

# Endoscopic Lateral Approach Thyroid Lobectomy: Safe Evolution from Endoscopic Parathyroidectomy

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## Abstract

*Introduction:* Endoscopic thyroid surgery has been shown to be feasible. Most minimal access procedures have been performed via a midline approach. Based on our experience of more than 500 endoscopic parathyroidectomies via a lateral approach we have used the same method for thyroid lobectomy.

*Methods:* We present our experience of endoscopic thyroid lobectomy via a lateral approach (ETLA) and review of the results over a 1-year period (2004). Inclusion criteria for ETLA were (1) solitary nodule with atypical/suspicious fine-needle biopsy (FNB) or solitary toxic nodule; (2) lesions with a diameter of <3 cm. Patients with a history of previous neck surgery or radiation exposure were excluded. All patients underwent postoperative vocal cord checks and plasma calcium evaluation.

*Results:* A total of 742 thyroid procedures were performed during 2004. Among them, 38 patients (5.1%) underwent ETLA. Indications for surgery were suspicious FNB results (36 patients) and a toxic nodule (2 patients). Mean nodule size was 19.2 mm. Mean  $\pm$  SD operating time was 102  $\pm$  27 minutes. All recurrent laryngeal nerves were identified (including one that was nonrecurrent). Of the 38 patients, the superior parathyroid gland was identified in 36 and the inferior parathyroid gland in 33. There were two conversions due to difficulty with the dissection. Two operations were converted because malignancy was diagnosed on frozen section examination. Two patients underwent a delayed completion thyroidectomy when definitive histology necessitated it. There were no permanent operative complications, and all patients were discharged on the first postoperative day.

*Conclusions:* ETLA offers excellent intraoperative visualization of the vital structures and is a safe alternative to conventional thyroid lobectomy in selected cases.

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Minimal access approaches are playing an ever-increasing role in various fields of endocrine surgery. Laparoscopic adrenalectomy has become the approach of choice in the treatment of virtually all benign disease of the adrenal gland<sup>1</sup> and is considered for large adrenal tumors and metastasis in some departments.<sup>2,3</sup> An increasing number of laparoscopic pancreatic resec-

tions for endocrine tumors are being reported.<sup>1,4,5</sup> In such cases, the benefits of laparoscopy compared to an open approach are major. Compared to intraabdominal operations, the benefit of endoscopic neck procedures is more difficult to demonstrate given the low morbidity associated with open neck operations. However, minimally invasive parathyroidectomy is finding a role alongside conventional cervicotomy when treating primary hyperparathyroidism.<sup>6,7</sup> The role of minimal access

thyroidectomy requires further clarification regarding indications, technique, safety, comfort, and results.<sup>8</sup>

The minimal access approaches to the thyroid gland may be broadly classified into three groups: the open lateral approach via a small incision<sup>9</sup>; video-assisted approach via the midline<sup>10</sup>; and various endoscopic techniques performed by cervical or noncervical access and allowing unilateral or bilateral thyroid resection.<sup>11</sup> Endoscopic thyroid surgery has been shown to be feasible. In 1998 the senior author of this article described an entirely endoscopic parathyroidectomy via a lateral approach. With the benefit of the experience of more than 500 endoscopic parathyroidectomies via a lateral approach during the last 7 years,<sup>6</sup> this approach has been adapted to perform thyroid lobectomies in selected patients. We believe that the endoscopic lateral approach combines the benefits of the minimal access unilateral approach with those of fiberoptic magnification. This study presents the results of our initial experience.

## MATERIALS AND METHODS

During a 1-year period (2004), ETLA was utilized in patients with (1) a solitary thyroid nodule with atypical/suspicious fine-needle biopsy (FNB) results or a solitary toxic nodule; or (2) lesions with a diameter < 3 cm or > 3 cm if partly cystic. The thyroid parenchyma adjacent to the nodule was normal. The volume of the lobe was also taken into account. Volumes of > 30 ml were a contraindication for ETLA given the difficulty of mobilizing the lobe and extracting the specimen through a 12-mm incision. Previous neck surgery and radiation exposure were exclusion criteria as well.

