

Utility of abdominal ultrasonography in HIV patients

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ABSTRACT

Introduction: Various diseases associated with human immunodeficiency virus (HIV) infection are often difficult to diagnose. A poor immune response, atypical presentations and opportunistic pathologies all contribute to this difficulty. We tried to evaluate the utility of routine abdominal ultrasonography (US) in new and follow-up HIV cases, and compared the results among those with a clinical need for US and those where US was performed as a routine screening.

Methods: 150 consecutive seropositive patients were subdivided into four groups depending on the necessity of abdominal US on the initial workup, i.e. Group A (38 patients) or B (112 patients), and whether they were newly-diagnosed HIV patients or follow-up patients, i.e. Group X (62 patients) or Y (88 patients), giving us subgroups, AX (22 patients), AY (16 patients), BX (40 patients) and BY (72 patients).

Results: The prevalence of significant US findings was higher in those with CD4 less than 200 cells/ml (77.8 percent) compared to those with CD4 200–500 cells/ml and CD4 more than 500 cells/ml (65.5 percent and 37 percent, respectively). 24 out of 38 patients with clinical indications and 71 out of 112 patients without any obvious clinical need for US, had positive findings on US, the majority of which had a major therapeutic impact.

Conclusion: We conclude that abdominal US is a simple and cost-effective tool in resource-poor countries like India, where HIV care is becoming more and more important.

Keywords: acquired immunodeficiency syndrome, active anti-retroviral therapy, anti-retroviral therapy, highly hepatic venous thrombosis, highly-active anti-retroviral therapy, human immunodeficiency virus, ultrasonography

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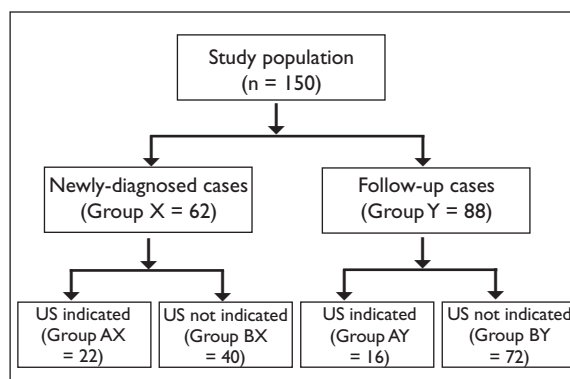


Fig. 1 Tree diagram shows the distribution of the study population into four groups.

INTRODUCTION

Abdominal complaints are common in human immunodeficiency virus (HIV)-infected patients, and the signs and symptoms of the disease may be masked by a concurrent illness and a weak immune response, making accurate diagnosis difficult. Patients with acquired immunodeficiency syndrome (AIDS) are susceptible to diseases common to the general population. Moreover, the state of acquired immunodeficiency makes them more susceptible to a number of unusual disorders, predominantly infectious and neoplastic ones.⁽¹⁾ The search for an aetiology frequently leads to many investigations, which are often difficult in a resource-limited setting like ours. The objectives of this study were to evaluate the role of ultrasonography (US) of the abdomen in HIV patients, and to assess the utility of US of the abdomen as a baseline investigation in all HIV patients.

METHODS

This study was conducted at Medical College Kolkata, India. 150 consecutive outpatients (62 new, 88 follow-up) attending the HIV specialty clinic at our institution from May to July 2005 were enrolled into this study. 58 patients among the follow-up group were on highly-active anti-retroviral therapy. All the patients were subjected to detailed history taking, thorough clinical examination and US evaluation of the whole abdomen. Other investigations were performed based on clinical indications and their CD4 counts. The purpose of US, whether clinically indicated (Group A) or for study purposes (Group B), was

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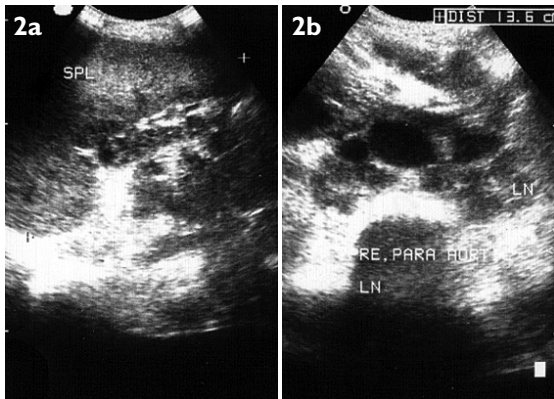


Fig. 2 US images show (a) splenomegaly (SPL), and (b) retroperitoneal lymphadenopathy (LN).

