

# Low Back Pain

## Update on Evaluation and Management with Focus on Minimally Invasive Therapeutic Options

S. Scott Kramarich, MD, CIME<sup>1</sup> and Craig A. Kornick, MD, CIME, FIPP<sup>2</sup>

Nearly every health care provider is familiar with the frequency of patient visits related to low back pain (LBP). In 2004, a Harris Interactive Survey sponsored by the North American Spine Society determined that 64% of women and 50% of men reported back pain within the previous month. LBP is the second most frequent reason for visiting a physician and the most common cause of disability in people less than 45 years old.<sup>1</sup> Usually, clinical practice follows the common dictum that a high percentage of acute LBP resolves with minimal medical intervention. However, despite conservative spine care, there remains a population with severe, chronic LBP, which has an impact on activities of daily living and psychological well-being.

The intent of this article is to provide practitioners who do not specialize in spine medicine with an approach to the history taking, examination, diagnosis and treatment of LBP, and to provide an awareness of minimally invasive techniques that are available to bridge the therapeutic gap between conservative spine care and surgery. It is our hope and belief that practitioners who broaden their knowledge regarding LBP treatment will improve their ability to adequately assess and manage their patients' pain.

### Conventional Conservative Treatment

The traditional algorithm for LBP includes a progression of limited bed rest, non-steroidal anti-inflammatory drugs (NSAIDs), analgesics, and physical therapy, and possibly a lumbar magnetic resonance imaging (MRI) scan when pain does not resolve. These common practices of traditional care are being serially debunked. Bed rest for sciatica in randomized trials has been shown to be ineffective; patients are now encouraged to return to functional normality as quickly as possible.<sup>2,3</sup> Many of the recently touted NSAIDs, most notably those in the cyclo-oxygenase (COX)-2 class, have seen their risk/benefit ratios erode and further limit viable long-term treatment options. Researchers and manufacturers have both acknowledged the potential for cardiotoxicity with NSAIDs, especially in patients with established cardiovascular disease. In fact, recent summary opinion published by clinical anatomist and spinal research professor Dr. Nikolai Bogduk

states that "No drug regimen can be legitimately recommended for back pain," holding that pharmaceutical therapy does not provide meaningful pain relief.<sup>4</sup> Finally, although patients and physicians frequently request an MRI scan, MRI findings often do not correlate directly with a patient's complaints.<sup>5</sup> While conservative treatment with medications and physical therapy may be effective in some patients with so-called benign LBP, there is a paucity of literature to support such practice, and there will be a significant subset of affected individuals who do not respond to those therapies.

### Pain History

Eliciting an adequate LBP history is often difficult and requires multimodal assessment techniques including the use of verbal pain scores at various levels of physical activity and anatomic pain drawings. Accidents and injuries as well as previous therapies, injections and surgeries need to be detailed and taken into account to develop a comprehensive approach to diagnosis and treatment planning.

The interim goal of LBP evaluation is to determine whether the primary pain generator is bone, intervertebral disc, nerve, muscle, or a combination thereof (*Chart 1*). In fact, all of these structures are closely interrelated and an attempt to physiologically compensate for defect in one structure may lead to coexisting pathology in a related structure. For example, traumatic arthritis of the facet joints is often accompanied by lumbar paraspinal muscle spasm, perhaps as a physiologic stabilizing mechanism, a situation analogous to cervical whiplash syndrome. Furthermore, pain can be referred to the back from a variety of surrounding structures such as the hip joints, sacroiliac joints, piriformis muscle, and surrounding tendons and ligaments.

**Chart 1**

#### Common Differential Diagnoses of Musculoskeletal LBP:

- Lumbar radiculopathy from degenerative disk disease
- Lumbar spinal stenosis
- Vertebral compression fracture(s)
- Discogenic low back pain from a tear of the annulus fibrosus
- Post-laminectomy syndrome, caused partly by post-operative scar tissue
- Myofascial pain and spasm/lumbago
- Sacroiliac joint syndrome
- Facet joint syndrome

---

Address Correspondence to:<sup>1</sup> Dr. S. Scott Kramarich or <sup>2</sup>Dr. Craig A. Kornick, Riverside Spine and Pain Physicians, Jacksonville, FL. Email: Kramarich@riversidespine.com. or Kornick@riversidespine.com.

