

Free hand fine needle aspiration cytology (FNAC) versus ultrasound-guided (US) core sampling of thyroid gland for thyroid nodules

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Abstract

Objective: To determine the satisfactory sampling rate and safety of free hand FNAC and ultrasound-guided sampling of thyroid gland.

Material and methods: This comparative study was conducted at the department of surgery Mardan Medical complex, Mardan from July 2012 to June 2015. A total of 212 thyroid samples were included in this study. Out of these samples 114 were obtained with free hand while 98 were obtained under US guidance. The satisfactory sampling rate of both methods was compared. Relevant information were recorded on a pre designed questionnaire prepared in accordance with the objectives of the study.

Results: During the study period a total of 212 aspirates were performed 114 by free hand and 98 with US guidance. Among the US guided group 82% samples were satisfactory while in free hand aspiration 55% were satisfactory with a chi square of 18.146 and $p=0.0001$. After excluding all the cysts and colloid nodules the satisfactory sampling rate in US guided group is 86.36% while in free hand it is 53.72 % with chi square of 16.51 and $p=0.0001$. This is statistically significant. No clinical complication was observed in any group.

Conclusion: US guided core sampling provides more satisfactory samples for cytology than free hand aspiration.

Keywords: Fine needle aspiration cytology, ultrasound guided sampling, thyroid nodule.

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Introduction:

Free hand FNAC is well accepted procedure for diagnosing soft tissue tumors.^{1,2} This technique for evaluation of a neck mass was first reported by Kun in 1847. The first organized attempt at aspiration of head and neck masses were made by Martin & Ellis at the memorial Sloan-Kettering Hospital as early as 1930 using an 18G needle.^{2,3} Now-a-days tumor marker studies, special stains and the modern imaging techniques are also being employed to improve the safety and accuracy of FNAC.^{3,4} Thyroid nodules of varying aetiology affect 3.2% of non iodine deficient population and are the most common condition presenting to the endocrine surgeon.⁵ FNAC in the clinic has become an obligatory part of assessment of thyroid nodule and serves to estab-

lish the diagnosis and initiate a treatment plane, where needed. There are, however, limitations with FNAC particularly in case of follicular lesions. Also, it is difficult to distinguish follicular neoplasm from hyperplastic nodules within a multinodular goiter. In addition 5 to 43.1% of freehand FNAC are initially unsatisfactory necessitating repeat sampling^{2,6,7}. Several authors advocated the use of ultrasound-guidance (US) for histology or US-guided FNAC to improve the diagnostic adequacy of thyroid nodule sampling^{3,6}.

In our setup aspiration of thyroid nodule for cytological examination performed by either Free hand FNAC by consultant general surgeon using 23 G needle or core biopsy was taken under

Table 1: Free hand FNAC and USG-guided cytology outcomes

Cytology report	US Guide core (%)	Free hand FNA(%)
Unsatisfactory	17 (17.34)	51 (44.73)
Satisfactory	81 (82.65)	63 (55.26)
Total	98	114

Table 2: Free hand FNAC and US-guided cytology outcomes (excluding cysts and colloid nodules)

Cytology report	US Guide core (%)	Free hand FNA(%)
Unsatisfactory	9 (13.63)	26 (47.27)
Satisfactory	57 (86.36)	29 (52.72)
Total	66	55

US-Guidance with the help of sonologist.

The aim of this study was to compare the satisfactory sampling rate of free hand FNAC and US guided core sampling.

Material and Methods:

This comparative study was conducted in Department of surgery and Radiology, Mardan Medical Complex, Mardan. A total of 212 thyroid aspirates were obtained in surgery and Radiology Department in three years interval (July 2012 to June 2015) and all were included in the study irrespective of age and gender.

Free hand FNACs were performed by consultant general surgeon with 21 gauge needle and 10 ml Disposable syringe while USG guided core sampling was performed by surgeon with the help of sonologist.

The exclusion criteria were all cases with follicular cyst and colloid goiter.

Following the procedure patients were observed for an hour for any complication. All aspirates both Free handed and US guided were sent to pathologist. Note was taken of clinical detail and the cytology result was graded as unsatisfactory, containing no follicular cells and satisfactory containing sufficient number of follicular cells.

Research variables were Free Hand FNACs to Ultrasound guided Core sampling.