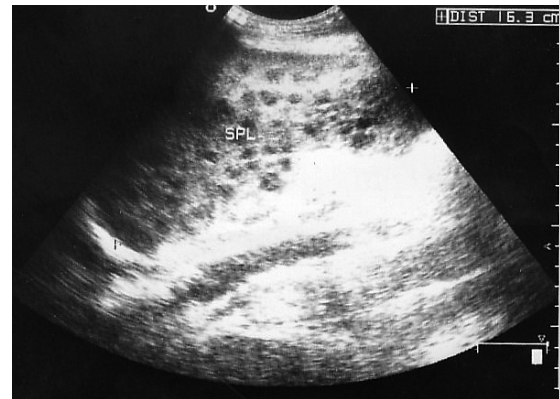


Fig. 3 US image shows multiple hypoechoic lesions in splenic tuberculosis.

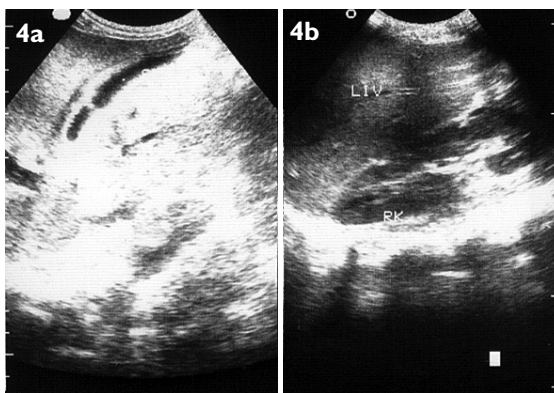


Fig. 4 US images show (a) hypoechoic area surrounding the gallbladder in HIV cholangiopathy, and (b) normal liver and right kidney.



Fig. 5 Doppler US image shows hepatic venous thrombosis.



Fig. 6 US image shows pancreatic calcification involving the head of pancreas.

recorded. To avoid bias pertaining to the recommendation of US, the attending physician at the HIV clinic was not aware of the study protocol, and the US requisitions were routed through the nursing officer on duty at the outpatient department. The US (HPAgilent Technologies, Netherlands) was performed using a curvilinear 3.5–5 MHz probe, at the Department of Radiology by the same radiologist, who was aware of the clinical background,

but blinded to the study protocol. The US findings were recorded and correlated with the patients' indications, for assessing the utility of abdominal US as a routine investigation for HIV patients.

RESULTS

Our cohort of 150 seropositive patients were subdivided into four groups, AX, AY, BX and BY, depending on the necessity of abdominal US on initial workup, Group A (n = 38) or B (n = 112), and whether they were newly-diagnosed HIV or follow-up patients, Group X (n = 62) or Y (n = 88). Newly-diagnosed HIV patients with clinical indication of US were grouped as AX (n = 22), while new HIV patients with no need for abdominal imaging were categorised as BX (n = 40). The corresponding subgroups for follow-up patients were AY (n = 16) and BY (n = 72), respectively (Fig. 1).

Of the 62 newly-diagnosed HIV patients and 88 follow-up patients in our study, positive findings on abdominal US were documented in 40 (64.5%) and 55 (62.5%) patients, respectively. These figures validated the justification of routine US screening at baseline, and intermittently thereafter. In addition, the chi-square test

Table I. The distribution of patients and yield on abdominal ultrasonography.

