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Ultrasound Guided Fine Needle Aspiration Cytology of Intra-abdominal Masses in Patients Attending Birat Medical College Teaching Hospital, Nepal

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ABSTRACT

Introduction: Fine needle aspiration cytology is a well-established, rapid, safe and cost-effective diagnostic technique and is increasing in popularity to diagnose mass lesions in intra-abdominal organs. Deep-seated organs are safely sampled and routinely aspirated using the fine needle under radiological guidance.

Objective: To diagnose intra-abdominal masses using ultrasound-guided fine needle aspiration cytology and to categorize them as malignant, benign, suspicious, inflammatory, and unsatisfactory according to organ-wise.

Methodology: This was a hospital-based prospective cross-sectional study carried out in Birat Medical College Teaching Hospital, where 77 cases were included in which FNAC was done for intra-abdominal masses under ultrasound guidance. Air dried smears were prepared for Giemsa stain and wet smears were prepared for PAP stain. The smears were classified as unsatisfactory, inflammatory, benign, malignant, and suspicious for interpretation categories.

Results: A total of 77 patients with intra-abdominal lesions were included in this study. The patient age ranged from 13 to 90 years, out of which 37 cases (48.1%) were males and 40 cases (51.9%) were females. Out of the total 77 cases, 76.6% of cases were reported to be malignant followed by 9.1% inflammatory, 6.5% suspicious, 5.2% inadequate and 2.6% benign. The liver was the most common site for FNAC comprising 35 (45.5%) cases.

Conclusions: In cases of intra-abdominal masses, the most common site for FNAC was the liver. Similarly, the most common cytological findings were malignant cases, followed by inflammatory, suspicious, unsatisfactory, and benign cases.

INTRODUCTION

Intra-abdominal masses are a common concern in daily surgical practice.¹ These lesions may appear as either superficial or deep non-palpable masses. They encompass a range of conditions, including both benign and malignant growth as well as non-neoplastic (inflammatory) processes.²

FNAC (Fine needle aspiration cytology) is a simple, safe, rapid and cost-effective diagnostic technique and is increasing in popularity as a means of diagnosing intra-abdominal mass.³ A blind FNAC has been carried out frequently for large-sized, superficial and palpable lesions. However, Ultrasound (USG) guided FNAC is necessary to improve the accuracy of cytological diagnosis for small size, deep-seated and non-palpable lesions as well as for lesions located adjacent to critical structures such as neurovascular structures.²

Ultrasound-guided FNAC has brought about a revolution in the field of cytological

diagnosis. The diagnostic efficacy is high and discomfort to the patient is minimal through this technique which permits the accurate localization of non-palpable and deep-seated lesions in the body. An image-guided FNAC is routinely done when single or multiple lesions are located in inaccessible sites. It is very important to confirm the cytological diagnosis which is essential for both treatment as well as staging of cancer.⁴ It has an important role in diagnosing inflammatory, benign and malignant lesions of the abdomen.⁵

An imaging technique may not always distinguish between benign and malignant lesions and as various inflammatory conditions such as tuberculosis and liver abscesses, can create focal lesions that may be mistaken for malignancy, potentially leading to misinterpretation by radiologist.³ Distinguishing between malignant, nonmalignant and particularly inflammatory lesions is crucial for patient management.⁶

Image guided FNAC allows real time visualization of the needle tip as it navigates through the tissue into the target area making it a reliable method for obtaining diagnostic material for rapid and accurate diagnosis.⁷

Effective collaboration and communication between cytopathologists and radiologists play a key role in maximizing diagnostic yield and enhancing overall accuracy.³ The objective of the present study was to diagnose intra-abdominal masses using ultrasound-guided FNAC and to categorize them organ wise as malignant, benign, suspicious, inflammatory and unsatisfactory.

