

Fine Needle Aspiration of Thyroid: A Cyto-histopathological Correlation in Ramathibodi Hospital

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Objective: To evaluate the accuracy of fine needle aspiration cytology (FNAC) of thyroid lesions in Ramathibodi patients.

Material and Method: A retrospective review is performed on 469 cases of thyroid surgical pathology specimens with previous FNAC reports; during January 2005 to January 2008. All histopathology reports are compared to the latest previous cytopathology results which are categorized as unsatisfactory, benign, inconclusive, borderline and malignancy.

Results: The cytopathology results showed 74 cases (15.7%) of unsatisfactory specimens, 243 cases (51.8%) of benign lesions, 33 cases (7%) of inconclusive lesions, 15 cases (3.2%) of borderline lesions and 104 cases (22%) of malignant lesions. The histopathology results for benign lesions reveal multinodular and nodular goiter of 236 cases and other diagnosis of 54 cases. The histopathology results for malignant lesions were papillary carcinoma of 147 cases, follicular carcinoma of 24 cases and other malignancy of 8 cases. Among 243 cases of benign from FNAC; 23 cases turn out to be malignancy while 104 cases of malignancy from FNAC show no false positive. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of FNAC are 81.9%, 100%, 100%, 90.4% and 93.4% respectively.

Conclusion: FNAC is a minimally invasive, highly accurate and cost-effective procedure. In our setting the FNAC enable the clinician to "rule-in" malignant lesions with confidence.

Keywords: Accuracy, Fine needle aspiration, Lesion, Thyroid

J Med Assoc Thai 2012; 95 (Suppl. 1): S74-S78

Full text. e-Journal: <http://jmat.mat.or.th>

Thyroid nodules are common clinical findings and about 5 to 10% are malignant⁽¹⁾. Appropriate management can decrease morbid and mortality. Fine needle aspiration cytology (FNAC) has been used to evaluate the patients, whether further surgical intervention is required. FNAC is the most accurate, cost-effective and simplest screening test for diagnosing of thyroid nodules^(2,3). In the present study, we review the accuracy of FNAC of thyroid nodules; correlated with surgical pathology results in Ramathibodi patients.

Material and Method

A review of all surgical pathology reports of

712 thyroid specimens receiving from Department of Surgery in Ramathibodi Hospital during 3 years (the 1st January, 2005 to 1st January 2008) were performed. The operations were excision, lobectomy, total and subtotal thyroidectomy. They were requested for histopathological diagnosis by Department of Pathology Ramathibodi Hospital. A retrospective reviews for the patients with previously FNAC diagnosis were selected (71 males and 398 females). These cases included FNAC specimens sent from Department of ENT, Medicine, Surgery, Pediatric and Family Medicine. Each patient underwent FNAC by using 25 guage needles then spray and smear into at least four consecutive glass slides then fixed in 95% ethanol and sent to the cytology laboratory, where they were stained by the Papanicolaou technique. The smears were reviewed by the cytotechnologists and confirmed by the cytopathologists. The criteria used for adequacy of specimens were those suggested by Kini et al⁽⁴⁾ and included at least 6 to 8 tissue fragments of well preserved follicular epithelium on each of two

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slides.

The cytology results were categorized into 4 groups: unsatisfactory, benign, inconclusive/ borderline and malignancy. Aspiration classified as benign including adenomatous nodule, nodular goiter, Hashimoto thyroiditis and lymphocytic thyroiditis. The inconclusive category including those of follicular neoplasm and Hurthle cell neoplasm lesions which only capsular invasion from histopathological diagnosis are the gold standards for diagnosis⁽³⁾. The borderline category includes the aspirate with atypical features suggestive of, but not diagnostic for malignancy. The aspirations of either primary or metastatic malignant of thyroid gland were classified as malignancy. Aspirated with insufficient cellularity or poor quality smears were classified as unsatisfactory.

Thyroid FNAC results were compare to the results of final histopathological diagnosis of the excised specimens in order to calculate to value the test. Unsatisfactory aspirates, borderline/inconclusive groups were excluded from the calculation due to lack of definite information whether benign or malignancy of the lesions.

Results

From total 469 cases (71 males and 398 females), the cytopathology results show 74 cases (15.8%) of unsatisfactory specimens, 243 cases (51.8%) of benign lesions, 33 cases (7%) of inconclusive (follicular and Hurthle cell) lesions, 15 cases (3.2%) of borderline lesions and 104 cases (22.2%) of malignant lesions.

The histopathology results for benign lesions reveal adenomatoid nodules of 236 cases (81.4%), follicular adenoma of 31 cases (10.7%), Hurthle cell adenoma of 3 cases (1%) Hashimoto thyroiditis of 3 cases (1%) and other diagnoses of 17 cases (Table 1). The histopathology results for malignant lesions are papillary carcinoma of 147 cases (82.1%), follicular carcinoma of 24 cases (13.4%) and other malignancies (medullary carcinoma, anaplastic carcinoma, malignant lymphoma and metastatic carcinoma) of 8 cases (Table 2).