Patient distribution	n	Negative US	Positive US	p-value
Total no. (%) of patients	150	55 (36.7)	95 (63.3)	NS
No. (%) of new cases (AX + BX)	62	22 (35.5)	40 (64.5)	NS
With US indication (AX)	22	8 (36.4)	14 (63.6)	
Without US indication (BX)	40	14 (35.0)	26 (65.0)	
No. (%) of follow-up cases (AY + BY)	88	33 (37.5)	55 (62.5)	NS
With US indication (AY)	16	6 (37.5)	10 (62.5)	
Without US indication (BY)	72	27 (37.5)	45 (62.5)	

US: ultrasonography; NS: not significant

Table II. Distribution of positive ultrasonographical findings according to CD4 counts.

Distribution of cases	n	CD4 count (cell/ml)			Cases with positive findings
		< 200 (n = 36)	200–500 (n = 87)	> 500 (n = 27)	
No. (%) of new cases					
With US indication (AX)	22	4	5	5	14 (63.6)
Without US indication (BX)	40	17	6	3	26 (65.0)
No. (%) of follow-up cases					
With US indication (AY)	16	6	2	2	10 (62.5)
Without US indication (BY)	72	1	44	0	45 (62.5)
Total no. (%) of cases	150	28 (77.8)	57 (65.5)	10 (37)	95 (63.3)

performed on this data gave a p-value of no statistical significance, justifying the universal application of abdominal US.

From our data, 26 (65.0%) new (BX) and 45 (62.5%) follow-up (BY) patients had positive US findings despite having no obvious indication for this investigation. Interestingly, among those with indications for US, positive findings emerged in 14 (63.6%) new (AX) and 10 (62.5%) follow-up (AY) patients. Thus, there appears to be no real benefit of selecting patients for US based on presentations. Moreover, the US findings for Groups BX and BY would have been missed, if this modality was restricted to patients with specific indications alone. Therefore, the increase in HIV cases detected when all patients underwent US were 26 (41.9%), 45 (51.1%) and 71 (47.3%) for new, follow-up and total patients, respectively (Table I).

The patients were stratified according to their CD4 counts into three groups: CD4 < 200, CD4 200–500, CD4 > 500 cells/ml, with 36 (24%), 87 (58%) and 27 (18%) patients in each of the respective groups. Prevalence of positive US findings was higher in the CD4 < 200 group (77.8%) compared to the other two groups, CD4 200–500 (65.5%) and CD4 > 500 (37%) (Table II). The utility of US was higher in the low CD4 count group than in the groups with higher CD4 counts.

Of the 95 patients who had positive findings, 33 (34.7%) had hepatomegaly, 22 (23.2%) had retroperitoneal

lymphadenopathy (Fig. 2) and 15 (15.8%) had splenomegaly with or without ascites or splenic space-occupying lesion. Among the 22 patients with retroperitoneal lymphadenopathy, fine needle aspiration cytology (FNAC) was performed in 15 patients, and features of tuberculous involvement could be documented in eight of them. 11 (11.6%) patients had ascites, of whom four had high serum-ascites albumin gradient. One patient was suffering from chronic hepatitis B and the aetiology remained elusive in three (3.2%). US-guided FNAC documented hepatic or splenic tuberculosis in 13 (13.7%) patients (Fig. 3). The other significant findings were HIV cholangiopathy in four (4.2%) (Fig. 4) and hepatic abscess in seven (7.4%) patients. Thickening of the gut wall, suggestive of intestinal lymphoma, was seen in two (2.1%) patients, and this was subsequently confirmed on histopathology. Ileocaecal tuberculosis, hepatic venous thrombosis (Fig. 5) and pancreatic calcification (1.1% each) (Fig. 6), were the other uncommon observations (Table III).

DISCUSSION

Imaging plays an important role in the detection of various pathologies associated with AIDS. In many cases, the radiologist provides us the first clue in suspecting the possibility of an underlying HIV infection.⁽²⁾ Abdominal symptoms are among the most frequent complaints of patients with AIDS. Since precise diagnosis based on symptoms alone is very difficult in these patients, the

Table III. Distribution of abdominal ultrasonographical findings among those with a positive test and their correlation with supportive tissue diagnosis.

