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How Often Is Low Back Pain Not Coming From the Back?

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Study Design. Consecutive case series cohort.

Objective. To determine the relative frequencies of the spine, the sacroiliac (SI) joint, and the hip joint being the primary pain generator among patients presenting at a spine surgery clinic for low back pain (LBP).

Summary of Background Data. Identification of the primary pain generator in a patient with LBP is difficult. Possible pain sources include the lumbar spine, the SI joint, and the hip joint. Their relative frequencies among patients presenting at a spine surgeon's clinic have not been well established.

Methods. Three hundred sixty-eight new patients were seen at a single spine surgeon's clinic during a 10-month period. Of these, 289 (78.5%) complained primarily of LBP with or without leg pain. Seventy-seven had previous surgery. The remaining 200 cases were reviewed for all diagnostic tests performed, as well as the final diagnosis.

Results. One hundred sixty-four (82%) had spine pathology, but only 130 (65%) had spine-only pathology, whereas 35 (17.5%) had a combination of spine plus hip and/or SI joint pathology. An additional 16 (8%) had hip and/or SI joint pathology without spine pathology. Twenty (10%) had an undefined pain source. Overall, 25 (12.5%) had hip pathology, and 29 (14.5%) had SI joint pathology.

Conclusion. For patients presenting to a spine surgeon's clinic for LBP, up to 25% of patients may have significant pain contribution from the hip or SI joints, and an additional 10% will still have an undefined pain source even after diagnostic workup. This underscores the need for clinicians to be aware of nonspinal pain generators and to appropriately pursue alternative diagnoses.

Key words: low back pain, sacroiliac joint pain, hip joint pain, nonspinal low back pain. **Spine 2009;34: E27–E32**

Identification of the significant pain generator(s) in patients with low back pain (LBP) remains one of the biggest challenges to a spine specialist. In general and from an anatomic standpoint, pain may arise from the spine itself (which may need to be further localized), the sacroiliac joint,[1,2] or the hip joint.[3] Other possible but presumably less common origins of pain are the retroperitoneal structures within the abdominal and pelvic cavities. Yet, despite LBP being the most common type of pain reported by adults,[4] the second leading cause of disability,[5] and the leading cause of job-related disability in the United States costing Americans more than $50 billion dollars per year,[6] there had been no consensus on the relative frequency of different anatomic sites as major pain generators nor on an algorithm on the proper diagnostic workup of these patients.

Our question, therefore, was: what are the relative frequencies of the spine, the sacroiliac joint, and the hip joint being the main pain generator among patients who present with low back pain at a spine surgeon's clinic? We addressed this question through a review of clinic notes on consecutive patients with a complaint of LBP with or without leg pain and noting the final diagnosis arrived at after appropriate workup. The answer to this question may then allow us to predict the pretest probability of alternative diagnoses and overlapping symptomatology among spine specialists, and to better formulate diagnostic recommendations.

Methods

Records of all patients seen for the first time between August 2006 and May 2007 at a single spine surgeon's clinic were reviewed by an independent observer not involved in their care. Those who presented with a chief complaint of low back pain, with or without leg pain, were reviewed in further detail, taking note of all imaging and other diagnostic examinations performed and their results, until a final diagnosis was arrived at. Records of consultations with other specialists in relation to the low back pain were likewise reviewed. Institutional Review Board exemption for review of existing patient records was obtained before study initiation.

Initial clinical suspicion on the etiology of the patients' pain was arrived at using information available during their first clinic visit, including history, physical examination, and imaging findings. If the evidence was deemed strong enough that there was high likelihood of what the underlying pain generator was, appropriate surgical or nonsurgical treatment was recommended (Figure 1). If, however, there was deemed a need for confirmation of this clinical impression or if findings were unable to point to a specific pain generator, then additional testing was performed. These included epidural steroid injections (interlaminar or transforaminal), facet blocks, selective nerve root blocks, discography, sacroiliac joint injections, hip joint injections, computerized tomography (CT) of the spine, pelvis or hip, magnetic resonance imaging (MRI) of the spine, and magnetic resonance arthrogram of the hip.

