

Effective Treatment of Back Pain

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*Reprinted with permission from Journal of the American Chiropractic Association, June 1999;22-24, 26

Introduction

Back pain has become one of the most expensive conditions in the United States. It is the second most common reason for physician visits and the leading reason for visits to orthopedists and neurosurgeons. The growth of low-back pain disability between 1960 and 1980 was 14 times the growth of the population. The cost of low-back pain in the United States (health care costs, work loss, and disability payments) exceeds \$50 billion. In fact, 25 percent of cases make up 96 percent of the costs.

In order to successfully treat low-back pain it must be understood that the most important and frequent contributing component to pain is joint dysfunction - improper movement of one or more of the many joints in the spine. This dysfunction can be caused by acute trauma, such as a fall or acceleration / deceleration forces. Smaller but repetitive forces that accumulate over time can also cause tension or inflammation of pain-sensitive joint capsules, causing pain directly and/or causing reflex muscle spasm. It must be remembered that at each vertebral level, there are four synovial joints; in the thoracic spine that amount increases to eight. These synovial joints are rich in pain fibers as well as mechanoreceptors.

These proprioceptive mechanoreceptors mediate reflex muscle spasm, or inhibition, due to pain. Muscle dysfunction is a disturbance of the muscles' ability to properly contract and relax in stabilizing the spine. Frank muscle weakness, as seen with neurological defect, is not necessary to cause pain. Subtle weakness, tightening, or myofascial trigger points can cause altered biomechanics of joints, referred pain, or instability of joints. Spinal lesions can have several manifestations besides back pain, and radiculopathy.

These include:

- . Scleratogenous referred pain
- . Myotogenous tonus and texture changes and referred pain
- . Perceptual dermatogenous sensory changes
- . Automatic concomitants.

Reproduction of the patient's pain during examination is essential. If it can't be reproduced, the clinician is not able to form a proper diagnosis. Panjabi's model of the spinal stabilizing system consists of three subsystems.

A dysfunction in any component of any one of the subsystems can result in:

- . An immediate response from other subsystems to successfully compensate
- . A long-term adaptive response of one or more subsystems
- . An injury to one or more components of any subsystem.

Restoration of normal function of all subsystems is required to restore spinal stability. Evaluation of the components and function of the spinal system's subsystems must be performed. Successful treatment of back pain should return the patient to normal activity, including a return to work at the level the patient and the employer enjoyed prior to onset.

Where Have We Failed?

The health care system has been largely unsuccessful in the treatment of acute back pain and has not prevented the development of chronic back pain. The main reasons for this are misdiagnosis and mismanagement of back pain. The overemphasis on structural diagnosis in explaining the patient's pain is not consistent with the literature. We know that disc pathology is present in a majority of asymptomatics. In fact, bulges are present in 52 percent of this group. It is more likely that finding them is coincidental.

Joint dysfunction and muscle dysfunction are more probable causes of pain in the acute- or chronic-pain patient. A tissue-specific diagnosis that describes the pain generator and the functional defects should be made. The overprescription of bed rest and analgesics results in deconditioning and avoidance of movement. Analgesics and narcotics remain the treatment of choice for lower-back pain among the general physician population, despite the fact that this model has been shown to increase the duration and severity of back pain. Rest and immobilization cause muscles to lose strength at a rate of 10 percent to 15 percent per week. Movement is imperative to avoid fear/avoidance behavior and debilitation. Gordon Waddell, MD, states, "Patients do need symptomatic measures to control pain, but these should be used mainly to facilitate active rehabilitation, rather than be seen as an end in themselves." (1995) Physical agents, such as neuromuscular electrical stimulation, that help to reduce painful muscle spasms as well as stimulate endorphin production, can be used to regulate pain. In cases involving severe pain and muscle spasm, local injection at the site of the pain generator (epidural, nerve, muscle, or facet) can help to facilitate active movement and rehabilitation. However, epidural injections, nerve blocks, and other analgesic and anti-inflammatory interventions are not treatments to be used without the goal of rehabilitation to correct joint and muscle dysfunction. The inappropriate use of surgery, which is most frequently the result of misdiagnosis and/or poor selection criteria, is highly prevalent in the United States. Back surgery is five times more common here than in England. "Most failed backs are found in unfortunate individuals who should never have had surgery in the first place or who, needing surgery, did not have the right procedure at the right time and at the right level." Between 1979 and 1990, the frequency of back surgery rose in the United States at a rate of 137 percent, compared with a general population growth of 23 percent. Even in cases where structural pathology is the pain generator, surgery should be a last resort. A diagnosis of herniated nucleus pulposus with disc mediated radiculopathy can be successfully treated without surgery. In one study, 50 of 52 patients (96 percent) with proven disc herniation and EMG-confirmed radiculopathy had successful nonoperative outcomes. They were treated with aggressive rehabilitation and pain control, including epidural injection of corticosteroids, physical modalities, and lumbar stabilization exercise training. In this study, 92 percent of patients returned to work. In addition, failure to identify biopsychosocial factors can lead to illness behavior and chronic pain. "Illness behavior is quite simply the outward manifestation of disease, or more precisely, observable and potentially measurable actions and conduct which express and communicate the individual's own perception of disturbed health." If the clinician does not address these biopsychosocial issues through restoration of function, prompt return to activity, and reduction of pain and stress, the patient will soon develop fear of pain and avoidance behavior. Fear-avoidance variables have been found to be excellent predictors of chronic lower-back pain, according to Klenerman.