Disease	Findings on US alone for all patients (n = 150)	Group A (n = 38)				Group B (n = 112)			
		On US alone	Supported by FNAC / aspiration	Tissue diagnosis achieved	Therapeutic advantage	On US alone	Supported by FNAC / aspiration	Tissue diagnosis achieved	Therapeutic advantage
Hepatomegaly	33	19	–	–	17	10	–	–	–
Hepatic TB	11	9	1	9	9	2	2	2	2
Hepatic abscess	5	3	2	2	3	2	1	1	2
Hepatic venous thrombosis	1	1	–	–	1	0	–	–	–
Ascites	14	3	3	3	3	11	7	5	8
Splenomegaly	32	9	–	–	–	23	–	–	–
Splenic TB	2	2	2	2	2	0	–	–	–
Splenic abscess	2	0	–	–	–	2	2	2	2
Retroperitoneal lymphadenopathy	23	2	–	–	–	21	–	–	–
TB lymph node	17	–	1	1	1	–	17	17	17
Histoplasmosis of lymph node	2	–	0	0	0	–	2	2	2
Lymphoma presenting as lymphadenopathy	2	–	1	1	1	–	1	1	1
HIV cholangiopathy	4	1	–	–	–	3	–	–	–
Intestinal lymphoma	2	1	1	1	1	1	1	1	1
Intestinal TB	1	0	–	–	–	1	1	1	1
Pancreatic calcification	1	0	–	–	–	1	1	1	1
Total	95	24	–	–	–	71	–	–	–

TB: tuberculosis; US: ultrasonography; FNAC: fine needle aspiration cytology.

contribution of radiology is important to reaching the diagnosis.⁽³⁾ US offers a cheap avenue of diagnosing opportunistic infections in HIV. In 2003, Uygur-Bayramicli et al showed that the most common abdominal US findings in HIV patients were ascites and hepatomegaly.⁽⁴⁾ It had been earlier documented that microabscesses of the liver and spleen in AIDS patients could be detected with 5-MHz US.⁽⁵⁾ There have been several publications on US findings in tuberculosis with HIV.^(6,7) Tarantino et al demonstrated the radiological features and the value of fine needle aspiration biopsy of the lymph nodes and spleen in AIDS patients with disseminated mycobacterial infection.⁽⁸⁾ We documented focal splenic lesions in several patients, the majority of whom underwent FNAC and reached a definitive diagnosis. Porcel-Martin et al documented the utility of abdominal US in detecting focal splenic lesions in patients with AIDS.⁽⁹⁾ We had four patients with HIV cholangiopathy, and a single patient was diagnosed to have pancreatic calcification. Various authors have suggested that the pancreas and biliary tract are frequent sites of infectious, inflammatory and neoplastic diseases in patients with HIV infection. However, the symptoms of pancreaticobiliary involvement may be relatively mild so that the prevalence of these disorders is probably underestimated. An appreciation of the imaging

findings of HIV-associated pancreaticobiliary disorders is important, because at times, involvement of these organs may be the only suggestion that ultimately establishes the diagnosis of AIDS.⁽¹⁰⁾

Although we have tried to highlight the utility of US in evaluating visceral involvement and lymphadenopathy, it is prudent to remember that the use of US often needs to be supported by other appropriate diagnostic tools.⁽¹¹⁾ In our setting, US is provided free of charge whereas an abdominal computed tomography (CT) costs nearly USD 70. The patients who could afford it were advised to undergo CT, and the findings correlated well with the US interpretation.

With rising HIV prevalence in India, it is timely to develop cost-effective and affordable protocols for the management of this disease. Moreover, with long-term survival of HIV patients becoming the rule rather than the exception, patients need to be followed up with feasible options and guidelines. Tissue diagnosis and sophisticated imaging are difficult to access in our country. US assumes an even greater importance in the setting of worsening immune status. We conclude that US should be used as an affordable diagnostic tool for HIV patients in resource-poor settings, and it is particularly cost-effective in those patients with low CD4 counts.

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