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ORIGINAL ARTICLE

PATTERNS OF ABDOMINAL ULTRASOUND FINDINGS IN HIV/AIDS PATIENTS IN BLACK LION HOSPITAL

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ABSTRACT

Background: *HIV infection is a major public health concern worldwide. This cytopathic retrovirus destroys the immune system that leads to opportunistic infections and tumors. Various organs of the body may be affected, leading to a variety of clinical presentations. Radiology plays an important role in the management. Not many papers have focused on this role in Ethiopia and little attention has been given to the use of ultrasound in the evaluation of patients with HIV/AIDS.*

Materials and Methods: *institutional based prospective cross sectional study of 111 HIV/AIDS patients who presented for abdominal ultrasound to the Department of Radiology, Black Lion Hospital, from November 2015 to July 2016*

Results: *The most common finding was hepatomegaly found in 50(45.5%). Other findings were hyperechoic (fatty) liver in 26(23.4%), splenomegaly in 31(27.9%), lymphadenopathy in 13(11.71%) and ascites in 11(9.91%). Gallbladder and biliary ductal and renal findings were uncommon in this study.*

Conclusion: *The findings in this study demonstrate that a myriad of ultrasonographic abnormalities can appear in the abdomens of HIV/AIDS patients. These sonographic abnormalities are non-specific to a particular pathogen or disease entity. However, such findings in the right clinical context and laboratory evaluation will help clinicians arrive at a diagnosis, leading to better patient care and management.*

INTRODUCTION

HIV continues to be a major global public health issue, having claimed for more than 35 million lives so far. In 2017, 940 000 people died from HIV-related causes globally. There were approximately 36.9 million people living with HIV at the end of 2017 with 1.8 million people being newly infected in 2017 globally. Even if there has been a decrease in the new HIV infection in eastern and southern parts of Africa since 2010, there were 800 000 new HIV infection in 2017, a 30% decrease since 2010(1). Even if there are favorable trends in several countries as to the incidence of HIV infection related to changes in behaviors and prevention programs, the number of people living with HV is also increasing due to the life prolonging effects of antiretroviral therapy.

Abdominal manifestation is one of the most frequent clinical presentation in HIV/AIDS patient. and Imaging plays key role in assessment of abdominal manifestation of HIV/AIDS. US is the most suitable imaging modality in resource limited set up because of it is wide availability, safety, affordability, versatility and also comparable diagnostic accuracy to that of other cross sectional imaging modality like CT(2).

Due to a high prevalence of HIV infection in sub-Saharan Africa and also increased number of patients living with HIV due to improved care and treatment, radiologists should be aware of the different spectrum of abdominal US findings in order to facilitate the diagnosis and improve the quality of health care delivery. Understanding the abdominal manifestation of HIV/AIDS and findings on US will contribute to an improved quality of care of this group of patients. To the authors knowledge there is no published study assessing the pattern of US findings of abdomen in the patient with HIV/ AIDS.

This study evaluated the use of ultrasound in diagnosis and management of abdominal manifestations of HIV by assessing the patterns of abdominal manifestations of HIV/AIDS on ultrasonography and as well correlating the ultrasound findings and degree of immunosuppression.

MATERIALS AND METHODS

This study was a prospective cross-sectional study conducted at the department of radiology, Black lion Hospital, Addis Ababa, Ethiopia. All adult HIV/AIDS patients more than 15 years of age who were sent to the department of radiology from

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ART clinics, OPD or Wards for abdominal ultrasound were included in the study. Study was conducted from November 2015 to July 2016 in all consecutive HIV/AIDS patients who underwent abdominal ultrasound.
The ultrasound scanning machines used in this study were Sonoscape machines, with curvilinear and linear probes. Proper setting of the overall (system) gain and the time or depth gain compensation (TGC/DGC) was adjusted for each patient to optimally visualize each organ. To examine the various abdominal organs, patients lay on the examination couch in different positions which included supine, prone, lateral and oblique positions. The abdominal organs were scanned in multiple planes and their size and echogenicity was evaluated using structured questionnaire. The scan was done by senior radiology residents and reviewed by consultant radiologist when found difficult.

