

Transoral endoscopic thyroidectomy vestibular approach (TOETVA): a novel option in the treatment of pediatric patients

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ABSTRACT

Introduction. Thyroid surgery has increased in the pediatric population. One of the main issues following this surgery is the presence of a neck scar, which has been reported to have an impact on quality of life. Transoral endoscopic thyroidectomy is used in adult patients with good results, but there are few reports on the use of this technique in pediatrics.

Clinical case. 17-year-old female patient diagnosed with toxic nodular goiter. As a result of the patient's refusal to undergo conventional surgery due to the scar, transoral endoscopic lobectomy was carried out. The surgical technique used will be described.

Discussion. In order to prevent the psychological and social impact of neck scars in children, and given the results published on the use of this technique in pediatrics, transoral endoscopic thyroidectomy stands as an alternative to conventional thyroidectomy in adequately selected patients eager to avoid neck scars.

KEY WORDS: Thyroidectomy; Pediatrics; Minimally invasive surgical procedures.

TIROIDECTOMÍA TRANSORAL ENDOSCÓPICA CON ABORDAJE VESTIBULAR (TOETVA): UNA NUEVA OPCIÓN PARA EL TRATAMIENTO DE PACIENTES PEDIÁTRICOS

RESUMEN

Introducción. La cirugía tiroidea ha aumentado en la edad pediátrica, y uno de los problemas luego de esta cirugía es la presencia de una cicatriz cervical, que se reportó como causa de alteración en la calidad de vida. La tiroidectomía transoral endoscópica se utiliza en pacientes adultos con buenos resultados, pero hay escasos reportes de la utilización de esta técnica en pediatría.

Caso clínico. Paciente femenina de 17 años con diagnóstico de bocio nodular tóxico. Ante la negativa de realizarse una cirugía convencional por la cicatriz, se realizó lobectomía transoral endoscópica. Se detalla la técnica quirúrgica.

Comentarios. Con el objetivo de prevenir alteraciones psico-sociales que pueden provocar las cicatrices cervicales en niños, y con

los resultados publicados sobre la utilización de esta técnica en pediatría, podemos decir que la tiroidectomía transoral endoscópica puede ser una alternativa a la tiroidectomía convencional en pacientes adecuadamente seleccionados que deseen evitar una cicatriz cervical.

PALABRAS CLAVE: Tiroidectomía; Pediatría; Procedimientos quirúrgicos mínimamente invasivos.

INTRODUCTION

Thyroid surgery has become more frequent in pediatric patients as a result of the increase in thyroid nodules and carcinomas. One of the main issues following this surgery is the presence of a neck scar, which has been reported to have an impact on quality of life⁽¹⁾. This has led to the development of minimally invasive techniques, such as video-assisted thyroidectomy or robotic thyroidectomy with axillary approach^(2,3), which do not leave neck scars. In the last years, transoral endoscopic thyroidectomy (TOETVA) has been used in adult patients with good results^(4,5). We present the case of a 17-year-old female patient who underwent transoral endoscopic thyroid lobectomy. The objective is to describe this technique in order to demonstrate its feasibility in the pediatric population.

CLINICAL CASE

17-year-old female patient presenting with a palpable neck nodule. A thyroid gland increased in size to the detriment of the left lobe, with an approximately 3 cm mobile nodule, was palpated. Lab tests were carried out to assess thyroid function, with hyperthyroidism being diagnosed: TSH: 0.20 uIU/ml (0.53-3.59 uIU/ml); T3: 119 ng/dl (58-185 ng/dl); T4: 8.3 ug/dl (4.3-13.3 ug/dl). The ultrasonography reported a 45 mm hypoechoic nodular image in the left lobe, with anechoic areas, mixed appearance, thin walls, regular margins, and type III flow (Fig. 1).

