A Comparison of Ultrasound U staging, FNAC results and Histology of Thyroidectomies at Walsall Manor hospital

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Background

Although reports have shown an increasing prevalence of thyroid cancer, this is mostly likely due to increased detection of small papillary tumours (0-1cm) (1), and mortality from thyroid cancer remains stable. Together, these factors attribute the increased prevalence to overdiagnosis. The use of ultrasound increases the detection rate of thyroid nodules compared to palpation alone (1,2). Thyroid nodules are classified from U1-U5 as per BTA guidelines, where nodules classified U3-U5 warrant further investigation (4). Inappropriate use of imaging can lead to invasive investigations and treatment of low;risk tumours that may have never been identified. Therefore, it is important to assess the specificity and sensitivity of ultrasound as a means of initial staging, to avoid further investigation of benign results.

Objectives

1. A radiologist review of all ultrasound scans on patients that have undergone thyroidectomies over the last 5 years
2. Comparison of the results of the ultrasound U staging with the results of FNAC staging and histological staging
3. Analysis of the sensitivity and specificity of ultrasound U staging and FNAC staging for thyroid nodule

Methods

Retrospective review of 213 thyroidectomy cases at Walsall Manor hospital between 2012 ; 2017, conducted by a 4th year medical student and F1 under supervision of an ENT Consultant. A case note review was performed, in which the relevant data of the patient's thyroidectomy, including staging and diagnosis, was collected and analysed.

Results

<u>Benign cases</u>

The majority of benign cases were classified U3, with only 2 being classified U1 (fig. 1). Overall, >90% of benign cases classified U3;U4 (table 2). The specificity of U staging was calculated at 1.9%, with a negative predictive value of 20% (table 1).

<u>Malignant cases</u>

U3 classification was found in 63%, and U4 in 19% (table 3). Furthermore, 59% of cases were classified Thy3 and 11% Thy4. Eight cases were classified U1 (fig. 1), and 10 cases were classified Thy1 (fig. 2). Ultrasound sensitivity was found to be 86%, with a positive predictive value of 33% (table 1).

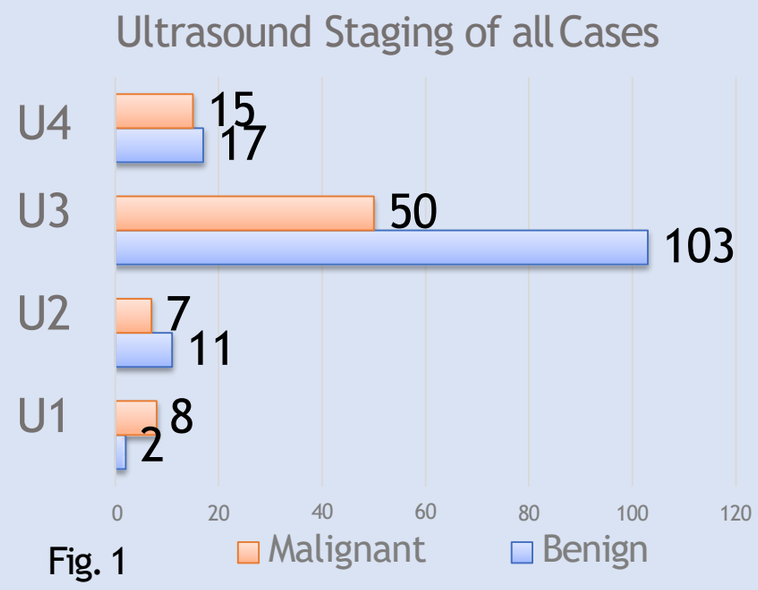

Fig. 1

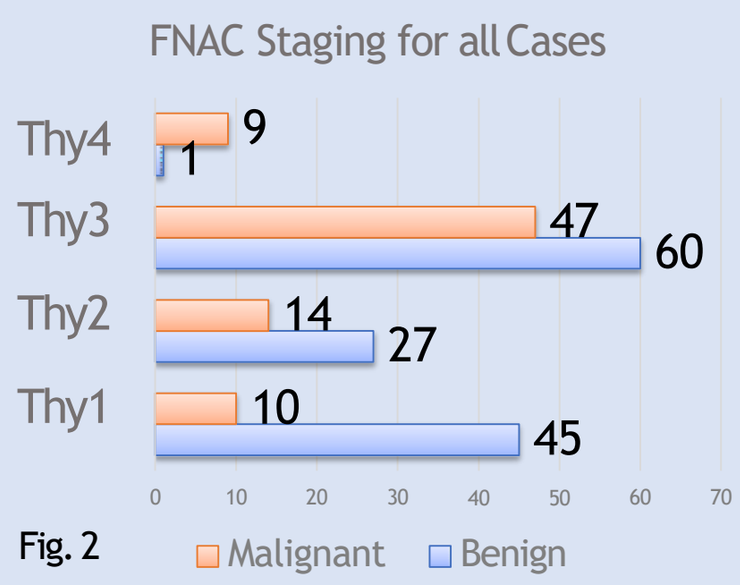

Fig. 2

Statistical analysis of US and FNAC staging

Statistics	FNAC Staging	U Staging
Specificity	42.90%	1.90%
Sensitivity	82.50%	86.20%
Positive Predictive Value	43.90%	32.70%
Negative Predictive Value	81.80%	20%

Table 1

Benign cases staging combined

	U1	U2	U3	U4	Thy total
Thy1	0	8	33	4	*45 (34%)*
Thy2	0	0	23	4	*27 (20%)*
Thy3	2	3	46	9	*60 (45%)*
Thy4	0	0	1	0	*1 (1%)*
U total	*2 (2%)*	*11 (8%)*	*103 (77%)*	*17 (13%)*	

Table 2

Malignant cases staging combined

	U1	U2	U3	U4	Thy total
Thy1	0	3	5	2	*10 (14%)*
Thy2	3	1	9	1	*14 (18%)*
Thy3	4	2	32	9	*47 (59%)*
Thy4	1	1	4	3	*9 (11%)*
U total	*8 (10%)*	*7 (9%)*	*50 (62%)*	*15 (19%)*	

Table 3

Discussion

In both malignant and benign cases, the majority had both U3 and Thy3 staging. This stage warrants discussion in an MDT and where considered appropriate, surgical intervention takes place. This has led to overtreatment of thyroid nodules, often benign, with the hope of removing malignant disease which has an excellent prognosis and long-term survival. The extremely low specificity of ultrasound indicated by these findings highlights the inability of ultrasound to identify benign tumours that do not warrant invasive investigations and/or active treatment.

Recommendations

Results have shown the high sensitivity of ultrasound staging, but also the limitations in distinguishing between benign and malignant pathology, highlighted by a very low specificity. Further research needs to be carried out on how to improve the early screening investigations to rule out malignancy. Research is currently ongoing into ultrasound elastography for thyroid nodule investigation.

References

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