

Total Thyroidectomy as The Main Surgical Option for Malignant and Benign Thyroid Disease, A Prospective Study

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ABSTRACT

Background and Objectives: Total thyroidectomy is regarded as the definitive management of thyroid tumors, malignant and benign. The aim of the study is to assess the safety of total thyroidectomy as the main surgical procedure for treating both malignant and benign thyroid diseases, that is to avoid technically challenging reoperation for residual diseases.

Methodology: a prospective study was done for patients who have underwent thyroidectomy between December 2023 till January 2025 at a public and Privet hospital in Duhok City, Kurdistan Region, Iraq. This study represents a single surgeon experience of Thyroid diseases. A total of 102 cases were enrolled in the study.

Results: The commonest complications encountered was seroma collection 9.8% followed by transient hypocalcemia 6.86% which underwent spontaneous resolution and postoperative treatment of hypocalcemia. Nerve injury, recurrent laryngeal and external branch of superior laryngeal nerves, Respiratory distress, thyroid crisis and surgical site infection had neglectable results ~ 0.0%. The commonest presentation of the cases was mass like lesions or nodules 70.59%.

Conclusion: This study supports the approach of total thyroidectomy as the main surgical technique and supports the superiority of this technique over others as it is associated with less complications and it significantly avoid the potential complications that could develop following a redo-operation for benign and malignant thyroid tumors

Keyword: *Thyroid Carcinoma; Total Thyroidectomy; Post-operative Thyroid complications*

1. INTRODUCTION

Thyroid gland is a butterfly shaped endocrine gland located in the midline of the neck and represents one of the anterior neck structures [1]. It consists of two lobes which are connected by a central peace known as isthmus. Anatomically, the gland is located in the neck corresponding to the C5-T1 vertebral levels wrapping around the tracheal rings and cricoid cartilage, posterior to the sternothyroid and sternohyoid muscles, and inferior to the laryngeal thyroid cartilage [1,2]. The glands main function is to produce thyroid hormones (T3 and T4) and calcitonin to regulate body metabolism, body growth, as well as the regulation and balance of electrolytes [3].

Several diseases can involve the thyroid gland or associated structures which could either be of incidental finding, of minimum or significant impact with local or systemic signs and symptoms [4-7], for instance, alteration in hormone production as in hypo and hyper thyroidism, inflammatory disorders as in thyroiditis, auto-immune disease as in graves' disease and Hashimoto thyroiditis and cancers such as papillary carcinoma, follicular carcinoma and medullary carcinoma [5, 7-11]. Thyroid cancer ranks the 10th most common cancers affecting humans globally with papillary thyroid carcinoma accounting for up to 90% of the cases in some instances, followed by follicular thyroid carcinomas 4% and other types [12, 13]. Several of these diseases which might end in surgical treatment [4, 12] with the surgeons being aware of the surgical anatomy in order to avoid or minimize the complications to the adjacent structures such as recurrent laryngeal nerve injury, external branch of the superior laryngeal nerve injury, post-operative bleeding and many others [14-16].

Thyroid surgery is becoming a common practice and advancing toward a safer approach due to several aspects; new surgical techniques with the use of special sealing devices like ligaSure and intraoperative monitoring [17]. One of the commonest indications of Thyroidectomy is thyroid carcinoma [14, 17]. The surgical procedure performed to remove a part of or the whole thyroid gland is known as thyroidectomy, which is subdivided depending to the type of resection into total or partial thyroidectomy [14]. The indications of the surgery include; malignancy, neck mass, compressional symptoms, and functional disorders like hyperthyroidism [14, 18]. One of the important complications post-operatively is

recurrent laryngeal nerve



injury which could reach to 6.1% according to a retrospective study [19].

The aim of the study is to prove that total thyroidectomy is a safe surgical option and can be considered as the main surgical procedure for treating both malignant and benign thyroid diseases, that is to avoid technically challenging reoperation for residual diseases.

2. METHODOLOGY

This study was conducted as a prospective study of the patients who have underwent thyroidectomy between December 2023 till January 2025 at a public and Privet hospital in Duhok City, Kurdistan Region, Iraq. This study represents a single surgeon experience of Thyroid diseases. A total of 102 cases were enrolled in the study. Cases with incomplete data or were lost during follow-up were excluded. Inclusion criteria; all cases who were indicated for thyroidectomy due to benign or malignant diseases were enrolled regardless of gender, type of operation, or Fine Needle Aspiration Cytology report. Exclusion criteria; age of < 18 was regarded as an exclusion criterion.

