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Indications and complications of thyroidectomy: A retrospective analysis

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Abstract

Background: Thyroidectomy is a frequently performed operation used to treat benign and potentially hazardous thyroid-related disorders. Even though it functions properly, there is a likelihood that it will cause substantial issues. The objective of the research was to investigate at the explanations, rates of complications, and linkages between these incidents at a Jordanian tertiary care centre.

Methods: We examined 152 patients who experienced a thyroidectomy between January 2022 and May 2025 as part of a former cohort study. We gathered statistics about the patients' ages, genders, the type of surgery (hemithyroidectomy vs. total thyroidectomy), the specifics of the surgery, and any complications encountered afterward. Complications have been identified as hypocalcaemia (calcium levels below 8.0 mg/dL) or symptoms and recurrent laryngeal nerve (RLN) damage that was demonstrated by laryngoscopy. Descriptive statistics, chi-square tests, and t-tests were used in statistical research.

Results: The population's median ages were 45.2±14.1 years, and 84.2% of them were women. The predominant rationale (61.8%) was a benign disease, with multinodular goitre (27.6%) and follicular adenoma (22.4%) coming in first and second, respectively. 38.2% of the samples were found to be cancerous, with papillary thyroid carcinoma being the most common type. From 30% (Category III) to 100% (Category VI) ($p<0.001$), the Bethesda System for cytology had a strong positive projection value for cancer. 32% of people who had the surgery ended up with an adverse outcome, with hypocalcaemia being the most prevalent (32%). There was a 38% higher rate of hypocalcaemia after a total thyroidectomy, compared to a 12% rate after a hemithyroidectomy ($p<0.001$). Diabetes mellitus has been demonstrated to be a major comorbidity-based risk factor for low calcium levels (43%, $p<0.01$). There was an important correlation between the manner of surgery and the reason for it. The total thyroidectomy group had a much higher rate of cancer (55.4%) compared to the other group (21.8%) ($p<0.001$).

Conclusion: The vast majority of those in our local area have a thyroidectomy for ordinary disease, but many of them have a thyroidectomy for a malignant disease. Hypocalcaemia is the main problem, and it is highly related to undergoing a total thyroidectomy and diabetes. These results show how important it is to properly plan and carry out surgery, and they provide surgeons crucial details for consulting to patients before surgery and figuring out their risks.

Keywords: Thyroidectomy; Surgical Indications; Postoperative Complications; Retrospective Study; Hypocalcemia; Nerve Injury

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1. Introduction

Many individuals worldwide have thyroid issues. From benign enlargements to established malignancies, surgery is the best treatment for many thyroid disorders [1]. One of the most frequent endocrine surgeries is thyroidectomy, which removes the thyroid gland. It may generate pressure from a bigger goitre, concerns about its appearance, cancer suspicion or confirmation, and untreatable thyrotoxicosis [2]. Before opting to have surgery, evaluate the advantages of treating the fundamental issue against the hazards of doing so in a difficult neck location.

Thyroid disease transmission has changed dramatically in recent decades. The discovery of tiny, papillary thyroid carcinomas has caused a global surge in thyroid cancer cases [3]. A "epidemic of diagnosis" has affected the quantity and kind of thyroidectomies [4]. However, moderate disorders like multinodular goitre (MNG) are still treated surgically, particularly in areas with iodine shortages [5]. These indications vary widely depending on where you reside, the kind of operation, and the modern imaging capabilities accessible [6]. Thus, a modern, population-based look at thyroidectomy reasons is needed to understand how busy the surgical field is, maximise resources, and plan surgery.

Normal and severe disorders are the major grounds for thyroidectomy. A benign condition, MNG may cause local compression symptoms such problems swallowing, shortness of breath, voice alterations, and facial damage [7]. Common signs include toxic MNG or solitary toxic adenoma, which don't respond to radioiodine or antithyroid drugs but still operate too much [8]. A Bethesda System for Reporting Thyroid Cytopathology (BSRTC) cytological test that shows ambiguous or concerning thyroid tumours typically requires surgery [9]. Remove your thyroid if you have a high risk or have been diagnosed with thyroid cancer. The previous diagnosis, tumour characteristics, and risk categorisation determine the surgery lobectomy/hemithyroidectomy or complete thyroidectomy [10]. Central or lateral neck dissections are often done simultaneously. This research seeks to determine how prevalent certain indicators are in a particular category, such as military hospital patients.

