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Original Research Article

Role of Fine Needle Aspiration Cytology in Diagnosis of Thyroid Swelling

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Abstract:

Background and Objectives: Fine needle aspiration cytology is the sampling of a palpable or nonpalpable (radiological) mass by means of a fine needle with negative pressure applied by an attached syringe. It is an interventional cytological procedure and the purpose of this procedure is to obtain diagnostic material for cytological study from organs that do not shed cells spontaneously. To evaluate the efficiency and prospect of fine needle aspiration cytology of thyroid swelling in patients. To provide with a reliable, rapid and inexpensive method of diagnosis.

Material and Method: The material will be collected from the patient attending the outdoor as well as admitted indoor patients of Darbhanga Medical College and Hospital, Darbhanga. The patient attending the outdoor patient department underwent a thorough clinical evaluation.

Conclusion: The diagnostic yield of FNAC, in this series; was 93%. The diagnostic accuracy, in terms of detecting malignancy, was 83.34%. There was no false positive result recorded. False negative results in terms of detection of cancer were found to be 2.5%. No major complications were noted after FNAC procedure.

Keywords: FNAC, Thyroidectomy, Malignancy.

Introduction

Fine needle aspiration cytology is the sampling of a palpable or nonpalpable (radiological) mass by means of a fine needle with negative pressure applied by an attached syringe. It is an interventional cytological procedure and the purpose of this procedure is to obtain diagnostic material for cytological study from organs that do not shed cells spontaneously [1]. The clinical value of fine needle aspiration cytology is not limited to neoplastic conditions only, but it is also valuable is the diagnosis of inflammatory, infectious and degenerative conditions. It has proven useful in the diagnosis and monitoring of graft rejection in transplantation surgery. Intraoperative cytology is another application and is a valuable alternative or complement to frozen section examination [2]. The technique has gained wide acceptance over the past three decades and is being increasingly used to sample a wide variety of body tissues. Palpable lesions commonly sampled are enlarged lymph nodes, breast lumps, enlarged thyroid lumps and superficial soft tissue masses. The salivary glands and palpable abdominal lesions are also frequently sampled by fine needle aspiration cytology [3].

Nonpalpable lesions sampled with the help of ultrasonography, CT scan, image intensifier and endoscopy guided, are from abdominal cavity, retroperitoneum, pelvic organ, thoracic cavity, prostate, orbit, bone and joint spaces. Almost all organ systems are accessible to this procedure and versatility of this technique has enormously increased the scope of diagnostic cytology [4].

There is some confusion between fine needle aspiration cytology and fine needle biopsy using true cut needles. In fine needle aspiration cytology, a smear is made from the aspirate for cytological evaluation, while in the later technique; a piece of tissue is cut out from the parenchyma for histological evaluation. In the initial years, wide bore needles (diameter 1-3 mm) were used with passes of time disposable finer needle (0.4-7 mm) i.e. 22-27 gauge is experienced most suitable for this procedure [5]. Fine needle aspiration cytology of the thyroid gland was introduced by soderstorm in the year 1952. Thyroid swelling often present diagnostic difficulties. The risk of carcinoma of the thyroid gland is higher in cases of solitary nodule. Darbhanga medical college & hospital, Darbhanga, serves an area of Sub Himalayan region where Iodine deficiency has been reported in endemic proportion. Consequently, large number goiters are seen in the out and in door patient department of this hospital. The main limitation of thyroid fine needle aspiration cytology is the inability to distinguish between follicular adenoma and follicular carcinoma. The distinction depends mainly on the

demonstration in tissue sections of capsular or vascular invasion [6]. In most cases, examination of a large number of blocks from surgically excised sample remains the only way to obtain a definitive diagnosis.

Objectives

- To evaluate the efficiency and prospect of fine needle aspiration cytology of thyroid swelling in patients of DMCH.
- To provide with a reliable, rapid and inexpensive method of diagnosis.

Material and method

The material has been collected from the patient attending the outdoor as well as admitted indoor patients of Darbhanga Medical College and Hospital, Darbhanga, Laheriasarai. The patient attending the outdoor patient department underwent a thorough clinical evaluation. Study duration of Two Years.

Fine needle aspiration cytology of the thyroid swelling: All antiseptic precautions should be taken before aspiration.

Pre-operative preparation: Prior to the procedure, the neck skin was shaved (in case of pressure of hair).

