Reviewing the evidence of surgical management of thyroid nodules

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Abstract:

Surgery of the thyroid gland has evolved in many ways since its modernization by Theodor Kocher in the late nineteenth century. Along with procedural modifications, the surgical indications for benign and malignant disease have also continued to evolve and have often been a source of controversy. This article describes the indications, diagnosis and surgical management for thyroid nodules. We conducted this overview to summarized the evidence based on surgical management of thyroid nodules, we performed an electronic search through specific databases such, PubMed (MEDLINE) and Ovid EMBASE, up to November 2017. The palpable thyroid nodule is a frequent finding in our population, whereas thyroid cancer is a relatively unusual problem. Nonetheless, the danger that a thyroid nodule is cancer warrants an organized technique to this clinical discussion. Patients with symptoms resulting from single or numerous thyroid nodules, such as dysphagia and choking sensations, require excisional surgery, whether cancer exists or not. Existing advancements in thyroid surgery are making the procedure much more efficient and preferable for patients and surgeons. Because the morbidity associated with thyroid surgery is fairly low, and the mortality basically zero, it is not a significant issue that the final diagnosis of numerous patients undergoing operation often turns out to be a benign one, nevertheless if managed properly thyroid surgery can be safe and rewarding.

Introduction:

Thyroid nodules are clinically palpable in 4-7% of adults usually [1], [2].With ultrasound exam, thyroid nodules are determined in approximately 70% of grownups [6].In asymptomatic individuals, the potential for malignancy underlies the clinical importance of examining thyroid nodules.

Thyroid nodules most typically represent benign colloid nodules [3]; generally less than 5% are malignant [4], [5].Although that a small percentage of thyroid nodules are malignant, the occurrence of both thyroid nodules and thyroid cancer are enhancing and has expanded 2.4 folds over the last 3 decades [7], [8].Enhanced incidence of thyroid nodules is likely, in part, because of boosted surveillance in addition to greater resolution ultrasound (US) [9].Nonetheless, threat of cancer in addition to patient stress results in the require to precisely identify and diagnose thyroid nodules.

Thyroid surgeries are complexed by post-operative thyroid hormone imbalance, hypoparathyroidism, recurring laryngeal nerve injury, bleeding, or infection; hence, there has been an initiative to restrict unnecessary surgical treatment in asymptomatic patients with benign lesions [4], [5], [8].Surgical procedure for benign lesions ought to preferably be restricted to patients with compressive signs, Graves's illness presenting with a blemish, hyperthyroidism, hyperparathyroidism, increasing the size of nodule, or the patient's personal desire for surgical management [10], [2], [3].

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indications for benign and malignant disease have also continued to evolve and have often been a source of controversy. This article describes the indications, diagnosis and surgical management for thyroid nodules.

Methodology:

We conducted this overview to summarized the evidence based on surgical management of thyroid nodules, we performed an electronic search through specific databases such, PubMed (MEDLINE) and Ovid EMBASE, up to November 2017, we limited our search on English language published studies, and all studies discussing surgical management of thyroid nodules. Also references concerning the same topic was extracted from chosen studies for further board search to collect as strong evidence as we can.

Discussion:

- **Thyroid nodules**

Enhancements of the thyroid gland consist of a host of conditions such as the endemic goiter of iodine deficit (normally in underdeveloped countries), primary hyperthyroidism (Graves' illness), solitary thyroid nodules, multinodular goiter, numerous ranges of thyroiditis (acute, subacute, and

chronic), and frank thyroid cancer. The enhancement of nutritional iodine in salt in the United States and in the majority of locations of the globe has essentially eliminated goiter from iodine deficiency. Nevertheless, separating the other clinical presentations of thyroid augmentation from thyroid cancer remains a diagnostic obstacle. Nodules in the thyroid, whether solitary or several, typically present with just what appears to be a singular nodule on physical exam. An organized strategy is required for their analysis.

The frequency of thyroid nodules greatly relies on the method utilized for their detection. If one were to include all thyroid nodules discovered at autopsy exam, half of the patients would be found to have several thyroid nodules [11], however the majority of nodules would be as well little to have been discovered clinically. This same scenario would use if one were to evaluate thyroid glands for nodules by ultrasonography [13], [12], specifically in the population of patients who are greater than 50 years old. This is a very sensitive approach for identifying small occult nodules [14].Due to the fact that most apparent nodules are > 1.5 cm, and just an extremely tiny proportion of smaller sized nodules show to be cancer, our additional conversation of this professional trouble will certainly deal only with apparent nodules.

- **Diagnosis**

Thyroid nodules are an usual finding, and usually a source of diagnostic and management issues. The low cost and accessibility of ultrasound have made detection of thyroid nodules really simple and has caused the 10 times boosted discovery rates [15].Coupled with the incidental discovery of blemishes during imaging for nonthyroid procedures clinicians are seeing an epidemic. Although most of the nodules are benign, 5% to 10% of nodules are malignant. Surgeons must familiarize themselves with the sonographic qualities of thyroid nodule pathology and their appropriate management.