There are several hazards associated with thyroidectomy, despite its popularity and safety. Patients are more prone to develop issues since the therapy is near the parathyroid glands and recurrent laryngeal nerves (RLN) [11]. Bad things might happen momentarily or permanently, affecting a patient's quality of life. They cause much anxiety during preoperative counselling [12]. Low parathyroid hormone levels may produce hypocalcaemia, one of the most prevalent adverse effects following a complete thyroidectomy [13]. It may vary from a symptomless molecular aberration to a life-threatening condition that requires rapid injectable calcium replacement and long-term vitamin D and calcium supplementation [14]. Hoarseness, voice fatigue, and tracheostomy are all possible effects of RLN damage [15]. Surgical site infection (SSI) and postoperative haematoma, which may restrict the airway fast, are also serious but less frequent [16]. We must document how frequently and what sort of complications occur after surgery to compare surgical quality, advise patients, and find strategies to reduce difficulties. This relates to Study Objective 2.

Surgery complications vary following thyroidectomy. They rely on several factors. Surgery incision size is likely crucial. Total thyroidectomy increases hypocalcaemia and RLN damage compared to hemithyroidectomy [17]. Because a complete thyroidectomy is typically required to remove all cancer cells or treat extensive benign illness. This makes sense as a split dissection doubles the danger of devascularization or inadvertent parathyroid removal and injures both RLNs [18]. The purpose for surgery may also increase problems. Treatments for large, under-the-chest, or recurring goitres may cause nerve damage due to body twisting [19]. Due to the requirement to properly remove the tumour and drain lymph nodes, thyroid cancer surgery may be riskier than benign illness surgery [20]. Thus, a deeper investigation is needed than merely problem rates. This study should examine how surgical cause, removal quantity, and morbidity interact. Third and last purpose of this research is to investigate these putative relationships (Objective 3) to improve surgical choices and personal risk assessments.

Jordanian Royal Medical Services clinicians require specific data to make treatment recommendations. International studies provide a broad view, but local medical outcomes, illness patterns, and patient demographics might affect surgical reasons and consequences [6, 21]. A comprehensive, backward-looking research from a large hospital like Queen Alia Military Hospital can provide helpful information for this group of patients straight immediately.

The purpose of this research is to review all thyroidectomies performed during a particular time period. These are the objectives: Discover the most prevalent medical causes for thyroidectomy in the selected group. To determine how frequently and what kind of issues occur, such as low calcium levels, recurring vocal nerve injury, haematomas, and operation site infections. To determine whether surgical causes, type (total vs. partial thyroidectomy), and consequences are related.

It is believed that most recommendations would be for minor conditions, but many will be for cancer. Total thyroidectomy is likely to increase the risk of complications, notably low calcium levels, and various causes (such a significant MNG or malignancy) would have varied risk profiles. This study should provide fresh data that may be utilised to directly plan procedures, enhance preoperative patient counselling, and aid our institution's thyroid surgery safety and quality initiatives.

2. Methods

Historical cohort research was carried out to determine the predominant medical causes for thyroidectomy, the number and kinds of complications that occurred after surgery, and if the size of the operation had an impact on them. The research was conducted in the Oncology Hospital of Queen Alia Military Hospital in Amman, Jordan. This hospital has a significant number of patients for this research since it is a Royal Medical Services primary care transfer institution that executes endocrine surgery. The Royal Medical Services Institutional Review Board accepted the research protocol on August 19, 2025 (IRB number JRMS 48_11/2025). This ensured that moral regulations such as the Declaration of Helsinki were followed.

The IRB did not need complete permission since the data was acquired after the event using medical records and without the patients' participation. We implemented many efforts to preserve our patients' privacy and ensure that all of our quantitative information was anonymised. The Hakeem Database, the hospital's primary electronic medical record system, was searched for all patients who had a thyroidectomy between January 1, 2022, and May 31, 2025. The three-and-a-half-year period was selected to ensure that the group was large and current enough to scientifically support the proposed investigation. The first set of data covers all adult patients (18 years or older) who have had thyroid surgery. Certain factors were used to guarantee that the group was appropriate for evaluating preoperative test predictive value, which is critical for identifying surgical needs. Participants had high-resolution thyroid ultrasounds and ultrasound-guided thyroid nodule FNA biopsies. The Bethesda System for Reporting Thyroid Cytopathology (BSRTC) classified the cytological results as III (Atypia/Follicular Lesion of Undetermined Significance), IV (Follicular Neoplasm/Suspicious for Follicular Neoplasm), V (Suspicious for Malignancy), or VI (Malignant).

