

East African Medical Journal Vol. 92 No. 4 April 2015

UPPER ABDOMINAL ULTRA-SONOGRAPHY FINDINGS IN HIV PATIENTS AT KENYATTA NATIONAL HOSPITAL AND THE DEFENSE FORCES MEMORIAL HOSPITAL

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ABSTRACT

Background: Easy availability, accessibility and affordability make ultra-sonography an invaluable diagnostic tool in clinical investigation of infectious and non-infectious complications of human immunodeficiency virus (HIV).

Objective: To determine the pattern of upper abdominal abnormalities in HIV infected patients at ultra-sonography and correlate with clinical presentations.

Design: A descriptive cross-sectional study.

Setting: Kenyatta National Hospital and the Defence Forces Memorial Hospital, Nairobi, Kenya.

Subjects: HIV infected patients referred for upper abdominal sonography within the study duration of eight months.

Results: Two hundred and seventy three (273) patients were included in the study. Overall, upper abdominal pain accounted for 31.9%, pyrexia of unknown origin 30.40% and general abdominal pains 27.68% of clinical indications for sonography. The main clinical indication for liver sonography was hepatitis (45.80%) and the kidney was renal failure (66.67%). The most common liver pathology was diffuse fat infiltration at 35.71%. The most common renal pathology was renal parenchymal disease (93%). Para-aortic lymphadenopathy was present in 42.90% and ascites 25.60% of patients.

Conclusion: Renal parenchymal changes (type I and II), fatty liver, intra-abdominal lymphadenopathy and gallbladder sludge are common findings in HIV infected individuals despite paucity of clinical suspicion.

INTRODUCTION

The gastrointestinal tract is the second most common site of opportunistic infection after the respiratory system (1). Ultra-sonography provides useful information about the status of abdominal organs. It is vital in differentiating solid from cystic lesions. This study sought to determine the pattern of upper abdominal disease in HIV infected individuals at sonography and to compare these findings with the clinical presentations.

MATERIALS AND METHODS

This was a descriptive cross-sectional study carried out at Kenyatta National Hospital (KNH) and the Defense Forces Memorial Hospital over a period of eight months from May 2004 to January 2005. The study population comprised patients who had tested

positive for HIV-antibodies and had been referred for upper abdominal ultrasound.

Systematic sampling procedure was used in selecting patients into the study. Numbers were sequentially issued to the subjects. Eligible patients were invited to participate in the study. Patient data were obtained from prefilled radiology request forms. Additional information was obtained from the patient/guardian of minors.

The calculated sample size was 273 patients. The adult subjects were starved for at least six hours prior to the examination while children and infants whose clinical condition permitted were not fed for three hours. The patients were scanned in supine position and the organs were studied in multiple planes. Two-dimensional Sonographic data were acquired using conventional clinical ultra-sonographic equipment (Philips-SD 800 and Hewlett Packard - Image point). Findings were recorded in terms of size of the organ/or lesion, shape, echotexture

and multiplicity of lesions. Selected images were recorded on the sono-ultrasonic thermo-printing paper by multiformat camera inherent within the machine. Data were entered into the computer software SPSS. Descriptive statistics were done whereby all categorical variables were calculated in terms of proportions and presented in tables, texts and bar charts. Continuous variables were analysed using measures of central tendency and confidence intervals were calculated using the 95% confidence levels. Correlations of the clinical presentations and ultrasound findings were done using proportions.

RESULTS

A total of 273 patients with confirmed HIV infection underwent abdominal ultra-sonography for various indications. The mean age was 32 (\pm 13.8) years with 68.8% of the patients aged between 15 and 45 years

and 17% aged below 15 years. There were slightly more males (51.6% than females 48.4%). Most of the clinical indications for abdominal ultra-sonography were non-organ specific (Table 1). A total of 81 (29.67%) patients had various indications for liver sonography. Specific clinical indications for renal and pancreatic scans were 24 (8.8%) and three (1.1%) respectively. For the spleen the indications were 18 (6.6%) and gallbladder eight (2.9%).

Para-aortic/caval lymphadenopathy and ascites were found in 117 (42.9%) and 70 (25.6%) cases respectively. Mesenteric adenopathy was found in 23.5% while porta hepatis lymphadenopathy was present in 13.7% of the subjects. Other findings were solid abdominal mass (2.2%) and intra-abdominal abscess (3.3%). Many patients were found with multiple pathologies at scanning; these results are presented in Table 2.

