

Endoscopic transoral parathyroidectomy: Initial experience

Luis-Mauricio Hurtado-López MD, PhD¹  | Sandra-Haydee Gutiérrez-Román MD, MSc¹ | Erich Basurto-Kuba MD¹ | Kuauhyama Luna-Ortiz MD²

¹Thyroid Clinic, General Surgery Service, Hospital General de México, Mexico City, Mexico

²Head and Neck Service, Instituto Nacional de Cancerología, Mexico City, Mexico

Correspondence

Luis-Mauricio Hurtado-López, Clínica de Tiroides, Servicio de Cirugía General, Hospital General de México Dr. Balmis 148, Torre Quirúrgica, CP 06726, Mexico City, Mexico.

Email: hurtado@clinicadetiroides.com.mx

Abstract

Background: We evaluate our initial experience of transoral vestibular approach parathyroidectomy (TOEPVA) for the treatment of primary hyperparathyroidism.

Methods: We conducted a prospective study of patients with single parathyroid adenoma, using TOEPVA to perform the parathyroidectomy. The variables we analyzed were size, volume, and location of the adenoma, bleeding, identification, and preservation of the recurrent laryngeal nerve, injury to the mental nerve, and the effective cure rate, using measures of central tendency.

Results: Our study included 21 women, with an average age of 43 years. The recurrent laryngeal nerve and mental nerve suffered no permanent damage, the average size of the adenoma was 26.6 mm, and a volume of 3.95 mL. We were able to identify the adenoma and cure the hyperparathyroidism in 20 of the patients (95.2%).

Conclusions: TOEPVA is viable and safe in who wish to avoid the cervical scar resulting for the patient with primary hyperparathyroidism.

KEYWORDS

adenoma, endoscopic, hyperparathyroidism, parathyroid, surgery

1 | INTRODUCTION

Hyperparathyroidism was initially described in the 1920's by Albright and Recklinghausen in the context of severe bone disease. This disease is characterized by the autonomous production of parathyroid hormone (PTH). Primary hyperparathyroidism (pHPT) is caused by a single benign adenoma in 80%-85% of cases, by multiple adenomas in 10%-15% of cases, and by parathyroid carcinoma in less than 1% of cases.¹

Characteristically, patients with hyperparathyroidism have high values of serum calcium and PTH as a result of the excessive secretion of PTH. There are two types of patients with pHPT: the asymptomatic patient and the symptomatic patient.² Those who have symptoms of hypercalcemia often present with nephrolithiasis (calcium oxalate and calcium phosphate), extensive bone resorption, gastrointestinal symptoms such as peptic acid disease or pancreatitis, cardiovascular or neurological disorders, and pathological

fractures, as well as some nonspecific symptoms (muscle weakness and changes in mental status).³

Current evidence suggests that surgery is the “Gold Standard” of treatment for this condition, since it has resulted in favorable outcomes with a 96.5%⁴ effective cure rate. The first successful parathyroidectomy was performed by Félix Mandl in 1925. Today, there are multiple surgical techniques used for parathyroidectomy; among them are open bilateral cervical exploration, open nonbilateral cervical exploration, minimally invasive open surgery guided by gammagraphy, video-aided minimally invasive surgery, and endoscopic surgery via axillary.⁵ Since 1997, various techniques have been proposed as an alternative to cervical incision, but these have not been fully accepted by the Western population primarily as they can present the surgeon with challenges such as difficulty of exposure, more extensive tissue dissection, increased pain, etc. Recently, the transoral endoscopic approach has been used for the surgical treatment of thyroid

diseases. In 2008, Witzel et al⁶ introduced the sublingual transoral thyroidectomy technique, performed first on 2 cadavers, and later on 10 pigs with no complications. In 2015, Anuwong⁷ published the first series of 60 cases of transoral endoscopic thyroidectomy vestibular approach (TOETVA) successfully performed on humans.

Alternative surgical techniques and their use in various diseases of the neck are advancing at a rapid pace, and in 2010, Karakas et al⁸ published the first case of transoral endoscopic parathyroidectomy vestibular approach (TOEPVA), with no intraoperative complications, thus presenting this approach as a possible technique for the treatment of pHPT in cases in which the patient wishes to avoid having a cervical scar.

Although it is true that the use of a transoral approach is due to an aesthetic consideration, avoiding a cervical scar is, for many patients, of primary concern, and therefore we believe it is important to analyze this alternative “scarless” procedure as a viable option.