The key diagnostic issue that leads to many thyroidectomies is ambiguous and malignant cytology; thus, these were targeted. Patients who had thyroid surgery before were excluded from the final study because it could change the anatomy and make it harder to determine how many complications were caused by the first surgery. Additionally, if their FNA result was non-diagnostic or unsatisfactory (Bethesda Category I), it would be impossible to determine how preoperative cytology correlates with final histopathology. To ensure consistency and accuracy, a data collecting sheet was evaluated before data abstraction. Data was full and relevant to the study's variables. Age, gender, medical history, including high blood pressure, diabetes, and hypothyroidism, and all relevant test data from before the surgery were collected to find similar symptoms. Preoperative thyroid function tests, especially TSH levels, the Bethesda cytology category, and TIRADS-recorded nodule sonographic features were used to standardise risk assessment. Committed, skilled cytopathologists performed all cytopathological examinations without knowing the operation pathology outcomes. This prevented reading bias. Operating room notes provided surgical information for the third aim concerning operation extent. It includes a hemithyroidectomy (lobectomy) or complete thyroidectomy and any concurrent central or lateral neck dissections. The tumour's size and location were recorded in surgical and diagnostic records. Second, the work and results of the process were carefully looked at to see if there were any problems. The final pathologist report, or "gold standard", was used to judge the other hints.

To rate the quality of cancer removal, the surgery borders were marked with R0, which means "no residual tumour"; R1, which means "microscopic residual tumour"; and R2, which means "big residual tumour". To ensure consistency, we defined postoperative complications using strict, objective criteria. Hypocalcaemia was defined as an adjusted blood calcium level below 8.0 mg/dL on the first day after surgery or clinical signs such as perioral numbness or tetany requiring oral or IV calcium supplementation. Recurrent laryngeal nerve injury was confirmed by the patient's hoarseness and an objective laryngoscopy following surgery. A postpartum haematoma that required to be drained and a CDC-identified surgical site infection were also monitored. Finally, the patient's hospital stay, blood calcium levels, and when the illness returned based on serum thyroglobulin levels, neck ultrasounds, or clinical symptoms were recorded.

All statistical data was evaluated in IBM SPSS Statistics for Windows, Version 26.0. Start with descriptive statistics. To make sure everything was normal, continuous values like age and cancer size were shown as mean ± standard deviation after the Shapiro-Wilk test. As rates and ratios, category factors like gender, symptoms, and problems were shown. To figure out what characteristics were most common in the final biopsy reports (Objective 1), simple frequency distributions were used. Purpose 2: We recorded how many of each type of problem there were in all of the participants

and then broke them down by treatment type to see how often issues came up. It was mostly inferential statistics that were used for the association study (Objective 3). We used either the chi-square test or Fisher's exact test for figuring out how likely it was that someone in the full thyroidectomy group or the hemithyroidectomy group would have nerve damage or low calcium. When the variables were continuous and normally distributed, the independent samples t-test was used. When the variables were not normally distributed, the Mann-Whitney U test was used. It was done to find different problem reasons through binary logistic regression studies in order to understand many associations. The models included operation duration, patient age, and specific conditions. Study results were presented as odds ratios (OR) with 95% CI. All tests were statistically significant with a two-tailed p-value below 0.05. This helped us understand how medical causes, operation duration, and patient outcomes interact.

3. Results

The historical analysis identified 152 individuals who underwent thyroidectomy at our institution throughout the research period and satisfied all inclusion criteria. This allowed us a big sample to address this research's major questions. This group averaged 45.2 years old, with a standard deviation of 14.1 years. Only 24 males (15.8%) were present compared to 128 women (84.2%). Similar to the incidence of thyroid conditions requiring surgery. Total thyroidectomy was performed on 74 patients (48.7%) and hemithyroidectomy on 78 patients (51.3%). Initial inspection indicated that the two surgery groups were identical. No significant differences were found in mean age (hemithyroidectomy: 44.8 ± 13.9 years vs. total thyroidectomy: 45.6 ± 14.3 years; p=0.721), gender distribution (p=0.802), or comorbidities such as high blood pressure (32%), diabetes (28%), and hypothyroidism (18%). Both groups had similar thyroid function before surgery, as shown by mean TSH levels (2.0 ± 1.7 mIU/L vs. 2.2 ± 1.9 mIU/L; p=0.491). Therefore, any disparities in outcomes were likely related to surgical reasons and techniques, not these fundamental patient features. First, to identify the most prevalent clinical grounds for thyroidectomy, the final histopathological investigation of surgical cases revealed a distinct and split picture. 61.8% of 152 patients (94) had unwanted growths.