Table 1
General indications Upper Abdominal Sonography n=273

	Frequency	%age
Right upper quadrant pain	87	31.9%
Ascites	37	13.6%
Para aortic lymphadenopathy	56	20.5%
Pyrexia of unknown origin	83	30.4%
Jaundice	42	15.4%
Abdominal mass	35	12.8%
General abdominal pain	75	27.68%
TB peritonitis	68	24.9%

Table 2
Upper abdominal Sonography: Non-specific findings

Ultrasound diagnosis	Frequency	Percentage
Abdominal lymphadenopathy	224	71.9
Ascites	70	23.1
Intra-abdominal abscess	9	3.0
Solid abdominal mass	6	2.0
Total	303	100%

Table 3
Indications for liver ultrasound n=273

Clinical diagnosis	Frequency	Percentage
Hepatitis	37	45.58%
Hepatomegaly	17	20.99%
Metastasis	25	30.86%
Cirrhosis	2	2.47%

More than half of the patients 174 (63.7%) had normal liver scans. The remaining 36.3% of the livers exhibited various Sonographic findings as shown in (Table 2) below. Fatty liver being the predominant finding (Scan 1).

Table 4
Ultrasound findings of the liver

Sonographic diagnosis	Frequency	Percentage
Normal liver	174	63.7%
Fatty liver	40	14 %
Hepatomegaly	32	11.7%
Diffuse liver infiltrates	28	10.3%
Cirrhosis	6	2.2%
Dilated intrahepatic ducts	3	1.1%
Abscess	2	0.73%
Tumor (Solid)	1	0.37%

More than half of the patients (55.7%) had normal kidneys. The remaining 121 (44.3%) showed renal parenchymal disease in 93.4%, hydronephrosis in 3.3 % and solid renal tumour in 3.3 % (Table 6). The mean bipolar lengths of paediatric and adult kidneys were within normal range at 7.69cm (95CI 7.12 – 8.26) ± 1.73 and 10.58cm (95%CI 10.42 – 10.74) ± 1.28

respectively. Twelve (5.1%) patients had right kidneys with bipolar lengths above 12 cm while 23 patients (9.8%) exhibited left kidney lengths above 12cm. A total of 113 patients had increased renal parenchymal echogenicity. Type 1 change accounted for 48.67% while type II contributed 51.33% (scan 3)

Table 5
Indications for kidney ultrasound n=24

Clinical diagnosis	Frequency	Percentage
Renal mass	1	4.17%
Hydronephrosis	2	8.33%
Metastatic disease/infiltrates	2	8.33%
Acute/chronic renal failure	16	66.67%
Recurrent urinary tract infections	3	12.5%

Table 6
Ultrasound findings of the kidneys

Ultrasound diagnosis	Frequency	Percentage
Normal renal scan	152	55.7%
Increased Renal Parenchymal Echogenicity	113	41.4%
Hydronephrosis	4	1.45%
Solid Renal Masses	4	1.45%
Total	273	100%

Majority of the subjects 264 (96.7%) had normal spleens at sonography. Splenomegaly was the commonest (69%) pathological finding. (Table 8).

Table 8
Ultrasound findings-spleen

Ultrasound diagnosis	Frequency	Percentage
Normal splenic scan	198	72.5
Splenomegaly	52	19
Diffuse splenic infiltrates	21	7.7
Solid lesion (tumour)	2	0.73
Total	75	100

At scanning, 77.7% (212) subjects displayed normal gallbladders and biliary system. Of the 61 patients who had various biliary pathologies, gallbladder sludge was present in 75.4%(46)(Scan 2), gallstones in five (8.2%), acute cholecystitis in four (6.6%), dilated gallbladder three (4.9%) and dilated common bile

duct in three (4.9%).

A comparison was made between clinical indications and ultrasound findings for various organs. Charts comparing clinical indications and ultrasonic findings for the liver and kidneys are shown below.

