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Prevalence and Patterns of Post-Thyroidectomy Complications Among Adult Patients at Wachemo University Nigist Eleni Mohammed Memorial Comprehensive Specialized Hospital, Central Ethiopia: A Retrospective Cross-Sectional Study

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Abstract

Background

Thyroid disease is among the most common endocrine disorders worldwide; global goiter prevalence is estimated at 15.8%, rising to 28.3% in Africa, and the burden of thyroid disease in Ethiopia is correspondingly high. Thyroidectomy is one of the most frequently performed endocrine surgical procedures, but the prevalence and pattern of postoperative complications differ substantially between industrialized and resource-limited settings. No data on post-thyroidectomy complications have previously been reported from Wachemo University Nigist Eleni Mohammed Memorial Comprehensive Specialized Hospital (WUNEMMCSH).

Methods

An institution-based retrospective cross-sectional study was conducted among 233 adult patients who underwent thyroidectomy at WUNEMMCSH between January 1, 2022 and December 31, 2024, enrolled by consecutive non-probability sampling. Data were abstracted from medical records using a structured checklist, entered into Kobo Toolbox, and analyzed in SPSS version 25 using descriptive statistics, with the chi-square test for categorical comparisons and the Shapiro-Wilk test to assess normality.

Results

Among the 233 participants, 35 (15.0%; 95% CI 10.4–20.0%) developed a post-thyroidectomy complication. As independent proportions of the full cohort, hypocalcemia accounted for 5.6%, voice change for 5.2%, hypothyroidism for 3.4%, hematoma for 3.0%, combined hematoma with voice change for 1.7%, and recurrence for 1.7%. Twenty-eight patients (12.0%) developed early complications (within 48–72 hours) and 21 (9.0%) developed late complications (after 48–72 hours).

Conclusion

The prevalence of post-thyroidectomy complications at WUNEMMCSH (15.0%) exceeded rates reported from high-income settings (1.5–4.2%) but was broadly comparable to other Ethiopian referral hospitals. Hypocalcemia and voice change were the most prevalent individual complications, and early-onset complications were slightly more frequent than late-onset complications. These findings support structured postoperative monitoring protocols — particularly serum calcium surveillance and laryngoscopic assessment of voice function — in resource-limited surgical settings.

BACKGROUND

Thyroidectomy — the surgical removal of diseased thyroid tissue, performed as a subtotal, near-total, or total procedure depending on indication — is among the oldest major operations and is now among the safest. During the eighteenth century, operative mortality approached 40%, principally from hemorrhage and sepsis [1, 2]. Pioneering work by Desault, Pirogoff, and later Halsted, Billroth, and Kocher transformed the safety of the procedure; Kocher's refinements in particular reduced surgery-related mortality to below 0.5% [10]. Modern antiseptic technique, anesthesia, and instrumentation have since lowered morbidity and mortality further [4, 5], and thyroidectomy is now one of the most commonly performed endocrine surgical procedures worldwide.

Thyroid pathology nonetheless remains a substantial global health burden. Goiter prevalence in the general population is estimated at 15.8% worldwide and 28.3% in Africa, and the burden of thyroid disease in Ethiopia is correspondingly high, with large numbers of patients requiring surgical care each year [1]. Despite the overall safety of modern thyroid surgery, its anatomical complexity carries an inherent risk of complications — including wound infection, hematoma or hemorrhage with airway compromise, hypocalcemia, recurrent or external branch superior laryngeal nerve (RLN/EBSLN) injury, and, rarely, thyroid storm [6, 11]. Hypocalcemia is identified by symptoms such as circumoral paresthesia, carpopedal spasm, Trousseau's or Chvostek's sign, or a low serum calcium; RLN injury presents as hoarseness, choking, or airway obstruction confirmed by laryngoscopy; and EBSLN injury manifests as loss of high-pitched vocal range or vocal fatigue during prolonged speech [11, 12].

