

ROLE OF "CELL BLOCK" IN THYROID CYTOLOGY

A CROSS SECTIONAL STUDY

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Abstract

Introduction: As an initial diagnostic procedure fine needle aspiration cytology (FNAC) of thyroid is widely accepted as it is convenient and cost effective. But being a highly vascular organ, often it yields haemorrhagic and inadequate smear which reduces its diagnosis efficacy. In those cases Cell block can be made from the residual material of the needle hub, if there is any.

Objective: The purpose of this study was to see the adequacy, provision of additional information and diagnosis efficiency of cell block and Direct smear in case of thyroid swellings.

Method: This is a cross sectional study on 160 cases which took place in the department of pathology of Dhaka Medical College, done over the period from July 2008 to June 2010. Each of the cases underwent FNA and from each aspiration direct smear as well as cell block were prepared.

Result: It was seen that by adding cell block technique 12.5% inadequate direct smear could yield a diagnosis and combined use of direct smear and cell block increases the diagnostic efficacy up to 95.7%. Cell blocks also provided additional valuable information in 68.4% cases.

Conclusion: As both the procedures are done in a single sitting, if material is available in the needle hub during performing DS, CB should be done to increase the efficacy of FNAC.

Keywords: Thyroid, cytology, cell block, FNAC

Introduction

Thyroid enlargement or goiter is a common problem of Bangladesh. According to Bangladesh

country health system profile-WHO, 2004, total visible goitre rate is 8.8%. As the initial diagnostic procedure Fine needle aspiration (FNA) is recommended, because, it is more useful and accurate than scintigraphy, ultrasound and frozen section in the diagnosis of goiter¹⁻³.

Despite its value, there are some limitations of thyroid FNA. Accurate cytological diagnosis depends not only on the experience of the cytopathologist interpreting the specimen but also on specimen adequacy, skill of the aspirator and sample processing method in the laboratory. Inadequate specimens are also at risk for false negative diagnosis^{4,5}.

Cell block (CB) preparation of FNA specimens has been shown to be a valuable additional technique to Direct smear (DS) and had been increasingly used in addition to FNA to improve diagnostic accuracy⁶. This method uses histological techniques for processing. The residual material in the needle hub used for CB, often contains valuable diagnostic evidence and tissue fragments that cannot be processed by cytological technique⁷. Despite the increased use of FNAC (FNA cytology) and immunocytochemistry in the diagnosis of solid tumors of thyroid only limited study has been done to assess the contribution of CB, although the value of CB has been acknowledged^{8,9}. Several studies showed that CB increases the diagnostic accuracy and efficacy of thyroid FNA, results in slide reduction and obviates repeat FNA^{7,10}. Kung and Yuen¹¹ have also advocated the use of CB in thyroid aspirates, especially for processing bloody specimens and Qiu et al⁷ showed that without

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onsite assessment CB alone is superior to DS for hemorrhagic thyroid swelling.

This study was aimed to evaluate the association of adequacy, diagnosis of thyroid lesion and provision of additional information between CB and DS.

Material and Method

A cross sectional study was carried out in the Department of Pathology, Dhaka Medical College during the period of July 2008 to June 2010. A total of 160 study subjects of both sex were enrolled in the study having following inclusion and exclusion criteria:

Inclusion Criteria

- Any neck swelling moving with deglutition and
- Presence of residual material in the needle hub after preparation of direct smear

Exclusion Criteria

- Any neck swelling which does not move with deglutition
- Any neck swelling which moves with deglutition but does not possess any residual material in the needle hub after preparation of direct smear

Selected subjects had undergone thyroid FNA. For collection of data, a pre-designed data collection form was used. From the aspirated material two Direct smear (DS) slides were prepared, fixed and sent for subsequent Papanicolaou and H&E (haematoxylin & eosin) staining. The residual material of the needle hub (if any) was processed for Cell block (CB) preparation. DS & CB were done following standard procedures. Quality of smear and CB were assessed by criteria set by Mair et al¹². Study parameters done by DS and CB were compared by Mc Nemar's paired chi-square test and the confidence level was set at 95%. All the collected raw data were organized into tabulated form. All the categorical data were expressed in percentage (%) and frequency (f).

