



Image-guided fine-needle aspirates in thoracoabdominal lesions with particular reference to liver malignancies

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ABSTRACT

The present research has been conducted to find the utility of image-guided fine-needle aspiration cytology in the diagnosis of thoracoabdominal lesions. It also has attempted to study the frequency of distribution of thoracoabdominal lesions with the help of image-guided fine-needle aspiration cytology. The study of image-guided FNAC of thoracoabdominal lesions was carried out for twenty-four months, i.e. from MAY 2014 to APRIL 2016, which included 80 cases. Most patients (80%) were in the 5th-7th decade of life. All cases of ovarian lesions were diagnosed as malignant tumours on cytology, 08 were diagnosed as adenocarcinoma and one case of granulosa cell tumour. 06 out of 08 cases which diagnosed as adenocarcinoma on cytology, were confirmed on histology and diagnosed as mucinous cystadenocarcinoma (03 cases) and papillary serous carcinoma (03 cases). A case of malignant granulosa cell tumour was diagnosed on cytology and confirmed on histopathology. A case of mesenteric lymphadenopathy was diagnosed as granulomatous inflammation, suggestive of tuberculosis and was confirmed on histopathology with 100% accuracy. This was the only paediatric case in our study. A case of paraspinal abscess of thoracic vertebrae was diagnosed as chronic inflammation on guided FNAC, and the etiological agent was identified with histopathology as actinomyces.

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INTRODUCTION

Fine needle aspiration cytology (FNAC) is nowadays widely used tool for the diagnosis of superfi-

cially palpable lesions as well as deep-seated lesions of thorax and abdomen. The abdomen has various palpable and non-palpable lesions that are hidden in it. Most patients with abdominal lesions present either with vague clinical complaints, especially when the lesion is not palpable, and more often, only with the complaint of a lump in the abdomen or sometimes with pain in the abdomen. In these patients, unless we know the histologic nature and origin of the mass, we cannot proceed further, even for any palliative treatment. Moreover, sometimes patients present with advanced metastatic abdominal masses or with medical illnesses and are not fit for undergoing surgery (Kinmonth, 1963). The main indication in thoracic lesions is to diagnose malignancies though it can be used in the diagnosis of infections and some diffuse

benign processes. As imaging techniques cannot always differentiate benign and malignant tumours, US-guided FNAC helps not only in establishing the diagnosis but also in the staging of the tumours and planning the management in specific lesions. It is especially of great help in diagnosing lesions where thoracotomy is contraindicated like anaplastic carcinoma, metastatic tumours or infections (Mostafa and Golam, 2001). Fine needle aspiration cytology which emerged in the early 18th century, as a technique, that truly reflects the creativity and the urge to simplify the diagnosis of these lesions and is widely accepted and routinely practised today. Many surgical procedures have now been replaced by the gentle, fine needle aspiration, to the benefit of the patients. Besides the rapid diagnosis possible with fine-needle aspiration, it can also shorten or avoid hospital admissions and speed a patient's route to an appropriate specialist (Roskell and Buley, 2004). It is particularly useful in patients with extensive disease that would not be palliated by an operation (Smith, 1988).

Fine needle aspiration cytology (FNAC) helps to know whether the lesion is neoplastic or non-neoplastic, if neoplastic, whether it is benign or malignant and if malignant, whether it is primary or secondary and also to know the type of malignancy. Although FNAC promises a high diagnostic yield and accuracy, in experienced hands and with radiologic guidance, a thorough clinical workup in all patients and correlation with histopathology and other ancillary techniques like serum tumour markers is mandatory. In our study, we have performed Image-guided FNAC in 80 patients suspected of having an intra-abdominal mass or any thoracic lesion. Confirmation on histopathology, with the aid of biopsies or surgical specimens, and correlation with serum tumour markers have been performed wherever possible. It is essential to make an accurate diagnosis to proceed towards the precise management of the patient. Image-guided FNAC of intra-abdominal masses and thoracic lesions contribute to the same.

Aims

To study various thoracoabdominal lesions in the body with Image-guided fine-needle aspiration cytology.