The pattern of post-thyroidectomy complications differs markedly between industrialized and developing countries. In Ethiopia, thyroid surgery is performed predominantly by general surgeons rather than ENT or endocrine subspecialists, owing to the limited availability of the latter [13]. Comparative data illustrate this gap: a 30-day outcomes study in the United States found total thyroidectomy associated with significantly higher overall and medical complication rates than unilateral lobectomy, with no significant difference in surgical complication or mortality rates between the two procedures [12]. By contrast, a Nigerian series reported postoperative airway complications in 12.8% of patients (hematoma 0.8%, laryngeal nerve injury 3.0%, laryngeal oedema 3.7%, tracheomalacia 5.3%) [3, 7], and a study from a comparable resource-limited setting documented EBSLN injury in 7.5% and hypocalcemia in 5.5% of patients [14, 15]. Continent-wide, a meta-analysis and a retrospective cohort study from Africa reported pooled complication prevalences of 26.6% and 15.3%, respectively [8, 9].

Ethiopian data remain sparse. A study at Saint Paul's Hospital Millennium Medical College identified hypocalcemia as the most common immediate postoperative complication [18]; a study at Ambo University reported an overall complication magnitude of 18.6–21.8% [22]; a Bahir Dar study found a lower prevalence of 11%, with voice change (6.1%) predominating; and a study from Harar, eastern Ethiopia, reported a complication rate of 9.5%, led by hemorrhage and hypocalcemia (2.5% each) [33]. To the authors' knowledge, no published data exist on post-thyroidectomy complications at WUNEMMCSH, a tertiary referral hospital serving a catchment population of approximately 3.2 million people in central Ethiopia, despite clinical impressions of a substantial complication burden. The absence of local

evidence limits the development of context-specific postoperative monitoring protocols and the justification for targeted resource allocation.

This study therefore aimed to determine the prevalence, pattern, and onset of post-thyroidectomy complications among adult patients who underwent thyroidectomy at WUNEMMCSH between January 2022 and December 2024, in order to generate baseline evidence for postoperative care in this and comparable resource-limited surgical settings. Specifically, the study sought to determine (i) the overall prevalence of post-thyroidectomy complications, (ii) the prevalence of specific individual complications, and (iii) the onset — early versus late — of these complications.

METHODS

Study design, setting, and period

An institution-based retrospective cross-sectional study was conducted at Wachemo University Nigist Eleni Mohammed Memorial Comprehensive Specialized Hospital (WUNEMMCSH), a comprehensive specialized teaching hospital located in Hosanna, central Ethiopia, approximately 230 km southwest of Addis Ababa. The hospital trains undergraduate and postgraduate medical students, has approximately 220 beds, and its emergency department serves a catchment population of approximately 3.2 million people [21]. The study covered all adult patients who underwent thyroidectomy between January 1, 2022 and December 31, 2024.

Source and study population

The source population comprised all patients attending the surgical referral clinic of WUNEMMCSH for postoperative follow-up during the study period. The study population comprised all adult patients (≥ 18 years) who underwent thyroidectomy at WUNEMMCSH during the same period. Patients with incomplete or missing medical records, and those who underwent thyroid surgery outside the study institution, were excluded.

Sample size and sampling technique

The sample size was calculated using the single-population proportion formula:

$$n = Z^2 \times P(1 - P) / d^2$$

where n is the required sample size, Z (= 1.96) corresponds to a 95% confidence level, P is the expected proportion of complications, and d is the desired margin of error (5%). The expected proportion (P = 18.6%) was derived from a facility-based study of thyroidectomy complications conducted in a comparable resource-limited setting [22]. Without an additional non-response allowance, the calculated sample size was 233. All eligible patients who underwent thyroidectomy during the study period were

enrolled consecutively, using a non-probability consecutive sampling technique, until the target sample size was reached (Fig. 2).

Data collection

Data were abstracted from patients' charts, operative records, anesthesia records, and follow-up notes using a structured data extraction checklist. Medical record numbers were identified from the surgical referral clinic and operating room logbooks, and the corresponding charts were retrieved from the hospital registrar's office.

Study variables and conceptual framework

The dependent variable was the occurrence of a post-thyroidectomy complication (yes/no). Independent variables included age, sex, type of thyroidectomy, presence of malignancy, anterior neck swelling, compressive symptoms, toxic symptoms, and voice change. Variable selection was guided by a conceptual framework derived from the literature, encompassing patient-related factors (advanced age, male sex, antiplatelet therapy, coagulopathy), surgical factors (extent of thyroidectomy, dissection difficulty, malignancy), and medical comorbidities such as hypertension and diabetes mellitus [20] (Fig. 1).

