Section: Pathology

Original Research Article

CYTOPATHOLOGICAL PROFILE OF ULTRASOUND GUIDED FINE NEEDLE ASPIRATION CYTOLOGY OF LESIONS IN PATIENTS ATTENDING TERTIARY CARE HOSPITAL: A RECORD BASED STUDY

K.L Shoba[1], Amrutha Gorva[2], Yogender Patwari[2], Chaithanya K[2]

[1]Associate Professor, Mandya Institute of Medical Sciences, Mandya, Karnataka, India
[2]Assistant Professor, Mandya Institute of Medical Sciences, Mandya, Karnataka, India

Received : 19/02/2023
Received in revised form : 16/03/2023
Accepted : 31/03/2023

Keywords:
Deep-seated lesions, USG guidance, FNAC.

Corresponding Author:
Dr. Ayshath Shumaisa,
Email: sumaisa2006@yahoo.com

DOI: 10.47009/jamp.2023.5.2.312

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (2); 1487-1493

Abstract

Background: Fine needle aspiration cytology (FNAC) is a simple investigation for the preoperative diagnosis of palpable, deep-seated lesions of various organs. A confirmed diagnosis is essential for both the treatment and staging of cancers. The present study was undertaken to critically analyze the use of ultrasound-guided FNAC in the diagnosis of various lesions. The aim is to describe the cytological features of deep-seated, inaccessible, impalpable lesions through USG-guided FNAC and to describe the common site and demographic profile of patients. **Materials and Methods:** A retrospective record-based 5-year study was conducted from January 2017 to December 2021. **Result:** Among a total of 334 cases of USG-guided FNAC, 55% were females and 45% were males with a mean age of 48.31 years. 98 lesions were benign, 130 were malignant and 106 were other lesions. 116(34.7%) were thoracic lesions, 148(44.3%) were head and neck lesions, 12(3.6%) were retroperitoneal lesions, 42(12.6%) were abdomino-pelvic lesions and 16(4.8%) were bone, synovial lesions and lower limb lesions. In thoracic lesions, 65(56%) cases were from the lung, and among that 16(24.6%) were squamous cell carcinoma. In head and neck lesions, 57(38.5%) cases were from cervical lymph nodes, and among that 18(31.6%) were metastatic squamous cell carcinoma. In retroperitoneal lesions, one case of DLBCL of the spleen and metastatic squamous cell carcinoma of the para-aortic lymph node each. In abdominopelvic lesions, 15(35.7%) cases were from the liver, and among that 4(26.7%) were hepatocellular carcinoma. The sensitivity and specificity of USG-guided FNAC were 100% and 100% respectively. **Conclusion:** USG-guided FNAC is a minimally invasive and safe diagnostic procedure for the diagnosis of various deep-seated, inaccessible lesions thereby avoiding unnecessary, expensive, and often aggressive diagnostic procedures and leading to less morbidity and mortality, and treatment can be started early.

INTRODUCTION

Ultrasound-guided Fine needle aspiration cytology (FNAC) is a simple, rapid, accurate, economical, and safe diagnostic procedure that can be used in various neoplastic and non-neoplastic lesions. As a diagnosis is rapidly available on FNAC, the appropriate medical and surgical therapies can be started earlier, thus avoiding unnecessary, expensive, and often invasive procedures.[1] With the increased sophistication of radiologic imaging techniques, the sensitivity of detecting non-palpable, deep-seated lesions has greatly improved. Imaging techniques do not always distinguish between benign and malignant lesions morphologically. A confirmed diagnosis is essential for both the treatment and staging of cancers.[2] FNAC has long been used for the non-surgical confirmation of primary as well as metastatic lesions. Ultrasonography (USG) guided FNAC does not require the injection of any contrast medium and can be easily repeated when necessary.[2]

Though histopathology is the gold standard, USG-guided FNAC offers promising results. When the procedure is jointly done by a pathologist and radiologist, the accuracy rate of obtaining a good sample is very high as it allows accurate localization of the lesion, assesses the origin of mass and provides incessant real-time needle tip visualization as it passes through the tissue planes to the target area and can also lead to a suggestion of additional biopsy sites and sampling for special procedures such as culture or gram staining in abscess and

ISSN (O): 2687-5365; ISSN (P): 2753-6556

immune-phenotyping in malignancies or any other means of confirmation.[1,3]

The present study was undertaken to critically analyze the use of ultrasound-guided FNAC in the diagnosis of various head and neck, thoracic, abdominal, retroperitoneal, and deep-seated, inaccessible, impalpable lesions as small as 1cm in critical anatomical sites.

