

FINE NEEDLE ASPIRATION CYTOLOGY OF ABDOMINAL ORGANS – TEN-YEAR SINGLE CENTER EXPERIENCE

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SUMMARY – The aim of the study was to assess the role of fine needle aspiration cytology (FNAC) in the diagnosis of focal changes in solid abdominal organs. A total of 1084 aspirates from intra-abdominal organs including liver, spleen, pancreas and kidneys obtained by ultrasound (US) guidance during a 10-year period were included in the study. The smears were classified as benign, malignant or suspected of malignancy, and unsatisfactory for interpretation. The liver accounted for more than half of the US-guided FNA procedures, followed by the pancreas with 38%. Out of 1084 aspirations, 192 (17.7%) were inadequate for cytologic analysis. Over half of aspirated lesions in the pancreas were primary cancers, while one-third of pancreatic lesions were benign. In the majority of kidney lesions (83%), cytology found benign changes, mostly cysts. Spleen FNA was least likely; in most cases (59%) it showed lymphoid tissue hyperplasia; in four cases cytologic diagnosis was lymphoma and three lesions were suspected lymphoma. During the study, no major complications were observed on any US-guided FNAC procedure. In conclusion, intra-abdominal FNA is a reliable, sensitive and specific method with a high diagnostic accuracy for the diagnosis of malignant lesions. It can be utilized as a preoperative procedure for the management of all intra-abdominal lesions.

Key words: *Endoscopic ultrasound-guided fine needle aspiration; Abdomen – ultrasonography*

Introduction

Intra-abdominal lesions are demonstrated by radiological investigations, but these may fail to distinguish malignant and benign lesions. On the other hand, an accurate morphological diagnosis is essential both for treatment and staging of cancer¹. In 1939, Blady carried out aspiration cytology using imaging techniques, and in 1975 percutaneous needle biopsy under computed tomography (CT) scan was used². Fine needle aspiration cytology (FNAC) is nowadays a widely used tool for the diagnosis of superficially palpable lesions, as well as deep seated lesions of the abdomen. The technique is relatively painless and reliable, produces speedy results and is cheap³.

The techniques of image guided FNAC not only permit precise anatomical imaging and targeting of lesions, but also allow planning of a safe access route, with constant visualization of the needle tip during insertion, thereby reducing the risk of complications. The advantage of ultrasound (US) guidance over CT scan is that it is rapid, inexpensive, without radiation exposure, easily repeated when necessary and does not require injection of contrast medium⁴.

Most studies have shown that FNAC is a highly sensitive, highly specific, accurate and cost effective diagnostic procedure with a negligible complication rate⁵⁻¹⁹. The only absolute contraindication for the procedure is uncorrectable severe coagulopathy²⁰.

The aim of this study was to assess the usefulness and utility of FNA as a preoperative diagnostic procedure in the management of intra-abdominal lesions. Our objectives were to examine age and sex distribution of patients with intra-abdominal lesions, organ distribution, the rate of unsatisfactory material, and

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Table 1. Distribution of cytologic diagnosis according to organs

Organ	Inadequate	Benign	Suspected	Primary malignant	Metastatic malignant	Total	%
Liver	72	85	30	138	252	577	53
Pancreas	108	100	46	156	3	413	38
Kidney	10	54	4	7	-	75	7
Spleen	2	10	3	4	-	19	2
Total	192	249	83	305	255	1084	100

also the distribution of cytomorphological diagnoses, which were classified as malignant, suspected of malignancy, or benign.

Material and Methods

The study was carried out at the Department of Cytology, Sestre milosrdnice University Hospital Center, for a period of 10 years (120 months), from January 2000 to December 2009. A total of 1084 aspirates from intra-abdominal organs including liver, spleen, pancreas and kidneys were included in the study.

After thorough clinical examination, an informed consent was obtained from patients after explaining them the procedure. All aspirations were performed by clinicians under US guidance. The puncture site was marked. Under aseptic precautions, a 22-23G needle for superficial lumps and a lumbar puncture needle of the same thickness for deep seated lumps, which was fitted with a 20 mL syringe, was introduced immediately under radiological guidance and the aspiration was done under negative pressure. On an average, two to three needle passes were made in each case to obtain adequate material. The sample was expelled onto slides, air-dried and stained with Giemsa. Prepared slides were examined under the microscope, the cases were analyzed based on cytologic features and reported by experienced cytologists. In some cases, in order to improve diagnostic accuracy, cyto- or immunocytochemistry were used. Definitive diagnosis was achieved through corroboration by clinical and radiological features. The smears were classified as benign, malignant, suspected of malignancy, and unsatisfactory for interpretation.