METHODOLOGY

This hospital-based cross-sectional study was conducted from January 2023 to September 2023 in the department of Pathology, at Birat Medical College Teaching Hospital. Ethical clearance for the study was obtained from the Institutional Review Committee (IRC) with IRC-PA-265/2023 of the institute. The study included cases of intra-abdominal masses with abnormal USG finding and organs like liver, pancreas, stomach, gallbladder, small and large intestines, omentum, mesentery, and lymph node. However, patient with parietal swellings arising from the skin, abdominal wall, uterus, cervix, spleen, retroperitoneum, kidneys, adrenals, prostate and the bone and soft tissues were excluded. Additionally, individuals with a

history of haemorrhagic tendencies, prolonged prothrombin time, suspected extra-hepatic obstructive jaundice, hepatic surface hemangioma and echinococcosis and uncooperative patients were not included in the study. Before the procedure, patients were evaluated for coagulopathy, and informed consent was obtained after explaining the procedure. Each patient underwent an ultrasonographic evaluation to assess the lesion's origin and its relationship with adjacent organs.

Following aseptic precautions, a percutaneous fine-needle aspiration cytology (FNAC) was performed under real-time USG guidance. For superficial lesions, a 20 mL disposable plastic syringe with a 22-gauge needle was used, while for deep-seated intra-abdominal lesions, a 20–22 gauge, 9 cm spinal needle was utilized. A trans-abdominal approach was employed, ensuring the most direct route to the lesion. Care was taken to obtain material from the most solid portion of the lesion. Once the needle was inserted, strong suction was applied, and the needle tip was moved in and out by approximately 5 mm. The needle was then withdrawn, and smears were prepared on slides. Wet smears were stained using the Papanicolaou method, while air-dried smears were stained with Giemsa. The smears were categorized into five interpretation groups: non-representative, inflammatory, benign, malignant, and suspicious.⁸ The smear containing insufficient cellular material, showing drying artifact and with hemorrhage only were categorized under non-representative cases. The collected data were entered into Microsoft Excel and subsequently transferred to the Statistical Package for the Social Sciences (SPSS) version 16 for analysis. Data analysis was conducted using frequencies and percentages.

RESULTS

This study included 77 cases of intra-abdominal lesions. Based on cytological morphology, the majority were malignant (59 cases, 76.6%), followed by inflammatory lesions (7 cases, 9.1%), suspicious lesions (5 cases, 6.5%), inadequate samples (4 cases, 5.2%), and benign lesions (2 cases, 2.6%). Most cases were observed in individuals aged 51-60 years (25 cases, 32.5%), followed by those in the 41-50 age group (18 cases, 23.4%). The mean age of patients was 54.45 ± 14.78 years. (Table 1)

Table 1: Age distribution of intra-abdominal lesions (n=77)

Age group	Inflammatory	Benign	Malignant	Suspicious	Unsatisfactory	Total (%)
11-20	0	0	1	0	0	1(1.3%)
21-30	1	0	2	0	0	3 (3.9%)
31-40	0	0	7	0	0	7 (9.0%)
41-50	2	1	11	2	2	18 (23.4%)
51-60	1	0	22	1	1	25 (32.5%)
61-70	2	0	9	1	1	13 (16.9%)
>70	1	1	7	1	0	10 (13%)
Total	7 (9.1%)	2(2.6%)	59 (76.6%)	5 (6.5%)	4 (5.2%)	77

The majority of cases were female comprising of 40 cases (51.9%) followed by male patient comprising of 37 cases (48.1%). Malignant cases were more common in female patients compared to male patients. (Table 2)

Table 2: Sex-wise distribution of lesions (n=77)

Sex	Inflammatory	Benign	Malignant	Suspicious	Unsatisfactory	Total (%)
Male	3	2	28	3	1	37 (48.1%)
Female	4	0	31	2	3	40 (51.9%)
Total	7 (9.1%)	2 (2.6%)	59 (76.6%)	5 (6.5%)	4 (5.2%)	77

Out of total 77 cases, the liver was the most commonly affected site, with 35 cases (45.5%), followed by gallbladder masses (14 cases, 18.2%), pancreatic masses (8 cases, 10.4%), ovarian masses (6 cases, 7.8%), lymph node involvement (6 cases, 7.8%), omental lesions (5 cases, 6.4%), duodenal masses (2 cases, 2.6%), and rectal masses (1 case, 1.3%).

