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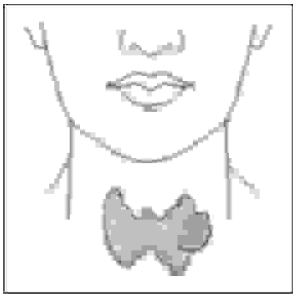
FNAC IN THE MANAGEMENT OF SOLITARY THYROID NODULE



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ABSTRACT... surgsohail@yahoo.com **Objective:** To determine the significant role of FNAC upon other diagnostic modalities in pre-operative investigations of patients presenting with solitary thyroid nodules and to compare the post operative histopathological results with the results of FNAC. **Design:** A Comparative study. **Place and Duration of Study:** Department of Surgery Combined Military Hospital Quetta and Combined Military Hospital Rawalpindi from December 1999 to December 2001. **Patients and Methods:** In this study 46 patients with solitary thyroid nodule were studied. Only 2 patients were toxic while remaining 44 were with euthyroid. In this study only one case was suspected to be malignant clinically out of 5 malignant cases. All 46 patients under went thyroid scanning, ultrasound examination and fine needle aspiration biopsy and the diagnostic accuracy was assessed. **Results:** 36 patients (78.26%) were operated while 10(21.73%) were managed conservatively. There were 5(10.86%) malignant nodules while 41(89.13%) were benign. All the 5 cases with malignancy were with 'cold' nodules on scan as most of others, while 'solid' on ultrasound examination and so were most of other benign nodules. All cases diagnosed malignant pre-operatively on FNAC, proved to be malignant on histopathology after surgery and the others diagnosed as benign on FNAC proved to be benign. **Conclusion:** This study shows that conventional investigations for evaluation of solitary thyroid nodules are inaccurate in identifying the malignant from the benign nodules and their routine use in such patients should be abandoned, while the use of FNAC should be encouraged more in our hospitals as this technique is with high degree of sensitivity and specificity, cost effective and safe.

Key words: Fine Needle Aspiration Cytology, Thyroid Nodule, Thyroid Cancers.

INTRODUCTION

A discrete swelling in an otherwise impalpable gland is termed isolated or solitary, whereas the preference term for a similar swelling in a gland with clinical evidence of generalized abnormality in the form of a palpable contralateral lobe or generalized mild nodularity is dominant. Discrete thyroid swellings are 3-4 times more common in women than men, but a discrete swelling in

a male is much more likely to be malignant than in females. The importance of discrete swelling lies in the risk of neoplasia compared with other thyroid swellings. Some 20 per cent of isolated swelling prove to be malignant and an additional 30-40 per cent are follicular adenomas. The remainder are non-neoplastic largely consisting of areas of colloid degeneration. FNAC has established as the investigation of choice in discrete thyroid swellings and has excellent patient compliance, is simple and quick to perform in out patient department and is cost effective with high degree of sensitivity and specificity.

FNAC is with high degree of specificity as a pre surgical investigation with; Papillary carcinoma, Medullary carcinoma, Anaplastic carcinoma, Thyroiditis, Colloid nodules, Lymphoma.

Note: FNAC cannot distinguish between a benign follicular adenoma and follicular carcinoma as this condition is dependent not on cytology but on histological criteria, which include capsular and vascular invasion. Other diagnostic modalities as:-

a. Thyroid radio nuclide scans can categorize only hot (hyper functioning), Warm (normal functioning) or cold (hypo functioning) thyroid nodules. As the majority of cancers arise in cold nodules hence a malignant tumor appears as a cold area on scintiscanning.
b. Ultrasonography reveal only about size, cystic, solid, or nodularity about thyroid gland and is not able to differentiate reliably between benign and malignant nodules. Colour Doppler is also not effective in this regard.
c. Standard radiography and biochemical tests in this regards are also not much effective.
d. Computed tomography and Magnetic resonance imaging, they play a role but both are cost pertaining and we can not afford them as a routine.

As above-mentioned different diagnostic modalities are either not very reliable regarding their specificity and sensitivity or they are very costly with limited diagnostic importance. Hence, the confirmation of benign or malignant nature of thyroid nodule must be either on histological or cytological evaluation.

