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Role of repeat fine needle aspiration cytology in head and neck lesions: preliminary study

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Abstract

In this preliminary prospective study the value of repeating fine needle aspiration cytology (FNAC) in patients with head and neck lesions was investigated. Few reports exist on the significance of repeating the procedure in head and neck patients. Fifty-seven patients have been sampled twice for the first and second (repeat) FNAC. The second aspirate was performed in the operating theatre under general anaesthesia prior to a surgical procedure. The cytological results were compared with the histology of the 57 resected lesions. It was found that the overall diagnostic results improved after repeating the FNAC. It can be concluded that repeating FNAC is useful and should be considered under some circumstances, especially in the case of non-diagnostic cervical lymph node aspirates.

Key words: Biopsy, Fine Needle; Neck; Diagnosis, Differential

Introduction

Fine needle aspiration cytology (FNAC) has gained widespread usage for the diagnosis of lesions. Although the procedure dates back to 1847 when Kun reported on the recovery of cells by needle for microscopic examination, it was not until the 1930s that the procedure began to be more universally accepted.[1] Martin and Ellis[2] reported a series of aspiration specimens that showed that the technique was diagnostically accurate. In 1950 Soderstrom and Franzen in Sweden and Lopes-Cardozo in Holland studied 1000s of cases each year.[3] Zajicek[4] emphasized the simplicity, safety, rapidity and diagnostic accuracy of the technique by presenting his findings with full clinical, histological, and follow-up data. He has provided a model for fine needle aspiration (FNA) services for the rest of the world.

FNAC is invaluable in the investigation of head and neck masses. It is accurate, inexpensive and quick. The tissues most frequently sampled are lymph nodes, the thyroid gland and the major salivary glands.[5]

Only a few reports in the literature discuss the value of repeat FNAC in head and neck lesions. In this study we present our experience of repeating the procedure in head and neck lesions.

Materials and methods

This prospective study was carried out in the departments of Otorhinolaryngology Head and Neck surgery and Histopathology at Birmingham Heartlands and Solihull NHS Trust. Approval from the hospital ethical committee was obtained before conducting the study.

Clinically indicated FNA samples were performed in the out-patients' clinic on 83 patients with a variety of head and neck lesions. Only those who subsequently underwent surgical resection of the lesions were included in the study. They were subjected to a second FNA in the operating theatre before resection of the lesion. There were 57 such patients. The first and second aspirates were taken from the same site of the lesion and the cytological results were compared with the histological result of the subsequent surgical excision of this lesion. All the aspirates were taken randomly by two competent clinicians. The procedures were carried out using a 10 ml syringe with a 22-gauge needle placed in a Cameco-type syringe holder. The anatomical distribution of the lesions was: 25 in cervical lymph nodes, 25 within the thyroid gland and seven in the major salivary glands. The vast majority of the FNAC samples were interpreted by an experienced cytopathologist.

The data have been analysed from the perspective of the site of the lesion, first and second FNAC results and then the latter were compared with the histological diagnosis in a series of 2×2 tables.

It was found that the site of the biopsy was a significant discriminator between malignant and benign lesions, ie, 15 out of 25 lymph nodes were malignant, whereas only three out of 25 of thyroids

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TABLE I

THE CORRELATION BETWEEN FIRST FNAC, SECOND FNAC AND HISTOLOGY IN THE LYMPH NODE GROUP AND THE THYROID GLAND GROUP WITH THE PERCENTAGES OF SENSITIVITY AND SPECIFICITY

		Lymph nodes group				Thyroid gland group			
		Histology		Sensitivity	Specificity	Histology		Sensitivity	Specificity
		Malignant	Benign	%	%	Malignant	Benign	%	%
		(n = 15)	(n = 10)			(n = 3)	(n = 22)		
	Malignant	8	0			3	0		
1st FNAC	Benign	0	5	53%	50%	0	11	100%	50%
	Non-diagnostic	7	5			0	11		
	Malignant	10	0			3	0		
2nd FNAC	Benign	0	7	67%	70%	0	12	100%	55%
	Non-diagnostic	5	3			0	10		

were malignant, therefore, the thyroid and lymph node groups were studied separately. The outcome of the assessment has been categorized as malignant or benign without further sub-classification, as the data set was small. The seven salivary gland aspirates were too few to enable any quantitative analysis as a separate group and were, therefore, not included in this analysis.