Objectives of the study:

1. To describe the cytological features of deep-seated, inaccessible, impalpable lesions through USG-guided FNAC
2. To describe the common site of lesions and to determine the demographic profile of patients.

MATERIALS AND METHODS

This was a retrospective record-based 5-year study on 334 cases, who were referred for guided FNAC to the Department of Pathology, Mandya Institute of Medical Sciences, Mandya during the period from January 2017 to December 2021. Under radiological guidance, aspiration was done with a 22G spinal needle and an 18-22G hypodermic needle attached with a 10ml syringe for deeper and superficial lesions respectively. Smears were prepared and stained with Hematoxylin & Eosin (H&E) and May-Grunwald Giemsa (MGG). The lesions were divided into the following categories: inflammatory, benign, malignant, others, and inconclusive. The smears were correlated with the histopathological diagnosis for available cases.

The collected data were entered into a Microsoft Excel sheet and analyzed using SPSS 20 statistical software (trial version). Descriptive statistics like mean, Standard deviation, and percentage were calculated. The Chi-square test was used to assess the significance of the association between the variables. The level of significance was considered as a P value < 0.05.

Ethical Consideration

Prior approval from the Institutional Ethics Committee (No. MIMS/IEC/561) of MIMS, Mandya was obtained for the study.

RESULTS

The age of the patients ranged from 1 -110 years. The mean (±SD) age was 48.31 (±18.86) years.

Table 1: Age and sex distribution of patients

Age in years	Male	Percentage (%)	Female	Percentage (%)
1 to 20	11	7.3	14	7.6
21 to 40	27	18	72	39.1
41 to 60	49	32.7	67	36.4
61 to 80	61	40.7	29	15.8
> 80	2	1.3	2	1.1
Total	150		184	

Out of 334 study population, 184 (55%) were females, the majority of them were in the age group of 21-40 years of age and the majority of the male patients were in the 61-80 age group.

Table 2: Site-wise frequency of FNAC

Site	Number	Percentage
Head and neck	148	44.3
Thoracic	116	34.7
Abdomen and pelvis	42	12.6
Retroperitoneum	12	3.6
Bone and synovium	8	2.4
Lower limb	8	2.4
Total	334	100

Out of 334 cases, the majority of lesions were from the Head and Neck region (44.3%).

Table 3: Distribution pattern of lesions based on cytological features

Lesions	Number	Percentage
Inflammatory	81	24.3
Benign	98	29.3
Malignant	130	38.9
Inconclusive	17	5.1
Others	8	2.4
Total	334	100

Among 334 lesions, 130 lesions were malignant (38.9%).

Table 4: Cytological diagnosis of Head and neck lesions (148 cases)

Inflammatory	Benign	Malignant	Inconclusive & others
Thyroid (60 cases)			