Among 243 cases of benign lesions from FNAC; 23 cases turn out to be malignant while 104 cases of malignant lesions from FNAC show no false positive (Table 3). The histopathology results of those 23 false negative cases are 16 cases of papillary carcinoma, 5 cases of follicular carcinoma and 1 case for each malignant lymphoma and metastatic carcinoma of unknown primary, respectively (Table 4).

The sensitivity, specificity, positive predictive

Table1. Final histopathology diagnosis of benign lesion

Histopathology diagnosis	Number of cases (%)
Nodular goiter and multinodular goiter	236 (81.4)
Follicular adenoma	31 (10.7)
Thyroglossal duct cyst	6 (2.1)
Hurthle cell adenoma	3 (1)
Hashimoto thyroiditis	3 (1)
Atypical adenomatous nodule	3 (1)
Benign thyroid tissue	3 (1)
Benign cystic lesion	3 (1)
Chronic lymphocytic thyroiditis	2 (0.7)
Total	290 (100)

Table2. Final histopathology diagnosis of malignant lesion

Histopathology diagnosis	Number of cases (%)
Papillary carcinoma	147 (82.1)
Follicular carcinoma	24 (13.4)
Medullary carcinoma	4 (2.2)
Malignant lymphoma	2 (1.1)
Anaplastic carcinoma	1 (0.6)
Metastatic carcinoma	1 (0.6)
Total	179 (100)

value, negative predictive value and accuracy of FNAC are 81.9%, 100%, 100%, 90.5% and 93.4%, respectively.

Discussion

FNAC is a simple, reliable and cost effective test to determine malignancy of thyroid nodules. Diagnostic accuracy varies between different reports (Table 5), depending on method and data analysis⁽³⁾. Experienced cytopathologist and optimal specimens are important for high diagnostic accuracy^(1,10,11,16). Even though there is no false positive case in this reports, papillary carcinoma is most common among the false negative lesions (16 out of total 23 cases); including some in a group of cystic papillary carcinoma which are previously diagnosed as “benign” cystic lesions/ nodules and a group of papillary microcarcinoma (or occult papillary carcinoma) that is also incidentally found in the excised specimens. The clinician should aware and follow-up for any clinically suspicious cystic lesions and “inappropriate medical response” nodules^(12,13,16). The rest of false negative lesion are follicular carcinoma, malignant lymphoma and metastatic

Table 3. Comparison of FNAC to final histology

FNAC	Histology No. (%)		Total
	Benign	Malignant	
Positive for malignancy	0 (0)	104 (100)	104
Negative for malignancy	220 (90.5)	23 (9.47)	243
Borderline	2 (13.3)	13 (86.86)	15
Inconclusive	19 (57.6)	14 (42.42)	33
Unsatisfactory	53 (71.6)	21 (28.36)	74
Total	294	175	469

Table 4. Histological diagnosis of 23 cases with false negative cytology

Cytologic diagnosis	Histologic diagnosis	No. of cases (total 23 cases)
Benign; nodular goiter	Papillary carcinoma	10
	Micropapillary carcinoma	3
	Follicular carcinoma	5
	Metastasis carcinoma of unknown primary	1
Benign; hemorrhagic, cystic nodule	Papillary carcinoma	2
	Micropapillary carcinoma	1
Benign; reactive lymphoid tissue and chronic inflammation	Malignant lymphoma	1

Table 5. Previously reported accuracy of malignancy categorization by FNAC^(3,5-9)

Reports	No.	Malignant (%)	Suspicious (%)	Non-diagnostic (%)	FP (%)	FN (%)	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Gharib and Goellner, 1993	3144	32	10	17	3	5	83	92	83	92
Chang et al, 1997	662	25	22	7	8	10	65	98	92	95
Ogawa et al, 2001	226	67	16	18	1	13	76	73	85	60
Sclabas et al, 2003	240	43	42	5	4	4	71	98	96	82
Morgan et al, 2003	253	13	29	14	26	46	55	94	70	67
Cheung e YS et al, 2007	179	8	58	17	0	4	54	100	100	75
Himakhun et al, 2009	469	22	10	16	0	24	82	100	100	90

FN = False negative, FP = False positive, PPV = Positive predictive value, NPV = Negative predictive value

carcinoma of unknown primary site, which diagnoses by cytomorphology are quite limit.

When it comes to the diagnosis of “borderline” category, the clinician should be aware for malignant potential of the lesion. Up to 86% of malignancy arises in such category of our series. Even

the “inconclusive” category appears more benign than malignancy corresponding to the other previously reports, but surgical resection is still recommended for definite diagnosis. Follicular carcinoma is the most common malignancy arises in follicular lesion, it came to a poor prognosis if delay surgery.

