

## Case Reviews in Pain

# Struck From Behind: Maintaining Quality of Life With Chronic Low Back Pain

Allen Lebovits, Brian Hainline, Laura S. Stone, David A. Seminowicz, James T. Brunz, Richard W. Rosenquist, and Penney Cowan

**Key words:** *Chronic low back pain, disk disorders, back injuries, multidisciplinary.*

### Case

**A** 38-year-old woman was the driver of a stopped car that was struck from behind by another vehicle. She developed sudden flexion and extension of her back, but without head trauma or change in level of consciousness. On the evening of the accident, she presented to the emergency room with severe mid and low back pain, and right knee pain, but was discharged with pain medications. One week following the accident, the pain became increasingly severe. For the past 6 months, she has been unable to work and is on disability. Chiropractic treatment, trigger-point injections, epidural injections and physical therapy, nonsteroidal anti-inflammatory drugs, muscle relaxers, and hydrocodone provided no or minimal relief. An MRI of the thoracic spine revealed a subacute appearing left paracentral disc herniation at T<sub>11</sub>-T<sub>12</sub>, with effacement of the subarachnoid space, but without spinal-cord or nerve-root compression; an MRI of the lumbar spine revealed a disc bulge at L4-L5 without significant mass effect; and EMG and nerve-conduction studies of the lower extremities were normal.

At the time of her initial presentation, she reported severe, constant right-sided mid and low back pain, as well as pain in the right anterior shin. The thoracic disc herniation was not considered a primary anatomic basis of her pain. She was treated in a multidisciplinary manner, including medication management, psychological counseling, physical therapy with a focus on myofascial release, and cognitive behavioral psychotherapy. She did not improve with numerous anticonvulsant and antidepressant medications. She has obtained pain relief with methadone in escalating doses up to 140 mg per day as well as bupropion 300 mg daily and lamotrigine 400 mg daily. She has been able to function reasonably well as a home-

maker, doing household chores with her husband. She walks 3 miles every other day, is not limited by pain, and is aware of the need to pace herself.

She acknowledges having been depressed after the accident because of the restriction of activities but feels that her depression has improved considerably. She has been married 18 years with 3 children and has a supportive relationship. She admits to a long-standing history of prior sexual abuse. The ongoing management focus is to prevent further methadone dose escalation concomitant with maintaining quality of life, and to increase functionality through psychotherapy with medical follow-up. Further diagnostic workup and therapeutic injections are not planned.

**Allen Lebovits, PhD**

**Division of Neurology and Integrative Pain Medicine  
ProHEALTH Care Associates**

**Lake Success, New York**

**Adjunct Associate Professor of Anesthesiology  
New York University School of Medicine**

**Brian Hainline, MD**

**ProHEALTH Care Associates**

**Lake Success, New York**

**Clinical Associate Professor of Neurology**

**New York University School of Medicine**

## Under Pressure: The Underlying Mechanisms of Pain from Disc and Back Disorders

Chronic low back pain can have many underlying physical causes and the specific structures responsible for back pain are rarely identified. The underlying causes may be divided into 3 broad categories: disc disorders, back disorders, and back injuries.

### Disc Disorders

Disc disorders include the most common diagnosis for low back pain: disc degeneration. Intervertebral discs (IVDs) consist of an inner, gelatinous core called the

Address reprint requests to Dr J.A. Paice, Northwestern University Medical School, 676 North St Clair Street, Suite 850, Chicago, IL 60611-2927. E-mail: [j-paice@northwestern.edu](mailto:j-paice@northwestern.edu)  
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nucleus pulposus surrounded by concentric layers of cartilage called the annulus fibrosus. Progressive disc degeneration is a natural consequence of aging. The discs begin to lose fluid and flexibility, which decreases their ability to cushion the vertebrae. One study evaluating the incidence of disc degeneration in adults without low back pain reported that 64% of asymptomatic individuals had disc abnormalities at 1 or more spinal levels.<sup>16</sup> It is not understood why some individuals experience pain while others are asymptomatic.

Disc degeneration can result in chronic pain through multiple pathways and the disc itself is not always the source of pain. Under normal conditions, IVDs are largely avascular and only the very outer layers are innervated. As discs degenerate, they become increasingly vascularized and innervated. In humans, the presence of substance P-expressing nerve fibers in discs is correlated with pain.<sup>12</sup> The axiogenesis marker GAP-43 is also increased in painful human discs.<sup>12</sup> As a consequence of aberrant innervation, mechanical forces within the disc may activate nociceptors, resulting in pain in response to normally innocuous movement. A variety of proinflammatory and pronociceptive mediators including nitric oxide, interleukins, matrix metalloproteinases, prostaglandin E<sub>2</sub>, and tumor necrosis factor, have been implicated in disc degeneration.<sup>21</sup> Contact of these mediators with nociceptors in and around the disc may result in peripheral sensitization and exaggerated nociceptor responsiveness. With increasing degeneration, the spinal cord nerve roots may become compressed, resulting in radicular pain.