Review of Literature

FNAC is a relatively new technique which was known as far back as in 1833 and is an art that has been updated now.¹² The earliest case of FNAC was done in 1833 for a case of infected hydatid cyst at St. James Ewing, (Koss and Melamed, 2006a) the director of Memorial Hospital for Cancer in New York

City, was a dominant figure in this field between 1910-1940. In 1933, Dr Fred W. Stewart published an article, "The Diagnosis of a tumour by aspiration", in which he discussed, all the aspects of the procedure.[6] It took time to convince clinicians that seedling of a tumour by using fine-needle aspiration is an infrequent complication (Koss and Melamed, 2006b). Gradually more and more people were working on this new, simple, economical, rapid method of making a diagnosis. Amid a debate over accepting this technique, the procedure was gaining popularity in Sweden. Although it was slow and steady growth, it had made a place for itself. In 1972 H.H. Holm described ultrasound imaging of the abdomen, which was a milestone in the history of imaging techniques and is used the world extensively over for guided FNACs (Holm, 1971). Nowadays, FNAC techniques have been refined to aspirate any lesion that can be assessed with the needle. With cost-effectiveness and rapidness of the method, clinicians have found FNAC as the first line of investigation for palpable lesions in the body. Fine needle aspiration (FNA) is increasingly being applied to abdominal masses since it permits a rapid diagnosis with minimal intervention and carries a low complication rate. It has replaced many unnecessary exploratory laparotomies for the diagnosis of lesions into neoplastic or non-neoplastic, benign or malignant, primary tumours or metastasis.

In 1973, Cardoza published the Atlas of Clinical Cytology which included more than 3000 colour plates including deep-seated intra-abdominal lesions. Zajicek (1979) published his classic work on FNAC of supradiaphragmatic and infra-diaphragmatic organs, reflecting the wealth of material from the Scandinavian experience.

Goldstein *et al.* (1977) reported their experience with percutaneous transperitoneal aspiration biopsy of the pancreas and other abdominal masses in 37 patients with over 75% rate of correct results without any significant complications. Zornoza *et al.* (1977) reported FNAC of lymph nodes, retroperitoneal and abdominal masses in 109 patients with an overall success rate of 82% with no severe complications. Ferruci performed a hundred guided FNAC of abdominal organs.

Fine needle aspiration is indicated in almost every mass where the aetiology is unclear. Close cooperation between the imaging and cytopathology departments provides maximum efficiency of machines and personnel time and ensures the most accurate diagnostic yield. Porter *et al.* (1981) reviewed 168 Ultrasound-guided fine-needle aspiration biopsies on 145 patients. Fifty-seven biopsies were from the

liver, 40 biopsies from the liver, 28 from the kidney, 26 from the abdomen and 17 from retroperitoneum. The total accuracy rate was 66%.

Soderstrom first established fine-needle aspiration biopsy of the liver in 1966 with the examination of 500 cases (Engzell *et al.*, 1971). Grossman *et al.* (1972) confirmed the superiority of the needle aspiration biopsy (FNAB) over core biopsy while identifying tumour cells in case of metastatic liver cancers. An early report of ultrasonically guided fine needle aspiration of the liver was by Rasmussen *et al.* (1972), who compared Menghini needle biopsy and ultrasonically guided fine needle aspiration in the same group of patients. Of thirteen patients with liver metastases, blind Menghini liver biopsy correctly identified three, while fine needle aspirations identified nine with ultrasound guidance.

Cavanna L. performed US-FNAC in patients with focal hepatic lesions to improve the accuracy rate of ultrasonography used alone. Ultrasound has a sensitivity of 61.58%, specificity of 93.5% and an accuracy of 88%, which is improved to 93% with US-FNAC. Therefore they believe that ultrasound-guided FNAC should be the first invasive procedure to obtain a definitive cytological diagnosis. Liver abscess needs to be carefully diagnosed because HCC lesions with extensive necrosis can be misdiagnosed as abscess as studied by Wee *et al.* (1995).