The diagnosis accuracy was expressed in terms of sensitivity and specificity. In this study the sensitivity was defined as the percentage of aspirates correctly diagnosed by FNAC as malignant in the presence of malignancy and the specificity was the percentage of aspirates correctly diagnosed by FNAC as benign in the absence of malignancy (Table I).

The data have also been analysed in terms of positive and negative results, irrespective of the site and the nature of the lesions. It was possible to include the data of the salivary gland group in this analysis. Only the cytological results that gave a definitive diagnosis similar to the histology were considered positive results (diagnostic results). All other results were considered negative (non-diagnostic), even those that were able to exclude malignancy or identified some cells similar to the histological findings. The results of this analysis are presented as percentage figures (Table II).

Results

The 57 patients included in the study comprised 20 males and 37 females with an age range of 25–87 years (median 52 years). The cytological findings of the aspirates (57 first aspirates and 57 second aspirates) were tabulated and compared against the histological diagnosis obtained from 57 resected lesions. The comparison between the first FNAC, second FNAC and histological findings in each studied group are summarized in Tables III, IV and V.

In the lymph node group, there were seven cases of tuberculous lymphadenitis and one case of sarcoidosis. The malignant cases comprised five cases of lymphoma (two Hodgkin's and three non-Hodgkin's) and 10 cases of squamous cell carcinoma. In the thyroid gland group there was one case of Hashimoto's thyroiditis and one case of non-specific inflammation. The malignant cases comprised two cases of papillary thyroid carcinoma and one case of follicular carcinoma (Hurthle cell carcinoma). One of the submandibular gland lesions was diagnosed as a Sjögren's related lympho-epithelial lesion.

The correlation between the first FNAC, second FNAC and histology in the lymph node group and the thyroid group are shown in Table I. In the lymph node group there was a positive correlation between the first FNAC and histology in eight out of 15 malignant cases and five out of 10 benign cases compared with 10/15 malignant cases and seven out of 10 benign cases on the second FNAC. In the thyroid group, the correlation was three out of three of the malignant cases on both first and second FNAC and 11/22 and 12/22 of the benign cases respectively. Table I shows the collected data in a two by two format as well as the sensitivity and specificity in the lymph node and in the thyroid groups. In the salivary gland group, there was a positive correlation between first FNAC and histol-

TABLE II

COMPARISON BETWEEN THE PERCENTAGE FIGURES OF THE DIAGNOSED CASES BY FIRST FNAC AND SECOND FNAC

	Lymph node lesions		Thyroid gland lesions		Salivary gland lesions		Total no. of cases diagnosed	
	No.	%	No.	%	No.	%	No.	%
No. of patients	25	100%	25	100%	7	100%	57	100%
Cases diagnosed by 1st FNAC	13	52%	14	56%	3	43%	30	53%
Cases diagnosed by 2nd FNAC	17	68%	15	60%	5	71%	37	65%
Cases diagnosed by both 1st FNAC and 2nd FNAC	20	80%	20	80%	5	71%	45	79%

No. = number of cases; 1st = first; 2nd = second

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TABLE III
COMPARISON BETWEEN THE FIRST FNAC, SECOND FNAC AND HISTOLOGY RESULTS IN THE LYMPH NODES GROUP

Histological results	No.	1st FNAC results		2nd FNAC results	
		Correct diagnosis	Non-diagnostic	Correct diagnosis	Non-diagnostic
Non-specific inflammation	2	1	1	1	1
Specific inflammation	8	4	4	6	2
Hodgkin's lymphoma	2	0	2	0	2
Non-Hodgkin's lymphoma	3	1	2	2	1
Carcinoma	10	7	3	8	2

