Comparison of thyroid fine needle aspiration biopsy results before and after implementation of Bethesda classification

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Objectives: Bethesda classification was introduced in 2008 to overcome variations in the evaluation of fine needle aspiration biopsy (FNAB) and provide standardization for this method. We aimed to compare diagnostic value of pre-Bethesda and Bethesda classification systems to differentiate benign and malignant thyroid nodules.

Methods: Data of 3037 patients operated between June 2007-June 2014 were reviewed retrospectively. Nodules evaluated with FNAB before and after March 2010 (the time Bethesda classification was implemented) were grouped as pre-Bethesda and Bethesda, respectively. Pre-Bethesda classification was categorized as nondiagnostic, benign, indeterminate, suspicious for malignancy and malignant. According to Bethesda, nodules were classified as nondiagnostic, benign, atypia of undetermined significance/follicular lesion of undetermined significance (AUS/FLUS), follicular neoplasia (FN), suspicious for malignancy and malignant.

Results: There were 1810 (26.1%) nodules in pre-Bethesda and 5115 (73.9%) in Bethesda groups. Cytologically, nondiagnostic rate was lower, and benign and suspicious for malignancy rates were higher in pre-Bethesda group (p<0.001 for each). Frequency of malignant cytologies were similar. In pre-Bethesda, 10.7% of nodules were indeterminate and in Bethesda 12.8% of nodules were AUS/FLUS and 1.3% were FN. When benign cytology was considered negative and suspicious for malignancy/malignant cytologies were considered positive, sensitivity, specifity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of pre-Bethesda were 71.8%, 98.0%, 79.5%, 97.0% and 95.4%, respectively. For Bethesda, these parameters were 77.0%, 98.7%, 84.6%, 97.8% and 96.8%, respectively. When indeterminate cytology in pre-Bethesda and FN in Bethesda were also included as positive, PPV was 42.8% and NPV was 97.0% in pre-Bethesda, PPV was 72.6% and NPV was 97.8% in Bethesda. Accuracies of pre-Bethesda and Bethesda were 85.7% and 95.3%, respectively.

Conclusions: A majority of nodules interpreted as indeterminate previously has switched to AUS/FLUS category with the implementation of Bethesda classification. When suspicious for malignancy and malignant cytologies were considered positive, although sensitivity of Bethesda was higher, most of diagnostic performance criteria including accuracy did not change.

Table 1: Cytological and histopathological results in nodules evaluated before and after implementation of Bethesda classification

	Pre-Bethesda (n=1810)			Bethesda (n=5115)			p*
	n	Histopathology		n	Histopathology		
		Benign	Malignant		Benign	Malignant	
FNAB							
Nondiagnostic	340 (18.8%)	313 (92.1%)	27 (7.9%)	1340 (26.2%)	1274 (95.1%)	66 (4.9%)	**0.030**
Benign	1164 (64.3%)	1129 (97.0%)	35 (3.0%)	2811 (55.0%)	2750 (97.8%)	61 (2.2%)	0.118
AUS/FLUS	-	-	-	657 (12.8%)	541 (82.3%)	116 (17.7%)	-
FN	-	-	-	66 (1.3%)	47 (71.2%)	19 (28.8%)	-
Indeterminate	194 (10.7%)	152 (78.4%)	42 (21.6%)	-	-	-	-
Suspicious for malignancy	77 (4.3%)	22 (28.6%)	55 (71.4%)	119 (2.3%)	31 (26.1%)	88 (73.9%)	0.698
Malignant	35 (1.9%)	1 (2.9%)	34 (97.1%)	122 (2.4%)	6 (4.9%)	116 (95.1%)	0.603

* Indicates statistical significance of malignancy rates between pre-Bethesda and Bethesda according to individual cytological categories