Large needle biopsy
Procedure is difficult in small nodules (less than 2 cm) and is also associated with complications like bleeding and injury to adjacent structures and as its diagnostic specificity and sensitivity is not superior than fine needle aspiration cytology, so it has no role as a routine test. Hence above-mentioned information with FNAC will help us pre operative planning for appropriate mode of surgery and on the other hand decision about conservative management in benign lesions.

The Purpose of this study is therefore mainly to find out.;

* Role of fine needle aspiration cytology with its high degree of specificity and sensitivity in the surgical management of solitary thyroid nodule.
* Comparison of FNAC with histopathological results after surgical management of thyroid nodule.

PATIENTS AND METHODS

The study regarding FNAC in the surgical management of solitary thyroid nodule is organized in the department of general surgery at combined Military Hospital, Quetta and Combined Military Hospital Rawalpindi where both the military and civilian patients are managed.

A total of 68 Patients of both sex with all age groups varied from 18 to 65 years included, who were having clinically palpable solitary thyroid nodule. Out of these, 22 cases were found to be having multi nodular goiter either on further work up or on surgery and thus were excluded from this study. Hence finally 46 patients with true solitary thyroid nodules were selected for this study. The 14 out of 46 Patients were male (30.43 %) and 32 were Female (69.56%) in this study in keeping with female predominance of thyroid disorders. It was noted that the majority of the Patients were young females between 20-35 years of age.

Following investigation protocol was adapted.

* All patient were subjected to indirect laryngoscopy in order to assess the mobility of vocal cords.
* All patients were assessed for serum T3, T4 and TSH .
* Scintigraphic examination of the thyroid gland was also carried out in each patient with technetium.
* In each case ultrasonographic examination.
* In each case FNAC performed and results noted .

Note: In one case of hashimoto's thyroidities, the autoimmune profile consisting of anti thyroglobulin and anti microsomal anti bodies were carried out.

1. In another case of medullary carcinoma serum calcitonin level was done.
2. X-Ray examination of neck was performed in only 8 patients to see compression of the trachea as they were having symptoms suggestive of tracheal compression

FNAC

Note: The Cytopathological results were classified as follows.

1. Benign
2. Malignant
3. Suspicious for malignancy. When the aspirate was either having abundant cellularity with dense "clumping" of cells or when some epithelial cells showed changes suggestive of malignancy.
4. Inadequate Biopsy. When insufficient material was obtained for cytological assessment and repeat biopsy was advised in such cases.

A total of 36 out of 46 patients were submitted to operation for different indications. Out of these 36 patients 13 were men (36.11%) and 23 were women (63.88%). There were two patients, both female with hot and solid nodules. The remaining 34 cases had all 'cold' nodules with solid in 20 cases, mixed in 10 and cystic in 6 patients. In each case the histopathological results (diagnosis) of the resected gland were compared with the pre-operative cytological diagnosis.

Nine patients (19.56%) out of 46 patients were female and one patient (2.17%) out of 46 patients was male who did not under go operation. In 9 of these 10 cases, clinical assessment and FNAC did not detect any evidence of malignancy. All of these were having solid and cold nodules. One out of these who was having Hashimoto thyroiditis, she was treated with thyroxin, while the other 8 cases who were found to be having adenomatous colloid nodule on FNAC and were managed by observations alone. The tumor size of the above mentioned patient were between 1.5 to 3 cm with a mean of 2.25 cm. One male patient out of 10 patient was with anaplastic carcinoma and he was not subjected to further surgery because the tumor was inoperable and he was referred for radiotherapy.

RESULTS AND OBSERVATION

During a period of two years, 46 patients with true solitary thyroid nodules were studied. Out of these 46 patients, 14 were men (30.43%) and 32 were female (69.56%) with a male to female ratio of 1:2.3. All the above mentioned patients were between ages, ranging from 18 to 65 years.

In this study the patient were mostly from the Quetta and its surroundings, Gilgit, Abbottabad and Attock districts which are among the known endemic regions for goiter in Pakistan[1]. In this study regarding thyroid gland status out of 46 patients only 2 patients were found with hyperthyroidism.