Discs are under constant pressure. As discs degenerate and weaken, cartilage can bulge or be pushed into the space containing the spinal cord or a nerve root, causing compression-induced pain. Severe degeneration can result in rupture of the disc and leakage of the nucleus pulposus into the surrounding area. In addition to the resultant mechanical compression, it has been shown that application of nucleus pulposus material to dorsal root ganglia or spinal nerves results in neuronal excitability and neuropathic-like pain.<sup>6,8</sup> Thus, radicular pain secondary to degeneration may result from either mechanical compression or chemical insult.

### **Back Disorders and Injuries**

Back disorders that may result in pain include inflammatory spine conditions such as spondylosis (spinal inflammation/arthritis), spinal stenosis (degenerative narrowing of the spinal canal, nerve root canals, and/or intervertebral foramina), alignment disorders (ie, scoliosis), and small fractures to the spine resulting from osteoporosis. Back injuries resulting in pain include strains or tears to the muscles or ligaments supporting the back.

In the current case study, it is not clear if the bulging and herniated discs occurred after the car accident or if they were already present. Regardless of the absence of spinal-cord or nerve-root compression, these discs may be contributing to the chronic pain. For instance, either abnormal disc innervation subsequent to herniation or exposure of nerves to the escaping nucleus pulposus could result in nociceptor activation in the absence of mechanical compression.

In addition to the underlying biomechanical changes associated with back pain, there are complex cognitive and emotional components. The commonly referenced biopsychosocial model of pain posits that painful conditions are characterized by not only the physiological roots of the disorder, but also that many variables personal to the individual have an impact on the experience. There are reports that chronic back pain disrupts normal brain structure in regions related to cognitive, emotional, and sensory processes,<sup>2,25</sup> and there is evidence that the presence of pain influences the functional activity in a cognitive brain network.<sup>26</sup> This line of research reinforces the need for pain treatments to be multimodal and multidisciplinary in order to prevent or reverse the negative effects of chronic pain on the brain.

**Laura S. Stone, PhD**

**David A. Seminowicz, PhD**

**Alan Edwards Centre for Research on Pain**

**McGill University**

**Faculty of Dentistry**

**Montreal, Quebec, Canada**

## **From Acute to Chronic: Risk Factors and Management**

Low back pain is one of the most common medical complaints in the adult population, accounting for nearly 15 million physician visits annually in the US alone.<sup>14</sup> It is estimated that between 12 and 15% of the US population will visit a physician with a complaint of back pain in any given year,<sup>1</sup> leading to nearly 45 million total health care visits in 2004 alone.<sup>1</sup> About 90% of all patients who present with low back pain will have nonspecific low back pain without an obvious anatomic cause.<sup>17</sup> Up to 70% of patients who develop acute low back pain have resolution of their symptoms within 6 weeks and up to 90% will have resolution within 3 months.<sup>7</sup> Low back pain which persists for greater than 3 months has an uncertain prognosis and is more likely to result in some level of disability. Risk factors for developing chronic back pain are multifactorial and include demographic, health, occupational, psychologic, and spinal anatomy factors<sup>24</sup> (Table 1).

### **Evaluation of Low Back Pain**

Because the vast majority of patients who present with low back pain lack a clear anatomic diagnosis, evaluation must include consideration of other important factors. These include: 1) underlying systemic disease as a source of pain; 2) neurological involvement as a manifestation of the presentation; and 3) the significant impact that psychological factors can play in the patient's overall pain experience.<sup>24</sup> The evaluation and treatment of patients with chronic musculoskeletal pain should include a multidisciplinary approach which includes detection and treatment of psychiatric comorbidity.<sup>10</sup>

Assessment of a history of trauma is an important, often overlooked aspect of the chronic low back pain workup. There is a high prevalence of PTSD (post-traumatic stress disorder) symptoms among patients with

**Table 1. Risk Factors for the Development of Chronic Back Pain\***


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Demographic factors
Increasing age
Female gender
Low socioeconomic status
Low educational level
Health factors
Increased BMI
Tobacco use
Perceived general-health status
Medical comorbidities
Occupational factors
Physical activity
Monotonous tasks
Job dissatisfaction (could also be categorized as a psychological factor)
Psychological factors
Depression
History of trauma/PTSD
Fear avoidance behavior
Somatization disorder
Spinal anatomy factors
Anatomic variations
Imaging abnormalities

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\*Adapted from reference 24.

chronic pain. PTSD has been shown to predict pain-related physical health symptoms compared to nonpain health problems.<sup>4</sup> In 1 study, up to 50% of patients evaluated for back pain at a multidisciplinary clinic had a history of sexual or physical trauma.<sup>13</sup> In fact, experiences of sexual and physical abuse may predispose patients, especially women, to chronic pain conditions.<sup>19</sup> PTSD symptoms in patients with accident-related chronic pain may impact severity of pain, depression, and disability.<sup>23</sup> The etiology of this may relate to overlapping neural networks mediating both cortical pain modulation systems and psychological components. Patients with high catastrophizing behavior demonstrate higher pain intensities compared to patients without catastrophizing behavior, indicating the importance of psychological evaluation and possible treatment in chronic-pain patients.<sup>28</sup>

### **Treatment: Multidisciplinary Approach**

Treatment of low back pain should be directed at identifiable anatomic causes. The medical literature does not provide clear direction regarding the most efficacious therapeutic approach to nonspecific low back pain. In general, a multidisciplinary approach to nonspecific low back pain is usually most effective and includes medical management, physical therapy, maintaining physical activity level, cognitive behavioral therapy, and counseling.

