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Characteristics of Patients Undergoing Thyroidectomy in a Resource-Limited Setting in Ibb city of Yemen: A Retrospective Monocentric Study

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ABSTRACT

Background and aim: This study aims to review the indications, histopathology, and complications of thyroid operations in a resource-limited setting where the management is provided primarily by general surgeons.

Material and methods: A retrospective study between Jun 2010 and March 2019 included 246 cases who underwent thyroid operations for a thyroid disorder in Al-Nasr Hospital, Ibb, Yemen. The patient's demographic characteristics, operative findings, complications, fine needle aspiration biopsy (FNAB) results, and outcomes were gathered and analyzed.

Results: The mean age was 41.60 ± 8.31 years. The prevalence was high in the age group of 31–40 years and the female gender (87.8%). The main indication for thyroidectomy was compressional symptoms (35%). The main cytology findings were multinodular goiter (89%). Thyroid cancer was presented in 18(7.3%) patients; the most type was follicular thyroid carcinoma (FTC) in 9 patients. The most typical type of surgery was near-total thyroidectomy in 186 (75.6%) patients. Complications were presented in 47 (19.1%) patients, and total mortality was observed in 5(2.03%) patients. Intraoperative bleeding was the most typical complication in 36 (14.6%) patients. The sensitivity, specificity, and accuracy of FNAB were 98.35%, 98.28%, and 98.28%, respectively. FNAB was not precise enough in diagnosing FTC with a sensitivity of 55%.

Conclusions: Even though the rate of complications following thyroidectomy in this study is still high. Most of the mentioned complications are temporary and easy to treat. Thyroidectomy may be viable even in a resource-limited setting or performed by general surgeons.

1. Introduction

Thyroid disorders are among the most clinically encountered conditions. These are primarily caused by alterations in hormonal production, thyroid gland enlargements (goiter), or both. The presentation of thyroid disorders varies based on the underlying etiology, with goiter, hypothyroidism, hyperthyroidism, thyroiditis, and neoplasms accounting for most of their presentation.^[1] Several factors may influence the incidence and prevalence of thyroid disorders in the general public, such as restricted iodine, selenium, and vitamin D intake and radiation exposure.^[2] On many occasions, thyroidectomy is one of the most frequently performed globally by surgeons, including general, endocrine, thoracic, head and neck surgeons, and otolaryngologists.^[3] Even though thyroid surgery is a commonly performed and relatively safe procedure in the community. It is not devoid of risks, including hypoparathyroidism, nerve injuries, recurrent laryngeal nerve

damage and external branch of the superior laryngeal nerve, and hemorrhage, which is related to the morphological features and anatomical location of the thyroid gland.^[4, 5] Findings clearly show the consequences of thyroidectomy in various clinical settings, with different dependent potential predictors.^[4-6] Further study into the predictors of these consequences may assist in developing preventative measures and treatment approaches. Studies on the incidence of thyroidectomy and its consequences are quite sparse in our region due to inadequate resources despite its importance.^[2, 4] A study in Yemen that included 260 thyroidectomies reported that nodular colloid goiter and papillary thyroid carcinoma are the commonest thyroid disorder for surgical intervention.^[7] In this study, we aimed to review the indications, histopathology, and post-surgical consequences of thyroidectomy at Al-Nasr hospital, Ibb, Yemen, in the context of limited resources and general surgeons

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as the sole operators. This study will add a wider view of thyroidectomy in a data-limited nation, where thyroid disorders are diagnosed clinically and managed exclusively by general surgeons.

2. Material and methods

Study design

It is a retrospective cross-sectional study between Jun 2010 and March 2019, including 246 cases operated upon for a thyroid disorder in Al-Nasr Hospital, Ibb, Yemen. The Ibb University of Medical Sciences' ethics committees approved this study on 22/09/2022, with ID number IBBUNLAC.YEM.2022.45, which was carried out in accordance with the Helsinki Declaration.

Inclusion criteria

All patients whose undergone thyroid surgeries, regardless of the type of surgery and the disease, in our center (Al-Nasr Hospital, Ibb, Yemen) during the study period were included.

Exclusion criteria

Patients with incomplete information, concurrent surgery in the same hospitalization, or operated in other hospitals were excluded.

Data collection

The demographic characteristics of the patients, including age, gender, the indication of surgery, primary diagnosis, method of surgery, duration of hospitalization, fine needle aspiration biopsy (FNAB) result, histopathologic diagnosis, intraoperative complications, immediate post-surgical complications, mortality, were gathered from the patient's medical profiles. Additionally, the sensitivity, specificity, and accuracy of FNAB were compared to the postoperative pathological reports.

Statistical analysis

Statistical analysis was performed using SPSS (IBM SPSS, version 22, Armonk, New York: IBM Corp). Descriptive statistics for variables were calculated as mean and standard deviation. For reporting frequencies, descriptive analysis was used. Standard statistical formulas were used to calculate sensitivity and specificity.

