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EVALUATION OF ASPIRATION VERSUS NONASPIRATION TECHNIQUES IN THE DIAGNOSIS OF THYROID LESIONS

Pathology

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ABSTRACT

BACKGROUND: Fine needle aspiration cytology (FNAC) as a diagnostic technique has gained valuable recognition in the last decade, as this is the best way to obtain a tissue with minimal trauma to patients. This technique is often complicated by aspiration of significant quantity of blood. To deal with this problem, an alternative technique of fine needle sampling without aspiration was developed, also known as CYTOPUNCTURE or fine needle capillary sampling (FNC). Present study was conducted to evaluate the accuracy of FNAC versus FNC. This was a retrospective study conducted in Rama Medical College Hospital And Research Centre,Mandhana, Kanpur, comprising of 51 patients both OPD and IPD.

KEYWORDS

FNAC, FNC, Thyroid.

INTRODUCTION

Cytodiagnosis, a diagnostic technique has arisen in parallel with histopathology which serves with both screening and predictive function (Orell, 1992).The idea of cytodiagnosis (FNAC) was first conceived by Grieg and Gray in 1904 who employed aspiration procedure to obtain material from lymphnode for studying the etiology of trypanosomiasis. It is a safe, simple, quick investigation, with minimal patient discomfort, no requirement of specialized anaesthesia, lack of complication and less expensive. The technique involves attaching the needle with a plastic syringe and creating a vacuum by drawing the plunger several times (Kline, 1981). The function of the negative pressure is not to tear cells from the tissue but merely to hold the tissue against the sharp cutting edge of the needle (Thompson, 1982). This method is suitable for swellings that are easily palpable. Frequently this technique is complicated by aspiration of significant quantities of blood. To deal with this problem an alternative technique of fine needle sampling without aspiration(FNC) was developed in France (Zajdela et al., 1987). This method employs insertion of a fine needle into a lesion without attachment of syringe for suction and relies on the property of capillary tension in narrow channels. This physical principal states that a fluid or semi – fluid substance will ascend spontaneously in to a narrow tube in inverse proportion to the diameter of that tube. The advantage of this technique over conventional aspiration is that the operator can feel the consistency of the tissue much better, less painful, for obtaining textbook quality material, and as admixture with blood is less than that with aspiration, this makes the technique particularly suited for cytology of the thyroid.

The present study is being conducted with the following objectives :

1. Comparative study of fine needle aspiration and non aspiration cytology in the diagnosis of thyroid lesions.
2. Histopathological correlation in cases of diagnostic dilemma where ever possible.
3. Classification of thyroid lesions into benign and malignant.

MATERIAL AND METHODS

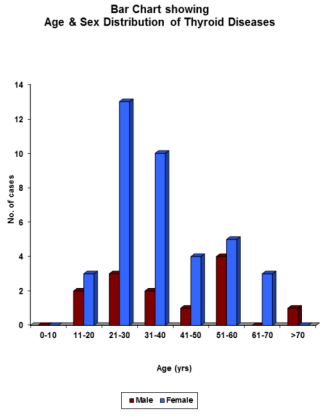
The study was conducted in the Department of pathology, Rama Medical College Hospital and Research Centre, Kanpur. It is a retrospective study. Patients were taken from the indoor and outdoor cases attending the hospital. A through clinical history was taken along with a detailed clinical examination. Patients having any thyroid lesion were subjected to fine needle aspiration cytology(FNAC) and fine needle non aspiration cytology(FNC). The other investigations that were done prior to FNAC or FNC sampling were – BT, CT and PT. The lesion was first palpated to analyze its location and its relation to surrounding structures, its size, depth, mobility, consistency and to assess the optimal direction for approach to sampling.

The fine needle non aspiration method was performed by using a 22 G needle and passing into site and moving back and forth in various directions without using syringe for suction.

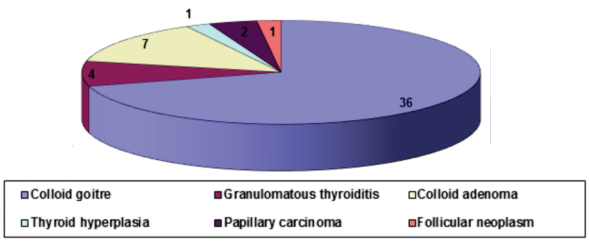
The fine needle aspiration method was performed using 22 G needle along with an attached 10 ml syringe, used for creating negative pressure, needle moved back and forth in various directions and then negative pressure applied. All needle sampling procedures were performed by a single operator, Bias was thus avoided in all stages of sampling, from patient examination to slide fixation. All smears were assessed using predetermined objective criteria. A cytologic diagnosis was rendered for each case seen, and each individual slide was objectively analyzed using a point scoring system to enable accurate comparison between FNAC and FNC techniques.