No. = number of cases; 1st = first; 2nd = second

TABLE IV
COMPARISON BETWEEN THE FIRST FNAC, SECOND FNAC AND HISTOLOGY RESULTS IN THE THYROID GLAND GROUP

Histological results	No.	1st FNAC results		2nd FNAC results	
		Correct diagnosis	Non-diagnostic	Correct diagnosis	Non-diagnostic
Inflammatory	2	1	1	1	1
Colloid nodular goitre	15	8	7	8	7
Adenoma	5	2	3	3	2
Malignant	3	3	0	3	0

No. = number of cases; 1st = first; 2nd = second

TABLE V
COMPARISON BETWEEN THE FIRST FNAC, SECOND FNAC AND HISTOLOGY RESULTS IN THE SALIVARY GLAND GROUP

Histological results	No.	1st FNAC results		2nd FNAC results	
		Correct diagnosis	Non-diagnostic	Correct diagnosis	Non-diagnostic
Inflammatory	3	0	3	1	2
Pleomorphic adenoma	4	3	1	4	0
Malignant	0	0	0	0	0

No. = number of cases; 1st = first; 2nd = second

ogy in three out of seven benign cases compared with five out of seven benign cases on the second FNAC.

Twenty-seven first aspirates and 20 second aspirates were considered non-diagnostic. Figure 1 shows the reasons for this.

In the whole study, 30 out of 57 cases (53 per cent) were correctly diagnosed by the first FNAC compared with 37/57 cases (65 per cent) diagnosed by the second FNAC. Accordingly, a total of 45/57 cases (79 per cent) were diagnosed by both first and second FNAC (Table II).

Discussion

The benefits and interpretation of FNA cytology, although widely advocated in many different lesions, still generate controversy amongst clinicians and pathologists.

A recent survey of UK otolaryngologists showed that only nine per cent use FNAC as an investigative technique in cervical lymphadenopathy.[6] Connolly and MacKenzie[7] stated that the vast majority of these cervical lymph nodes, especially in young patients, are reactive lymph nodes arising in association with upper respiratory infection. The natural history of these nodes is gradual resolution when the primary focus of the disease resolves. A significant number of these lymph nodes are small in size and needle biopsy or surgical excision for histological analysis is uncommon unless the lymphadenopathy is persistent and/or multiple.

On the other hand, Illes and Brian[8] regard the technique as well established in the diagnosis of salivary gland lesions, although it is still considered by some as ineffective in that most salivary gland swellings are eventually excised. Similar concerns are still prevalent among many practising otolaryngologists about the value of the FNAC in diagnosis of thyroid gland lesions.

The objective of this prospective study was to confirm the efficacy of FNAC in the setting of a busy primary referral head and neck clinic and, more importantly, to assess the value of repeating the procedure in order to improve the diagnostic accuracy.

The diagnostic figures of the first FNAC in this study were below the expected value (Table II). These results should be interpreted with caution,

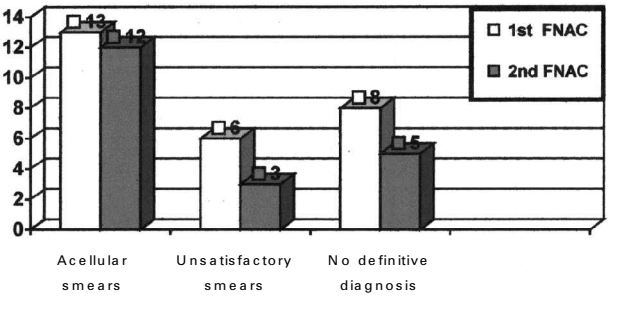

FIG. 1
The reasons for the non-diagnosed cases in first FNAC and second FNAC.

