

Original Research Article

A comparative study of fine needle aspiration cytology versus non aspiration technique in thyroid lesions

Sasikumar M. N., Sam Christy Mammen*, Jacob P. Thomas

Department of General Surgery, Government Medical College, Kottayam, Kerala, India

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*Correspondence:

Dr. Sam Christy Mammen,

E-mail: samchristymammen@gmail.com

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) is regarded as the gold standard investigation in the diagnosis of thyroid swellings. But often unsatisfactory specimen, especially mixed with blood, poses an obstacle in proper cytological interpretation. To overcome this problem, an alternative method of fine needle non aspiration cytology (FNNAC) technique was developed which, relies on the capillary pressure only to suck the cells inside the needle bore.

Methods: Patients presenting with thyroid swellings from July 2008 to January 2009 were included in the study. 91 patients treated for thyroid lesions entered a prospective comparative evaluation of fine needle cytology with aspiration and non-aspiration techniques in thyroid. The thyroid swelling in every patient was sampled by both the aspiration as well as the non-aspiration technique by a single operator. Both procedures were done using 23G needles. Aspiration was done using a 10ml syringe. Both dry and wet smears were made and stained. All smears were interpreted by a cytologist without knowledge of the technique employed. Apart from the diagnosis, comments were made on the quality of the slides and three qualitative categories are created as unsuitable specimens, diagnostically adequate and diagnostically superior.

Results: Non-neoplastic lesions accounted for 92.3%. They comprised mainly of nodular colloid goiter 53.84%, colloid nodules 29.6%, thyroiditis 8.79%, and one case of suppurative lesion. Out of the 7 neoplasms, 2 were follicular neoplasms, 1 was papillary carcinoma, 2 cases of Hurthle cell neoplasm and 1 cellular nodule in an MNG. Diagnostically superior material was obtained in 42 cases (46.15%) of the non-aspiration samples, as compared with 18 cases (19.78%) of aspiration samples which was statistically significant.

Conclusions: The FNNAC produces better results in the form of a better quality of the cellularity and less field obscuration by blood. This technique should be used alone or in tandem with FNAC for better diagnostic yield.

Keywords: Diagnostically superior, Fine needle aspiration cytology, Fine needle non aspiration technique

INTRODUCTION

Fine needle aspiration cytology (FNAC) has been practiced initially at the Karolinska Hospital, Stockholm, since 1950.¹ However, it was only in the 1980s, that this technique gained acceptance in the USA and UK.² Currently FNAC is practiced worldwide and is regarded as the gold standard investigation in the diagnosis of thyroid swellings. It allows better selection of patients

who need to undergo a surgical procedure. However in aspiration of thyroid lesions, an unsatisfactory specimen, especially mixed with blood, poses an obstacle in proper cytological interpretation.³

In an attempt to overcome the problem of vascularity of the thyroid gland, an alternative fine needle sampling was developed in France. This technique avoids aspiration and utilizes only the needle and functions on the capillary

pressure to draw the cells inside the needle bore.⁴ This technique was first described for use in the investigation of thyroid lesions by Santos and Leiman in 1988.⁵ This technique is also called as fine needle capillary cytology, non-aspiration cytology, cytopuncture or fine needle sampling.

This present study was conducted with the objective to determine which method of fine needle biopsy is most effective for diagnosis in thyroid lesions, fine needle aspiration cytology (FNAC) or fine needle non aspiration cytology (FNNA).

METHODS

This prospective validation study was conducted at Government Medical College, Kottayam, from July 2008 to January 2009. A consecutive series of 91 patients treated for thyroid lesions were included in the study. All the smears prepared and compared by FNA and FNNA techniques. They were interpreted by a cytopathologist without knowledge of the technique employed for the slides and apart from the diagnosis, comments were made on the quality of the slides.

All patients presenting with thyroid swelling attending to the surgical outpatient department of the hospital were included in the study. Exclusion criteria included patients with metastatic disease.

