FREE HAND FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) VERSUS ULTRASOUND-GUIDED CORE SAMPLING OF THYROID GLAND FOR THYROID NODULES

Mohammad Hussain[1], Mahid Iqbal[2], Mukamil Shah[3], Imran ud Din[3], Shakil Ahmad[4]

ABSTRACT

Objective: *To determine the satisfactory sampling rate and safety of free hand fine needle aspiration cytology (FNAC) and ultrasound-guided sampling of thyroid gland.*

Methodology: *This comparative cross-sectional study was conducted at the department of surgery and department of ENT & head and neck surgery of Saidu Teaching Hospital from January 2008 to December 2010. A total of 212 thyroid samples were included in this analysis. 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.*

Results: *Among the U/S guided group, 82% samples were adequate while in free hand aspiration, 55% were adequate (p=0.0001). After excluding all the cysts and colloid nodules, the adequate sampling rate in U/S guided group was 86.36% while in free hand it was 53.72% (p=0.0001). No clinical complication was observed in any group.*

Conclusion: *US guided core sampling provides more adequate samples for cytology than free hand aspiration. Both FNAC and ultrasound-guided sampling of thyroid gland are safe.*

Key Words: *Fine Needle Aspiration Cytology, Ultrasound Guided Sampling, Thyroid Nodule.*

This article may be cited as: Hussain M, Iqbal M, Shah M, Din IU, Ahmad S. Free hand fine needle aspiration cytology (FNAC) versus ultrasound-guided core sampling of thyroid gland for thyroid nodules. Khyber Med Univ J 2012;4(3):106-109.

INTODUCTION

Free hand, *fine needle aspiration cytology* (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 etiology 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 establish 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 5-43.1% of free hand FNAC are initially unsatisfactory necessitating repeat sampling[2,6,7]. Several authors advocated the use of ultrasound (U/S) guidance for histology or U/S-guided FNAC to improve the diagnostic adequacy of thyroid nodule sampling.[3,6]

In Pakistan, FNAC has been tried in management of solitary thyroid nodule & multinodular goiter with good diagnostics yield.[8-10] In our setup, aspiration of thyroid nodule for cytological examination performed by either free hand FNAC by consultant general or ENT surgeons using 23 G needle or core biopsy was taken under US-Guidance with the help of sonologist. The aim of this study was to compare the satisfactory sampling rate and safety of free hand FNAC and US guided core sampling.

METHODOLOGY

This study was conducted in department of surgery, department of ENT & Head and Neck surgery and

1 Department of Surgery, Saidu Medical College, Saidu Sharif Swat, Pakistan
2 Department of ENT, Saidu Medical College, Saidu Sharif Swat, Pakistan
3 Department of Pathology, Saidu Medical College, Saidu Sharif Swat, Pakistan
4 Director, Swat Institute of Nuclear Medicine, Oncology and Radiotherapy (SINOR) Swat, Pakistan

Address for Correspondence:
Dr. Muhammad Hussain
Assistant Professor, Surgery Department
Saidu Group of Teaching Hospital Swat
Saidu Medical College Saidu Sharif, Swat
Cell: 0300-5923813
Email:mhussaindr@hotmail.com
Date Submitted: March 11, 2012
Date Revised: July 29, 2012
Date Approved: July 30, 2012

Radiology Department Saidu Teaching Hospital Saidu Sharif Swat. A total of 212 thyroid aspirates were obtained in surgery, ENT and Radiology Department in three years interval (Jan 2008 to Dec 2010) and all were included in the study. Free hand FNAs were performed by consultant general surgeon and ENT surgeon with 23 gauge needle and 10 ml Disposable syringe. Non dominant nodules as part of multinodular goiter and those difficult to palpate were sampled under USG guidance, by surgeon and ENT surgeon with the help of sonologist. Thyroid gland was scanned with high resolution linear probe (9-11 MHz) and the core needle was inserted through U/S guidance, mainly in to the dominant nodule. 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 results were graded as unsatisfactory, containing no follicular cells or less than six groups of epithelial cells and satisfactory containing sufficient number of follicular cells. Data were analyzed using chi-square test comparing satisfactory results obtained by free hand FNAs to US 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 U/S guided core sampling. These samples include cystic as well as colloid nodules. In the U/S guided group, 17/98 (17.34%) cytology samples were inadequate as compared to 51/114 (44.73%). This is a statistically significant difference with a chi square of 18.146 and a p=0.0001 (Table I).