SPSS 20.0 for windows software was used for data analysis. Continuous variables were expressed as mean ± standard deviation with student T-test analysis for comparison. Categorical variables were expressed as percentage. Two tailed p-value < 0.05 was considered significant.

Ethical consideration

Patient identifiers were omitted from the data collection form, and ultrasound was done when requested as a routing clinical evaluation but not for the objective of the research. Ethical approval was taken from the research and ethics committee of the department of radiology at Ababa University.

RESULTS

Of the 111 cases, 79 (71.2%) were females and 32 (28.8%) were males. The mean age was 39.93 years, (range 17–70 years). The modal age group was the 4th decade with a frequency of 36.9% (Table1). 90(87.2%) patients were on HAART, of whom 39 (44%) were taking it for 5-10yrs.

Table 1: cross tabulation of abnormal sonographic findings with CD4+ count

Sonographic Findings	Frequency	CD4 class None	Mild	Advanced	Severe	p-value
Hepatomegaly	15	2	4	2	7	0.639
Hyperechoic liver (fatty)	11	2	2	2	5	0.876
Splenomegaly	7	0	2	1	5	0.37
Focal splenic lesion (yes)	7	1	1	0	5	0.173
Lymphadenopathy (present)	2	0	1	0	1	0.601
Ascites present	3	0	0	0	3	0.352

Liver

Hepatomegaly was the most common liver finding; it was demonstrated in 50 (45%) patients. Most, 82 (74%), of the patients had normal hepatic echogenicity, whereas 26(23.4%) patients had hyperechoic parenchyma and 3 (2.7%) patients had a heterogenous hepatic parenchymal pattern. Furthermore, 12 (11%) patients had focal hepatic lesions which are probably attributable to hemangioma in 6, focal fat infiltration in 2, and metastasis in 1 patient who had a primary breast cancer. No specific cause could be given in 3 patients who had focal liver lesions and further imaging was recommended.

Spleen

Splenomegaly was demonstrated in 31 (28%) of the patients. There were 16 (14.6%) patients with focal splenic lesions, of which 6 had lymphoma and the hypoechoic splenic lesions were attributable to splenic involvement, 6 had disseminated TB and the splenic lesions were attributable to TB, one patient had anechoic lesions which were attributed to simple cysts, and another had hyperechoic lesions for which hemangioma was considered. 2 cases had nonspecific hypoechoic lesions which could not be attributed to any particular disease entity.

Kidney
Normal renal echogenicity was seen in 106 (95.5%) patients, while 5 (4.5%) patients had hyperechoic kidneys. Four of the patients with hyper echoic kidneys have been on ART for more than 5 years, 2 of them for more than 10 years but the association was not statistically significant (p-value 0.26). 0ne of the patients with hyperechoic kidneys had bilateral renomegally.

9 patients had hydronephrosis, of which 7 were unilateral. Pelvic masses with distal ureteric compression/ invasion were the presumed causes in 5 patients, 1 patient had distal ureteric stone, another had previous renal TB treatment and no cause was identified in 2 of the cases.

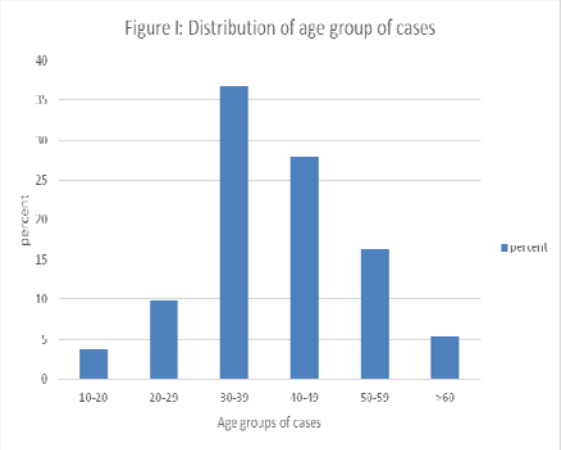
Lymph node
Enlarged lymph nodes were seen in 13 (11.7%) patients. These lymph nodes were seen in the para-aortic region in 8 (61.5%), periportal in 9 (69.2%), splenic hilum in 2 (15.4%), mesenteric in 4(30.7%) and aortocaval in 1 (7.7%) patient. Many of these lymph nodes were seen at multiple sites.

