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# Quick Review: Thyroid Nodules

C Perry, B Phillips

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## Abstract

Most thyroid nodules are benign. 4% of Americans have a thyroid nodule. Of these approximately 2-5% harbors a malignancy. Most patients are euthyroid and imaging studies are not helpful in differentiating malignant versus benign characteristics. Diagnosis initially with an FNA is utilized most often. If malignant and the lesion is excised with either total thyroidectomy or a hemithyroidectomy including a lobectomy with an isthmusectomy depending upon size.

## INCIDENCE:

4-7% of Americans have a palpable thyroid nodule

## RISK FACTORS FOR MALIGNANCY:

- Radiation exposure
- MEN II
- Prior thyroid malignancy
- Hoarseness
- Single cold nodule
- Familial polyposis syndromes
- Enlarging nodule on suppression therapy

## PRESENTATION

Classically patients present with a neck mass and no other symptoms. 20 % of patients present with palpable lymphadenopathy and 2 % present with metastasis to the lungs or bone.

## DIFFERENTIAL DIAGNOSIS

Adenoma, Carcinoma, Cyst, Nodular Hyperplasia, Thyroiditis, Lymphoma, Metastasis.

## WORK-UP

Initial history and physical for characteristics of hyper/hypothyroidism are sought. Characteristics suspicious

for malignancy include a dominant nodule >4cm, prior radiation exposure, solitary nodule, male, very old, very young patients, cervical lymphadenopathy, voice changes, cachexia, and dysphasia. Thyroid function tests including a TSH, free T3, Calcium, and PTH may be helpful. Imaging with ultrasound and radioactive scanning may also be helpful when evaluated together. Malignant lesions are often cold. Remember that only 10% of cold lesions are malignant.

Patients with a family history of MEN II should have a RET-2 proto-oncogene screening test and their calcitonin levels examined. Ultrasound can characterize the lesion. A halo sign suggests a benign lesion while irregular borders suggest malignancy. Dominant lesions especially in patients with multinodular goiters are suspicious for malignancy. Ultrasound can also be utilized for fine needle aspiration. CT scan should only be mentioned to be condemned as it will render the thyroid resistant to subsequent radioactive tractor ablation or scanning if necessary as the iodinated contrast fully iodinated the gland.

FNA has a reported sensitivity of 96% and a specificity of 85%. FNA may not be necessary for highly suspicious lesions as a hemithyroidectomy may be more efficacious.

## FNA

Utilizing a 22 to 25 gauge needle and syringe under sterile conditions the nodule is aspirated 4 times while suction is applied. Cytologic examination is subsequently performed.

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There is minimal risk for hematoma or malignant needle tract seeding of the tract.

**MANAGEMENT**

Thyroid lesions benign by FNA and scanning may be managed by serial examinations and repeat FNA. Thyroid suppression may be utilized in the interim monitored by TSH suppression. If the nodule shows no response excision of the mass is indicated.

If a malignancy is discovered, extirpation is performed. At the time of surgery the contralateral lobe is inspected as is the central compartment for lymphadenopathy. A frozen section is performed as well. If the lesion is contained within the thyroid and small a hemithyroidectomy is performed. If the lesion is >4 cm, shows extrathyroidal involvement and the surrounding lymph nodes are involved a total thyroidectomy and lymph adenectomy is performed. Thyroid suppression is done for all carcinomas.

In follicular and papillary cancers I-131 can be utilized to detect residual thyroid and can be ablated. Thyroglobulin levels are also helpful in detecting recurrences.

**Figure 1**

**Indications for Operative Management:**

- Cysts > 4cm, compound, solid or cyst lesions
- Recurrent nodules
- Single cold lesions
- FNA consistent with malignancy
- Inconclusive FNA
- Inadequate FNA after repeated attempts
- Elevated nodules associated with elevated calcitonin levels
- Nodules Increasing in Size
- Multiple nodules associated with history of ionizing radiation
- Symptomatic Nodules
  - Airway compression
  - Dysphagia
  - Cosmetic disfigurement
- High risk patients with nodules
  - Young
  - Male
  - Family history

**MINIMAL OPERATION, FOR A SUSPICIOUS NODULE:**

Isthmusectomy & Ipsilateral Thyroidectomy

**TOTAL THYROIDECTOMY:**

- Papillary Cancer > 1cm
- Presents of lesion greater than 4 cm in patients older than 60 with follicular or Hurthle cell neoplasms
- Multinodular gland