The study started by obtaining acceptance from the necessary authorities. Data were collected from a governmental and privet hospital. prior to enrollment all patients were ensured on the privacy of their information and only the final data will be shared. The cases were assessed in the clinic and with a thorough history and clinical examination including both general and local examination of the thyroid gland. Then cases which were presenting with signs and symptoms related to thyroid disease [4, 20-21] were sent to laboratory investigation as thyroid function test (TSH, Free T3 and Free T4) to determine thyroid status, ultrasonography and Fine Needle Aspiration Cytology (FNA cytology) when was needed to take a biopsy and asses the tissue prior to the surgical intervention. Once surgery was indicated the patients were prepared for surgery according to the surgical guidelines for total Thyroidectomy. Post-operatively, the removed glands were sent for histopathological assessment to determine the type of tissue removed. Additionally, each case was followed by for up to 3 months for post-operative complications [16 & 17] mainly nerve injury, recurrent laryngeal and superior laryngeal nerve, post-operative hypocalcemia, Thyroid crisis, and acute respiratory distress.

Data were inputted to SPSS version 26 and were analyzed for frequencies and percentages.

3. RESULTS

Table 1 demonstrates the clinical presentation of the sample and the main reason for seeking medical advice. The vast majority of the cases, 72 cases (70.59%) presented with a mass like lesion including nodules and solitary lesions. Nearly 16.67% of them presented with pressure effect over the trachea and esophagus caused by the mass impact, and 10.78% presented with features of hyperthyroidism, while only 1.96% of the cases were diagnosed incidentally.

Table (1) Clinical Presentation of cases		
Presentation	Frequency	Percentage
Features of Hyperthyroidism	11	10.78%
Mass like lesion, including nodules	72	70.59%
Pressure effect	17	16.67%
Incidental finding	2	1.96%

The results of the next step, i.e. Fine Needle Aspiration Cytology (FNA cytology) are shown in table (2). Follicular lesions were the commonest findings accounting for 18.63% followed by Papillary Carcinoma 15.69%. From the total cases, 6.86% were found to have suspicious lesions, the other cases; Medullary carcinoma, Hard Pyramidal nodule, Hurthle cells, and inconclusive cytology each were seen with 0.98% frequency, and 1.96% were inform of missing data. Nonetheless, 52.94% of the sample did not undergo FNA cytology due to various reasons.

Table (2) Findings of Fine Needle Aspiration Cytology for the assessed cases		
Character	Number	Percentage
Follicular Lesion	19	18.63%
Suspicious lesion	7	6.86%

Medullary Carcinoma	1	0.98%
Not done	54	52.94%
Papillary Carcinoma	16	15.69%
Hard Pyramidal nodule	1	0.98%
Hurthle cells	1	0.98%
Inconclusive	1	0.98%
Missing Data	2	1.96%
Total	102	100.0%

Table 3 represents the next step of the approach and the corner stone of the study, surgical intervention. All cases ended up with total thyroidectomy. One case, which represented 0.98% of the sample, had previously underwent operation and with right lobectomy as the subsequent form the case became categorized as total thyroidectomy. Several cases also have had neck dissections; 1.96% Left sided neck dissection, 1.96% Central Neck dissection and 0.98% Right sided neck dissection.

Table (3): Type of Surgical intervention			
Character		Number	Percentage
Right Lobectomy		1	0.98
Total Thyroidectomy		96	94.12
	Left sided neck dissection	2	1.96
	Right sided neck dissection	1	0.98
	Central Neck dissection	2	1.96
Total		102	100

Table 4 demonstrates the histopathological reports of the sample. The histopathological report of the sample following surgery indicated that Multi-nodular goiter accounted for the commonest finding 36.27% of the sample, with 1 case 0.98% showing follicular nodular disease and 1.96% of the cases showing a Hashimoto background. The second commonest accounting for 27.45% of the cases was Papillary thyroid carcinoma, the third commonest finding was Hashimoto Thyroiditis with 20.59%. Follicular adenoma accounted for 6.86% of the cases, 2.94% were Lymphocyte thyroiditis, 1.96% Hyperplastic Goiter, while Thyroid dysgenesis, Toxic goiter, non-invasive follicular thyroid neoplasm and medullary carcinoma each accounted for 0.98%.

