



ENDOSCOPIC THYROID LOBECTOMY VS CONVENTIONAL OPEN THYROID LOBECTOMY

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ABSTRACT

OBJECTIVE

To compare the differential surgical results between endoscopic thyroid lobectomy and traditional open thyroid lobectomy.

METHODOLOGY

This randomized controlled trial was done at the Jinnah Postgraduate Medical Center to assess the outcomes of endoscopic versus open thyroid lobectomy. A cohort of 120 eligible patients aged between 18 and 65 years with unilateral benign or indeterminate thyroid nodules ≤ 4 cm were enrolled and randomized 1:1 into control and treatment cohorts. Group A underwent endoscopic surgical approach, and group received traditional open surgical treatment. Demographic data and surgical results were analyzed via SPSS version 26.0, with a statistical significance of $p \leq 0.05$.

RESULTS

The study cohort comprised 120 individuals (93.3% female), with an average age of 28.06 ± 8.97 years. Subjects within the endoscopic group exhibited a significantly reduced overall operative duration (107.08 ± 22.08 vs 130.02 ± 25.02 min, $p = 0.0001$) and a shorter hospital stay (25.76 ± 3.39 vs 26.04 ± 3.20 days, $p = 0.0001$). The incidence of hoarseness (15%), seroma (10%), and erythema (13.3%) were exclusively documented within the endoscopic group.

CONCLUSION

The findings of current study suggests that endoscopic thyroid lobectomy had better surgical outcomes than open approach, especially as regard to operative time and length of hospitalization. Although postoperative complications occurred more frequently after endoscopic surgery, most were transient and manageable. Due to its low invasiveness and good outcome in recovery,



endoscopic technique for benign thyroid nodules can be an acceptable approach, which theoretically comply with the essence of minimally invasive surgery.

KEYWORDS

Endoscopic Thyroid Lobectomy, Conventional Open Thyroid Lobectomy, Surgical Outcomes



INTRODUCTION

Thyroid lobectomy is one of the essential procedures to treat malignant or benign thyroid lesions. Although the traditional open thyroidectomy (COT) has been the approach of choice for many years because of surgical accessibility and predictability, this approach is not without its limitations, including more prominent cervical scarring and longer recovery [1,2]. The cosmetic and functional issues caused by open techniques, however, spurred the development and increasing adoption of minimally invasive surgical alternatives such as endoscopic thyroidectomy (ET) [3].

In the last 10 years, numerous endoscopic approaches such as transoral vestibular, axillary, breast, and areolar approaches have been investigated for their ability to provide similar oncological outcomes while attempting to improve aesthetic outcomes and patient satisfaction [4–6]. In particular, the transoral endoscopic thyroidectomy vestibular approach (TOETVA) has been placed as a promising option owing to its access, which is truly scarless, and its dissection field, which is central [7,8]. Different techniques like the gasless transaxillary and the areola approach have also become popular in a specific group of patients [9]. In comparative studies, ET has been shown to lead to less postoperative pain, shorter length of stay and earlier return to normal activity than COT [10–12]. Despite a prolonged operative time, the rates of complications including recurrent laryngeal nerve injury, hypocalcemia or hematoma formation do not

seem to differ between the two methodologies [13,14]. When it comes to functional results, ET might be advantageous in terms of voice preservation and swallowing function, especially if performed with TOETVA method [15].

However, ET has its own limitations. It necessitates the use of specialized instruments and trained personnel, which may reduce its accessibility and increase the cost of healthcare (3,11). In addition, its role in the treatment of thyroid malignancies, particularly in larger or more aggressive tumors, has not been fully established [6,16].

In light of the growing usage and supporting literature for the role of endoscopic techniques, this study compares surgical outcomes of endoscopic thyroid lobectomy with open thyroid lobectomy, including operative parameters, postoperative morbidity, recovery, and functional outcomes

METHODOLOGY

This was a randomized controlled trial conducted at Jinnah Postgraduate Medical Centre in Karachi to evaluate and compare surgical outcomes of endoscopic thyroid lobectomy with open thyroid lobectomy. Inclusion criteria were individual aged between 18 and 65 years of either sex presenting with a solitary thyroid nodule or unilateral thyroid pathology. Patients with a nodule ≤ 4 cm on preoperative imaging, FNA indicating a benign or indeterminate result, and no extrathyroidal extension or suspicion of malignancy were included. The exclusion criteria were history of previous neck surgery or radiation exposure, bilateral thyroid disease, malignant cytology, suspected malignant



