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Thyroid Surgery Trends and Histopathological Patterns at a National Referral Center in Sri Lanka: A Retrospective Analysis (2017–2023)

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ABSTRACT

Background: Thyroid disorders represent a significant spectrum of endocrine diseases globally. This study aimed to evaluate demographic, surgical, and histopathological trends of thyroidectomies at the National Hospital of Sri Lanka (NHSL) from 2017 to 2023. **Methods:** This retrospective cohort study analyzed 2,580 thyroidectomy cases performed at NHSL between January 2017 and December 2023. Data were extracted from electronic and paper-based patient records, including demographic characteristics, surgical procedures, and histopathological findings. Statistical analysis was performed using chi-square tests and regression analysis. **Results:** The cohort comprised 2,580 patients (84.7% female, mean age 47.7 years). Total thyroidectomy was the most common procedure (82.0%). Malignancy was identified in 24.5% of cases, with papillary carcinoma (18.2%) being the most common. Male gender was significantly associated with malignancy (32.6% vs 23.0%, p<0.001). Parathyroid glands were identified in 7.0% of specimens, and lymph nodes in 11.9% overall (29.3% in malignant cases). **Conclusion:** This study represents the largest single-center audit of thyroid surgery in Sri Lanka. The findings highlight the predominance of benign disease, the significant association of male gender with malignancy, and opportunities for improving surgical quality indicators including parathyroid preservation and lymph node assessment.

Keywords: Thyroidectomy, Thyroid pathology, Parathyroid gland, Thyroid carcinoma, Lymph node.

INTRODUCTION

Thyroid disorders represent a diverse and globally significant spectrum of endocrine diseases, with a sharp rise in detection rates reported across both developed and developing regions in recent decades. Among these, thyroid nodules and differentiated thyroid cancers (DTCs) constitute the most frequently encountered surgical pathologies requiring operative management. The American Thyroid Association (ATA) guidelines underscore the importance of evidence-based, risk-adapted management for thyroid nodules and DTCs, aiming to balance oncological safety with minimization of surgical morbidity, especially in resource-constrained settings [1].

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Globally, the incidence of thyroid cancer has steadily increased over the past three decades, with GLOBOCAN 2020 data ranking it among the most commonly diagnosed cancers in women in several regions, including Asia [2]. Multiple factors underlie this rise, including enhanced diagnostic sensitivity through imaging, increased use of fine needle aspiration cytology (FNAC), and potential environmental and dietary contributors [3,4]. Additionally, improved iodine nutrition, a double-edged sword in thyroid epidemiology, may influence the histological pattern of thyroid diseases in various populations [5,6]. In Sri Lanka, the nationwide universal salt iodization programme introduced in the 1990s significantly altered the endemic goitre landscape, shifting the burden from iodine-deficiency goitre to nodular thyroid disease and autoimmune thyroiditis [7,8].

Recent local studies have reported a steady increase in thyroid cancer incidence and surgical volume in Sri Lanka, paralleling global trends [8,9]. This rise is complicated by diagnostic ambiguity in cytopathology, particularly in indeterminate Bethesda categories, and by resource limitations in applying molecular diagnostics [9,10]. The epidemiology of thyroid surgery in Sri Lanka, while explored in smaller series [8-11], remains inadequately characterized at a national referral level, especially with respect to temporal trends, demographic patterns, histopathological spectrum, and critical quality indicators such as lymph node yield and parathyroid gland preservation.

The spectrum of thyroid malignancies in Asia is also distinct. Data suggest a higher proportion of follicular and aggressive subtypes, particularly among older patients [6,12]. As such, operative planning must be guided not only by oncological principles but also by regional disease patterns and evolving guidelines. There remains a crucial need for high-resolution, locally generated data to guide surgical training, institutional protocols, and national cancer control policy.

In this context, the present study provides the largest retrospective analysis of thyroidectomy practice at the National Hospital of Sri Lanka (NHSL), examining 2,580 consecutive cases over a seven-year period (2017-2023). This study aims to comprehensively evaluate the evolving landscape of thyroid surgery by examining temporal trends in operative volume, demographic patterns, histopathological characteristics, and key surgical quality indicators such as parathyroid gland preservation and lymph node assessment.

METHODOLOGY

Study Setting and Design

This retrospective cohort study was conducted at the National Hospital of Sri Lanka (NHSL), Colombo, encompassing all patients who underwent surgical intervention for thyroid gland disorders between January 2017 and December 2023. The NHSL, established in 1864, is the country's largest tertiary care and final referral center, offering comprehensive medical and surgical services across all specialties and subspecialties.