Spine pathology was assessed mainly by history and physical examination findings[7] in correlation with imaging studies (radiographs, CT and MRI). Epidural injections[8] and facet blocks[9] were performed for both diagnostic and ther-

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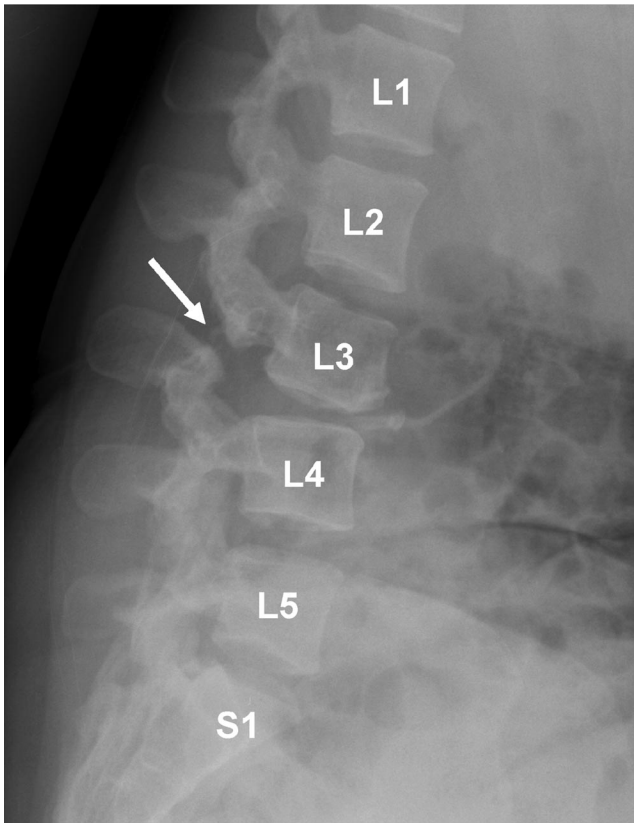

Figure 1. Evident underlying pathology for low back pain symptoms on initial radiographs. A lateral flexion radiograph showing bilateral pars defects at L3 (arrow) with abnormal motion at L3–L4. No further workup was deemed necessary to look for alternative diagnosis to explain the patient's pain symptoms.

apeutic purposes. Patients who were deemed to have discogenic back pain and were potential surgical candidates also underwent discography,[10] findings of which may further confirm the disc as the main pain generator in these cases.

Hip pathology was suspected on the basis of pain localization in the groin area,[11] start-up pain on walking, limited ability to cross legs, and pain aggravation on passive hip range of motion, particularly on flexion-internal rotation.[12] Radiographs were evaluated for findings of degenerative joint disease in the hips. In the absence of arthritic changes in the setting of positive physical examination findings, patients were sent for diagnostic hip injection and magnetic resonance arthrography, to assess for intra-articular pathology such as a labral tear (Figure 2).[13–16] Patients with a positive test, defined as structural abnormalities on imaging and at least 50% pain relief from the local anesthetic, were then referred to a hip specialist for further evaluation and treatment.

Patients with pain localization to an area just below the posterior superior iliac spine in the region of the sacral sulcus (Figure 3),[17,18] and with positive findings on maneuvers to detect sacroiliac (SI) joint pain[19,20] were clinically presumed to have SI joint pathology. They were then either sent for diagnostic SI joint injections[21] (Figure 4) or advised a trial period of a physical therapy regimen with manual techniques tailored for SI joint pain.[22] Patients who reported improvement with either injection or physical therapy were then given a final diagnosis of SI joint pathology.

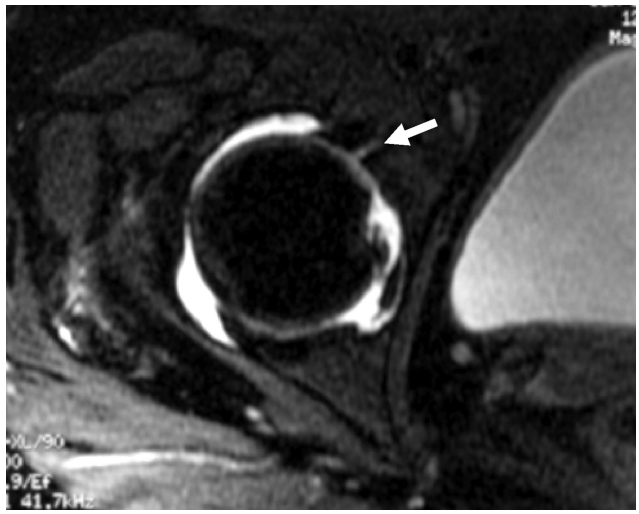

Figure 2. Axial image of a magnetic resonance (MR) arthrogram study of the right hip showing a 1.5-cm tear of the anterior labrum (white arrow). The patient subsequently underwent arthroscopic debridement of the hip joint.