Position of the patient: Initial examination of thyroid was done with the patient in the upright position and the FNAC in the supine position. The anterior surface of the neck was made prominent by placing a pillow under the neck to extend the cervical spine and to expose the gland more prominently. The patient was introduced to refrain from the swallowing during the procedure. The swelling was palpated and fixed with left hand. With right hand, the needle mounted on the syringe was introduced gently into the lesion with the plunger in the resting position. On reaching the lesion plunger was retracted to create vacuum in the syringe. Subsequently, the needle was moved back and forth in different directions within the lesion under constant suction. Thicker colloid stains more darkly and presents as a dense clumps.

C-Cells resemble medullary carcinoma cells but are difficult to find in thyroid smear without resorting to immunostaining for calcitonin.

Sample colloid goitre: Follicular cells dominate the picture and sometimes arranged in micro follicle. Colloid distension of follicles may be present. Bare nuclei are often found scattered throughout the smear with background of colloid of varying thickness. There is no clear cytological difference between normal thyroid gland and normal cytological appearances, suggests simple colloid goitre.

The commonest cell type is plasmacytoid. They have an eccentric nucleus within a moderately abundant, dense cytoplasm with fairly well defined borders. Another common cell type is smaller with scanty cytoplasm and ovoid nuclei. Such cells form dense clusters, often with nuclear moulding. In the spindle cell the nucleolus are more central and the cytoplasm less distinct.

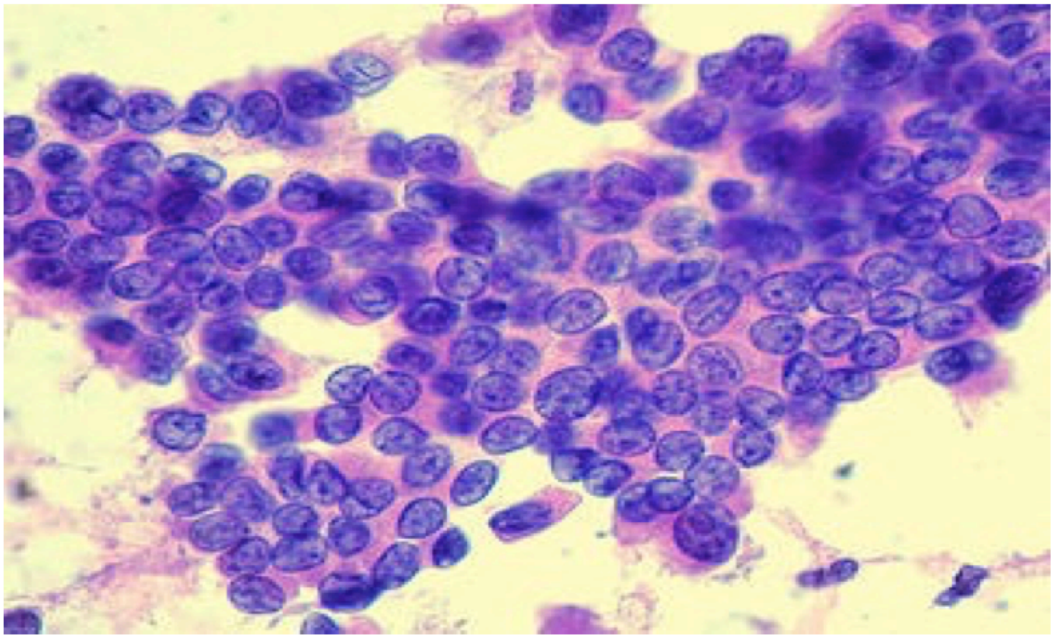

Figure 1: Papillary carcinoma

Figure 2: Hashimoto's thyroiditis

Results

Table I: Age and sex distribution

Age (years)	Male	Female	Total	Percentage
Less than 20	01	05	06	6
21 – 30	02	08	10	10
31 – 40	06	42	48	48
41 – 50	05	13	18	18
51 – 60	03	10	13	13
More than 60	02	03	05	5

Majority of patients in the present series were of 30 -40 years age group (48%). The youngest was of 15 years old whereas oldest was of 65 years old. Nineteen out of 100 were males (19%); remaining 81 patients (81) were females. All patients had palpable thyroid swelling. 65 out of 100 patients had thyroid nodule (single or multinodular), whereas remaining 35 had diffuse thyroid swelling. Pallor was noticed in 35 patients. Ipsilateral cervical lymph node was palpably enlarged in three patients. These nodes were hard in consistency and fixed to adjacent structures.