Data were analyzed in SPSS version 17, using chi-square test comparing satisfactory results obtained by Free Hand FNACs to Ultrasound

guided Core sampling. A p-value of less than 0.05 was considered to be statistically significant.

Results:

During the three years study period a total of 212 aspirates were performed 114 by free hand and 98 USG guided core sampling. These samples include cysts as well as colloid nodules. In the US guided group, 17/98 (17.34%) cytology samples were unsatisfactory as compared to 51/114 (44.73%), in the free hand FNAC. This is a statistically significant difference with a chi square of 18.146 and a $p=0.0001$ (or $p<0.05$) which is statistically significant shown in table No:1

If all the cysts and colloid nodule are excluded from analysis of adequacy, 9/66 (13.63%) USG guided core samples were unsatisfactory as compared to 26/55 (47.27%) of free hand FNAs, the chi square is 16.51 with a $p=0.0001$ (or $p<0.05$) which is also statistically significant as shown in Table No: 2

Discussion:

Thyroid swelling is a common condition presenting to general surgeons. FNAC has become an obligatory part of assessment of a thyroid nodule to establish a diagnosis and initiate a treatment plan. Freehand FNAC is regarded as a rapid, safe and inexpensive investigation. However there are limitations with FNAC particularly in case of follicular lesions in which this technique is unable to differentiate between benign and malignant lesions. Several authors have reported the high proportions of cytological unsatisfactory samples obtained with freehand FNA samples which range from 5 to 43%.⁷⁻¹³ These unsatisfactory samples necessitate repeat sampling. Recent work has shown that Ultrasound-guided samples for cytological or histological examination of thyroid gland can increase the sensitivity and specificity for diagnosis of neoplasia and decrease the unsatisfactory rate compared with freehand FNAs.^{9,10,11}

The use of Ultrasound as an aid to obtain the samples for histology and cytology has expand-

ed in the recent years and studies has shown that the ultrasound guidance in obtaining samples for cytology or histology can increase the specificity and sensitivity for diagnosis of malignancies and decrease the unsatisfactory rate of sampling compared with free hand FNAs. The aim of this study was to assess the satisfactory and unsatisfactory rate of ultrasound guided core sampling and free hand FNAC for cytology. Our results indicate that Ultrasound guided core sampling for cytology provides more satisfactory (82.65%) samples than free hand FNAC (55.66%). These results compare favorably with other studies which report an Ultrasound guided satisfactory rate ranging from 68 to 85%.^{9,14,15}

When all the cysts and colloid nodules were excluded from analysis and the data were analyzed the satisfactory rate of Ultrasound guided core sampling for cytology increased from 82.65% to 86.66%. However the free hand FNA satisfactory rate decreased from 55.26% to 52.72%. This suggests that if the nodules which need to be sampled is a solitary nodule or part of a multinodular goiter then it is preferable to perform Ultrasound guided core sample for cytology.

There are a number of possibilities for the greater reliability rate of Ultrasound guided core sampling compared with free hand FNAs. Firstly the US guided core is performed using wide bore 20G compared with free hand FNAs 21G that provide more cellular material for diagnosis. Secondly thyroid nodules can be localized more accurately under ultrasound guidance than by palpation. This accurate localization may be a contributing factor in an improved rate of satisfactory sampling in Ultrasound guided core group. It is important to recognize the two techniques are used in different groups of patients which in itself can affect the results.

In this study US guided core sampling for cytology was associated with a greater reliability rate in comparison with free hand FNA without any additional clinical complications.

Conclusion:

Ultrasound guided core sampling for cytological examination leads to greater proportion of satisfactory samples than free hand FNAC and is a safe and useful technique for obtaining samples for cytology and histopathology to diagnose thyroid malignancy and to plan for further management.

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Role and contribution of authors:

Dr Waseem Yar Khan, Associate Professor, Department of General Surgery, Nowshera Medical College & Qazi Hussain Ahmed Medical Complex, Nowshera, abstract writing, material and methods, results, discussion and references.

Dr Zahid Khan, FCPS (general surgery), Associate Professor of Surgery at Nowshera Medical College & Qazi Hussain Ahmed Medical Complex, Nowshera, introduction writing, help in searching of references, discussion writing and conclusion writing

Dr Hamzullah Khan, Assistant Professor of Pathology at Nowshera Medical College, Nowshera, data collection, data analysis, typing and editing references search

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