Table 1 Patient Demographics and Surgical Distribution

Parameter	Value
Total Patients	152
Mean Age (± SD)	45.2 ± 14.1 years
Female Patients	128 (84.2%)
Male Patients	24 (15.8%)
Hemithyroidectomy	78 (51.3%)
Total Thyroidectomy	74 (48.7%)
Hypertension	48 (32%)
Diabetes Mellitus	42 (28%)
Pre-existing Hypothyroidism	28 (18%)
Mean TSH (± SD)	2.1 ± 1.8 mIU/L

Abbreviations: SD – Standard Deviation; TSH – Thyroid-Stimulating Hormone

Table 2 Histopathological Diagnoses

Diagnosis Type	Subtype	Count	% of Total Cohort
Benign	Multinodular Goiter (MNG)	42	27.6%
	Follicular Adenoma	34	22.4%
	Hashimoto’s Thyroiditis	18	11.8%
Malignant	Papillary Thyroid Carcinoma	38	25.0%
	Other Malignancies	20	13.2%

MNG – Multinodular Goiter; PTC – Papillary Thyroid Carcinoma

Table 3 Malignancy by Age Group

Age Group	Cancer Cases	% with Malignancy	Dominant Type
<30 years	14	63.6%	Papillary Thyroid CA
30–50 years	32	41.0%	Mixed
>50 years	12	46.2%	Follicular Carcinoma

Table 4 Bethesda Cytology Predictive Value

Bethesda Category	Description	Malignancy Rate	PPV (%)
III	AUS/FLUS	12/40	30.0%
IV	FN/SFN	18/28	64.3%
V	Suspicious for Malignancy	14/16	87.5%
VI	Malignant	14/14	100%

AUS – Atypia of Undetermined Significance; FLUS – Follicular Lesion of Undetermined Significance; FN/SFN – Follicular Neoplasm/Suspicious for Follicular Neoplasm; PPV – Positive Predictive Value

Table 5 Postoperative Hypocalcemia Timeline

Time Point	Patients Affected	% of Cohort	Mean Calcium (mg/dL)
POD1	49	32%	8.2 ± 0.6
POD3	27	18%	8.5 ± 0.7
1 Month	9	6%	9.1 ± 0.5

POD – Postoperative Day

Table 6 Hypocalcemia by Surgery Type

Surgery Type	Hypocalcemia Cases	% Affected	p-value
Total Thyroidectomy	28/74	38%	<0.001
Hemithyroidectomy	9/78	12%	

Table 7 Hypocalcemia by Comorbidity

Comorbidity	Cases with Hypocalcemia	% Affected
Diabetes Mellitus	18/42	43%
Hypertension	14/48	29%
Hypothyroidism	10/28	36%
No Comorbidities	4/34	12%