Among the 59 malignant lesions, metastatic tumors were most prevalent in the hepatobiliary region, accounting for 23 cases (38.9%), followed by primary hepatocellular carcinoma in 9 cases (15.3%) (Figure 1) and gallbladder adenocarcinoma in 7 cases (11.9%) (Figure 2). All 6 ovarian masses (10.2%) were diagnosed as serous cystadenocarcinoma (Figure 3). In pancreatic cases, 5 (8.5%) were identified as adenocarcinoma (Figure 4). Metastatic deposits were observed in 4 (6.8%) omental nodules and 2 (3.4%) intra-abdominal lymph nodes. Additionally, there were 2 cases (3.4%) of duodenal adenocarcinoma and 1 case (1.6%) of rectal adenocarcinoma. Among the 7 inflammatory lesions, 3 were hepatic abscesses, while 4 were reactive lymph nodes. The 2 benign lesions identified were both cases of acinar cell hyperplasia in the pancreas. (Table 3)

Table 3: Distribution of malignant lesions (n=59)

Site of intra-abdominal lesion	Cytological diagnosis	Frequency	Percentage
Liver	Liver abscess	3	45.5
	Suspicious	0	
	Primary	9	
	Metastasis	23	
	Unsatisfactory	0	
	Total	35	
Gall bladder mass	Benign	0	18.2
	Suspicious	4	
	Adenocarcinoma	7	
	Unsatisfactory	3	
	Total	14	
Pancreatic mass	Benign	2	10.4
	Suspicious	1	
	Adenocarcinoma	5	
	Unsatisfactory	0	
	Total	8	
Rectal mass	Adenocarcinoma	1	1.3
Ovarian mass	Serous	6	7.8
	Cystadenocarcinoma		
Intra-abdominal lymph node	Reactive	4	7.8
	Lymphadenitis		
	Metastasis	2	
	Total	6	
Omental	Metastasis	4	6.5
	Unsatisfactory	1	
	Total	5	
Duodenal mass	Adenocarcinoma	2	2.6
Total		77	100

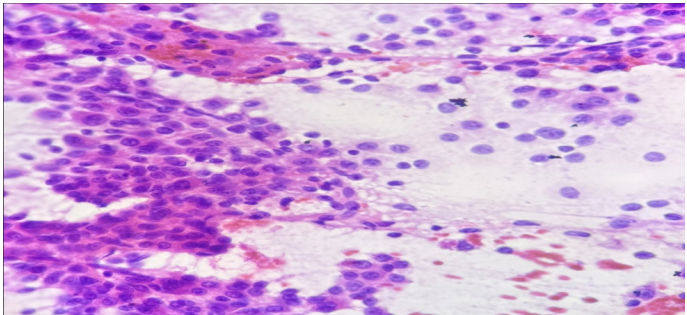


Figure 1: FNAC from liver mass showing sheets of pleomorphic hepatocytes traversed by endothelial cells- hepatocellular carcinoma (Pap, 40x)

