

Retrospective Evaluation of Thyroid Cancer Cases Requiring Completion Surgery After Lobectomy

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Abstract

Background: Thyroid lobectomy has become an accepted initial surgical approach for selected patients with low-risk differentiated thyroid cancer. However, postoperative histopathological findings may reveal high-risk features that necessitate completion thyroidectomy. The clinical and pathological characteristics of patients requiring completion surgery after lobectomy remain an important area of investigation. **Methods:** This single-center, retrospective observational study included patients who underwent thyroid lobectomy for differentiated thyroid cancer between January 2018 and December 2022 and subsequently required completion thyroidectomy based on postoperative histopathological findings. Demographic data, clinical characteristics, surgical details, histopathological features, biochemical parameters, and postoperative complications were analyzed. **Results:** A total of 64 patients were included. Papillary thyroid carcinoma was the most common histological subtype. The leading indications for completion thyroidectomy were multifocality, extrathyroidal extension, vascular invasion, aggressive histological variants, and positive surgical margins. Malignant lesions in the contralateral thyroid lobe were detected in approximately one-third of patients. Postoperative hypocalcemia was the most frequently observed complication, with the majority being transient. Permanent complications were rare. **Conclusion:** Although thyroid lobectomy is an appropriate initial surgical option for selected low-risk differentiated thyroid cancer patients, a considerable proportion require completion thyroidectomy due to high-risk pathological features identified postoperatively. Careful histopathological evaluation and an individualized, risk-adapted surgical strategy are essential to optimize patient outcomes. Completion thyroidectomy can be performed safely in experienced centers with acceptable complication rates.

Keywords: Differentiated thyroid cancer; Thyroid lobectomy; Completion thyroidectomy; Histopathology; Surgical outcomes

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1. Introduction

Thyroid cancers are the most common endocrine malignancies, with differentiated thyroid cancers (DTCs) accounting for the majority of cases. Among these, papillary thyroid carcinoma represents the most frequent histological subtype and is generally associated with a favorable prognosis¹.

For many years, total thyroidectomy has been accepted as the standard surgical approach due to its potential to reduce local recurrence rates and to facilitate radioactive iodine (RAI) therapy². However, with increasing awareness of surgery-related complications, the 2015 American Thyroid Association (ATA) guidelines state that thyroid lobectomy may be a sufficient treatment option for selected patients with low-risk, intrathyroidal differentiated thyroid carcinoma measuring 1–4 cm³.

Nevertheless, histopathological findings obtained after lobectomy may lead to a change in the initial risk stratification. The presence of high-risk features such as multifocality, vascular invasion, extrathyroidal extension, aggressive histological variants, and positive surgical margins constitutes an indication for completion thyroidectomy⁴. Previous studies have reported considerable rates of malignancy detected in the contralateral lobe among patients who underwent completion surgery following lobectomy⁵.

Retrospective studies have demonstrated that approximately 20–40% of patients treated with lobectomy require completion thyroidectomy due to pathological findings⁶. Moreover, completion thyroidectomy performed in experienced centers has been reported to be associated with complication rates comparable to those of primary total thyroidectomy^{7,8}.

The aim of the present study was to retrospectively assess thyroid cancer patients who underwent completion thyroidectomy following lobectomy and to analyze the factors leading to the need for completion surgery.

2. Methods

This study was approved by the Van Yüzüncü Yıl University Clinical Research Ethics Committee (approval date: 18/11/2022; decision number: 22/11-17) and was conducted in accordance with the principles of the Declaration of Helsinki. The study was designed as a single-center, retrospective, observational study.

Patients who underwent thyroid lobectomy as the primary surgical treatment for suspected differentiated thyroid cancer between January 1, 2018, and December 31, 2022, and who were subsequently indicated for completion thyroidectomy based on postoperative histopathological evaluation were included. All surgical procedures were performed at the same institution by general surgeons experienced in thyroid surgery.

