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Accuracy of Ultrasound Guided Fine Needle Aspiration Cytology of Head, Neck and Breast Lesions

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Abstract: *Background*: Palpable superficial mass (es) is a major complain making patients attending any surgical and otolarygeal clinics. Most of these lesions are related to thyroid, cervical lymph nodes, breast or salivary glands Triple assessment using clinical examination, ultrasound and cytology are usually sufficient in reaching the final diagnosis especially in specialized surgical centers. *Aims*: Is to assess ultrasound accuracy in making provisional diagnosis of the lesion and how accurate as a guide for fine needle aspiration cytology (FNAC). *Methods*: This prospective study included 90 patients whom were presented with self-detected head, neck or breast lesions then attended the specialized surgical clinic of the Medical City Complex, Baghdad during the period from November 2019 to October 2020. Their age ranged from 10-63 years (mean 37.8 years). Patients underwent ultrasound examination and ultrasound guided FNAC. *Results*: The majority of these lesions were thyroid (34%), breast lesions (33%) and cervical lymphadenopathy (27%).The provisional diagnosis provided in ultrasound report for loco-regional pathology was benign in majority of Lymph nodes group (72%), 3 of 4 parotid lesions were benign and majority of thyroid cases were also benign (87%), the majority of breast lesions were malignant and represents 84%of the cases. The FNAC results in correlation with ultrasound findings were in concordance regarding all the lymph nodes and parotid aspirates(100%) while that of thyroid aspirates were in correlate in 100% after two passes, breast aspirates, concordance rate was 88%. The accuracy of ultrasound in guiding the needle for targeting the lesion was 100%, while The sensitivity, specificity, positive and negative predictive values and accuracy in reaching the final diagnosis were 100%, 62%, 96%, 100% and 96.6%, respectively. *Conclusions*: Ultrasound and ultrasound guided FNAC represent a reliable modality for providing a provisional diagnosis and targeting the needle to reach any accessible lesions, with avoiding nearby vital organs and vessels. Ultrasound and ultrasound guided FNAC can be recommended for the clear cellular sampling by flickering the needle within the lesion.

Key words: Head · Neck lesions · Breast Ultrasound · Ultrasound Guided Fine Needle Aspiration · Cytology

INTRODUCTION

In certain circumstances, the clinical examination of the head and the neck masses can be difficult, because of the confusing location of the lesion [1]. Most frequently these lesions are enlarged lymph nodes, thyroid gland nodules, or salivary gland related lesions. Other rare possibilities are thyroglossal duct cysts, glomus tumors of carotid, jugular or vagus nerve [2]. The clinical diagnosis of neck masses is based on clinical history obtained from the patients and data collected from physical examination. The further diagnosis and management of neck masses can include ultrasound, computed tomography, fine-needle aspiration, or even biopsy [3].

Ultrasound is a safe method of diagnosis due to lack of ionizing radiation. It is very useful for checking the superficial organs like neck, breast and testicle, its working in real time making the operator dependent and facilitates the local intervention procedure [4].

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FNAC is a cheap, simple, quick and worthy procedure. It can be performed either with or without imaging guiding, the latter being in real time and it gives clear details regarding the nature of the imaged lesion. The technique has very little or even no contraindications and complications and is suitable for the use in an widespread clinical settings [5, 6]. It can give precise data for the diagnosis of head and neck masses by discriminating malignant from inflammatory lesions and both had different treatment protocols [7]. Effortlessly, FNAC should be performed before surgery for most cases of query cervical or head masses, as the cytological results can help further future management [1]. All over the world, FNAC is broadly used and recognized maneuver in the diagnosis of thyroid and breast lesions [8, 9]. Therefore, the aim of this study was to assess the ultrasound accuracy in making the provisional diagnosis and the accuracy of ultrasound guidance in giving adequate cell for cytological studies.

MATERIALS AND METHOD

Patients: This prospective study enrolled 90 patients whom complained of palpable head, neck and breast masses referred from the specialized surgical clinics to interventional Radiology clinic in Martyr Ghazi Alharriri and Baghdad Teaching Hospitals (Medical City Complex, Baghdad) during the period from November 2019 to October 2020. Their ages ranged from 10 to 63 years (mean age 37.8 years). Specialist surgeons performed the clinical examination of all patients then patients were referred to ultrasound examination which was performed by a specialist radiologist.

Ultrasound Examination: The scanning was performed using GE Voluson E6 ultrasound machine (Korea) equipped with 7-12 MHz real-time B-mode linear array transducer. The ultrasound examination of the patients was performed by asking the patient to lie flat on the couch with desired region fully exposed, the mass was assessed for it location, size and vascularity using color Doppler, all these parameters were documented.

FNAC: FNAC which was performed under ultrasound guidance by a specialist Radiologist. After sterilizing the area of interest using 10% povidone iodine with probe being covered by sterile probe cover, using 22\23 Gauge needle, in plane approach was used in all cases, once the needle is within the lesion multiple to and fro movements were done until sufficient material seen within the needle hub, one to three passes were performed in each patient according to material gained after each pass. Then the aspirate was smeared on slides, immerged in absolute alcohol jar, stained using Papanicolaou stain and examined cytologically for presence of any abnormal cells, then results correlation were done.