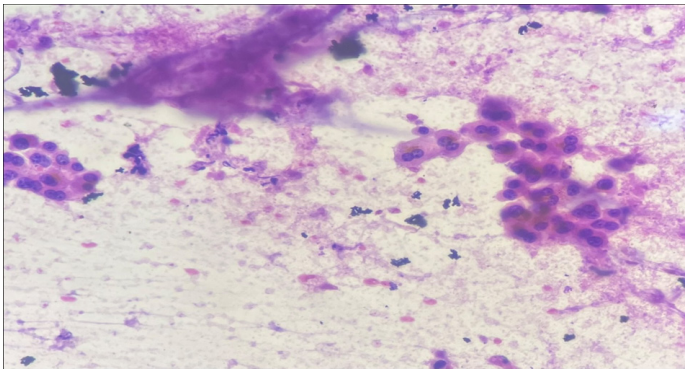


Figure 2: FNAC done from gall bladder mass showing atypical columnar epithelial cells forming acinar pattern- Cholangiocarcinoma (Pap, 40x)

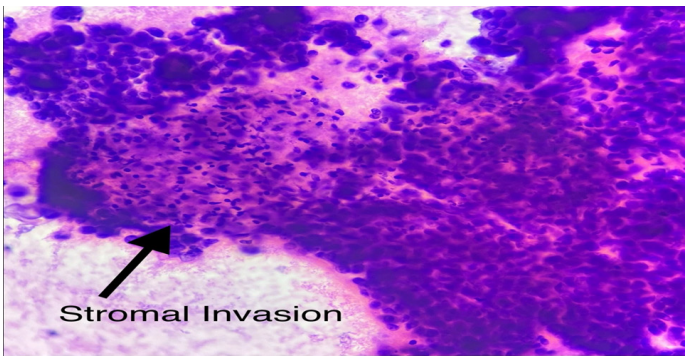


Figure 3: FNAC from the ovarian mass showing clusters of atypical epithelial cells forming glandular pattern and with presence of psammoma bodies and stromal invasion- Serous Cystadenocarcinoma (Pap, 40x)

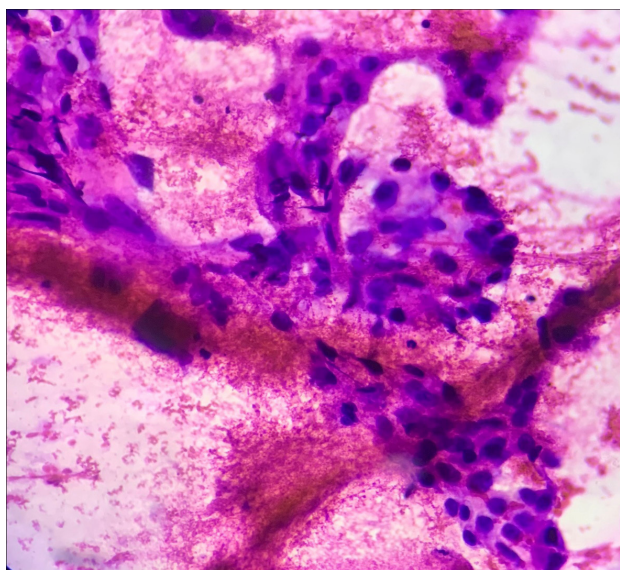


Figure 4: FNAC from pancreatic mass shows clusters of atypical epithelial cells forming glandular pattern-adenocarcinoma. (Pap, 40x)

DISCUSSION

In case of a deep-seated lesion, the exact size, site and location are not possible without the help of ultrasound. Therefore, USG guided aspiration increases the diagnostic efficacy of FNAC. In this study, 5.2% cases were non-representative hence the diagnostic yield was 94.8%, which was similar to the study conducted by Glaxon et al, Dosi et al, Nautiyal et al and Vyas et al with the diagnostic yield of 93.9%, 92.7%, 93.06% and 84.4% respectively.^{3,9,10,11} The non-representative cases were due to insufficient cellular material and hemorrhagic sample. Hence, multiple aspiration and sampling without applying negative pressure needs to be considered in those cases.

In our study, patient age varied from 13-90 years, which was similar to the study conducted by Dosi et al in which the age range was 12-90 years and Tan et al, with age range of 11-82 years.^{9,12} Intraabdominal lymph node was the site present in a 13-year-old male patient which was later reported as reactive lymphadenitis. Image guided FNAC played an important role in assessing the lesion without any complication.