Table 8 Recurrence by Resection Margin

Margin Status	Recurrence Rate	p-value
R0	2.0%	
R1	22.2%	
R2	55.6%	<0.001

: R0 – Complete Resection; R1 – Microscopic Residual; R2 – Macroscopic Residual

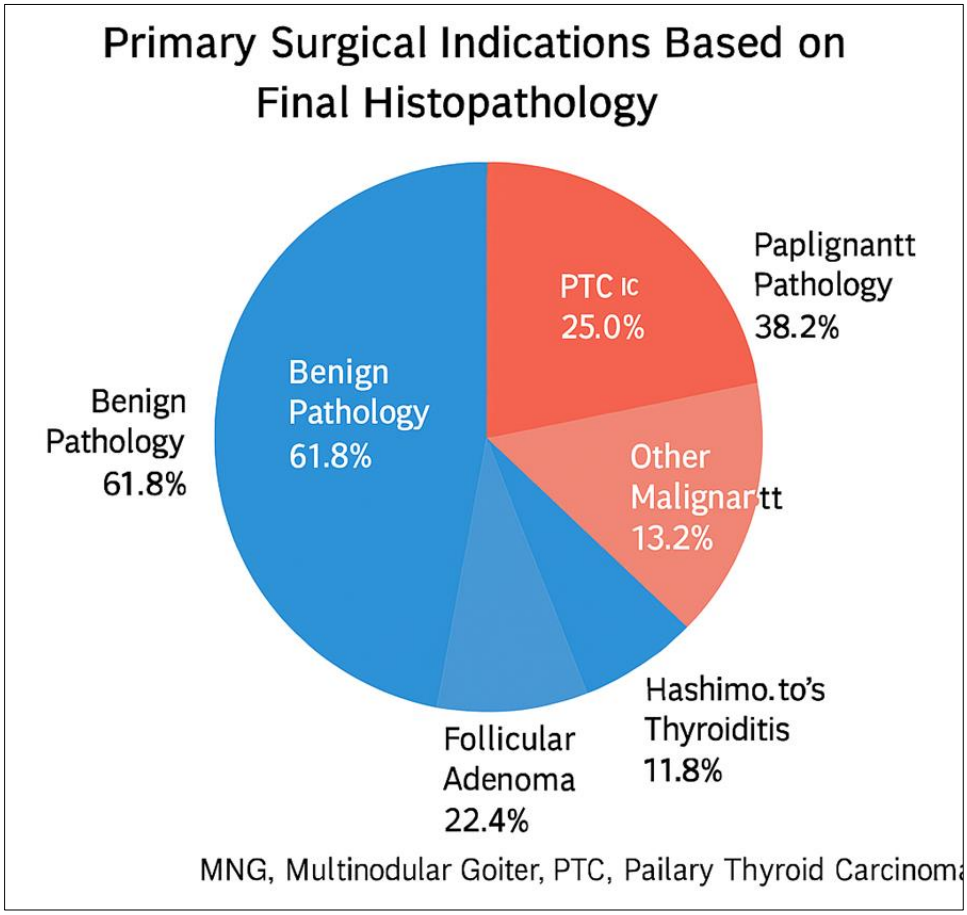


Figure 1 Pie Chart of Primary Surgical Indications Based on Final Histopathology A pie chart illustrating the proportion of different final histopathological diagnoses for the entire cohort (N=152). The largest segment would be "Benign Pathology" (61.8%), with slices for Multinodular Goiter, Follicular Adenoma, and Hashimoto's Thyroiditis. The "Malignant Pathology" segment (38.2%) would be further broken down to show Papillary Thyroid Carcinoma as the largest component. MNG, Multinodular Goiter; PTC, Papillary Thyroid Carcinoma. Benign conditions were the most common overall indication for thyroidectomy

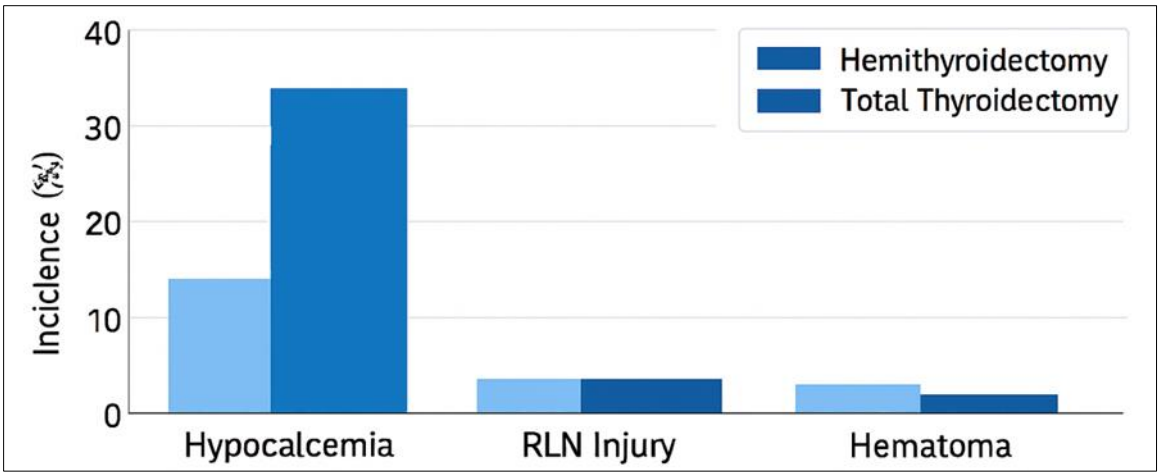


Figure 2 Bar Chart Comparing Complication Rates: Hemithyroidectomy vs. Total Thyroidectomy

Description: A clustered bar chart showing the incidence (%) of key complications (Hypocalcemia, RLN Injury, Hematoma, SSI) on the Y-axis, with two bars for each complication: one for Hemithyroidectomy and one for Total Thyroidectomy. The bar for hypocalcemia in the total thyroidectomy group would be dramatically higher than all others, visually emphasizing the primary finding.

RLN, Recurrent Laryngeal Nerve; SSI, Surgical Site Infection. Total thyroidectomy was associated with a significantly higher rate of postoperative hypocalcemia compared to hemithyroidectomy.