Result

A total of 160 cases were enrolled in the study to see the adequacy, provision of additional information and diagnosis efficiency of thyroid swelling by both CB and DS.

DS was adequate in 133 (83.1%) cases and was inadequate in 27(16.9%) cases. Out of this 27 inadequate case of DS, 20 cases of aspirated material became adequate for diagnosis when DS was supplemented by CB. CB was adequate in 120 (75%) cases and was inadequate in 40 (25%) cases. In 100 (62.5%) cases both CB and DS were adequate and in 07 (4.4%) cases both were inadequate (Table-I). CB and DS were compared with adequacy and found statistically not significant ($p>0.05$). In both the procedure nodular goiter had the highest frequency (Table-II).

Table -I: Association of adequacy between CB and DS (n=160)

DS	CB		Total f (%)
	Adequate f (%)	In adequate f (%)	
Adequate	100 (62.5)	33 (20.6)	133 (83.1)
Inadequate	20 (12.5)	07 (04.4)	27 (16.9)
Total	120 (75.0)	40 (25.0)	160 (100)

Table -II: Distribution of Cell Block and Direct Smear diagnosis (n=160)

Thyroid lesions	CBf (%)	DSf (%)
Nodular goiter *	95 (59.3)	99 (61.8)
Hashimoto Thyroiditis *	06 (03.8)	11 (06.9)
Follicular neoplasm **	06 (03.8)	12 (07.5)
Malignant **	13 (08.1)	11 (06.9)
Inadequate	40 (25.0)	27 (16.9)
Total	160 (100)	160 (100)

* Non-neoplastic, ** Neoplastic

A comparison between DS and CB diagnosis in 100 cases was made where both DS and CB were adequate (Table-III). Seventy one cases of nodular goiter as diagnosed by DS, CB confirmed 68 cases as nodular goiter, 01 case as Hashimoto thyroiditis and 02 cases as papillary carcinoma. Deviations of diagnosis were observed in other types also. Table-IV shows distribution of thyroid lesions by provision of additional information by CB.

Table -III: Comparison between DS and CB diagnosis in cases where both DS and CB were available

Thyroid lesion	Cell block diagnosis						
	Nodular goiter f (%)	Hashimoto Thyroiditis f (%)	Follicular neoplasm f (%)	Papillary carcinoma f (%)	Anaplastic carcinoma f (%)	Metastatic carcinoma f (%)	Total f (%)
Nodular	68 (68)	01 (01)		02 (02%)			71
Goiter							71
Hashimoto thyroiditis		06 (06)					06 (06)
Follicular lesion	07 (07)		05 (05)				12 (12)
Papillary carcinoma				08 (08)			08 (08)
Positive for malignancy					02 (02)	01 (01)	03 (03)
Total	75 (75)	07 (07)	05 (05)	10 (10)	02 (02)	01 (01)	100 (100)

Table -IV: Distribution of Thyroid lesions by provision of additional information by CB (N=38)

Direct smear diagnosis of Thyroid lesions f (%)	Additional information provided by CB			
	Confirmed the diagnosis of DS f (%)	Established new diagnosis f (%)	No additional information f (%)	Total f (%)
Nodular goiter	-	03 (07.9)	09 (23.7)	12 (31.6)
Hashimoto Thyroiditis	02 (05.3)		01 (02.6)	03 (7.9)
Follicular neoplasm	05 (13.2)	07 (18.4)	-	12 (31.6)
Papillary carcinoma	06 (15.7)	-	02 (05.3)	08 (21.0)
Anaplastic carcinoma	02 (05.3)	-	-	02 (5.3)
Metastatic carcinoma	01 (02.6)	-	-	01 (2.6)
Total	16 (42.1)	10 (26.3)	12 (31.6)	38 (100)