Study procedure

The thyroid swelling in every patient was sampled by both the aspiration as well as the non-aspiration technique by a single operator. Both procedures were done using 23G needles. Fine needle aspiration was done using a 10ml syringe while non-aspiration technique was done without a syringe or a holder. The needle was held between the thumb and the fore finger of the aspirating hand was inserted gently into the nodule and moved in different directions. The material entering the hub the needle by capillary action was then expressed on to clean glass slides, after attaching a syringe to it. Both dry and wet smears were made and stained accordingly. All smears were interpreted by a cytologist without knowledge of the technique employed for the slides.

Apart from the diagnosis, comments were made on the quality of the slides. For this purpose, three qualitative categories are created.

- *Unsuitable specimens:* Consisted mainly of red blood cells or absent cellularity making them inadequate for cytodiagnosis.
- *Diagnostically adequate:* Possible to render an opinion on the nature of the lesion sampled, but the cellular material present was sub-optimal due to poor cellularity, sample dilution, degenerative changes or specimen entrapment in blood clots.

- *Diagnostically superior:* Cell aggregates were prominent, well-preserved, unobscured by background blood and cellular morphology was well displayed.

Statistical analysis

All the values obtained were analysed by using Chi square test. P values <0.05 were considered as statistically significant.

RESULTS

In this study, majority of the patients were under the age group of 31-40 years. Females (86.81%) were more affected than males (13.13%) (Table 1).

Table 1: Age distribution.

Characteristics	No. of patients (n=91)	Percentage (%)
Age Group (in years)		
11-20	1	1.1
21-30	22	24.1
31-40	25	27.4
41-50	21	23.1
51-60	13	14.3
61-70	8	8.8
71-80	0	0
81-90	1	1.1
Sex		
Male	12	13.2
Females	79	86.8

Table 2: Types of neoplastic and non-neoplastic lesions.

Types	No. of patients	Percentage (%)
Non neoplastic		
Colloid Nodules	26	30.95
Nodular Colloid Goiter	49	58.3
Thyroiditis	8	9.5
Suppurative lesions	1	1.2
Neoplastic		
Follicular neoplasms	3	42.9
Papillary carcinoma	1	14.3
Hurthle cell neoplasm	2	28.5
Cellular nodule	1	14.3

Non-neoplastic lesions accounted for 92.3% of the total cases. They comprised mainly of nodular colloid goiter (49 cases), Colloid nodules (27 cases), thyroiditis (8 cases), and one case of suppurative lesion. Out of the 7 neoplasms (7.7% of the total), 2 were follicular neoplasms, 1 was papillary carcinoma, 2 cases of Hurthle cell neoplasm and 1 cellular nodule in an MNG (Table 2). Figure 1 presents the age distribution of cases in

neoplastic lesions. Majority of the patients were under the age group of 51-60 years followed by 21-30 years.

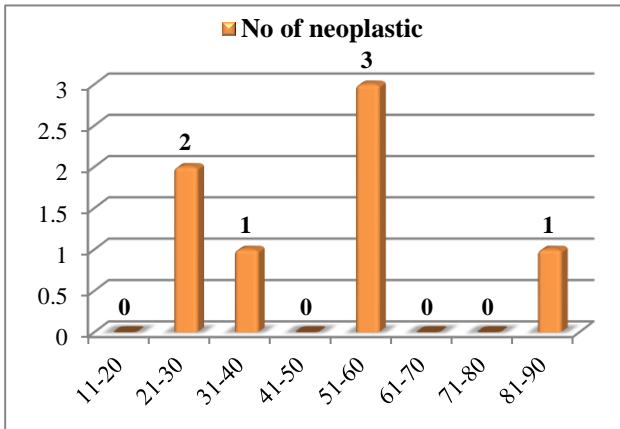


Figure 1: Distribution of age in cases of non-neoplastic lesions.