If all the cysts and colloid nodule are excluded from analysis of adequacy, 9/66 (13.63%) U/S guided core samples were inadequate as compared to 26/55 (47.27%) of free hand FNAs, the chi square is16.51 with a p=0.0001 (Table II).

There were no clinical complications as a result of free hand FNAs as well as U/S guided core sampling for cytology.

DISCUSSION

Thyroid swelling is a common condition presenting to general surgeons and head and neck surgeons. FNAC has become an obligatory part of assessment of a thyroid nodule to establish a diagnosis and initiate a treatment plan. Free hand 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.[11] Several authors have reported the high proportions of cytological inadequate samples obtained with free hand FNA samples which range from 5 to 43%,[7,12-17] These inadequate samples necessitate repeat sampling. The use of U/S in taking histological and cytological samples has expanded in the recent years. Recent work has shown that U/S-guided samples for cytological or histological examination of thyroid gland can increase the sensitivity and specificity for diagnosis of neoplasia and decrease the inadequate rate compared with freehand FNAs.[13-15] Our results indicate that U/S guided core sampling for cytology provides more adequate (82.65%) samples than free hand FNAC (55.66%). These results compares favorably with other studies which report an U/S guided adequate sampling, ranging from 68 to 85%.[13,18,19]

When all the cysts and colloid nodules were excluded from analysis and the data were analyzed the adequate sampling rate of U/S guided core sampling for

FREE HAND FINE NEEDLE ASPIRATION (FNA) AND ULTRASOUND GUIDED CYTOLOGY OUTCOMES

Cytology reports	U/S Guide core (%)	Free hand FNA(%)	Chi Square Test
Inadequate	17 (17.34)	51 (44.73)	p=0.0001
Adequate	81 (82.65)	63 (55.26)	
Total	98	114	

Table I

FREE HAND FINE NEEDLE ASPIRATION (FNA) AND ULTRASOUND GUIDED CYTOLOGY OUTCOME (EXCLUDING CYSTS AND COLLOID NODULES)

Cytology reports	Ultra Sound Guide core (%)	Free hand FNA(%)	Chi Square Test
Inadequate	9 (13.63)	26 (47.27)	p=0.0001
Adequate	57 (86.36)	29 (52.72)	
Total	66	55	

Table II

cytology increased from 82.65% to 86.66%; however, the free hand FNA adequate sampling 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 multi-nodular goiter then it is preferable to perform U/S guided core sample for cytology.

There are a numerous possibilities for the high reliability rate of U/S guided core sampling compared with free hand FNAs. U/S guided core was performed using wide bore 20G compared with free hand FNAs 23G that provided more cellular material for diagnosis. Secondly thyroid nodules can be localized more accurately under ultrasound guidance than by palpation. This accurate localization may be contributing factor in an improved rate of adequate sampling in U/S guided core group. It is important to recognize that two techniques are used in different groups of patients which in itself can affect the results.

In this study U/S guided core sampling for cytology was associated with a greater reliability rate in comparison with free hand FNA without any additional clinical complications. FNAC is a safe procedure and very few minor complications have been reported.[20-22] Safirullah et al reported minor skin Bruises in 10 % cases.[21] Tariq M et al reported minor complications like seroma of wound and hyperparathyroidism and subcutaneous hematoma.[22]

CONCLUSION

U/S guided core sampling for cytological examination leads to greater proportion of adequate samples than free hand FNA and a safe and useful technique for obtaining sample for cytology and histopathology in diagnosis of thyroid malignancy and to plan for further management.