3. Results

The baseline clinical characteristics of the study population are summarized in table 1. 246 cases underwent thyroid operations with a mean age of 41.60 ± 8.31 . The prevalence was high (30.1%) in the age group of 31–40 years, followed by the age group of 41–50 years (27.6%). Females were more affected than males (87.8% vs. 12.2%), with a female-to-male ratio of 7.2:1.

Table 1. The patients' Characteristics.

Variables	N (%)
Age (year)	41.60± 8.21
Gender	
Male	30(12.2)
Female	216(87.8)
Living area	
Urban	74 (30)
Rural	172 (70)
Type of operation	
Near-total thyroidectomy	186(75.6)
Total thyroidectomy	28(11.4)
Unilateral lobectomy + Isthmus resection	27(11.0)
Nodulectomy	5(3.0)
Complications	
Intraoperative hemorrhage	36(14.6)
Recurrent laryngeal nerve palsy	14(5.7)
Postoperative wound infections	12 (4.87)

Transient hypocalcemia	12 (4.87)
Need for re-operation	10(4.06)
Needed for tracheostomy	3(1.2)
Death	5(2.03)
Hospital stays	
2-4 days	188 (76.4)
5-7 days	48(19.5)
More than 7	10 (2.03)

The commonest preoperative cytology finding was multinodular goiter type in 219 (89%) patients (Fig. 1).



Fig. 1. Total thyroidectomy for multinodular goiter (A); show the mass (arrow). (B); intraoperative photo shows the resected mass.

There was thyroid cancer in 18(7.3%) patients, and the most type was follicular thyroid cancer (FTC) in 9 patients. The most typical symptom (indication for thyroidectomy) was compressional in 86 (35.0%) patients. The commonest type of surgery was near-total thyroidectomy in 186 (75.6%) patients. Complications were presented in 47 patients (19.1%), and total mortality was observed in 5 (2.03%) patients. Intraoperative bleeding was the commonest complication presented in 36 (14.6%) patients, including postoperative hematoma in 10 (4.06%) during admission with respiratory compromise or obstruction that necessitates re-intervention or evacuation. Recurrent laryngeal nerve palsy was seen in 14 (5.7%) patients, which was

bilateral in 3 (1.2%) patients requiring tracheostomy. Furthermore, postoperative wound infections were presented in 12 (4.87%) patients, and transient hypocalcemia was presented in 12 (4.87%). Most of the patients, 188 (76.4%), were hospitalized for 2 to 4 days. The sensitivity, specificity, positive predictive value, negative predictive value, and accuracy of FNAB were 98.35%, 98.28%, 81.79%, 99.87%, and 98.28%, respectively. FNAB was not precise enough in the preoperative diagnosis of FTC (55%). Thus, a negative result can mostly rule out the diagnosis of thyroid carcinoma (Table 2).

Table 2. The correlation between fine needle aspiration biopsy and final pathology results (N= 246).

Final Histopathology	Fine Needle Aspiration Biopsy, N (%)					Total
	Multi-nodular Goiter	Adenoma	Follicular	Papillary	Lymphoma	
Multi-nodular goiter	219(98.2)	4(1.8)	0(0.0)	0(0.0)	0(0.0)	223
Adenoma	0(0.0)	5(100.0)	0(0.0)	0(0.0)	0(0.0)	5

Follicular	0(0.0)	4(44.4)	5(55.6)	0(0.0)	0(0.0)	9
Papillary	0(0.0)	0(0.0)	0(0.0)	7(100.0)	0(0.0)	7
Lymphoma	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(100.0)	2
Total	219	13	5	7	2	246

4. Discussion

Several environmental and nutritional variables impact the incidence and prevalence of thyroid disorders, which are rising globally. This study found that the multinodular goiter type was the most preoperative cytology finding. Similarly, Alwageeh et al. evaluated thyroid disorders histopathologically and reported that multinodular goiter was the most prevalent preoperative cytology result.^[7] These results are consistent with previous findings that goiter is the most prevalent thyroid condition affecting young women in their teens and twenties.^[2] Iodine-deficient regions are rampant with nodular goiter; a greater proportion of multinodular goiter in our study's representative areas may imply an iodine deficit.^[8] Establishing the causes and pathophysiology in our community may necessitate further studies. In this research, the female prevalence of thyroid illnesses over men was found, making a 7.2:1 female-to-male ratio, similar to Al-wageeh et al. study^[7] and slightly higher than Mengistu et al. and Gitau's studies ranging from 2:1 to 9:1.^[9, 10] Thyroid diseases affect women more than men, owing to thyroid disorders' autoimmune nature and changes in thyroid function during pregnancy.^[11, 12] The main indications for thyroid surgeries are thyroid cancer, toxic multinodular goiter, toxic adenomas, local compressive symptoms, Graves' disease that failed or refractory to medical treatment or for whom medical management may not be advised, such as those attempting to become pregnant, and, rarely, cosmesis.^[13] In our study, the main indication was a compressional symptom in 35%. A similar indication was reported by Al-Hureibi et al.,^[8] On the contrary, in Alyahya et al. study, neck mass was declared the most common indication.^[3] In our study, the mean age was 41.60 ± 8.21 , with the most affected (30.1%) in the age category of 31–40. Similarly, in Wondwosen et al. study, the mean age for thyroidectomy was 41 ± 12.46 , with 59 (29.6%) in the age category of 31–40 years.^[4] Factors such as iodine deficiency and lousy nutrition may increase thyroid disease in this age group.^[14] FNAB is considered a cost-effective and safe test for evaluating thyroid masses, which may be performed with ultrasound assistance for higher diagnostic accuracy.^[15] The current study found that 94.3 % of benign thyroid diseases type were diagnosed by FNAB, which varies from previous findings in studies such as Alwageeh et al., who found that 66.2 % of benign thyroid diseases were diagnosed by FNAB.^[7] FNAB showed high accuracy in detecting papillary, medullary, and anaplastic thyroid carcinoma; however, it has lower accuracy and precision in the preoperative diagnosis of FTC. These findings may be explained by follicular carcinoma's encapsulated and highly vascular nature.^[7, 16]