Figure 1
Association of clinical diagnosis and ultra sound findings in the liver

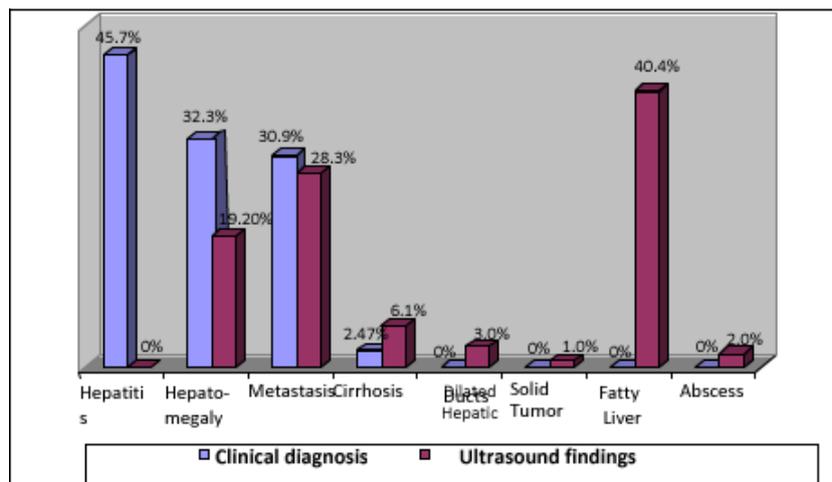
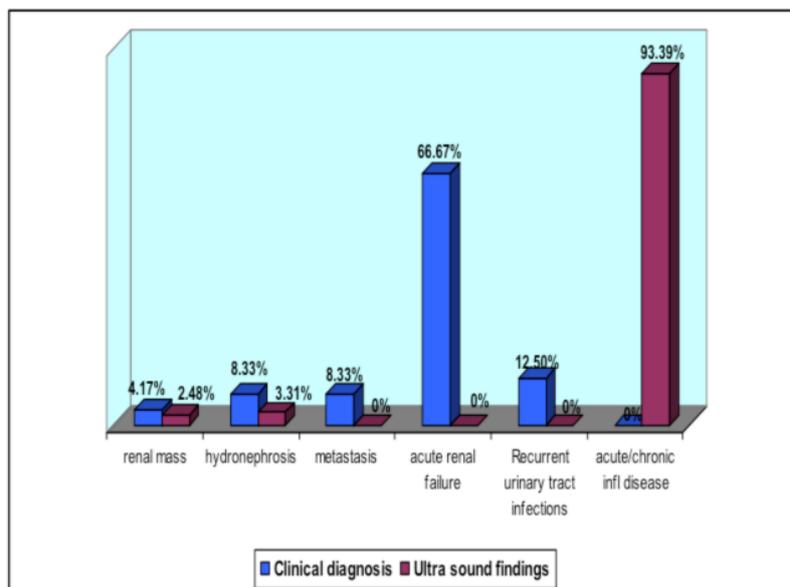


Figure 2
Comparison between clinical indications and ultrasound findings of the kidneys



DISCUSSION

In this study of 273 HIV infected patients, a pattern of upper abdominal findings at sonography has been determined and correlations with clinical presentations made. The gender distribution pattern is roughly equal at 51.6% (males) and 48.3% (females). This ratio is consistent with that of the national HIV / AIDS surveillance study in Kenya (26).

The most common findings were intra-abdominal lymphadenopathy (Para-aortic – 42.9%, Mesenteric – 23.5% and Porta Hepatic – 13.7%) and ascites.

Ascites was documented in 70 (25.6%) of the patients. The lymph nodes were variable sizes, discrete and or matted, and echopoor.

The results of this study reveal that 47 (69.1%) out of the 68 patients suspected to have tuberculous peritonitis showed enlarged para aortic lymph nodes while 33(48.52%) had ascites. Identical nodal appearances are seen with infections such as Cryptococcus, Histoplasmosis, Pneumocystis carinii, Mycobacterium avium complex and AIDS related neoplasms (3-6).

Thirty two patients (32.32%) had hepatomegaly. This compared well with a study done by Tsachibwabwa E T *et al* involving 900 HIV infected individuals which reported hepatomegaly in 35% of the cases (7).

Sonographically established causes of liver enlargement were diffuse fatty infiltration (15%) and ill-defined liver infiltrates (42.9%). Fatty liver aetiology is likely multi-factorial. Malnutrition and anti-retroviral drugs being the most probable culprits (1,8). However, since no enquiry was made as to whether the patients were on ARVs or not, it is not possible to conclusively attribute the relatively large finding of fatty liver disease to ARVs or other causes. A study carried out at KNH concluded that fatty liver is a rare occurrence at in the general population only 0.5% (9). But this study reveals that fatty liver is common in HIV- infected individuals.

Suspected metastatic disease accounted for 30.86% (25 cases) of requests for liver ultrasound. Twenty eight patients were found to have non-specific ill-defined heterogeneous diffuse liver infiltrates. The guiding factor to the most appropriate sonographic diagnosis was relevant clinical information. In this study, four patients had carcinoma of the cervix and non-Hodgkin's lymphomas while eight were known to have Kaposi's sarcoma. Only six cases, (6.1%) of those patients with liver pathology at sonography had features of liver cirrhosis. Two patients had features of macronodular cirrhosis often associated with chronic viral infection (HBV). The remaining four cases had features of micronodular cirrhosis.

The diagnosis of liver abscess was made in two cases (6.1%) ultrasound guided aspiration and microbiologic analysis. Tuberculous and pyogenic

abscesses display similar sonographic characteristics (4).

All the 25 cases (9.16%) suspected clinically to have hepatitis, had normal ultrasound findings. This clinical-ultrasonic discordance is due to unavailability of characteristic ultrasonic diagnostic features for hepatitis.

