



STUDY OF FINE NEEDLE ASPIRATION CYTOLOGY OF ABDOMINAL LUMPS.

Pathology

Dr. Shital Subhash Gosavi* Assistant Professor, Department of pathology, Smt. Kashibai Navale Medical College, Pune, Maharashtra, India. *Corresponding Author

Dr. Yasmin Altaf Momin Associate Professor, Department of Pathology, Government Medical college, Miraj, Sangali, Maharashtra, India.

ABSTRACT

OBJECTIVE : To study cytomorphological features of abdominal masses. To categorise lesions as inflammatory, benign & malignant lesions. To ascertain reliability of cytological findings & its comparison with histopathological examination wherever possible.

METHOD: The present study consists of fine needle aspiration cytology (FNAC) of abdominal lumps in 55 patients over a period of **four years and eight months from 1st January 2011 to 31st August 2015**. Core biopsy or excisional biopsy was obtained for histopathological correlation wherever possible.

RESULTS: Majority (25/55 i.e. 45.45%) had lesions based in the liver, of which **hepatocellular carcinoma was the commonest neoplasm (7/25 cases i.e. 28%)** followed by metastatic adenocarcinoma (4/25 cases i.e. 16%). **Cutaneous metastasis** accounted for majority of the abdominal wall lesions (8/18 cases). Ovarian lesions constituted 8/55 cases i.e. 14.54%. 3/8 cases i.e. 37.5% were reported as benign mucinous neoplasm of ovary. 4/8 ovarian cases i.e. 50% were reported as positive for malignancy—adenocarcinoma.

The sensitivity, specificity and diagnostic accuracy rate for FNAC of **intra abdominal lumps** was 85.71%, 100%, 90% respectively. The sensitivity, specificity and diagnostic accuracy rate for FNAC of **abdominal wall masses** was 100%.

CONCLUSION: FNAC has a good sensitivity as well as specificity. It can be a near substitute for biopsy when correct technique is coupled with radiological guidance.

KEYWORDS

FNAC; Abdominal lumps; cytology; Histopathology

INTRODUCTION:

Intra-abdominal masses always remain as an enigma in surgical practice. A documentary evidence of the nature of the pathology before the institution of therapy and also for prognosis is mandatory. In a majority of cases, the diagnosis which is obtained by FNAC, is the substitute for surgical procedures like diagnostic laparotomy. Most of the intra abdominal masses are non – palpable and even if they are palpable, the idea of their size and shape and the extent of the lesion is not possible. Therefore, various imaging modalities like fluoroscopy, CT and USG are used as a guide for fine needle aspiration. As a tool of investigation, the advent of Fine Needle Aspiration Cytology is a boon to all patients with superficial swellings as well as deep seated mass lesion. It establishes a preliminary pre-operative diagnosis and helps the practitioner to tailor the path of management.

MATERIAL AND METHODS:

The present study of Fine Needle Aspiration Cytology of abdominal lumps is carried out in the Department of Pathology, in collaboration with Department of Radiodiagnosis. The study includes cases from January 2011 to August 2015.

Intra-abdominal organs including the liver, spleen, stomach, gallbladder, the small and large intestines, the omentum, mesentery, ovary and parietal swellings arising from the skin and the abdominal wall are included in the study. Retroperitoneal organs are not included in this study as there are small chances of spillage of neoplastic cells.

Detailed clinical history, physical examination and routine investigations like platelet count and prothrombin time were done before performing FNAC. Radiological investigations including ultrasound and CT findings were taken into account to know the origin and nature of the mass. i.e. solid or cystic, presence of central necrosis, areas of calcification, presence of septae and status of other abdominal organs in view of metastatic tumors.

Written informed consent of patient was obtained prior to the procedure.

We carried out direct aspiration in case of palpable masses and USG guidance for aspiration in case of impalpable and deep seated masses. After marking the site, the skin surface was cleaned with betadine and spirit. Depending upon the depth and direction determined earlier, the chosen needle was inserted always during a suspended respiration. Maintaining the negative pressure in the syringe, the needle was

moved in multiple directions. Prior to withdrawal of needle, the negative pressure was released and the needle with syringe were withdrawn to avoid the aspiration of cytological material into the syringe. After completion of aspiration, hemostasis was achieved with a gauze pad. Aspirated material was then expelled forcefully on the prelabelled, dry, clean, sterile slides. Two to four smears were prepared including air dried and alcohol fixed smears. Air dried smears were stained with Leishman stain while alcohol fixed smears were stained with hematoxylin & eosin stain or Papanicolaou stain. Whenever sufficient material was not obtained, the procedure was repeated.

Cytological specimens were classified as positive for malignant cells, benign neoplasms, inflammatory / non-neoplastic lesions, suspicious of malignant cells, unsatisfactory smear and inconclusive cytology.

We attempted cyto-histological correlation with the aid of biopsies or surgical specimens wherever possible.

RESULTS:

During the study period, **55 fine needle aspirations** were performed of which, 18 lesions were from abdominal wall and remaining 37 were intra-abdominal. Histopathological correlation was available in 16 cases.

The youngest patient who presented with abdominal lump was 24 years old, the oldest being 80 years. It is observed that the maximum number of cases (14) i.e. 25.45% belonged to the age group of 51 to 60 years. More cases (52.72%) were observed in males. **Maximum number of aspirates were obtained from liver (25/55 i.e. 45.45%) followed by abdominal wall (18/55 i.e. 32.72%).** [Table no.1].