Ethical Approval

This study was approved by the Ethics Review Committee of the National Hospital of Sri Lanka (ERC/Approval No. AAJ/ETH/COM/2025). All procedures were conducted in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments. As this was a retrospective analysis of anonymized surgical and pathological records, the Ethics Review Committee waived the requirement for informed consent.

Data collection

A dedicated retrospective database was developed by reviewing electronic and paper-based patient records. Surgical pathology reports, operative notes, and clinical documentation were used to extract relevant variables including: year of surgery, age and gender, histopathological diagnosis (benign vs malignant, including subtype classification), cervical lymph node involvement, and detection of parathyroid glands in the final surgical specimen.

Statistical analysis

The dataset was analyzed using SPSS software. Descriptive statistics were used to summarize demographic profiles and surgical volumes. Chi-square tests were used to assess associations between categorical variables such as gender, diagnosis type, and surgery type. Trend analysis was performed to visualize annual shifts in surgical and malignancy patterns. A p-value <0.05 was considered statistically significant.

RESULTS

Demographic and Temporal Trends

Between 2017 and 2023, 2,580 thyroid surgeries were performed at the National Hospital of Sri Lanka. The annual surgical volume ranged from a low of 294 cases in 2020-likely reflecting the global impact of the COVID-19 pandemic-to a peak of 448 cases in 2023 (Table 1). A linear regression analysis yielded a positive slope of +10.68 surgeries per year, indicating a mild upward trend; however, this was not statistically significant (p=0.383, R^2=0.154).

Table 1. Annual Distribution of Thyroid Surgeries (2017-2023)

Year	Number of Surgeries	Percentage (%)	Cumulative (%)
2017	346	13.4	13.4
2018	336	13.0	26.4
2019	440	17.1	43.5
2020	294	11.4	54.9
2021	327	12.7	67.6
2022	389	15.1	82.6
2023	448	17.4	100.0
Total	**2,580**	**100.0**	**-**

The study cohort had a mean age of 47.73 years (95% CI: 47.23-48.23), with a median of 47 years. Patient ages ranged from 15 to 97 years. The majority (53.2%) belonged to the 40-59 age group, followed by 20.4% aged 60 years or older, 24.9% aged 21-39 years, and only 1.5% aged 20 years or younger. Overall, 84.7% (n=2,184) were female and 15.3% (n=396) were male, demonstrating a clear predominance of thyroid surgery among female patients.

Gender Distribution and Malignancy Association

Among all surgeries, 75.5% were performed for benign indications (n=1,949), while 24.5% were for malignancies (n=631). When stratified by indication, malignant pathology was observed in 32.6% of male and 23.0% of female patients. A chi-square test assessing the association between gender and malignancy status was statistically significant (χ^2 (1) = 16.688, p<0.001), indicating that the proportion of malignancy is significantly higher in males compared to females (Table 2).

Table 2. Gender Distribution by Surgical Indication

Gender	Malignant n (%)	Benign n (%)	Total	% Malignant
Male	129 (32.6)	267 (67.4)	396	32.6
Female	502 (23.0)	1,682 (77.0)	2,184	23.0
Total	**631 (24.5)**	**1,949 (75.5)**	**2,580**	**-**

Surgical Practice Trends

The most commonly performed surgery was total thyroidectomy, accounting for 82.0% (n=2,116) of all cases. Other procedures included right lobectomy (5.9%), left lobectomy (5.1%), near total thyroidectomy (2.3%), and various less frequent partial or completion procedures. Total thyroidectomy remained the dominant procedure for both benign and malignant diseases, though it was more frequently employed in malignant cases. A chi-square test assessing the association between type of thyroidectomy and surgical indication yielded a statistically significant result (χ^2 (8) = 36.682, p<0.001).

Histopathological Profile

Among the 2,580 thyroidectomy specimens examined, papillary carcinoma was the most frequently encountered malignancy, comprising 18.2% of all thyroidectomies, followed by follicular carcinoma (4.9%). Other malignancies-including medullary, anaplastic, and poorly differentiated thyroid carcinomas-accounted for less than 0.5% of cases each (Table 3).

Table 3. Distribution of Histological Types

Tumor Type	Frequency	Percentage (%)
Papillary Carcinoma	469	18.2
Follicular Carcinoma	123	4.8
Hurthle Cell Carcinoma	7	0.3
Poorly Differentiated Carcinoma	8	0.3
Anaplastic Carcinoma	7	0.3
Medullary Carcinoma	8	0.3
Lymphoma	1	<0.1
Other Malignancies	8	0.3
Benign	1,949	75.5
Total	**2,580**	**100.0**

Parathyroid Gland and Lymph Node Detection

Parathyroid glands were histologically identified in only 7.0% of specimens (n=180), while 69.6% (n=1,796) had no parathyroids detected. Parathyroid detection rates varied significantly between malignant and benign indications: 13.6% (n=86) in malignant cases versus 4.8% (n=94) in benign cases (χ^2 (2) = 262.953, p<0.001).