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Hashimoto's thyroiditis [n=18, 30.0%] Lymphocytic thyroiditis [n=3, 5.0%]	Colloid goiter [n=11, 18.3%] Nodular goiter [n=11, 18.3%] Colloid cyst [n=1, 1.7%]	Follicular neoplasm [n=5, 8.3%] Anaplastic carcinoma [n=1, 1.7%] Medullary carcinoma [n=1, 1.7%] Papillary carcinoma [n=8, 13.3%] Non-Hodgkin's lymphoma [n=1, 1.7%]	
Cervical lymph node (57 cases)			
Granulomatous lesion [n=3, 5.3%] Reactive lymphoid hyperplasia [n=18, 31.6%]		Metastatic papillary carcinoma thyroid [n=5, 8.8%] Metastatic Squamous cell carcinoma [n=18, 31.6%] Metastatic adenocarcinoma [n=1, 1.7%] Metastatic poorly differentiated carcinoma [n=7, 12.4%] Metastatic medullary carcinoma [n=1, 1.7%] Non-Hodgkin's lymphoma [n=2, 3.5%] Metastatic nasopharyngeal carcinoma [n=1, 1.7%] Metastatic mucoepidermoid carcinoma [n=1. 1.7%]	
Parotid (11 cases)			
Chronic sialadenitis [n=2, 18.2%]	Basal cell adenoma [n=1, 9.1%] Warthins tumor [n=1, 9.1%]	Adenoid cystic carcinoma [n=1, 9.1%]	
Intraparotid lymphnode [n=1, 9.1%]	Pleomorphic adenoma [n=3, 27.2%] Ameloblastoma [n=1, 9.1%]	Salivary duct carcinoma [n=1, 9.1%]	
Other Cervical swellings (11 cases)			
Acute suppurative lesion [n=1, 9.1%]	Benign cystic lesion [n=2,18.2%] Thyroglossal cyst [n=5, 45.4%] Benign adnexal tumor [n=1, 9.1%] Benign spindle cell lesion [n=2, 18.2%]		
Submandibular gland (5 cases)			
Chronic sialadenitis [n=1, 20.0%]	Pleomorphic adenoma [n=1, 20.0%] Ameloblastoma [n=1, 20.0%]	Mucoepidermoid carcinoma [n=1, 20.0%]	Inconclusive [n=1, 20.0%]
Parapharyngeal mass (2 cases)			
	Nodular fascitis [n=1, 50.0%] Benign spindle lesion [n=1, 50.0%]		
Scalp (1 case)			
			Inconclusive [n=1, 100%]
Nasal cleft (1 case)			
	Lipomatous lesion [n=1, 100%]		

Among 148 (44.3%) head and neck lesions, 60 cases were from thyroid, out of which 18 (30%) were Hashimoto's thyroiditis followed by papillary carcinoma thyroid (13.2%). Out of 37 cervical lymph node lesions, 18 cases each of reactive lymphoid hyperplasia and metastatic squamous cell carcinoma were noted. Among parotid swelling, the majority were pleomorphic adenomas (27.2%).

Table 5: Cytological diagnosis of Thoracic lesions (116 cases)

Inflammatory	Benign	Malignant	Inconclusive & others
Lung (65 cases) and pleura (1 case)			
Acute on chronic suppurative abscess [n=8, 12.3%] Chronic inflammatory lesion [n=7, 10.8%] Granulomatous lesion [n=2, 3%]	Pleural nodule [n=1, 100%]	Squamous cell carcinoma [n=16, 24.6%] Adenocarcinoma [n=8, 12.3%] Poorly differentiated carcinoma [n=8, 12.3%] Large cell neuroendocrine carcinoma [n=1, 1.5%] Oat cell carcinoma [n=1, 1.5%] Small cell carcinoma	Inconclusive [n= 6, 9.3 %]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

		[n=3, 4.6%]	
		Large cell carcinoma [n=5, 7.8%]	
Breast (39 cases)			
Acute on chronic mastitis [n=3, 7.7%]	Benign cystic lesion [n=1, 2.5%]	Invasive Ductal Carcinoma [n=8, 20.5%]	
	Simple cyst [n=6, 15.5%]		
	Fibrocystic disease [n=9, 23.0%]		
	Galactocele [n=2, 5.1%]		
	Usual epithelial hyperplasia [n=1, 2.5%]		
	Atypical ductal hyperplasia [n=1, 2.5%]		
	Fibroadenoma [n=6, 15.5%]		
	Gynaecomastia [n=2, 5.1%]		
Axilla (7 cases)			
	Fibrocystic disease [n=4, 57.2%]	Invasive Ductal Carcinoma [n=2, 28.6%]	Calcified lesion [n=1, 14.2%]
Chest wall (3 cases)			
		Poorly differentiated carcinoma [n=1, 33.3%]	Inconclusive [n=1, 33.3%]
		Squamous cell carcinoma [n=1, 33.3%]	
Mediastinal mass (1 case)			
Granulomatous lymphadenitis [n=1, 100%]			

Among 116 (34.7%) thoracic lesions, the majority were from the lung (56%), out of which 24.6% were squamous cell carcinoma, followed by fibrocystic disease of the breast (23%).

