

To Evaluate the Diagnostic Accuracy of FNAC in Palpable Lesions of Thyroid by Comparing with Histological Diagnosis

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Abstract

Background: Cemented Bipolar hemiarthroplasty thus appears a good option for fracture neck femur in the elderly population. The aim of this study to evaluate the functional outcome and management of intracapsular fracture of neck of femur by cemented bipolar hemiarthroplasty. **Materials & Methods:** A hospital based prospective study done on 20 patients involving intracapsular fracture of neck of femur at department of orthopaedic and indoor at our centre Government Medical College & attached groups of Hospital, Barmer, Rajasthan. The results were classified as excellent, good, fair and poor based on points scored on Harris Hip Score. **Results:** The present study showed that mean age of 69 years. Male to female ratio was 1.85:1. The clinical results were analyzed using the Harris hip score. Most of the patients showed excellent to fair score. Only 1 patient showed poor Harris hip score. Radiological results were excellent (55%) in the current study. There was only 1 case with poor radiological results. There was no case with subluxation or dislocation of the prosthesis. **Conclusion:** We concluded that cemented bipolar hemiarthroplasty seems to be the best way to get good clinical outcomes in elderly patients with fractured femoral neck. Continuous clinical and radiologically testing is essential for the diagnosis of complications.

Keywords: Hemiarthroplasty, Harris Hip Score, Femoral neck, Fracture

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Introduction

Fine Needle Aspiration cytology (FNAC) is a diagnostic procedure in which needle tip functions as a cutting instrument, a negative pressure is created in a syringe and as a result of pressure difference, cellular material is drawn into the needle. It is a safe, simple, cost effective and accurate technique for tissue sampling. The purpose of fine needle aspiration is to obtain diagnostic material for cytological studies from organs that do not shed cells spontaneously. The modern method of fine needle aspiration cytology was originally described and was advocated by Martin and Ellis in 1930[1]. Though the first diagnosis of lymphoma of skin was established by Hirschfeld in 1912, by studying the aspirated sample from lymphomatous deposits of the skin. The method is applicable to lesions that are easily palpable, for example superficial growth of the skin, subcutis, soft tissue and organs such as the thyroid, breast, salivary glands and superficial lymph nodes. Modern imaging techniques, mainly ultrasonography (USG) and computed tomography (CT), applied to organs and lesions in site not easily accessible to surgical biopsy offer vast opportunities for percutaneous, trans-thoracic and trans-peritoneal fine needle biopsy of deeper structure. In the practice of FNAC there are clear advantages not only to patients but to doctors also. The technique is relatively painless, produces a speedy result and is inexpensive[2]. Its accuracy when applied by experienced and well-trained practitioners, can approach that of histopathology in providing an unequivocal diagnosis. A

definitive specific diagnosis is not always possible by cytology, but a categorisation of disease and a differential diagnosis can be provided in a majority of cases to suggest the most efficient further investigations, saving time and resources.

Although FNAC can be practically applied to every organ and tissue of the body, certain limitations do exist. The four fundamental requirements on which the success of FNAC depends are representativeness, adequacy of the sample, high quality of preparation with relevant and correct clinical / radiological information. These four prerequisites will always remain sine qua non, no matter how sophisticated the supplementary technique is[3]. Thyroid FNAC is a simple, minimally traumatic office procedure. FNAC of the thyroid gland is firmly established as a first line diagnostic test for the evaluation of goitre and the single most effective test for the preoperative diagnosis of a solitary thyroid nodule. The main indications for FNA are:

1. Diagnosis of diffuse nontoxic goitre.
2. Diagnosis of the solitary or dominant thyroid nodule.
3. Confirmation of a clinically obvious thyroid malignancy.
4. To obtain material for special laboratory investigations aimed at defining prognostic parameters[3].

FNAC can reliably confirm benignity in about 2/3 of benign nodules & this is the main purpose of the test. FNAC is also an excellent method for the study of inflammatory and autoimmune thyroid lesions. The main limitations of thyroid FNAC is the inability to distinguish between follicular adenoma and carcinoma[4]. This distinction depends mainly on the demonstration in tissue sections of capsular or vascular invasions.

The sensitivity and accuracy of thyroid cytology has been shown to be as high as 85-95% in experienced hands[5]. Positive predictive value of 89-98%, negative predictive value of 94 - 99%[6] and false negative rates as low as 5-10% [7] has established FNAC as an invaluable diagnostic modality. The aim of this study to

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evaluated the diagnostic accuracy of FNAC in palpable lesions of thyroid by comparing with histological diagnosis.

