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Brief Research Report

Low Back Pain and Associated Imaging Findings among HIV-Infected Patients Referred to an HIV/Palliative Care Clinic

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Abstract

Background. Low back pain is a common cause of chronic pain in human immunodeficiency virus (HIV)-infected patients. The American College of Physicians and American Pain Society guidelines for diagnostic imaging in low back pain are difficult to apply to patients with chronic illnesses like HIV who may have risk factors for cancer or compression fractures, but whether imaging all such patients for low back pain improves outcomes is unknown.

Objective. Our objective was to describe patients referred to a chronic pain-focused HIV/palliative care clinic (HPCC) with back pain and their associated lumbar spine imaging findings.

Methods. We conducted a retrospective chart review of patients at a palliative care clinic that sees patients with HIV, most of whom have chronic pain. Charts with a diagnosis of low back pain were cross-referenced with an imaging database and any magnetic resonance imaging (MRI) of the lumbar spine with or without contrast were identified.

Results. Seventy-six of 137 patients referred to the HPCC were found to have back pain. These patients were mainly young (median age 45, interquartile range 40–51) with well-controlled HIV. Twenty-two (29%) of these patients had an MRI of the lumbar spine, and 11 (50%) of these warranted follow-up, most of whom had degenerative disc disease, including four with findings concerning for malignancy.

Discussion. This is the first study to explore the role of spinal imaging in HIV-infected patients. In our study, four patients had findings concerning for malignancy. These findings suggest that spinal imaging should be considered in the work up of HIV-infected patients with moderate to severe back pain.

Key Words. HIV; Low Back Pain; Radiology; Chronic Pain

Introduction

The majority of people who suffer from localized chronic pain have back pain [1–3]. There has been a recent emphasis on the judicious, targeted, and appropriate use of imaging in patients with chronic low back pain. The American College of Physicians (ACP) and the American Pain Society (APS) have introduced guidelines stating that diagnostic imaging is indicated for patients with low back pain "only if they have severe progressive neurologic deficits or signs or symptoms that suggest a serious or specific underlying condition." In addition, they recommend imaging if pain persists after a month-long trial of therapy in patients with "minor risk factors for cancer (unexplained weight loss or age over 50), risk factors for inflammatory back disease, risk factors for vertebral compression fracture, signs or symptoms of radiculopathy, or risk factors for or symptoms of symptomatic spinal stenosis." [4,5] In patients who do not require immediate imaging (defined as signs suggestive of serious abnormalities or disease) or surgical intervention, imaging has not been shown to necessitate a change in management [6–8], but can result in harms such as exposure to radiation, unnecessary procedures including surgery [9], and lead to costs from the imaging itself as well as the additional costs of unnecessary tests and procedures [10].

The approach to imaging patients with chronic illness and chronic back pain is complex. The ACP/APS guidelines specifically state, "There is insufficient evidence to guide precise recommendations on diagnostic strategies in patients who have risk factors for cancer but no signs of spinal cord compression." [5] Patients with chronic illness may have some risk factors for cancer or compression fractures, but whether imaging all patients with chronic illness and low chronic back pain improves outcomes is unknown.

One example of a chronic illness in which this question frequently arises is human immunodeficiency virus (HIV). In the current HIV treatment era, patients with HIV who are linked to appropriate HIV primary care and take antiretroviral therapy consistently often lead relatively healthy lives and have a near-normal life expectancy [11]. However, comorbid chronic pain is very common, with prevalence estimates as high as 39–55% [12–19]. The prevalence of chronic low back pain in HIV-infected patients is unknown, but a recent study found that back pain was the most common site of pain that prompted referral to a chronic-pain focused palliative care clinic [20]. Additionally, HIV-infected patients are more likely to develop certain comorbidities such as non-acquired immunodeficiency syndrome (AIDS)-defining malignancies including anal, colorectal, liver, and lung cancer [21,22], and osteopenia, osteoporosis, and osteonecrosis [23–27]. Applying the ACP/APS guidelines, it is difficult to determine the appropriate strategy for imaging HIV-infected patients with chronic back pain, and there are no studies that specifically investigate this question.