■ Results

Three hundred sixty-eight new patients were seen in clinic during a 10-month time period. Of these, 289 (78.5%) had a chief complaint of low back pain, with or without leg pain. Seventy-seven patients had previous spine surgery, and an additional 12 patients had previous hip surgery. No patient had previous SI joint surgery. This resulted in 200 patients with LBP, and without previous spine, hip, or SI joint surgery (Table 1).

Of the 200 patients, 114 (57%) were women. Mean patient age was 49.8 years (range: 11–92 years.). Majority of the patients, 137 (68.5%), were in the 21 to 60-year-old age group. Distribution of patients according to symptom duration was fairly heterogeneous, although a significant number of patients, 92 (46%), have had symptoms for more than a year. Although there were patients whose symptoms were brought about by specific and identifiable inciting events (*e.g.,* work injury, sports injury, vehicular accident, fall, lifting, and other), there was no history of such in majority of patients, 130 (65%). Most of the patients, 105 (52.5%) were referred to the spine clinic by their primary care provider, with smaller numbers referred by other specialties, chiropractors/physical therapists, or were self-referred (Table 2).

One hundred sixty-four (82%) of the 200 patients were assessed to have spinal pathology; 25 (12.5%) were assessed to have hip pathology; and 29 (14.5%) were assessed to have SI joint pathology. There was enough overlap of diagnoses, such that 35 patients (17.5%) had some combination of spine, hip, or SI joint pathology (Table 3; Figure 5). Finally, 20 patients (10%) did not have a clear etiology of their pain even after appropriate testing.

■ Discussion

Common anatomic origins of LBP are the spine itself, the hip joint, and the sacroiliac joint. It is intuitive that

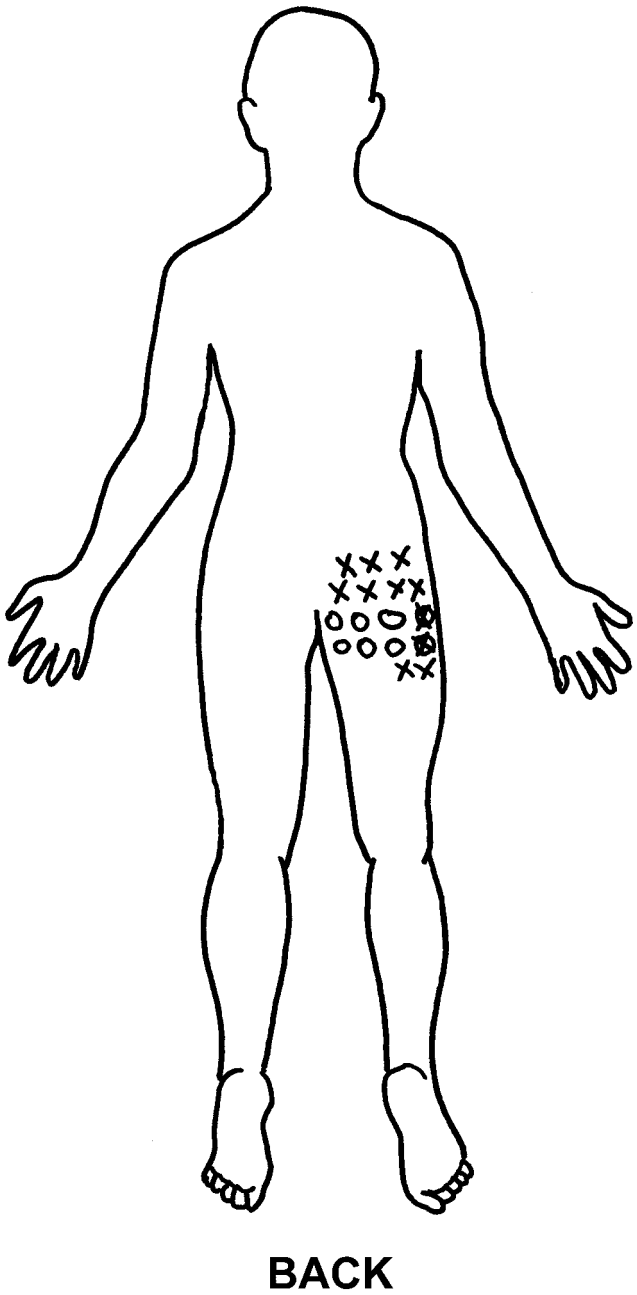

Figure 3. Pain drawing of a patient who had fluoroscopic-guided injection-confirmed sacroiliac joint source of pain.