Primary lobectomy procedures were performed through a standard cervical incision, with meticulous attention paid to the preservation of the recurrent laryngeal nerve and parathyroid glands. Ipsilateral central lymph node dissection was performed only when deemed necessary based on clinical or imaging findings.

Completion thyroidectomy procedures were planned following primary surgery. During the second surgical intervention, careful dissection was performed with consideration of the previous surgical field. Parathyroid autotransplantation was performed when deemed necessary. Routine prophylactic central neck dissection was not performed; selective dissection was reserved for cases with clinically suspicious lymph nodes.

Inclusion criteria were: age ≥ 18 years, thyroid lobectomy as primary surgery, postoperative histopathological diagnosis of differentiated thyroid cancer (papillary or follicular type), and having undergone completion thyroidectomy. Patients with medullary or anaplastic thyroid cancer, those who underwent total thyroidectomy as the initial surgery, and those with incomplete data were excluded.

2.1. Statistical Analysis

All statistical analyses were performed using SPSS Statistics version 28.0 (IBM Corp., Armonk, NY, USA). Continuous variables are presented as mean $\pm$ SD and minimum–maximum values; categorical variables as numbers and percentages. The Shapiro–Wilk test was used to assess normality. The Wilcoxon signed-rank test was used for non-

normally distributed variables, and the paired Student's t-test for normally distributed data. Categorical variables were compared using the chi-square test or Fisher's exact test. A two-sided p-value of <0.05 was considered statistically significant.

3. Results

After applying inclusion and exclusion criteria, a total of 64 patients constituted the study cohort. The demographic and baseline clinical characteristics are presented in Table 1. A predominance of female patients was observed, with most individuals clustered in the middle adult age group.

Table 1. Demographic and Clinical Characteristics of the Patients

Variable	Value
Number of patients	64
Age (years), mean $\pm$ SD (min-max)	44.6 $\pm$ 11.8 (22-68)
Sex (Female / Male)	49 / 15
Primary surgery	Lobectomy
Interval to completion thyroidectomy (weeks), mean $\pm$ SD	6.3 $\pm$ 2.0

Abbreviations: SD, standard deviation.

Postoperative histopathological examination demonstrated papillary thyroid carcinoma as the most frequently identified subtype. Evaluation of histopathological features leading to completion thyroidectomy revealed multifocality, extrathyroidal extension, vascular invasion, aggressive histological variants, and positive surgical margins as predominant factors. In some patients, more than one high-risk pathological feature was identified concurrently. The distribution of indications is detailed in Table 2.

Table 2. Histopathological Indications for Completion Thyroidectomy

Indication	n	%
Multifocality	27	42.2
Extrathyroidal extension	19	29.7
Vascular invasion	14	21.9
Aggressive histological variant	11	17.2
Positive surgical margin	9	14.1

Note: More than one histopathological indication may be present in the same patient; therefore, percentages do not total 100%.

Histopathological examination of the contralateral thyroid lobe following completion thyroidectomy revealed additional malignant foci in a subset of patients, whereas benign pathological findings were observed in the remaining cases (Table 3).

Table 3. Histopathological Findings of the Contralateral Thyroid Lobe

Histopathological Finding	n	%
Malignant lesion detected	21	32.8
Benign pathology	43	67.2
Total	64	100

Note: Histopathological evaluation was performed following completion thyroidectomy.

Comparison of preoperative and postoperative biochemical parameters demonstrated statistically significant changes in serum calcium and parathormone (PTH) levels (Table 4).

Table 4. Comparison of Preoperative and Postoperative Biochemical Parameters After Completion Thyroidectomy

Parameter	Preoperative	Postoperative	p value
Serum calcium (mg/dL)	9.4 $\pm$ 0.5	8.3 $\pm$ 0.7	<0.001
PTH (pg/mL)	48.6 $\pm$ 16.2	31.4 $\pm$ 14.8	<0.001

Abbreviations: PTH, parathormone. Statistical tests: Wilcoxon signed-rank test for serum calcium; paired Student's t-test for PTH values.

Evaluation of postoperative surgical complications identified hypocalcemia as the most frequently observed complication. The majority of hypocalcemia cases resolved during follow-up. Recurrent laryngeal nerve injury was observed rarely (Table 5).

