

Management of Solitary Cold Thyroid Nodule

(A Retro- & Prospective Study)

By

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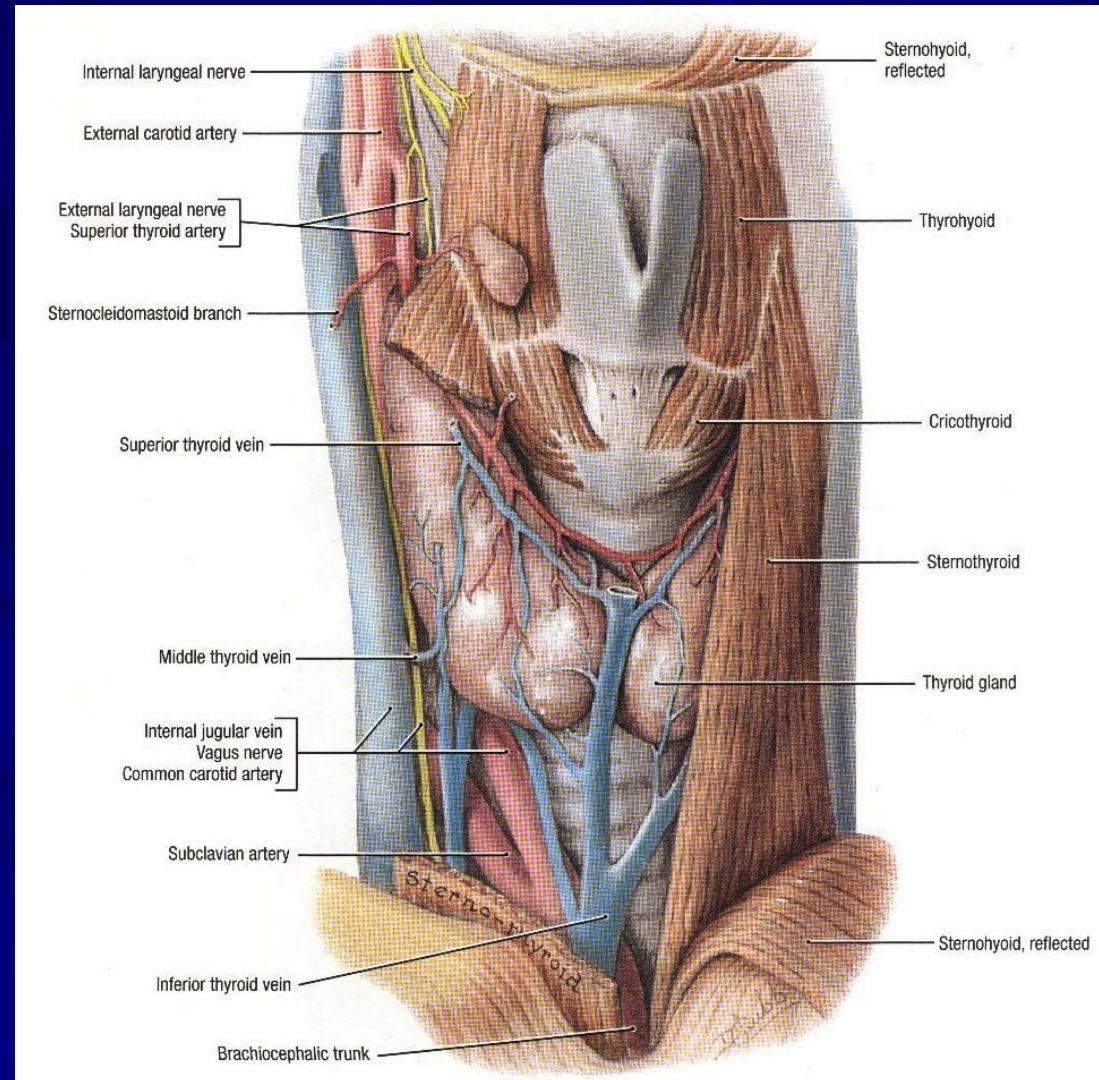
Introduction

- The solitary thyroid nodule is defined as a discrete palpable swelling in an otherwise impalpable gland.
- It is a clinical diagnosis. Many of these cases prove to be multinodular but presenting as a single thyroid nodule.