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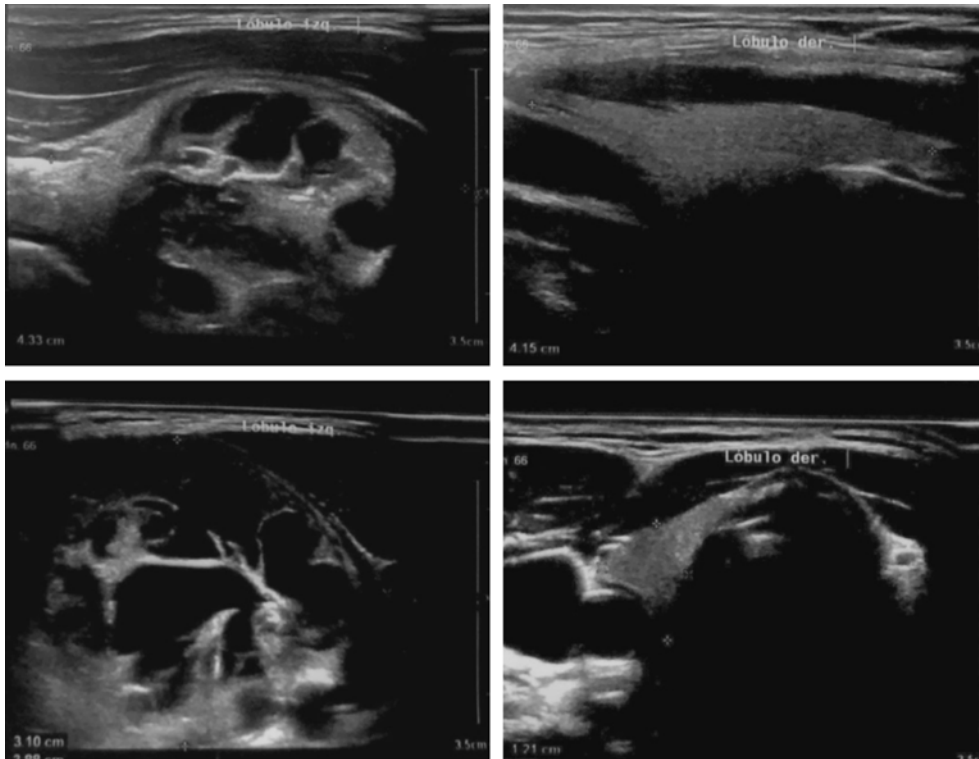


Figure 1. Ultrasonography showing a 45mm mixed nodule in the left lobe.

An aspiration puncture with a thin needle was performed. It revealed cytological findings compatible with nodular goiter, with cystic degeneration and signs of bleeding (Category II, Bethesda System). Finally, thyroid scintigraphy was conducted. It showed an increased uptake nodule in the left lobe, with inhibition of the remaining gland, compatible with Plummer syndrome.

The patient and her parents were informed of the indication of surgery, and given the refusal to undergo conventional surgery as a result of the neck scar, transoral endoscopic thyroidectomy (TOET) was proposed. The procedure, risks, and potential complications were explained, and once the informed consent had been achieved, the surgery was carried out.

SURGICAL TECHNIQUE

As a preoperative assessment, a direct laryngoscopy was carried out to evaluate the mobility of the vocal cords, which was preserved. Antiseptic rinsing 3 times a day for a total of 3 days was also indicated.

Patient and surgical room preparation

Orotracheal intubation with a tube for intraoperative monitorization of the recurrent nerve is carried out. Subscapular enhancement is placed for neck hyperextension purposes. The surgical tower is placed at the feet of the patient, the surgeon is placed at the head level, the first

assistant holding the scope is placed to the left, and the second assistant is placed to the right (Fig. 2).

Antibiotic prophylaxis with ampicillin/sulbactam is used in the anesthetic induction. Basic laparoscopic instruments are used, namely one 10 mm port, two 5 mm ports, two Maryland forceps, an aspirator, a clipper, and a 10 mm, 30-degree scope. In addition, energy instruments are employed for dissection and vascular sealing purposes.

Surgery

Surgery starts with the insertion of the first 10 mm port in the jugal mucosa, horizontal in the midline, above the end of the lower lip frenulum. Hydrodissection with 1% lidocaine solution is conducted, then with 0.5% lidocaine, and finally with saline solution. Initially, a 50/8 needle is used, and then progress is made with a Veress needle. Once the space has been dissected, the trajectory is dilated with Hegar bougies. The port is placed, and CO₂ is insufflated at 6 mmHg at a 12 l/min rate. The 5 mm ports are placed through lateral incisions within both commissures, with special caution being exercised not to damage the mental nerves. The trajectory should be lateral to the exit of the nerves at the jaw (Fig. 3).