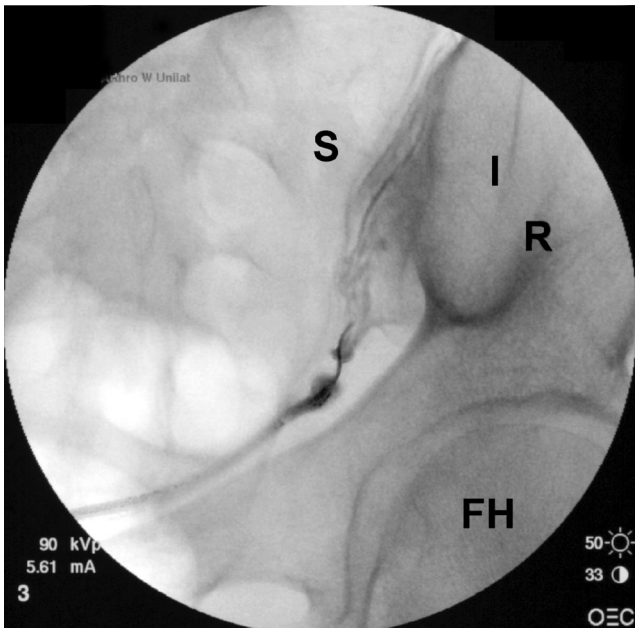

Figure 4. Fluoroscopic image of a successful intra-articular sacroiliac joint injection with radio-opaque contrast medium. (S = sacrum; I = ilium; FH = femoral head).

proper treatment would be predicated on proper identification of the source of pain. Specific components in the patient's history such as localization of pain through patient drawings[23–25]; physical examination findings or maneuvers designed to stress either the lumbar spine, hip joint, or SI joint; imaging studies; and diagnostic injections have been looked at in an effort to help physicians identify the major source of the patient's pain. The objective of this study was to determine the relative frequencies of these anatomic sites being the major source of pain, as well as the frequency of overlapping syndromes. Knowledge of this would help raise clinicians' level of awareness and degree of suspicion that would have an impact on the order and number of diagnostic tests to be performed.

Our study has a number of obvious limitations, foremost of which is the lack of a formal diagnostic algorithm implemented during the period of study. Diagnostic workup was performed on the discretion of the treating spine surgeon appropriate to the clinical diagnosis, which, in turn, was based on a synthesis of all available information from the history, physical examination, and imaging studies at the time. Although this lack of a controlled setting is limiting, it, however, more closely resembles the typical scenario that clinicians encounter in their day-to-day practice.

Another limitation is the lack of long-term follow-up to verify if patients benefited from the treatment rendered. However, this approach also introduces the confounding effect of other variables affecting treatment outcome, such as the technical skill of the surgeon, patient motivation, implants or spacers used, and surgical complications, among others. Furthermore, treatment methods such as general body conditioning, smoking cessation, weight reduction, and others may bring about perceived benefits not specific to a major pain generator site.

Table 1. Breakdown of Consecutive New Patients Seen in Clinic for Low Back Pain With or Without Leg Pain (August 2006 to May 2007) According to Previous Surgeries

	No. Patients
Had previous spine surgery	77
Had previous hip surgery	12
Had no previous surgery	200
Total	289

Table 2. Background Data on 200 Patients Presenting at a Spine Clinic for Low Back Pain and With No Previous Lumbar Spine, Hip, or Sacroiliac Joint Surgery

	No. (%) Patients
Gender	
Females/males	114 (57%)/86 (43%)
Age	
Mean (Range)	49.8 yr (11–92)
Median	48 yr
<20 yr	9
21–40 yr	51
41–60 yr	86
61–80 yr	42
>80 yr	12
Duration of symptoms	
≤1 mo≤	24
1–3 mo	24
3–6 mo	31
6 mo–1 yr	25
1–5 yr	44
>5 yr	48
Unspecified	4
Inciting event	
Work injury	14
Sports injury	9
Vehicular accident	10
Lifting	9
Fall	16
Other injury	5
Hx of malignancy	7
None	130
Referral source	
Primary provider (MD/DO)	94
Primary provider (non-MD)	11
Orthopedic specialist	22
Rehab/neuro/pain specialist	11
Medical subspecialties*	15
Surgical subspecialties†	9
Psychiatrist/ER physician	2
Chiropractor/PT	7
Self-referred	29

*Medical subspecialties: hematology/oncology (5); immunology/transplant medicine (5); rheumatology (2); geriatrics (1); endocrinology (1); gastroenterology (1).
†Surgical subspecialties: neurosurgery (7); urology (1); general surgery (1).