Lymph nodes were histologically identified in 306 cases (11.9%) overall. Among malignant cases, lymph nodes were identified in 185 (29.3%), compared to only 6.2% (121 of 1,949) of benign specimens. This distribution demonstrated a statistically significant association between indication for surgery and lymph node documentation status (χ^2=283.095, **p<0.001).**

DISCUSSION

This study, encompassing 2,580 thyroidectomy cases over seven years at the National Hospital of Sri Lanka, represents the most comprehensive single-center audit of thyroid surgical practice in the country. It offers critical insights into evolving disease epidemiology, operative patterns, and histopathological outcomes in a high-volume endocrine surgery unit.

The mean patient age of 47.7 years, with a female-to-male ratio of approximately 5.5:1, aligns closely with global thyroid disease demographics, where benign nodular disease and differentiated thyroid cancers disproportionately affect middle-aged women [1,2]. Our finding that 53.2% of patients were aged 40-59 years and 84.7% was female corroborates international literature and reflects the estrogen-linked pathogenesis of both benign and malignant thyroid disorders [3,4].

Notably, the annual surgical volume exhibited a mild upward trend, with a nadir in 2020, coinciding with the COVID-19 pandemic. Similar temporal dips in elective thyroid surgery have been reported globally during the pandemic period [5,6]. However, the overall regression analysis in our study did not demonstrate statistical significance, suggesting natural year-to-year fluctuations rather than a sustained increase.

Malignancy accounted for 24.5% of all thyroidectomies, consistent with global resection rates for DTCs in surgical series [1,3]. Papillary carcinoma dominated the histological spectrum (18.2% overall), followed by follicular carcinoma (4.8%), with anaplastic and medullary subtypes remaining rare. This distribution echoes regional patterns in Asia, where papillary carcinoma prevalence is high but follicular variants are relatively more frequent than in Western cohorts [6,12].

Importantly, male gender was significantly associated with malignancy (32.6% of males vs.

23.0% of females; p<0.001), mirroring existing data where thyroid cancer in males is less common but tends to present more aggressively [2,10]. Younger mean age in malignant cases (45.9 years) compared to benign (48.3 years) reinforces prior epidemiological observations that DTC can affect relatively younger individuals [3,9].

Total thyroidectomy was the most common procedure (82.0%), even in benign disease, a practice pattern that may reflect institutional preference, patient expectations, or a strategy to preclude reoperation. However, several meta-analyses now advocate for hemithyroidectomy in low-risk DTC, citing equivalent oncological outcomes and lower complication rates [13,28].

One of the most striking findings was the low rate (7.0%) of parathyroid gland identification in surgical specimens. Although a low retrieval rate is often desirable as it implies successful in situ preservation, the histological presence of parathyroids can indicate inadvertent excision, especially when not documented intraoperatively [30]. The significantly higher parathyroid detection in malignant cases (13.6% vs. 4.8%; p<0.001) suggests greater surgical complexity or more extensive dissection.

Lymph node identification was recorded in only 11.9% of cases overall, rising to 29.3% in malignant cases. While this is expectedly higher in cancer patients, the overall rate remains suboptimal compared to international standards. According to ATA and ESES recommendations, nodal dissection or sampling should be considered in intermediate or high-risk papillary thyroid carcinoma [31,32].

Study Limitations

This study has several limitations. Its retrospective design inherently introduces selection and documentation biases. The data were derived solely from histopathology records, which lack crucial intraoperative and clinical parameters, such as surgical intent, extent of neck dissection, nerve monitoring use, and intraoperative parathyroid management. Clinical correlations were unavailable, such as serum calcium levels, thyroid function tests, and follow-up outcomes.

CONCLUSION

This study represents the largest Sri Lankan thyroidectomy dataset analyzed to date, providing invaluable insights into real-world surgical practices in a low-middle-income country context. The findings highlight temporal, demographic, pathological, and surgical trends over seven years. The significant association of male gender with malignancy, the predominance of papillary carcinoma, and the opportunities for improving surgical quality indicators including parathyroid preservation and lymph node assessment, establish a critical foundation for national guidelines and future prospective multicenter studies.

Author declaration

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Authors' contributions:
Conceptualization: DMPWASBD, MG; Manuscript writing: DMPWASBD, Manuscript review and editing: DMPWASBD, MG, SS, KA, GD, NJ, NM, PM, ER; Data entry: CS, SD, PP, PS, SU, RD.

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Data will be available on request from the corresponding author.

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