

THE ACCURACY OF FINE NEEDLE ASPIRATION CYTOLOGY IN THE DIAGNOSIS OF NON THYROID NECK MASSES: EXPERIENCE AT QUEEN ALIA MILITARY HOSPITAL

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ABSTRACT

Objective: To assess the accuracy of cytological examination of non thyroid neck masses and to correlate the findings between cytology and subsequent histopathology examination at Queen Alia Military Hospital between 2001 and 2005.

Methods: This study was carried out at Queen Alia Military Hospital between January 2001 and December 2005. The records of 104 adult patients, over a five-year period were reviewed. The definitive diagnosis of the palpable mass was determined by review of the patient's case notes.

Results: Sixty-four (61.5%) of all neck masses were originally classified by fine needle aspiration as benign, 30 (28.8%) as malignant, and 10 (9.6%) as nondiagnostic. Histopathology of all the excised 104 specimens revealed that 70 (67.3%) had benign disease and 34 (32.7%) had malignant disease. The most common benign disease was pleomorphic adenoma with a sensitivity of 88.2%, a specificity of 98.1%, and an overall accuracy of 93.3%. The most common malignant pathology was squamous cell carcinoma with a sensitivity of 88.9%, a specificity of 100% and an overall accuracy of 98.0%. Overall, for benign and malignant tumors combined, sensitivity, specificity, and accuracy were 86.9, 96.3, and 92.3%, respectively.

Conclusion: Fine needle aspiration biopsy in experienced hands is a good screening test with acceptable sensitivity and specificity in the assessment of non thyroid neck masses.

Key words: Carcinoma, Cyst, Fine needle aspiration, Neck.

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Introduction

Neck lumps include reactive lymphadenopathy, inflammatory salivary gland enlargement, thyroid gland masses, brachial cysts and benign neoplasms.⁽¹⁾ More than 50% of symmetrical neck lumps are malignant tumors either primary (usually

lymphoma) or secondary (usually carcinoma)⁽²⁾ therefore, the accurate diagnosis of the nature of a neck swelling is of paramount importance.⁽³⁾ The standard procedure for the diagnosis of a neck mass is open biopsy of the mass with histological examination of the excised tissue, however, open

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biopsy has been reported to lead to a higher incidence of wound complications, regional neck recurrence and distant metastases, than in patients who have no biopsy performed prior to definitive treatment.⁽⁴⁾ To avoid all complications, an open biopsy is generally contraindicated in the presence of an undiagnosed mass in the head and neck.⁽³⁾

Fine needle aspiration procedure is minimally invasive, easily performed, has rapid results and detects the presence of carcinoma, salivary gland tumors and other neoplasms with high degree of accuracy.

Fine needle aspiration biopsy (FNAB) has low cost, complication-free and first choice diagnostic tool for the study of palpable head and neck masses, excluding abscesses and vascular neoplasms.^(5,6)

FNAB enables high accuracy in identifying the nature of a lesion, differentiation of benign from malignant disease, differentiation of the specific tumor cell type and determination of site of origin.⁽⁷⁾ FNAB is not usually associated with seeding of malignant cells or interference with subsequent histological examination. Several large studies sampling parotid, prostate, renal cell carcinoma and breast masses suggest that FNAB is not associated with significant needle tract seeding.^(8,9)

The unexpected finding of malignancy in an excised mass which had been considered benign pre-operatively is still encountered in occasions; such failure to identify malignancy pre-operatively has serious consequences. For example, urgent cases may be dealt with non-urgently, leading to delay in diagnosis and, thus, a delay in definitive treatment.^(3,5) In addition, the treatment of such patients may entail additional morbidity. Thus patients with unsuspected squamous cell carcinoma may require radiotherapy in addition to surgery as part of their definitive treatment.

With these considerations in mind, the present study was undertaken to assess the accuracy rates of FNAB in non thyroid neck masses.