1. Specimens were considered unsuitable for cytodiagnosis if they consisted mainly of blood or if cellular material was absent, making them inadequate for determination of benign or malignant changes.
2. Specimens were categorized as diagnostically adequate when it was possible to render an opinion on the nature of the lesion sampled, but when the cellular material present was suboptimal due to poor cellularity, sample dilution, degenerative changes or specimen entrapment in blood clots, the sample was considered as diagnostically inadequate.
3. Specimens were noted as diagnostically superior if the cells or cell aggregates were concentrated, well preserved, unobscured by background blood and excellently displayed, with retention of architectural structures as follicles, papillae and flat sheets.

OBSERVATION



Pie Chart Showing Distribution of Cases of Thyroid Lesions



DISTRIBUTION OF INDIVIDUAL CASES ACCORDING TO AGE AND SEX

Diagnosis	No. of cases	%	M:F Ratio	Most common age group
Colloid goitre	36	70.58%	1:2	3rd – 4th decade
Granulomatous thyroiditis	4	7.84%	1:3	6th decade
Colloid adenoma	7	13.72%	All female	5th decade
Thyroid hyperplasia	1	1.96%	All female	2nd decade
Papillary carcinoma	2	3.92	1:1	6th decade
Follicular neoplasm	1	1.96%	All female	7th decade

Colloid goitre comprised 70.58% of all the lesions evaluated
- Colloid goitre was the most common thyroid swelling
- They were most common in 3rd and 4th decade
- Male : Female ratio was 1 : 2.

Colloid adenoma comprised 13.72% of all the lesions evaluated
- They were 2nd most common swelling
- All cases were females
- Most common age group was 5th decade

Granulomatous thyroiditis comprised 7.84% of all the cases
- They were most common in 6th decade
- Male : Female ratio was 1:3

Thyroid hyperplasia constituted 1.96% of all the lesions evaluated
- Thyroid hyperplasia was most common in 2nd decade
- One case was reported, which was a Female

Papillary carcinoma comprised 3.92% of lesions evaluated
- They were most common in 6th decade
- Male : Female ratio was 1:1
- Follicular neoplasm comprised 1.96% of lesions evaluated
- They were most common in 7th decade
- One case was reported which was a Female

CYTOLOGICAL FEATURES IN BENIGN THYROID LESIONS

Cytological features		Cytological diagnosis			
		Colloid goitre	Granulomatous thyroiditis	Colloid adenoma	Thyroid hyperplasia
Back ground colloid	Abundant	33	4	6	1
	Scanty	3	-	1	-
Follicular cells	Papillae	-	-	-	-
	Follicles	-	-	-	-
Cellularity	Good	25	4	6	1
	Scanty	11	-	1	-
Nuclear characters	Pleomorphism	-	-	-	-
	Intranuclear inclusious	-	-	-	-
	Chromatin	Dark condensed	Dark condensed	Dark condensed	Dark condensed
Cytoplasm	Vacuoles	5	0	0	1
Others/Misc.		-	Giant cells	-	-

- Background colloid is abundant in most cases.
- Follicular cells are present in cohesive clusters.
- Cellularity is good but colloid scanty in colloid adenoma.
- Pleomorphism is not seen. Follicular cells have dark condensed chromatin.
- Cytoplasmic vacuoles or 'Fire flares' are seen in cases of thyroid hyperplasia and few cases of colloid goitre and colloid nodular showing hyperfunctional activity.
- Granulomatous thyroiditis show presence of giant cells.

CYTOLOGICAL FEATURES IN MALIGNANT THYROID LESIONS

Cytological features		Cytological diagnosis	
		Papillary carcinoma	Follicular neoplasm
Back ground colloid	Abundant	2	1
	Scanty	-	-
Follicular cells	Clusters	-	-
	Papillae	2	-
	Follicles	-	1
Cellularity	Good	2	1
	Scanty	-	-
Nuclear characters	Pleomorphism	2	1
	Intranuclear inclusious	2	-
	Chromatin	Powdery	Coarse and irregular
Cytoplasm	Vacuolater (fire flares'	-	-
Others		Chewing gum colloid, nuclear crowding, multiple nucleoli	Rosettes

- Papillary carcinoma showed intranuclear inclusions with nuclear grooving colloid was scanty and ropy known as chewing gum colloid. Nuclear crowding
- was seen. Chromatin was powdery.
- Follicular carcinoma are seen in clusters and form rosettes. Nuclear crowding was seen. Pleomorphism was mild.

