

**COMPARATIVE STUDY BETWEEN TRANSAREOLAR ENDOSCOPIC  
THYROIDECTOMY AND CONVENTIONAL THYROIDECTOMY**\*<sup>1</sup>M. S. Abdelhamid, <sup>1</sup>H. A. Nafady, <sup>1</sup>A. M. Bacheet, <sup>1</sup>A. M. Rashad, <sup>1</sup>A. S. Abdel Gayd and <sup>2</sup>T. M. Elgaabary.<sup>1</sup>Surgery Department Faculty of Medicine Bani Suef University Egypt.<sup>2</sup>Surgery Department Fayoum Faculty of Medicine Egypt.

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**ABSTRACT**

**Background:** Thyroidectomies using the open method are effective, well-tolerated and safe but involve transverse incision on the neck measuring 7–10 cm in length. Thyroid disorders are more common in women and they find these scars uncomfortable and cosmetically unacceptable. Hence, minimal access approaches are playing an ever increasing role in neck surgery as they result in a reduction in size or elimination of the scar on the neck. The aim of this study is to compare between Transareolar endoscopic thyroidectomy and conventional open thyroidectomy regarding the feasibility, safety of surgical outcome, complications. Patients and methods This prospective study was carried out in Beni-suef University Hospital between January 2017 and December 2017, after the patients fitted both the inclusions and exclusions criteria. This study was enrolling 40 co-operative patients aged 18-60 years with unilateral thyroid lobe nodule, nodules or diffuse swelling with the largest diameter less than 4 cm. 20 patients went transareolar thyroid lobectomy and 20 went open thyroid lobectomy. Thyroid nodules less than 4-cm in their largest transverse diameter. Thyroid gland volume less than 20-ml as estimated by US. Cranio-caudal axis of the lobes must not exceed 7-cm. Results The mean operative time was 90 min (57 -135) minutes for transareolar thyroid lobectomy while it was 70 min (40 -90) minutes for open thyroid lobectomy. The LOS was 24 hours in transareolar and 72 hours in the open method. No RLN injury, no tracheal injury, no esophageal injury, no bleeding in both methods. There were one SLN injury, one seroma, and 2 wound complications in open lobectomy.

**Conclusion:** we demonstrated that thyroidectomy through Transareolar endoscopic approach is technically feasible, safe, and minimally invasive procedure with excellent cosmetic results. Although the number of patients that we have treated in this manner is still small, we believe that the procedure constitutes a useful surgical treatment for thyroid disease as it is superior to open approach regarding cosmesis and invasiveness.

**KEYWORDS:** Transareolar Thyroidectomy – Cosmesis – Cost.

**INTRODUCTION**

The era of modern thyroid surgery was introduced by Theodore Billroth and subsequently developed as a safe and effective procedure by Theodore Kocher. Since then, excision of the thyroid through a skin crease incision in the anterior neck just over the thyroid gland has been proven efficacious way of treating a variety of thyroid pathologies.<sup>[1]</sup>

Conventional open thyroidectomy remains the treatment of choice for benign and malignant thyroid nodules, but the surgery requires a long incision line on the neck and leaves a long scar on the lower anterior neck. This incision may lead to prominent scarring that can develop into keloid or hypertrophic scars and lead to paraesthesia or hypoaesthesia.<sup>[2]</sup>

Endoscopic approaches to the thyroid can be performed using direct or indirect approaches. The direct

approaches place the access ports within the cervical region and are considered the least invasive.<sup>[3]</sup> On the other hand, indirect approaches include the anterior chest wall approach,<sup>[4]</sup> the breast approach,<sup>[5]</sup> and the transaxillary approach,<sup>[6]</sup> the areolar approach.<sup>[7]</sup>

**Patients**

This prospective study was carried out in Beni-suef University Hospital between January 2017 and December 2017 after the patients fitted both the inclusions and exclusions criteria. This study was enrolling 40 co-operative patients aged 18-60 years with solitary thyroid nodule with the largest diameter less than 4 cm.

The preoperative diagnosis of thyroid nodules was made by ultrasonography and ultrasonography-guided fine needle aspiration cytology to exclude carcinoma.

**(I) Inclusion Criteria**

Thyroid nodules less than 4-cm in their largest transverse diameter, Thyroid gland volume less than 20-ml as estimated by US, Cranio-caudal axis of the lobes must not exceed 7-cm, Benign thyroid lesions.