Out of 55 cases, FNAC was diagnostic (conclusive) in 47 (85.45%) cases, in 2 (3.63%) cases it was inconclusive. In one case (1.81%) it was suspicious of malignancy and the smears were acellular and / or contained blood only in 5 (9.09%) cases. Out of the two inconclusive cases, aspirate from liver mass in one case revealed normal looking scattered hepatocytes [Figure No.1], so definite opinion was not possible. In second case, aspirate from liver mass revealed only necrotic material, therefore it was an inconclusive cytological finding. [Table no. 2].

It is observed that **52.72% cases were diagnosed as positive for malignancy** and 1.81% cases were reported as suspicious of malignant cells. Benign neoplasms constituted 14.54% of total

cases. 18.18% were inflammatory/nonneoplastic in nature. [Table no. 3]. Organ wise and lesion wise distribution of cases is shown in [Table no. 4]. Overall malignant lesions were common (30/55 cases i.e. 54.54%) than benign (8/55 cases i.e. 14.54%) as well as non neoplastic lesions (10/55 cases i.e. 18.18%).

Out of the 16 histopathologically diagnosed cases, 13 cases were cytohistopathologically correlated and were concordant. In 2 cases, cytohistopathologic correlation was not possible due to inadequate cytology. Disparity between cytologic and histopathological diagnosis was noted in one case of ovarian mass. In this case, aspirate from solid-cystic mass of ovary was interpreted as benign mucinous neoplasm and histopathological diagnosis was mucinous borderline tumor endocervical type [TABLE NO. 5]

Out of the 25 liver aspirates, 18 aspirates led to definite cytologic diagnosis. **Hepatocellular carcinoma constituted majority of the (07/25) cases.** Histopathological examination was carried out in two cases diagnosed cytologically as hepatocellular carcinoma. Cyto-histopathological correlation was seen in both the cases. Out of 4 cytologically diagnosed metastatic adenocarcinomas of liver, histopathology was carried out in two cases. Cyto-histopathological correlation was seen in both the cases. 5 cases were diagnosed as abscess cytologically. Histopathological examination was carried out in two cases. Cyto-histopathological correlation was seen in both the cases. Aspirate from liver mass in one case revealed scant cellularity with few cells showing atypia. Therefore, cytological impression was given as suspicious of malignancy. Histopathological study showed bits of tumour with predominantly spindle cells having elongated blunt ended nuclei arranged in ill formed fascicles. Occasional mitotic figure and few bizarre cells were noted. Extensive areas of coagulative necrosis were seen. Therefore impression was given as possibility of metastatic gastrointestinal stromal tumor (GIST).

Out of 4 inadequate aspirates from liver, histopathological examination was carried out in two cases. One case was diagnosed as GIST (gastrointestinal stromal tumor), and other as a hepatocellular carcinoma with interface hepatitis. [Table no. 6].

Cytology of hepatocellular carcinoma [Table no 7]-Characteristic trabeculae composed of broad columns of cells bordered by sinusoidal endothelial cells were seen in five cases (71.42%) [Figure No. 2]. **Acinar formation** was noted in all seven cases (100%) usually in the form of rosette like arrangement of malignant hepatocytes around circular gaps. Resemblance of tumor cells to hepatocytes was obvious in all seven cases (100%) however, the cells exhibited increased nuclear:cytoplasmic ratio. Atypical naked hepatocytic nuclei were noted in 5 cases (71.42%). Scattered multinucleate tumor giant cells were encountered in 2 cases (28.5%). **Intracytoplasmic bile pigment** was observed in five cases (71.42%). A prominent endothelial cell component representing the sinusoidal network was identified in 4 cases (57.14%) in the form of slender spindle shaped endothelial cells surrounding some of the clusters [Figure No. 3]. **Intranuclear inclusions**, representing cytoplasmic invaginations were seen in 6 cases (85.71%) [Figure 4].

We encountered a single case of intrahepatic cholangiocarcinoma diagnosed on cytology. Cytology smears revealed scattered, clusters and sheets of small round to oval cells having pleomorphic vesicular nuclei with moderate amount of eosinophilic cytoplasm. Background showed unremarkable hepatocytes and sheets of benign bile duct epithelial cells [Figure No. 5].

In our study, **18 cases were aspirated from palpable cutaneous, subcutaneous masses of the abdominal wall.** Maximum number (08) of aspirates were diagnosed as **metastatic carcinoma comprising about 44.44% of the cases.** Out of these eight cases, four cases were diagnosed as metastatic adenocarcinoma, two as metastatic deposits from carcinoma of the breast and two cases were diagnosed as squamous cell carcinoma one of it was a known case of carcinoma of cervix. Histopathological examination was carried out in 2 cases and correlation was seen in both. **Three cases of abdominal wall masses were diagnosed as benign spindle cell neoplasm on cytology.** Histopathological examination was carried out in two out of the three cases. Both the cases turned out to be **abdominal wall desmoid (fibromatosis) on histopathology.** Hence concordance was seen in cytological and histological diagnosis. **Two cases of abdominal wall masses were diagnosed as scar endometriosis.** However

histopathological correlation was not available in these cases. Two cases of abdominal wall masses were diagnosed as lipoma on cytology. Aspirate from one case was inadequate for opinion due to presence of only blood. [Table no. 8]

Percutaneous fine needle aspiration cytology was carried out in 2 cases of mass lesions involving the **gall bladder.** Cytological diagnoses were ? Squamous cell carcinoma, ? Adenosquamous carcinoma in one case and Adenocarcinoma in other case. However in both the cases histopathological study was not available.