Methods

The study was conducted in a 200-bed military hospital in Amman-Jordan, Queen Alia Military Hospital (QAMH) from January 2001 till December 2005. The records of 104 adult patients were reviewed. The indication for performing FNAB and the results of this procedure were recorded. The diagnosis of the neck lump in each case was determined by the examination of the case notes of all the patients.

The FNAB was performed by pathologist using a 22-gauge needle attached to a 20ml syringe. Usually one pass was required but some cases needed more. Smaller lumps were biopsied under ultrasound guidance but larger ones were done clinically. The aspirated material was evacuated and spread on glass slide for staining. When Papanicolaou's stain was done slides were fixed with 95% alcohol, but when Geimsa stain was used the slides were air dried.⁽⁷⁾

In cases where the neck lump was subsequently removed, the final diagnosis of the lump was established by histological examination of the excised tissue.

Results

Of the 104 FNABs, 64 (61.5%) were originally classified as benign, 30 (28.8%) as malignant, and 10 (9.6%) as non-diagnostic. Histopathology of all the excised specimens revealed that 70 patients (67.3%) had benign disease and 34 (32.7%) had malignant disease (see Table I).

FNAB correctly identified 62 out of 70 benign lesions (sensitivity: 88.6%) (see Table II). Of the eight was a false-negative result (see Table III), and seven were actually non-diagnostic rather than malignant. Therefore, when the non-diagnostic results were excluded from the analysis, the sensitivity of FNAB for benign disease was 94.1%. The specificity of FNAB for benign disease was 94.1% overall and 93.5% when non-diagnostic results were excluded (there were two false positives (Table III)). The positive predictive value (PPV) for benign disease was 0.969, and NPV was 0.080. Therefore, the overall accuracy of FNAB for benign disease was 90.4% (Table II). The most common benign disease in this study was pleomorphic adenoma, where FNAB had a sensitivity of 88.2%, a specificity of 98.1%, and an overall accuracy of 93.3% (Table II).

The overall sensitivity of FNAB for malignant disease in general was 85.3%. Of the five false-negative results (Table III), three were actually non-diagnostic rather than benign. Therefore, when the non-diagnostic results were excluded, the sensitivity of FNAB for malignant disease was 93.5%. The specificity of FNAB for malignant disease was 98.6% overall and 98.4% when the non-diagnostic results were excluded (there was one false-positive, see Table III). The PPV was 0.967, the NPV was 0.932, and the overall accuracy was 94.2% (Table II).

Table I. Pathology of excised benign and malignant specimens

Pathology	No.	%
<i>*Benign</i>	70	67.3
Pleomorphic Adenoma	51	72.9
Warthin's Tumor	8	11.4
Adenoma (other)	4	5.7
Chronic sialadenitis	3	4.3
Epidermoid Cyst	3	4.3
<i>*Oncocytoma</i>		
Benign Myofibroblastic Tumor	1	1.4
<i>*Malignant</i>	34	32.7
Squamous Cell Carcinoma	18	52.9
Acinic Cell Carcinoma	4	11.8
Melanoma	3	8.8
Adenocarcinoma	3	8.8
Lymphoma	2	5.9
Adenoid Cystic Carcinoma	1	2.9
Malignant Histiocytoma	1	2.9
Myoepithelial Carcinoma	1	2.9
Poorly differentiated carcinoma	1	2.9

Table II. Accuracy of FNAB

Pathology	Sensitivity	Specificity	PPV*	NPV*	Accuracy
Benign (n=70)	88.6%	94.1%	0.969	0.800	90.4%
Pleomorphic Adenoma (n=51)	88.2%	98.1%			93.3%
Malignant (n=34)	85.3%	98.6%	0.967	0.932	94.2%
SCC (n=18)	88.9%	100%			98.0%
Overall	86.9%	96.3%	0.968	0.866	92.3%