Six cases (2.2%) were clinically suspected to have acute cholecystitis while the remaining two cases (0.7%) were thought to have chronic cholecystitis. At scanning, 77.7% of patients had normal gallbladder while 22.34% had various features of gallbladder disease. Gallbladder sludge was the most common finding at (75.41%).

Out of eight cases clinically suspected to have cholecystitis, four had features consistent with chronic cholecystitis. Two of the cases had gallstones.

Grossly distended gallbladder, dilated common bile duct (CBD) and intrahepatic ducts were present in three patients all of whom had pancreatic head mass.

All the three cases (1.10%) clinically suspected to have acute pancreatitis had normal findings at sonography.

Incidental pancreatic body lesions were found in four cases (1.47%); with three (1.10%) had complex cysts and one bore a solid mass. Three other patients who had solid masses within the head of the pancreas had been referred for evaluation due to suspected surgical jaundice. In general, there was paucity of specific clinical indications for ultrasonic examination of the pancreas.

Splenomegaly, was the most common splenic finding observed at ultrasound with a total 94.54%.

Those patients who had splenomegaly, 17 (32.3%) displayed ill-defined splenic infiltrates while 35 (67.7%) showed homogeneously enlarged spleens. It was, however, not possible to determine the exact aetiology of splenic enlargement at scanning. Several studies have reported splenomegaly with one involving 900 HIV positive subjects putting the figure at 35 % (7)

Twenty one patients (38.2%) of those who had splenic lesions were classified for the purposes of this study as having non specific infiltrates. This is because these lesions were ill-defined, multiple, and nonspecific for a particular infective process or neoplastic disease.

Disseminated opportunistic infections, fungal, viral, protozoan or bacterial tend to involve the spleen in HIV-infected individuals; unfortunately, they exhibit similar nonspecific sonographic features. AIDS related neoplasms, Kaposi's sarcoma and non-Hodgkin's lymphoma, also give similar presentation.

The presence of close relationship between kidney sizes and function has been demonstrated in a number of studies. It has been shown by authors that bipolar kidney length is an accurate indication of

kidney weight and volume, as well as its functional state. That is why longitudinal axis of the kidney is used as a parameter during clinical examinations (10,11)

In this study of 273 patients, only 8.8% had specific requests for renal ultrasound evaluation. Requests for ultrasonic evaluation of the kidneys because of renal failure was the most common at 66.67%. The mean bipolar lengths of the adult and paediatric kidneys of $10.58\text{cm} \pm 1.28$ and $7.69\text{cm} \pm 1.73$ respectively were within the normal ranges.

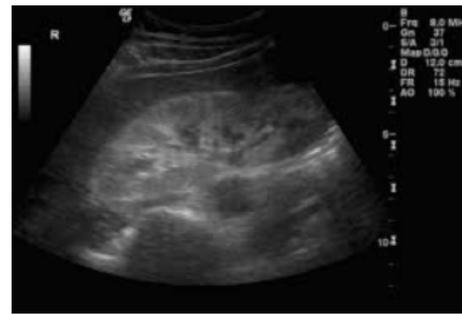
There is no significant difference in length between the right and the left kidneys. These figures compare well with studies done elsewhere involving normal subjects (10,11).

A total of 113 (93.39%) out of 121 patients who had renal pathologies exhibited increased renal parenchymal echogenicity. Type 1 renal parenchymal change accounted for 55(48.67%) of the cases and 58 (51.33%) had features of type 11 renal changes. Sixteen (5.90%) patients were confirmed to have end stage renal disease. These showed sonographic features type 11 renal disease. Sonography therefore picked up 97 (7,12) patients with kidney disease and no prior clinical suspicion of HIVAN. Hydronephrosis was diagnosed in four cases while only two had been suspected clinically.

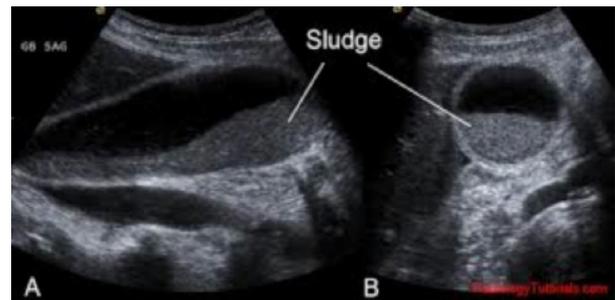
Generalised change in renal echogenicity conforms to two patterns. These are increased echogenicity of the cortex with normal echogenicity of the medullary pyramids with accentuation of the cortico-medullary differentiation or increased echogenicity of both cortex and the medulla with loss of cortico-medullary differentiation. The above features are referred to as Type I and Type II renal changes respectively. Type I is seen in early HIVAN and rapidly progresses to Type II. Numerous disease processes can produce similar renal changes (12-15).



Scan 1 FATTY LIVER



Scan 3 HIVAN



Scan 2GB SLUDGE

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