A subplatysmal flap is first conducted with a harmonic scalpel, freeing the sternohyoid muscles. The midline is opened, and the adhesions of the sternohyoid muscles are dissected towards the gland and the sides. Sometimes, muscle insertions need to be totally or partially divided. Prolene® 2.0 extracorporeal stitches are then placed to

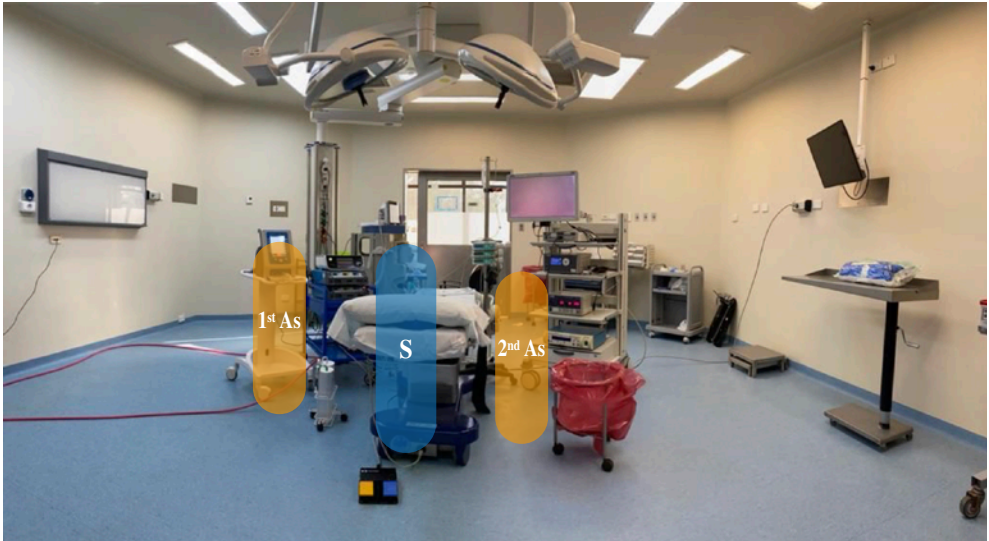


Figure 2. Operating room preparation and surgical team location (*S = surgeon; 1st As = first assistant; 2nd As = second assistant*).



Figure 3. Port and traction stitch placement, with the postoperative results.

retract the muscles to the side, thus allowing for better visualization.

Subsequently, the isthmus is divided with a harmonic scalpel, pursuing the dissection of the upper pole while identifying the upper laryngeal nerve. The upper parathyroid gland is identified and preserved, then dissected until the recurrent laryngeal nerve has been visualized at its entry into the larynx, which is confirmed with the neurostimulator (Fig. 4). In this technique, contrarily to the

conventional one, dissection is carried out from cephalad to caudal. The lower parathyroid gland is identified and preserved, and lobe freeing is completed by clipping and dividing the middle thyroid vein, with tracheal adhesions being freed.

The lobe is removed through the bag, and hemostasis is controlled, while leaving hemostatic material (Surgicel®) in the surgical bed. Port closure is carried out with Vicryl® stitches.