One male patient out 44 patients who was of 61 years of age was having obvious clinical signs and symptoms of malignancy with hoarseness of voice, fixity of the thyroid gland with the adjoining neck structures and enlarged cervical lymph nodes. On examination the size of solitary thyroid nodule was found varied from 1.5 cm to 7 cm. The location of the nodules in the thyroid gland was varied in right lobe, left lobe and in the isthmus and is given in (Table I).

Table-I. Site of solitary thyroid nodule in 46 case.		
Part of thyroid gland	**No. of cases**	**%age**
Right lobe	26	56.52%
Left lobe	17	36.95%
Isthums	3	6.52%

In this study ultrasonography was performed in all 46 patients. As ultrasound can only tell us about solid, cystic and mixed nature of the nodule and not about the existence of benign or malignant disease as well as about the pathology of the nodule.

In this study indirect laryngoscopy was also performed in all 46 patients. Out of 46 cases, only one case was reported with vocal cord paralysis and he was the patient with anaplastic carcinoma having palpable cervical lymph nodes, hoarseness of voice and the gland fixity to the surrounding structures. Scintiscans were also performed in all 46 patients with solitary thyroid nodules. Based on results regarding scintiscan, the patients were divided in two groups as given in (Table II).

Table-II. Scintiscan results in 46 cases regarding their function.		
Function	**No. of cases**	**%age**
Hot nodule	2	4.36%
Cold nodule	44	95.65%

In this study cold nodule was most common type of solitary nodule. The percentage of cold benign and malignant nodules among the cystic, mixed and solid nodules is shown in (Table III).

In this study FNAC was performed in all of 46 cases. Aspirate was found to be conclusive in 44 cases (95.65%) and inconclusive in 2 cases (4.34%) initially. FNAC was performed in the same remaining 2 inconclusive patients after one week, which turned to be conclusive. The initial inconclusive results could be due to faulty technique. There was no complication observed in all patients undergoing FNAC procedure, except mild pain in 5 patients which were treated with tablet ponstan as an outdoor case.

Out of 46 conclusive aspirates, 40 cases (86.94%) were found to be having benign aspirates, 2 cases (4.34%) were found to be having suspicious aspirates and 4 cases (8.69%) were found to be having malignant aspirates. Out of 2 cases with suspicious aspirates, when operated upon, their histopathological reports revealed one with follicular carcinoma and the other with follicular adenoma.

Table-III. Relation of 44 benign and malignant 'Cold' nodules with ultrasonographic findings			
Nature of nodule	**Benign nodules**	**Malignant nodules**	**%age benign/ malignant**
Cystic nodules	5	Nil	11.36% / 00%
Mixed nodules	7	Nil	15.90% / 00%
Solid nodules	28	4	63.63% / 9.09%

Table-IV. Relation of FNAC in 46 patients with solitary thyroid nodule			
Type of aspirate	**Specific diagnosis**	**No. of cases**	**%age**
1. Malignant cells seen	-	4	8.69%
a. Papillary Carcinoma		2	4.34%
b. Medullary Carcinoma		1	2.17%
c. Anaplastic Carcinoma		1	2.17%
2. Suspicious cells seen	-	2	4.34%
3. No Malignant cells seen	-	40	86.95%
a. Adenomatous colloid goiter		39	84.78%
b. Hashimoto's thyroiditis		1	2.17%

Out of 4 cases with malignant aspirates, one was diagnosed on cytology as an anaplastic carcinoma which was having obvious. signs and symptoms of malignancy and the patient was decided not to be operate-able. The remaining 3 malignant aspirates were having 2 papillary

carcinoma and one with medullary carcinoma.

Out of 40 benign aspirates, 31 cases were selected for operation and 9 cases were decided to treat conservatively. The results of FNAC are given in (Table-IV). In this study out of 46 patients 36 patients were treated surgically and the procedures performed are given in (Table V). In one case with suspicious thyroid aspirate on FNAC, after hemi-thyroidectory and histopathological report which was follicular carcinoma, near total thyroidectomy performed after one week. Histopathological results of operated 36 cases are given in (Table VI). Out of two suspicious aspirates one proved on histopathological diagnosis as follicular adenoma and the other follicular carcinoma.

In this study where 4 cases ware proved malignant out of 46 patients on FNAC basis, only one patient who was a male proved malignancy on clinical examination and the remaining 3 cases were clinically indistinguishable from benign nodules.