The treatment of chronic nonspecific low back pain with long-term opioids remains controversial, as sufficient evidence for long-term efficacy is lacking.<sup>9</sup> A recent review of the literature would suggest that the analgesic efficacy of opioids is not sustained during long-term therapy, the treatment is frequently associated with significant side effects, and opioid-induced hyperalgesia may result from alterations in pain-modulation pathways.<sup>3,22</sup>

Exercise and physical therapy are important and undervalued modalities in the treatment of low back pain. Exercise has been shown to alleviate pain, reduce functional disability, and improve depression and anxiety in patients with low back pain.<sup>5</sup> Furthermore, regular exercise has been shown to be clinically more effective in reducing low back pain and disability when compared to traditional primary-care management techniques.<sup>20</sup> Alternative treatment modalities such as acupuncture and acupressure have also been shown to reduce pain and disability in patients with chronic low back pain.<sup>27</sup> Spinal-cord stimulation has reemerged in recent years as a promising treatment modality for refractory low back pain, and may be more effective than conservative medical management in this setting.<sup>15,18</sup> Behavioral therapy plays an important role in low back pain treatment, as illness perception has been shown to impact outcomes.<sup>11</sup>

The patient in this case study is receiving multidisciplinary care incorporating medical management, psychological counseling, physical therapy with a focus on myofascial release, and cognitive behavioral psychotherapy. As a result, she has been able to resume most activities of daily living and is able to walk 3 miles without being limited by pain. The key to continued improvement and maintenance of her quality of life will likely involve ongoing multidisciplinary treatment including psychological counseling. She has several risk factors for persistent chronic pain including her history of sexual abuse, the fact that her pain started as the result of a traumatic event (MVA), and her failure to return to work despite good restoration of function. These factors may dramatically impact perceptions of pain and disability, and need to be addressed as a critical element of any successful ongoing treatment plan.

**James T. Brunz, MD**

**Richard W. Rosenquist, MD**

**Pain Medicine Division**

**University of Iowa**

**Iowa City, IA**

### **“You Have to Learn to Live With the Pain”**

Long-term chronic pain can have a negative impact on quality of life and level of functioning. Without any interventions, pain can escalate and become not only the focus of one's day, it can become his or her identity. I have been dealing with chronic pain since 1974. For almost 6 years, I believed that the medical community would identify the cause of my pain and eliminate it, allowing me to return to a full life. What I didn't know was there is only so much the medical community has to offer in the way of treatment and relief. And with each new doctor visit, test, and treatment, the answer was always the same: “You will have to learn to live with it.”

In 1979, I was fortunate to enter a multidisciplinary program under the direction of a physician skilled in pain management. For the first time since my pain began, someone said he could help me. The program was a comprehensive pain-management program that provided the tools I needed to begin my journey from a dependent patient back to a functional person. It was

a difficult journey because I had become so deconditioned, but one that I needed to make to regain control of my life. I increased my level of functioning, improved the quality of my life, and greatly reduced my sense of suffering. But there would always be some level of pain that I would have to live with. This I could do because I no longer feared the pain, I understood it.

My success in this program depended on 2 components. The first was someone who believed my pain and gave me the validation I needed to take an active role in the treatment process. The second was knowledge. The staff members taught me what I needed to know to recondition my body and, at the same time, to accept the pain but understand that it was only a small part of who I was. What I found most interesting was that I was the most significant member of the team. Without my own personal effort and acceptance, I would not have been successful.

Upon leaving the program there was great fear that if I went back to my "normal" routine, I would lose all that I

had gained at the clinic and that I would fall back into the passive role of patient. To be successful in living with pain, I had to remain active and continue learning. With my physician's encouragement, I started a support group. That was the beginning of the American Chronic Pain Association (ACPA). Twenty-eight years later, I am still learning and still a person, rather than a patient.

The ACPA helps members work more effectively with their physicians, improves the quality of their lives, and enhances their overall level of functioning. Many members report that their sense of suffering is reduced. Additionally, the ACPA helps members improve their outlook on life and relationships with others. The ACPA now has groups across the United States and in many other countries. The philosophy is that people with pain must take an active role and remain involved if they are going to live a full life in spite of their pain.

**Penney Cowan**  
**American Chronic Pain Association**  
**Rocklin, CA**

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