

# Solitary Nodule of Thyroid Gland: An Overview and Case Study

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**Abstract:- Solitary nodule of thyroid gland is an isolated enlargement within the glandular thyroid, often raises concerns due to the potential risk of malignancy. It presents the diagnostic evaluation, management, and follow-up of a patient with a solitary nodule of the thyroid gland. Furthermore, it highlights the importance of a systematic approach to the assessment of thyroid nodules, including clinical examination, imaging studies, and histopathology with a tiny aspirating needle. The case also emphasizes the significance of multidisciplinary collaboration involving endocrinologists, radiologists, and surgeons in providing optimal patient care. Additionally, it emphasizes the requirement for ongoing monitoring in order to look for relapse or metastasis in those individuals. The report strives to add to the body of knowledge by offering valuable perspectives into the management of solitary thyroid nodules and its implications for patient outcomes.**

**Keywords:** *Thyroid gland, Solitary thyroid nodule, Thyroidectomy.*

## I. INTRODUCTION

In clinical practice, thyroid diseases continue to rank among the most often seen endocrine conditions, with females being more frequently affected. Due to the thyroid's structure matching ancient Greek shields, the word thyroid originates from the Greek word for shield<sup>1,2</sup>. The upper aerodigestive tract is sheathed by the thyroid gland, which weighs around 20–25 grams and has a robust vascular and lymphatic supply<sup>1</sup>.

The term "clinically solitary thyroid nodule" can be used to describe "a thyroid swelling that seems to be a single palpable nodule located within an otherwise normal gland" Frequently, these thyroid tissue abnormal growths can be felt as a lump in the throat and are seen at the thyroid glands margin<sup>3</sup>. They might appear as a lump in the upper portion of the neck when they are huge. A thyroid cyst is a hollow filled with fluid that can occasionally accompany a thyroid nodule<sup>3</sup>. Since it presents a variety of pathological signs, the solitary thyroid nodule continues to elude surgeons and pathologists in this era of recent advancements. Occasionally it exhibits no indications and has a very slight clinical impact, but due to its extremely malignant character, it proves to be lethal<sup>4</sup>.

## II. ETIOLOGY

The underlying causes of thyroid single nodule conditions may differ, it include both benign and malignant conditions. Most common causes include:

### A. Benign (Non-cancerous) Nodules:

- Colloid nodules: These are the most common benign nodules and are composed of overgrown thyroid tissue.
- Thyroid cysts: Fluid-filled sacs within the thyroid gland.
- Adenomas: Non-cancerous tumours originating from the thyroid follicular cells.

### B. Malignant (Cancerous) Nodules:

- The most frequent form of thyroid carcinoma, causing around 80% of all the thyroid gland tumours, is papillary cancer of the thyroid.
- Follicular thyroid carcinoma: A less common but more aggressive type of thyroid cancer.
- Medullary thyroid carcinoma: Develops from the thyroid's parafollicular C cells and is linked to genetic alterations.
- Anaplastic thyroid carcinoma: A very uncommon and severe thyroid malignancy.

### C. Other Factors:

- Iodine Deficiency
- Radiation Exposure 5,6.

## III. PREVALENCE AND INCIDENCE

Thyroid nodules have a rate of occurrence ranging from five to fifteen percent in the general public, making them relatively frequent. The incidence increases during age, and women are more commonly affected than men. Solitary nodules account for approximately 20-30% of all thyroid nodules<sup>5</sup>.

## IV. PATHOPHYSIOLOGY

The pathophysiology of solitary nodules of the thyroid gland involves a complex interplay of genetic, cellular, and environmental factors. Overgrowth and accumulation of colloid within thyroid follicles, Uncontrolled proliferation of filamentous thyroid gland cell, Genetic alterations, alterations in the RET proto-oncogene causing abnormal growth.

## V. EVALUATION OF THYROID NODULE

- **Clinical Examination:** A thorough visual examination of the thyroid gland is carried out to assess the size, consistency, and mobility of the nodule, as well as the existence of any sort of related indications or symptoms of malignancy.
- **Imaging Studies:**
  - **Ultrasonography (USG):** Provides detailed information about the size, location, composition, and vascularity of the nodule.
  - **Radionuclide scanning:** Using radioactive iodine or technetium, this scan helps evaluate the functional activity of the nodule and can differentiate between hot (usually benign) and cold (potentially malignant) nodules.
  - **Computed tomography (CT) or magnetic resonance imaging (MRI):** These imaging modalities are used when additional characterization or evaluation of nodules is required.
- **Fine-Needle Aspiration Biopsy (FNAB):** A minimally invasive procedure that involves using a fine needle to extract cells from the nodule for cytological examination. FNAB plays a crucial role in determining the risk of malignancy and helps guide further management decisions<sup>7,8</sup>.

## VI. MANAGEMENT

The treatment of a solitary thyroid nodule depends on several factors, including the size, characteristics, risk of malignancy, and patient-specific considerations.

### A. Observation:

Small, asymptomatic nodules that have a low risk of malignancy can be monitored without immediate intervention. Observation typically involves regular clinical examinations and periodic imaging studies to assess the nodule's size and any changes over time.

### B. Fine-Needle Aspiration Biopsy (FNAB):

FNAB is a minimally invasive treatment that entails taking cells out of a nodules using a small instrument for cytological analysis. It helps determine the risk of malignancy and guides further management decisions.