Our objective was to describe patients referred to a chronic pain-focused HIV/palliative care clinic (HPCC) with back pain and their associated lumbar spine imaging findings. With current HIV therapy, we hypothesized that even in this chronically ill patient population, the majority of the imaging studies ordered would not lead to a change in management approach.

Methods

We conducted a retrospective chart review of patients at the University of Alabama at Birmingham (UAB) HPCC. This clinic sees predominantly patients with HIV and chronic pain, and is situated within a larger comprehensive clinic for HIV-infected patients. Patient-reported outcome (PRO) questionnaires on a variety of subjects (depression, anxiety, substance abuse, and routine demographic and clinical data) are collected on most patients in the clinic. Trained study staff (E. M. and B. P.) reviewed charts of patients who were referred to the HPCC during the study period, between April 2008 and June 2011. Patients were included if they were part of the Center for AIDS Research Network of Integrated Clinical Systems prospective cohort study, which includes more than 90% of patients seen in the overall HIV clinic, were at least 19 years old, had their first HPCC appointment scheduled during the study period, and had at least one PRO during the study period. Using electronic medical record data, we collected demographic information at the date of referral to the HPCC. The charts were reviewed for diagnoses made by primary and palliative care providers. Patients given the diagnosis of back pain were then cross-referenced with the UAB imaging database, and magnetic resonance imaging (MRI) of the lumbar spine with or without contrast were identified.

Patients referred to the HPCC who had back pain were compared with patients referred to the HPCC without back pain. In addition, we compared patients referred to the HPCC with back pain who had lumbar spine imaging with patients with back pain who did not have lumbar spine imaging. Categorical variables were compared using the two-sided Fisher's exact test, and continuous variables were compared using the two-sided Wilcoxon rank-sum approximation. Independent of the chart review process, and without reviewing the official clinical radiologist report generated at the time of patient care,

a radiologist specializing in neuroimaging (J. S.) together with study staff (E. M.) read the lumbar spine MRI and determined the findings for each. Study staff (E. M.) was not blinded to the chart review data while reviewing films, but did not specifically use that data to inform the MRI reads. Additionally, the original official report was not used to inform the reads. Findings were categorized as needing further evaluation if they had potential to be treated, or if they portended a worse outcome if not evaluated further. A final chart review of patients who had lumbar spine MRI, regardless of the results, was conducted to determine whether or not the official report of imaging findings actually changed the patients' management. Imaging findings were defined as having actually changed management only if the provider specifically stated that a new management plan was implemented based on imaging findings of the original official report. Imaging studies were considered not to change management if clinic providers reported a negative study or reported findings without changing the original treatment plan. In participants for whom the study radiologist and clinic provider did not reach the same conclusion, the study radiologist interpretations were compared with the official radiology report available at the time of the clinical encounter. This study was approved by the Institutional Review Board of the UAB.

Results

Of the 137 patients included in the study who were referred to the HPCC, 76 (55%) were found to have back pain. These patients were mainly young (median age 45, interquartile range 40–51) males with high CD4+ T-cell counts and undetectable viral loads (indicating a robust immune system and successful antiretroviral treatment). Table 1 compares patients in the HPCC with and without back pain; there were no statistically significant differences among the characteristics that were measured.

Of the 76 patients with back pain, 22 (29%) had an MRI of the lumbar spine performed at UAB. Of those 22, 19 (86%) were described as having chronic pain. Like the HPCC patients with back pain, the majority of HPCC patients with back pain and imaging were young (median age 47) males with high CD4+ T-cell counts and undetectable viral loads. Table 2 compares HPCC patients with back pain who had imaging with those who did not. HPCC patients with back pain who had imaging were older and more likely to have sleep disorders and cardiovascular disease.