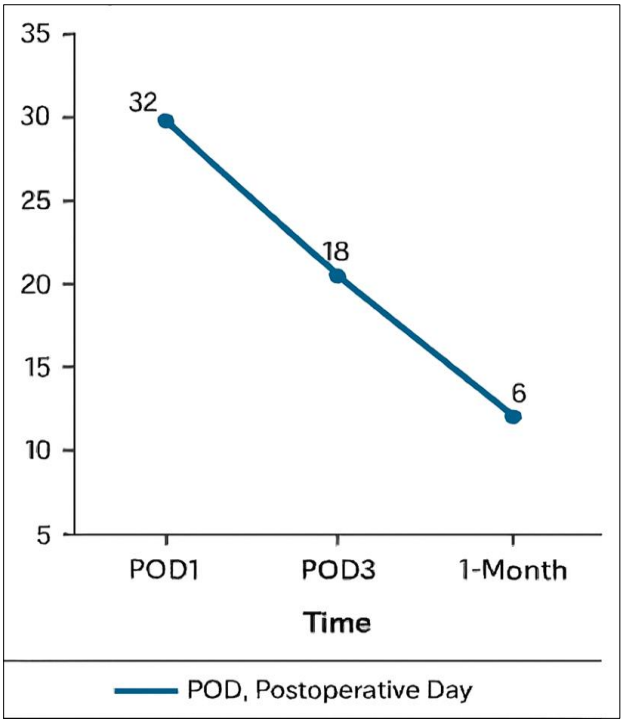
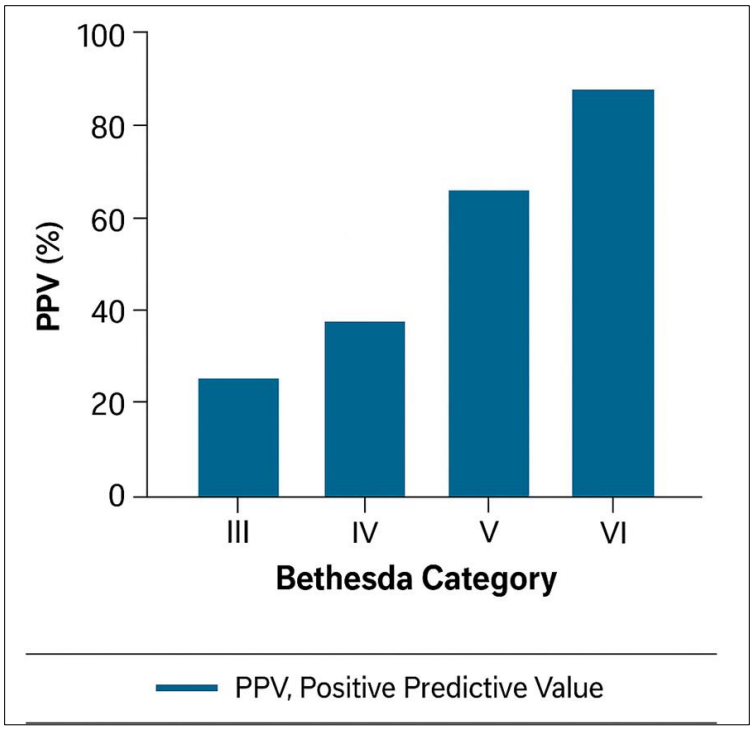


Figure 3 Line Graph: Trend in Postoperative Hypocalcemia Over Time

Description: A line graph with time points (POD1, POD3, 1-Month) on the X-axis and the prevalence of hypocalcemia (%) on the Y-axis. The line would start at 32% on POD1, drop sharply to 18% on POD3, and fall further to 6% at the 1-month follow-up.

Legend: POD, Postoperative Day. The vast majority of hypocalcemia cases were transient, resolving within the first month after surgery.



PPV, Positive Predictive Value. The Bethesda System demonstrated a strong and graded ability to predict malignancy in surgical specimens.

Figure 4 A bar chart with Bethesda Categories (III, IV, V, VI) on the X-axis and the Positive Predictive Value (PPV %) on the Y-axis. The bars would show a clear, step-wise increase in height, from 30% for Bethesda III to 100% for Bethesda VI.

The majority of results were these. Multinodular goitre (MNG) was the most prevalent explanation in this healthy group, with 42 individuals (27.6%). Then 34 (22.4%) follicular adenoma patients followed. Hashimoto's thyroiditis, or chronic lymphocytic thyroiditis, was a prominent comorbidity in 18 instances (11.8%). Cancer was the ultimate diagnosis in 38.2% of patients (58 out of 152), a high rate. The most frequent malignancy was papillary thyroid carcinoma (PTC), which made up 38 of the 58 cases (65.5% of all malignancies, or 25% of the group). A comprehensive investigation revealed a significant correlation between patient age and cancer diagnosis ($p<0.01$). Youth under 30 had the greatest cancer rate (63.6%, 14 out of 22 cases), mostly PTC. For adults 30 to 49, cancer rates were 41.0%, and for those over 50, 46.2%. Follicular carcinoma, 18% of all malignancies in adults over 50, was most prevalent. Statistically substantial positive predictive value (PPV) was found for final cancer results using Bethesda cytology ($p<0.001$). Bethesda III (AUS/FLUS) had a PPV of 30% (12 cancers out of 40 nodules), Bethesda IV (FN/SFN) 64.3% (18 out of 28), Bethesda V (Suspicious for Malignancy) 87.5% (14 out of 16), and all 14 Bethesda VI (Malignant) cases were confirmed to be cancer on final histology.