Table 3. Relative Frequency of Major Pain Generators Among Patients Presenting at a Spine Clinic With Low Back Pain With or Without Leg Pain, and With No Prior Lumbar Spine, Hip, or Sacroiliac Joint Surgery

Diagnosis	No. Patients (%)
Spine (all)	165 (82.5%)
Hip (all)	25 (12.5%)
SIJ (all)	29 (14.5%)
Spine only	130 (65%)
Hip only	5 (2.5%)
SIJ only	10 (5%)
Spine + hip	16 (8%)
Spine + SIJ	15 (7.5%)
Hip + SIJ	1 (0.5%)
Spine + hip + SIJ	3 (1.5%)
No cause identified	20 (10%)
Total	200 (100%)

SIJ indicates sacroiliac joint.

In identifying pain sources, the patient's ability to localize the pain is typically the most obviously helpful piece of information. Although this may be true of extremity and facial pain, this ability is typically not present in patients with back pain. In part, this may be because of the relatively smaller cortical region in the sensory homunculus dedicated to this relatively large region of the body, in contrast to those dedicated to areas like the hands and face.[26] Clinically, this is evidenced by a much higher threshold for 2-point discrimination over the skin of the back when compared with the face and fingers.[27]

Another probable reason for a patient's inability to distinguish pain coming from these different anatomic regions may be explained by the referred pain phenomenon. Studies on the innervation of the hip[28–30] and sacroiliac joints[31–33] have pointed to the lower lumbar and sacral nerves as responsible for transmitting pain impulses from these areas. However, in lumbar spine disease, these same nerves are typically the ones that are either impinged on or transmit impulses from a painful disc. The brain may thus be unable to distinguish pain impulses traveling through the same nerves or sharing the same somatosensory neurons.[34]

Various physical examination maneuvers have been described in an attempt to localize the pain source. However, most of these have been shown to have either poor interobserver reproducibility or validity.[35] Also, patients in severe or chronic pain may report pain aggravation with almost any maneuver,[36] thus decreasing the specificity of these tests.

Imaging studies are generally considered helpful adjuncts in the workup of spine patients. However, their ability to diagnose the source of pain is not precise. Plain radiographs, although a useful and inexpensive initial test, are known to miss out on a lot of spinal pathology. CT scan while giving more bony detail than radiographs, does not give as much detail on the soft tissues. MRI, on the other hand, while giving more detailed information,

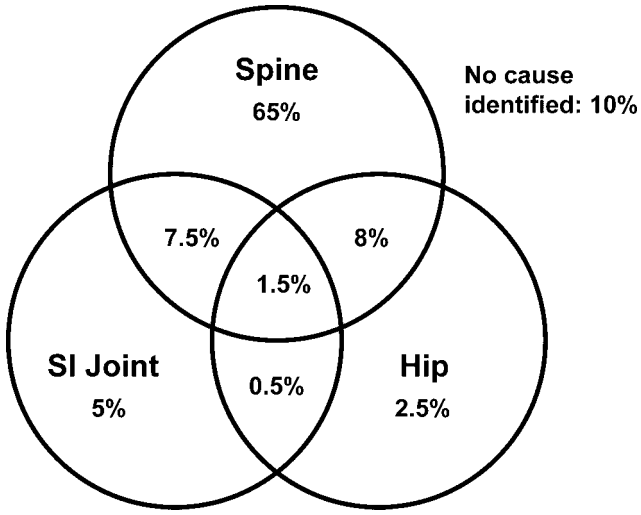

Figure 5. Venn diagram showing the distribution of pain generators (spine, hip joint, and SI joint) being responsible for symptoms in 200 patients complaining of low back pain, after diagnostic workup.

is also known to give extraneous and nonclinically significant information. Studies have shown a significant age-related increase in number of asymptomatic individuals that have abnormal MRI findings.[37,38] Therefore, correlation of imaging with clinical findings is recommended to get a better picture of whether the spine is playing a major role in a patient's pain. This may be further investigated with diagnostic injections.