Operational definitions

- **Total thyroidectomy**: complete removal of all thyroid tissue — both lobes, the isthmus, and the pyramidal lobe — with attempted preservation of the RLN, EBSLN, and parathyroid vasculature [23].
- **Near-total thyroidectomy**: near-complete thyroid removal, leaving less than 1 g of tissue adjacent to the RLN near the ligament of Berry [24].
- **Hemithyroidectomy**: removal of one entire thyroid lobe together with the isthmus, without entering the contralateral side of the neck [25].
- **Subtotal thyroidectomy**: removal of both thyroid lobes and the isthmus, leaving several grams of tissue along the posterior capsule; considered an inadequate procedure for thyroid cancer [26].
- **Transient / permanent hypocalcemia**: clinical or biochemical hypocalcemia resolving within, or persisting beyond, 6 months, respectively [27].
- **Transient / permanent RLN injury**: voice change resolving within, or persisting beyond, 6 months, respectively [28, 29].
- **Early / late complication**: a complication occurring within 48 hours of thyroidectomy (early) or 48–72 hours after surgery or later (late) [30].

Data quality control

The data extraction checklist was pre-tested on 5% of records outside the study area. Data collectors received standardized training, and collected data were cross-checked daily for completeness and consistency.

Data processing and statistical analysis

Data were entered into Kobo Toolbox and analyzed using SPSS version 25. Descriptive statistics — frequencies, percentages, means, and standard deviations — were used to summarize variables. The chi-square test was used for categorical comparisons and the Shapiro-Wilk test to assess the normality of continuous variables; a p-value < 0.05 was considered statistically significant.

Ethical considerations

Ethical clearance was obtained from the WUNEMMCSH Institutional Review Board (IRB approval/reference number: to be inserted), and a support letter was secured from the Department of Surgery. Given the retrospective, records-based design, the requirement for individual informed consent was waived by the IRB (to be confirmed against the approval letter). Patient confidentiality was maintained throughout via anonymized data collection, and no personal identifiers were recorded.

RESULTS

Socio-demographic characteristics

A total of 233 adult patients who underwent thyroidectomy at WUNEMMCSH were included. The mean (± SD) age was 37 ± 12 years; 171 (73.4%) were aged 18–44 years, 49 (21.0%) were 45–59 years, and 13 (5.6%) were ≥ 60 years. The cohort was predominantly female (218, 93.6% vs. 15, 6.4% male) (Table 1).

Table 1
Socio-demographic characteristics of the surgical patients at WUNEMMCSH (N = 233)

Variable	Category	Frequency (N)	Percent (%)
Age (years)	18–44	171	73.4
	45–59	49	21.0
	≥ 60	13	5.6
Sex	Female	218	93.6
	Male	15	6.4
Marital status	Married	161	69.1
	Unmarried	35	15.0
	Divorced	9	3.9
	Widowed	28	12.0
Religion	Protestant	148	63.5
	Orthodox	51	21.9
	Muslim	34	14.6
	Other	0	0.0
Residence	Urban	60	25.8
	Rural	173	74.2
Educational status	Cannot read or write	57	24.4
	Primary school	114	48.9
	Secondary school	52	22.3
	Higher education	10	4.3
Note: Data are reported as number and percent.			

Clinical and surgical characteristics

Most patients presented with anterior neck swelling and pressure symptoms (110, 47.2%), anterior neck swelling with toxic symptoms (53, 22.7%), or the combination of swelling, pressure, and toxic symptoms (35, 15.0%). Lobectomy and isthmusectomy was the most common procedure performed (96, 41.2%), followed by near-total thyroidectomy (53, 22.7%), the Dunhill procedure (43, 18.5%), subtotal thyroidectomy (33, 14.2%), and total thyroidectomy (8, 3.4%) (Table 2).