Table-V. Operations performed in 36 patients with solitary thyroid nodules

Operation	Benign Cases	Malignant Cases	Suspicious Cases	Total Cases	% age
Hemi-thyroidectomy	31	Nil	2	33	91.66%
Near-total thyroidectomy	Nil	3	Nil	3	8.33%

Table-VI. Histopathological diagnosis in 36 operated cases of solitary thyroid

Histopathological diagnosis	No. of cases	% age
A. Benign lesions	31+1*	88.88%
a. Colloid goiter	26	72.22%
b. Follicular adenoma	1	2.77%
c. Simple cyst	5	13.88%
B. Malignant lesions	3+1*	11.11%
a. Papillary carcinoma	2	5.55%
b. Medullary carcinoma	1	2.77%
c. Follicular carcinoma	1	2.77%

In this study all the malignant cases were with a discrete solid lesion on ultrasonography, but those who proved benign were also mostly having similar sonographic picture. More over all cases with confirmed thyroid carcinoma showed a 'cold' nodule on scintigraphy, but at the same time all the remaining cases also showed cold nodularity on scintigraphy except two, and these cold nodules proved to be benign on FNAC and histopathology. Moreover FNAC proved a much better diagnostic tool in the correct diagnosis of different thyroid lesions including thyroid cancers out of 46 patients.

Sensitivity

It is defined as the ability of a test to detect a disease when it is present[16].

Specificity

It is defined as the ability of a test to reflect the absence of the disease in those disease free[16]. As in this study no false-positive or false-negative case was seen, the sensitivity (true positive/true positive+false negative) x 100 and specific (True negative/true negative + False positive) x 100% was 100 % and 100% respectively as mentioning (Table VII).

Table-VII. Results of sensitivity and specificity

Results of FNAC	No. of cases	%age
False-Negative for malignancy	Nil	Nil
False-Positive for malignancy	Nil	Nil
Sensitivity	-	100%
Specificity	-	100%

In this study two cases were suspicious as per FNAC report. Both suspicious cases were decided for operative surgery. Histopathological results of the operated cases

revealed were with follicular adenoma and the other with follicular carcinoma. Hence this study revealed that FNAC can not distinguish between follicular adenoma and follicular carcinoma.

In this study the overall incidence of malignancy out of 46 patients was 10.86% in both sex with all age groups. In this study the maximum follow up time was one year.

DISCUSSION

The aim of investigation in patients with a solitary thyroid nodule is the identification of a few malignancies among the numerous nodules and thus to operate as a few cases as possible without missing any case of malignancy.

In this study FNAC was used to differentiate malignant from benign lesions of true solitary thyroid nodules in 46 patients of all ages and in both sex and the duration of this study was two years.

Solitary or multithyroid nodules are very common between 30 to 60 years, but the chances of malignancy are more in patients younger than 30 years or older than 60 years[2]. In this study most of the patients were belonging to endemic areas for goiters in Pakistan, which reflect that the diet deficiency of iodine as described by bilfiore at all[2].

Clinically 68 Patients were diagnosed as solitary, but 22 cases (32.35%) out of 68 proved to be multi nodular after having ultrasonogrophy, scintiscanning or on histopathology and hence these 22 cases were excluded from the study. The over all incidence of malignancy in this study was 10.86% while the incidence of malignancy in solitary thyroid nodules ranges from 8 to 23%[3,4]. Out of 5 malignant neoplasms in this study 2 were papillary carcinoma (40%), which is close to the results where its incidence was between 50 and 60%[5,6].

Incidence of medullary carcinoma (20%), Anaplastic carcinoma (20%), follicular carcinoma 20% in this study which seems to be higher than reported by others[7]. As in this study, a number of other studies[8,9] revealed that FNAC is to be the only reliable diagnostic test in differentiating malignant from benign thyroid swelling before surgery. The value of FNAC reflects its significance in this study, where 46 patients emphasis the value of this procedure.

FNAC in this study revealed pre-operatively 5 malignancies, out of which one with anaplastic carcinoma did not undergo. Operative management. An other one diagnosed as follicular carcinoma which was diagnosed as suspicious on FNAC, while the remaining 3 which were diagnosed as 2 papillary and the 3rd as medullary carcinoma pre-operatively, all revealed the same results after operation on their histopathological diagnosis. Hence in this study there was no false negative or false positive case for malignancy, which does not coincide with those reported by others[6,10] but these results are very much encouraging. This study also revealed that FNAC not only predict about malignancy but also about the type of malignancy except follicular carcinoma, which is very much relevant to[16].