Anwar *et al.* (2006) collected 55 patients having unilocular and non-septate cysts based on ultrasonographic examination. Ultrasound-guided aspiration of cysts was followed by excision. The cytology of fluid was correlated with histology of excised cyst. Follicular cysts were seen in the highest percentage followed by haemorrhagic luteal cysts, serous cystadenoma and serous cystadenocarcinomas. They concluded that ultrasound-guided fine-needle aspiration of ovarian cysts is a feasible alternative to surgery for benign cysts of the ovary.

Das *et al.* (1992) performed ultrasonographically guided FNAC in patients clinically suspected to have renal tuberculosis with negative urine culture for acid-fast bacilli. They reported that the method is useful for diagnosing such patients and of value in defining the granulomatous nature of sonographically visible lesions in patients with a positive culture.

Nils Soderstrom of University Hospital, Lund, Sweden wrote about how to use cytodiagnostic spleen puncture. He reported that a simple cytologic smear obtained by the safe needle puncture is a rich source of valuable diagnostic information. He further stated that splenic aspirate looks like a blood smear. Myeloid metaplasia, malignant lymphomas includ-

ing Hodgkin's diseases, granulomatous lesions can be diagnosed based on FNAC, to name a few (Söderström, 2009).

MATERIALS AND METHODS

The present study is a two-year hospital-based prospective study of various thoracoabdominal lesions with Image-guided FNAC during a period of May 2014 to April 2016, which includes 80 cases. The study is a descriptive and cross-sectional, which is done in the department of Pathology with attached tertiary care hospital.

OBSERVATION AND RESULTS

The study of Image-guided fine needle aspirates in thoracoabdominal lesions was done in the department of Pathology our institute, which is a tertiary care centre. Total of 80 cases in Table 1 was obtained within a period of 2 years from May 2014 to April 2016, which was hospital-based prospective, cross-sectional study.

The youngest patient was 11 years old, and the oldest was 79 years old in the present study. Sixty-four cases (80.00%) were in the 5th -7th decade of life, which was the most common age group. The mean age of presentation was 57yrs old. There were 43(53.75%) females and 37(46.25%) males; with slight female preponderance with an F: M ratio of 1.16:1.

The most common presenting complaint was a lump in the abdomen (75%) due to presence of palpable abdominal mass, mostly at an advanced stage of the disease, or pain in the abdomen (45%) mainly due to irritation of the capsule of the respective organ. Breathing difficulty was the most common presentation in thoracic lesions, followed by cough in Table 2.

The overall accuracy of 100% on histopathological correlation was obtained in the present study. All cases (09) of Image-guided FNAC of ovarian lesions were malignant. Amongst them, 08 were surface epithelial malignancies (88.89%), and 01 case (11.11%) was malignant granulosa cell tumour. 06 of the 08 surface epithelial malignancies diagnosed on FNAC were studied histopathologically and were diagnosed as mucinous cystadenocarcinoma (03 cases) and papillary serous carcinoma (03 cases) in Table 3.

One case was diagnosed as malignant granulosa cell tumour, which was confirmed on histopathology. This 32-year-old female patient came with complaints of a lump in the abdomen along with pain in the abdomen. She gave a history of recurrence of

Table 1: Distribution of gender and age

Patient Age (year/s)	Male Gender	Female Gender	Total	%
11- 20	0	1	1	1.25
21-30	0	0	0	0
31-40	0	7	7	8.75
41-50	6	10	16	20.00
51-60	16	14	30	37.50
61-70	10	8	18	22.50
71-80	5	3	8	10.00
Total	37	43	80	100

Table 2: Frequency distribution of clinical presentation

Clinical Presentation	No. of cases	Percentage
Lump in abdomen	60	75%
Pain in the abdomen	44	55%
Anorexia	18	22.50%
Generalized weakness	15	18.75%
Breathing difficulty	14	17.50%
Cough	10	12.5%
Fever	05	06.25%
Haematuria	04	05%
Weakness in limbs	01	1.25%

