



Thyroid Surgery 2000-2022 Results

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Intruduction

Thyroid gland takes its name from the ancient Greek word thyreos that means emblem. It has the shape of a butterfly and stands in a lower-middle throat position acting as a regulator of body metabolism. Thyroid diseases are of two categories, either anatomical or functional. Thyroidectomy is ourdays performed either for benign anatomical diseases like simple goiter, for malignant thyroid diseases like cancer of the thyroid gland or for functional derangement of the type of hyperthyroidism like Grave's Disease. In this paper we present our experience of 770 cases of thyroid surgery in the form of thyroidectomy.

Materials and Methods

During the period 2000 – 2022 we performed 770 cases of thyroidectomies both for benign and malignant diseases. This study was done to analyse the indications for thyroidectomy, cancer types, postoperative complications, morbidity and mortality and survival according to cancer type.

Diagnostic Workout

All patients had physical examination and palpation of the thyroid gland. Ultrasound of neck and thyroid gland was also performed for all patients. In case of a single thyroid nodule or a dominant nodule in a multinodular goiter, then Fine Needle Aspiration was done under guidance with ultrasound. The existence of cervical LN was always looked for during palpation and ultrasound. Calcitonin and thyroglobulin levels were measured if suspicion of cancer. CT scan and MRI were performed for staging purposes.

Surgical Technique

A 4cm neck incision was performed at a level 2cm above above the sternal notch. The incision is made through the skin subcutaneous tissue, fat and platysma. The flaps are being elevated superiorly to the level of thyroid cartilage and inferiorly to the level of the sternal notch. The sternohyoid muscle is so exposed and at the midline it is divided longitudinally with the thyroid gland and its fascia being exposed. Following that intracapsular dissection was performed with an average of 7 fascial layers being identified and transected. While going laterally to each lobe you can see it being freed and expanding. Just next to and at the outskirts of the thyroid gland on each side you can find the parathyroid glands and the recurrent and superior laryngeal nerves (RLN, SLN). The superior

parathyroid glands are classically found near the posterolateral aspect of the superior pole approximately 1 cm superior to the intersection of the recurrent laryngeal nerve (RLN) and the inferior thyroid artery (ITA). The inferior parathyroid glands are described as being located adjacent to the inferior aspect of the thyroid lobe between the inferior thyroid artery and vein.[5] In a small but significant number of patients, ectopic and/or supra-numerary parathyroid glands exist, and these can be located anywhere from the inferior border of the mandible to the mediastinum.[8]

The thyroid gland's blood supply is from the superior thyroid artery.

CND should be performed with well-differentiated large tumors (T3 and T4), poorly differentiated thyroid cancers, and the presence of pathologic lymph nodes in the central compartment.[26]

Indications for bilateral LND include MTC with high calcitonin and MTC (Myeloid carcinoma of thyroid) with palpable cervical lymphadenopathy. Indications for ipsilateral LND include sporadic MTC 2 cm or larger with evidence of central neck disease or grossly identifiable lateral neck disease in PTC or MTC.

In differentiated thyroid cancer, such as papillary thyroid cancer (PTC), lobectomy may be performed for microcarcinoma. Indications for total thyroidectomy rather than lobectomy in PTC include size >1cm, tall cell variants, extrathyroidal extension, bilateral disease, and lymphovascular invasion[12]

Results

This analytical study was done to assess all aspects of our results of thyroid surgery from our team of surgeons. There were 770 cases of thyroidectomies performed during the 22 years period mentioned above. Of those 400 were multinodular goiters, 130 were Grave's Disease, 70 toxic adenomas and 170 cancers of the thyroid gland (Table 1).

<u>Indication for Thyroidectomy</u>	<u>Number</u>
Multinodular Goiter	400
Grave's Disease	130
Toxic Adenoma	70
Thyroid Cancer	170
	<u>770 Total Number</u>

Table 1.

The types of thyroid cancer were as follows : Papillary (70), Follicular (60), Medullary (22) and Anaplastic (18) (Table 2).

Type of Thyroid Cancer	Number
Papillary	70
Follicular	60
Medullary	22
Anaplastic	18
	170 Total Number

Table 2.

Types of operations performed for thyroid diseases include total thyroidectomy with or without central neck dissection and with or without lateral neck dissection, uni- or bi-lateral (Table 3).