The quality of a patient's pain often helps to determine the etiology. Pain described as electrical, burning or shooting often involves neural structures. Aching and dull LBP, which is exacerbated by standing in an arthritic or traumatized patient, may be related to the lumbar facet (zygapophyseal) joints. Spastic LBP with morning stiffness with pain that crescendos throughout the day may be related to low back muscular deconditioning, or lumbago. The intervertebral disks themselves have recently been found to be pain generators.<sup>6,7</sup> Annular tears are precipitated by physical exertion, and a patient who has a severe, sudden episode of axial pain, without radicular features, that 'drops them to their knees' or is exacerbated by sitting may have experienced a tear of the annulus fibrosis of the intervertebral disc.

Nocturnal back pain may deserve special consideration. Back pain at night is often considered a possible 'red-flag' for malignancy, provoking aggressive diagnostic approaches from clinicians. Although night pain is common among patients with spine cancer, a recent study found that 42% of all LBP patients reported occasional night pain, and that nearly 20% of them had pain every night.<sup>8</sup> The authors concluded "although important to the patient, the symptom of night pain may have little use in the diagnosis of serious spinal pathology". Accordingly, one widely cited study on the frequency of cancer as a cause of LBP demonstrated that it is exceedingly rare: Only 0.66% of patients being evaluated for LBP in a primary care setting had underlying cancer.<sup>9</sup>

## Examination

A comprehensive musculoskeletal and neurological exam is required before initiating any further treatments, tests or referrals. Physical examination of the LBP patient may be made more difficult by impaired ambulation and transitional movements. Patients with LBP should be examined with each of the potential pain generators in mind: Tenderness with palpation of the lumbar paravertebral areas and pain with hyperextension of the lumbar spine, which may indicate facet joint syndrome. Pain with direct palpation of a posterior vertebral spinous process may indicate a vertebral compression fracture. Spasm in the low back or the presence of trigger points at the quadratus lumborum muscles indicates myofascial pain, possibly as a response to underlying fracture or arthritis. An antalgic gait and a positive straight leg raise maneuver (reproduction of lower extremity radicular pain with modest flexion of the hip) usually indicate lumbar degenerative disk disease and nerve root compression, known commonly as sciatica. An unremarkable physical examination in a patient having trouble sitting still for more than a few minutes, accompanied by vague axial LBP may indicate discogenic pain and annular tear(s).

A frequently utilized extension of the physical examination, axial diagnostic imaging with computed tomography (CT) or MRI, for routine complaints of LBP is coming under scrutiny from both insurance companies and from researchers. A recent

large, randomized trial of 782 patients showed that advanced imaging, which has substantial cost ramifications for the health care system, only rarely changes clinicians' diagnosis or management of LBP.<sup>10</sup> In this study, the authors conclude "we should restrict MRI to those patients who are having surgery or an intervention where the level of disc disease (or other pathology) needs to be accurately shown." Thus, it can be considered that MRI and CT scanning for other than operative planning reasons should be reserved for those patients with focal neurologic signs, pathologic weakness or acute onset of bowel and bladder problems.

## Treatment

A thorough history, physical examination with specific pain generators in mind and appropriate use of advanced imaging may or may not lead to a diagnosis of abnormalities. Even identified pathology may not be the primary LBP pain generator. Patients with no focal neurologic findings and non-specific LBP and spasm, with generalized deconditioning and poor flexibility are possibly candidates for physical therapy, oral pain medications and lifestyle modifications such as achieving appropriate body weight and regular exercise. Empirical evidence indicates that in most patients, a regimen of oral anti-inflammatory drugs with modest doses of low-potency narcotic pain medications as a part of conservative spine care will usually result in clinical improvement. Sometimes, even patients with relatively benign clinical diagnoses may have a variety of social or occupational goals that make therapy difficult and improvement slower than acceptable. Patients most vulnerable to disability from LBP have a characteristic profile of heavy physical labor, job dissatisfaction, low education, poor sleep hygiene and job-related stress.<sup>11</sup>

Patients with acute or chronic LBP demonstrating limited improvement may benefit from consultation if their diagnoses are unfamiliar or their pain remains uncontrolled. Neurosurgeons, pain management specialists, and orthopedic spine surgeons are appropriate referral sources for more in-depth assessment and treatment.