Table II: Duration of neck swelling at the time of presentation

Duration	Number	Percent
Less than (1) one year	03	3
1 - 5 years	42	42
6 - 10 years	32	32
More than 10 years	23	23

Forty two patients had their neck swelling for a period of 1 – 5 years at the time of presentation. In thirty two patients, the duration ranged from 6 – 10 years. There were 23 patients with a history of neck swelling for more than 10 years. The minimum and maximum duration of neck swelling in the present study was 6 months and 10 years respectively.

Table III: Fine needle aspiration cytology: diagnostic yield

	Number
Total patients	100
Total cytological Aspiration (patients)	100
Sufficient material for smear	93
No aspirate	02
Blood aspirated	05
Repeat aspiration	07
Diagnostic yield	93%

Of 100 patients fine needle aspiration yielded material for smear in 93 patients. Only blood was aspirated in five patients while this procedure failed in two patient. Aspiration was repeated in five patients where two aspirations was a failure. Repeat aspiration was successful in these patients. The diagnostic yield in our study was 93%.

Table IV: Findings on Cytological Examination

Findings	Number
Nonneoplastic	72
Equivocal (/ Malignancy)	13
Malignant	10
Hashimoto's Thyroiditis	03
De Quervain Thyroiditis	02

There are 72 patients with non-malignant cells on aspiration cytology smear. Hyperplastic cells were seen in thirteen patients in whom suspicion of malignancy was raised. Ten patients showed malignant cells on cytological evaluation. Out of these ten patients, three showed a follicular pattern and the other seven showed features of papillary carcinoma. In three patient hashimoto's thyroiditis was noticed. In two patients De Qervain's thyroiditis was seen.

Table V: Treatment

Procedure	Number
Subtotal thyroidectomy	80
Total thyroidectomy with Thyroxin replacement	07
Hemithyroidectomy	08
Radiotherapy	05

95 out of 100 patients underwent surgical procedures for their disease. Surgical procedures carried out on these 95 patients were subtotal thyroidectomy (80), hemithyroidectomy (8) and total thyroidectomy with thyroxin replacement (07). Five of the patients who were not operated upon, were frank cases of thyroid cancer and were in advanced stage of their disease. They were confirmed to be malignant on fine needle aspiration cytology and were subsequently referred to higher centre for further management.

Table VI: Histopathological Findings

Findings	Number
Colloid Goiter	77
Nodular Goiter With Hyperplasic Changes	03
Follicular Adenoma	03
Papillary Carcinoma	07
Follicular Carcinoma	03
Papillary (Follicular)Carcinoma	02
Hashimoto's Thyroiditis	03
DE Quervain's Thyroiditis	02

Histopathological evaluation of biopsy specimen revealed colloid goiter in 77 patients, follicular adenoma in three cases, and nodular goiter with hyperplasic changes in three patients, hashimoto's thyroiditis in three patients and de Quervain's thyroiditis in two patients. Seven out of 12 cases of histological confirmed cases of thyroid carcinoma belong to papillary carcinoma group. Follicular carcinoma and papillary (follicular) carcinoma were found in three and two patient respectively.

Table VII: Complications of fine needle aspiration cytology

Complications	Number
Pain at puncture site	13
Minor bleeding	03
Major complication	00
Tumour implantation	00

In the present study, no major complication was found. Thirteen patients reported pain at puncture site which subsided after two days and required non-narcotic analgesic drugs to alleviate pain. There was no incidence of major bleeding or tracheal perforation. However, minor bleeding was seen in three patients who subsided after compression. Out of ten patients of thyroid malignancy followed up for a period of more than six months, there was no incidence of tumour
Implantation.

Discussion

This hospital serves a part of the goiter belt population. Consequently, a large of patients with thyroid swelling attends and services of this hospital. Fine needle aspiration has been claimed as a very good diagnostic tool in identifying various thyroid diseases [7]. The purpose of this study has been to evaluate the efficiency of this diagnostic modality in the diagnosis of thyroid swelling in Indian particularly north eastern India setup8. In the present study, majority of patients (66%) were of 31 to 50 years age group (table). The sex ratio was observed to be (4.26) in favour of females. (Similar findings have been reported by law Hagen et al 1979. in their

study, 271 out of 412 (65.7%) patients were of 31 to 60 years age groups). Female predominated in there series with 6.64:1 ratio9. Besides a neck swelling which moved on deglutition, other presenting symptoms (table II) have been: (a) hoarseness of voice in five patients (5%), (b) mild dysponea in three (3%) and (c) features of hyperthyroidism in five cases (5%)10. History of painful neck swelling and radiation exposure was noted in three and two patients respectively. Five out of twelve (41.67% of series) cases of thyroid cancer presented at very advanced stage of malignancy.