The operation was undertaken with the patient in a supine position under general anesthesia. The procedure was performed after the introduction of three trocars: a 10 mm optic trocar inserted via a 12 mm lateral incision on the medial border of the sternocleidomastoid (SCM) muscle at the level of the thyroid isthmus and two 2.5 mm trocars subsequently inserted along the anterior border of the SCM muscle. The plane between the carotid sheath laterally and the strap muscles medially was opened. CO<sub>2</sub> low pressure insufflation was provided. Dissection of the thyroid lobe and various anatomic structures were performed through this "backdoor" approach with the magnification of the endoscope. The gas not only maintains the operative space but may also decrease the effect of any minor bleeds. The assistant holds the camera, and the primary operator begins the dissection. This permits identification of the key structures: esophagus, trachea,

inferior thyroid artery, and the recurrent laryngeal nerve, which, once identified, is followed for its entire cervical length into the larynx. The smallest terminal vascular branches of the inferior thyroid artery are skeletonized and electrocoagulated, and the artery proper and its larger terminal branches are skeletonized and dealt with later. The posterior aspect of the thyroid is mobilized entirely up to the superior pole vessels, which are also skeletonized. During this dissection the superior parathyroid gland is identified and preserved. The inferior parathyroid, less constant in its position, can also usually be identified and preserved. The three trocars are now removed and the mobilized thyroid lobe can be brought to the skin surface. In this way the skeletonized superior pole vessels are controlled and divided individually using the Harmonic Scalpel via the main 10 mm trocar skin incision. The isthmus is now divided using the Harmonic Scalpel, thereby permitting exteriorization of the thyroid lobe and division of the inferior pole vessels. At this stage all that remains is dissection of the terminal branches of the inferior thyroid artery, which is performed under direct vision with the recurrent laryngeal nerve in clear view and free from traction. The procedure can be conducted by the surgeon and requires only one assistant.

For all patients, the preoperative characteristics, the feasibility of ETLA, and the postoperative results were analyzed. Various parameters were extracted from the operative report, including identification of anatomic structures, difficulties, conversion, and time of surgery. All patients underwent postoperative vocal cord checks and plasma calcium evaluation prior to discharge. Pathology reports were recorded.

## RESULTS

There were 33 women and 5 men in the study. The mean  $\pm$  SD age at surgery was  $45 \pm 12$  years (20–69 years). Indications for surgery were suspicious FNB results (follicular lesion with atypia) for 36 patients and solitary toxic nodule for 2 patients. With the exception of the latter two, all patients were euthyroid before surgery. All patients underwent a vocal cord check preoperatively. Altogether, 38 ETLAs were performed in 2004. This represented 5.1% of the 742 thyroidectomies performed and 21% of the 184 thyroid lobectomies. The mean  $\pm$  SD nodule size was  $19 \pm 8$  mm (7–47 mm). The mean  $\pm$  SD operating time was  $102 \pm 27$  minutes (64–190 minutes). In all cases the recurrent laryngeal nerve (including one inferior nonrecurrent laryngeal nerve) was preserved intact. Of the 38 patients, the superior parathyroid gland

was identified in 36 and the inferior parathyroid gland in 33. Two patients required conversion to an open cervicotomy because of difficulty with the dissection. In one patient with a 22 mm nodule, difficulty with the dissection was caused by the volume of the thyroid lobe. Two more patients required conversion after papillary thyroid cancer was diagnosed on frozen section biopsy. All patients underwent vocal cord checks and calcium level measurements postoperatively, and all were discharged on the day following surgery. Two patients underwent a delayed completion thyroidectomy via a conventional approach when definitive histology necessitated it. A definitive pathology examination confirmed benign follicular neoplasm in 34 patients and papillary thyroid cancer in 4. There were no postoperative complications.