Table 6: Cytological diagnosis of Abdominopelvic lesions (42 cases)

Inflammatory	Benign	Malignant	Others
Liver (15 cases)			
Hydatid cyst [n=1, 6.7%]	Liver cell adenoma [n=2, 13.4%]	Hepatocellular carcinoma [n=4, 26.7%]	Normal [n=1, 6.7%]
Abscess [n=1, 6.7%]		Metastatic Squamous cell carcinoma [n=1, 6.7%]	
		Metastatic adenocarcinoma [n=2, 13.0%]	
		Metastatic papillary adenocarcinoma [n=1, 6.7%]	
		Metastatic invasive ductal carcinoma [n=1, 6.7%]	
		Cholangiocarcinoma [n=1, 6.7%]	
Intestine (3 cases)			
		Adenocarcinoma-jejunum [n=1, 33.3%]	
		Adenocarcinoma- ascending colon [n=1, 33.3%]	
		Large cell carcinoma-Right ileocaecal mass [n=1, 33.3%]	
Scrotum (1 case)			
			Calcinosis cutis [n=1,100%]
Ovary (1 case)			
		Serous cystadenocarcinoma [n=1, 100%]	
Mons pubis (1 case)			
			Inconclusive [n=1,100%]
Gallbladder (1 case)			
Empyema [n=1, 100%]			
Soft tissue (13 cases)			
	Benign spindle cell lesion [n=3, 23%]	Metastatic SCC [n=1, 7.7%]	Scar endometriosis [n=5, 38.5%]
	Lipoma [n=4, 30.8%]		
Peritoneal deposits (2 cases)			
		Metastatic papillary serous Cystadenocarcinoma [n=1, 50.0%]	
		Metastatic mucinous adenocarcinoma	

ISSN (O): 2687-5365; ISSN (P): 2753-6556

		[n=1, 50.0%]	
Inguinal lymph node (5 cases)			
Granulomatous lesion [n=1, 20.0%]		Metastatic melanoma [n=1, 20.0%]	Inconclusive [n=1, 20.0%]
Reactive lymphoid hyperplasia [n=1, 20.0%]		Metastatic Squamous Cell Carcinoma [n=1, 20.0%]	

Out of 42(12.6%) abdominopelvic lesions, 15 (35.7%) cases were from the liver, out of which 5 (33.3%) were from metastatic tumors followed by hepatocellular carcinoma (26.7%).

Table 7: Cytological diagnosis of retroperitoneal lesions (12 cases)

Inflammatory	Benign	Malignant	Others
Kidney (2 cases) and adrenal (1 case)			
	Renal oncocytoma [n=1, 50.0%]		Inconclusive, adrenal [n=1, 100%]
	Angiomyolipoma [n=1, 50.0%]		
Spleen (2 cases)			
		DLBCL [n=1, 50%]	Inconclusive [n=1, 50%]
Para-aortic lymph node (2 cases)			
Suppurative lesion [n=1, 50.0%]		Metastatic Squamous cell carcinoma [n=1, 50.0%]	
Urinary bladder (1 case)			
Acute on chronic cystitis [n=1,100%]			
Abdominal lymph node (4 cases)			
Tubercular cold abscess [n=1, 25%]			
Caseating TB lymphadenitis [n=1, 25%]			
Reactive lymphoid hyperplasia [n=2, 50%]			

In retroperitoneal lesions, one case of DLBCL of the spleen and metastatic squamous cell carcinoma of the para-aortic lymph node each.