All the **eight ovarian cases** were diagnosed cytologically. Three out of eight cases were reported as benign mucinous neoplasm of ovary. Histopathological study was carried out in two cases. Cytohistopathologic correlation was obtained in one case. Disparity between cytologic and histopathological diagnosis was noted in other case. In this case, aspirates from solid-cystic mass of ovary was interpreted as benign mucinous neoplasm and histopathological diagnosis was mucinous borderline tumor endocervical type. Four out of eight ovarian cases were reported as positive for malignancy – Adeocarcinoma. Subtyping was not possible in all these four cases. Histopathological correlation was not available in all the four cases. Aspirate from one solid-cystic lesion of ovary was interpreted as malignant surface epithelial neoplasm. Histopathological diagnosis was malignant surface epithelial tumor suggestive of high grade serous carcinoma.

Out of **two cases of abdominal lymph node enlargement**, one case was cytologically diagnosed as Non Hodgkin Lymphoma. Aspirate from other case of left iliac fossa lymphadenopathy was reported as metastatic adenocarcinoma. Histopathological correlation was not available in both the cases.

The cases which were inadequate on cytology were excluded from calculation. Only cases that had cyto-histopathological correlation were included in the calculation of false positive and false negative values (14 cases). Aspirate from one case of ovarian mass was interpreted as benign mucinous neoplasm and histopathological diagnosis was mucinous borderline tumor endocervical type. For practical purpose, we have included this case under false negative.

The sensitivity, specificity and diagnostic accuracy rate for FNAC of intra **abdominal lumps** was 85.71%, 100%, 90% respectively. The sensitivity, specificity and diagnostic accuracy rate for FNAC of abdominal wall masses was 100%. The sensitivity, specificity and diagnostic accuracy rate was 88.88%, 100%, 92.85% respectively for FNAC of **all abdominal lumps.** [Table no 9]

DISCUSSION:

While undertaking the present study, we stressed upon the optimum clinical and radiological data. We tried to establish the technique of FNAC in case of abdominal masses, studied various cytomorphological features of abdominal lesions and attempted to correlate the cytology findings with histopathology wherever possible. We categorized the various lesions that presented as abdominal masses as per the organ viz. lesions of the liver, gall bladder, ovary, abdominal wall and abdominal lymph node. We did not encounter any lesions of gastrointestinal tract and spleen presenting as abdominal lump.

In the present study, sensitivity of FNAC of intra abdominal lumps was 85.71% (**calculated as percentage of true positive cases from the sum total of true positives and false negatives**), which is comparable to that of studies by Hemalatha A.L. et al.,¹ Sobha Rani G. et al.,² Sidhaling Reddy et al.,³ Ahmad SS et al.⁴ 100% specificity was observed in all these studies (**calculated as percentage of true negative from the sum total of false positives and true negatives**), as was found in the present study. We found a diagnostic accuracy of 90% (**calculated as percentage of sum total of true positive and true negative cases from the total number of cases**), which was comparable to that of above mentioned studies. [Table no. 10]

The most common organ which was involved in the present study was the liver (45.45%); an observation which was similar to the one made by: Sidhaling Reddy et al (2011)³ - (38%) and Sanjay Kumar Nigam et al (2014)-(30.4%).⁵ Malignant lesions constituted 48% of total liver lesions in our study, which is comparable with the study of Tatsuta et al (1984)⁶ and Madan Y. et al⁷ (2014). Majority of hepatic lesions in our study were hepatocellular carcinomas (28%), which was

comparable with the results of the study of **Haque S. et al (2012)**⁸ and **Tatsuta et al(1984)**.⁶ As opposed to our study, **Sattar A. et al (2014)**,⁹ **Rasania A. et al (2007)**¹⁰ and **Madan Y. et al (2014)**⁷ have reported majority of metastatic deposits in the liver. We compared the features of hepatocellular carcinoma in our study with those of **Wee et al(1991)**.¹¹ Our findings were concordant with the author that the most useful cytologic findings are: **similarity of the tumor cells to hepatocytes(100%)**, identification of trabecular pattern (71.4%), atypical naked hepatocytic nuclei(71.4%), intranuclear inclusions(85.7%) and presence of sinusoidal endothelial cells(57.1%). Acinar pattern was found in almost all cases (100%) in our study as quoted by the author (32.1%). Intracytoplasmic bile pigment was found in more number of our cases(71.4%) as compared with the author (39.2%).(Table no 11)

In the present study, metastatic carcinomas in liver accounted for about 16% of the cases (4 out of 25 liver aspirates), all were metastatic adenocarcinoma (100%).

For favouring metastatic carcinoma over hepatocellular carcinomas, the negative features which we considered as suggestive of metastases were absence of hepatocytic resemblance, absence of trabeculae lined by endothelial cells and absence of bile production. Positive findings suggestive of metastatic adenocarcinoma in liver encountered in our study were tall (columnar) cells with hyperchromatic nuclei and nuclear palisading, microacini, necrotic / fibrotic background and mucin production[Figure no.6].