REFERENCES

1. Daskalopoulou D, Papanastasiou C, Markidou S, Rapidis AD. The diagnostic value of fine needle aspiration cytology in Waldyer's ring lymphomas. Oral Oncol 2001; 37: 36-41.
2. Furrukh K, Shahida N, Nagi AH, Mansoor AJ, Naveed IA. Fine needle aspiration cytology (FNAC): An experience at King Edward Medical College Lahore. Pak J Pathol 1996; 7: 33-6.
3. He Y, Zhang Z, Tian Z, Zhang C, Zhu H. The application of magnetic resonance imaging guided fine needle aspiration cytology in the diagnosis of deep lesions in head and neck. J Oral Maxillofac Surg 2004; 62: 953-8.
4. Iqbal M, Anwar K, Ihsanullah, Javaid M, Khan IA, Hussain G. The diagnostic value of fine needle aspiration cytology in masses of the salivary glands. J Postgrad Med Inst 2011; 25: 73-77.
5. Tunbridge WMG,Edverd Dc,Hall R, Appleton D, Brewise M, Clark et al. The spectrum of thyroid diseases in a community. The whickman survey. Clin Endocrinol 1997, 7: 481-93.
6. Mehrotra P, Hubbaro JGH, Jhonson SJ, Richardson DL, Bliss R, Lennard TWJ. Ulrasound scan guided core sampling for diagnosis versus free hand FNAC of the thyroid gland. Surgoen 2005; 3: 1, 1-5.
7. Tabaqchali MA, Hanson JM, Jhonson SJ, Wadehra V, Lennard TW, Proud G. Thyroid aspiration cytology in Newcastle, a six years cytology/histopathology correlation study. Ann R Coll Surg Eng 2000; 82: 149-55.
8. Basharat R, Bukhari MH, Saeed S, Tahira Hamid T. Comparison of fine needle aspiration cytology and thyroid scan in solitary thyroid nodule. Patholog Res Int 2011; 2011: 754041-9.
9. Addique M, Islam UU, Iqbal P, Baloch Q. FNAC: A reliable diagnostic tool in solitary thyroid nodule and multinodular goiter. Pak J Surg 2008; 24(3): 118-91.
10. Anwar K, Khan IA, Zada B. The role of fine needle aspiration cytology (FNAC) in the management of solitary thyroid nodule. KUST Med J 2010; 2(2): 49-52.
11. Zygmunt H K. The thyroid and parathyroid glands. In. Baily and Love's Short practice of surgery .25th ed. London. Edward Arnold, 2008. 771-806.
12. Ko KM, Jhu IK, Yang SH, Lee JH, Nam JH, Juhung SW et al. Clinicopathological analysis of fine needl aspiration cytology of thyroid. Acta Cytol 2003; 47: 727-32.
13. Hatda T, Okada K, Ishii H, Ichii S, Utsumiya J. Evaluation of ultrasound guided fine needle aspiration biopsy for thyroid nodule. Am J Surg 1998; 175: 133-36.
14. Daness D, Sciacchitano S, Farsetti A, Andreoli M, Pontecorvi A. Diagnostic accuracy of conventional versus sonographically guided fine needle aspiration biopsy of thyroid nodule. Thyroid 1998; 8: 15-21.
15. Carmeci C, Jeffery RB, Mc Doughal IR, Nowels KW, Weigal RJ. Ultrasound guided fine needle aspiration biopsy of thyroid masses. Thyroid 1998; 8: 283-89.
16. McHenry CR, Sluserzyki SJ, Khiyami A. Recommendations for management of cystic thyroid disease. Surgery 1999; 126: 1167-72.
17. Tangpricha V, Chen BJ, Swan NC, Sweeny AT, Morenas A, Sefer JD. Twenty one gauge needle provide more cellular samples than twenty gauge needles in fine needle aspiration biopsy of the thyroid but may not provide increased accuracy. Thyroid 2001; 11; 973-76.

18. Rosen IB,Azadian A, Walfish PG, Salem S, Lansdown E, Bedard YC. Ultrasound guided fine needle aspiration biopsy in the management of thyroid diseases. Am J Surg 1993; 166: 346-49.

19. Court-Payen M, Nygaard B, Horn T, Krag-Jacobson G, Braendstup O, Narvestad E, et al. US guided fine needle aspiration biopsy of thyroid nodule. Acta Radiol 2002; 43: 131-40.

20. Raza S, Saeed Z, Raza H, Ahmed M. FNAC in the management of solitary thyroid nodule. Professional Med J 2008; 13: 598-603.

21. Safirullah, Mumtaz N, Khan A. Role of fine needle aspiration Cytology (FNAC) in the diagnosis of thyroid swellings. J Postgrad Med Inst 2004; 18: 196-201.

22. Tariq M, Iqbal MZ, Ali MZ, Ch. MA, Khan RS, Irum S. FANC of thyroid nodule; Diagnostic accuracy of fine needle aspiration cytology (FNAC). Professional Med J 2010; 17(4): 589-597.

AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

MH: Conception and design, Data collection, Drafting the manuscript

MI, MS, IUD: Data collection

SA: analysis and interpretation of the data.

CONFLICT OF INTEREST

Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE

NONE DECLARED

KMUJ web address: www.kmuj.kmu.edu.pk

Email address: kmuj@kmu.edu.pk