Materials & Methods

This is a hospital based prospective study done on 120 cases of palpable lesions of thyroid in the Department of pathology, Dr. Sampurnanand Medical College & Associated groups of hospitals, Jodhpur.

Following cases were excluded from the study:

1. Cases presenting with uncorrectable coagulopathies.
2. Where there is lack of safe biopsy route.
3. Uncooperative patient.

Methods

A careful thorough history & clinical examination was done in each case. Routine & specific biochemical investigations were carried out as per individual requirements. FNAC was done without any aids of C.T. or ultrasonic guidance.

Procedure of Aspiration

The FNAC was done under full aseptic precautions. Proper preparation and draping of the part were done. Aspiration needle was mounted on syringe and all air from the syringe was expelled. The swelling was identified and fixed by left hand in between thumb and the finger, so that skin was stretched, and mounted needle was inserted in the central part of swelling by sharp and quick jerk. Its entry into the tumour was felt by change in the resistance to the needle. The negative pressure was created by withdrawing the piston. Usually, 2-3 ml of air will create an adequate vacuum.

Obtaining Material

With the piston of the syringe in vacuum position, the needle is rapidly moved back and forth in the same plane, to loosen up the target and aspirate the tiny tissue fragments dislodge by needle tip in lumen of needle. Depending on the target, 3-20 movements of the needle were performed. Nothing should be seen in the barrel of the syringe. The material in the lumen of the needle is sufficient for diagnostic purpose in majority of cases.

Changing the Direction of Needle

It is often desirable to secure a sample from more than one area of the lesion. For this reason, direction of the needle must be modified but this should never be done while the needle is still within the lesion, as it will result in hemorrhage. The needle under vacuum must be withdrawn to the level of subcutaneous tissue and then redirected.

Release of Vacuum and Withdrawal of The Needle

The piston of the syringe must be returned to the normal position before withdrawal of the needle otherwise the material will be sucked into the barrel of the syringe.

Non-aspiration Fine Needle Technique

Also called cytopuncture or fine needle capillary sampling technique used either as an alternative to or in combination with the FNA cytological technique in thyroid lesions, yielding excellent results.

In this technique the needle held by the hub, is placed within the target and moved back and forth to collect small fragments of tissue. The fragments are collected within the shaft of the needle. The hub - opening of the needle should be left uncovered during sampling.

Preparation of Smear

When aspiration biopsy has been completed and after the needle has been withdrawn, the syringe is disconnected from needle, filled with air and reconnected. The material in the needle is expelled on to glass slide, case being taken to deposit as a syringe drop at on end of the slide. The needle tip therefore brought into light contact with slide and the aspirate carefully expressed. The aspirate that has been deposited on the glass slide is first inspected visually, it consists of droplet of fluid with or without admixture of blood or of semi fluid semisolid material. Semisolid aspirate is spread along the slide using flat pressure with other glass slide. This distributes the material obtained by aspiration evenly on slide. The slides were then air dried, fixed in methanol and stained with May Grunwald Giemsa stain. Few smears were immediately wet fixed in 95% alcohol and stained with papanicolaou (Pap) or with haematoxylin and eosin (H & E). According to Hamburger et al (1989)[8] the satisfactory smear in a multiinstitutional study declared that six clusters of epithelial cells on two separate smears constitute an acceptable minimum of sampling adequacy. However, in many conditions, this criterion is unrealistic. For example, pure colloid may be consistent with the diagnosis of benign colloid goitre and a pure population of macrophages may be diagnostic of a thyroid cyst or pseudocyst in a patient with past history of haemorrhage. Subsequent of needle aspiration the cases were studied. The tissues were processed routinely, and paraffin embedded blocks were prepared. Sections were stained with haematoxylin and eosin. The final histopathological diagnosis was compared with the initial cytologic diagnosis and cytohistopathologic correlations were established in cases[6-7].