### C. Surgical Intervention:

Surgery may be recommended for nodules that show a high suspicion of malignancy or exhibit concerning features on imaging.

### D. Surgical options include:

- Hemithyroidectomy: Extraction of the thyroid glands one lobe.
- Entire thyroidectomy: Complete gland of the thyroid resection.
- Lymph node dissection: If there is evidence of lymph node contribution, adjacent lymph nodes are removed using this technique.

### E. Radioactive Iodine Ablation:

Any residual thyroid cells after surgery are eliminated using radioactive iodine, which is specifically absorbed by thyroid tissue.

### F. Thyroid Hormone Replacement:

After surgery or radioactive iodine therapy, thyroid hormone replacement therapy is usually initiated to maintain optimal thyroid hormone levels in the body.<sup>9,10</sup>

## VII. CASE STUDY OF MRS M

A 48-year-old woman who had no major prior medical and medication histories was admitted to the hospital with complaints of throat soreness and swelling in the anterior area of her neck for the past month. She was alert, focused, and cognizant during her physical assessment. her health indicators was found to be normal and laboratory investigation shows that RBC (4.2million cells/cumm), Haemoglobin (11.9 mg/dl) and MCHC (30gm/dl) were found to be decreased. The USG neck revealed a solitary thyroid nodule in right lobe-tirads1. In prelude of surgery, general anaesthesia (Inj-Fentanyl-100mcg, inj. Propofol-100mg, inj. Scoline-100mg, inj. Atracurium-25mg) was given, and the procedure continued with the patient in a supine posture.. Inj.Isopar 1mg + Inj.Tramadol50mg + Inj Glycopyrrolate 0.5 mg + Inj.Dexa 8mg + Inj.xylocard 40mg + Inj.Mgso4 1gm was also administered and right lobe of thyroid along with isthmus was removed.

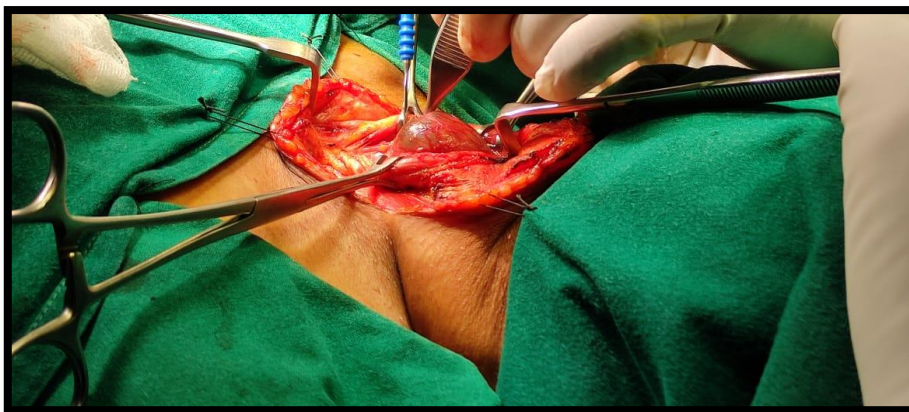


Fig. 1: Procedure for solitary nodule of thyroid gland

Source: Vivekanandha Medical Care Hospital

## VIII. METHODOLOGY

The ultrasonography was performed on 15/06/23, and the report's findings were as follows.

A. *Surgical Technique:*  
Hemithyroidectomy.

B. *NECK:*

A well-defined wider than taller predominantly cystic lesion measuring 2.9 X1.7 cm noted replacing the right thyroid lobe with minimal low level internal echoes and few soft tissue components. On colour doppler minimal peripheral and internal soft tissue colour uptake noted.

C. *SIGNS AND SYMPTOMS:*

She had the complaints throat pain and swelling in anterior part of neck for past one month.

D. *COMPLICATION:*

- Hematoma,
- Infection
- Respiratory Obstruction
- Thyroid Insufficiency

E. *MANAGEMENT:*

Hemithyroidectomy was the surgical technique performed on the subject.

F. *HEMITHYROIDECTOMY:*

A cut (incision) is made by the doctor in the middle of the neck once the patient is sedated from general anaesthesia. After making a suitable transverse incision through the skin and subcutaneous platysmal muscle, the flap is raised slightly over the upper border of the thyroid cartilage to allow for dissection underneath. Subplatysmal flap can be raised to reveal the inferior pedicle, deep fascia, and sup. Strap muscles can be retracted laterally and dissected laterally from free areolar tissue. Simply contracting the muscles creates a bloodless environment in the surgical area. The thyroid lobe's surrounding strap muscles and accompanying adventitial tissues are pulled away from it and laterally retracted as the lobe is lifted. Inferior thyroid artery is located in connection to Recurrent laryngeal nerve after identification of RLN and inferior parathyroid gland, although it should be maintained. The Inferior thyroid artery should be split and ligated close to the gland capsule. The right thyroid lobe and isthmus were cut apart, and a 12-F drain kept the wound closed in layers.

## IX. CONCLUSION

Thyroid nodules are frequent, and ultrasound is being used more frequently for unrelated issues, making them easier to find. The solitary thyroid nodule (STN) has a greater impact on women than men. The majority of them had normal thyroid function. STN frequently impacts the right lobe. The therapy of a nodule will eventually be decided by the results of a fine needle aspiration biopsy (FNAB), which is crucial to decision-making and can provide extremely precise information despite the importance of a full history and clinical examination. The study also emphasises the

significance of using a complete strategy for assessing and treating solitary thyroid nodules.

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