VER
Vascular & Endovascular Review

Profile of Follicular Thyroid Carcinoma Recurrence After Thyroid Resection at Dr. Soetomo General Hospital, May 2021–May 2025

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ABSTRACT

Background: Follicular thyroid carcinoma (FTC) accounts for 10–15% of differentiated thyroid cancers and poses a risk of recurrence despite generally favorable outcomes. Recurrence is influenced by clinical and pathological factors, yet evidence from Southeast Asia remains limited. This study aimed to describe the characteristics of patients with recurrent FTC following thyroid resection at Dr. Soetomo General Hospital, Surabaya.

Methods: A descriptive observational study with a cross-sectional design was conducted using retrospective medical records of patients diagnosed with recurrent FTC between May 2021 and May 2025. Total sampling was applied. Data included patient demographics, tumor characteristics, and pathological features. Recurrence was defined as local lymph node or distant metastasis confirmed by imaging or biopsy. Descriptive statistics were generated using SPSS version 26.

Results: A total of 105 FTC patients were included, of whom 58 experienced recurrence. Most patients were female (74/105), and the predominant age group was 50–80 years (62/105). Recurrent cases were more common in women (47/59) and individuals aged >50–80 years (34/59). Pathological factors strongly associated with recurrence included larger tumor size (>5 cm: 26/59), gross extrathyroidal extension (57/59), multifocality (57/59), aggressive histology (57/59), lymph node metastasis (43/59), and lymphovascular invasion (47/59).

Conclusion: Recurrence of FTC was more frequent in older patients and women, and strongly associated with aggressive pathological characteristics. These findings underscore the importance of risk-adapted postoperative surveillance incorporating age, sex, and pathological features. Further multicenter studies are needed to refine prediction models and improve long-term management strategies for high-risk FTC patients.

KEYWORDS: Follicular thyroid carcinoma; Cancer recurrence; Extrathyroidal extension; Lymphovascular invasion; Thyroidectomy

How to Cite: Erisi Syafiril Umah, Marjono Dwi Wibowo, Dwi Hari Susilo., (2025) Profile of Follicular Thyroid Carcinoma Recurrence After Thyroid Resection at Dr. Soetomo General Hospital, May 2021–May 2025, Vascular and Endovascular Review, Vol.8, No.19s, 239-244

INTRODUCTION

The thyroid gland is a bilobed endocrine organ composed of follicular cells that regulate metabolic processes, and malignant transformation of these cells gives rise to differentiated thyroid cancers (DTC), including papillary (PTC), follicular (FTC), and Hürthle cell carcinoma.[1,2] FTC accounts for approximately 10–15% of thyroid cancers and, although generally less common than PTC, remains clinically important due to its distinct biological behavior and potential for hematogenous metastasis.[2,3] Globally, thyroid cancer incidence has increased markedly over the past three decades, with substantial burden observed in the United States, Southeast Asia, and Indonesia.[4] This rise is not attributable to overdiagnosis alone, as both incidence and mortality continue to increase in several populations.[5]

Multiple risk factors contribute to FTC development, including iodine deficiency, which is associated with higher FTC prevalence compared with PTC and improves with iodine supplementation.[6] Molecularly, FTC is characterized by RAS mutations—particularly NRAS—and PAX8–PPARG rearrangements, which are generally mutually exclusive and represent distinct oncogenic pathways.[7–9] However, these alterations also occur in follicular adenoma, limiting their diagnostic sensitivity and reinforcing the requirement to demonstrate capsular or vascular invasion for definitive diagnosis.[10–13] Fine-needle aspiration cytology (FNAC) remains the initial diagnostic modality, yet cannot reliably distinguish FTC from adenoma, often producing indeterminate results such as “follicular neoplasm” or AUS/FLUS.[13–15] Ultrasonography enhances lesion characterization and guides sampling, especially in multinodular disease.[5,16]