- The incidence of solitary thyroid nodule is about 4%
- Females are more affected than males (4:1)
- Commonest in the age group between 21-40 years
- Malignancy is found in about 8-10% of these nodules
- The chance of malignancy in the solitary cold thyroid nodule is 15-20%

Anatomy

Anatomy of the thyroid gland



Pathology of the Solitary Thyroid Nodule:

- Simple (colloid) nodule
- Autonomous (toxic) nodule
- Inflammatory nodule:
 - Acute thyroiditis
 - Granulomatous thyroiditis
 - Autoimmune thyroiditis
 - Riedel's thyroiditis
- Cysts

■ Neoplastic nodule:

– Epithelial tumors:

- Follicular adenoma
- Papillary carcinoma
- Follicular carcinoma
- Hürthle cell (oncocytic) tumors
- Clear cell tumor
- Squamous cell, mucinous and related tumors
- Poorly differentiated carcinoma
- Undifferentiated carcinoma
- Medullary carcinoma

– Lymphoid tumors and tumor like conditions

– Metastatic tumors

Diagnostic Tools of Solitary Thyroid Nodule

- Clinical examination
- Laboratory studies
- Radiological studies:
 - Neck ultrasonography
 - Isotope scanning of the thyroid
 - CT scan
- Histopathological studies:
 - Fine needle aspiration cytology
 - Frozen section
 - Final histopathological examination

Thyroid Ultrasonography

Benefits:

- Detection of multinodularity
- Differentiates texture of the nodule (cystic vs solid and homogenous vs heterogeneous)
- Detects and follows the size of the nodule
- Detection of thyroid calcification
- Exploration of the neck for enlarged lymph nodes
- Guidance of FNA
- Color Doppler sonography in malignancy prediction

Disadvantages:

- Operator dependent
- Does not clearly delineate anatomy between thyroid and adjacent structures
- Cannot diagnose malignancy

Isotope Scanning of the Thyroid Gland

Appearance of thyroid carcinoma on thyroid scan:

- No change.
- Enlargement of the lobe without alteration in the apparent activity.
- Encroachment on the edge of the lobe (benign lesions tend to displace rather than encroach on the lobe).
- Presents as cold area within the lobe.

Disadvantages:

- Radiation exposure
- Difficult to detect lesions in the periphery or isthumus
- Normal tissue over nonfunctioning nodule may mask findings
- Cannot diagnose malignancy

Fine Needle Aspiration and Cytology

Benefits:

- Simple, safe, painless, well tolerated procedure and can be repeated many times when needed
- Enables definite diagnosis of malignancy
- Diagnostic accuracy is more than 90%

Limitations:

- Technical difficulties including sampling error, inadequate preparation of the aspirate, and interpretation errors
- False positive results
- False negative results
- Less reliable for cystic lesions
- Differentiation between follicular adenoma and well differentiated carcinoma