Thyroidectomy may be performed for several benign and malignant disorders, including thyroid nodules, hyperthyroidism, substernal goiter, thyroid malignancies, and thyroid lymphoma.^[13] Total thyroidectomy or hemithyroidectomy with contralateral near-total excision has been suggested in the literature, given the lower recurrence and re-operation rate.^[17-19] In this study, most of our operations, 75.6 % were near-total thyroidectomies, similar to Al-Hureibi et al. study.^[8] Nevertheless, lobectomy was reported as a reasonable substitute for total thyroidectomy by Matusz et al.,^[20] particularly for the treatment of papillary thyroid neoplasms in young patients (45 years old) with relatively smaller tumors with diameters of 4 cm or less and without

nodal involvement clinically, extrathyroidal invasion, or metastases. Thyroid carcinoma was present in 7.3% of patients, and the most type was FTC in 9 patients. Another study reported 23.3% of thyroid carcinomas.^[21] A high rate of thyroid carcinoma was reported by Al-wageeh et al., who reported that 28.1% of thyroidectomy specimens showed thyroid carcinoma.^[7] This could be interpreted as the total number of cases, the monocentric nature of our study, the different populations, and the geographical distribution of the disease in those studies. Another explanation is that most cancerous patients are preferred undergoing surgery in a referral oncologic center in Sanaa city, where the cost of operation is few. The most prevalent consequences after thyroidectomy were recurrent laryngeal nerve palsy, low calcium levels, and local hematoma.^[22] In a meta-analysis assessing post-thyroidectomy complications, transient or permanent recurrent laryngeal nerve paralysis was reported in up to 4% and 2% of cases, respectively; in addition, transient hypocalcemia in 1% to 21%, hematoma in 2%, and overall complication rates up to 26%.^[23] In our study, complications occurred in 19.1% of patients. Intraoperative bleeding was the commonest complication presented in 36 (14.6%) patients, including postoperative hematoma in 10 (4.06%) during admission with respiratory compromise or obstruction that necessitates re-intervention or evacuation. Recurrent laryngeal nerve palsy was seen in 14 (5.7%) patients, which was bilateral in 3 (1.2%) patients requiring tracheostomy. Furthermore, postoperative wound infections were presented in 12 (4.87%) patients, and transient hypocalcemia was presented in 12 (4.87%). Our explanation for this difference is that the general surgeon performed all the operations. Additionally, most of the mentioned complications are temporary and easy to treat. It was reported that the surgeon's experience was influenced significantly by the incidence of postoperative complications. The higher volume surgeons had lower complication rates.^[24, 25] Sosa et al. and Chahardahmasumi et al. found a strong association between higher surgeon volume and favorable patient outcomes.^[26, 27] It can be concluded that referral of patients to high-volume thyroid surgeons is associated with better outcomes.^[27] There were several limitations in the current study. A monocentric and retrospective nature is the main limitation of our study. Some data, such as thyroid gland volume and long postoperative survival rate, were not investigated. We do not know how many patients developed permanent hyperparathyroidism due to short postoperative follow-ups, and most patients do not return for additional care. A future prospective multicentric study with a large patient number and longer follow-up is recommended to confirm our result.

5. Conclusion

The findings of this study demonstrate that compressional symptoms were the most symptoms of patients who underwent thyroidectomy, the commonest preoperative cytology finding was multinodular goiter, and near-total thyroidectomy was the most performed surgery. The most prevalent complications were intraoperative bleeding. Furthermore, FTC was the most common type of thyroid cancer. It was mainly misdiagnosed on FNAB preoperatively, even though this study's rate of complications following thyroidectomy is still high. Most of the mentioned complications are

temporary and easy to treat. Thyroidectomy may be available in a resource-limited setting or performed by general surgeons. We recommend additional research with a larger population to validate our findings.

Conflict of Interest

The authors declared that there is no conflict of interest.

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