Results

The results of 120 cases of aspirates were compared with surgically excised specimens available in 53 cases which were routinely processed and stained with haematoxylin and Eosin stain. In present study, most of the cases on which FNAC was performed were in age group of 21-30 years. There were 43 cases (35.83%) in this age group followed by 27 cases (22.5%) in 31-40 years, 17 cases (14.17%) in 11-12 years and minimum number of cases were in age group of >70 years (1.67%). Among the 120 patients, 26 were males (21.67%) and 94 were females (78.33%) and ratio was found to be M:F=1:3.6 (Table No.1)

Table1: Demographic profile of FNAC Cases

Profile	No. of Cases	Percentage
Age (Yrs.)		
0-10	5	4.17%
11-20	17	14.17%
21-30	43	35.83%
31-40	27	22.5%
41-50	15	12.5%
51-60	8	6.67%
61-70	3	2.5%
71-80	2	1.67%
Gender		
Male	26	21.67%
Female	94	78.33%

Maximum cases 44 cases (36.67%) out of 120 cases were cytologically diagnosed as colloid goitre followed by follicular neoplasia 25 cases (20.83%) and autoimmune thyroiditis (lymphocytic/ Hashimoto's thyroiditis) 18 cases (15%), 10 cases (8.33%) were diagnosed as thyroglossal cyst and 9 cases (7.5%) as

simple thyroid cyst. Cytological suspicion of papillary carcinoma was offered in 4 cases (3.33%) and definite diagnosis of malignancy (typing papillary carcinoma) was given in 5 cases (4.17%). Cytological material was found inadequate for giving definite opinion in 4 cases (3.33%). (Table No.2)

Table 2: FNAC Finding in Palpable Lesions of Thyroid Gland

Sr. No.	FNAC Diagnosis	No. of Cases	Percentage
1.	Non-neoplastic		
	Colloid goitre/adenomatous goitre	44	36.67
	Colloid cyst/ simple Thyroid cyst	9	7.5
	Thyroglossal cyst	10	8.33
	Thyroiditis-lymphocytic/Hashimoto's thyroiditis	18	15
	Abscess	1	0.83
2.	Follicular neoplasm	25	20.83
3.	Suspicious of malignancy-papillary carcinoma	4	3.33
4.	Diagnosis of malignancy-papillary carcinoma	5	4.17
5.	Unsatisfactory/ Non diagnosis	4	3.33

FNAC findings were correlated with histological diagnosis in 53 cases. Histological findings were found to be consistent in 46 cases (86.79%), inconsistent in 7 cases (13.20%) and material was found inadequate in 4 cases (3.33%) (Table No. 3).

Table 3: Correlation Between FNAC and Histological Diagnosis of Thyroid Lesions

Groups based on FNAC	No. of cases (120)	No. of cases with surgical biopsy (53)	Consistent (46)	Non-Consistent (7)	Histopathological Findings
Non-neoplastic Colloid goitre/ Adenomatous goitre	44	14	12	2	colloid goitre-12 follicular adenoma-2
Colloid cyst/ Simple thyroid cyst	9	3	3	-	-
Thyroglossal cyst	10	4	4	-	-
Thyroiditis- lymphocytic/Hashimoto's thyroiditis	18	-	-	-	-
Abscess	1	-	-	-	-
Follicular neoplasm	25	23	19	4	Follicular adenoma-17 Follicular carcinoma-2 Follicular variant of papillary carcinoma-1 Multinodular goitre-3
Suspicious of malignancy- Papillary carcinoma	4	4	3	1	Papillary carcinoma-3 Lymphocytic thyroiditis-1
Diagnosis of malignancy-papillary carcinoma	5	5	5	--	--
Unsatisfactory/ Nondiagnostic	4	---	---	---	---

In this study out of 120 cases 53 cases of FNA were correlated with histopathology. The overall accuracy rate of fine needle aspiration cytology was 96.23% with the sensitivity 88.89% and specificity 97.73%. Positive predictive value and negative predictive value were found 88.89% and 97.73% respectively (Table No.4).

Table 4: Diagnostic Accuracy of FNAC In Palpable Lesions of Thyroid Gland

FNAC Diagnosis	Total No. of FNAC Cases	No. of Cases with Surgical Biopsy	Correct Cytological Diagnosis	False positive	False Negative
Malignant	09	09	08 (True positive)	01	---
Benign	107	44	43 (True negative)	---	01
Inconclusive	04	--	--	--	--