Table 2
Clinical and surgical characteristics of the study population (N = 233)

Variable	Category	Frequency (N)	Percent (%)
Neck ultrasound result (TI-RADS)	TI-RADS 1	12	5.2
	TI-RADS 2	55	23.6
	TI-RADS 3	71	30.5
	TI-RADS 4	86	36.9
	TI-RADS 5	9	3.9
Surgical procedure performed	Total thyroidectomy	8	3.4
	Near-total thyroidectomy	53	22.7
	Subtotal thyroidectomy	33	14.2
	Lobectomy & isthmusectomy	96	41.2
	Dunhill procedure	43	18.5
FNA cytology result*	AUS	13	5.6
	Benign	175	75.1
	FLUS	1	0.4
	FN / suspicious for FN	10	4.3
	Malignant	2	0.9
	Suspicious for malignancy	6	2.6
Duration of symptoms	1–5 years	99	42.5
	5–10 years	100	42.9
	≥ 10 years	34	14.6

*FNA cytology results are reported as a percentage of the total study cohort (N = 233), classified according to the Bethesda System. AUS = atypia of undetermined significance; FLUS = follicular lesion of undetermined significance; FN = follicular neoplasm.

Mean thyroid function test results for the cohort are summarized in Table 3 (units to be confirmed by the authors before submission).

Table 3
Thyroid function test results (Mean ± SD)

Thyroid function test	Mean ± SD
T3	19.06 ± 4.40
FT3	6.5 ± 5.68
T4	182.55 ± 139.4
FT4	29.7 ± 26.2
Note: Reports are presented as mean ± standard deviation.	

Prevalence of overall post-thyroidectomy complications

Among the 233 participants, 35 (15.0%; 95% CI 10.4–20.0%) developed a post-thyroidectomy complication, including hematoma, voice change, recurrence, hypocalcemia, hypothyroidism, and combined hematoma with voice change (Fig. 3).

Prevalence of individual post-thyroidectomy complications

Considered as independent, non-overlapping proportions of the full cohort (N = 233), hypocalcemia accounted for 5.6%, voice change for 5.2%, hypothyroidism for 3.4%, hematoma for 3.0%, combined hematoma with voice change for 1.7%, and recurrence for 1.7%; the remaining 85.0% of patients had no complication (Fig. 4).

Onset of post-thyroidectomy complications

Of the total cohort, 28 patients (12.0%) developed early complications (within 48–72 hours) and 21 patients (9.0%) developed late complications (after 48–72 hours); together with the 79.0% of patients who experienced no complication, these proportions account for the full cohort (Fig. 5).

DISCUSSION

This study assessed the overall prevalence of post-thyroidectomy complications, the burden of each specific complication, and the timing of onset among 233 adult patients who underwent thyroidectomy at WUNEMMCSH. The overall prevalence of post-thyroidectomy complications was 15.0% (35/233). Within this group, hypocalcemia accounted for 5.6%, voice change for 5.2%, hypothyroidism for 3.4%, hematoma for 3.0%, combined hematoma with voice change for 1.7%, and recurrence for 1.7% of the total cohort.

Owing to the limited availability of ENT and endocrine surgery subspecialists, general surgeons undertake the majority of thyroid surgery in low-resource settings such as Ethiopia. Certain post-thyroidectomy complications are particularly feared because they can cause lifelong morbidity, including

RLN or EBSLN injury, hypoparathyroidism, hypocalcemia, hypothyroidism, or recurrent hyperthyroidism [31, 32].

A retrospective cross-sectional study conducted in Addis Ababa, Ethiopia, reported a post-thyroidectomy complication prevalence of 29.4% at the six-month follow-up visit [1] — higher than our finding. Possible explanations include a longer follow-up window (six months versus our institution's standard follow-up), differences in surgical case mix, and possible differences in surgeon caseload between the two centers. A retrospective cross-sectional study from eastern Ethiopia [33] and a study from Washington, D.C., USA, reported prevalences of 9.5% and 3.28%, respectively — both lower than our finding. This difference may reflect the higher-resource surgical environment in the USA (including routine intraoperative neural monitoring and PTH-guided calcium protocols) and possible differences in goiter size and disease severity at presentation between settings. A study at Ambo University, Ethiopia [22], reported a post-thyroidectomy complication prevalence in the range of 18.6–21.8%, similar to our finding, likely reflecting comparable case mix, similar surgical infrastructure, and shared regional patient demographics between the two Ethiopian university hospitals.