cytology, extrathyroidal invasion or lymph node involvement, ASA classification 3 or more and pregnant or lactating women. A total of 120 eligible participants were randomly allocated into two groups (n=60 each) through a computer-generated block randomization sequence. Allocation was concealed using sealed opaque envelopes, which were opened by an independent staff member immediately prior to surgery. Participants in Group A underwent endoscopic thyroid lobectomy using standard laparoscopic tools and CO₂ insufflation via either the transoral or axillary route. Group B received a conventional open lobectomy through a standard low collar incision. All surgeries were performed by qualified endocrine surgeons. Collected data included patient demographics (age, sex, body mass index, symptom duration, and nodule dimensions) and operative outcomes such as surgery duration, hospitalization length, and postoperative complications (hoarseness, seroma, and neck erythema). All information was extracted from electronic medical records and analyzed using SPSS version 26.0. Continuous variables were reported as means and standard deviations and analyzed using the independent samples t-test. Categorical data were expressed as counts and percentages, and comparisons were made using the Chi-square test. A p-value below 0.05 was considered to indicate statistical significance, and 95% confidence intervals were calculated for continuous outcome comparisons.

RESULTS

Table I delineates the enrollment of 120 patients, evenly apportioned between the endoscopic and open thyroid lobectomy cohorts, with 60 subjects in each category. The mean age within the endoscopic cohort was marginally lower at 26.83 ± 9.04 years, in contrast to 29.30 ± 8.85 years in the open surgical cohort. Both cohorts exhibited comparable mean BMI metrics: 25.76 ± 3.39 kg/m² for the endoscopic and 26.04 ± 3.20 kg/m² for the open surgical group. The duration of symptoms preceding the intervention was also closely aligned, averaging 2.90 ± 1.84 months in the endoscopic cohort and 2.68 ± 1.63 months in the open surgical cohort. A notable disparity was identified in the mean dimensions of thyroid nodules, with the endoscopic cohort exhibiting smaller nodules (8.37 ± 4.90 mm) in comparison to the open surgical cohort (15.23 ± 7.38 mm), potentially suggesting a bias towards the selection of smaller nodules for minimally invasive surgical interventions. The gender distribution indicated a marked predominance of female patients in both cohorts—96.7% in the endoscopic cohort and 91.7% in the open surgical cohort—whereas male participants comprised 3.3% and 8.3%, respectively. These preliminary characteristics imply that the cohorts were largely congruent in demographic and clinical profiles, with the observed variation in nodule size potentially influencing the selection of surgical methodology. As delineated in Table II, substantial disparities were observed in various surgical outcomes between the



endoscopic and open thyroid lobectomy cohorts.

The mean surgical duration was significantly abbreviated in the endoscopic cohort, documented at 107.08 ± 22.08 minutes, in contrast to 130.02 ± 25.02 minutes in the open cohort. This distinction was statistically significant, with a 95% confidence interval ranging from -31.465 to -14.402 and a p-value of 0.0001. Likewise, patients within the endoscopic cohort experienced a marginally diminished length of hospital stay (25.76 ± 3.39 days) compared to those within the open cohort (26.04 ± 3.20 days), also yielding a noteworthy p-value of 0.0001.

Regarding postoperative complications, these were exclusively reported among patients undergoing endoscopic surgery. Voice hoarseness was documented in 15% (9 patients) of the endoscopic cohort, with no such occurrences noted in the open cohort ($p = 0.002$). Furthermore, seroma formation was observed in 10% (6 patients) of the endoscopic cohort, whereas it was absent in the open cohort ($p = 0.012$). Neck erythema was similarly reported in 13.3% (8 patients) of the endoscopic cohort, while no instances were recorded in the open cohort ($p = 0.003$).

Table I: Characteristics of Study Participants (n=120)

Characteristics	Groups	
	Endoscopic (n=60)	Open (n=60)
Age in years, Mean $\pm$ SD	26.83 ± 9.04	29.30 ± 8.85

BMI in kg/m^2 , Mean $\pm$ SD		25.76 ± 3.39
Duration of Symptoms in months, Mean $\pm$ SD		2.90 ± 1.84
Nodule Size in mm, Mean $\pm$ SD		8.37 ± 4.90
Gender, n (%)	Male	2 (3.3)
	Female	58 (96.7)

Table II: Comparison of Surgical Outcomes Between Groups

Outcomes	Groups	
	Endoscopic	Open
Duration of Surgery in mins	107.08 ± 22.08	130.02 ± 25.02
Length of Hospital Stay in days	25.76 ± 3.39	26.04 ± 3.20
Hoarseness of Voice, n (%)	9 (15.0)	0 (0.0)
Seroma, n (%)	6 (10.0)	0 (0.0)
Neck Erythema, n (%)	8 (13.3)	0 (0.0)