Central or lateral neck dissection was always performed in combination with total thyroidectomy.

Types of Operation	Number
Total Thyroidectomy	640
Subtotal Thyroidectomy	130
Central Neck Dissection	80
Lateral Neck Dissection Uni/Bilateral	40

Table 3

Postoperative complications include bleeding in 28 patients with 13 of them being reoperated, laryngeal nerve injury in 17 patients with 7 of them being permanent and hyperparathyroidism in 44 patients for 22 of those having being established as permanent (Table 4).

Postoperative complications	Type of Complication	End Action
Bleeding	28	13 Reoperations
RLN Injury	17	7 Permanent
Hypoparathyroidism	44	22 Permanent

Table 4.

Morbidity accounts for 89/770 cases (11,55%) and Mortality Rate was 1/770 cases (0,12%) (Table 4).

Morbidity	89/770 (11,56%)
Mortality	1/770 (0,12%)

Table 4.

Survival Rates for Thyroid Carcinoma subtypes, ie Papillary, Follicular, Medullary and Anaplastic is displayed in Table 5.

Type of Carcinoma	Median Overall Survival (months)
Papillary	146
Follicular	130
Medullary	87
Anaplastic	13

Table 5.

Discussion

Historically, thyroidectomy was the treatment of choice for goiter. Improvements in diagnostic imaging and medical management have reduced the need for thyroidectomy for most goiters and many thyroid nodules with benign characteristics.

By the middle of 19th century thyroidectomy mortality was 40%. It was the impact of the pioneer surgeons Kocher and Billroth that brought the mortality down to 0.5%.

In our series the rate of complications is 11.5%, while other series report rates of 20%, 21% and 24%. (9, 7, 8) So, our morbidity is on the low edge of the spectrum. To be noted that the type of operations performed by us was total thyroidectomy (83.12%) and near total thyroidectomy (16.88%). Our operative preferences include subtotal thyroidectomy for Grave's Disease and Total thyroidectomy for the rest of the patients. Indications for thyroidectomy were multinodular goiter (51.9%), Grave's Disease (16.8%), toxic adenoma(9.09%) and thyroid cancer (22.07%).

In the United States of America (US), most departments of otorhinolaryngology head and neck surgery have been performing thyroid surgery for many years. In contrast to the US, thyroid surgery is still dominated by general surgeons in most European countries. In numerous university centers, there continues to be friction regarding thyroid surgery. The focus of this editorial is to demonstrate that there is objective data in the literature to suggest that otorhinolaryngologists with appropriate training in head and neck surgery are well suited to perform the entire spectrum of thyroid surgery. The question

of who is qualified to perform thyroid surgery is not determined by the basic specialty certification of the surgeon-general or otolaryngology; rather it depends on the training, skill and experience in surgery of the neck, of post-surgical and post-irradiated necks, and of neighboring structures. (6)

In order that the risk for a postoperative permanent vocal cord palsy is not likely above the national average, the annual case volume should reach 110 thyroid interventions. (7)

The majority of OTO-HNS programs use IONM for thyroid and parathyroid surgery, whereas less than half of GS programs regularly use IONM for these surgeries. Thyroid surgeons, with larger thyroid surgery volume, regardless of discipline, tend to use IONM more. The motivations for using IONM differ significantly between OTO-HNS and general surgeons in that more GS use it for locating the RLN, and more OTO-HNS use it for continuous monitoring of the nerve during resection and for medicolegal purposes.(20)

Intra-operative identification and preservation of parathyroid glands is an important but challenging aspect of thyroid surgery. Several modalities have been used to aid parathyroid gland identification, including Raman spectroscopy, indocyanine green angiography, and NIRAF. Studies utilising NIRAF technology were able to identify 76.3%-100% of parathyroid glands intra-operatively. (3, 5, 22)

Another modality of parathyroid localization is by the use of Technetium sestamibi scan that can accurately localizes parathyroid adenomas in 70 to 85 per cent of cases. In patients,however, with primary hyperparathyroidism and negative sestamibi scan, an attempt was made to find adenomas intraoperatively with the use of gamma probe. In 19 of the 21 patients analyzed, the gamma probe successfully identified the adenoma in the operating room (sensitivity, 90.5%). There were no false positives. In all cases, the parathyroid resected was confirmed by frozen section. (19).