Others
There were 11(9.91%) patients with ascites. Of these, 3(27.3%) were secondary to disseminated TB involving the peritoneum, 2(18.18%) had portal hypertension and 1 patient had puerperal sepsis and had minimal pelvic collection. No specific cause was identified in 5 patients.

One patient had cholelithiasis, another had biliary ductal dilatation with no obstructing lesion identified.

CD4 classification
Of the 111 cases, CD4 counts were documented in the charts in only 35 patients. Grouping into CD4+ classes was done according to the World Health Organization's (WHO's) classification of CD4+ immunological profile in adult HIV-infected patients, with CD4+ counts >500/microlitre categorized into the None or Not significant class; 350 - 499 as Mild; 200 – 349 as Advanced; and a CD4+ count <200 in the Severe category.

There were 8 (7.2%) patients in the Not significant category, 7 (6.3%) in the Mild, 5 (4.5%) in the Advanced, and 14 (12.1%) in the Severe CD4+ class. There was no statistically significant association between the abdominal ultrasound findings and CD4 counts.



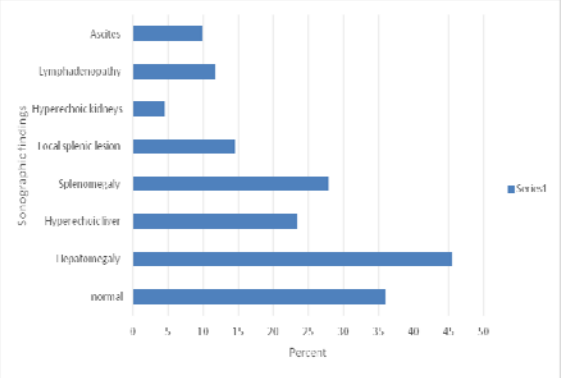


Figure 2: Distribution of the different sonographic finding

DISCUSSION

Our study revealed various abnormal abdominal sonographic findings in 64% of the 111 patients. These sonographic abnormalities are non-specific to a particular pathogen or disease entity but the findings may help the referring clinician to narrow his differential diagnosis and also reach a definitive diagnosis with other clinical and laboratory findings. The findings also enables us guide the next imaging evaluation if there is a need. Overall there will be a better patient care.

More than two-third of our cases belong to the age group 20-49yeras, females constituting more than 70% of the respondents which is the most productive year and also at higher risk of HIV infection. Young girls in Ethiopia are more vulnerable to HIV than boys because of early age at sexual debut, early marriage, sexual abuse and violence such as rape and abduction (3, 4). The female prevalence and mean age of 39.93 years in our study is also in line with a comparable study by Obajimi *et al* (5) in a similar environment in which they reported a similar female prevalence and mean age of 38.02 years.

Liver diseases in HIV patients are mostly due to infections and tumor infiltrations. By far the most common cause of liver infection in HIV patients is tuberculosis. Others include fungal infection (Cryptococci neoformas) and leishmaniasis. And most patients with liver disease show abnormalities on histopathology studies (6). Postmortem hepatic histopathological.

Findings in HIV patients also revealed tuberculosis being the most common infection (65%) patients had clinical tuberculosis. Granulomatous hepatitis, chronic hepatitis, nonspecific reactive hepatitis and steatosis were the most common hepatic histopathological lesions(7).

In our study hepatomegaly was the most common finding which was seen in 50(45.05%) which is comparable to studies by Igbinedion *et al* (8) who reported 39% hepatomegaly from 300 patients and Tshibwabwa ET *et al* (9) who reported 35% hepatomegaly in 900 patients. The finding of hepatomegaly in our series and in other similar studies are not specific to a particular disease condition but may be attributed to non-specific reactive hepatitis, granulomatous hepatitis chronic active hepatitis, infiltrations by lymphoma or Kaposi's sarcoma (6, 10). There were 26(23.4%) patients who had hyperechoic liver parenchyma in our study.