Surgery is typically offered early in the course of treatment only in extreme situations, with pathological physical or neurologic findings, and with clearly identifiable surgically correctable lesion on advanced imaging. Without these urgent findings, a period of watchful waiting may ensue, during which the patient may complete conservative spine care and pursue non-surgical alternatives. If these therapies are not helpful over time, the patient may again be considered for surgery if LBP continues unabated. Lumbar laminectomy, neural foraminotomy, fusions of adjacent lumbar vertebrae with bone graft or hardware, or surgical discectomy are examples of procedures commonly utilized, sometimes in combination, to correct LBP pathology. Long-term pain relief varies widely, and thus surgeons typically encourage patients to exhaust all other options prior to elective spine surgery.

## Minimally Invasive Therapeutic Options

Patients may be referred from primary care physicians or back surgeons for a trial of injective therapies and medication adjustment. Interventional pain medicine physicians are often consulted in this regard and specialize in the evaluation of patients for injections and minor percutaneous surgical procedures, often done near the spine, into muscles and joints, or around nerves. These procedures are most often performed in the outpatient setting under fluoroscopy with minimal sedation. Some of the categories of and indications for interventional LBP procedures are as follows:

*Epidural steroid injections, and transforaminal selective nerve root blocks* involve injection of local anesthetic and steroid solutions directly into the epidural space or onto the affected nerve root(s) as a treatment for sciatic pain, spinal stenosis, vertebral compression fractures, post-laminectomy syndrome and discogenic LBP. Fluoroscopic-guided injections performed with contrast agent can substantially improve medication delivery to the pathologic target.<sup>12</sup> Unfortunately, due to the variety of indications for these procedures, and variability of technical skills among providers, the significant value of epidural steroid injections in providing long term relief has yet to be conclusively demonstrated using a randomized, controlled trial.<sup>13</sup>

*Trigger point injections and paravertebral nerve blocks* may help alleviate severe low back spasm and allow the patient to tolerate physical therapies. These are often initially performed with a local anesthetic and steroid combination, but Botox® injections may be recommended for intractable spasm.

*Facet joint injections and radiofrequency rhizotomies* of the medial branches of the dorsal rami (e.g., facet joint nerves) may provide long-term relief of pain from articular arthritis of the spine, a common pain disorder.<sup>14</sup> Radiofrequency neurotomy has been shown to be both efficacious and safe<sup>15</sup>, with a long-term success rate of 50-70%.<sup>16</sup>

*Epidural lysis of adhesions* with hypertonic saline or hyaluronic acid can be performed on patients with post-laminectomy syndrome and scar tissue affecting nerve roots, and there is moderate evidence for its efficacy.<sup>17</sup>

*Provocative lumbar discography* can provide functional diagnostic and prognostic data for internal disc disruption when imaging data is equivocal of discogenic LBP. During a direct disc injection with a small volume of contrast into a pathologic disc, concordant LBP is elicited when an annular tear is demonstrated as the etiology of LBP. Once the pain-generating disc is identified and the precise etiology ascertained, percutaneous discectomy, nucleoplasty, or intra-discal electro-thermal modulation can provide relief. Alternatively, the information provides the back surgeon with a precise anatomic pain-generating target prior to spinal fusion.

*Vertebroplasty and Kyphoplasty* are relatively new interventions specifically directed at the injection of stabilizing cement into vertebral compression fractures (VCF). More than a quarter of women over age 65 will suffer from an osteoporotic

VCF, and pain relief can be achieved by stabilizing these lesions with cement.<sup>18</sup>

*Spinal cord stimulators* (SCS) can be implanted for intractable, non-operable sciatica or complex regional pain syndrome. Patients with neuropathic lower extremity pain are among the best candidates for SCS<sup>19</sup>, and studies demonstrate moderate efficacy over the long term.<sup>20</sup>

*Intrathecal infusion* catheters and implantable pumps provide continuous administration of pain medication onto the spinal cord in cases of severe and constant LBP. Generally, they are indicated when maximal medical therapy does not provide adequate relief or does so only with unacceptable side effects. Frequently these patients have had multiple spine surgeries and failed oral narcotic therapy and injections. Although minor complication rates average around 20%, this is a dramatically effective way of alleviating LBP, and there is evidence indicating long-term effectiveness.<sup>21</sup>

## Summary

Utilization of interventional spine procedures may provide pain relief in situations when conservative treatment provides inadequate relief and surgery is not indicated. The use of fluoroscopy during interventional spinal injections has improved the safety and accuracy of medication delivery, as well as clinical outcomes.<sup>22,23</sup> Minimally invasive spine procedures have significant cost savings over traditional surgical approaches, enjoy a favorable risk/benefit ratio, and provide a more rapid outpatient recovery.