* PPV: positive predictive value NPV: negative predictive value

Table III. False negatives and false positives for benign and malignant disease

Pathology	No.
<i>*False negatives, benign (n=8)</i>	
Pleomorphic adenoma	2
Oncocytoma	3
Cysadenoma	1
Myofibroblastic tumor	1
Warthin's tumor	1
<i>*False positive, benign (n=2)</i>	
Adenocarcinoma	1
Lymphoma	1
<i>*False negatives malignant (n=5)</i>	
Lymphoma	2
Adenocarcinoma	1
Adenoid cystic carcinoma	1
Melanoma	1
<i>*False positives, malignant (n=1)</i>	
Pleomorphic adenoma	1

Squamous cell carcinoma was the most common malignant pathology in our study comparable with other studies.⁽¹⁰⁾ Where the sensitivity of FNAB was 88.9%, its specificity was 100%, and its overall accuracy was 98.0% (Table II). Overall, for benign and malignant tumors combined, sensitivity,

specificity, and accuracy were 86.9%, 96.3%, and 92.3% respectively (Table II).

Discussion

The sensitivity and specificity of FNAB for benign and malignant disease in our study were comparable

Table IV. Previous study results of FNA cytology of neck masses

Study	No. of histological specimens	Sensitivity %	Specificity%	Accuracy%
Piromalli <i>et al</i> ⁽⁶⁾	216	95	97.5	--
Holleman <i>et al</i> ⁽⁷⁾	53	84	52	65
Sanders <i>et al</i> ⁽⁸⁾	345	92	97	--
Leonard <i>et al</i> ⁽⁹⁾	184	88	78	80
Lopez <i>et al</i> ⁽¹⁰⁾	827	90	99.8	99
Bakhos <i>et al</i> ⁽¹¹⁾	625	93	96	--
Sruojjeh <i>et al</i> ⁽¹²⁾	100	--	--	--
Present study	104	86.9	96.3	92.3

--: not determined

to previously reported rates,^(5-9,15,16) Table IV. The overall accuracy of cytological diagnosis based on FNAB has been reported to range from 65 to 99%; our overall accuracy rate was 92.3%. For benign lesions, the reported sensitivity of FNAB ranges from 84 to 95%; ours was 88.6%.

When FNAB is non-diagnostic, which we encountered in 9.6% of our cases, some authors recommend performing an ultrasound-guided core biopsy to obtain a tissue diagnosis.⁽¹¹⁾ Some of the false-negative and false-positive results in the present study are worth to be mentioned. First, two of the five specimens that were falsely negative for malignancy was low grade non Hodgkin's lymphomas. These were the only cases of lymphoma in our group of patients. The fact that both were not reported as malignant on FNAB is consistent with other reports that lymphoma is difficult to diagnose by FNAB.^(6,8,9,12,13,16) Most pathologists state that the diagnostic accuracy for lymphoma is between 50% and 60%.⁽³⁾ If non Hodgkin lymphoma is suspected, flow cytometry of FNAB can be a useful diagnostic aid.⁽¹²⁾

Second, the only false positive for malignancy in our study was reported as "large malignant cells suggesting carcinoma" on cytology. This tumor was later found to be a pleomorphic adenoma on histopathology. Conversely, a finding of pleomorphic adenoma on FNAB does not completely exclude the presence of adenocarcinoma on histology.⁽¹⁴⁾

There are other concerns about the use of FNAB preoperatively, namely that FNAB can cause histological changes that can obscure a histologic diagnosis. However, the findings of at least one large study appear to disprove this idea. Mukunydzai *et al.* found that while FNAB may produce changes such as infarction and hemorrhage; these changes were usually not extensive enough to compromise a histological diagnosis.⁽¹⁷⁾

Conclusions

Fine needle aspiration biopsy is an accurate means of diagnosing both benign and malignant neck tumors. It is especially useful in excluding squamous cell carcinoma. Although it is important to be mindful of the possible pitfalls of FNAB, we believe it plays a useful role in the assessment of non thyroid neck masses.

FNAB in experienced hands is a good screening test in the assessment of non thyroid neck masses. Repeating FNAB in cases where the original result is negative for carcinoma may increase the sensitivity of FNAB especially in the detection of cystic carcinomas.

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