Globally conducted systematic reviews and meta-analyses [34, 35], spanning different time frames, reported pooled prevalences of post-thyroidectomy complications of 1.48% and 4.2%, respectively — substantially lower than our finding. This difference likely reflects the pooled nature of meta-analytic estimates, which combine studies conducted predominantly in high-resource settings with differing patient populations, socioeconomic status, and access to specialist endocrine surgical care, all of which are known to influence complication rates.

A sub-group analysis of individual complications showed hypocalcemia (5.6%), voice change (5.2%), hypothyroidism (3.4%), hematoma (3.0%), combined hematoma with voice change (1.7%), and recurrence (1.7%). A study conducted at Ghaem and Razavi hospitals, Iran [37], reported lower prevalences of hypocalcemia (3.3%), hematoma (0.8%), and dysphagia (0.1%), but a higher prevalence of RLN injury (6.1%), compared with our findings, potentially attributable to more advanced surgical infrastructure and greater resource availability — including routine intraoperative neuromonitoring and standardized postoperative calcium protocols — at the Iranian center compared with WUNEMMCSH.

A study from southwestern Saudi Arabia reported a prevalence of recurrent laryngeal nerve palsy of 1.9% and wound hematoma of 1.4% [38], broadly comparable to our findings; this similarity may reflect comparable surgical case volumes and similar proportions of total versus partial thyroidectomy. In contrast, a study from Brazil reported prevalences of hypocalcemia and vocal cord paralysis of 9.2% and 0.44%, respectively [39] — higher than our hypocalcemia finding but lower for RLN injury, possibly attributable to a higher proportion of total thyroidectomy in the Brazilian cohort, which carries greater hypocalcemia risk, and differences in postoperative calcium surveillance protocols between the two settings.

Complications following thyroidectomy are classified as early or late based on time of onset; hypocalcemia, wound infection, hematoma, RLN injury, and Horner's syndrome are among the principal

postoperative complications reported in the literature [40, 41]. In our study, 28 patients (12.0%) developed early complications (within 48–72 hours) and 21 patients (9.0%) developed late complications (48–72 hours or later). A study from Iran reported considerably higher prevalences of early and late post-thyroidectomy complications, at 74.5% and 15.5% respectively [42]; this marked difference may reflect a more intensive postoperative surveillance protocol (e.g., scheduled calcium measurement in all patients regardless of symptoms, detecting a higher proportion of subclinical biochemical hypocalcemia), differing definitions of an 'early' complication, and possible differences in surgeon experience and case complexity between the two settings.

To the authors' knowledge, this is the first study to examine post-thyroidectomy complications at this institution, and the sample size was determined using a formal calculation. Several limitations should nonetheless be acknowledged. Post-thyroidectomy complications were not systematically recorded in a dedicated endocrine outpatient log, which made retrospective ascertainment from surgical ward and clinic records more challenging. As a retrospective cross-sectional study, the findings may have limited generalizability to other settings and cannot establish causal relationships between risk factors and complications.

CONCLUSION

The prevalence of post-thyroidectomy complications at WUNEMMCSH was 15.0% (35/233; 95% CI 10.4–20.0%), exceeding rates reported from high-income settings (1.5–4.2%) but broadly comparable to rates reported from other Ethiopian tertiary hospitals (11–21.8%). Hypocalcemia (5.6%) and voice change (5.2%) were the most prevalent individual complications, and early-onset complications (12.0%) were slightly more common than late-onset complications (9.0%). These findings quantify, for the first time, the burden of post-thyroidectomy complications at this institution and support the early identification and timely management of complications such as wound hematoma, hemorrhage requiring transfusion, and hypocalcemia. They also provide a baseline against which future quality-improvement interventions can be measured, and underscore the need for structured post-thyroidectomy monitoring protocols in resource-limited Ethiopian surgical settings.