Cancer arising from the thyroid gland is separated into those derived from the follicular cells (follicular cell-derived) and those arising from neuroendocrine cells (medullary thyroid cancer). Follicular cell-derived forms of thyroid cancer account for 95% of all cases.(2)

Thyroid cancer incidence has risen since the early 1970s largely due to increased detection of small papillary thyroid cancer (PTC). Due to the increase in small PTCs that may have remained clinically silent, and concerns of overtreatment, society guidelines have recommended a more conservative approach.

Patients appropriate for active surveillance are those with well-defined solitary \leq 1 or 1.5 cm intrathyroidal PTCs with at least 2 mm of normal thyroid parenchyma surrounding the tumor, no suspicious lymph nodes, and older age.(22)

0 4PTCs with multiple driver events, such as BRAF V600E+TERT, or RAS+TERT, have been suggested to be inappropriate for active surveillance(22) due to the concern of a potentially more aggressive course. Sonographic features such as rich vascularity and calcification patterns are associated with higher rate of growth 25.

Extent of surgery

High-risk features such as gross extrathyroidal extension, incomplete tumor resection, distant metastases, pathologic lymphnodes ≥ 3 cm, and FTC with extensive vascular invasion indicate the use of RAI treatment which necessitates total thyroidectomy. ATA guidelines extend the option of hemithyroidectomy for low-risk thyroid cancers in the 1 to 4 cm size range.30.

According to the ATA guidelines, patients with DTC are considered to have had an excellent response after total thyroidectomy andRAI if they have undetectable or very low Tg level along with negative imaging tests such as neck ultrasound.

The anti-PD-1 monoclonal antibody pembrolizumab is approved for tumors with high microsatellite instability or high expression of the PDL-1 ligand and has been studied in thyroid cancer, and the PD1 inhibitor, spartalizumab recently was shown to have activity in anaplastic thyroid cancer (ATC).. BRAF V600E inhibitor vemurafenib(18) was associated with median PFS of 18.2 months in RAI RPTC patients. In addition, combination therapy using the BRAF V600E and MEK inhibitors dabrafenib and trametinib are FDA-approved for BRAF V600 E-mutated ATC. Finally, two second-generation inhibitors of RET, Selpercatinib125and Pralsatinib were FDA approved for RET-mutated and RET-rearranged cancers, including PTC and medullary thyroid cancer(2).

5-year relative survival rates for thyroid cancer

These numbers are based on people diagnosed with thyroid cancer between 2012 and 2018. American Cancer Society Tables 6, 7, 8, 9.

Papillary thyroid cancer	
SEER* Stage	5-Year Relative Survival Rate
Localised	>99.5%
Regional	99%
Distant	74%
All SEER Stages Combined	>99.5%

Table 6.

Follicular Thyroid Cancer	
SEER Stage	5-Year Relative Survival Rate
Localised	>99.5%
Regional	98%
Distant	67%
All SEER Stages Combined	98%

Table 7.

Medulary Thyroid Cancer	
SEER Stage	5-Year Relative Survival Rate
Localised	>99.5%
Regional	92%

Distant	43%
All SEER Stages	91%

Table 8.

Anaplastic Thyroid Cancer	
SEER Stage	5-Year Relative Survival Rate
Localised	39%
Regional	11%
Distant	4%
All SEER Stages	8%

Table 9.

As seen there is some discrepancy between our results for medullary and anaplastic carcinoma between our results and SEER results, the second being more favourable, possibly due to new treatment modalities.

In the thyroid gland, radiofrequency ablation (RFA)(21) is being applied to both benign nodules and cancers internationally, while interest is also growing in the West. Benign thyroid nodules (BTNs) may be candidates for intervention when symptoms develop. For differentiated thyroid cancers (DTC), surgery is currently the first-line treatment. However, for candidates with high surgical risk or those who refuse to undergo repeated surgery, newer techniques such as RFA are an option. RFA seems to be an effective and safe alternative to surgery in high-risk surgical patients with thyroid cancers and for selected BTNs.

In conclusion, we consider that our results are in concordance with the world standards, although in certain situations new treatment modalities have come out in the recent years that has revolutionized certain aspects of thyroid diseases therapy.

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