*Original Article*

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# Role of FNAC in the Evaluation of Solitary Cold Thyroid Nodule

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**Abstract**

**Background:** Fine needle aspiration cytology (FNAC) provides diagnostic information as to the nature of a solitary cold thyroid nodule. **Objective:** This study was carried out to evaluate the effectiveness of FNAC as a diagnostic method of malignancy in solitary cold thyroid nodule. **Methodology:** This cross sectional study was carried out among 40 cases of solitary cold thyroid nodule who were admitted in the Department Surgery and ENT of DMCH during period of January 2006 to December 2007. This study was conducted using convient type of non-probability sampling technique Data were collected by face to face interview, clinical examination and finding of both cytological and histological examination. **Result:** The study revealed that the mean age of the patients was 35.8± 2.36 year with female to male ratio 2.6:1. For all the patients, FNAC were done preoperatively and after definitive surgery histopathology were done for confirmed diagnosis and results of FNAC were compared with histopathology reports. 30 cases were diagnosed as benign and 10 case diagnosed as malignant cold thyroid solitary nodules among 40 cases. In this study, the sensitivity of FNAC was 80% for the presence of malignancy and specificity 96.7% for the absence of malignancy in solitary cold thyroid nodules. The positive predictive value was 88.9% and negative predictive value was 92.5% and diagnostic accuracy was 92.5%. **Conclusion:** FNAC can be used as a diagnostic method for the evaluation of malignancy as well as in the management of solitary cold thyroid nodule which has reasonable sensitivity and specificity. Finally, it is a quick, cost effective procedure and has excellent patient compliance.

**Key words:** FNAC, thyroid nodule, malignancy

## Introduction

Fine needle aspiration cytology (FNAC) of the solitary cold thyroid nodule is a minimally invasive, safe, fast and cost effective technique which provide diagnostic information as to the nature of a solitary cold thyroid nodule[1]. It can be used in appropriate setting to allow rapid management planning[1]. Before FNAC of solitary thyroid nodule, it is at first categorized as cold, hot or warm nodule by radio-nucliotide scan and USG is done to detect the nodule as solid, cystic or mixed (both cystic & solid) nodule[2]. With the better understanding of cellular pathology and with the better visualization of cellular morphology, identification of specific pathology by cytological examination had begun to make its own place. With the experience of exfoliative cytology in mind malignant cells were less cohesive than normal cells[2].

Scientists extended their endeavour to collect cells from deep seated lesions. FNAC is a very simple procedure which can be performed in the out door department (OPD) without much discomfort to the patient. The result can be obtained more quickly than surgical biopsy. FNAC is done to detect the nature of clinically palpable or suspicious thyroid nodule after proper selection by USG and radio-nucleotide scan. It is effectively utilized as diagnostic and therapeutic procedure[3,4]. Aspiration cytology by an expert cytologist can reduce the number of operation for benign solitary thyroid nodule[5].

In Bangladesh, FNAC has been carried out by several worker[6]. Their results are encouraging. So there is scope of utilizing this procedure as a part of patient management protocol where appropriate facilities are available. This study was carried out to evaluate the effectiveness of FNAC as a diagnostic method. The aim of the study was to find out the specificity, sensitivity and diagnostic accuracy as well as usefulness of FNAC in solitary thyroid nodule.