Cytological Interpretation

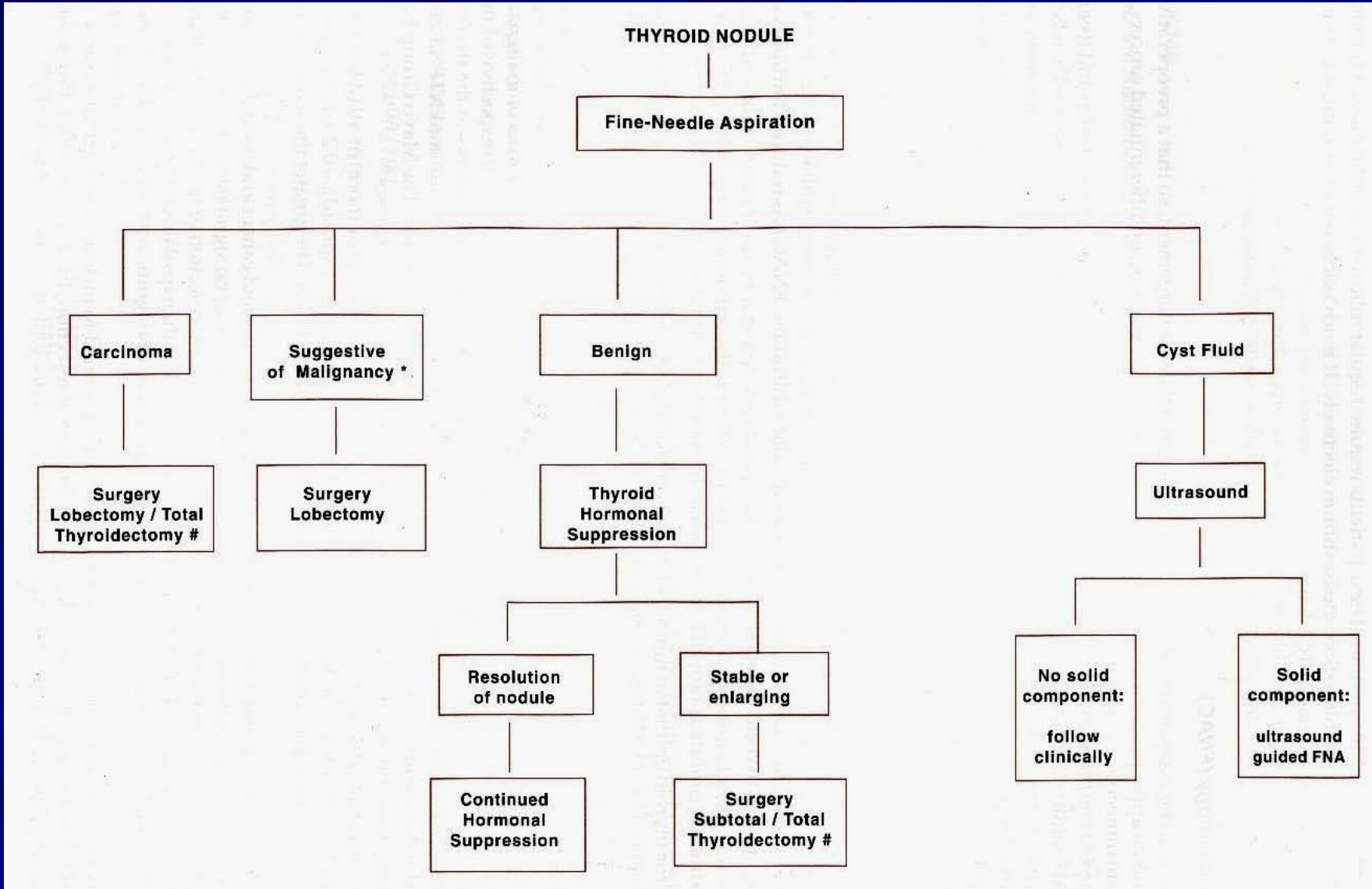
- Positive malignancy: Malignant cells are present
- Suspicious: In presence of nuclear atypia and hypercellularity
- Negative: No evidence of malignant cells
- Unsatisfactory: Inadequate specimen for interpretation

Indications of surgical resection of thyroid nodule influenced by FNAC

- All proven malignant nodules
- All cytologically diagnosed follicular neoplasms
- All lesions exhibiting an atypical but non-diagnostic cellular pattern on cytology
- Cystic nodules which recur following aspiration
- When on clinical grounds, suspicion of malignancy is high even if the cytology report suggests benign disease

Findings that may increase risk of malignancy in thyroid nodules

- Solitary cold nodule
- Male sex, age >40 years
- Rapidly enlarging
- Hoarseness or dysphagia
- History of neck irradiation, family history of thyroid carcinoma
- Inherited tumor syndromes e.g. MEN type II
- Irregular, hard, fixed, ill defined margins
- Ipsilateral lymphadenopathy or distant metastases
- Hypoechoic nodule or cyst >4 cm or complex cyst
- Microcalcifications
- Vascular or capsular invasion



Treatment of the Solitary Cold Thyroid Nodule

Non-Surgical:

- No treatment, just follow-up by FNAC
- Hormone suppressive therapy
- Aspiration of a cyst
- Ethanol injection
- Recently, Laser photocoagulation

Surgical:

- Isthmo-lobectomy
- Near total thyroidectomy
- Total thyroidectomy

Indications for Total Thyroidectomy

- High-risk patients with high-risk tumor
- Young patients with bulky nodal disease requiring RAI ablation
- Patients with:
 - Gross disease in both lobes of the thyroid
 - Gross extrathyroidal tumor requiring RAI ablation
 - Preoperative diagnosis of poorly differentiated tumor
 - Medullary thyroid carcinoma
 - Thyroid cancer with history of radiation
 - Operable anaplastic thyroid carcinoma
 - Distant metastasis requiring RAI ablation

Complications of Thyroidectomy

- Hypoparathyroidism
- Recurrent laryngeal nerve injury
- Superior laryngeal nerve injury
- Air way obstruction:
 - Recurrent laryngeal nerve injury
 - Cervical haematoma
 - Laryngeal oedema
 - Tracheomalacia
- Thyroid insufficiency
- Stitch granuloma
- Thoracic duct injury and chylous leakage
- Scar complications
- Infectious complication
- Pneumothorax
- Miscellaneous anatomical complications

Material and Methods

- Fifty patients presented, to the Surgical Oncology Department in the National Cancer Institute, with clinically palpable single thyroid nodule which proved to be cold by thyroid scintigraphy, will be the material of the present study

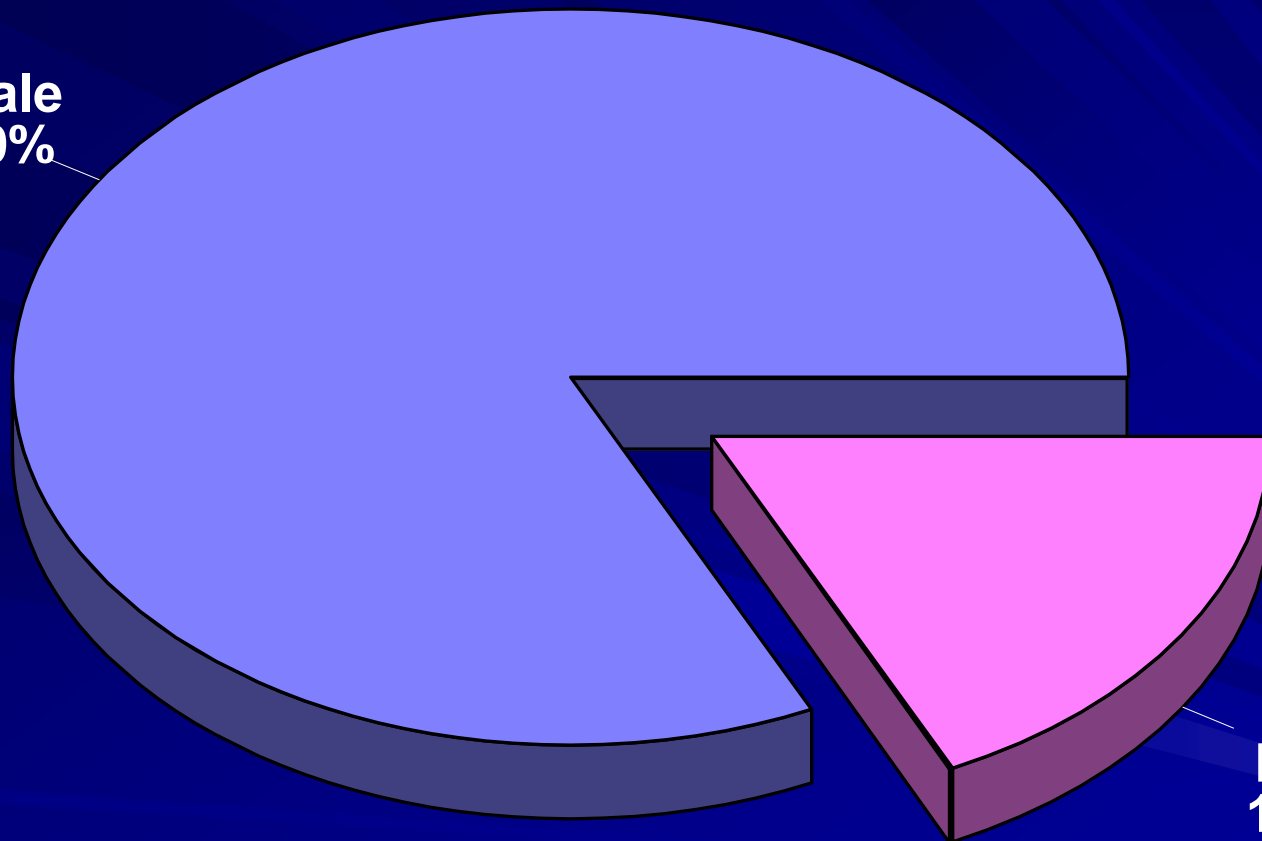
All patients were subjected to:

- History and clinical examination
- Laboratory investigations including T3, T4, TSH estimation
- ^{99m}Tc pertechnatate thyroid scan
- Neck ultrasonography
- CXR, abdominal ultrasonography for malignant cases
- Pre-operative FNAC
- Histopathological examination

Sensitivity, Specificity and Accuracy of FNAC were calculated by comparing cytology results with histopathological results

Results

Female
82.0%



Male
18.0%

Sex Distribution

Age distribution

<i>Item</i>	<i>No.</i>	<i>%</i>
Age (years)		
<30	9	18.0
30-	13	26.0
40-	15	30.0
50-	7	14.0
60+	6	12.0
Total	50	100.0

Clinical presentation of the solitary thyroid nodule

<i>Item</i>	<i>No.</i>	<i>%</i>
Main symptom:		
Neck swelling	48	96.0
Pain	1	2.0
Dysphagia/Dyspnea	1	2.0
Voice change	0	0.0
Toxic manifestation(s)	0	0.0
Signs:		
<i>Consistency:</i>		
Firm	36	72.0
Hard	9	18.0
Cystic	5	10.0
<i>Movement with deglutation:</i>		
Movable	47	94.0
Fixed	3	6.0
<i>Cervical lymph node enlargement:</i>		
Absent	44	88.0
Present	6	12.0

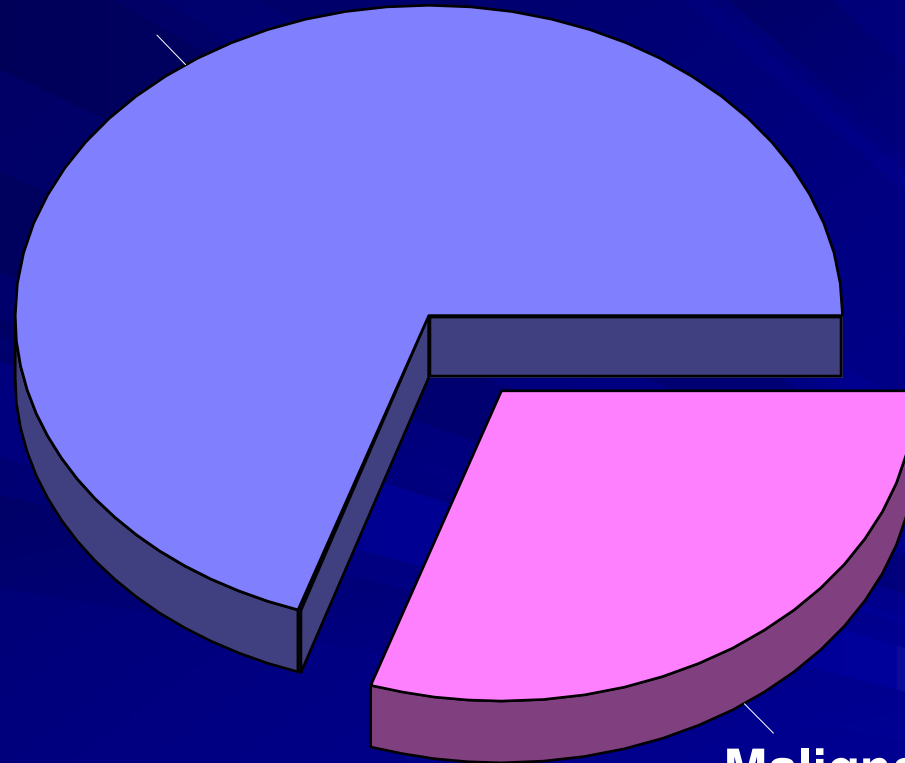
Pre-operative fine needle aspiration cytology results