## DISCUSSION

The definition of minimally invasive thyroidectomy covers a large variety of operations. Surgery could be considered minimally invasive based on the size and site of the skin incision, the accessibility of the operative field, and the extent of the dissected field. Some minimally invasive thyroidectomies are performed through an open approach via a small incision, with the problem being defined as “small.”<sup>12</sup> Others are done with the help of an endoscope as video-assisted surgery or as a completely endoscopic technique. The endoscope provides light in a confined space and magnification resulting in a better view for the surgeon. Therefore we believe that the endoscopic procedure results in a safer dissection because of better visualization of the key structures compared to an open approach via a small incision. It may also provide better ergonomics for the surgeon and the assistant. Endoscopic techniques can be divided arbitrarily between cervical and noncervical approaches. The latter are most developed in Asia. They consist of access to the thyroid field through an axillary, anterior chest, or mammary approach. Noncervical approaches require larger dissection but allow resection of large thyroid tumors.<sup>13</sup> One should mention that, despite this being an endoscopic technique, it is probably no less invasive than conventional cervicotomy. The other difference between cervical and noncervical approaches is the location of the scar. In many Asian countries, noncervical scars (anterior chest, axillae) balance favorably with cervical scars. The contrary is observed in many European countries.

The video-assisted approach through a midline incision<sup>10</sup> is one of the most widely used techniques in Western countries. This dissemination can be explained

by various factors. The midline anterior approach, as for open surgery, utilizes the same landmarks. Furthermore, the ability to reduce the length of the incision progressively may help the “open” surgeon move to an endoscopic video-assisted approach step by step. The possibility of conversion by simply increasing the length of the incision is reassuring. It allows bilateral dissection and total thyroidectomy. Thus indications such as Graves’ disease<sup>14</sup> or low risk thyroid cancer<sup>15</sup> could be considered adequate for using this technique. However, it requires a second assistant for the surgeon: one holding the endoscope and one holding the retractors. ETLA requires only the presence of the surgeon and one assistant, an important advantage in our time of surgical resident shortage.

With our extensive experience in endoscopic parathyroidectomy through a lateral approach, we decided to apply the approach to patients with solitary unilateral thyroid nodules when surgery was required. The endoscope provides light and magnification in this closed space. In our opinion, this is the least invasive and most focused operation of any described. Our dissection is not extensive but identifies all of the necessary structures. Morbidity was nil in this small series. To date, it seems to compare favorably with the open approach. It calls for a discrete incision on the anterior border of the SCM muscle with no tethering such as can occur with midline incisions in thin patients as a result of adhesions to the strap muscles. More widespread use of this complete endoscopic approach may be hindered by a long learning curve when applied only to thyroid surgery; however, this drawback may be overcome given its application for thyroidectomy and parathyroidectomy. The procedure takes more time than the open approach; but with increasing experience and advances in surgical instruments, shorter operating times may be anticipated. It is a unilateral approach; so when completion thyroidectomy is required, conversion to a conventional cervicotomy is necessary. Nonetheless, if indications are appropriate, almost 90% of these operations can be completed endoscopically.

Although appropriate indications remain rare at present, we have resisted the temptation to extend the indications to patients with low risk thyroid cancers. In our experience, only 5.1% of the patients were appropriate for this approach. This represents one in five patients requiring lobectomy in our department. One could propose that the more accurate the FNB is, the less this type of procedure may be needed. To date, management of small nodules, clearly benign on FNB, remains conservative despite the advent of endoscopic thyroidectomy.

On the other hand, increasing volumes of “systematic” thyroid ultrasonography could lead to the discovery of suspicious infraclinical nodules and could benefit from this approach. ETLA could be the technique of choice for this new type of patient.

We believe that ETLA belongs to the minimal access unilateral approaches that satisfactorily complete the therapeutic goal in most carefully selected patients. ETLA provides the benefits of fiberoptic magnification for surgeon ergonomics and patient safety.

## CONCLUSIONS

Endoscopic thyroid lobectomy via a lateral approach requires a small, discrete incision for direct access to the thyroid lobe, resulting in a focused operation without extensive dissection. This unilateral, focused approach satisfactorily treats appropriately selected patients. With the increasing volume of thyroid ultrasonography, more and more patients could be considered for this approach. ETLA combines the benefits of the minimal access lateral approach with fiberoptic magnification. It is a safe, effective technique in the hands of an appropriately trained surgeon. It has a role to play in selected patients and should coexist with, rather than replace, conventional thyroidectomy.

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