Results

A total of 1084 FNAC of deep seated lesions were done under US guidance. There were 585 (54%) male and 499 (46%) female patients, with a male to female ratio of 1.2:1. The youngest patient in the study was aged 10 years and the oldest 83 years. Malignant lesions diagnosed by FNAC were primary or metastatic neoplasms of the liver, adenocarcinoma of various organs, sarcoma, neuroendocrine carcinoma, non-Hodgkin's lymphomas, anaplastic carcinoma, small cell carcinoma, acinic cell carcinoma and renal cell carcinoma. Benign lesions diagnosed in the study were angiomyolipoma, cystic lesions, abscess, different types of inflammation and degenerative changes. Liver accounted for more than half of US-guided

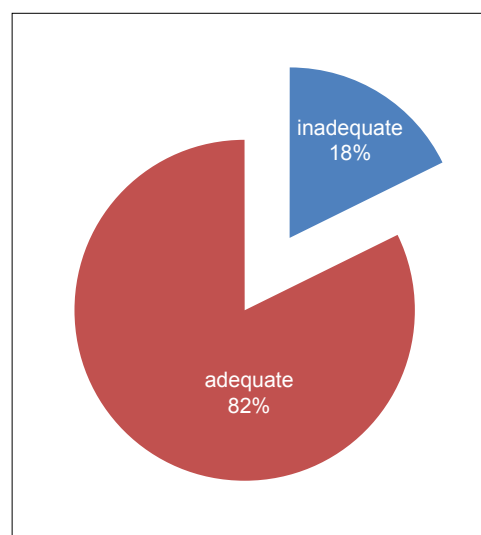


Fig. 1. Adequacy rate of fine needle aspirations of intra-abdominal lesions.

FNA procedures, followed by the pancreas with 38%. Kidney and spleen together made up less than 10% of the aspirations. Out of 1084 aspirations, 192 (17.7%) were inadequate for cytologic analysis. The largest number of inadequate needle aspirations referred to the pancreas (26%). The liver had 12.5% and kidney and spleen 10% of nondiagnostic material. Metastatic carcinoma was the most frequent finding in the liver (50%), followed by primary tumors (27%) and benign lesions (17%) involving inflammation and degenerative changes of liver tissue. A small number of lesions (6%) were suspected of malignancy. Over half of aspirated changes in the pancreas were primary cancer, followed by suspected lesions (15%), while one-third of pancreatic lesions were benign. In the majority of kidney lesions (83%), cytology found benign changes, mostly cysts, while a smaller number were malignant or suspected of malignancy (in total less than 20%). Spleen punctures were least likely; in most cases (59%), we found hyperplasia of lymphoid tissue, in four cases cytologic diagnosis was lymphoma and three lesions were suspected lymphoma.

During the study, no major complications were observed on any US-guided FNAC procedure.

Discussion

In the present study, the adequacy rate was 82.3% (Fig. 1), which we found satisfactory compared with

literature data where the inadequacy rates range between 6% and 23%²¹. Adequacy depended on the lesion size, location, consistency, histologic type of tumor, vascularity and amount of necrosis present. A slightly higher rate of inadequate material was observed in FNA of the pancreas. It can be explained by localization of the pancreas, which is more deeply seated and the approach is more complicated. The aspirated material was usually adequate in malignant lesions, in comparison to benign and non-neoplastic lesions, suggesting that US-guided FNAC should be routinely done in deep seated lesions because of the high adequacy rate and very low complication rate^{1,21}.

Liver was the most common site for FNAC, followed by the pancreas (Fig. 2). The findings of the present study are similar to those reported by Ahmad *et al.*¹⁹, Sidhalingreddy and Anadol²¹ and Adhikari *et al.*²².