These findings correlated well with the criteria proposed by **Sattar A. et al (2014)**⁹ and **Cohen et al(1991)**.¹² Cytologically metastatic cells look foreign to liver. Benign hepatocytes are present on the background. **Ahuja et al(2007)**¹³ studied cytomorphology of 25 cases of metastatic tumors to liver. He found admixture of clusters of benign hepatocytes in 56% of the cases, necrosis in 44% cases and mucinous background in 12% cases.

Out of six non-neoplastic lesions, five cases were diagnosed as abscess(Acute suppurative inflammation).. Smears revealed abundant viable and degenerated polymorphs, against necrotic debris. Few reactive hepatocytes and bile duct epithelial cells were noted.

We studied 8 cases of ovarian masses which clinically presented as abdominal lumps. Majority of ovarian tumors i.e.5 (62.5%) were malignant as observed by **Bandyopadhyay A. et al(2012)**¹⁴ and **Uguz A. et al (2005)**¹⁵. At our institute, the lesions that appeared completely cystic on USG were suspected to be benign and were not subjected to FNAC. These patients directly underwent laparotomy. This could be the reason why we obtained a greater number of malignant lesions in our study. Aspirates were obtained in all the cases by percutaneous transabdominal route under USG guidance. Three of the ovarian masses were diagnosed as benign mucinous neoplasms on cytology[Figure no.7]. Histopathological correlation was available in 2 cases. One case was diagnosed as Endocervical like (Mullerian type) mucinous borderline tumor of ovary and other case was diagnosed as Mucinous cystadenoma. Disparity between cytologic and histopathologic diagnosis was observed in first case as cytologic diagnosis was benign mucinous neoplasm and histopathologic diagnosis was mucinous borderline tumor. However, in this grey zone, it is not possible to distinguish cytologically between benign ovarian tumors and tumors of borderline malignancy. 16 Borderline serous and mucinous neoplasms are difficult to differentiate from malignant counterpart as invasion cannot be documented on cytology. They usually present as highly cellular smears with nuclear features ranging from bland to highly atypical. 17 One solid-cystic ovarian mass was diagnosed as malignant surface epithelial neoplasm on cytology with histopathological confirmation as a high grade serous carcinoma. Four cases were diagnosed as adenocarcinoma on cytology[Figure No.8]. However histopathological correlation was not available in all these four cases.

Two cases of abdominal lymph nodes encountered in the present study turned out to be malignant on cytology which is comparable with findings of other authors **Hemalatha A.L.(2013)**¹ and **Tuladhar AS et al,(2012)**¹⁸. Aspirates from left iliac fossa lymph node in one case was diagnosed on cytology as metastatic adenocarcinoma. Aspirates from right iliac fossa lymph node in second case led to cytologic diagnosis of non Hodgkin lymphoma. In both the cases, histopathological correlation was not available.

We studied 18 cases of abdominal wall nodules and masses. Maximum number (08) of aspirates were diagnosed as metastatic carcinoma [Figure No.9] comprising about 44.44% of the cases which is comparable with finding of **Rana et al. (2012)**¹⁹. Most of the lesions were presented as painless nodules with size ranging from 1x1 cm to 5x4 cm. In 5 out of 8 cases, the primary lesion was known viz, breast (2 cases), stomach (1 case), liver (1 case) and cervix (1 case). However in 3 cases the primary lesion could not be traced (unknown primary) and patients were lost for follow up (Table no 12). Study conducted by **S. R. Chaudhury et al (2013)**²⁰ have reported 16 cases of cutaneous metastasis out of which 5 were located on anterior abdominal wall. In his study, primary tumor was located in ovary in 4 cases while **Rana et al (2012)**¹⁹ observed primary tumor in ovary in 3 of his cases (Table no.13).

Sister Mary Joseph nodule is a metastatic umbilical lesion secondary to a primary malignancy of underlying viscera. It can be a presenting symptom (a sign of undiagnosed malignancy) or a symptom or sign of progression or recurrence in a known case. Its incidence is 1%–3% of all intra-abdominal or pelvic malignancies. When a patient presents with an umbilical nodule, fine-needle aspiration biopsy is adequate to establish an easy and early diagnosis.²¹

Out of 18 cases of abdominal wall nodules and masses, three cases were diagnosed as benign spindle cell neoplasm [Figure No.10 and 11]. Histopathological examination was carried out in two out of the three cases. Both the cases turned out to be abdominal wall desmoid (fibromatosis) on histopathology. **Marcus O. et al (2003)**²² reported two female patients with desmoid tumor of the abdominal wall, both presented in the age range of 20-40 years. Both had a previous history of abdominal surgery.

Guraya S. et al (2011)²³ reported single case of abdominal wall desmoid tumor in 41 year female. **Economou A. et al(2011)**²⁴ described a case of abdominal wall desmoid in 40 years male who had previous history of urgent abdominal surgery with a past history of shotgun injury two years earlier. In our study, one case of abdominal wall desmoid was 24 yrs female, 6 weeks PNC, while in other case, patient was 25 years old female.