Table (4) Histopathology results of the cases following surgical intervention			
Character		No.	Percentage
Papillary Thyroid Carcinoma (Macro and Micro-carcinoma)		28	27.45%
Follicular Adenoma		7	6.86%
Thyroid dysgenesis		1	0.98%
Toxic Goiter		1	0.98%
Medullary Carcinoma		1	0.98%
Hashimoto Thyroiditis		21	20.59%

Multi-Nodular Goiter		34	33.33%
	Follicular Nodular Disease	1	0.98%
	Hashimoto background	2	1.96%
Hyperplastic Goiter		2	1.96%
Lymphocyte thyroiditis		3	2.94%
Non invasive follicular thyroid neoplasm		1	0.98%
Total		102	100.0%

Table 5 represents the frequency of post-operative complications with an extensive three months follow up. The commonest complication was Seroma formation which accounted for 9.8% followed by Transient Hypocalcemia with 6.86% of the cases. None of the cases have had any nerve injury, acute respiratory distress, wound infections, or Thyroid crisis.

Table (5) Frequency of complications during the post-operative follow-up		
Character	Frequency	Percentage
Nerve injury	0	0.0%
Acute Respiratory Distress	0	0.0%
Wound infection	0	0.0%
Seroma formation	10	9.8%
Transient Hypocalcemia	7	6.86%
Thyroid Crisis	0	0.0%

4. DISCUSSION

One of the definitive managements of thyroid cancer [21] which is widely and globally applied is total thyroidectomy [14]. The disease accounts for 1-4% of all malignancies with female predominance 3:1 [21]. Definitive treatment includes surgical intervention [22] with the most commonly approached method is Total thyroidectomy [23]. Total thyroidectomy has several advantages for the patients over ordinary medical treatment or other approaches such as; can treat multiple lesions especially in both lobes with a single surgical method, a better facilitation of monitoring for thyroid cancer recurrence and metastasis, reduce the recurrence rate of the malignancy and the risk of reoperation and its own subsequent complications, better for postoperative radioactive iodine treatment in indicated cases and the postoperative staging and risk stratification of patients is more accurately assessed. [23-24] Additionally, there is no obvious superiority of other surgical methods over total thyroidectomy like lobectomy [23].

As of any other surgeries, it is expected for a number of patients to develop postoperative complications based on the type of operation and patients overall clinical condition. From the complications assessed in this study was nerve injury, recurrent laryngeal nerve injury and external branch of superior laryngeal nerve injury, with no any cases encountered during the study despite 3 months of extensive follow-up. This could be seen with a very delicate and meticulous dissection techniques which can reduce the risk of nerve injury significantly [25] and reflects the frequency of operation done in a given time; more frequent operation elevates a safe surgical practice. Nevertheless, other studies have found presence of external laryngeal nerve palsy reaching with at least 2% of the cases [25]. Additionally, despite that one of the methods of reducing nerve injury is intraoperative nerve monitoring, which showed a significant reduction from 3% to 0.7%, yet it was not neglectable [26], yet this method was not used intraoperatively due to unavailability. From this we can see that one of the most dangerous complications and the fear of surgeons is nerve injury during thyroid surgery, total thyroidectomy has shown a significantly low to neglectable percentage of cases that would develop such complication. Moreover, it has been seen that a re-do operation has been associated with the increased risk of recurrent laryngeal nerve injury [27], making total thyroidectomy as a superior method of treatment. Other serious postoperative complications such as Acute Respiratory Distress Syndrome and Thyroid crisis were not found among any cases. Despite that literatures have indicated the presence of such complications could be inevitable in some cases [28-29]. The two complications which were

found postoperatively were transient hypocalcemia 6.86% of the cases due to damage thermal injury through using LigaSure to parathyroid gland arteries and seroma formation 9.86% which both seems to exist in other literatures as well for up to 2.2% for seroma [30-31].

All cases in this study underwent total thyroidectomy, one case only as a redo-operation which also ended in total thyroid gland removal following right lobectomy. The beneficence of total thyroidectomy is well documented and seen as it can avoid the potential complications that develops following a re-do operation [23-24].

5. LIMITATION

One of the limitations is that this study was done as a single surgeon experience in a short time interval. Thus, a significantly higher number of cases would be required to provide a more sensitive data. Additionally, the use of continuous intraoperative nerve monitoring and the usage of the Near-infrared autofluorescence for the detection of parathyroid glands would significantly reduce the risk of nerve injury and hypocalcemia, transient and permanent, however, due to unavailability, they were not used.

6. CONCLUSION

This study supports the approach of total thyroidectomy as the main surgical technique and supports the superiority of this technique over others as it is associated with less complications and it significantly avoid the potential complications that could develop following a redo-operation for benign and malignant thyroid tumors.

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Conflict of Interest

None to declare.

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Clinical Trial Number

Not applicable

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