Degenerative joint disease or osteoarthritis of the hips has been generally evaluated using plain radiographs. However, plain radiographs may be unable to pick up early stages of the disease or other intra-articular pathology such as a labral tear or chondral lesions. Studies have shown that diagnostic lidocaine injections and magnetic resonance arthrogram are helpful adjuncts (Figure 2).[13–16]

The sacroiliac joint, because of its irregular anatomy, does not lend itself well to adequate evaluation with plain radiographs alone, although findings such as subchondral sclerosis and bone spurs may be appreciated. However, a study done in 1967 showed that a quarter of asymptomatic patients have abnormalities of the SI joint on plain radiographs.[39] A study using CT scans found unacceptably low sensitivity and specificity of this test for symptomatic SI joint pathology.[40] Radionuclide scanning likewise has not been recommended for the diagnostic workup for this condition, mainly because of poor sensitivity.[41,42] At present, for SI joint syndrome, relief with an ameliorative injection or concordant pain reproduction with a provocative injection is generally considered the best diagnostic test.[21]

Ultimately, perhaps the most important limitation of this study pertains to the accuracy of the diagnoses arrived at in each case. Although methods and modalities used were what are presently considered standard armamentarium in the investigation of LBP tempered by physician discretion, none of these could claim 100% accuracy. For example, even as discography has become widely used, its validity to this day remains controversial, in part because postdiscography surgical outcomes have been inconsistent.[43] For epidural injections, sensitivity figures between 65% and 100%, and specificity between 71% and 95% have been quoted.[8] However, obtaining accuracy estimates for spinal injection techniques (*e.g.,* facet blocks, epidural injections, and selective nerve root blocks) have been problematic primarily because there is no available gold standard that would measure presence or absence of pain to compare them against.[44] Some statements on accuracy may be inferred from reproducibility studies (screening and confirmatory injections) and surgical outcomes.[45] Although the former could measure false positivity and reliability, the limitations of using surgical outcomes as reference standard have already been discussed. At present, investigations are being performed to optimize the accuracy of these diagnostic methods and to search for newer more accurate methods.[44–47] In this light, some of the diagnoses arrived at in our series may not be able to stand up to the scrutiny of future diagnostic methods. To help minimize this limitation, we considered only the general diagnosis (*i.e.,* identification of the pain generator as spine, hip, or SI joint), and not the specific diagnosis, with the acknowledgment that the latter is still clinically important for successful management of low back pain.

This study may be considered an epidemiologic, cross-sectional study on the relative frequency of pain coming from the spine, the hip joint, the sacroiliac joint, and the different combinations thereof, among patients presenting with low back pain at a spine surgeon's clinic of referred patients. Our finding that the spine is the predominant source of pain in two-thirds of patients, and is at least a contributing factor in 82%, may be perceived as a high number. It should, however, be taken into account that these are the findings in the setting of a spine surgeon's clinic. Many of the patients would have already undergone some preliminary workup by their referring physician or caregiver, and a provisional diagnosis of spinal pathology may have already been arrived at before referral. It would be interesting to look at these relative frequencies among patients with low back pain presenting to a hip surgery clinic, a primary care clinic, a physiatry clinic, and a pain-management clinic.

Our finding that the SI joint is a significant pain generator in 14.5% of LBP patients is very similar to the 18.5% and 13 to 30% findings in the studies of Maigne *et al* and Schwarzer *et al*, respectively.[2,21] Both studies used diagnostic injections as a reference standard.

Considering that an alternative diagnosis (*i.e.,* hip joint and SI joint pathology) was found to be present in 25% of patients, and that no specific cause was identified in an additional 10%, this finding only underscores the need for clinicians to be aware of the possibility of nonspinal pain generators. In particular, for patients whose findings do not point to an obvious source of pain, or those who are considered potential candidates for site-specific treatment (*e.g.*, surgery), we strongly recommend aggressive pursuit of alternative diagnoses in an effort to come up with the most appropriate treatment plan.

■ Key Points

- Possible pain generators in patients complaining of low back pain (LBP) include the spine, the hip joints, and the sacroiliac (SI) joints.
- Among patients presenting to a spine surgery clinic for LBP, only 65% have their pain generator(s) confined solely to the spine.
- Up to 25% of LBP patients have significant pain coming from their hip and/or SI joints.
- Ten percent of LBP patients still have an undefined source of pain even after appropriate diagnostic workup.

• Clinicians need to be aware of nonspinal pain generators and appropriately pursue alternative diagnoses to spinal causes of pain.

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