In our study, two cases of abdominal wall nodule were diagnosed as scar endometriosis cytologically [Figure No.12 and 13]. Both the patients presented with small sized nodule at Pfannenstiel incisional scar done for cesarean section. Cytology smears show sheets of epithelial cells, spindle stromal cells and a variable number of hemosiderin laden macrophages. The presence of any two of the three components is required for the diagnosis of endometriosis. Our cases fulfilled these criteria. (Table no.14)

Nogales et al²⁵ have reported a case of cesarean scar endometriosis with massive decidualization in a 25-year-old patient, who presented as an extensively ulcerated lesion.

CONCLUSION:

FNAC is a rapid, inexpensive and minimally invasive procedure, which helps in identification of space occupying lesions, to differentiate between primary tumors and metastases so as to avoid unnecessary exploratory laparotomy. It has a good sensitivity as well as specificity. It can be a near substitute for biopsy when correct technique is coupled with radiological guidance.

Table No.1 Distribution of cases according to site of lesion.

Site of lesion	No. of cases	Percentage %
Liver	25	45.45%
Gall bladder	02	3.63%
Ovary	08	14.54%
Abdominal lymph nodes	02	3.63%
Abdominal wall	18	32.72%
Total	55	100

Table No.2 FNAC Results

FNAC results	No. of cases(n=55)	Percentage
Conclusive	47	85.45%
Inconclusive	02	3.63%
Suspicious of malignancy	01	1.81%
Inadequate	05	9.09%
Total	55	100%

Table No.3 Categorisation of cytological diagnoses-FNA abdominal masses

Cytological diagnosis	No.of cases (n=55)	Percentage %
1.Inflammatory/Non-neoplastic lesions	10	18.18%
2.Benign Neoplasms	08	14.54%
3.Suspicious of Malignant Cells	01	1.81%

4.Positive for malignancy	29	52.72%
5.Unsatisfactory smear a)Haemorrhagic/Noncellular b)Inadequate material.	05	9.09%
6.Inconclusive cytology	02	3.63%
Total	55	100%

Table no. 4 Organ wise distribution of cytologically diagnosed cases.

Site of lesion	No.of cases (n=55)	Inflammatory/ Non-neoplastic	Benign neoplasm	Suspicious of malignant cells	Positive for malignant cells	Unsatisfactory smear	Inconclusive cytology
Liver	25	6	0	1	12	4	2
Gall bladder	02	0	0	0	2	0	0
Ovary	08	0	3	0	5	0	0
Abdominal wall	18	4	5	0	8	1	0
Abdominal lymph node	02	0	0	0	2	0	0
Total	55	10	8	1	29	5	2

Table No.5 Correlation between cytology and histopathology

Site of lesion	No.of lesions (n=55)	Cytologically diagnosed lesions and lesions suspicious of malignant cells	Cyto-histopathological correlation	Disparity between cytologic and histopathologic diagnosis
Liver	25	19	7	-
Gall Bladder	02	2	-	-
Ovary	08	8	2	1
Abdominal wall	18	17	4	-
Abdominal lymph node	02	2	-	-
Total	55	48	13	1

Table No.6 Cyto-Histopathologic Correlation of liver lesion

Cytologic diagnosis	No. Of cases(n=25)	Percentage	Cytohisto-pathologic correlation
Hepatocellular carcinoma	07	28%	02
Metastatic adenocarcinoma	04	16%	02
Abscess	05	20%	02
?Cyst	01	4%	-
Cholangiocarcinoma	01	4%	-
Suspicious of malignancy	01	4%	01
Inconclusive	02	8%	-
Inadequate	04	16%	02
Total	25	100%	09

Table no.8

FNAC diagnosis	No. of cases (n=18)	Percentage	Histopathological examination
Metastatic carcinoma	08	44.44%	02
Benign Spindle cell neoplasm	03	16.66%	02
Lipoma	02	11.11%	-
Scar endometriosis	02	11.11%	-
Inflammatory lesion	02	11.11%	-
Inadequate	01	5.55%	-
Total	18	100%	04

TABLE NO. 9 STATISTIC VALUES

Location	Sensitivity	Specificity	Diagnostic accuracy rate
Intra abdominal lumps	85.71%	100%	90%
Abdominal wall masses	100%	100%	100%
All abdominal lumps	88.88%	100%	92.85%

TABLE NO. 10 COMPARATIVE ANALYSIS OF STATISTICAL RESULTS OF FNAC OF INTRA- ABDOMINAL LUMPS

Author	Sensitivity	Specificity	Diagnostic accuracy rate
Hemalatha A.L.et al (2013) ¹	94.1%	100%	96.3%
Sobha Rani G.et al (2012) ²	90%	100%	92%
SidhalingReddy et al,(2011) ³	94.1%	100%	96.5%
Ahmad SS et al,(2006) ⁴	94.11%	100%	95.7%
Present study	85.71%	100%	90%

Table No.11 Cytologic features In Hepatocellular Carcinoma :

Authors	Wee et al (1991)11	Present study
Number of cases studied (n)	28	7
Hepatocytic Appearance(%)	85.7%	100%
Trebecular pattern (%)	71.4%	71.4%
Acinae(%)	32.1%	100%
Vascular component (endothelial cells)	67.8%	57.1%
Bile pigment	39.2%	71.4%
Atypical naked hepatocytic nuclei(%)	53.5%	71.4%
Intranuclear inclusions(%)	42.8%	85.7%

Table No.12 Clinicopathologic details of our all 8 cases diagnosed as metastatic carcinoma to abdominal wall