Surgical resection is the primary treatment, with total thyroidectomy recommended for tumors more than 1 cm, extra-thyroidal extension, or distant disease, while lobectomy may suffice for low-risk, minimally invasive FTC.[8,17] Adjuvant radioactive iodine (RAI) is used for high-risk features, and alternative therapies—including external beam radiotherapy (EBRT), tyrosine kinase

inhibitors (TKIs), and chemotherapy—are reserved for RAI-refractory or unresectable disease.[1,11,18–21] Despite generally favorable survival outcomes, recurrence remains a major concern and may present locally, regionally, or as distant metastases, most often in bone or lung.[16] Established risk factors include gross extra-thyroidal extension, aggressive histology, vascular invasion, nodal metastases, and elevated postoperative thyroglobulin, all incorporated into ATA and AMES risk stratification systems.[10,12,18,21]

However, evidence specific to FTC—particularly in Southeast Asia—remains limited, and regional differences in iodine intake, clinical practice, and healthcare accessibility may influence recurrence patterns.[4,6] To address this gap, the present study describes the clinical and pathological characteristics of patients with recurrent FTC following thyroid resection at Dr. Soetomo General Hospital, Surabaya, between May 2021 and May 2025, providing essential baseline data to support future analyses and optimize risk-adapted follow-up strategies in the Indonesian population.

METHODS

This study applied an observational descriptive design with a cross-sectional approach, using retrospective data obtained from medical records. All information was collected from patients diagnosed with recurrent follicular thyroid carcinoma (FTC) who previously underwent thyroid resection at Dr. Soetomo General Hospital, Surabaya. The study period covered clinic visits to the Head and Neck Surgery outpatient clinic between May 2021 and May 2025.

The study population consisted of all patients with thyroid carcinoma who experienced recurrence following surgical resection. A total sampling strategy was used, whereby all patients who met the eligibility criteria during the study timeframe were included. Sampling was conducted consecutively to ensure complete capture of available cases. Patients were eligible for inclusion if they had a confirmed diagnosis of follicular thyroid carcinoma and experienced recurrence after thyroid resection. Patients were excluded if they had FTC recurrence without prior thyroid resection, if they did not experience recurrence following resection, or if their medical records were incomplete.

The study included one dependent variable, recurrent FTC, defined as either local lymph node metastasis or distant metastasis confirmed through imaging modalities or biopsy. Independent variables comprised patient characteristics—specifically sex and age—and a set of pathological characteristics, including tumor size, extrathyroidal extension, multifocality, aggressive histology, lymph node metastasis, and lymphovascular invasion. All operational definitions and classifications were based on the documentation available in patient records.

Data collection relied entirely on secondary sources, specifically paper-based and electronic medical records stored at Dr. Soetomo General Hospital. The process involved verification of diagnosis, surgical details, pathological findings, and documentation of recurrence. Prior to data extraction, several preparatory steps were completed, including a preliminary assessment of data availability, preparation of the research protocol, submission for ethical approval, and acquisition of formal permission from the hospital's research and development unit.

All collected data were analyzed descriptively to determine the frequency and percentage distribution of each study variable. Statistical analyses were performed using IBM SPSS Statistics version 26.

RESULTS

A total of 105 patients with follicular thyroid carcinoma who had undergone thyroid resection were included in this study. The majority of patients were women (n = 74), while men accounted for 31 cases. Age distribution showed that most patients were between 50 and 80 years old (n = 62), followed by those aged >40–50 years (n = 20), ≤40 years (n = 12), and >80 years (n = 11). Recurrence was identified in 58 patients, whereas 47 patients did not develop recurrence.

Table 1. General Characteristics of the Study Subjects

Characteristics	Number
Sex	
Male	31
Female	74
Age (years)	
≤ 40	12
> 40–50	20
> 50–80	62
> 80	11
Recurrence	
Yes	58
No	47

Pathological characteristics demonstrated variations across several parameters. Tumor size was ≤5 cm in 63 patients, whereas 42 patients presented with tumors larger than 5 cm. Extrathyroidal extension was almost evenly distributed, with 52 patients classified as having minor extension and 53 patients as gross extension. Multifocality was observed in 54 patients, while 51 patients had unifocal tumors. Aggressive histological variants were identified in 62 patients, compared with 43 who did not exhibit such features. Lymph node metastasis was documented in 56 patients, and 49 showed no nodal involvement. Lymphovascular invasion was present in 58 patients, while 47 demonstrated no evidence of vascular or lymphatic involvement.