These patients showed evidence of recurrent laryngeal nerve involvement in the form of hoarseness and vocal cord paralysis [11]. They also had cervical lymphadenppathy. The incidence of hoarseness of voice has been reported in 13 -40% cases of thyroid cancer (Alhadef, 1956; Lindsay, 1960; Pakash et al, 1974; leoutakos and Georgia is, 1976). In the present study it was found in (41.67%) of cases of thyroid malignancy. Cases of thyroid cancer have been reported in patients who had received irradiation for some other causes (chang – chair et al, 1977). In this study, there was two patient who could be thought of having radiation exposure. Neck and facial venous congestion were noted in three patients. These three patients were suffering from thyroid cancer with lymph node metastasis in the as well as in the superior mediastinum causing compression of veins draining blood from the neck and head. In the present study, the duration of neck swelling (Table – III) was less than one year in three cases. These patients, having the thyroid swelling for last six and seven months, were found to have a mixed papillary – follicular carcinoma and papillary carcinoma of the thyroid respectively. Thyroid cancer with duration of less than one year has been reported by various authors (prakash et al 1974; Dave and Patel 1983) [12]. In this study, none of the patients with goiter for more than 10 years had a demonstrable malignant pathology. All these 23 patients had nontoxic multinodular goiter. The diagnosis of hashimoto's thyroiditis on the basis of FNAC smear has been reported by law Hagen et al (1979) reported difficulty in diagnosing cases of hashimoto's thyroiditis on aspiration cytology smear. In this study, there were only three cases of hashimoto's thyroiditis, which as diagnosed on FNAC smear and subsequently confirmed on histopathological examination.In two patients,a diagnosis if De Quervain'sthyroiditis was made on aspiration cytology. Multinucleate giant cells with macrophages, lymphocytes and degenerated features in follicular cells were found was subsequently confirmed on histopathological examination. In the present study, there was difficulty in diagnosing thirteen cases of FNAC smear. These smears showed increased cellularity [13]. A doubt of malignant pathology was also raised in such cases. 72 patients with FNAC diagnosis of colloid goiter were confirmed by subsequent histopathological examination (table IX). Similarly, in ten cases where a FNAC diagnosis of malignancy was made were also confirmed of thyroid carcinoma were diagnosed by means of FNAC.

The diagnostic accuracy for detecting thyroid carcinoma was 83.34 % [14] There was no false positive result in this study. However, Ashcroft and von herle (1981) have indicated false positive results of 0.5 – 3.3%reported in the world literature. The documentation of tumour implantation by Crile (1956) should not lead to rejection of this highly rewarding diagnostic tool. Moreover the needle used by these authors has been wide-bored (diameter 1 – 3 mm). The 22 gauge needle used for FNAC of the thyroid has a diameter of 0.6 mm. there are large numbers of reports in the literature indicating no evidence of tumour implantation by this technique (KLne and Neal, 1978; Zajicek 1979). Upon experimental work, Engzell et al (1979) have shown the theoretical possibility of needle track tumour implantation. However, on the clinical grounds it does not seen sound. This is based on the fact that upon detection of malignancy, the surgical treatment or radiotherapy takes care of the tumour cells spread out through the punctured wound [15]. Aspiration biopsy of a thyroid swelling also has the advantage of indicating the nature of the problem to the surgeon prior to the operation. This will definitely help in planning the definitive surgical procedure for the patient. Aspiration biopsy of a thyroid swelling also has the advantage of indicating the nature of the problem to the surgeon prior to the operation. This will definitely help in planning the definitive surgical procedure for the patient.

Conclusion

This study comprised of 100 cases of palpable thyroid mass selected from various units of the department of surgery, and pathology, Darbhanga Medical College & Hospital, Darbhanga. Detailed clinical examination was supplemented with available laboratory investigations. Fine needle aspiration cytology was performed on these patients with thyroid Swelling. Subsequently, patients were subjected to various surgical procedures on the thyroid gland. Histopathological examination of the biopsy specimen was done.

- 66%patients in this study belonged to 31 – 50 years age, groups.
- Sex ratio of 4.26:1 in favor of females was observed.
- 80 out of 100 (80%) patients in this series had benign goiter.
- Five out of twelve (41.67%) patients of thyroid carcinoma presented at an advanced stage of malignancy.

- The duration of neck mass in patients with thyroid cancer varied from seven months to nine years.

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