Appropriate treatment of thyroid nodules relies on analysis cytology acquired through fine-needle aspiration biopsy (FNAB). The danger of hatred coincides for patients with a singular nodule or several nodules. Sonographically benign-appearing nodules larger than 1.5 cm or sonographically or clinically dubious nodules need to be considered for biopsy. The results of FNAB integrated with ATA released therapy standards help direct the management of thyroid nodules. FNAB outcomes are identified as benign (70%); indeterminate (10%," dubious for hatred" or possible follicular neoplasm); malignant (5%); and nondiagnostic (15%) [16].

Ultrasound-guided FNAB considerably improves diagnostic precision over palpation with decrease in false-negative and nondiagnostic rates. Management of cytologically benign thyroid nodules consists of monitoring with interval follow-up caused by the FNAB false-negative rates of as much as 5%. A substantial rise in nodule size more than 20% to 50% or growth of dubious sonographic attributes warrants repeat ultrasound-guided FNAB or surgical excision.

Nodules with FNAB demonstrating indeterminate cells (" questionable,"" follicular," or Hurthle cell neoplasm) bring about a 10% to 20% risk of hatred [17].Solid or complicated nodules generating persistent nondiagnostic searchings for may demonstrate a 5% to 10% threat of malignancy [18].For these patients with associated risk elements, the ATA recommends thyroid lobectomy as a first treatment. Adhering to lobectomy, intraoperative icy histopathologic evaluation favorable for cancer needs an overall thyroidectomy and feasible main node dissection if gross nodal transition is identified. If the pathologist delays diagnosis until irreversible sectioning, all patients with malignancy except those with a solitary emphasis or subcentimeter condition must undergo completion thyroidectomy. Conclusion thyroidectomy is usually performed in the first month following the initial treatment [19].Situations that could gain from a total thyroidectomy instead of lobectomy consist of (1) people with tumors above 4 cm and

cytologic atypia, (2) FNAB" dubious for papillary cancer," (3) patients with family history of thyroid cancer, and (4) childhood years radiation exposure caused by increased risk of malignancy in these clinical setups.

Table1. The Patient With a Thyroid Nodule: Key Features

History	Physical examination
Age and gender	Size and location of nodule
Family history (thyroid or endocrine disease)	Firmness or tenderness
Prior head and neck radiation	Other nodules
Recent hoarseness	Cervical lymph nodes
Dysphagia or respiratory distress	Vocal cord paresis or paralysis
Pain or tenderness	Tachycardia and/or tremor
Symptoms of hypermetabolism	

- **Fine Needle Aspiration in Investigating Thyroid Nodules**

FNA biopsy is the most sensitive and particular preoperative indicator for thyroid malignancies. More than 60% of FNA biopsies reveal benign illness, preventing the requirement for surgical intervention [19].In this instance, the accuracy of a benign FNA report mores than 90% and increases to 98% if the exact same result is seen on repeat biopsy. These patients can be followed up with serial ultrasound examinations 6-- 18 months after the initial FNA. Repeat FNA is just scheduled for enhancing nodule size (> 50% rise by nodule quantity or > 20% increase in at least 2 nodule measurements). Or else, subsequent examinations can be delayed to 3- 5 annual intervals [20].

A further 5-10% of biopsies show obvious malignancy, necessitating surgical treatment. Analysis of the remaining 30% of biopsies is more complicated, as most of these are read as questionable for follicular or Hurthle cell lesions. The diagnosis of a follicular cell lesion or neoplasm remains to be the topic of debate and results in problem in making suitable therapy recommendations. Biological markers and immunohistochemistry have no clear-cut role in routine analysis

objectives for the moment, although a number of molecular markers have been recommended to be helpful in detecting thyroid cancer, including telomerase, beta-galectin and B-Raf [21].There is a continuous study to test the precision of recognizing B-Raf anomalies in FNA samplings in forecasting for thyroid malignancy. Ultimately, surgical decisions ought to be made based on clinical and ultrasound attributes, patient anxiousness and the convenience level of the treating doctor. Both the patient and the doctor should understand that only 15- 20% of these lesions are ultimately confirmed to be malignant-- either follicular thyroid cancer or follicular version of papillary thyroid cancer. It is additionally crucial that the analysis of the FNA biopsy be correlated with the clinical context in question, given that FNA has a false-negative rate of 5-10%. If there is a strong professional suspicion of malignancy, the patient would either need repeat biopsies or medical intervention.

- **SURGERY FOR THYROID NODULES**

Patients with symptoms resulting from single or numerous thyroid nodules, such as dysphagia and choking sensations, require excisional surgical procedure, whether cancer is present or otherwise. The danger that a thyroid blemish is cancer is the other significant component, and this opportunity is analyzed by the combination of scientific variables detailed earlier and by the results obtained from FNAB. Since the morbidity associated with thyroid surgery is rather low, and the mortality essentially zero, it is not a significant concern that the last medical diagnosis of many patients undergoing operation often ends up being a benign one [22].