Recommendations

For clinicians

- Implement structured post-thyroidectomy monitoring, including serum calcium measurement at 6 and 24 hours after total or near-total thyroidectomy.
- Perform baseline and postoperative laryngoscopic assessment of vocal cord function for early detection of RLN or EBSLN injury.
- Establish a standard hypocalcemia-prevention protocol, including prophylactic oral calcium and calcitriol following total thyroidectomy in high-risk patients.

For researchers

- Conduct prospective cohort studies incorporating intraoperative PTH monitoring, surgeon case volume, and WHO goiter grading as covariates.
- Extend follow-up to a minimum of 12 months to accurately distinguish transient from permanent complications.
- Investigate the specific risk factors associated with post-thyroidectomy complications at WUNEMMCSH using a multivariable analytic approach.

For policymakers and hospital administrators

- Support the development of an endocrine surgery subspecialty service at WUNEMMCSH.
- Invest in intraoperative nerve monitoring (IONM) equipment to reduce the risk of recurrent laryngeal nerve injury.
- Establish a standardized national post-thyroidectomy complication registry across Ethiopian surgical referral centers to enable benchmarking and quality improvement.

Declarations

Ethics approval and consent to participate

This study was approved by the Institutional Review Board (IRB) of Wachemo University Nigist Eleni Mohammed Memorial Comprehensive Specialized Hospital (approval reference number: to be inserted by the authors). Given the retrospective, records-based design, the requirement for individual informed consent was waived by the IRB (to be confirmed by the authors against the approval letter). All methods were carried out in accordance with relevant institutional guidelines and regulations, and in accordance with the Declaration of Helsinki. Patient confidentiality was maintained throughout via anonymized data collection.

Consent for publication

Not applicable. This manuscript does not contain any individual person's identifying data, images, or clinical details.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests. (To be confirmed by the authors.)

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Authors' contributions

MMA and KMY conceived and designed the study, supervised data collection, contributed to data analysis, and drafted and revised the manuscript. KMY contributed to study design, data collection, data analysis, and manuscript drafting. AG contributed to the methodology and statistical analysis plan and critically reviewed the manuscript. All authors read and approved the final manuscript.

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Figures

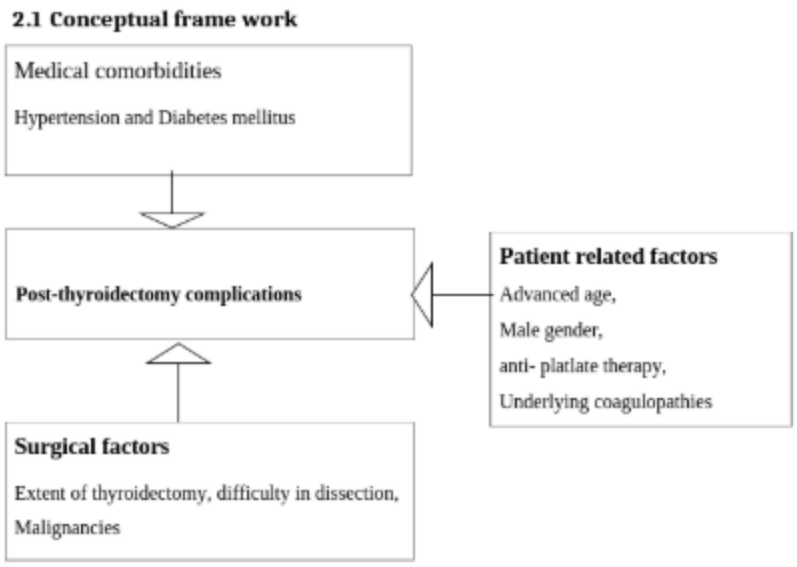


Figure 1

Conceptual framework guiding selection of study variables, adapted from the literature [20].

