Ultrasound of the Thyroid – a practical approach.

Rhodri M. Evans
Incidence of nodules.

- 3 – 7% have palpable nodule
- 30 – 70% have nodules detected on Ultrasound

x 10 Increase in incidence of nodules with Ultrasound.
Thyroid Nodules

- Age
- Incidence

Palpation

50

70

30

50

Age

100
Thyroid Nodules

Incidence

US/Autopsy

Palpation

Age

50

100
Incidence of malignancy?

- 1000 new cases per annum in England and Wales (0.002%)
- 1 new case per 50,000, per year.
- 250,000 population = 5 new cases/year
- 500,000 population = 10 new cases/year.
Thyroid nodules.

- A problem?
- The solution?
- Ultrasound.
Signs?

- 426 resected nodules, surgical correlation
- Benign nodules: iso/hyper-echoic and contain cystic degenerative change with a perinodular hypoechoic rim

Signs?

- Comet tail sign
- Solitary paper and reference
- 100 patients, cytological diagnosis
- 85% of patients with the sign showed an abundance of colloid

Solitary versus multiple?

Indicator of malignancy?
### Myth – solitary versus multiple.

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<thead>
<tr>
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<th>Multiple</th>
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<tr>
<td>Cochand</td>
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<td>Marquee</td>
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<td>Papini</td>
<td>9%</td>
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Incidence of Papillary carcinoma?

- 6,499 patients: US and FNAC
- 164 cases (incidence: 2.52%) of malignancy:
  - 116 Papillary Ca
  - 23 Follicular Ca
  - 6 Medullary Ca
  - 7 Anaplastic Ca
  - 8 Hurthle Cell Ca
  - 4 Lymphomas

Occult Incidence.

- Autopsy series.
- Small (less than 1cm) papillary tumours: “micro-carcinomas”.
- Reported incidence: 10-30%.
Papillary Carcinoma.

- Papillary carcinoma: indolent tumour
- 20 year survival: 90%

K Jones, CME
Endocrinol, 2002;(1)4, 4-9.
Signs: papillary carcinoma?

- 259 pathologically verified thyroid nodules
- Microcalcification:
  - Accuracy: 76%
  - Specificity: 93%
  - PPV: 70%
  - Sensitivity: 36%

Signs: papillary carcinoma?

- Combination of absent halo, microcalcification and type III (marked intranodular flow) most specific
- Specificity: 97.2%
- Sensitivity: 16.6%

Rago et al., Eur J Endocrinol., 1998; 138, 41-46
Follicular carcinoma.
Follicular lesions.

- Spectrum from adenoma to carcinoma.
- 80% will be benign
- Follicular carcinoma – 10-15% of all thyroid Ca.
- Cytology of no use.
- Histology of no use in differentiation.
- Surgical specimen: vascular and capsular invasion – follicular carcinoma.
Ultrasound: follicular lesion.
CBX: follicular lesion.
Map 3
170dB/C 2
Persist Off
2D Opt:FSCT
Fr Rate:Surv
SonoCT™

POST BIOPSY
POST BIOPSY
Follicular lesions.

- Adenomas: solid, homogenous, iso/hyper-echoic.
- Well defined halo.
- Carcinoma: solid, hypo-echoic areas within.
Medullary carcinoma.
Medullary Carcinoma Thyroid

- Typically hypo-echoic.
- Contains calcification.
- Calcification more “globular”.
- “Calcification” may be amyloid.
Signs?
### Predictors of Cancer.

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Thyroid nodules.

- Sorting out nodules.
- Learn from others – Breast Radiologists.
- R Classification.
- Cytological classification (1 -5)
- Clinical scenario.
- Correctly manage patient.
Breast nodules – R classification..

1 : Normal.
2 : Probably benign.
3 : Indeterminate.
4 : Suspicious.
5 : Malignant
Nodules – R classification…..thyroid?

1 : Normal.
2 : Probably benign.
3 : Indeterminate.
4 : Suspicious.
5 : Malignant
R 2
R 2
R 2
R 4
R 5
R 5

Lymphoma
Metastases
Thyroid nodules.

- R Classification.
- Cytological classification (1 - 5)
- Clinical scenario.
- Correctly manage patient.
Case 1.
Case 2.
R 2 or 3?
Case 3.
FNA(x2) : non-diagnostic.
CBX: No features of malignancy, probable colloid nodule.
Case 4.
Case 5.
Case 6.
Case 7.
Case 8.
Case 9.
Ultrasound – predictive value.

- Risk of Malignancy in Nonpalpable Thyroid nodules: Predictive value of Ultrasound and Colour Doppler features.
- Editorial: Nonpalpable Thyroid Nodules – managing an Epidemic
- J.Clin Endoc.&Metab. 2002. 87(5) 1938-1940
Incidental nodules—predictors of cancer?

- Papini et al: 494 consecutive patients
- Needled nodules between 8-15mm
- Diagnostic Cytology – 402 patients
- Surgical excision: all patients with suspicious & malignant cytology
- Correlation Ultrasound findings with Histology
Incidental nodules—predictors of cancer?

- 31(7.7%) cases of malignancy
- Incidence of occult micro-carcinoma: 10-30%.
- Papillary (87%), Follicular (6.5%), Medullary (6.5%)
- 347 (86.3%) cases of benign disease
Incidental nodules-predictors of cancer?

- **Cancer**: risk factors: irregular or blurred margins, intra-nodular vascular pattern and microcalcification.

- Majority (87%) of cancers can be identified by FNA of solid, hypo-echoic lesions in conjunction with one other risk factor.
Thyroid Nodules – managing an epidemic.

- Thyroid nodules are the norm.
- Thyroid cancer is rare.
- Specific signs for Thyroid carcinoma.
- Use the signs to classify nodules Radiologically.
- Manage the patient.