**(II) Exclusion Criteria**

**Absolute:** Previous neck surgery Multi-nodular goiter. Malignant thyroid lesions evidenced by fine needle aspiration cytology preoperatively.

**Relative:** Previous neck irradiation, Hyperthyroidism (GD or toxic adenoma), Chronic thyroiditis, Lactating females.

**Operative steps****1-patient position**

All patients were prepared for Transareolar endoscopic thyroidectomy under general anesthesia. After the patient was placed in a supine position and their legs apart, a pillow was placed beneath the shoulder to extend the head and neck. The operator stands between the patient's legs and scope assistant stood on the right side of the patient, and the monitor was placed at the head of the patient.<sup>[7]</sup>

**2-preparation of operative field**

To facilitate dissection and reduce bleeding, approximately 50 ml of saline solution (including 1 ml epinephrine and 20 ml bupivacaine) was injected into the subcutaneous layer of the anterior chest and the subplatysmal space in the neck. A 10-mm incision was made on the upper edge of the areola on the right side, (direction, at 2–4 o'clock) a 5-mm incision was made on the upper edge of the areola on the right side at 11 o'clock, and a 5-mm incision was made on the upper edge of the areola on the left side at 11 o'clock. After the blunt dissection, ports were inserted through each incision. Then, the flaps were dissected bluntly from the suprasternal notch till the thyroid cartilage and laterally to the medial edge of each of the sternocleidomastoid muscles. Carbon dioxide gas was injected with a pressure of 6 to 8 mmHg. A 30-degree rigid endoscope was inserted through the 10 mm trocar on the upper edge of the right areola. The other two 5mm ports were used for the Harmonic scalpel on one side and for grasping the specimen on the other side.<sup>[7]</sup>

**3-Surgical steps****(A) Separation of the inferior pedicle**

After the subplatysmal space was created with blunt and sharp dissection using a shears-type Harmonic scalpel, the strap muscles were separated at the midline with the Harmonic scalpel. Once the inferior thyroid pedicle was identified, inferior thyroid veins were coagulated 1st with the Harmonic scalpel to divide the lower pole of the thyroid from the upper pole of the thymus. Then the inferior thyroid pedicle was lifted and the isthmus was divided and freed from the trachea with the Harmonic scalpel.<sup>[7]</sup>

**(B) Identification of the RLN and the parathyroid glands**

A gentle traction was maintained upward, keeping the trachea and RLN in view. Image magnification permits an excellent view of the parathyroid glands, nerves, and vessels. The ITA was coagulated with the Harmonic scalpel. In doing so, care was taken to avoid thermal injury to the RLN by keeping the hot tip of the Harmonic scalpel away from.<sup>[7]</sup>

**(C) Controlling the middle thyroid vein:** After separation of the inferior pedicle of the thyroid gland, gentle traction on the lobe was done medially to expose the middle thyroid vein and its coagulation with the Harmonic scalpel.<sup>[7]</sup>

**(D) Separation of the superior pedicle:** The thyroid lobe was lifted up from trachea until the superior pole was reached. Then entire lobe was retracted downward and laterally and the superior thyroid pedicle and ligament of Berry were divided with the Harmonic scalpel.<sup>[7]</sup>

**(E) Removal of the specimen.**

The removed specimen was put in an endo-bag and guided out through the 10-mm port on the left side. The cavity was cleaned with a saline solution before a meticulous haemostasis was performed. The separated strap muscles were approximated at the midline using 3 or 4 interrupted absorbable braided suture. A 100-ml Hemovac was placed into the neck through the 5mm port site and removed when the amount of drain was < 15-ml per day. The skin wounds were closed with non-absorbable stitches after tight closure of subcutis using a 4-0 absorbable multifilament.<sup>[7]</sup>

The following steps illustrate the technique of open thyroid lobectomy or hemi-thyroidectomy

The skin incision, Elevation of the flaps, Separation and mobilization of prethyroid strap muscles, Exposure and mobilization of the gland, Division of superior thyroid vessels and mobilization of upper pole Identification and isolation of ITA, Identification, isolation, and preservation of RLN, Identification and preservation of parathyroid gland Mobilization of inferior pole, Removal of the thyroid lobe, isthmus, and pyramidal lobe Haemostasis Wound closure and drainage

**Results** The mean operative time was 90 min (57 -135) minutes for transareolar thyroid lobectomy while it was 70 min (40 -140) minutes for open thyroid lobectomy, The LOS was 24 hours in transareolar and 72 hours in the open method. No RLN injury, no tracheal injury no esophageal injury, no bleeding in both methods. There were one SLN injury, one seroma, in transareolar and 2 wound complications in open lobectomy.