Case	Age / sex	Case History	Clinical findings	Clinical presentation	Cytological diagnosis
Case 1	35/F	Known case infiltrating duct carcinoma –breast	5x4 cm swelling in periumbilical region	Painless nodule	Metastatic Carcinoma
Case 2	55/F	Known case infiltrating duct carcinoma –breast	3x3 cm swelling in left lumbar region	Painless nodule	Metastatic Carcinoma
Case 3	60/M	Known case of mucinous adenocarcinoma of stomach	2x2 cm swelling in periumbilical region.	Painless nodule	Positive for malignant cells-Mucin secreting adenocarcinoma
Case4	65/M	Known case of hepatocellular carcinoma	4x3 cm swelling in right hypochondrium	Painless swelling	Positive for malignant cells- Metastatic Carcinoma
Case 5	67/F	Known case of squamous cell carcinoma of cervix	4x4cm lump in infraumbilical region	Warm and tender swelling	Positive for malignant cells- Metastatic Squamous cell carcinoma
Case 6	55/M	Primary was unknown	1x1 cm nodule in right lumbar region	Painless nodule	Positive for malignant cells- Adenocarcinoma
Case 7	40/F	Primary was unknown	2x2 cm nodule	Painless nodule	Positive for malignant cells- Squamous cell carcinoma
Case 8	55/M	Primary was unknown	Multiple small nodules over right lower abdominal wall,chest wall, left upper cervical lymphadenopathy	Painless nodule	Positive for malignant cells- Metastatic Adenocarcinoma

Table No. 13 Clinicopathologic details of cases diagnosed as metastatic carcinoma to abdominal wall in various studies:

Authors	No. of cases	Primary tumor	Cytological diagnoses of abdominal nodules
Chaudhury SR et al (2013) 20	5	Ovary-4 Colon-1	Metastatic carcinomas
Rana et al (2012)19	17	Ovary-3 Kidney -2 Cervix -2 Pancreas-2 Oesophagus-1 Gall bladder-1 Urinary bladder-1	Metastatic carcinomas
Present study	8	Breast-2 Stomach-1 Cervix-1 Liver-1 Unknown primary-3	Metastatic carcinomas

Table No.14 Clinicopathological details of cases diagnosed as scar endometriosis

Authors	No. of cases	Age range	History of previous gnaecological procedures	Character of nodule	Cytology
Pathan SK et al (2005)²⁶	08	27 to 56 years	Prior Caesarian section-7 cases. Hysterectomy for fibroid-1 case	Painful- in five cases. Painless –in 3 cases.	Epithelial clusters, fusiform stromal cells, numerous hemosiderin-laden macrophages
Present study	02	25 to 35 years	lower segment cesarean section- in both the cases.	Painful –in one case, painless in other	Scattered and clusters of glandular epithelial cells admixed with numerous hemosiderophages.

Figure 1: Cytology of normal hepatocytes : Polygonal cells having uniform, small, round, centrally located nuclei and abundant dense eosinophilic granular cytoplasm. (H&E, x400)

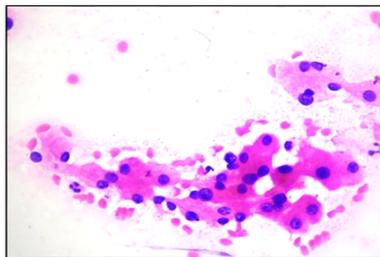


Figure 2:Hepatocellular carcinoma- Cellular smear illustrating trabecular pattern. (H&E, x40)

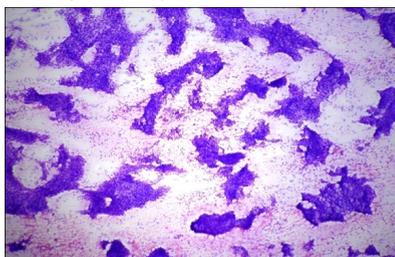


Figure 3 Hepatocellular carcinoma - Vascular transgression - Blood vessels traversing tumor cells.(H&E, x100)

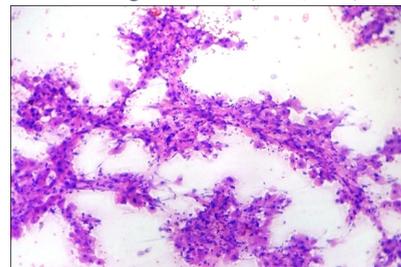


Figure 4: Hepatocellular carcinoma- Cluster of malignant hepatocytes with nuclear pseudoinclusion.(H&E, x400)

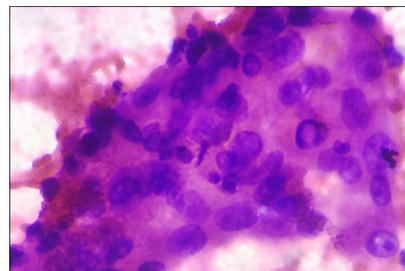


Figure 5: Intrahepatic cholangiocarcinoma- Monotonous (bland) appearance of ductular cells. (H&E, x400)

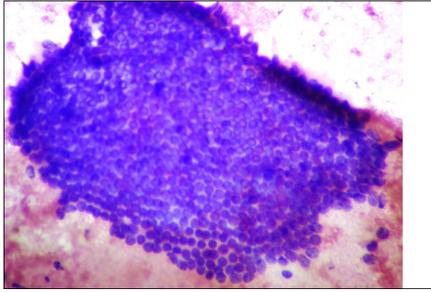


Figure 6: Metastatic adenocarcinoma - liver- Cellular smear with clusters of malignant epithelial cells. The background shows benign hepatocytes and necrotic debris. (H&E, x100)