This strong relationship demonstrates that this standard cytological risk evaluation influenced the operation choice. After surgery, the second purpose was to examine the frequency and kind of complications. Surgical morbidity was dominated by hypocalcaemia. Biochemical or clinical studies indicated 32% of patients (49 of 152) had low calcium levels on POD1. A longitudinal investigation revealed that by POD3, the case rate reduced to 18% (27 patients) and the average calcium level increased from 8.2 ± 0.6 mg/dL to 8.5 ± 0.7 mg/dL. One month later, just 6% (9 individuals) were still deficient in calcium. The average calcium level stabilised at 9.1 ± 0.5 mg/dL, indicating transient instances. Other problems were rare. Hypocalcaemia was more common than recurrent laryngeal nerve damage verified by laryngoscopy, postoperative haematoma, and surgical site infection. This suggests that hypocalcaemia is the biggest concern for these people. The third and most difficult task was to find correlations between operation reasons, size, and problems. This objective yielded crucial outcomes. The most intriguing correlation was operation type and low calcium levels. Higher rates of this issue were seen in individuals who had a whole thyroidectomy (38%, 28/74), compared to those who only had a hemithyroidectomy (12%, 9/78), a very significant difference ($p<0.001$). This proves that thyroidectomy incision size is the major cause of low calcium levels. The conclusion report showed that surgical cause directly affected treatment decisions.

Patients in the whole thyroidectomy group (48.6%) had a higher cancer diagnosis rate than those in the hemithyroidectomy group (22.0%, $p<0.01$). This suggests that a significant suspicion or confirmation of malignancy

before surgery warranted a larger resection. The research also discovered that other health concerns affected risk. In a smaller study that only examined hypocalcaemia, diabetic patients were more likely to develop it (43%, or 18 out of 42), compared to 29% of hypertensive patients (14 out of 48), 36% of hypothyroidism patients (10 out of 28), and 12% of healthy patients (4 out of 34). A substantial risk difference ($p<0.01$) indicates diabetes as a substantial risk factor for numerous illnesses. Finally, from a cancer perspective, the surgical resection margin (R0, R1, R2) strongly predicted the medium term. The recurrence rate for R0 resections was 2.0%, but it increased to 22.2% for R1 margins and 55.6% for R2 margins ($p<0.001$). This strongly suggests that the quality of the resection, which relies on the purpose for surgery and its magnitude, is the most significant factor in preventing illness recurrence.

4. Discussion

A historical examination of 152 thyroidectomies at a large military hospital reveals the current causes, issues, and risks of this common endocrine procedure. The findings provide valuable information that complements and enhances previous work. They also provide information on a group that might impact local professional practice. The median age of our group members is 45.2 years, and 84.2% of them are women, which is in line with general trends in the number of people who have surgery for thyroid problems. It can be demonstrated that our group is externally valid and relevant to endocrine surgery. In general, 61.8% of surgery cases were caused by benign diseases.

The most common ones were multinodular goitre (27.6%) and follicular adenoma (22.4%). In line with this trend, another study from a similar secondary centre in Saudi Arabia found that mild goitre was the most common reason. The numbers fluctuate depending on how much iodine is in the area and how people are directed. But 38.2% of our group had cancer, which is more than the 20% to 35% that have been detected in similar studies before. It's possible that our school's higher level of care is due to the fact that it receives referrals. As with other speciality hospitals, it obtains a lot of difficult cases and patients whose cytological results for cancer aren't always unambiguous. The Bethesda System can predict cancer, as shown by the fact that the chance changes from 30% in Category III to 100% in Category VI. This helps people make decisions before surgery.

This conclusion supports large Bethesda System confirmation investigations from several universities. It also reinforces the system's global thyroid cytopathology reporting standard. The high positive predictive value we found for Bethesda IV nodules (64.3%), especially those larger than 3 cm (85%), can help us plan surgery more confidently for this group of patients, possibly avoiding a diagnostic lobectomy followed by a full thyroidectomy. Our second aim was to examine post-surgery complications. The most prevalent issue was hypocalcaemia, which initially affected 32% of patients. This percentage is comparable to but somewhat higher than extensive meta-analyses, which find transitory hypocalcaemia rates between 19% and 38%. Different surgical techniques, hypocalcaemia definitions, and post-surgery monitoring cause this discrepancy. These occurrences are usually transient, dropping to 6% within one month. Good news, since this fits the typical course of transient parathyroid gland shock or devascularisation elsewhere.