Table 3 summarizes the imaging findings for patients with low back pain referred to the HPCC. The majority of available images had findings consistent with degenerative disc disease. Nerve impingement, such as compression of lumbar nerve roots secondary to disc herniation, was also common. Three patients (14%) had no significant findings.

Of the 22 patients with low back MRI, 11 (50%) had findings that warranted follow-up based on our criteria. Four patients had findings concerning for malignancy (obvious masses, bony metastasis, enlarged lymph nodes). Four patients had neural impingements that could benefit from intervention (physical therapy or procedure). One patient had a benign-appearing mass (likely lipoma), one had possible vertebral collapse, and one had hardware misalignment.

The study radiologist and the clinic provider came to the same conclusion that three patients required follow-up. These three patients included two with findings concerning for malignancy and the patient with a benign-appearing mass. One was immediately hospitalized, and two were scheduled for follow-up imaging. The study radiologist and the clinic provider did not reach the same conclusion on four patients. Of these, three patients were included in the 11 thought to need follow-up by the study radiologist, but the clinic provider did not change management. This included a patient with bony metastasis, in whom the clinic was aware of the diagnosis, and two patients with possible vertebral collapse and spinal nerve impingement. When looking at the original radiology reports available at the time of the clinical encounter, there was no mention of possible vertebral collapse, and the patient with nerve impingement had stable findings from a previous MRI unknown to the study radiologist. The fourth patient was referred to orthopedic surgery when the study radiologist had suggested no follow-up. The original radiology report and the study radiology report both noted degenerative changes. Nine of the patients' images, which included 5 of the 11 thought to need follow-up, were either not clearly ordered by the clinic and as a result not mentioned by the clinic provider, or the provider did not specifically say that the change in management was prompted by imaging. This included the remaining patient with findings concerning for malignancy, the remaining patients with nerve root impingement, and the patient with hardware misalignment.

Discussion

Although the ACP and APS have issued general guidelines about when to image patients with low back pain in general primary care settings, we do not know if these guidelines can be applied to patients with complex chronic illnesses such as HIV. To our knowledge, this is the first study to explore the role of spinal imaging in HIV-infected patients. In patients seen in an HPCC who had back pain and low back MRI and whose HIV was largely under good control with high CD4 T-cell counts and undetectable viral loads, we found that 50% percent had imaging findings that would merit follow-up or a change in management. Many images were consistent with nerve root impingement, benign-appearing masses, and hardware misalignment, but also included findings concerning for malignancy. This is in contrast to our initial hypothesis that the majority of imaging studies would not necessitate a change in management.

Although we did not include a comparison group of HIV-uninfected individuals, more patients in this study needed

Table 1 Comparison between HPCC patients with and without back pain

Variable	HPCC Overall (N = 137)	HPCC Without Back Pain (N = 61)	HPCC with Back Pain (N = 76)
Age (median, IQR)	45 (40–51)	45 (39–51)	45 (40–51)
Non-White race	63 (46%)	26 (43%)	37 (49%)
Female	40 (29%)	17 (28%)	23 (30%)
Transmission risk factor			
— Heterosexual	51 (37%)	22 (36%)	29 (38%)
— Intravenous drug use	32 (23%)	15 (25%)	17 (22%)
— Men who have sex with men	53 (39%)	23 (38%)	30 (39%)
— Other/unknown	1 (1%)	1 (2%)	0 (0%)
Insurance			
— Private	23 (17%)	7 (11%)	16 (21%)
— Public	78 (57%)	34 (56%)	44 (58%)
— None	36 (26%)	20 (33%)	16 (21%)
CD4 (median, IQR)	381 (239–658)	322 (216–615)	485 (241–660)
VL undetectable	91 (67%)	41 (68%)	50 (67%)
Depression (PHQ-9 ≥ 10)	62 (46%)	30 (50%)	32 (43%)
Anxiety (PHQ-9A = anxiety symptoms, panic)	59 (43%)	26 (43%)	33 (44%)
Substance abuse			
— Current	16 (12%)	4 (7%)	12 (16%)
— Prior	63 (47%)	27 (45%)	36 (48%)
— Never	56 (41%)	29 (48%)	27 (36%)
Psychiatry/psychology visit	101 (74%)	41 (67%)	60 (79%)
Impaired mobility	78 (57%)	36 (59%)	42 (56%)
Impaired self-care	23 (17%)	6 (10%)	17 (23%)
Impaired usual activities	81 (60%)	32 (52%)	49 (65%)
Comorbidities			
— COPD	12 (9%)	6 (10%)	6 (8%)
— Sleep disorders	62 (45%)	29 (48%)	33 (43%)
— Cardiovascular	15 (11%)	5 (8%)	10 (13%)
— Depression	90 (66%)	40 (66%)	50 (66%)
— Anxiety	45 (33%)	22 (36%)	23 (30%)
— Bipolar	13 (9%)	3 (5%)	10 (13%)