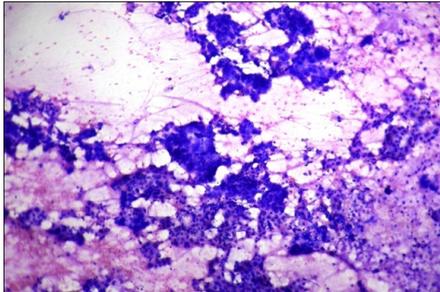


Figure 7: Benign mucinous neoplasm of ovary- Hypocellular smear with pools of extracellular mucin and honeycomb-like sheets of mucinous cells. (H&E, x40)

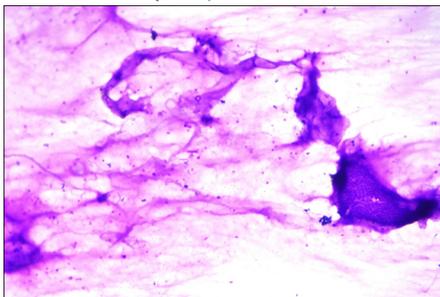


Figure 8: Adenocarcinoma ovary- Sheets of malignant epithelial cells. (H&E, x400)

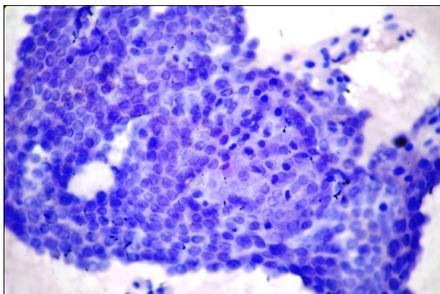


Figure 9: Metastatic adenocarcinoma abdominal wall - Scattered and clusters of pleomorphic cells, few bizarre and multinucleated tumor giant cells. (H&E, x400)

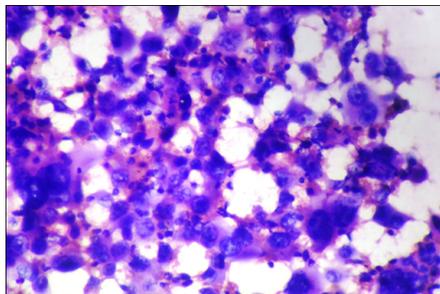


Figure 10: Abdominal wall desmoid - Cellular smear showing sheets of spindle shaped cells. (H&E, x100)

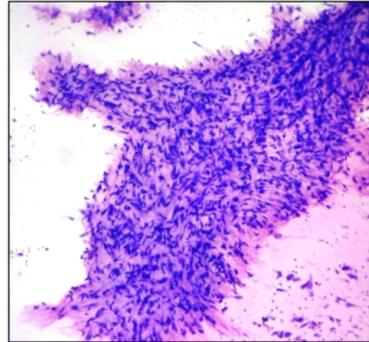


Figure 11: Abdominal wall desmoid - Bland spindle shaped cells with elongated nuclei and eosinophilic cytoplasm. (H&E, x400)

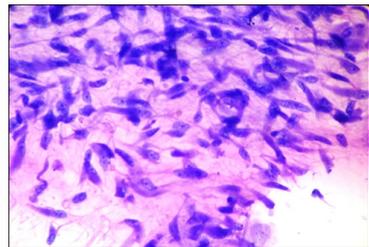


Figure 12: Scar endometriosis- Cluster of benign endometrial cells admixed with hemosiderin laden macrophages (arrow) on hemorrhagic background. (H&E, x100)

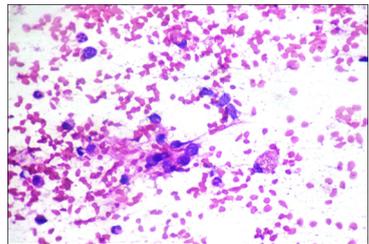
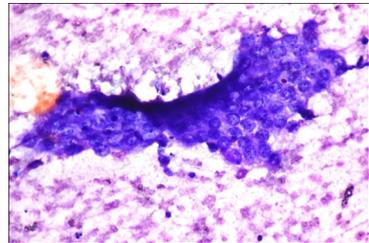


Figure 13: Scar endometriosis- Sheet of monotonous endometrial cells in honeycomb pattern. (H&E, x400)



