still in use and the abandoned sublingual approach. Particularly, this technique allows a cranio-caudal gland removal as well as a close and bilateral access to the anterior neck structures, minimizing the extent of dissection and post-operative pain (1-10).

Indications

Currently, TOETVA inclusion criteria are the following: i) imaging findings such as an overall gland diameter ≤ 10 cm, a thyroid volume ≤ 45 mL, a dominant nodule not larger than 50 mm; ii) benign uni- or multinodular goiter, and cytologically suspicious lesions assessed as Bethesda category 3 or 4; iii) malignant lesions namely papillary microcarcinoma (diameter ≥ 1 cm) with no clinico-radiological evidence of local or distant spread; iii) patient preference to get better aesthetic clinical outcomes. Patients for which is not recommended TOETVA are those affected by: i) poorly differentiated or undifferentiated neoplasms, with or without extrathyroidal posterior extension; ii) nodal metastases; iii) wide goiter and Grave's disease (11, 12).

Patient and surgeon candidacy

The correct patient and surgeon candidacy for TOETVA procedure is essential (Table 1-4). To achieve an optimal learning curve, it is advisable to start with a "simple" patient, e.g. a female with regular neck length and normal weight (body

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Table 1. How to choose the TOETVA patient for the beginner?

- Uncomplicated thyroid nodule*
- No obesity or not too short neck
- ASA 1
- No contraindication for nasotracheal intubation
- Preoperative laryngeal examination
- Right hand surgeon should start operate with right thyroid nodule
- Right lobectomy, female

*Uncomplicated thyroid nodule: Not too small and not too big, 3 cm nodule is appropriate: (a) easy to see endoscopically; (b) It isn't difficult to dissect; (c) It isn't too hard to handle when you look for the recurrent laryngeal nerve; (d) It isn't too complicated to put the nodule into the endobag and remove from the vestibule. Furthermore, proper location of nodule: (a) Not too low (near the suprasternal notch); (b) Not too high (upper pole dissection); (c) It should be not too deep (posterior lobe), not adhere carotid sheath, hide underneath muscles or difficult to palpate

Table 2. Male TOETVA patient is more challenging

- **Chin to neck region step**
- Be careful, more robust tissues
- **Laryngeal prominence/thyroid cartilage**
- Larger in adult men
- Interferes with vision
- Interferes with instrumentation

Table 3. Left TOETVA more challenging

- Right hand surgeon
- Instruments interbreed
- (Male patient) laryngeal prominence

Table 4. Transoral thyroid surgeon

General surgeon

- Wide experience in open thyroid surgery
- Training in endoscopic thyroidectomy
- Familiarity in laparoscopy (retroperitoneal)

Head and Neck surgeon

- Wide experience in open thyroid surgery
- Training in endoscopic thyroidectomy
- Familiarity in endoscopy (sinus surgery)

mass index comprised between 18.5 to 25), without co-morbidities (American Society of Anesthesiologists or ASA score equal to 1), with no contraindications to nasotracheal intubation or preoperative laryngeal abnormalities. For the surgeons, a right-handed surgeon should start operating a right thyroid nodule, somewhat beginning with a right lobectomy to avoid instruments interbreeding which can occur on the left. At the end of the learning process, it is also possible to carry out the procedure bilaterally, keeping the gland intact or more commonly dividing it into two specimens following the gland isthmus section (13-21).

The first to report a large series (i.e. 60 patients) of patients treated by TOETVA was Anuwong (22) in 2016. More recently, in a high-volume endocrine surgery center, the central nodal dissection of the neck has also been reported (23-25). This patient population expansion is also due to the introduction into the surgical practice of intraoperative intermittent or continuous neuromonitoring (26, 27).

Operative steps of TOETVA

The operative approach expect the patient in supine position, nasotracheally intubated with nerve monitoring tube, and with a suitable eyelid closure to prevent postoperative chemical conjunctivitis. To place the trocars we first make three incisions in the oral vestibule, a broader transversal anteriorly (about 1 cm) to the lower lip frenulum for the 10 mm-trocar and two smaller longitudinal, for two 5 mm-trocars, laterally and on both sides to the point where the mental nerve emerges, approximately before the 4th tooth, on the left and on the right from the midline respectively (Figure 1a). The latter two trocars are thus positioned laterally to prevent the risk of mental nerve injuries and to allow a greater range of movement of surgical instruments. By means of a hydrodissection, done with a Verres needle and using about 60-70 mL of physiologic serum, we create a subplatysmal space, subsequently enlarged in both sides by a specific vascular tunneler. Overcoming the chin is a crucial, since the dissection plane must be deep enough not to cause skin retraction or risk skin perforation. After having positioned the three trocars, the 10mm-trocar for the 0-30° endoscopic optics managed by the assistant and two 5mm-trocars for grasping and coagulating instruments used by the first surgeon, a CO₂-insufflation is delivered in order to obtain a constant pressure of six mmHg in the operating space. Additionally, by means of three non-resorbable stitches and an appropriate traction on the flap, a wider surgical field is maintained. At the end of the monolateral or bilateral procedure, a careful control of parathyroid glands integrity and hemostasis is performed. Finally a post-dissection functional verification of recurrent laryngeal nerve (RLN) and vagus nerve, by means of a percutaneous intraoperative neuromonitoring probe is carried out. For bilateral procedures, a pre-dissection evaluation, as early as possible, is always mandatory to avoid a bilateral nerve injury. In fact, in the event of a significant reduction or loss of the neuromonitoring signal, it is strongly forbidden to dissect the contralateral side. In this case, a completion thyroidectomy will be made afterwards in a second surgical intervention, so-called stage-thyroidectomy (11). To extract the operative specimen, inserted into an endobag, the median incision is used, pulling gently with circular movements. Then we proceed to the suture of the mucous incisions with resorbable stitches (Figure 1b) (11, 28).