Table 8: Cytological diagnosis of bone and synovial lesions and lower limb lesions (16cases)

Inflammatory	Benign	Malignant	Inconclusive & Others
Chronic synovitis of the knee [n=1, 6.25%]	Myositis ossificans [n=1, 6.25%]	Pleomorphic sarcoma- thigh [n=1, 6.25%]	Inconclusive [n=4,25%]
	Chondroma [n=1, 6.25%]		
	GCT of the tendon sheath [n=2, 12.5%]		
Caseating granuloma- spine [n=1, 6.25%]	Lipoma- thigh [n=2, 12.5%]		
	Benign proliferative lesion –shoulder [n=2, 12.5%]		
	Ganglion [n=1,6.25%]		

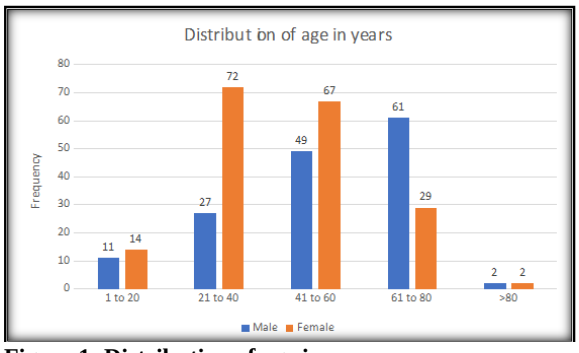

Figure 1: Distribution of age in years

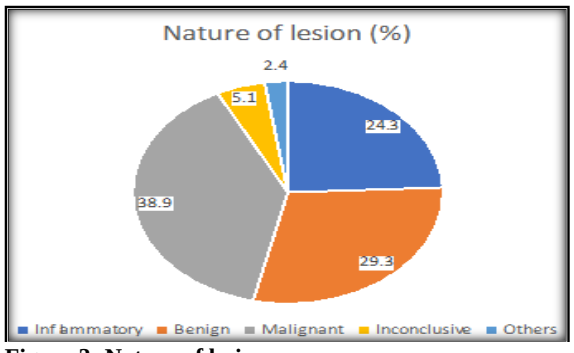

Figure 3: Nature of lesions

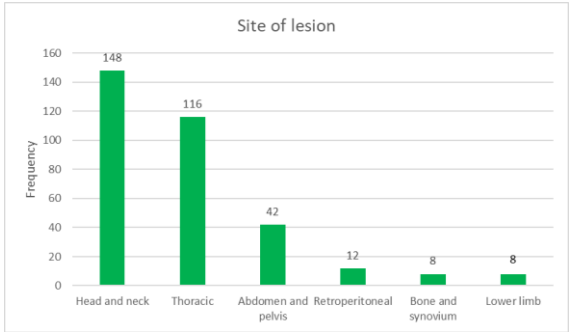

Figure 2: Site-wise distribution of lesions

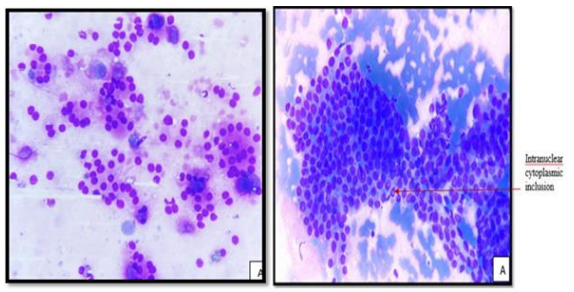

Figure 4: Microscopy (40x, MGG) of Follicular neoplasm (A), Papillary carcinoma thyroid(B).

ISSN (O): 2687-5365; ISSN (P): 2753-6556

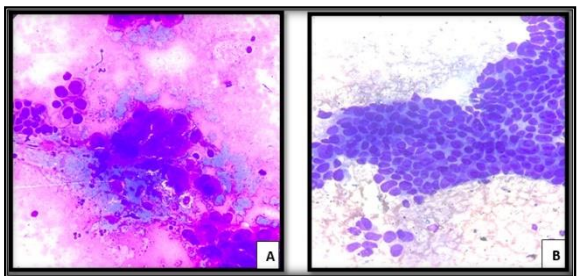

Figure 5: Microscopy (40x, MGG) of squamous cell carcinoma lung (A), large cell neuroendocrine carcinoma lung (B).

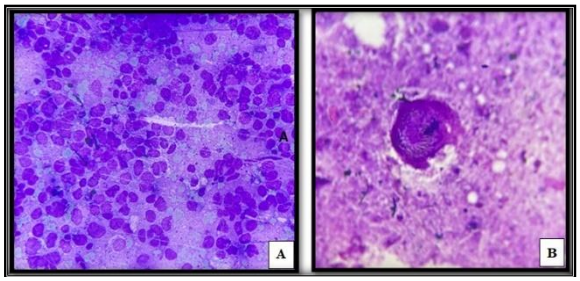

Figure 6: Microscopy (40x, MGG) of metastatic carcinoma to the liver (A), Hydatid cyst (B).