The objective of this study, then, is to present our initial experience with TOEPVA for the management of parathyroid adenomas and to demonstrate that this technique is a viable procedure which provides favorable results, and above all, is a safe alternative for patients with pHPT who wish to avoid a cervical scar.

2 | PATIENTS AND METHODS

We conducted a descriptive, observational, longitudinal, prospective study at the Neck Surgery Clinic of the General Hospital of Mexico and at the Department of Head and Neck Surgery of the National Cancer Institute, Mexico, from July 28, 2017 to August 14, 2018 in 21 patients with a single parathyroid adenoma, using the transoral endoscopic parathyroidectomy vestibular approach.

All of the patients with a single parathyroid adenoma and pHPT were informed of two surgical approaches to cure their condition: first, a traditional approach via a 2.5 to 2 cm incision through which the adenoma would be removed, and second, a transoral endoscopic parathyroidectomy vestibular approach. We explained that the difference between the two procedures is basically that the cervical approach requires an incision directly over the adenoma, which leaves a resultant cervical scar, whereas with the transoral approach, while there is a greater dissection of tissues, a cervical scar is completely avoided. The patients were asked to choose which procedure they preferred, and 21 patients opted for the transoral approach.

We performed the surgical procedure as described for TOETVA⁷ with the difference being that we moved the respective thyroid lobe to the midline in order to expose the tracheoesophageal groove and thus locate the adenoma to be resected, as well as to identify and preserve the corresponding recurrent laryngeal nerve.

The surgical team was experienced and skilled at using a transoral approach, having previously performed at least 50 transoral endoscopic thyroidectomies, therefore, the learning curve was minimal, and the necessary adaptations to reach the parathyroid glands were readily made.

The variables we evaluated were size, volume, and location of the adenoma, preoperative location tests, surgery time, bleeding, identification and preservation of the recurrent laryngeal nerve (through preoperative and postoperative direct laryngoscopy), injury to the mental nerve, intact preoperative blood levels of parathormone (diagnostic PTH), 10 minutes postresection, intraoperative (IOPTH), and 1 month postoperative (final PTH), with normal levels considered to be from 10 to 55 pg/mL. We also evaluated serum calcium levels at diagnosis and 1 month postoperatively, with normal levels considered to be from 8.5 to 10.2 mg/dL. Finally, we evaluated the effective cure rate. The variables were analyzed using measures of central tendency.

In those patients who had access to interoperative monitoring of the recurrent laryngeal nerve, we used a C2 Nerve Monitor, Innomed (Germany) with 25 cm electro-stimulators designed for endoscopic use.

The protocol was approved by the internal review board of the General Hospital of Mexico.

3 | RESULTS

In this study, we operated on 21 patients using the transoral endoscopic parathyroidectomy vestibular approach; 18 patients were from the General Hospital of Mexico and 3 were from the National Cancer Institute. All of them were female, with an average age of 43 years (37–51 years).

Twenty-one patients requested a transoral approach after having been informed of both kinds of surgical approaches. Two of them mentioned having keloid scars resulting from previous abdominal surgery and wished to avoid similar scarring in the neck. The remaining 19 mentioned that they did not wish to have a scar on their necks, simply for aesthetic reasons.

The average size of the adenomas was 26.6 mm (with a range from 7 to 50 mm), with an average volume of 3.95 mL (range from 0.24 to 7.50 mL).

The locations of the adenomas were: 11 lower right, 2 upper right, 6 lower left, and 1 upper left. In one case, the adenoma could not be located, despite the fact that in both the methoxyisobutylisonitrile (MIBI) scan and the ultrasound, it appeared to be in the lower left side of the thyroid gland. In a subsequent single-photon emission computed tomography (SPECT) scan, the adenoma was finally identified as being located between the esophagus and the spine.

Seventeen patients underwent a parathyroid MIBI SPECT scan, whereas four had only a MIBI scan. All patients had a cervical ultrasound.