Table 5. Postoperative Complications

Complication	n	%
Transient hypocalcemia	18	28.1
Permanent hypocalcemia	2	3.1
Transient vocal cord paralysis	1	1.6
Permanent vocal cord paralysis	0	0

Definitions: Postoperative hypocalcemia was defined as serum calcium levels <8.0 mg/dL. Transient hypocalcemia was defined as normalization of calcium levels during follow-up.

4. Limitations

This study has several limitations. First, the retrospective design inherently limits the ability to establish causal relationships and may be associated with selection bias. Second, the study was conducted at a single tertiary referral center, which may restrict generalizability. Third, some high-risk pathological features were only identified postoperatively. Long-term oncological outcomes could not be comprehensively evaluated due to the retrospective nature and limited follow-up duration. Despite these limitations, the present study provides valuable real-world data regarding the indications and outcomes of completion thyroidectomy following lobectomy.

5. Discussion

The extent of surgical management in differentiated thyroid cancer has been substantially re-evaluated in recent years. Although thyroid lobectomy is considered an adequate initial surgical approach for selected patients in accordance with ATA recommendations³, current evidence indicates that the need for completion thyroidectomy following lobectomy remains a clinically significant issue⁹.

Recent studies have reported that completion thyroidectomy is required in approximately 25–40% of patients who undergo lobectomy for low-risk papillary thyroid carcinoma based on postoperative histopathological findings⁹. This observation suggests that preoperative risk stratification may not always be sufficient to accurately predict the final pathological risk profile.

Multifocality, extrathyroidal extension, and aggressive histological variants have been identified as among the most important pathological factors determining the need for completion thyroidectomy¹⁰. The literature emphasizes multifocality as a strong predictor of malignancy in the contralateral thyroid lobe^{10,11}. In line with these reports, multifocality and extrathyroidal extension were among the leading indications for completion surgery in our study.

Contemporary studies have reported that additional malignant foci are identified in the contralateral lobe in approximately one-third of patients undergoing completion thyroidectomy¹¹. Similarly, the presence of malignant findings in contralateral lobe pathology in our cohort reinforces the necessity for careful postoperative surveillance.

Regarding the safety of completion thyroidectomy, recent meta-analyses have demonstrated that, when performed in experienced centers, complication rates are comparable to those observed after primary total thyroidectomy¹². Transient hypocalcemia has been consistently reported as the most common complication, whereas permanent hypocalcemia and permanent recurrent laryngeal nerve injury remain rare¹³.

Current approaches advocate that the decision to perform completion thyroidectomy after lobectomy should not be based solely on tumor size, but rather on a comprehensive evaluation of postoperative histopathological risk factors¹⁴.

6. Conclusion

Thyroid lobectomy represents an appropriate initial surgical approach for selected patients with low-risk differentiated thyroid cancer. However, postoperative histopathological evaluation reveals that a substantial proportion of patients require completion thyroidectomy due to the presence of high-risk pathological features. These findings highlight the limitations of preoperative risk stratification and underscore the critical role of meticulous postoperative pathological assessment.

Completion thyroidectomy can be performed safely in experienced centers with acceptable complication rates. The identification of pathological factors such as multifocality, extrathyroidal extension, and aggressive histological variants remains essential in guiding the need for additional surgery. An individualized, risk-adapted surgical strategy based on both preoperative evaluation and postoperative histopathological findings is crucial for optimizing treatment outcomes. Multidisciplinary decision-making and close postoperative follow-up should be integral components of patient management following thyroid lobectomy.

Ethical Approval: The Non-interventional Clinical Research Ethics Committee of Van Yüzüncü Yıl University approved this work (Decision No: 22/11-17, Date: 18/11/2022). The study was conducted in accordance with the Declaration of Helsinki.

Informed Consent: Approval from the Institutional Review Board was obtained. Given the retrospective design, informed consent was not required.

Conflict of Interest: The authors declare no conflict of interest.

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