## DISCUSSION

A new surgical technique when developed has to face up to its conventional standard and be comparable when it comes to results achieved, complications, safety, technical feasibility and cost-to-benefit ratio. A considerable recent surgery has occurred in the development of endoscopic techniques in thyroid surgery. Since Gagner.<sup>[8]</sup> and Hüscher et Al.<sup>[9]</sup> first reported successful endoscopic neck surgery in 1996 and 1997, several endoscopic thyroid surgical techniques have been developed.<sup>[10-16]</sup> Minimizing surgical stress, cosmetic concerns and improving the postoperative quality of life are the main motivations for developing novel endoscopic thyroid surgical techniques

The mean operative time for transareolar lobectomy in our series was 90 (57- 135) min and 70(40-90) min for open lobectomy. The acceptable operative time achieved was due to the short learning curve, the good surgical view, magnification of the surgical field, excellent instrumentation and the breast approach to the thyroid gland. Operative time is the only factor in our series that did not compare favorably to the open surgical procedure. However, the longer operative time compared to the open surgery group could be possibly reduced further through the accumulation of experience.

Although the conversion rates of ET via breast approach are reported to be 0–13%,<sup>[17-19]</sup> we did not have any conversions. This directly relates to the prior endoscopic experience of the main surgeon in endoscopic thyroid surgery with formal training as well as his own experience with previous open thyroid lobectomies. As is the case with open surgery, exposure to a high volume of cases enables one

We gained experience from our practice in this study shown in learning curves showed at first the time taken was 135 minutes which was long in comparison to the last case time (57 minutes) with different ranges of time in between with mean time of 90 minutes this goes hand in hand with Miccoli et al.<sup>[20]</sup> who stated that the operative time decreased steadily

We got one case of superior laryngeal nerve injury (1/20) 5 % mostly this is due to excessive cranial dissection but we did not encounter any case of recurrent laryngeal nerve injury in contrast to Miccoli et al.,<sup>[20]</sup> with multi-institutional experience who reported recurrent nerve palsy in eight cases (2.1%) while there were no cases of hoarseness with Shailesh et al.,<sup>[21]</sup> Hypoparathyroidism was not met with in any of our patients, while Miccoli et al.,<sup>[20]</sup> had eleven patients exhibited hypoparathyroidism, of which only two had permanent hypocalcemia (1.8%). There were no cases of tetany with Shailesh et al.,<sup>[21]</sup> Seroma was encountered in one of our patients (5%) and resolved spontaneously, the same was with ecchymosis. Comparing our finding in both groups with other finding showed that the transareolar approach is associated with some complications that not shown in open lobectomy,

there were SLN injury, and seroma in our patients while others had in addition RLN injury.

All previous researches concluded that this maneuver was difficult, time consuming, and expensive but by the time and with the progress of surgical facilities which have been available made this maneuver the one of choice in the near future

The 1st criticism is represented by the higher cost comes from use of a Harmonic Scalpel. The Ultracision shears are disposable, so they must be considered an additional cost, but this is not peculiar to video-assisted and endoscopic thyroid surgery.<sup>[20]</sup>

Cost seems to be the most important point against minimally invasive thyroidectomy due to use of Harmonic Scalpel, but this is balanced by, shorter hospital stay, smooth postoperative period, and now the harmonic scalpel got less expensive and available by different brands.

The 2nd criticism is represented by the scarce number of patients who fulfill the criteria to undergo this kind of procedure and this limits its clinical impact.<sup>[20]</sup> We faced difficulty in convincing patients by our technique due to poor education and fear of endoscopic approach especially with remote accesses but with meticulous description we were able to convince them with our technique.

Finally our study does not show a new technique but applying already present one with more facilities and more perfect results.

In conclusion, we demonstrated that thyroidectomy through trans areolar endoscopic approach is technically feasible, safe, and minimally invasive procedure with excellent cosmetic results. Although the number of patients that we have treated in this manner is still small, we believe that the procedure constitutes a useful surgical treatment for thyroid disease as it is superior to open approach regarding cosmesis and invasiveness.

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