- Prior Ionizing radiation
- Medullary cancer
- Anaplastic cancer

**Figure 2**

**TNM Staging**

- T1 < 1cm
- T2 >1, < 4 cm
- T3 > 4cm
- T4 Extension beyond the thyroid capsule

N1 positive nodes

M1 metastasis

Stage	Papillary	Follicular	Medullary/Anaplastic
I	T 1-4, N0-1, M0	T1,N0,M0	T1,N0,M0
II	M1	T2-3,N0,M0	T2-4,N0,M0
III		T4,N0,M0/T1-4,N1,M0	T1-4,N1,M0
IV		M1	M1

**Frequency of Histologic types:**

Papillary	80%
Follicular	12%
Medullary	5%
Hurthle cell	2%
Anaplastic	1%
Lymphoma	1%

**TREATMENT IS BASED UPON THE PATHOLOGIC EXAMINATION DIFFERENTIATED CARCINOMA:**

Papillary cancer is the most common type of thyroid malignancy. Mean age of presentation is 30-40 years. Histology reveals psammoma bodies. If the mass is less than a centimeter in size and is contained within the thyroid gland a hemithyroidectomy is appropriate. For lesions larger than a centimeter multicentricity is a possibility and a total thyroidectomy is indicated. There are several subtypes of papillary cancer that are resistant to radiation therapy, insular, columnar, and tall cell variants. They too will require total thyroidectomy. It also allows for thyroid ablation if necessary and avoids a re-operation of the neck with an increased risk [1 versus 10%] of RLN injury. Papillary cancer spreads via lymphatics. If the nodes appear suspicious a central neck dissection [below the thyroid cartilage to the sternal notch and between the carotid sheaths] is indicated only for gross disease. If lateral nodes are palpable a modified radical neck dissection is performed. Recurrence is monitored with RAI uptake and thyroglobulin levels. There is a ninety percent survival at 20 years for the majority of patients with low risk lesions.

Follicular neoplasia is the second most common thyroid well differentiated malignancy. The mean age of presentation is 50 years and 3 times more women are affected. It is difficult to discriminate between follicular carcinoma and adenoma with FNA alone. Treatment is debated, but for FNAs revealing follicular neoplasia [80% benign] and nodules less than 4 cm in size without extracapsular spread and no signs of lymphatic or neurovascular invasion are treated with hemithyroidectomy. Total thyroidectomy is indicated for patients wanting to avoid completion thyroidectomy for malignant lesions which can only be detected on permanent section, lesions beyond the thyroid capsule, lesions greater than 4 centimeters in size [50-80% malignant] age older than 50, history of radiation, presents of metastasis which occurs through hematogenesis spread. Hurthle cell carcinoma is treated the same way. However some advocate total thyroidectomy for all Hurthle cell cancers because of their aggressive nature. Radio ablation with I-131 is possible with total thyroidectomy as it is with papillary carcinoma and may be considered for detecting recurrence and extracapsular rests. Thyroglobulin levels can be followed for possible recurrence. It can metastasize to the lungs and bone through hematologist routes. Prognosis can best be determined through the various scoring systems developed for differentiated thyroid malignancies; AGES [Age Grade, Extent, Size] AMES [Age, Metastasis, Extent, Size], SAG [Size, Age, Grade]. A median survival at ten years is 85%.

### UNDIFFERENTIATED THYROID MALIGNANCIES

Medullary carcinoma occurs sporadically (75%) and in

familial settings such as MEN II. In familial syndromes the RET – 2 protooncogene is positive and the patients kindred should be tested and treated if positive. Remember that ME 2A- Sipple's syndrome is associated with Medullary thyroid cancer, pheochromocytoma, and hyperparathyroidism. MEN 2B – Sizemore syndrome is associated with MTC and benign pheochromocytoma and neuromas. Pathologic examination characteristics include amyloid deposition, C-cell hyperplasia, positive CEA and calcitonin staining. Medullary carcinoma is treated with total thyroidectomy and central neck dissection sparing the parathyroid glands. Metastasis to the lymphatics requires modified neck dissection and central neck dissection. Most surgeons advocate elective neck dissection due to the high rate of occult nodal disease. Patients with MEN II should be screened for parathyroid hyperplasia. Calcitonin and CEA levels can followed postoperatively for recurrence. Radio ablation is not effective as in papillary and follicular cell variants. Recurrence is extirpated if possible. Ten-year survival is 50%.

Anaplastic thyroid cancer is an undifferentiated malignancy. 95% of patients die within 1 year of their diagnosis. Most patients present with advanced symptoms of dysphasia and hoarseness due to the tumors virulence. Resection is indicated for small lesions, palliative debulking and tracheostomy placement. Chemotherapy is the mainstay of treatment. Radiation is helpful for palliation of compressive lesions.

### References

**Author Information**

**Charles W. Perry, MD**

Dept. of Surgery, University of Arizona

**Bradley J. Phillips, MD**

Dept. of Trauma & Critical Care, Boston University School of Medicine, Boston Medical Center