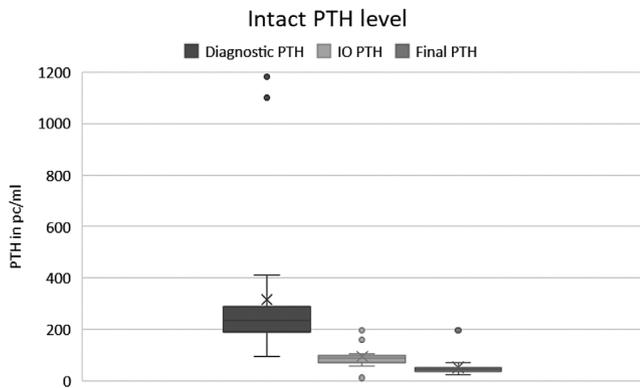


FIGURE 1 Parathyroid hormone (PTH) levels

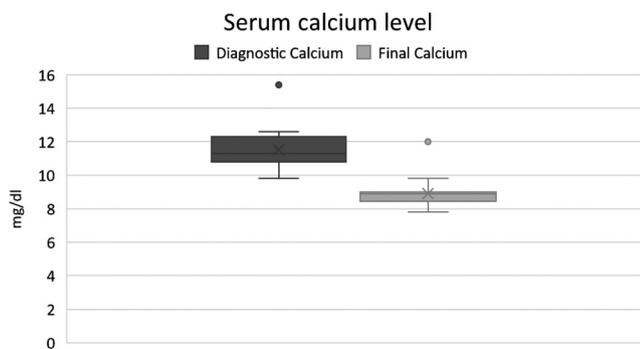


FIGURE 2 Serum calcium levels

Diagnostic, intraoperative (in 18 patients), and postoperative PTH levels can be seen in Figure 1. Serum calcium levels can be seen in Figure 2.

The average surgery time was 57.6 minutes (range 40-90 minutes), including the time it took to perform the rapid intact PTH test, and the average bleeding was 13.1 mL (range 5-35 mL).

The corresponding recurrent laryngeal nerve was identified and preserved in all 21 cases, 4 having functional corroboration via the use of intraoperative neuro-monitoring. There were no cases of dysphonia or alteration of cordal mobility post-op (using postoperative laryngoscopy) nor any permanent injury to the mental nerve.

We were able to cure 20 patients (95.2%), however, 1 patient could not be cured using the transoral route, as her adenoma was present outside of the accessible surgical field for this technique (between the esophagus and the spine), and she had to be operated on through open surgery.

4 | DISCUSSION

The main objective of surgical treatment of parathyroid adenoma is to achieve the complete removal of the adenoma, thus curing the hyperparathyroidism. Generally, this treatment is

considered to provide a cure rate between 92% and 99%.^{2,9} In this study, we used a new and seldomly used surgical technique, and obtained a cure rate of 95.2%, demonstrating that the TOEPVA is a viable technique that can be considered as an option for the treatment of single parathyroid adenomas.

It is important to bear in mind that, as with all minimally invasive surgeries, it is imperative to get the best preoperative localization of the adenoma as possible, in order to avoid a limited range of exploration which could lead to the inability to find the affected gland. This happened with one of our patients, when, despite exploring the entire right tracheoesophageal groove and superior mediastinum, we were unable to identify the adenoma, as it was located between the esophagus and spine, and thus outside the possible field of exploration when using the transoral surgical technique.

Historically, the first five cases in the Karakas et al¹⁰ series reported that two cases had to be converted to the traditional method mid-surgery, however, this might just be due to a learning curve, as later, the Thai group, having more experience in the procedure, reported another series of 12 cases,¹¹ all successful and with no morbidity. Similarly, in our work, with all 21 cases, there was no morbidity of either the recurrent laryngeal nerve or the mental nerve.

It is important to note that with a transoral approach, there is no significant advantage in terms of surgical effectiveness or a reduction in complication rates over the traditional surgical approaches currently in practice. Rather, it is the patient's desire for an improved aesthetic outcome that calls for its use, as was the case for 19 patients in this series, and is the reason that this approach is developing so quickly in the Asian culture. However, there are also cases with an increased risk of excessive scarring, as was the case for two of our patients with keloid scarring in other parts of the body, and which more clearly indicate the preference for a transoral approach.

Additionally, we would like to note that in our judgment, TOEPVA is not a minimally invasive procedure, despite it being known as such. On the contrary, there is more tissue invasion required in order to reach a location that is remote from the incision site. Possibly a better name for this technique would be "Natural Orifice Endoscopic Approach."

In conclusion, we believe that this study demonstrates that TOEPVA is a viable and safe technique, providing favorable results for patients with pHPT who wish to avoid having a cervical scar. When using this technique, it is imperative to have perfectly located the parathyroid adenoma preoperatively with a SPECT scan in order to ensure a successful outcome.

ORCID

Luis-Mauricio Hurtado-López  <https://orcid.org/0000-0003-2387-2023>

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How to cite this article: Hurtado-López L, Gutiérrez-Román S, Basurto-Kuba E, Luna-Ortiz K. Endoscopic transoral parathyroidectomy: Initial experience. *Head & Neck*. 2019;41:3334–3337. <https://doi.org/10.1002/hed.25828>