Table 2. Pathological Characteristics of the Study Subjects

Characteristics	Number
Tumor Size (cm)	
≤ 5	63
> 5	42
Extrathyroidal Extension	
Minor	52
Gross	53
Multifocality	
Yes	54
No	51
Aggressive Histology	
Yes	62
No	43
Lymph Node Metastasis	
Yes	56
No	49
Lymphovascular Invasion	
Yes	58
No	47

A comparative analysis between recurrent and non-recurrent groups revealed distinct patterns. In the recurrent group (n = 59), women predominated (n = 47), whereas the non-recurrent group (n = 46) showed a more balanced sex distribution with 31 men and 12 women. Age distribution indicated that the >50–80-year category constituted the largest subgroup in both cohorts, with 34 patients in the recurrent group and 29 in the non-recurrent group. Younger patients (≤40 years) were more frequently found in the non-recurrent group (n = 27), compared with 13 cases in the recurrent group.

Table 3. General Characteristics of the Study Subjects in the Recurrent and Non-Recurrent Groups

Characteristics	Recurrent (N = 59)	Non-Recurrent (N = 46)
Sex		
Male	15	31
Female	47	12
Age (years)		
≤ 40	13	27
> 40–50	9	11
> 50–80	34	29
> 80	2	2

Pathological disparities between the two groups were also pronounced. Larger tumors (>5 cm) were more frequent among recurrent cases (n = 26) compared with the non-recurrent group (n = 13). Gross extrathyroidal extension dominated the recurrent group (n = 57), whereas minor extension was typical among non-recurrent patients (n = 66). Multifocality was detected in almost all recurrent cases (n = 57), while only two patients in the non-recurrent group exhibited multifocal disease. Aggressive histology was also far more common in the recurrent cohort (n = 57), in stark contrast to the non-recurrent group (n = 2).

Table 4. Pathological Characteristics of the Study Subjects in the Recurrent and Non-Recurrent Groups

Characteristics	Recurrent (N = 59)	Non-Recurrent (N = 46)
Tumor Size (cm)		
≤ 5	32	56
> 5	26	13
Extrathyroidal Extension		
Minor	1	66
Gross	57	3
Multifocality		
Yes	57	2
No	1	67
Aggressive Histology		
Yes	57	2
No	1	67
Lymph Node Metastasis		
Yes	43	11
No	15	58
Lymphovascular Invasion		
Yes	47	11
No	11	58

Lymph node metastasis was observed in 43 recurrent cases compared with 11 non-recurrent cases. Similarly, lymphovascular invasion was detected in 47 patients in the recurrent group but only in 11 patients in the non-recurrent group. These findings indicate that recurrent FTC cases were more frequently associated with larger tumors, gross extrathyroidal extension, multifocality, aggressive histological features, and higher burdens of nodal and vascular invasion.

DISCUSSION

This study examined clinical and pathological characteristics associated with recurrence in patients with follicular thyroid carcinoma (FTC) who underwent thyroid resection at Dr. Soetomo General Hospital between May 2021 and May 2025. The findings emphasize that recurrence in FTC remains a clinically significant issue, as it is closely linked to increased morbidity, impaired quality of life, and long-term prognosis.[22] Interpretation of these findings within the context of prior evidence highlights several important patterns related to age, sex, and tumor behavior that contribute to recurrence risk.

Age appeared to be an important determinant of recurrence. In this study, the majority of recurrent cases were observed in patients aged ≥55 years, suggesting that recurrence is not limited to younger age groups traditionally considered high-risk.[23] Prior studies similarly demonstrate that older age confers a substantially higher risk of both recurrence and mortality. Chereau et al. (2016) reported that patients aged above 75 years experienced nearly twice the likelihood of recurrence compared with individuals below 65 years, underscoring the prognostic importance of age.[20] Likewise, Kauffmann et al. (2018) found that older age is associated with higher mortality in thyroid cancer.[24] Together with the present findings, these studies reinforce the role of age in risk stratification models for FTC and highlight the need for vigilant postoperative surveillance in older patients.