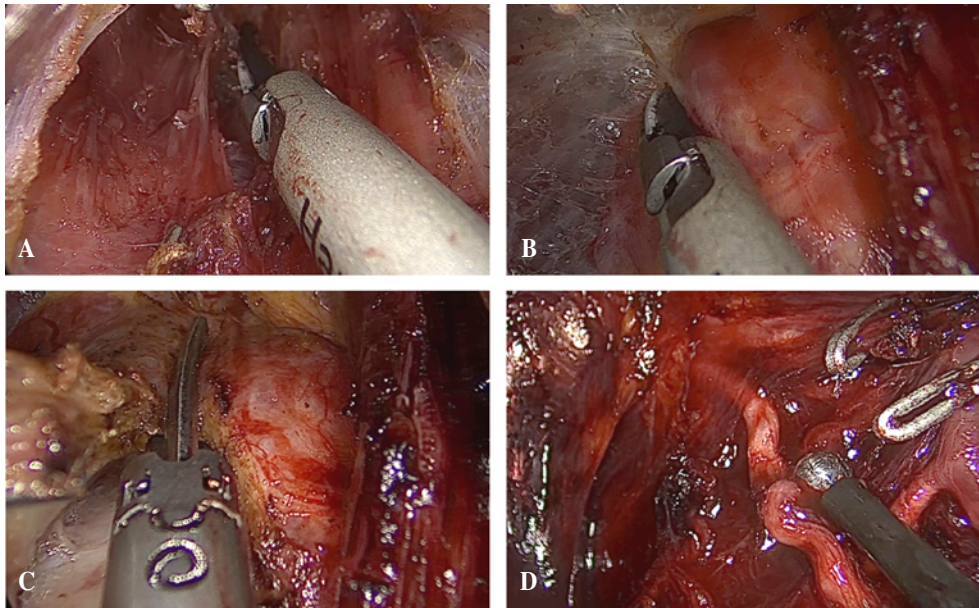


Figure 4. A) Midline opening with a harmonic scalpel. B) Dissection and lateral freeing of the left lobe. C) Isthmus division. D) Dissection and identification of the recurrent nerve with the help of the neurostimulator.

Postoperative period

Once the procedure has been completed, an adhesive elastic bandage is placed in the neck area for 24 hours, followed by an elastic chin rest to avoid edema for 24-48 hours.

The patient had no signs of respiratory impairment or dysphonia. She started oral nutrition 4 hours later, and she was discharged on postoperative day 1.

No complications were recorded, and the patient was highly satisfied with the cosmetic result. The pathological report revealed a follicular adenoma.

DISCUSSION

An increase in thyroid gland pathologies has been recently noted in pediatric patients, with the number of surgeries rising. According to the American Thyroid Association's guidelines, pediatric patients are those under 18 years of age⁽⁶⁾, and even though there are many similarities in terms of diagnosis and treatment with adult patients, certain particularities should be considered.

Some studies have assessed the impact of neck scars on pediatric patients, showing that patients with head and neck scars are more prone to depression, embarrassment, and loss of confidence in social situations, all of which could improve if scars were not visible⁽⁷⁾. In addition, hypertrophic scars have been described to have greater incidence in children⁽⁸⁾, which makes the situation even worse. The presence of neck scars has been demonstrated to make people look at them, but in patients undergoing TOET, there are no differences in terms of other people looking at the patients as compared to patients without surgeries⁽⁹⁾.

Pediatric patients undergoing thyroid carcinoma treatment have a much higher life expectancy than adult ones⁽¹⁰⁾, which means these scars may last for many years. In light of this, the efforts to avoid scars should not be considered purely cosmetic.

Various minimally invasive techniques, such as robotic surgery with axillary approach, have been developed for the treatment of thyroid pathologies while avoiding neck scars, but they are not widely used in pediatrics.

TOET has certain advantages over these alternatives, namely a shorter distance for dissection purposes with a nice exposure of the vital structures and an approach from the midline similar to that used in open surgery, as well as the fact it leaves no visible scars, since entrance is transoral⁽¹¹⁾. Additionally, it is a reproducible technique which does not require any specific laparoscopic or robotic training, with a reasonable learning curve.

After the first report on the use of this technique in humans in 2016⁽¹²⁾, this surgery has expanded globally and is currently used in multiple institutions, but it has not become popular in pediatric patients. It should be mentioned that TOETVA surgical teams should have extensive experience in conventional surgery, and training surgeries on cadavers are strongly recommended before conducting this procedure⁽¹³⁾. In addition, there are certain eligibility criteria when performing this technique – ≤ 10 cm gland diameter, Bethesda V-VI nodules up to 2 cm, Bethesda II-IV nodules up to 6 cm, hyperfunctioning nodules, benign lesions, and undetermined nodules⁽¹⁴⁾. Among the complications associated with this technique, mental nerve injury stands out as the most specific one. This may cause dysesthesia or discomfort as a result of lip biting due to loss of sensitivity. The injury is mostly transitory, with few cases

of permanent injury being reported. Regarding thyroidectomy complications, a multicenter study conducted in 48 pediatric patients with this technique showed no permanent complications such as recurrent nerve injury or hypocalcemia. Transitory hypocalcemia was observed in 33% of the patients undergoing total thyroidectomy, slightly higher than transitory hypocalcemia reports in adults. However, owing to the small number of patients (12), it should not be concluded that the risk is greater in pediatric patients⁽¹⁵⁾.