Out of 1084 aspirates, cytologic diagnosis of benign, malignant and suspected of malignancy was given in 23%, 52% and 7.5%, respectively (Fig. 3). The age distribution observed in the present study ranged from 10 to 83 years, suggesting that image guided FNAC of deep seated lesions can be done in a wide range of age groups including children without any major complications.

Although CT scan is more accurate for lesion localization, in the present study US was used in all cas-

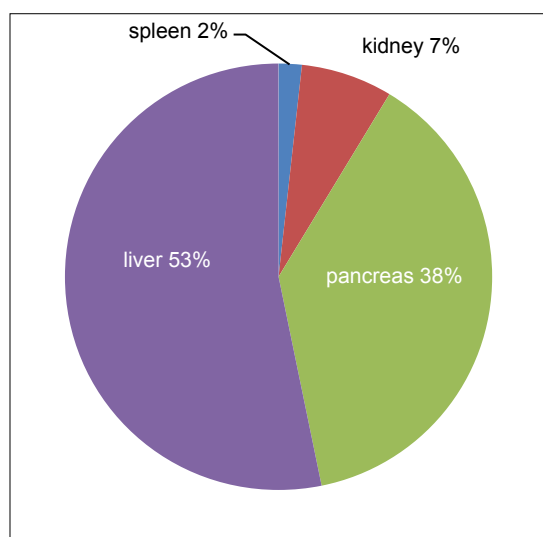


Fig. 2. Distribution of aspirated lesions according to organs.

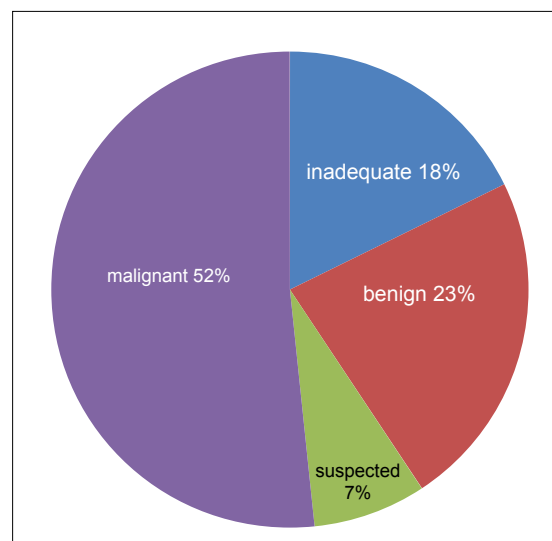


Fig. 3. Distribution of cytologic diagnosis.

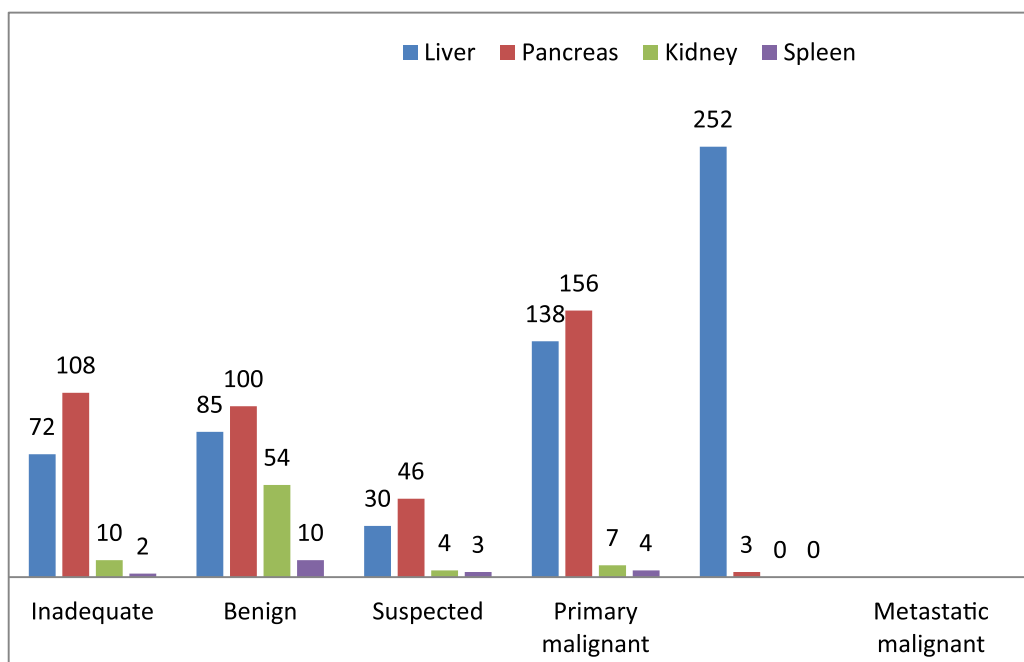


Fig. 4. Distribution of cytologic diagnosis according to organs.