REFERENCES

1. A LH, Sindhuram VS, SS, J KS, I V, Aditya A. Ultrasound guided fnac of abdominal-pelvic masses-the pathologists' perspective. J Clin Diagn Res. 2013, Feb;7(2):273-7.
2. Sobha Rani G, Md K Faheem N, Sai Prasad BV, Sudhakar Reddy E. Efficiency of ultrasound guided aspiration cytology in deep seated lesions - a diagnostic evaluation. Int J Med Health Sci. 2012, Jan;1(1).
3. Sidhalingreddy, Andola SK. Fine Needle Aspiration Cytology of Intra-Abdominal Lesions. J Clin Diagn Res. 2011, June;5(3): 551-558.
4. Ahmad SS, Akhtar K, Akhtar SS, Abrari A, Nasir A, Khalid M, et al. Ultrasound Guided Fine Needle Aspiration Biopsy of Abdominal Masses. JK Science : Journal of Medical Education & Research. 2006; 8(4):200-204.
5. Nigam SK, Paliwal U, Nigam N. Role of Fine Needle Aspiration Cytology in the Diagnosis of Intra-Abdominal Lumps. J of Evolution of Med and Dent Sci. 2014, March 3; 3(9): 2395-2402.
6. Tatsuta M, Yamamoto R, Kasugai H, Okano Y, Noguchi S, Okuda S, et al. Cytohistologic Diagnosis of Neoplasms of the Liver by Ultrasonically Guided Fine Needle Aspiration Biopsy. Cancer. 1984;54:1682-86.
7. Madan Y, Sheikh SS. Diagnostic Challenges of Fine Needle Aspiration Cytology of Focal Hepatic Lesions. Indian J Res. 2014, June ;3 (6).
8. Haque S, Riaz S. To Evaluate the Role of Fine Needle Aspiration Cytology in the Diagnosis of Liver Malignancy including Hepatocellular Carcinoma. Pak J Med Health Sci. 2012;6(1):220-223.
9. Sattar A, Khan AM, Anjum S, Naqvi .A Role of ultrasound guided fine needle aspiration cytology in diagnosis of space occupying lesions of liver. J Ayub Med Coll Abbottabad. 2014, Jul-Sep;26(3):334-6.
10. Rasania A, Pandey CL, Joshi N. Evaluation of FNAC in diagnosis of hepatic lesion. J Cytol. 2007;24(1):51-54.

11. Wee A, Nilsson B, Chan-Wilde C, Yap I. Fine needle aspiration biopsy of hepatocellular carcinoma. Some unusual features. *Acta Cytol.* 1991; Nov-Dec; 35(6):661-70.
12. Cohen MB, Haber MM, Holly EA, Ahn DK, Bottles K, Stoloff AC. Cytologic criteria to distinguish hepatocellular carcinoma from nonneoplastic liver. *Am J Clin Pathol.* 1991; 95: 125-130.
13. Ahuja A, Chawla Y, Gupta N, Kalra N, Rajwanshi A, Srinivasan R. Differentiation of hepatocellular carcinoma from metastatic carcinoma of the liver-clinical and cytological features. *Journal of Cytology.* 2007; July-September; 24(3):125-129.
14. Bandyopadhyay A, Chakraborty J, Chowdhury AR, Bhattacharya A, Bhattacharya P, Chowdhury M. Fine needle aspiration cytology of ovarian tumors with histological correlation. *J Cytol.* 2012; Jan; 29(1):35-40.
15. Uguz A, Ersoz C, Bolat F, Gokdemir A, Vardar MA. Fine needle aspiration cytology of ovarian lesions. *Acta Cytol.* 2005; 49(2): 144-148.
16. Orell SR, Sterrett GF. *Fine Needle Aspiration Cytology*. 5th ed. Churchill Livingstone; 2012. Chapter 13, Male and female genital tract; p.361-366.
17. Mathur SR. Ovarian Cancer: Role of Cytology. *Indian J. Med. Paediatr. Oncol.* 2007; 27(1):5-6.
18. Tuladhar AS, Adhikari RC, Shrestha S, Sharma SK, Pradhan S, Shrestha A et al. Role of USG guided FNAC in diagnosis of abdominal and thoracic lesions. *Nepal Med Coll J.* 2012; 14(4):271-274.
19. Rana S, Marwah N, Jain P, Gupta S, Marwah S, Sen R. Fine needle aspiration study of the abdominal cutaneous and subcutaneous nodules. *Iran J Dermatol.* 2012; 15: 50-55.
20. Chaudhury SR, Bandyopadhyaya R, Mukhopadhyaya S, Nag D, Sinha SK. FNAC of cutaneous metastatic nodules: a clinicopathologic study with review of literature. *Al Ameen J Med Sci.* 2013; 6(3):202-207.
21. Iavazzo C, Madhuri K, Essapen S, Akrivos N, Tailor A, Butler-Manuel S. Sister Mary Joseph's Nodule as a First Manifestation of Primary Peritoneal Cancer. *Case Rep Obstet Gynecol.* 2012; 2012:467240.
22. Overhaus M, Decker P, Fischer HP, Textor HJ, Hirner A. Desmoid tumors of the abdominal wall: A case report. *World J Surg Oncol.* 2003, Jul 9; 1(1):11.
23. Guraya SY, Murshid KR. Desmoid Tumor of the Abdominal Wall: Report of a Case. *J Clin Diagn Res.* 2011, December; 5(8): 1674-1676.
24. Economou A, Pitta X, Andreadis E, Papapavlou L, Chrissidis T. Desmoid tumor of the abdominal wall: a case report. *J Med Case Rep.* 2011, Jul 25; 5:326.
25. Nogales FF, Martin F, Linares J, Naranjo R, Concha A. Myxoid change in decidualized scar endometriosis mimicking malignancy. *J Cutan Pathol.* 1993; 20:87-91
26. Pathan SK, Kapila K, Haji BE, Mallik MK, Al-Ansary TA, George SS, Das DK, Francis IM. Cytomorphological spectrum in scar endometriosis: a study of eight cases. *Cytopathology.* 2005 Apr; 16(2):94-99.