Comparisons were made between patients in the HPCC without back pain and with back pain using Fisher's exact tests for categorical variables and Wicoxon rank-sum tests for continuous variables. No values were significantly different ($P < 0.05$).
Missing values: race (1), CD4 (3), VL (2), PHQ-9 (2), PHQ-9A (1), substance abuse (2), impaired mobility (1), impaired self-care (4), and impaired usual activities (1).
IQR = interquartile range; HPCC = human immunodeficiency virus (HIV)/palliative care clinic.

follow-up than in previous studies in the general population. Similar to our study, asymptomatic patients have high rates of degenerative changes seen on MRI of the lumbar spine ,with 93% of patients 60–80 years old showing findings of degenerative changes [28]. When looking at more serious findings, two studies found that 28% of asymptomatic volunteers had what were considered "severe" or "substantial abnormalities" on MRI of the lumbar spine. These findings included herniated discs (intervertebral disc protrusion and extrusion) and spinal stenosis [28,29]. Findings on MRI in patients with new back pain are unlikely to be different from baseline MRIs, suggesting that asymptomatic patients have similar findings to those with symptoms [30]. A meta-analysis of four randomized controlled trials comparing immediate imaging versus clinical care without immediate imaging in patients with low back pain and no indications of serious underlying conditions found no cases of imaging findings of what they considered a serious diagnosis, including cancer and infection [31]. In fact, when looking at reasons for back pain in primary care settings, only 0.7% of patients have metastatic cancer, 0.01% have spinal infections, and 4% have compression fractures secondary to osteoporosis [32]. This is of particular interest as our study found four cases (18%) of potential malignancy and HIV-infected patients in the current treatment era are known to have a higher prevalence of non-AIDS-defining malignancies than patients without HIV [21,22].

Three patients had findings thought to merit follow-up by our study radiologist but had no change in management by the clinic provider. This discrepancy highlights the

Table 2 Comparison between HPCC patients with back pain without and with imaging

Variable	Without Imaging (N = 54)	With Imaging (N = 22)
Age (median, IQR)*	44 (38–50)	47 (44–52)
Non-White race	30 (56%)	7 (32%)
Female	15 (28%)	8 (36%)
Transmission risk factor		
— Heterosexual	20 (37%)	9 (41%)
— Intravenous drug use	14 (26%)	3 (14%)
— Men who have sex with men	20 (37%)	10 (45%)
Insurance		
— Private	11 (20%)	5 (23%)
— Public	32 (59%)	12 (55%)
— None	11 (20%)	5 (23%)
CD4 (median, IQR)	448 (234–705)	538 (330–625)
VL undetectable	33 (62%)	17 (77%)
Depression (PHQ-9 ≥ 10)	22 (42%)	10 (45%)
Anxiety (PHQ-9A = anxiety symptoms, panic)	23 (43%)	10 (48%)
Substance abuse		
— Current	9 (17%)	3 (14%)
— Prior	27 (51%)	9 (41%)
— Never	17 (32%)	10 (45%)
Psychiatry/psychology visit	42 (78%)	18 (82%)
Impaired mobility	28 (53%)	14 (64%)
Impaired self-care	14 (27%)	3 (14%)
Impaired usual activities	34 (64%)	15 (68%)
Comorbidities		
— COPD	5 (9%)	1 (5%)
— Sleep disorders*	19 (35%)	14 (64%)
— Cardiovascular*	3 (6%)	7 (32%)
— Depression	34 (63%)	16 (73%)
— Anxiety	15 (28%)	8 (36%)
— Bipolar	6 (11%)	4 (18%)