<i>Item</i>	<i>No.</i>	<i>%</i>
Benign	26	52.0
Malignant	13	26.0
Suspicious	10	20.0
Unsatisfactory	1	2.0
Total	50	100.0

Histopathology results

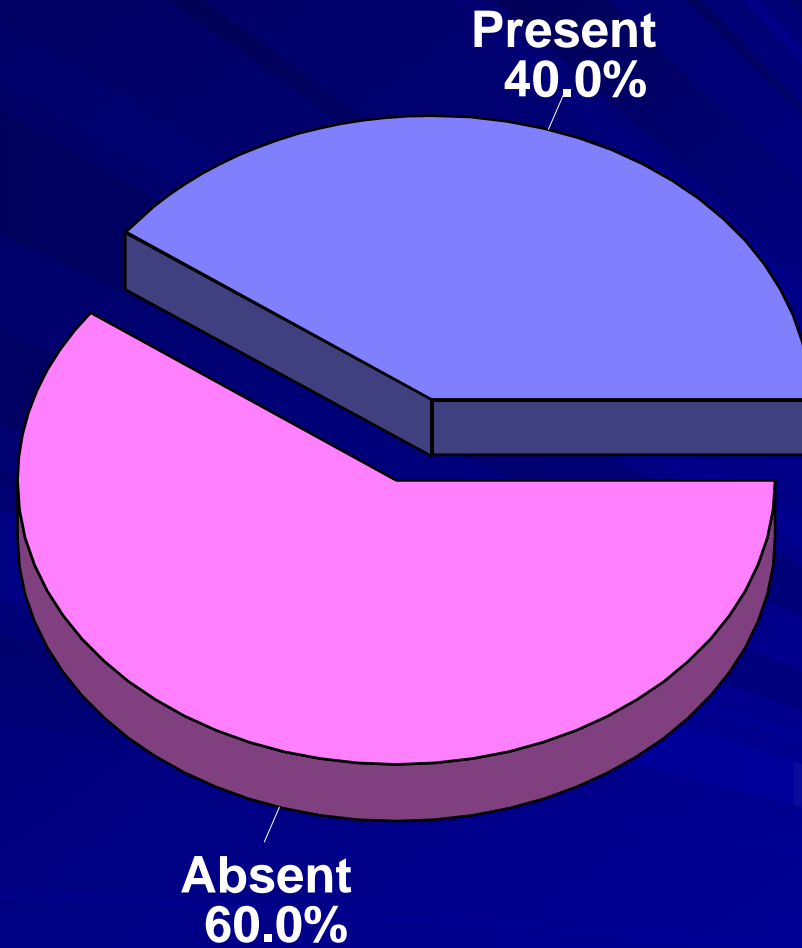
<i>Item</i>	<i>No.</i>	<i>%</i>
Colloid nodule	15	30.0
Adenoma	17	34.0
Cyst	3	6.0
Papillary carcinoma	7	14.0
Follicular carcinoma	3	6.0
Medullary carcinoma	2	4.0
Anaplastic carcinoma	3	6.0
Thyroiditis	0	0.0
Total	50	100.0

