

Reliability of Thyroid Ultrasound in assessment of Thyroid Nodules

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Introduction

- Thyroid nodules are widely prevalent; prevalence rates vary depending on population studied
- Prevalence rates: clinically palpable thyroid nodule in 3-7%; radiologically proven thyroid nodules as high as 30-70% and increases with age
- Increasing frequency of nodules being identified and investigated further, due to increased imaging modalities (Brito et al, BMJ 2013)
- The incidence rates of papillary thyroid cancer is also increasing though the outcomes and mortality rates have remained comparable to past decades
- New BTA guidelines 2014
 - Ultrasound (US) offers a very sensitive mode of investigation to identify malignancy
 - Size is not a useful criteria anymore
 - The use of U1-U5 grading system is recommended
 - US characteristics of benign lesion U1 or U2 need not have further investigation unless indicated with the patient having a statistically higher risk of malignancy
 - If nodule indeterminate or appears malignant(U3-U5), FNA is required
 - In multinodular gland the grading of the highest specified nodule should be used for staging

Aim

The aim of our retrospective analysis was to assess the reliability of Ultrasound of the thyroid gland to identify the character of a thyroid nodule, based on U1-U5 classification, in comparison with confirmed post-operative histology

Methods

- Retrospective analysis
- All patients who had undergone thyroid surgery for thyroid nodules included
- Patients with US done within 2 years preceding surgery included for analysis
- Histology reports verified and re-graded by expert histopathologist
- US images reviewed by dedicated radiologists team – blinded for outcome histology and previous US reports

Results

- Data on 591 cases who had been operated so far reviewed
- N=88 were included for the study – main limitation being availability of US for re-analysing the U grading
- 27/88 were malignant based on post-operative histology
- On US
 - 45 were U2
 - 43 were U3 or above
- Of the U2 nodules (n=45)
 - 36 benign on post op histology
 - All of these had Thy1 or Thy2 on FNAC
 - 4 follicular adenomas on post op histology
 - 5 were malignant
 - 3 micropapillary carcinomas
 - 2 over malignancies
 - FNA were Thy1 or Thy2 in all 5 of these nodules

Results

- Of the U≥3 nodules (n=43)
 - 18 were benign
 - 10 were labelled as U3
 - 8 were labelled as U4
 - 10/18 had Thy1 or Thy2 on FNA
 - 3 were follicular adenomas
 - 22 were malignant
 - 5 had Thy1 or Thy2 on FNA
- U3-U5 to diagnose malignancy
 - Sensitivity :82% , Specificity : 66%
- U3-U5 + FNA >Thy2 to identify malignancy
 - Sensitivity: 93%, Specificity : 80%

Discussion

- 11% of patients with U2 lesion were found to be malignant in our study
 - Even ignoring the microPTC, 4% could be missed
 - However even FNA was negative in these patients
- FNA can be inconclusive in determining a follicular lesion – in our study there were 7 cases and the US findings were a combination of U2 and U3
- Size of the nodule is no longer a discriminatory criteria to chose a patient for FNA or surgery
 - Pure cystic nodules are almost always benign
 - In mixed solid/ cystic swelling FNA of solid component should be taken
- If highly sensitive US identifies a <1cm nodule to appear malignant, further investigation should be based on clinical discretion to avoid over-treatment on insignificant microPTC (Pelizzo, Clinial Nuclear medicine 2007)
- 18/43 patients who had U3 were found to be benign; 10 of these had normal FNA- Patients with US showing U3 but FNA showing Thy2 should have repeat FNA done
- 5/43 patients had normal FNA –which highlights the limitation of FNAs
- A combination of history, examination, US and FNA would need to be correlated in all patients
- CT picked up nodules – clinical correlation is required and if needed US should be performed
 - CT is not a good modality of investigation to confirm benign nature
 - Inter-rater variability can be quite high, with various specialists and sonographers now reporting US or performing US for various reasons
- Limitations to our study
 - Retrospective analysis – there were some limitations to all the data available on all patients and a large number of patients had to be excluded
 - It is difficult to say if the nodule being investigated was where the cancer was found from the histology report

Conclusion

- 11% of patients with a benign appearing nodule on US could still have malignancy
- 42% of patients with indeterminate thyroid were actually normal
- Combining US with FNA improves sensitivity and specificity of the test
- When there is a clinical suspicion of malignancy, evidence should be obtained with various modalities and MDT discussion should be mandatory for further management and follow up