Even if the finding is nonspecific, it may also suggest a disseminated disease process like histoplasmosis, Mycobacterium avium intracellulare (MAI). Diffuse fat infiltration also contributed to hyperechoic liver parenchyma. Yee *et al* (11) and Schneiderman *et al* (10) attributed the diffuse increased hepatic echogenicity mostly to fatty infiltration or hepatic granulomatosis. However, hepatitis from infection or drugs can cause the observed hyperechoic and also hypoechoic hepatic parenchyma changes. Liver findings like hepatomegaly, changes in echogenicity and presence of focal hepatic lesions do not correlate with CD4+ count.

Splenomegaly was the next most common ultrasound finding reported in 31(27.9%). Other similar studies also showed comparable findings (11, 12). Even if clinical examination can identify splenomegaly, it only detects around one-third of cases with splenomegaly. Clinical detection of splenomegaly can also give false positive results too (13). The prevalence of splenomegaly is also highly associated with liver disease like hepatitis. One should have in mind also in endemic areas with malaria, there may also be co-infection of malaria and HIV. (14). The two ultrasound features of renal disease identified in our serious are increased echogenicity of the renal parenchyma and enlarged renal size which were seen in 4.5% & 10.9% patients, respectively.

Other studies reported larger proportion of renal findings; Igbinedion *et al* (8) reported renomegaly in 18.7% patients and hyperechoic kidneys in 37.3% of patients. The discrepancy may partly be explained by the fact that we used renal length regardless of axial renal dimension on the other hand, HIV associated nephropathy initially caused increased axial dimension of the kidneys (15).

HIV-associated nephropathy is the leading cause of renal failure in HIV-positive patients. US findings are variable and renal length may also be normal or enlarged but parenchymal echogenicity is the most characteristic finding of HIV nephropathy. In addition with hyperechoic kidneys the finding of thickened pelvicaliceal system at US should lead the radiologist to the diagnosis of HIV-associated nephropathy. (16). Other findings include heterogeneous renal parenchyma with patchy areas of increased and decreased echogenicity and also hydronephrosis in few. Follow-up scan in patients with normal renal length and echogenicity can also reveal increased renal size and echogenicity. The diagnosis of HIV nephropathy is useful in predicting the prognosis and telling survival (life span) after the diagnosis (17).

Our study reported 13(12%) cases were having intra-abdominal enlarged nodes and was also one of the most common findings in HIV patients in other studies too. Igbinedion *et al* (8) reported lymphadenopathy in 95 (31.7%) patients. Enlarged intra-abdominal nodes are uncommon sites both as part of generalized or localized nodal disease, the most common being cervical, axillary and intrathoracic nodes.The most common causes of enlarged nodes in HIV patients are tuberculosis, lymphoma and toxoplasmosis which accounted for more than 50% of the causes (18). Unlike other sites of enlarged nodes which can easily be noticed, like cervical and axillary, ultrasound plays a great role in identifying intra-abdominal nodes in asymptomatic patients.

Ascites was also one of the sonography findings in our series which was found in 9.9% of cases. No parasynthesis was done in our cases to investigate the cause but in addition to establishing the presence of fluid in the peritoneal cavity, ultrasound can also be used for guided diagnostic aspiration which is a safe method of getting fluid samples from the peritoneal cavity(19, 20). Most causes of ascites in HIV patients are not related with HIV and other opportunistic infection but is due to non-HIV related causes like portal HTN (20). All the above abdominal sonographic pathologies have no statistically significant association with CD4 count which may be due to small number of cased whose CD4+count was determined.

Conclusion

Even if abdominal ultrasound findings in patients with HIV are not that much specific in establishing diagnosis, the different ultrasound findings will help in supporting other clinical and biochemical findings and narrow the differential diagnosis in addition to identifying those cases who need further imaging evaluation and diagnostic tests.

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Competing Interest

The authors declare that this manuscript was approved by all authors in its current form and that no competing interest exists.

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