Nature of the Operation for a Thyroid Nodule

There is some difference regarding the extent of surgical procedure showed for a patient with an apparent thyroid nodule. Nonetheless, it is typically concurred that a simple excision of the

nodule from a thyroid wattle is an insufficient approach. All cosmetic surgeons think about the minimum treatment to be that of complete thyroid lobectomy on the side of the nodule or, if the nodule is just in the isthmus, total and generous excision of the isthmus itself [23].The factor for this consistent sight is the basic truth that the surgeon could not accurately develop a medical diagnosis of cancer in most cases at the time of procedure, despite having frozen-section diagnostic aid. In numerous circumstances, the last medical diagnosis of thyroid cancer might not come to be recognized till numerous days after operation and after full pathologic study of the tissue got rid of. To avoid a need to go back to a" disturbed" operative field, where the recurring laryngeal nerve and parathyroid glands are at threat of injury, it is thought about necessary to do a complete lobectomy for the nodule at the preliminary procedure. The varying reasonings of doctors regarding the procedure used concern the potential extra expansions of the operation beyond lobectomy for cancer or for benign thyroid disease. The action in the procedure that we favor are described below.

General Consideration

Surgions prefer general anesthesia with endotracheal intubation for neck exploration and thyroid lobectomy. The patient is positioned with neck hyperextension produced by a rolled towel under the shoulders, and both arms are put beside the thorax. The last positioning is to prevent development of an asymmetric surgical mark, which might well result if one arm is positioned laterally on an arm board.

Incision

The collar incision used for a thyroid lobectomy is approximately 2 finger-breadths above the degree of the clavicle; it is in proportion bilaterally and enough time to have a resulting mark that

appears to be a normal skin line when recovered. Brief anterior incisions typically create a more visible scar. After strengthening the incision with the platysma, and establishing skin flaps, the anterior boundary of the sternocleidomastoid muscle is activated on the side of the nodule, and the cervical fascia is incised in the midline in between the strap muscle mass. Numerous cosmetic surgeons perform high division of the ipsilateral band muscular tissues with the intent, to enhance accessibility to the thyroid wattle, yet our company believe this is rarely required [24].

Exploration of the Thyroid

The abnormal lobe and the contralateral lobe are carefully palpated after the strap muscles have been candidly separated from the thyroid gland by finger dissection. Monitoring and palpation of any bigger paratracheal lymph nodes are also crucial, as biopsy of an unusual node might establish truth diagnosis of the procedure in the thyroid and aid prepare the subsequent resection. The operative approach from this point forward, in terms of the degree of resection, depends mainly on the assessment of the gross searchings for in both lobes. However, an unforeseen searching for of lymph node enlargement from unexpected metastatic cancer could modify the procedure. In a lot of circumstances where the contralateral thyroid lobe is regular, independent lobectomy shows up to us to be the procedure of choice.

Technique of Lobectomy

Complete thyroid lobectomy is started by superior representation of the inferior boundary of the lobe after division and ligature of inferior thyroid veins. Careful candid dissection in retrothyroid tissues is carried out to determine and protect the recurring laryngeal nerve after ligation of the inferior thyroid artery branches near to the thyroid capsule. The goal of this strategy is to protect both the ipsilateral inferior parathyroid gland and its surrounding blood supply from the inferior

thyroid artery. Exposure, breakdown, and conservation of the persistent laryngeal nerve throughout its course constitute the most safe way to prevent injury to this framework. Invasion of the nerve by thyroid cancer is a practical indicator for sacrifice of this nerve. The other nerve to be maintained during lobectomy is the external motor branch of the superior laryngeal nerve, an additional branch of the vagus nerve. This motor branch accompanies the superior thyroid vessels and is functionally vital in tensing the ipsilateral vocal cord, specifically throughout singing. Careful seclusion and lateral traction of the superior laryngeal nerve by skeletonizing the adjacent vessels in the superior thyroid pedicle at the time of ligation will certainly maintain this nerve and its function. Conclusion of the lobectomy is then completed by dissection of the loose areolar tissue between the wattle and the throat throughout the midline so regarding consist of the thyroid isthmus in the surgical specimen. Division of the isthmus is achieved where it signs up with the contralateral lobe, unless findings at the preliminary exploratory analysis have brought about a decision to resect part or all the contralateral lobe. In this last instance, great care is taken to protect parathyroid tissue [25].

Conclusion:

The palpable thyroid nodule is a frequent finding in our population, whereas thyroid cancer is a relatively unusual problem. Nonetheless, the danger that a thyroid nodule is cancer warrants an organized technique to this clinical discussion. Patients with symptoms resulting from single or numerous thyroid nodules, such as dysphagia and choking sensations, require excisional surgery, whether cancer exists or not. Existing advancements in thyroid surgery are making the procedure much more efficient and preferable for patients and surgeons. Because the morbidity associated with thyroid surgery is fairly low, and the mortality basically zero, it is not a significant issue that

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