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**Methodology**

This cross sectional study was conducted with patients who were diagnosed as solitary cold thyroid nodule and admitted in the Department of Surgery and ENT of Dhaka Medical College & Hospital (DMCH), Dhaka from January 2006 to December 2007. The sample size of the study was 40 cases of solitary cold thyroid nodule diagnosed by clinical examination, USG and radionuclide scan. All the patients should have clinically palpable solitary thyroid nodule. Multinodular goitre, toxic nodule were excluded in this study. FNAC was done in every case. Finally histopathological examination of all biopsed material was carried out after definitive surgical procedure. A semi-structured questionnaire was used for face to face interview and an observation checklist was used for collection of information by taking history, physical examination, USG and radionuclide scan. The aspiration was done by the researcher himself, aspirates smeared on slides and numbering of slides was performed for future identification. Slides were sent to the Department of Pathology at Dhaka Medical College (DMC), Dhaka for staining and cytological examination and reports were collected. Finally specimens were collected after definitive surgery and was fixed with 10% formalin and was sent to the Pathology Department of Dhaka Medical College, Dhaka (DMC) for histopathological examination. Clinical diagnosis were grouped into malignant which were hard nodule, irregular margin fixed to the surrounding tissue, mobility restricted, palpable local lymph nodes, benign which were firm nodule with regular margin and mobile and cystic which were soft, cystic and fluctuation positive. Sonological diagnosis were done and grouped into solid, cystic and mixed. Radiounclide scan were done and patients with cold nodules were selected. Smears are classified according to microscopic finding like unsatisfactory, benign, malignant and suspicious of malignancy. Data were processed accordingly and were analyzed and findings were focused in the tabular form. Then evaluation of cytological diagnosis was done. Specificity was the presence of benign lesions identified by FNAC (Negative report); sensitivity was the presence of malignant lesions identified cytologically (positive for malignancy) and accuracy was percentage of total lesions (benign or malignant) identified correctly.

**Result**

Highest number of patients 13(32.5%) were in the age group of 31-40 years. Among 40 cases, 29(27.5%) were female and 11 (27.5%) were male. Five needle aspiration cytology (FNAC) of all cases was categorized as malignant 5 (12.5%), suspicious 4 (10%) and benign 31(77.5%) cases. The cases with unsatisfactory results was absent in this study. The histopathological diagnosis of the study population confirmed 10 (25%) malignant nodules and 30 (75%) benign nodules. Malignancy was highest (40%) in the age group 11-20 years (i.e. second decade of life). The mean age in malignant group was 29.70± SD 14.35 years. Among 40 cases, 10 (25%) were malignant, Incidence of malignancy in male was higher (36.4%), n=4) than in female (20.3%), n=6).

**Table- 1 : Age and sex distribution of the study population (n=40)**

| Age group (years) | Male N(%) | Female N(%) | Total N(%) |
|---|---|---|---|
| 11-20 | 0 | 6(20.00) | 6(15.00) |
| 20-31 | 1(9.1) | 10(34.5) | 11(27.5) |
| 31-40 | 6(54.5) | 7(24.1) | 13(32.5) |
| 41-50 | 3(27.3) | 5(17.2) | 8(20.0) |
| 51-60 | 1(9.1) | 1(3.4) | 2(5.0) |
| **Total** | **11(27.5)** | **29(72.5)** | **40(100.0)** |

**Discussion**

Solitary thyroid nodule is the commonest endocrine problem worldwide including Bangladesh. The incidence of malignancy in solitary cold thyroid nodule is range from 10 to 21%[7]. To avoid unnecessary surgery, FNAC of the solitary cold thyroid nodule is used as diagnostic tools to differentiate malignant nodule from benign nodule.

**Table 2 : FNAC findings of the study population (n=40)**

| FNAC | Number | Percentage |
|---|---|---|
| Malignant | 5 | 12.5 |
| Suspicious | 4 | 10.0 |
| Benign | 31 | 77.5 |
| **Total** | **40** | **100.0** |

In this study total number of patients were 40 and all the patients were clinically and biochemically euthyroid and had cold nodule on radionuclide scan. All the patients were investigated by FNAC before underwent surgery and after surgery histopathology were done for all cases. Patients in this study belonged to the age group of 14-59 years with mean age ± SD 35.8 ± 2.36 years. Among 40 case, 29(72.5%) were female and 11(27.5%) were male and the ratio between male and female was 1:2.6. This indicates that prevalence of thyroid nodule was common in female which matched the previous study[8].