Discussion

Among the 120 patients, 26 were males (21.67%) and 94 were females (78.33%) and ratio was found to be M:F=1:3.6. Saeed et al (2006)[9] performed FNAC in 125 patients of thyroid lesions out of which 35 males (28%) & 90 females (72%) and ratio was 1:2.6. In present study also the most common lesion encountered was colloid goitre 44 cases (36.67%) followed by follicular adenoma 25 cases (20.83%) so our findings were comparable with Saddique et al (2008)[10]. FNAC findings were correlated with histological diagnosis in 53 cases. Histological findings were found to be consistent in 46 cases (86.79%), inconsistent in 7 cases (13.20%) and material was found inadequate in 4 cases (3.33%). Two cases were cytologically diagnosed as adenomatous goitre were turned out to be follicular adenoma in histology. This can be explained by the

cytological appearances of nodular goitre can overlap with follicular adenoma and cytological criteria alone cannot always reliably distinguish between the two. If a microfollicular focus in a nodular goitre is relatively sampled the smear shows a repetitive pattern of microfollicular or rosettes with no colloid and distinction from follicular neoplasm may be impossible. Samples from other areas are likely to show macrofollicles, abundant colloid and degenerative changes recognisable as colloid goitre³. Mehdi et al (2003)[11] studied FNAC of 100 cases of thyroid swelling and surgical biopsy available in 34 cases. They also observed in their study that histological examination results were consistent with cytological findings except in two cases, where one case of colloid cyst and another of colloid goitre turned out to be follicular adenoma. In present study, two cytologically diagnosed cases of follicular neoplasm turned out to be

follicular carcinoma on histopathology and 17 follicular neoplasm were benign follicular adenoma. The cytological findings in follicular adenoma and follicular carcinoma are similar. Lowhagen et al (1974)[12] advocated that a cytologic report should only state that a follicular neoplasm is present with no implications of its benign or malignant nature. Friedman et al (1979)[13] also advised histological examinations in such cases. One cytologically diagnosed case of follicular neoplasm was turned out to be follicular variant of papillary carcinoma (false negative) and three cases turned out in multinodular goitre in histology. The follicular variant of papillary carcinoma may have well formed follicles containing colloid and cystic papillary tumours often contain abundant colloid. This can cause diagnostic difficulties if smears are poor in cells. Gangneten (1987)[14] stressed the importance of doing multiple aspirations in a thyroid swelling in order to obtain representative material from different area.

In their study five cases of papillary carcinoma were diagnosed cytologically and very well confirmed histologically.

Jogai et al (2005)[15] studied 192 cases of FNAC from thyroid swelling. They reported 39 cases (20.3%) as positive for malignancy out of which 38 cases were found to be consistent (24 classic papillary carcinoma, 12 cases follicular variant of papillary carcinoma, 1 case of follicular carcinoma, 1 case of medullary carcinoma). One case was cytologically diagnosed as follicular variant of papillary carcinoma which was turned out to be follicular adenoma on histology. However, the results of present study correlate well with those of silverman et al (1986)[16] who studied 309 cases of fine needle aspirations biopsy of swelling in thyroid regions. The sensitivity of the procedure was 93%, specificity was 95.1% and positive and negative predictive value were 88.9% and 96.5% respectively. Altavilla et al (1990)[17] conducted a study in which histologic diagnosis in 257 cases were compared with cytologic diagnosis to determine the accuracy of FNA cytology of thyroid lesions. Overall diagnostic accuracy was 95.09% with sensitivity 71.43% and specificity 100%. Singh et al (2003)[18] studied 212 cases with thyroid swelling. 46 cases were compared with histopathology. They found sensitivity of 80%, specificity of 100% and diagnostic accuracy of 95%, positive and negative predictive values are 100% and 93.75% respectively. Saeed et al (2006)[9] studied 125 cases of thyroid lesions and compared with histopathological results. The overall results showed a sensitivity of 98%, specificity 70%, positive predictive value 91%, negative predictive value 93% and diagnostic accuracy 91%. Safirulla et al (2004)[19] analysed 300 cases with palpable lesions of thyroid. After comparing with histopathological diagnosis, they found 94.2% sensitivity and 94% specificity. Another study done by Jogai et al (2005)[15], analyzed 192 cases of thyroid FNAC with subsequent histopathology. The overall sensitivity was 84.44% and specificity was 99.11%. Saddique et al (2008)[10] conducted a study in 90 patients with thyroid lesions showed an accuracy of 96.6%, sensitivity of 75%, specificity 95.83%, positive predictive value 81.81% and negative predictive value of 93.81%. Handa et al (2008) [20] performed FNAC in 434 patients with thyroid swelling. They revealed sensitivity 97%, specificity 100%, positive predictive value 96% and negative predictive value 100%.

Conclusion

There were no complications encountered in this study. So it can be concluded from the present study that fine needle aspiration cytology is a simple method of diagnosis of neoplastic and non neoplastic lesions of thyroid.

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