The percentage of suspicious aspirate in this study is {4.34%} which is very much within the range of reported cases[6]. In our surgical department, as per policy all cases with clinically solitary thyroid nodules underwent FNAC procedure. Hence in this way with pre operative diagnosis about malignant and benign lesions of thyroid nodules, we are in a sound position to select not only the operative modality particularly in cancer patients, but also we are able to select the mode of treatment for those with benign lesions[16,11].

In this way we are also able to avoid undue surgery, on the other hand the patients with positive malignancy or suspicious cytology, they undergo an early surgery. Those patients with negative cytology are kept under surveillance and FNAC is repeated after 6 to 9 months. A benign FNAC diagnosis is considered only as a useful adjunct to the clinical diagnosis for observing such patients and never as the sole or principal reason for avoiding surgery[18].

In this study only one case out of 5 cases was diagnosed

on clinical grounds as a malignant, while the remaining 4 cases could not be simply diagnosed as malignant out of benign cases. The radio-isotope scanning on other hand is of limited value in detecting malignant nodules out of benign one, except giving information about hot or cold nodules[12].

It has been found that cold nodules are the commonest form of solitary nodules and is the one which excite most interest because about 11-17% prove to be malignant[12]. Out of 46 patients only 2 cases 4.34% were with hot nodules and 44 were 95.65% were with cold nodules in this study. Out of 44 cold nodules only 5 cases proved to be malignant which is 11.36% and is well within the reported range. On the other hand both hot nodules were benign. Ultrasonography gives valuable information only regarding cystic, solid, mixed about the nodules, hence ultrasound cannot impart a reliable tissue diagnosis[12].

FNAC has been proved to be of paramount importance in the diagnosis and the management of malignant nodules out of large number of benign one and hence the use of this modality has reduced unwanted large number of thyroid surgery and complications related with thyroid surgery. Thus the advantages of FNAC over other investigative procedures are:-

a. FNAC can reduce the number of patients with benign thyroid nodules submitted to surgery for diagnostic hemi thyroidectomy without diminishing the discovering of malignancy[8].

b. An appropriate degree of surgery can be assigned to malignant cases because an early removal of differentiated cancers may reduce the possibility of their transformation into anaplastic carcinomas[8].

c. Identification of the type of cancer by FNAC may be helpful in planning its proper treatment required in individual cases and also surgery to be performed as one stage procedure which has its own benefits[8].

d. It has also the important advantage of providing for great sensitivity and specificity as compared with other less informative standard means of investigations, and at the same time is at a lower cost and morbidity than a diagnostic thyroid surgery[8].

FNAC has its own limitations and requirements and we should be very careful about it and these are:-

a. The requirement of expert hand to do FNAC who should know the exact technique.

b. An expert cytopathologist to interpret the aspirates.

c. The major limitation of FNAC, however rests on the identification of follicular neoplasms[13,15]. The pathological definition of follicular carcinoma frequently requires the evidence of capsular or vascular invasion, and therefore requires histological study of fixed sections and not the cytological evaluation[14].

CONCLUSION

The use of FNAC has increased the diagnostic precision, and is also in-expensive and moreover as it has improved surgical selectivity, the cost of patient care can be reduced considerably. On the other hand ultrasound and isotop scans have a little place in the routine management of the solitary thyroid nodules, as they do not accurately select those patients who require surgery. As FNAC procedure is without complications, hence FNAC deserves first priority in the evaluation of a solitary thyroid nodule when an experience cytologist is present.

Areas of residence, particularly those with iodine deficiency along with age and sex play an important role in the frequency of thyroid nodules and cancer in our population especially in solitary thyroid nodules. Although clinical features are not good predictor of malignancy, even then they do influence the rate of surgery in patients with thyroid nodules

In treating solitary thyroid nodules in addition to the findings by FNAC regarding presence or suspicion aspirates of malignancy, which are the important factors for surgery, a combined approach with clinical features suggestive of malignancy should also be used.

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