Sex-based differences were also apparent. Although more women were represented overall, recurrent cases included a disproportionately higher number of female patients. Interestingly, previous research shows mixed trends depending on disease stage. Sun et al. (2022) reported that men are more frequently observed among recurrent cases presenting at advanced stages, suggesting a potential interaction between sex and tumor aggressiveness.[25] Woo et al. (2021) further demonstrated that multifocal FTC—more common in women—was associated with higher recurrence rates compared with unifocal disease.[26] These differing patterns suggest that while FTC is more prevalent in women, male sex may convey additional risk in advanced disease, whereas multifocality may account for increased recurrence among women.

Tumor size also demonstrated a notable association with recurrence. Larger tumors (more than 5 cm) were more frequent among recurrent cases in this study, consistent with the conclusion by Sun et al. (2022) that tumor diameter is a meaningful predictor of recurrence.[13] Their study showed that at early stages, the median tumor size in recurrent patients was approximately 3 cm, compared with 2.3 cm in non-recurrent cases, although this association diminished in advanced disease. These findings collectively indicate that tumor size remains an important prognostic indicator in FTC, particularly in early-stage disease where surgical intervention may have greater influence on long-term outcomes.

Extrathyroidal extension (ETE) emerged as one of the strongest pathological predictors. Gross ETE was seen predominantly in recurrent cases, suggesting that extensive local invasion significantly contributes to postoperative recurrence. This aligns with findings from Sun et al. (2022), who reported that advanced-stage ETE markedly increases recurrence rates.[25] Gross ETE often indicates deeper infiltration into surrounding tissues, complicating complete surgical excision, and thereby elevating recurrence risk. The present study supports the consensus that early recognition of ETE is critical for treatment planning and postoperative monitoring.

Multifocality and aggressive histological patterns also showed strong associations with recurrence. In this study, multifocal tumors were found in a substantial proportion of recurrent cases, suggesting that tumor multiplicity increases the likelihood of residual disease following resection. Woo et al. (2021) showed similar findings, reporting significantly lower recurrence-free survival in multifocal FTC compared with unifocal tumors (93.3% vs. 97.1%). Aggressive histological variants, such as tall-cell or widely invasive patterns, were likewise more prevalent in recurrent cases in this study. Such variants are known to be more invasive and biologically aggressive, contributing to higher risks of both local and distant recurrence.

Metastasis to regional lymph nodes and lymphovascular invasion (LVI) were also strongly associated with recurrence. In the present cohort, nodal metastasis and LVI were substantially more frequent among recurrent patients. These findings corroborate those of Wang et al. (2017), who demonstrated that N1b nodal metastasis and LVI significantly increase recurrence risk, with hazard ratios of 3.24 and 2.31, respectively. LVI suggests the presence of tumor cells within vascular or lymphatic channels, facilitating both local spread and distant metastasis. Thus, its presence serves as a critical pathological marker for recurrence risk and should trigger closer postoperative follow-up.[27]

Overall, this study confirms that recurrence in FTC is influenced by a combination of clinical and pathological factors, including older age, larger tumor size, gross extrathyroidal extension, multifocality, aggressive histology, lymph node metastasis, and lymphovascular invasion. These findings align with previous research and reinforce the necessity of incorporating these variables into postoperative risk stratification. Moreover, they underscore the importance of individualized surveillance strategies tailored to each patient's risk profile. Future studies, particularly multicenter or prospective designs, are needed to further refine predictive models and to evaluate interventions that may reduce recurrence risk in high-risk FTC patients.

CONCLUSION

This study provides an overview of patients with recurrent follicular thyroid carcinoma who underwent thyroid resection at Dr. Soetomo General Hospital between May 2021 and May 2025. The findings indicate that recurrence occurred predominantly in patients aged ≥55 years, suggesting that increasing age is an important contributor to recurrence risk. Additionally, most recurrent cases were observed in female patients, reflecting the higher overall prevalence of thyroid cancer in women and highlighting the need for tailored postoperative surveillance in this population. These results emphasize the importance of integrating age and sex into postoperative risk assessment and follow-up strategies for follicular thyroid carcinoma. Further research with larger, multi-center cohorts is recommended to refine prognostic models and strengthen clinical decision-making regarding recurrence prevention and monitoring

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