Another limitation of FNAC is the “Unsatisfactory” category which gives rise to non-diagnostic results. Insufficiency of material, hemorrhagic lesion and preparing techniques affect the rate of non-diagnosis result. In some palpable cystic thyroid lesions yielded fluid, histiocytes and few follicular cells which did not meet the criteria of adequate sampling should be also interpreted. The Papanicolaou Society of Cytopathology published guidelines for the examination of FNA specimens from thyroid nodules. They suggest reporting such cases as “consistent with benign thyroid cyst”, with a qualifier indicating that the interpretation is limited by paucity or lack of follicular cells, rather than reporting them as insufficient for diagnosis^(14,15). However in the present study most of “Unsatisfactory” (71.6%) are benign lesion.

Summary

In summary, the FNAC in our setting show high yield of diagnosing and help the physician to pick up the patients who need surgery with confident. While an undiagnosed and false negative results may reduce by appropriate specimen preparing and clinical followed-up.

Potential conflicts of interest

None.

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การศึกษาความแม่นยำในการวินิจฉัยรอยโรคในต่อมไทรอยด์ด้วยการเจาะดูดทางเซลล์วิทยาของโรงพยาบาลรามธิบดี

วันวิสาข์ หิมะคุณ, รัชฎาวรรณ จันทโรสม, รังสิมา อรุณโรจน์, อัจฉราพร พงษ์ทิพพันธ์

วัตถุประสงค์: ทางเซลล์วิทยาโดยการเจาะดูดเซลล์ที่รอยโรคของต่อมไทรอยด์ เปรียบเทียบกับผลเนื้อเยื่อพยาธิวิทยาในรายที่มีการผ่าตัดรักษา

วัสดุและวิธีการ: ศึกษาย้อนหลังข้อมูลการวินิจฉัยชิ้นเนื้อทางพยาธิวิทยาของต่อมไทรอยด์ จำนวน 469 รายที่เคยมีการวินิจฉัยด้วยวิธีการเจาะดูดเซลล์มาก่อน ตั้งแต่ มกราคม พ.ศ. 2548 ถึง มกราคม พ.ศ. 2551 โดยเปรียบเทียบผลการวินิจฉัยชิ้นเนื้อทางพยาธิวิทยากับผลการวินิจฉัยด้วยวิธีการเจาะดูดเซลล์ครั้งสุดท้ายก่อนทำการผ่าตัด ซึ่งแบ่งกลุ่มเป็น *unsatisfactory*, *benign*, *inconclusive*, *borderline* และ *malignancy*

ผลการศึกษา: ผลการวินิจฉัยด้วยวิธีการเจาะดูดเซลล์รายงานเป็น *unsatisfactory specimens* 74 ราย (ร้อยละ 15.7) *benign lesions* 243 ราย (ร้อยละ 51.8) *inconclusive lesions* 33 ราย (ร้อยละ 7) *borderline lesions* 15 ราย (ร้อยละ 3.2) และ *malignant lesions* 104 ราย (ร้อยละ 22) ผลการเปรียบเทียบการวินิจฉัยด้วยการตรวจชิ้นเนื้อทางพยาธิวิทยาพบว่า ในกลุ่มที่เคยได้รับการวินิจฉัยเป็น *benign lesions* เป็น *multinodular* และ *nodular goiter* 236 ราย เป็นพยาธิสภาพชนิดอื่นๆ 54 ราย ในกลุ่มที่เคยได้รับการวินิจฉัยเป็น *malignant lesions* เป็น *papillary carcinoma* 147 ราย *follicular carcinoma* 24 ราย และเป็นมะเร็งชนิดอื่นๆ อีก 8 ราย ในกลุ่มที่เคยได้รับการวินิจฉัยเป็น *benign lesion* จากการเจาะดูดเซลล์ จำนวน 243 ราย มี 23 ราย ที่พบว่าผลตรวจชิ้นเนื้อทางพยาธิวิทยาเป็น *malignancy* ในกลุ่มที่เคยได้รับการวินิจฉัยเป็น *malignancy* จากการเจาะดูดเซลล์ 104 ราย ไม่พบว่ามีผลบวกหลง (*False positive*) เมื่อประเมินความไว (*sensitivity*) ความเที่ยง (*specificity*) ค่าพยากรณ์บวก (*positive predictive value*) ค่าพยากรณ์ลบ (*negative predictive value*) และความแม่นยำ (*accuracy*) ของการวินิจฉัยด้วยวิธีการเจาะดูดเซลล์ คิดเป็นร้อยละ 81.9 ร้อยละ 100 ร้อยละ 100 ร้อยละ 90.5 และร้อยละ 93.4 ตามลำดับ

สรุป: การวินิจฉัยรอยโรคของต่อมไทรอยด์ด้วยวิธีการเจาะดูดเซลล์ เป็นวิธีที่สร้างความเจ็บปวดแก่ผู้ป่วยน้อย แต่มีความแม่นยำสูงอีกทั้งยังเป็นวิธีที่มีราคาประหยัด จึงมีความคุ้มค่าและมีประโยชน์ในการวินิจฉัยโรคมะเร็งไทรอยด์ในโรงพยาบาลรามธิบดี