Benign nodules
70.0%

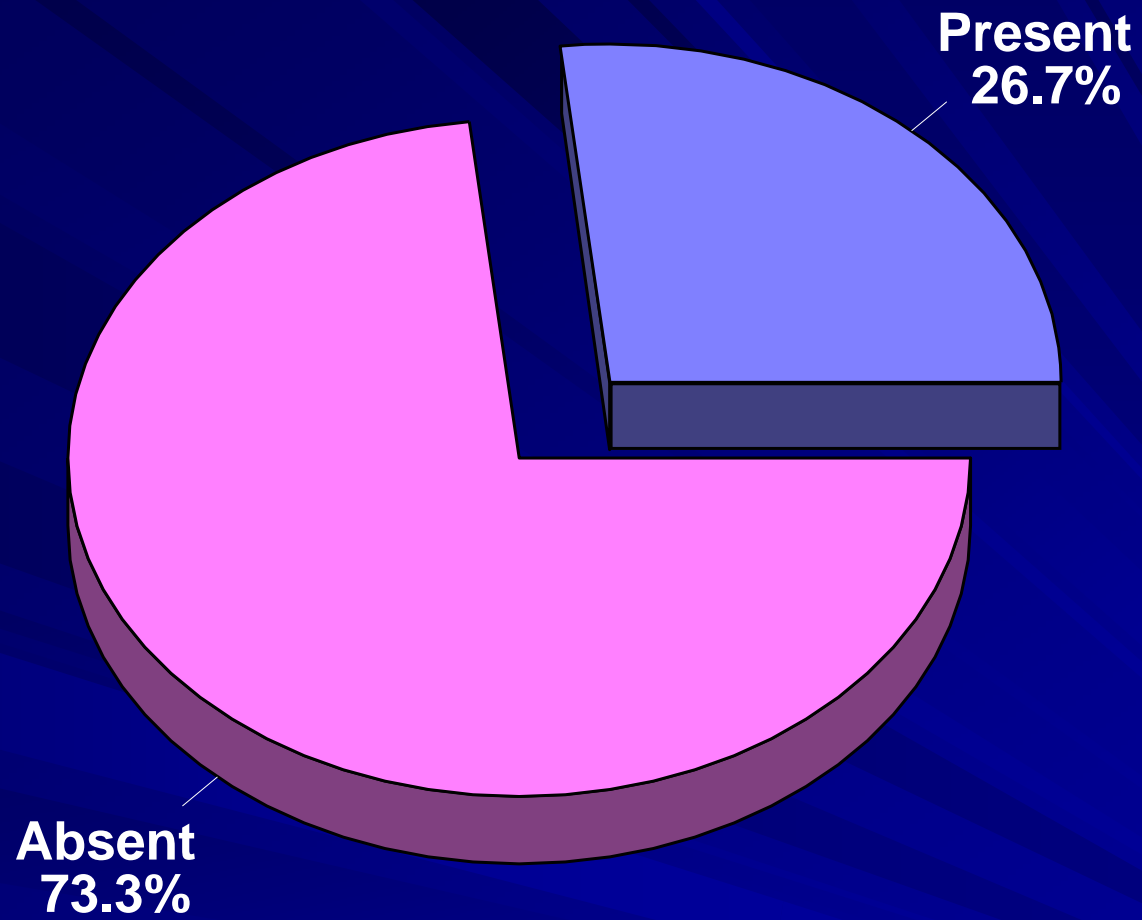


Malignant nodules
30.0%

Incidence of malignancy according to histopathology results



Incidence of cervical lymph nodes metastases among malignant nodules

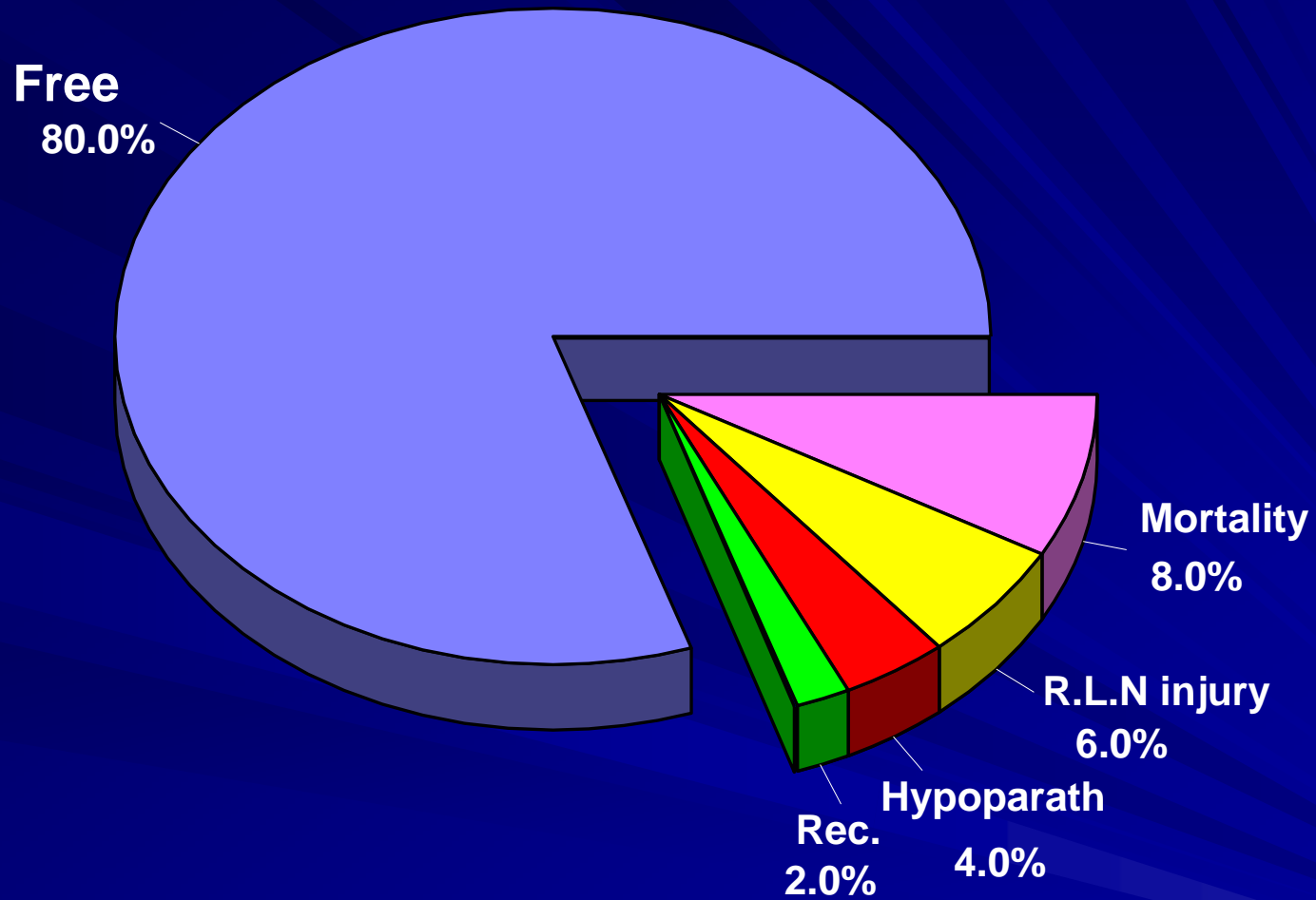


Incidence of distant metastases among malignant nodules

Management of cases with solitary cold thyroid nodule

<i>Item</i>	<i>No.</i>	<i>%</i>
Right hemithyroidectomy	15	30.0
Left hemithyroidectomy	18	36.0
Subtotal thyroidectomy	3	6.0
Total thyroidectomy	10	20.0
Others*	4	8.0
Adjuvant therapy:		
No adjuvant therapy	40	80.0
Radioactive iodine	8	16.0
Radiotherapy	1	2.0
Chemo-irradiation	1	2.0

* Others include no treatment, tracheostomy or pain killers



One year follow-up of cases under study

Reliability of Fine-Needle Aspiration and Cytology in the Diagnosis of Solitary Cold Thyroid Nodules

<i>Pre-operative cytology</i>	<i>Histopathology</i>	
	Benign	Malignant
Benign (26)	25	1
Malignant (13)	0	13
Suspicious (10)	9	1
Unsatisfactory (1)	1	0
Total	35	15

Accuracy of FNAC:

■ Sensitivity	=	93.3%
■ Specificity	=	73.5%
■ Accuracy	=	79.6%
■ Positive predictive value	=	60.9%
■ Negative predictive value	=	96.1%
■ False positive fraction	=	39.1%
■ False negative fraction	=	3.8%

Conclusion

On the basis of this study, we concluded the followings:

- FNAC is a safe, highly sensitive screening test for thyroid cancer in patients with solitary cold thyroid nodule and should lead to recommendation of thyroidectomy in this group, however, its specificity is relatively low in excluding the question of malignancy
- The presence of clinically suspicious solitary thyroid nodule especially if solid by ultrasonography, cold by scintigraphy with positive cytology is an indication of surgical intervention

FNAC is recommended as a routine prime investigation in the work-up of the solitary cold thyroid nodule

Thank You