In the non-neoplastic group, significantly more diagnostically superior specimens were obtained by the non-aspiration technique (Table 3). A similar trend was seen in the neoplastic lesions in which 4 samples obtained without aspiration were diagnostically superior, as compared with only 2 obtained by conventional aspiration. The unsuitable category included 5 non-aspiration specimens in non-neoplastic lesions.

Table 3: Performance of FNA and Non Aspiration techniques in non-neoplastic and neoplastic lesions in thyroid.

Category	Non neoplastic (n=84)		Neoplastic (n=7)	
	FNNA (%)	FNA (%)	FNNA (%)	FNA (%)
Diagnostically superior	38 (45.2)	16 (19.0)	4 (57.1)	2 (28.5)
Diagnostically adequate	41 (48.8)	58 (69.0)	3 (42.8)	3 (42.8)
Unsuitable	5 (5.96)	9 (10.7)	0	2 (28.5)
Total	84 (100)	84 (100)	7 (100)	7 (100)

Table 4: Performance of FNA and Non aspiration (NA) cytology in total series.

Category	FNNA (%)	FNA (%)
Diagnostically superior	42 (46.1)	18 (19.7)
Diagnostically adequate	44 (48.6)	62 (68.2)
Unsuitable	5 (5.49)	11 (12.08)
Total	91 (100)	91 (100)

When non-neoplastic as well as neoplastic lesions were analyzed together, statistically significant results were seen. As seen in Table 4, diagnostically superior material

was obtained in 42 cases (46.15%) of the non-aspiration samples, as compared with 18 cases (19.78%) of aspiration samples and on application of Chi square test, it was found to be significant ($p < 0.001$). The number of unsuitable smears was also greater in aspiration samples i.e. 11 (12.08%), while only 5 cases (5.49%) of non-aspiration samples were considered unsuitable.

DISCUSSION

FNAC is an established diagnostic modality for sampling lesions in virtually any body site. But this technique is complicated as it involves aspiration of significant quantities of blood, predominantly in vascular organs or hemorrhagic tumors which compromise cellular preservation and interpretation.⁶

A new technique called non-aspiration method was developed in France to overcome this situation. This technique involves insertion of a fine needle into a lesion without attaching a syringe. It depends on the property of capillary tension in narrow channels. The principle in this procedure states that a fluid (or semi fluid substance) will ascend spontaneously into a narrow tube in inverse proportion to the diameter of that tube.⁵ Brifford et al called this method which utilizes no active suction or aspiration, as cytopuncture.⁷

This study was designed as a comparative evaluation of these two techniques. This study involved 91 patients with thyroid lesions. Smears are collected from all the patients by FNAC and FNNAC techniques and they were interpreted by a cytologist and analysed for quality of the smears.

In the present study, the majority of the patients were under the age group of 31-40 years. Study by Tauro et al on 50 patients presented that the most affected age group as 40-49 years (36%).⁸ Female preponderance (86.81%) was observed in the study. Similar observations were also made by Ramachandra et al.⁹

Out of 91 samples, 7 of them were of neoplasm in nature and 81 were of non-neoplastic lesions. Similar observations were also made by Tauro et al.⁸ Out of 50 cases 49 were of non-neoplasm and 1 case reported of malignancy.

In this study, FNNA technique produced high quality smears compared to FNAC. But both the techniques have their own advantages and disadvantages. From table 4, it was observed that the non-aspiration technique yielded more diagnostically adequate specimens, as compared with FNA. This was well supported many other studies quoting that FNNA produces less bloody and higher quality samples. Whereas in a study by Carvalho et al FNAC and FNNAC provided smear samples with similar accuracy and adequacy. Mahajan et al, in his study concluded that non-aspiration techniques combined with

FNAC produced smears of good quality cellular material in thyroid lesions.

CONCLUSION

The FNNA technique is simple, easy to perform and produces better results in the form of a better quality of the cellularity and less field obscuration by blood in both neoplastic and non-neoplastic lesions of the thyroid. This technique should be used alone or in tandem with FNAC for better diagnostic yield.

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