In the present study, a maximum number of patients were in the age group of 51-60 years, which comprised of 32.5%. This finding was similar to the study conducted by Dosi et al, Vyas et al and Bajantri SR where 29.3%, 31.3% and 22.8% cases were seen in the age group of 51-60 years respectively.^{9,11,13} This age group was noted because maximum number of cases were of malignancy which is seen more commonly in the later age group. In this study, 37 cases (48.1%) were male and 40 cases were female 51.9% with male to female ratio of 0.9:1 which was in accordance with the study conducted by Sidhalingreddy et al, Vyas et al, Nigam SK and Yadav HK where male to female ratio was 1:1.3, 1:1.5, 1.18 and 1:1.16 respectively.^{8,11,14,15} This is in contrast with the study conducted by Madhav et al and Dosi et al where male to female ratio was 1.05:1 and 1.07:1, which could be due to the additional ovarian cases in our study.^{1,9}

In our study, out of the total of 77 cases, it was observed that maximum 76.6% cases were reported to be malignant followed by 9.1% inflammatory, 6.5% suspicious, 5.2% inadequate and 2.6% benign. Similar results were obtained by Glaxon et al and Dosi et al where the malignant cases were 83.33% and 61% respectively.^{3,9} This could be attributed to high number of patients attending Cancer Care Center in Birat Hospital.

In the present study, liver was the most common site for FNAC comprising of 35 (45.5%) cases. This is comparable to the study conducted by Madhav et al, Glaxon et al, Sidhalingreddy et al and Reyaz et al where liver FNAC comprised of 55.06%, 46.96%, 38% and 30.18% respectively.^{1,3,8,16} This is because the maximum cases noted in our study were from the liver and also because patients symptomatically present earlier in cases of liver masses with complaints of abdominal pain and an abdominal mass.

The second most common site for aspiration was the gall bladder, comprising of 14 (18.2%) cases which was in accordance with the study conducted by Madhav et al and Reyaz et al with the percentage being 32.27% and 16.98%.^{1,16} This is in contrast with the study done by Sidhalingreddy et al and Dosi et al where ovary was the second most common site comprising of 21.1% cases and 18.96% cases respectively.^{8,9} Similarly, in the study conducted by Glaxon et al, pancreas was the second most common site, comprising of 9.1% cases.³ The second most common site for aspiration in our case can be due to the more prevalence of gall bladder carcinoma in female above the age group of forty years.

Of the total 59 malignant lesions, in the liver, 38.9% cases were metastatic lesions followed by 15.3% cases of primary hepatocellular carcinoma. This is in accordance with the study conducted by Dosi et al where 41.5% cases were found to be metastatic deposits in liver, followed by 16% cases of primary hepatocellular carcinoma.⁹ Similarly, in the study conducted by Adikari et al, metastatic tumor of the liver was found to be the most common malignancy encountered in the abdomen (38.4%) followed by hepatocellular carcinoma (29.8%).¹⁷ The great majority of metastatic deposits in the liver can be explained by the fact that the majority of cases in our study were malignant and most cases presented came in the advanced stage of disease.

CONCLUSION

In case of intra-abdominal masses, the most common site for FNAC was the liver. The most common cytological findings for intra-abdominal masses were malignant cases followed by inflammatory, suspicious, unsatisfactory and benign cases.

RECOMMENDATIONS

Increasing sample size through multicenter collaboration, incorporating histopathological follow-up in select cases and using special stains and immunocytochemistry in diagnostically challenging cases needs to be considered.

LIMITATIONS OF THE STUDY

An important limitation to our study is the small number of

patients. Histopathological correlation along with special stains and immunocytochemistry are not done.

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CONFLICT OF INTEREST: None

FINANCIAL DISCLOSURE: None

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