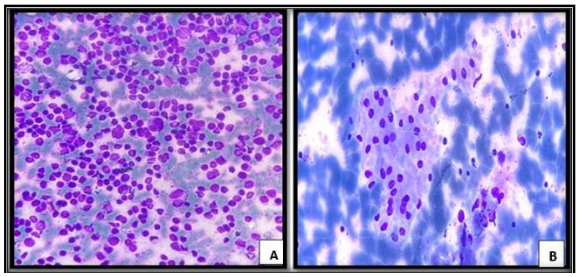

Figure 7: Microscopy (40x, MGG) of DLBCL spleen (A), Renal Oncocytoma (B).

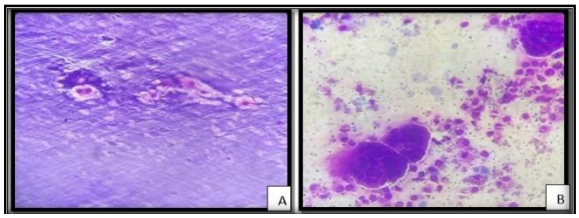

Figure 8: Microscopy (40x, MGG) of Ganglion (A), Giant cell tumor (B).

Histopathological correlation was available in 12 cases, by using which the statistical data was calculated. The diagnostic accuracy rate was 100% for benign, malignant, and non-neoplastic lesions. The sensitivity, specificity, and overall accuracy rate were 100%.

DISCUSSION

In our study, among a total of 334 cases of USG-guided FNAC, 184 (55%) were females and 150 (45%) were males which was similar to the study conducted by Amjad Sattar, Saba Hassan Shami, which showed 63.75% females and 36.25% males.[6] Most of the patients were in the age group of 41-60 years (34.7%) in the study which is the same as the study done by Momata Naiding (50.9%) and Mukta Pwereujani (38.9%).[7,8]

The age distribution observed in the present study ranged from 1 - 110 years reflecting that image-guided FNAC of deep-seated lesions can be done in a wide range of age groups including children without any major complications.

The inadequacy rates for guided FNAC have a very wide range from 2.8% to 33.6%. The factors which influence this include; the size, location, consistency of lesion, histological tumor type, vascularity and amount of necrosis present, facility for on-site adequacy evaluation, number of passes done, and the expertise of the pathologist and guiding radiologist.[8] In the present study, the inadequacy rate was low (5.1%) on account of all FNAC being performed by a pathologist. The findings of the present study were similar to the studies performed by Pujani M (5.6%).[8]

When going through the literature, we came across various studies on image-guided FNAC from various sites and observed that most of the authors reported reasonably good sensitivity, specificity, and diagnostic accuracy. Hemalatha evaluated USG-guided FNAC of abdominal and pelvic masses and reported the diagnostic accuracy as 100%, 96%, and 94.4%, respectively for benign, malignant, and non-neoplastic lesions.[5]

Histopathological confirmation was possible only in a few cases in our study as patients had either not given consent for any surgical intervention or had failed for follow-up. Most of the patients diagnosed to have malignant tumors cytologically were directly referred to oncology cancer centers as well.

Among 334 cases, 29.3% of lesions were benign, 38.9% were malignant and 31.8% were other lesions. Mangal N in a study noted 38% benign and 47% malignant lesions.[4]

On considering the distribution of cases, the majority of the cases belonged to the lung (65 cases) with adequate aspirates in 92.30 %. The incidence of squamous cell carcinoma was higher in our study similar to the study conducted by Hiral Chauhan.[9] This was followed by cervical lymph node(57 cases) in which metastatic malignancy (34 cases) was the most common lesion which was similar to 45 cases of metastatic malignancy observed in the study by Wilkinson AR.[10]