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owing to the small number of patients in each studied group, the marked disparity between the number of the malignant and benign cases in each group and the selection criteria of the diagnostic and non-diagnostic results that we have employed in this study. Fagelman and Chess[9] stated that the nature of the aspirated sample has an important impact on the efficacy of fine needle aspiration biopsy.

These figures improved on second FNAC (Table II). The total diagnostic yield figure increased after calculating the number of the diagnosed cases by both first and second FNAC, where 30 cases were definitively diagnosed by first FNAC, 37 cases were definitively diagnosed by second FNAC and a total of 45 cases were diagnosed by both first and second FNAC. This resulted in an increase in the total diagnostic figures to 80 per cent of the lymph node group, 80 per cent in the thyroid gland group, with no change in the salivary gland group. The total diagnostic figure for all the three groups together is 79 per cent. These last figures are better than the results achieved by other authors Mui *et al.*,[10] Feld *et al.*[11] and Lioe *et al.*[12] who reported a definitive diagnostic rate of 67 per cent, 72 per cent and 77 per cent respectively.

In our study, the overall results of sensitivity ranged from 67 per cent for the lymph node group to 100 per cent in the thyroid gland group, while the specificity results were 55 per cent in the thyroid gland group and 70 per cent in the lymph node group (Table I). Other authors have reported different ranges of results; however, their study designs have varied from that employed in this study. Murthy *et al.*[13] reported an overall sensitivity of 77.7 per cent and a specificity of 93.3 per cent in 91 patients with lesions of the salivary glands and cervical lymph nodes. Takashima *et al.*[14] reported 96 per cent sensitivity and 94 per cent specificity when they used ultrasound-guided FNA in 70 patients, while Horvath *et al.*[15] claimed a sensitivity of 80 per cent and a specificity of 93 per cent when the same technique was used in the pre-operative diagnosis of thyroid nodules. Burch *et al.*[16] investigated 422 patients with thyroid nodules and reported 80 per cent sensitivity and a specificity of 73.2 per cent.

Accurate comparison between these different studies including this study is very difficult because of the marked disparity in the design and the number of patients enrolled in each study. LiVolsi *et al.*[17] stated that it is difficult to compare all the studies and arrive at what are the generally accepted rates for the sensitivity and specificity of FNA. Patient selection criteria and more importantly, the manner in which different authors handle diagnoses of indeterminate, uncertain or suspicious of neoplasia in the reported studies, making accurate comparison extremely difficult.

The percentages of insufficient aspirates were 23 per cent and 20 per cent for first and second FNAC respectively. These results lie within the range of the results obtained by Mui *et al.*[10] and Ono *et al.*[18]

- **Fine needle aspirate biopsy is common practice and many papers have commented on its efficacy in the management of lesions of the head and neck**
- **This paper is a study that examines the sensitivity and specificity of initial and repeated biopsy when compared to the histopathology of the subsequently resected specimen**
- **The overall diagnostic yield was improved with a repeat biopsy**
- **The authors conclude that a non-diagnostic aspirate should prompt clinicians to repeat the test**

It should be emphasized that the role of FNAC is best regarded as a triage procedure for supplementing other clinical and radiological evidence in the prioritization of those patients who need further surgical management, and that it complements histology rather than competes with it. It should also be emphasized that a negative FNAC never excludes malignancy.

Conclusion

This study investigated the role of repeating FNAC in different head and neck masses. The diagnostic accuracy results were below the expected values for the first FNAC. However, this improved after repeating the FNAC, especially in the case of cervical lymph node lesions. In cases of thyroid gland lesions, it seems that the operator stands his/her best chance of obtaining a good diagnostic yield at the time of performing the first FNAC.

It can be concluded that FNAC is a rapid, safe and inexpensive, diagnostic tool that can be effectively used in the diagnosis and treatment of head and neck lesions. The operator should aim to get the best aspirates from the first FNAC. However, repeating the procedure should be considered under some circumstances, especially in the case of non-diagnostic cervical lymph node aspirates.

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