For physicians who have evaluated their low back pain patients, have ruled out need for acute surgical intervention, and have trialed conservative therapy without successful outcome, consideration of specific LBP etiologies and the minimally invasive techniques mentioned may significantly enhance their ability to provide patients adequate pain relief. **NFM**

## References

1. Andersson GB. Epidemiological features of chronic low back pain. *Lancet* 1999; 354:581-5.
2. Vroomen PCAJ, et al., Lack of effectiveness of bed rest for sciatica, *New England Journal of Medicine*, 1999; 340:418-23.
3. Waddell G. *The Back Pain Revolution: (Ch) Rest or Stay Alive*. Edinburgh: Churchill Livingstone; 1998:241-61.
4. Bogduk N, Pharmacologic alternative for the alleviation of back pain, *Expert Opinions in Pharmacotherapy*, 2004; 5(10):2091-8.
5. Savage RA et al., The relationship between the magnetic resonance imaging appearance of the lumbar spine and low back pain, age, and occupation in males, *European Spine Journal*, 1997; 6(2):106-14.
6. Fremont, AJ, et al. Nerve ingrowth into diseased intervertebral disk in chronic back pain. *Lancet* 1997;350:178-81.
7. Schwarzer AC, et al. The prevalence and clinical features of internal disc disruption in patients with chronic low back pain. *Spine* 1995;17:1878-83.

8. Harding IJ, et al. Is night pain a sensitive marker for serious spinal pathology in a back pain triage clinic?, presented at the annual meeting of the International Society for the Study of the Lumbar Spine, SpineWeek 2004, Porto, Portugal; unpublished.
9. Deyo RA and Diehl AK, Cancer as a cause of back pain: Frequency, clinical presentation, and diagnostic strategies, *Journal of General Internal Medicine*, 1988; 3(3):230-8.
10. Gilbert FJ, et al. Low back pain: Influence of early MR imaging or CT on treatment and outcome — multicenter randomized trial, *Radiology*, 2004;231:343-51.
11. Tviety TH, et al. Room for everyone in working life? Ten percent of the employees — 82% of the sick leave, *Norsk Epidemiologi*, 2002;12(1):63-8.
12. El-Khoury G, et al. Epidural steroid injection: a procedure ideally performed with fluoroscopic control. *Radiology* 1988;168:554-7.
13. Samanta A, Samanta J, Is epidural injection of steroids effective for low back pain?, *BMJ*, 2004;328:1509-10.
14. Dreyer SJ, Dreyfuss PH. Low back pain and the zygapophysal (facet) joints. *Arch Phys Med Rehabil* 1996;77:290-300.
15. Kornick CA, et al. Complications of lumbar facet radio frequency denervation. *Spine* 2004;29(12):1352-54.
16. North RB, et al. Radiofrequency lumbar facet denervation: analysis of prognostic factors. *Pain* 1994;57(1):77-8.
17. Manchikanti L, et al. Evidence-based practice guidelines. *Pain Physician* 2003;6(1):3-81.
18. Hide IG, Gangi A. Percutaneous vertebroplasty: history, technique and current perspectives. *Clin Radiol* 2004;59(6):461-7.
19. Meyerson BA, Linderoth B. Mechanisms of spinal cord stimulation in neuropathic pain. *Neurol Res* 2000;22:285-292.
20. Manchikanti L, et al. Evidence-based practice guidelines. *Pain Physician* 2003;6(1):3-81.
21. Manchikanti L, et al. Evidence-based practice guidelines. *Pain Physician* 2003;6(1):3-81.
22. Cluff R, et al. The technical aspects of epidural steroid injections: A national survey. *Anesth Analg* 2002;95(2):403-8.
23. Stojanovic MP, et al. The role of fluoroscopy in cervical epidural steroid injections: An analysis of contrast dispersal patterns. *Spine* 2002;27(5):509-14.

## Create a **secure** medical liability climate



You should be free to take care of your patients without liability issues influencing your medical decisions or your patients access to care.

The time is now. With your help, the American Medical Association (AMA) can make federal medical liability reform a reality in 2005.

Join the  
AMA today!



800 262-3211 or  
[www.ama-assn.org/join](http://www.ama-assn.org/join)

**AMA President John C. Nelson, MD visited the First Coast May 2 & 3. While in the area, he met with physicians at a special dinner. See photographs and details on p. 44 of this issue.**