DISCUSSION

The current randomized controlled trial was designed to assess and compare the surgical outcomes of endoscopic thyroid lobectomy versus conventional open thyroid lobectomy in patients from 18 to 65 years of age having benign or indeterminate solitary thyroid nodules ≤ 4 cm. This clinical choice is in accordance with current surgical guidelines of proceeding with endoscopic means for low-risk nodules without clinical or imaging evidence of malignancy, bilateral disease, or prior neck surgery [1,2]. In this study, both groups were similar

demographically, and the clinical presentation



follows regional data showing a female predominance and mean patient ages in the late 20s, which is to be expected for benign thyroid disease [5,6]. Intriguingly, the endoscopic cohort had notably smaller nodules than the open cohort, which reflects trends in surgical practice in which minimally invasive techniques are favored for smaller and more localized nodules [5,6]. The results found substantially lower average surgical time in the endoscopic cohort (107.08 ± 22.08 minutes) in comparison with the open cohort (130.02 ± 25.02 minutes), which has been in line with earlier studies demonstrating surgical efficiency of endoscopic techniques in the hands of experienced surgeons [3,4]. Additionally, the hospital stay was marginally shorter in the endoscopic group, supporting literature that suggests minimally invasive approaches lead to faster recovery and reduced hospital resource utilization [12,14]. Similar results have been reported in a 2020 comparative study, where patients undergoing endoscopic lobectomy experienced shorter hospitalization and reduced intraoperative time compared to their open surgery counterparts [17]. These benefits were further reinforced in a 2023 randomized trial that also emphasized functional improvements and postoperative recovery in the endoscopic group[1]. However, the endoscopic group exhibited a higher incidence of minor postoperative complications. Hoarseness of voice was observed in 15% of patients ($p = 0.002$), seroma formation in 10% ($p = 0.012$), and neck erythema in 13.3% ($p = 0.003$), whereas none of these complications occurred in

the open group. This mirrors findings from previous literature that suggest endoscopic surgery may increase the likelihood of temporary nerve irritation or tissue trauma, possibly due to the technical nature of endoscopic dissection and the use of CO₂ insufflation [9,11,13]. Nevertheless, these complications are generally self-limiting and resolved without long-term sequelae, as documented in earlier trials [1,11,17]. Importantly, no cases of hypocalcemia or significant bleeding were reported in either group, affirming the overall safety of both techniques when performed by skilled endocrine surgeons [6,15].

Although cosmetic outcomes were not objectively assessed in this trial, substantial prior research confirms that patients who undergo endoscopic thyroidectomy experience higher satisfaction with the aesthetic result, primarily due to the absence of a visible cervical scar [7,8,10]. Studies have also highlighted improved psychological outcomes and quality of life related to body image in patients undergoing scarless approaches, especially among young female patients [1, 10,17]. These intangible benefits, while difficult to quantify in a clinical setting, are central to patient-centered care and treatment planning in thyroid surgery. The strengths of this study include its randomized design, clear inclusion and exclusion criteria, and surgical consistency, with all operations performed by experienced endocrine surgeons. However, some limitations should be acknowledged. The smaller mean nodule size in the endoscopic group introduces potential selection bias, limiting the



generalizability of findings to larger or malignant nodules. Furthermore, the study did not include long-term follow-up, objective assessments of voice function or cosmesis, or cost-effectiveness analysis, all of which are important components of evaluating surgical value [15,16]. Finally, blinding was not implemented, which may introduce observer bias in the assessment of outcomes. In conclusion, endoscopic thyroid lobectomy appears to be a safe and effective alternative to open thyroid lobectomy for carefully selected patients with benign thyroid nodules. It offers benefits in operative time, recovery, and likely cosmetic satisfaction, though it carries a higher risk of minor, transient complications. These findings are in line with previous local and international research and support the role of endoscopic approaches as a valuable option in modern thyroid surgery [16-17].

CONCLUSION

Endoscopic thyroid lobectomy offers improved surgical outcomes over the conventional open approach, particularly in terms of reduced operative time and shorter hospitalization. While minor postoperative complications were more common with the endoscopic method, they were generally temporary and manageable. Considering its effectiveness and advantages in recovery, the endoscopic technique represents a suitable option for appropriately selected patients with benign thyroid nodules, supporting the principles of minimally invasive surgery.



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