Table 3: Cyto-Histological correlation of ovarian lesions

Cytology Diagnosis	Histopathology		Total	Accuracy
	Non neoplastic	Malignant		
Non neoplastic	-	-	-	-
Malignant	09	07	07	100% (07/07)
Total	09	07	07	100% (07/07)

Table 4: Cyto-Histopathological correlation of lesions of the lung

Cytology Diagnosis	Histopathology		Total	Accuracy
	Non neoplastic	Malignant		
Non neoplastic	01	-	01	100%(01/01)
Malignant	07	02	02	100% (02/02)
Total	08	03	03	100% (03/03)

the lump. The patient also complained of per vaginal bleeding. She was then advised USG abdomen and pelvis, it showed a mass in the left ovary with heterogeneous areas suggestive of neoplastic aetiology. USG also showed some deposits in peritoneum and omentum. Also noted was endometrial hyperplasia. The patient was referred to the pathology department for USG guided FNAC of a left ovarian mass. Because of clinical details, radiological findings, recurrence of lump and peculiar cytomorpho-

logical features; the cytological diagnosis was given as FNAC positive for malignant cells; features suggestive of malignant granulosa cell tumour. After few days patient was operated and panhysterectomy specimen was sent for histopathological examination. The cytological diagnosis of malignant granulosa cell tumour was confirmed on histopathology in Table 4.

There was only one case which was non-neoplastic

and which was diagnosed as a lung abscess. The detailed microbiological examination was done in this patient, and it was finally diagnosed as a pyogenic abscess. Histopathology also confirmed the diagnosis of pyogenic lung abscess. Malignancy was the most common lesion of lung diagnosed on cytology. 05 cases were of primary lung malignancy. Most common malignancy was squamous cell carcinoma (03 cases), with M: F ratio of 1.5:1. 02 cases were of adenocarcinoma of lung; seen in females only. 02 cases were of metastasis in the lung; 01 from adenocarcinoma stomach and 01 from squamous cell carcinoma of the buccal mucosa. The one case of metastasis from Ca stomach was seen in a 75-year-old male patient presented with complaints of breathlessness, cough, weight loss, generalized weakness. The patient was known case of carcinoma of the stomach and operated for the same one year back. CT chest was showing multiple, ill-defined lesions suggestive of neoplastic aetiology. Then USG guided FNAC was performed for this lesion and was diagnosed as metastatic adenocarcinoma because of cytological features and relevant clinical history. Histopathological correlation was done in 01 cases of lung abscess, 01 cases of primary SSC of lung and 01 cases of primary adenocarcinoma of the lung. 100% histopathological correlation was obtained in these lung lesions.

DISCUSSION

Total 80 cases were obtained within a period of 2 years from May 2014 to April 2016, which was a hospital-based cross-sectional, descriptive and prospective study. Metastatic adenocarcinoma of the colon is the most common metastatic malignancy of the liver. Out of 49 cases, correlation with the histopathological diagnosis was possible in 02 cases. One case of necrotic material and chronic inflammatory infiltrate was diagnosed as HCC on histopathology. This was a false negative diagnosis, mainly because of extensive tumour necrosis. So, overall accuracy on histopathological diagnosis in the present study was 50%.

CONCLUSION

One can conclude that USG and CT guided FNAC is also a safe procedure since the significant blood vessels in the path of the target lesion to be aspirated can be avoided by USG/CT guidance. It is well tolerated by most patients and ensures high patient compliance with no significant complication. Image-guided FNAC facilitates the diagnosis of tumours having substantial as well as a cystic component like ovarian tumours. Image-guided

FNAC also helps in the diagnosis of deep-seated lesions. Image-guided FNAC helps in differentiation between benign lesions and cancer when the clinical examination and radiological investigations fail to do so. Also, it facilitates the staging of cancer by knowing the status of pelvic, aortic or retroperitoneal lymph nodes. Although histopathology remains to be the gold standard that provides a confirmatory diagnosis of a lesion under investigation, it is invasive and requires more time. Image-guided FNAC is minimally invasive and gives rapid diagnosis with high accuracy. It can, therefore obviate the need to perform a biopsy.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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