Discussion

This cross sectional study was conducted to determine the association of adequacy, diagnosis of thyroid lesion and provision of additional information between CB and DS. Total 160 cases with palpable thyroid swelling were selected for this study. DS and CB were done in all the cases. Of these total 160 cases DS were adequate in 133 (83.1%) cases and were inadequate in 27 (16.9%) cases. When these 27 cases were supplemented by CB, 20 (12.5%) cases turned to be adequate for diagnosis. These cases were inadequate in DS either because, the aspirates were obscured by haemorrhage or because they were diluted by colloid or cyst fluid. So, they turned to be adequate in CB as they were concentrated in the procedure. CB was adequate in 120 (75%) cases and inadequate in 40 (25%) cases. In 33 (20.6%) cases, DS were adequate but CB was inadequate.

Total 153 cases (95.7%) were adequate for diagnosis when both the tests were combined. On the basis of adequacy, the difference between DS and CB was insignificant which differs from the study by Sanchez and Selvaggi¹³ and Qiu et al⁷. The first study found that DS was superior to CB and the reverse finding was observed in the latter one. The reason behind this discrepancy may be as Sanchez & Selvaggi¹³ had the facility of onsite evaluation. So, few numbers of passes needed to yield material and thus reduced amount of material was available for cell block. On the other hand Qiu et al⁷ had specimen all of which were aspirated by non pathologists. So, smears were of poor quality. In the present study, all aspirations were done by pathologist, so the quality of the aspirations was better. But as facility of onsite evaluation was not available, the adequacy of DS was less than the study of Sanchez and

Selvaggi¹³. According to the present study the combined tests provided the highest adequacy which is in line with the study done by De-Lima et al¹⁰.

In both the diagnostic procedures it was seen that nodular goiter had the highest frequency which was diagnosed in 59.3% and 61.7% cases of CB and DS respectively. Hashimoto thyroiditis was diagnosed in 3.8% and 6.8% cases by CB and DS respectively. Among the neoplastic cases Follicular lesion was the diagnosis in 7.5% of DS and 3.8% of CB. On the other hand malignancy was diagnosed in 8.1% and 6.8% cases of CB and DS respectively.

While comparing DS and CB diagnosis in 100 cases where both CB and DS were available it was seen that there were 10 discordant cases. Two of them were nodular goiter of DS which were diagnosed as papillary carcinoma by CB and 01 case of nodular goiter of DS which was diagnosed as Hashimoto thyroiditis by CB. There were 07 cases of follicular neoplasm of DS which were diagnosed as nodular goiter by CB.

CB provided additional information in 68.4% cases. CB confirmed the diagnosis of DS in 42.1% cases including 05 cases of follicular adenoma, 02 cases of Hashimoto thyroiditis, 06 cases of papillary carcinoma, 02 cases of anaplastic carcinoma and 01 case of metastatic carcinoma. In 26.3% cases CB established a new diagnosis against the previous diagnosis of DS. Among these newly established cases there were 02 cases of papillary carcinoma which were incorrectly diagnosed as nodular goiter in DS. Also, there were seven cases of follicular neoplasm of DS which proved to be nodular goiter and 01 case of nodular goiter of DS which proved to be Hashimoto Thyroiditis in subsequent CB. In a study done by Katharine et al.¹⁴ CB provided additional information in 69% cases. So, the present study is very much comparable to their study.

Conclusion

Though this study could not find difference of significance between the two procedures in terms of adequacy but some new information was found in CB procedure which might be helpful not only

to establish the diagnosis but new remarkable findings could have been explored. These two procedures can be performed easily in a single setting and it is obvious that combined effort of two procedures must have beneficial effect in diagnosis of palpable thyroid swelling. All the findings of our study must be evaluated and confirmed by the gold standard method that is histopathology. Our message from this study is that if material is available in the needle hub during performing DS, CB should be done in the same setting or at best material should be preserved for future evaluation.

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