es. CT scan is usually used only in those cases where mass localization is not possible by US and repeated US guided FNAC has failed to yield enough material. In cases where repeat aspiration is needed, US-guided FNAC is preferred to CT guidance because it is less time consuming, there is less chance of radiation exposure and it is possible to repeat without much discomfort to patient^{21,23}.

In liver lesions, the most common diagnosis was metastatic carcinoma (50%), followed by primary hepatocellular carcinoma (27%) and inflammation or degenerative changes (17%). In the pancreas, the situation was slightly different. The most common aspirations were primary pancreatic tumors (52%), followed by benign lesions (33%). Out of 75 renal aspirations, there were 83% of benign cases, while malignant tumor was found by cytology in seven (11%) cases. FNAs of the spleen were the rarest. In four (23.5%) cases, cytology found non Hodgkin's lymphoma and three (17.5%) cases were suspected lymphomas. As lymphoma can be cured effectively with chemotherapy, diagnosis achieved by means of a nonsurgical intervention like FNAC in such deep seated lesions increases the importance of image guided FNAC.

In some cases, histopathologic examination was available, but considering the low number of cases,

cytologic correlation was not done. The low percentage of histologic correlation can be explained by the fact that the intent with FNAC was to diagnose deep seated lesions, and in addition, patients advised for biopsy either had not given consent for any surgical intervention or had failed to present for follow up. Most of the patients cytologically diagnosed to have malignant tumors were directly referred to oncology department^{21,23}.

Conclusion

Imaging can easily and precisely visualize deep seated intra-abdominal mass lesions and image guided FNAC can be regarded as the investigation of choice for early confirmation and exclusion of neoplastic diseases. Intra-abdominal FNA is a relatively simple, economical, quick and safe procedure for the diagnosis of intra-abdominal lesions. It not only helps in differentiating between inflammatory, benign and malignant lesions, but also in categorizing different malignant lesions. Intra-abdominal FNA is a reliable, sensitive and specific method with a high diagnostic accuracy for the diagnosis of malignant lesions. It can be utilized as a preoperative procedure for the management of all intra-abdominal lesions.

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Sažetak

CITOLOŠKA PUNKCIJA TRBUŠNIH ORGANA – DESETOGODIŠNJE ISKUSTVO U JEDNOM CENTRU

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Svrha rada bila je procijeniti ulogu citološke punkcije u dijagnostici žarišnih promjena trbušnih organa. U studiju su bila uključena 1084 uzorka ultrazvučno vođene citološke punkcije trbušnih organa, uključujući jetru, gušteraču, bubrege i slezenu, dobivenih u 10-godišnjem razdoblju. Nalazi su klasificirani kao benigni, maligni, suspekti i neadekvatni. Preko polovine punkcija bile su punkcije jetre, a slijede punkcije gušterače. Od 1084 uzorka, 192 (17,7%) su bila neadekvatna za citološku analizu. U više od polovine uzoraka dobivenih punkcijom gušterače nađen je primarni karcinom, dok je oko trećine uzoraka bilo benigno. Većina bubrežnih lezija bila je benigna (83%). Punkcije slezene bile su najrjeđe, u najvećem broju slučajeva radilo se o hiperplaziji limfatičnog tkiva, u četiri slučaja citološka dijagnoza bila je limfom, a u tri slučaja suspekti limfom. Značajnije komplikacije nisu opažene niti u jednom slučaju. Zaključno se može reći da je ultrazvučno vođena citološka punkcija trbušnih organa pouzdana, osjetljiva i specifična metoda u prijeoperacijskoj dijagnostici abdominalnih lezija.

Ključne riječi: *Ultrazvučno vođena citološka punkcija; Abdomen – ultrazvuk*