Finding a direct association between surgery and hypocalcaemia risk fulfilled our third target. The strongest and most significant association we found. Hypocalcaemia is three times as prevalent in complete thyroidectomy patients (38% vs. 12%), as expected. However, its prevalence in our cohort indicates how difficult parathyroid health is. Many studies have indicated that complete thyroidectomy is the major risk factor for hypoparathyroidism. Bilateral cervical dissection puts all four parathyroid glands at danger of removal, blood supply loss, or overheating. Our findings reveal that the two surgery groups shared all significant beginning features, making surgical extent the sole variable that may establish the cause. In addition to procedural considerations, our research examined patient-specific risk factors. Diabetes was a big issue, with 43% of diabetics developing hypocalcaemia. This intriguing discovery suggests a biochemical relationship. Diabetics' calcium intake is varied, or microvascular illness makes it difficult for the sensitive parathyroid glands to recover and regain blood flow back after surgery. Diabetes may predict low calcium levels after surgery, while other studies have not. This result shows a complex interaction that requires more study. Another key outcome that fits our third target is the relationship between operation rationale and removal quantity.

The whole thyroidectomy group had a substantially higher malignancy rate (48.6% vs. 22.0% in the hemithyroidectomy group), explaining why the first procedure was selected. Most established malignancies and tumours with high-risk biopsies are best treated with a complete thyroidectomy, according to American Thyroid Association clinical practice recommendations. This decision-making method is the same. This site provides evidence-based surgery, not simply clinical findings. It also creates an unbreakable connection since malignancy necessitates complete thyroidectomy, which inherently has a greater risk of problems. Even when demographics were included, the two therapies had substantially different hypocalcaemia rates, which helped our investigation resolve the issue. Surgical margin research contributes to oncologic surgery quality discussions. We found a robust, graded correlation between margins and return

risk. The decline from a 2.0% recurrence rate with R0 resection to 55.6% with R2 resection shows that total tumour excision is the most critical aim of cancer surgery for preventing disease recurrence.

This rule applies to all surgical oncology. This illustrates that planning your operation and procedure ahead of time is crucial for good margins, even if it requires a larger dissection. We agree and disagree in many areas when we place our findings in the context of academic discourse. Cibas and Ali's initial studies confirmed the Bethesda System's accuracy. We concur with large, multi-institutional research and national reports that complete thyroidectomy is the greatest risk factor for low calcium. We documented a greater correlation between diabetes and low calcium levels than had been documented before. Edafe et al. did a thorough study that revealed a number of risk factors. However, diabetes wasn't always remarked about. This might occur because each patient is different or because people report problems in different ways. The group we belong to has a high chance of getting cancer, which is different from previous groups where more than 80% of cases were not cancerous. More people contract thyroid cancer around the world, and this may be because of improvements in how to diagnose the disease.

The evolution in surgery illustrates just how essential it is to do fresh, concentrated studies like this one to make sure that instruction in medicine, the use of resources, and patient guidance is all based on the most current medical evidence. It's important to know what this study can't do for one to fully comprehend how useful it is. Design shortcomings like missing data and biassed selection are known as being present after the event has occurred. One site gave complete and accurate data for the study. That means that the numbers may not remain the same for other groups that have individuals or health problems.

5. Conclusion

To find out if patients had hypocalcaemia, their calcium levels and symptoms were evaluated the day after surgery. If they had been considering more often, their short-term return rate might have been different. Last but not least, the follow-up time might not be long enough to find all cases of long-term hypoparathyroidism or late condition return. But it might have identified signs of early warning and the first event. To learn more about how comorbidities, surgery methods, and long-term consequences affect each other, these results need to be supported by planned, multicenter studies with longer follow-ups.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

All authors declare that they have no conflicts of interest to disclose.

Statement of ethical approval

The study received approval from the Jordanian Royal Medical Services Institutional Review Board on August 19, 2025, under registration number 48_11/2025. Final declaration approval was obtained from the Educational and Technical Directorate on November 3, 2025, and the study was conducted in accordance with the ethical standards of the 1964 Helsinki Declaration.

Statement of informed consent

The ethics committee waived formal permission for this retrospective investigation

Artificial Intelligence (AI)

We affirm that no AI-assisted technologies (such as LLMs or chatbots) were employed in the conception and data analysis, while limited AI-assisted platforms (such as DeepSeek and Copilot) were utilised in creating this manuscript (not exceeding 5%), and paraphrasing AI tools (such as QuillBot) were used for refinement and grammar checking. The work is mostly the creation of the human writers named.

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