In liver lesions, the most common diagnosis was metastatic carcinoma (33.3%) followed by Hepatocellular carcinoma (26.7%). This was almost similar to the study by Jha BM in which 39.21% were metastatic carcinoma followed by hepatocellular carcinoma (27.45%).[11] In contrast to our findings, Parajuli S found the most common malignancy as hepatocellular carcinoma.[3]

Guided FNAC was also done from various organs like the spleen, intestine, gall bladder, kidney, mediastinum, pleura, retroperitoneal lymph nodes, bones & abdominal wall with a high adequacy rate and minimal complications. In this study, apart from benign and malignant lesions, FNAC has diagnosed

ISSN (O): 2687-5365; ISSN (P): 2753-6556

non-neoplastic lesions like Endometriosis, calcinosis cutis of the scrotum, Tuberculosis, abscess, and hydatid cyst.

CONCLUSION

USG-guided FNAC is a cost-effective, minimally invasive, accurate, and safe diagnostic procedure for the diagnosis of various intra-abdominal, intra-thoracic, head and neck, retroperitoneal and deep-seated, inaccessible, impalpable lesions, thereby avoiding unnecessary, expensive and often aggressive diagnostic procedures.

It has a significant role in the detection of clinically unsuspected malignancy and has a low re-biopsy rate making it an investigation of choice for early confirmation or exclusion of pathology and leading to less morbidity and mortality; thus, treatment can be started early.

REFERENCES

1. Langlois S Le P, Chryssidis S. Imaging methods for guidance of aspiration cyology. In: Orell SR, Sterrett GF. Fine needle aspiration cytology, 5th ed. Churchill Livingstone, p.28-37;2012.
2. Boiselle PM, Patz EF, Vining DJ, Weissleder R, Shepard JA, McLound TC. Imaging of mediastinal lymphnodes: CT, MR and FDGPET. Radiographics 1998;18:1061-9.
3. S Parajuli, A Tuladhar, & R Basnet. Ultrasound and computed tomography-guided fine needle aspiration cytology in diagnosing intra-abdominal and intra-thoracic lesions. Journal of Pathology of Nepal. 2011; 1(1):17–21.
4. Mangal Nidhi, Sharma K V, Varma N, Agarwal K A, Sharma P S, Aneja S. Ultrasound guided fine needle aspiration cytology in the diagnosis of retroperitoneal masses: A study of 85 cases. Journal of Cytology. July 2009; 26 (3):97-101.
5. A L H, Sindhuram V S, S S, J K S, I V, Aditya A. Ultrasound guided FNAC of abdominal-pelvic masses-the pathologists' perspective. J Clin Diagn Res. 2013 Feb;7(2):273-7.
6. Amjad Sattar, Saba Hassan Shamim, Sana Wahab and Anum Javed. Yield and Safety Profile of Ultrasound Guided Fine Needle Aspiration Cytology (FNAC) of Lymph Nodes. Journal of the College of Physicians and Surgeons Pakistan. 2016;26 (5): 357-60
7. Naiding, Momota, Anirban Goswami and Shipra Singh. “ROLE OF USG GUIDED FNAC IN DIAGNOSIS OF INTRA-ABDOMINAL AND INTRAPELVIC MASSES.” International Journal of Approximate Reasoning. 5 (2017): 222-233.
8. Pujani M, Jetley S, Jairajpuri ZS, Khan S, Hassan MJ, Rana S, Kumar M. A Critical Appraisal of the Spectrum of Image Guided Fine Needle Aspiration Cytology: A Three Year Experience from a Tertiary Care Centre in Delhi. Turk Patoloji Derg. 2016;32(1):27-34.
9. Hiral Chauhan, Deepa P Jethwani, Gauravi Dhruva. USG guided FNAC of lung mass - A study of disease spectrum. MedPulse International Journal of Pathology. March 2020; 13(3): 130-2.
10. Wilkinson AR, Mahore SD, Maimoon SA. FNAC in the diagnosis of lymph node malignancies: A simple and sensitive tool. Indian J Med Paediatr Oncol. 2012;33: 21-4.
11. Jha BM, Shah R, Patel J. Effectiveness of image guided fine needle aspiration cytology in cases of deep seated lesions. Int J Med Sci Public Health. 2013; 2:465-468.

ISSN (O): 2687-5365; ISSN (P): 2753-6556