RESULTS

The details about patients' age are shown in Figures 1. Regarding the distribution of the anatomical locations, the majority of the lesions were thyroid and breast lesions representing 34% and 33% of lesions, respectively. Most of the remaining lesions are cervical lymphadenopathy, the details about loco-regional distribution are illustrated in the Table 1.

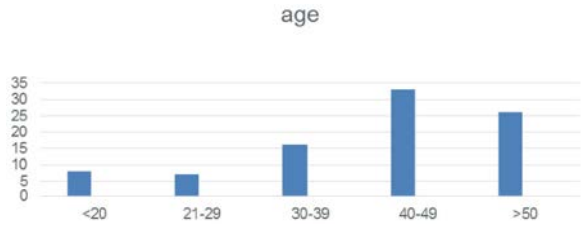

Fig. 1: Age Distribution of the Study Population

Table 1: Loco-Regional Distribution of the Study Sample

Lesion	No.(Percent)
Cervical Lymph nodes	25 (27%)
Parotid	4 (20%)
Thyroid	31(34.4%)
Breast	30 (33.3%)
Total	90 (100%)

Table 2: Ultrasound results according to the Loco-Regional pathology

Region	Ultrasound findings	%
Lymph nodes	Benign	18(72%)
	Malignant	7 (28%)
Parotid	Benign	3(75%)
	Malignant	1 (25%)
Thyroid	Benign	27(87%)
	Malignant	4 (13%)
Breast	Benign	5 (16%)
	Malignant	25(84%)

Table 3: Validity test of ultrasound in diagnosis of benign regional lesions in correlation with FNAC results

	FNAC		
Ultrasound	Positive	Negative	Total
Positive	82	3	85
Negative	0	5	5
Total	82	8	90
Sensitivity	100%		
Specificity	62%		
Negative predictive value	100 %		
Positive predictive value	96%		
Accuracy	96.6%		

The provisional diagnosis that was provided in ultrasound report for loco-regional pathology was benign in majority of lymph node group (72%) and malignant in 7 (18%). Three out of four parotid lesions (75%) were benign and majority of thyroid cases were also benign (87%) scored from 1-3 according to thyroid imaging and reporting data system provided by American college of radiologist. The majority of breast lesions were malignant and labelled as BIRADS (breast imaging reporting and data system) IV or V and represents 84% of breasts cases, further details regarding the ultrasound findings are demonstrated in Table 2.

The FNAC results in correlation with ultrasound findings were in concordance regarding all the lymph nodes and parotid aspirates (100%) while thyroid aspirates were in concordance in 100% after two passes (first pass was blood filled), Regarding breast aspirates, concordance rate was 88%.

The accuracy of ultrasound in guiding the needle for targeting the lesion was 100%, however the accuracy of ultrasound in reaching the final diagnosis was illustrated in Table 3 below.

DISCUSSION

FNAC is a simple, Safe, rapid and easy method in sampling the cells for cytology especially for focal superficial lesion. As well as, it is relatively cheap when compared to the core needle biopsy [10, 11], In Iraq FNAC remains the first choice in evaluating any suspicious breast and thyroid lesions detected by ultrasound or mammography (for breast lesion) and can plan for future management of the breast cancer [12, 13]. Nevertheless, drawbacks for FNAC include difficulty in giving the precise histopathology, difficulty in differentiation ductal from lobular breast carcinoma in poorly differentiated cases and providing the hormonal receptors and HER2 status if the aspirated samples are insufficient [14].

Accurate diagnosis requires the availability of competent radiologist or interventional radiologist; skilled in aspirating and targeting the lesion, as well as the availability of high resolution ultrasound probe and qualified ultrasound machine, finally well trained cyto-technologist to ensure the preparation of quality smears [15, 16]. In our study, there was high concordance between ultrasound guiding and FNAC results, targeting the lesion was achieved in 100% of cases. This could be attributed to that all FNAC were done by well-trained intervention radiologists skilled in ultrasound guided procedures including biopsy and aspiration and the technical by using in plain method ultrasound technique where the probe is parallel to our needle, this allows visualization of the needle from skin all the way down to the lesion [17].

In our study, most of samples aspirated yield sufficient materials, except for the thyroid lesions. Three attempts were performed in twenty out of thirty one patients due to vascular nature of solid thyroid nodule resulting in bloody smear collection. This was solved by using 23 gauge needle instead of 22 gauge and minimizing needle movement and time being within the lesion. In the other hand, aspirates from two lymph nodes lesions were insufficient for diagnosis, in these cases multiple to and fro movements with negative pressure were done, sufficient yield achieved and the cytological results revealed normal cellular pattern [18, 19].

The sensitivity of ultrasound in detection of lesion pathology as benign or malignant was 100%. The specificity was 62% and overall accuracy was 96.6%. These results agree with previously reported results that had sensitivity from 82.14% to 95% and specificity from 62.7% to 100% [20-23].

CONCLUSIONS

Ultrasound is an efficient, cost effective, real time scanning tool for guiding FNAC from superficial lesions; it lacks ionizing radiation and when performed by professional, well trained interventional radiologists / radiologist the results are highly accurate. This is usually enforced by major role of thorough history; proper clinical examination and competent cytology all are of utmost importance in yielding a high productive and precise diagnosis.

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