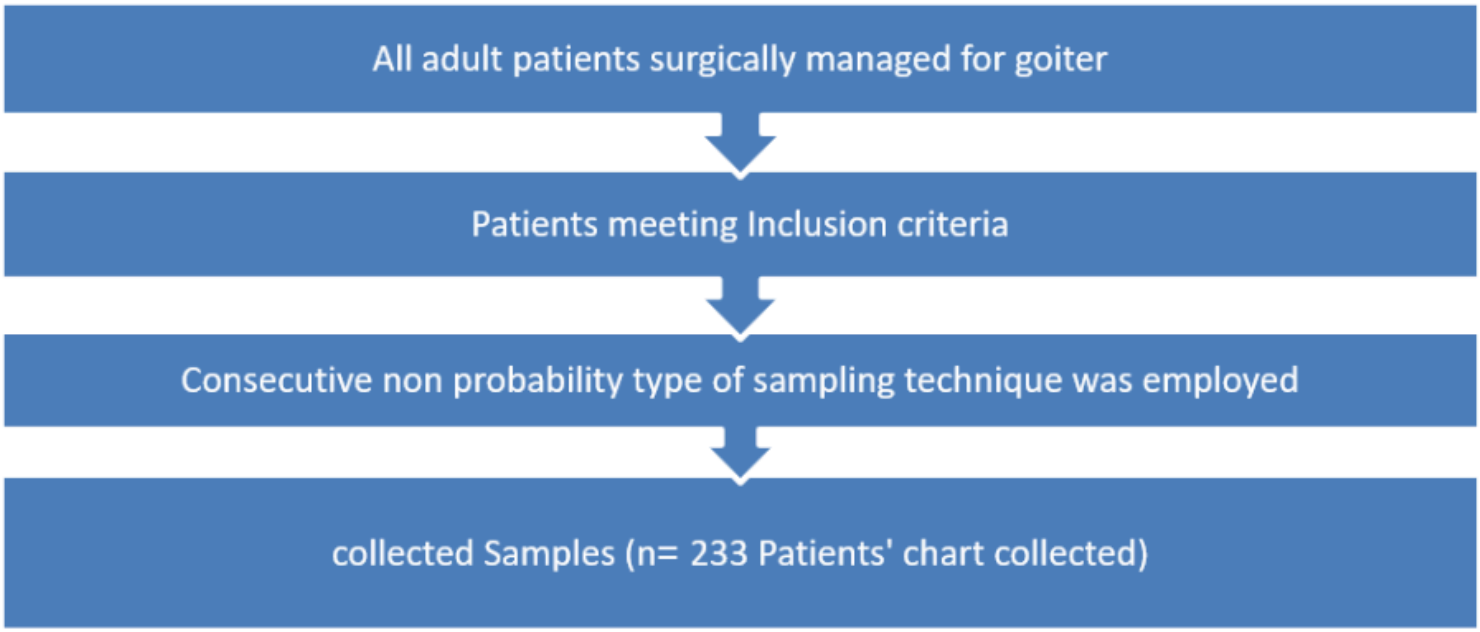


Figure 2

Sampling technique flow chart.

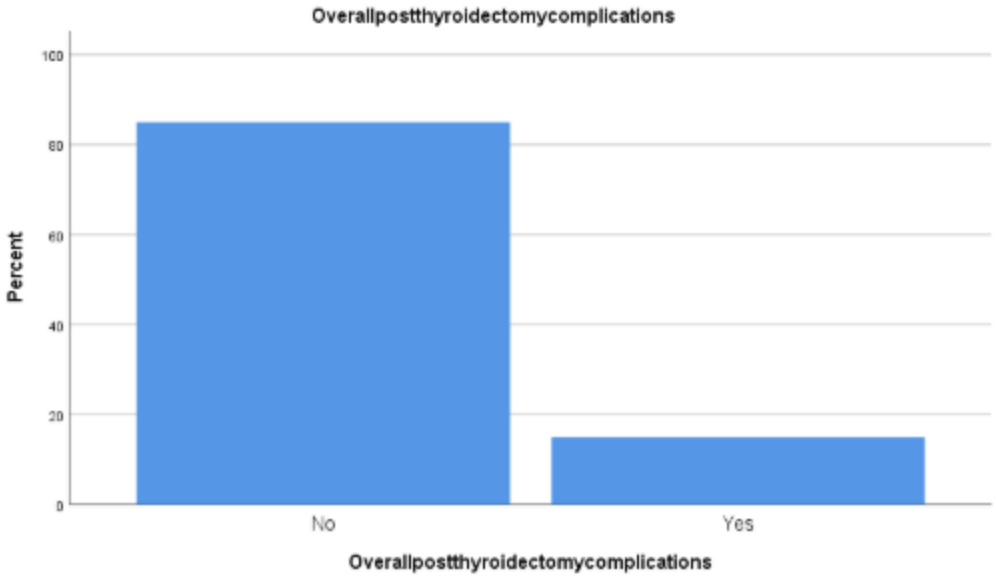


Figure 3

Prevalence of overall post-thyroidectomy complications among surgical patients (N = 233).