**Table 3 : Histological diagnosis of the study Population (n=40)**

| Histopathology | Frequency | Percentage |
|---|---|---|
| Papillary carcinoma | 11 | 25.00 |
| Follicular adenoma | 2 | 5.00 |
| Hurtle cell adenoma | 1 | 2.5 |
| Adenomatous goiter | 5 | 12.5 |
| Multinodular goiter | 21 | 52.5 |
| Hashimoto's thyroiditis | 1 | 2.5 |

FNAC is a diagnostic method which has been thoroughly validated in many tissues including thyroid nodules. In

essence the technique requires the insertion of a fine bore hollow needle through which a groups of cells are withdrawn under negative pressure, cellular material thus obtained and smeared on a slide and examined cytological.

**Table 4 : Comparison of FNAC with histopathological finding (n=40)**

| FNAC finding | Malignant (n=10) | Benign (n=30) | Total (n=40) |
|---|---|---|---|
| Malignant | 8(80.0) | 1 (3.3) | 9 |
| Benign | 2(20.0) | 29(96.7) | 31 |
| **Total** | **10(100.0)** | **30 (100.00)** | **40** |

The main objective of this study was to assess the value to FNAC in confirming preoperative diagnosis of patients of malignancy in solitary cold thyroid nodule. FNAC can be performed without hazards of anesthesia. It is less traumatic, less expensive and yield results more quickly. It is a safe procedure with low complication rate. The accuracy of FNAC exceeds that of other pre-operative diagnostic methods and it provides better opportunity of treatment planning and more definitive counseling with the patient and his relatives[9].

**Table 5 : Diagnostic Accuracy of FNAC**

| Test Validity | |
|---|---|
| Sensitivity | : 80% |
| Specificity | : 96.7% |
| Positive predictive value | : 88.9% |
| Negative predictive value | :92.5% |
| Diagnostic Accuracy of malignancy | : 92.5% |

In this study, the slides were grouped into three category like benign, malignant and suspicious of malignancy. The final diagnosis, in each case was confirmed by histopathological examination. In this study, FNAC was done in all 40 cases. Among the FNAC reports 77.5% cases were benign, 12.5% were malignant and 10% cases were suspicious of malignancy. After surgery, all cases were confirmed by histological examination. There were 8 true positive cases, 29 true negative case, 2 false negative cases and 1 (one) false positive cases after cytological (FNAC) diagnosis in this study. In a similar study of solitary cold thyroid nodule by FNAC, the percentage of malignancy was observed as 8%[10]. The study finding is almost similar to this finding. For statistical analysis, the cases with cytological diagnosis of positive or suspicious for malignancy, which on final histopathological examination were diagnosed as malignant were considered as true positive. In the present study, 8 cases were true positive and one (1) case was false positive. In the benign group, 29 cases were true negative. Two cases in the benign group with FNAC reports of solitary nodule the adenomatous goiter were found to be malignant histopathological report; So 2 cases were false negative. FNAC shows 80% sensitivity, 96.7% specificity and 92.5% accuracy for the evaluation of solitary cold thyroid nodule in this study. The sensitivity and specificity observed in other study were 92% and 95% respectively[4,5,6]. So, FNAC should be used as a routine method of determining the nature of the solitary cold thyroid nodule. The 40 case of solitary cold thyroid nodule diagnosed by radionucliotide scan were subjected to FNAC. In all cases tissues (nodule) were examined histologically after definitive surgery. Results of FNAC were compared with histological diagnosis. In this study, the sensitivity of FNAC was 80% for the presence of malignancy in solitary cold thyroid nodule and specificity 96.7% for the absence of malignancy in solitary cold thyroid Nodule and diagnostic accuracy was 92.5%.

**Conclusion**

FNAC is one of the most important investigations with high percentage of accuracy in evaluation of solitary cold thyroid nodule. The early detection of malignancy depends upon the proper evaluation of the solitary cold thyroid nodule. Finally, FNAC can be done quickly, excellent patient compliance and accurate cost effective procedure. This study was conducted in a small sample size. A prospective long-term study should be continued involving large number of subjects.

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