Postoperative management and follow-up

In the post-operative course of TOETVA, patients leave their bed after the 4th hour and feed in the day of surgery; moreover, this technique does not require any dressing, but only the use of non-alcoholic mouthwash for 5-7 days, three times a day. An oral antibiotic-therapy is recommended for at least five days. Specific transient sequelae, that generally resolves spontaneously, may occur, as cervical bruise, mild emphysema, or slight paresthesia.

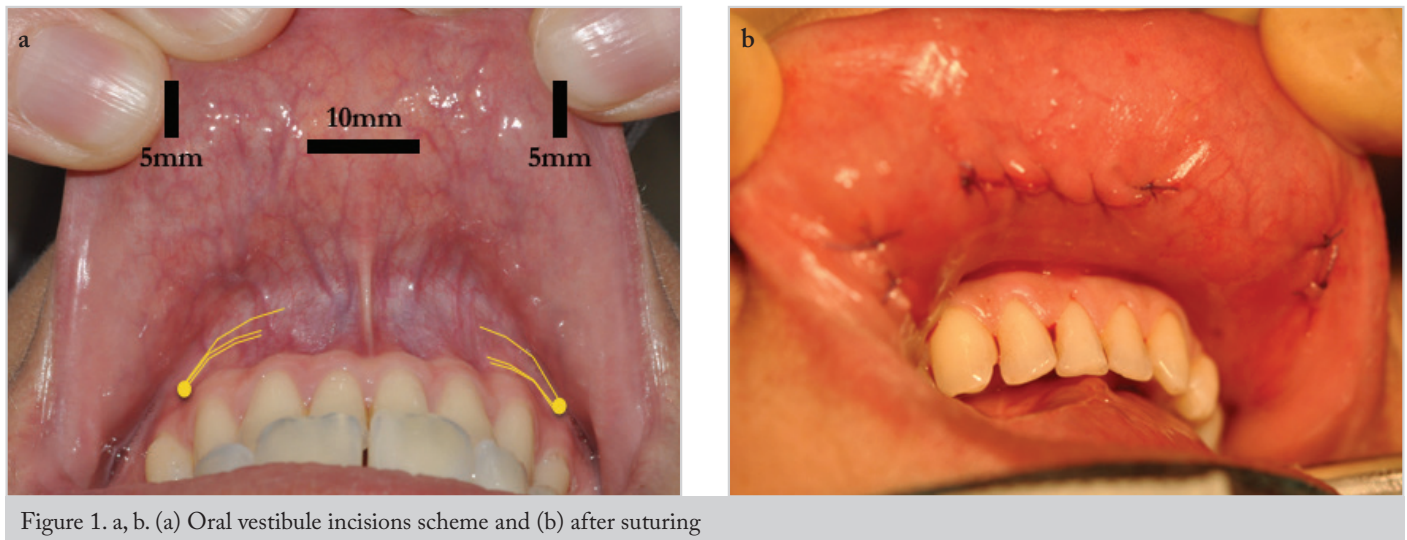


Figure 1. a, b. (a) Oral vestibule incisions scheme and (b) after suturing

Complication rates

Post-operative sequelae of TOETVA such as RLN injuries and hypoparathyroidism are similar in rates when compared with open procedures. Bleeding despite is a rare, but life-threatening complication (11). The eventual urgent evacuation of the compressive hematoma following TOETVA, imposes a longer time than the open technique having to create cervical access ex novo. After a first unilateral TOETVA procedure, an endoscopic thyroidectomy of completion is not recommended and the traditional technique is preferable (11).

Discussion and Conclusion

Firstly, Gagner (29) in 1996 described the thyroid surgery performed by a minimally invasive approach. Later, many other endoscopic techniques, some of which are still in use today were described and applied in order to improve the aesthetic results (considering the high visibility of a scar in the anterior region of the neck) and reduce tissue dissection, bleeding, post-operative pain and hospital stay (1-4). By default, minimally invasive surgery of the thyroid includes all endoscopic standardisable procedures that minimize or eliminate visible scars, reduce the distance between the surgical access and the gland, allow an image magnification such as to prevent vascular or neural damage by means of an early identification of these structures of the neck.

Some of these techniques, as BABA or axilla technique, require rather remote access and cause extensive tunneling flap dissection, increasing the risk of instrumental interferences and complications such as extensive areas of paresthesia (3, 4).

Transoral endoscopic thyroidectomy by vestibular approach provides a midline approach with a close access to the gland resulting in a smaller flap dissection, a better cranio-caudal perspective for gland removal, and less surgical instrumental difficulties, and its learning curve could be shorter than other minimally invasive techniques (13, 16, 18).

It is evident that it is necessary to begin this surgery with non-complex patients, i.e. non-obese, with necks not too short, without any comorbidities or laryngeal abnormalities, affected

by thyroid benign pathologies and with dominant nodules not too large (11, 21).

It is also recommended, for right-handed surgeons that it is appropriate to begin with the dissection of right nodules so as not to be hindered by the problem of the interweaving of the instruments, which occurs specifically for the left side dissections (12).

Transoral endoscopic thyroidectomy by vestibular approach represents a safe approach and is very appreciated by the patients. Among the transoral endoscopic thyroidectomies it guarantees better cosmetic outcomes, keeping a low complication rate like the standard open procedure. Specific training is needed to acquire good dexterity.

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