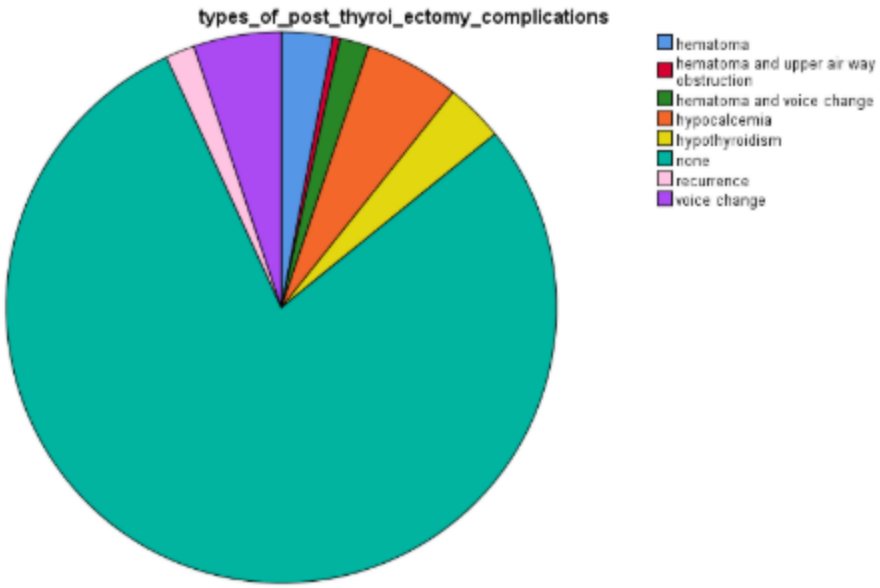


Figure 4

Prevalence of individual post-thyroidectomy complications among surgical patients (N = 233).

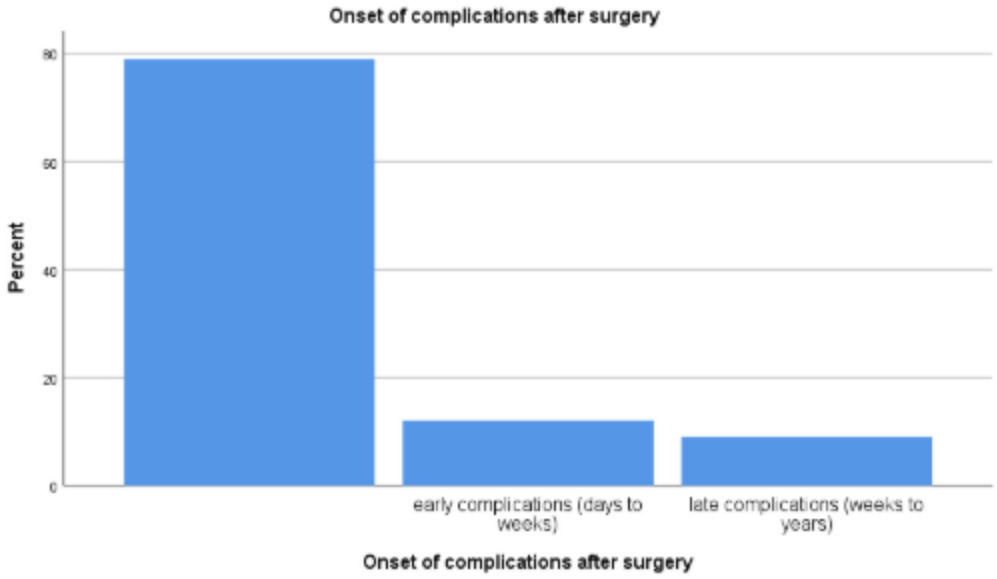


Figure 5

Onset of post-thyroidectomy complications after surgery (N = 233).