COMPARATIVE SCORES OF FIVE CRITERIAS IN INDIVIDUAL LESIONS

(According to Mair's Scoring System)

- Different cases of thyroid lesions were evaluated on the five criterias and comparisions were between FNAC and Fine needle non aspiration techniques.
- Background hemorrhage was less in non aspiration technique which was statistically significant ($p = 0.00012$).
- Cellularity was significantly higher in FNAC when compared with fine needle non aspiration technique student t-test was applied and p value of 0.00076 which was significant.
- Cellular arrangement was more preserved in non aspiration technique than FNAC and material obtained was of text book quality. P value of 0.0027 was significant.
- However in papillary carcinoma and follicular neoplasms the two techniques were equally good or FNAC proved to be a better technique diagnostically.

Table shows categorisation of smears according to following score
Diagnostically superior (Score 7-10)
Diagnostically adequate (Score 3-6)
Diagnostically Unsuitable (Score 0-2)

PERFORMANCE OF ASPIRATION AND FNS WITHOUT ASPIRATION IN TOTAL SERIES (51 CASES)

(According to Mair's Scoring System)

Diagnosis	Cases	B/g hemorrhage	Cellularity	Degeneration	Trauma	Arrangement
Colloid Goitre = 36						
FNA		0.79	1.55*	0.94	1.39	1.09
FNS		1.30*	1.03	1.58*	1.56	1.58*
Granu. Thyroiditis = 4						
FNA		1.33	1.00	1.33	1.67	1.67
FNS		1.00	1.00	1.33	2.00	1.33
Colloid adenoma = 7						
FNA		1.00	1.00	1.00	1.29	1.43
FNS		1.29	0.71	1.14	1.43	1.70
Thyroid hyperplasia = 1						

FNA		1.00	2.0	1.0	1.0	1.0
FNS		2.0	1.0	1.00	2.0	1.0
Papillary ca. = 2						
FNA		1.0	2.0	1.0	1.5	1.5
FNS		1.5	1.5	1.0	1.0	1.5
Folicular neoplasm = 1						
FNA		1.0	2.0	1.0	1.0	1.0
FNS		1.0	1.0	1.0	1.0	1.0

The table shows FNS without aspiration samples are more likely to be diagnostically superior (total score of 7-10) while the aspiration samples were more likely to be diagnostically adequate (total score of 3-6).

Many FNS without aspiration smears showed text book quality with excellent architectural display (total score of 7-10).

The aspiration smears were more likely to be diagnostically adequate than FNS without aspiration. When FNS without aspiration smears were diagnostic they more frequently produced superior quality material. Conventional fine needle aspiration technique although diagnostic in a greater number of cases mostly produced adequate rather than superior quality material.

Inadequate material for cytodiagnosis was more often produced with FNS without aspiration than aspiration but this difference was not statistically significant.

DISCUSSION

The present study has been carried out to investigate the advantage of fine needle sampling without aspiration compared with classic fine needle aspiration cytology in Thyroid lesions. The study was carried out on 51 patients and in each case clinical history, examination and clinical diagnosis were taken into consideration while reporting cytopathological diagnosis.

In all cases diagnostic accuracy with fine needle sampling without aspiration was compared with result of aspiration technique.

COLLOID GOITRE

In the present study 51 cases of thyroid lesions were studied, colloid goitre constituted the largest group comprising of 36 cases out of 51 cases.

Zimmerman et al (1990 stated that goitre typically presented in young adult females, which was in accordance to the present study.

. In my study comparison showed that FNS without aspiration was a much better technique than FNAC in cases of colloid goitre. The findings were comparable to **Ghosh** et al (2000) who compared the two techniques categorising all the smears obtained by FNA and FNS without aspiration.

Pinki et al (2015) some studies reported that FNS reduced bleeding and obtained higher quality samples.

Granulomatous Thyroiditis

In present study of thyroid lesions 4 cases of granulomatous thyroiditis were reported. Comparison between FNAC and FNS without aspiration showed that FNAC with was slightly better technique than FNS without aspiration in cases of granulomatous thyroiditis

COLLOID ADENOMA

Total of 7 cases of colloid adenoma were evaluated. **Li Volsi** et al stated that adenomas occur at all ages but they predominate in middle aged women

Papillary Carcinoma

Only 2 cases of papillary carcinoma were reported. Comparison between FNAC and FNS without aspiration showed that in cases of papillary carcinoma the two techniques were comparable with slight edge of FNAC with total score of 7 over FNS without aspiration with score 6.5. In a study by **Savage** et al (1995) compared the two techniques of FNAC and FNS without aspiration and stated that no statistically significant difference was noted in the graded criteria performance plus diagnostic yield between the two techniques which was in accordance to present findings.

FOLLICULAR NEOPLASM

In the present study of follicular neoplasms comparisons between FNAC and FNS without aspiration showed that both are equally useful and no statistical difference was found between the two. These findings were coincidental to findings of Savage et al (1995) who compared the two techniques of FNAC and FNS without aspiration and found no statistically significant difference between the two technique.

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