Even though this technique is most likely unfeasible in many cases of differentiated carcinoma –since they usually present with central or lateral lymphadenopathies at diagnosis–, a great number of patients could be eligible for this surgery, making the most of its benefits.

As a conclusion, TOET can be an alternative to conventional thyroidectomy in adequately selected pediatric patients eager to avoid neck scars.

REFERENCES

1. Choi Y, Lee JH, Kim YH, Lee YS, Chang HS, Park CS, et al. Impact of postthyroidectomy scar on the quality of life of thyroid cancer patients. *Ann Dermatol*. 2014; 26(6): 693-9.
2. Spinelli C, Donatini G, Berti P, Materazzi G, Costanzo S, Miccoli P. Minimally invasive video-assisted thyroidectomy in pediatric patients. *J Pediatr Surg*. 2008; 43(7): 1259-61.
3. Wu EL, Garstka ME, Kang SW, Kandil E. Robotic neck surgery in the pediatric population. *JSLS*. 2018; 22(3): e2018.00012.
4. Anuwong A, Ketwong K, Jitpratoom P, Sasanakietkul T, Duh QY. Safety and outcomes of the transoral endoscopic thyroidectomy vestibular approach. *JAMA Surg*. 2018; 153(1): 21-7.
5. Russell JO, Clark J, Noureldine SI, Anuwong A, Al Khadem MG, Yub Kim H, et al. Transoral thyroidectomy and parathyroidectomy - A North American series of robotic and endoscopic transoral approaches to the central neck. *Oral Oncol*. 2017; 71: 75-80.
6. Francis GL, Waguespack SG, Bauer AJ, Angelos P, Benvenega S, Cerutti JM, et al; American Thyroid Association Guidelines Task Force. Management guidelines for children with thyroid nodules and differentiated thyroid cancer. *Thyroid*. 2015; 25(7): 716-59.
7. Smith S, Eatough V, Smith J, Mihai R, Weaver A, Sadler GP. 'I know I'm not invincible': An interpretative phenomenological analysis of thyroid cancer in young people. *Br J Health Psychol*. 2018; 23(2): 352-70.
8. Le Touze A. Scars in pediatric patients. In: Téot L, Mustoe TA, Middelkoop E, Gauglitz GG, editors. *Textbook on scar management*. Springer, Cham. 2020. p. 397-404. Available from: https://link.springer.com/chapter/10.1007/978-3-030-44766-3_46
9. Juarez MC, Ishii L, Nellis JC, Bater K, Huynh PP, Fung N, et al. Objectively measuring social attention of thyroid neck scars and transoral surgery using eye tracking. *Laryngoscope*. 2019; 129(12): 2789-94.
10. Paulson VA, Rudzinski ER, Hawkins DS. Thyroid cancer in the pediatric population. *Genes (Basel)*. 2019; 10(9): 723.
11. Divarci E, Ulman H, Ozok G, Ozen S, Ozdemir M, Makay O. Transoral endoscopic thyroidectomy vestibular approach (TOETVA): A novel surgical technique for scarless thyroidectomy in pediatric surgery. *J Pediatr Surg*. 2022; 57(6): 1149-57.
12. Anuwong A. Transoral endoscopic thyroidectomy vestibular approach: A series of the first 60 human cases. *World J Surg*. 2016; 40(3): 491-7.
13. Razavi CR, Tufano RP, Russell JO. Starting a Transoral Thyroid and Parathyroid Surgery Program. *Curr Otorhinolaryngol Rep*. 2019; 7(3): 204-8.
14. Razavi CR, Russell JO. Indications and contraindications to transoral thyroidectomy. *Ann Thyroid*. 2017; 2(5): 12.
15. Cohen O, Tufano RP, Anuwong A, Russell JO, Assadi N, Dionigi G, et al. Trans-oral endoscopic thyroidectomy vestibular approach (TOETVA) for the pediatric population: a multicenter, large case series. *Surg Endosc*. 2022; 36(4): 2507-13.