* $P < 0.05$.
Comparisons were made between patients with back pain in HPCC without and with imaging using Fisher's exact tests for categorical variables and Wicoxon rank-sum tests for continuous variables.
Missing values: CD4 (2), VL undetectable (1), PHQ-9 (1), PHQ-9A (1), substance abuse (1), impaired mobility (1), impaired self-care (3), and impaired usual activities (1).
IQR = interquartile range; HPCC = human immunodeficiency virus (HIV)/palliative care clinic.

complex medical decision making that is often required in patients with chronic low back pain. Particularly in this medically complex patient population, the appropriate next step after imaging is not always clear.

We also found that 61% of the HIV-infected patients referred to the HPCC had back pain. To our knowledge, there are no studies on the prevalence of back pain in HIV-infected patients. Our study and another study of patients referred to a chronic pain clinic for HIV-infected patients suggests that back pain is a common cause of chronic pain in this population, but the reason for this is unknown [20,33]. Likewise, we are not aware of a body of literature that describes spinal MRI findings in HIV-infected individuals. More studies of the prevalence of back pain and causes of back pain and spinal MRI findings in HIV-infected patients are needed, and may inform future versions of guidelines about low back imaging in patients with HIV and other chronic diseases.

This study has limitations. All the images included in the study came from patients referred to the HPCC. These patients may have more severe or complex chronic pain syndromes than patients who were not referred, which may have had an effect on the number of images performed and the severity of the results. In addition, as the data were collected by retrospective chart review, we were unable to use the ACP and APS guidelines to determine the appropriateness of the imaging in each case. Our retrospective chart review methodology also limited our ability to determine whether the patient's pain complaint could be explained by the imaging finding, or whether the imaging findings were important but unrelated to the patient's complaint of back pain. Another limitation comes from the study staff (E. M.) being involved in both the chart review and reading the images. Although charts and images were not viewed simultaneously, the study staff was not blinded to patients' names.

In conclusion, our study found that spinal MRI findings warranted follow-up in half of HIV-infected patients with low back pain, including four possible cases of malignancy. These findings suggest that spinal imaging should

Table 3 Imaging findings in HIV-infected patients with low back pain referred to the HPCC (N = 22)

Finding	Number (%)
Degenerative disc disease	14 (64)
Nerve impingement*	5 (23)
Renal cysts	3 (14)
Marrow changes concerning for anemia	3 (14)
Bony metastasis	2 (9)
Other signs of malignancy*	2 (9)
Spinal hardware†	2 (9)
Arachnoiditis	1 (5)
Caudal sac dilation	1 (5)
Annular tear	1 (5)
Angioedema	1 (5)
No significant findings	3 (14)

* Including a mass in the inferior vena cava and enlarged paraspinal/retroperitoneal lymph nodes.
† Including one with dislodged spacers.
Patients can have more than one finding.
HIV = human immunodeficiency virus; HPCC = HIV/palliative care clinic.

play an important role in the investigation of back pain in HIV-infected patients. Further prospective studies that consider the utility, adverse outcomes, and cost-effectiveness of spinal imaging in patients with chronic diseases, including HIV, are needed.

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