New Directions for Lower-Back Pain Diagnosis and Treatment

Evaluation and Diagnosis

The changing landscape of health care, as well as the ethical need to provide the best care possible in a cost-effective way, requires these new directions. James Weinstein says. "... The medical model that we started with earlier in the century will not work in the next century .. "

Following are major points to consider when establishing an effective treatment plan:

Clinical. A prompt and thorough history, and an orthopedic and neurological examination with provocative testing to ideally reproduce the complaint, must be performed. A tissue-specific working diagnosis will then develop. Imaging or metabolic studies may be indicated, but are not necessary for all patients with back pain. Diagnostic testing should be used to rule out differential diagnoses when cause exists to suspect metabolic or neoplastic conditions.

Ergonomic. As part of a thorough history, an evaluation of the workplace and job requirements can help determine whether ergonomic factors contribute to the complaints and can be modified. Repetitive strain, postural design, and work overload should be considered.

Functional. Through the use of functional testing, an evaluation of strength, endurance, flexibility, cardiovascular condition, and motor control can be made. Often these factors are comorbid and need to be improved.

Biopsychosocial. Through the case history, the use of questionnaires, and the physical examination, the presence of biopsychosocial factors can be evaluated as predictors of outcome and addressed by the treating doctor or by possible referral. The presence of pain-avoidance behavior or abnormal illness behavior will create a barrier to rehabilitation. Job dissatisfaction, depression, or anxiety must be addressed as comorbidity factors that will prevent successful treatment. A psychological or job counselor may be indicated.

Treatment

Treatment protocols that follow a rational sequence should be utilized.

They include:

- . Pain control, as needed
- . Restoration of functional joint mobility
- . Correction of tight/shortened dysfunctional muscles
- . Correction of weak/inhibited dysfunctional muscles
- . Restoration of normal motor control
- . Spinal/pelvic stabilization training
- . Muscular activation
- . Restoration of muscle strength and endurance, including aerobic conditioning

Pain control allows functional restoration to occur. Oral anti-inflammatories or narcotics, or local injection at the site of the pain generator, may be necessary. Facet and/or epidural injections of analgesic/anti-inflammatory combinations will facilitate rehabilitation and active mobility in even the most painful conditions. These procedures will also relieve acute spasm in the intrinsic spinal muscles, allowing intersegmental motion to occur. Physical modalities help to modulate pain via several mechanisms. Time-limited use of passive modalities such as ice, heat, neuromuscular stimulation, ultrasound, traction, and massage can be effective in helping to relieve pain and muscle spasm facilitation of active rehabilitation. Joint manipulation is extremely effective in treating pain, as well as correct joint dysfunction.

Restoration of functional joint mobility is primarily achieved through manipulation of the hypomobile joints. Motion palpation of joints that reveals hypomobility must be performed. Hypomobility of joints inhibits normal muscular function, leading to weakness, instability, and eventual muscle atrophy. Painful joints can lead to muscle spasm. The joint mechanoreceptor must be stimulated for normal muscular function and tone. Manipulation of extremely painful joints can be accomplished under anesthesia. Stretching of tight/dysfunctional muscles will allow normal joint motion to continue. Tight muscles can prolong joint dysfunction. Post-isometric relaxation and other stretching/relaxation techniques can relieve trigger points, as well as relax and lengthen muscles. Stretch and spray or trigger point injections, as described by Travell, are also effective. Manipulation under anesthesia is extremely effective in stretching muscles and breaking adhesions in muscles, as well as in and around the joint capsules. Facilitation of hypotonic and inhibited muscles will start to provide the basis for spinal stability. These muscles are often inhibited due to Sherrington's reciprocal inhibition. Prior correction of hypertonic antagonists allows muscle facilitation techniques, such as rhythmic stabilization, to work.

Proper proprioception is essential for normal function. Dysfunction of joint capsule receptors, Golgi tendon organs, and muscle spindles secondary to injury results in alteration of postural reflexes and must be corrected. Joint, muscle and tendon injury causes proprioceptive deficit, which then increases risk of re-injury. Proprioceptive sensorimotor stimulation is highly effective in stimulation of gluteus medius and maximus muscles, prime stabilizers of the spine and pelvis. Use of balance shoes shows a marked increase in activity of the gluteus maximus (208 percent) and gluteus medius (195 percent) muscles.'

Spinal stabilization programs help to improve posture and spinal loading, as well as improve body movement awareness, balance, and muscle coordination. Enhancing spinal stability by increased intraabdominal pressure via transverse abdominous contraction will become sub-cortical and reflexive. Programs to improve strength and endurance of prime spinal movers and stabilizers must be initiated as soon as possible, with the exercise performed in the neutral zone. Complete range-of-motion strengthening programs must also be performed. Trunk extensor/flexor strength ratios must be addressed. Muscle strength and endurance must be in excess of the patient's work demands. Exercise programs must be strenuous enough and long enough to effect change. Muscles do not get stronger until after six to eight weeks of strength training. These programs should be continued by the patient after completion of active treatment. Strength, endurance, and cardiovascular training should be norm for all low-back pain patients. Workers must have the strength to perform tasks without approaching their maximum capacity. They must be able to perform these tasks for the entire day without fatiguing muscles and using improper mechanics to recruit additional muscles. Workers need to be industrial athletes; they must be conditioned to perform physically with strength and endurance, as well as with cardiovascular fitness.

Conclusion

Effective treatment of lower-back dysfunction requires the proper teamwork of patient and doctor, along with therapists, family management, patient motivation, and the cooperation of payers to return patients to normal function. Patients will be required to perform activities and have procedures that are difficult and occasionally painful. As with many facets of life, patients will get out of rehabilitation what they put in. Those who work harder will have better outcomes. Our job is to help make patients able and willing to do that work.

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