

Staff

**Secondary Conditions
Prevention & Treatment:
A Series—No. 3**

Chronic Pain Management

**The Research
and Training
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Abstract: Many researchers believe that chronic pain following SCI originates in the central nervous system. That's why the pain persists even after peripheral sources of acute pain have healed. The pain occurs in the area of the spinal injury where there may be scarred nerve tissue, inflamed membranes and tethered cord.

It's thought that these changes cause the spinal cord to malfunction with abnormal burst firing, altered concentrations of neural chemicals, disturbance of the pain pathways, and other unusual activities.

The areas of the body most vulnerable to chronic pain among persons with spinal cord injury are the back, shoulder, elbow and wrist. One study found that during the first six months following injury, 78% of tetraplegics and 35% of paraplegics had shoulder pain. However, examinations six to 18 months after injury found only 33% of the tetraplegics and all of the paraplegics continued to have pain. While the pain did not cause a decrease in movement for most of the paraplegics, it did cause functional disability in 8 of 10 tetraplegics.

Many doctors believe a combination of treatments is most effective in combating chronic pain. This also requires a team approach by specialists skilled in each area such as physicians, surgeons, rehabilitation nurses, physical/occupational/recreational therapists, and psychologists. Usually, physicians prefer to start with the most conservative types of treatment before moving on to surgery or more risky treatments.

Treatments include maintaining good health, pain medications, transcutaneous nerve stimulation, acupuncture, nerve blocks, nutritional management, surgery, electrical stimulation, physical treatment, and mental health therapy.

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Chronic Pain Management

There are two major types of pain — acute or short lasting, and chronic. Chronic pain is the more challenging to live with and treat. Chronic pain is long-lasting — traditionally defined as occurring for at least six months — is often difficult to cure, and may appear without any tissue damage or physical cause.

Researchers have concluded that chronic pain is caused by problems inside the central nervous system unlike acute pain, which is caused by an outside source. Spinal cord injuries frequently result in chronic pain. A 1996 Arkansas Spinal Cord Commission found 62% of the 650 persons with SCI in its study cited chronic pain as a secondary condition. A 1987 study estimates that between 11% to 94% of persons with SCI experience such pain. Unfortunately, despite many recent medical advances, chronic pain due to spinal cord injury is one of the most challenging problems for doctors and chronic pain patients to cope with. In some difficult cases, the treating doctor is left with only one option: Helping the patient understand and cope with the pain.

Thomas Balazy, M.D. from Craig Hospital in Englewood, Colorado, well-known for its SCI treatment and rehabilitation program, called chronic pain ‘extremely difficult to treat’ particularly, with non-surgical procedures” in a 1992 article in *The Clinical Journal of Pain* Volume 8, pgs. 102-110). B.S. Nashold Jr. and Brian Brophy, both neurosurgeons, said that multiple parts of the body’s sensory system may be involved in chronic pain and described the search for relief as “a detective story to sort out each culprit associated” in their 1989 *Handbook of Chronic Pain Management*.

Even if managing chronic pain is difficult, there are effective treatments. But before we examine them, we should know the most common causes and types of chronic pain associated with SCI.

Causes

Many researchers believe that chronic pain following SCI originates in the central nervous system. That’s why the pain persists even after peripheral sources of acute pain have healed. The pain occurs in the area of the spinal injury where there may be scarred nerve tissue, inflamed membranes and tethered cord.

It’s thought that these changes cause the spinal cord to malfunction with abnormal burst firing, altered concentrations of neural chemicals, disturbance of the pain pathways, and other unusual activities.

Types

There are several common types of chronic pain associated with spinal cord injury:

1. Intense, burning pain in a part of the body where sensation may be reduced or gone.
2. A spread-out, aching, crushing sensation in a limb.
3. Recurring, explosive pain with shooting episodes.
4. Phantom limb pain in the stump or phantom limb following amputation.
5. Pain in paralyzed limbs usually made worse by touching or rubbing the skin just above the injury level or by overfilling the bladder or bowel. Usually develops fairly early after injury.
6. Delayed pain in paralyzed limbs or injury-level skin several years following injury. Often a radiating pain to one or both legs or in the skin just above the injury level.

7. Pain around the abdomen like a light, squeezing band that produces a bloated sensation that won't go away.

Any change in the spinal cord above the injury site is called cystic myelopathy. Factors considered to contribute to this change are arachnoiditis (inflammation of the spinal cord membrane) and tethering of the cord (attachment of the spinal cord to the spinal column itself, restricting movement). Suspect cystic myelopathy if you have these symptoms along with chronic pain:

- Progressive loss of movement and sensation.
- Increasing spasticity.
- Autonomic hyperreflexia.
- Excessive sweating.
- Homer's Syndrome (lack of sweat, contraction of pupils, rolling of eyes back into sockets, or drooping of eyelids).

If you suspect you have any of these disorders related to cystic myelopathy, see your doctor. Treatment involves neurosurgery and shunting, which is diversion of the cerebrospinal fluid from the spinal cord through a small plastic, catheter-like tube. Shunts require regular examinations to check for blockage.

Location

The areas of the body most vulnerable to chronic pain among persons with spinal cord injury are the back, shoulder, elbow and wrist. One study found that during the first six months following injury, 78% of tetraplegics and 35% of paraplegics had shoulder pain. However, examinations six to 18 months after injury found only 33% of the tetraplegics and all of the paraplegics continued to have pain. While the pain did not cause a decrease in movement for most of the paraplegics, it did cause functional disability in 8 of 10 tetraplegics.

Treatment

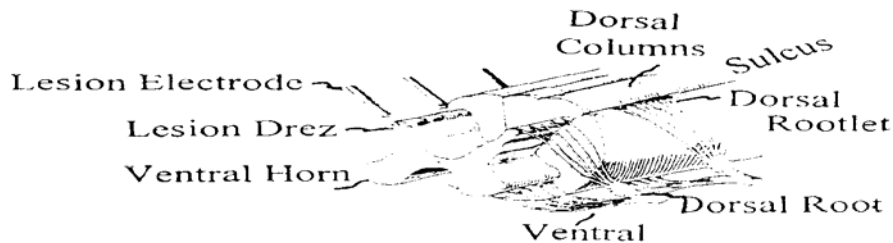
Many doctors believe a combination of treatments is most effective in combating chronic pain. This also requires a team approach by specialists skilled in each area such as physicians, surgeons, rehabilitation nurses, physical/occupational/recreational therapists, and psychologists. Usually, physicians prefer to start with the most conservative types of treatment before moving on to surgery or more risky treatments.

1. General Health. Rehab doctors and nurses treat problems such as urinary infections, breathing difficulties, pressure sores, etc., and also educate the person on ways to improve overall health. If the person with SCI can achieve a feeling of well being, the body's natural painkillers (opiates or endorphins) may increase and help reduce the pain.

2. Drugs. Pain medications can be divided into two major types: Non-narcotic and narcotic. Non-narcotic drugs — antidepressants, anticonvulsants, and antipsychotic medications fall into this category. There is disagreement over whether these drugs provide effective pain relief. Nevertheless, many people appear better able to cope with chronic pain when treated with these drugs.

Steroids are another potent substance that relieves pain. Steroids reduce inflammation, improve appetite, and improve general well-being but you should ask about possible side effects. While minor side effects are possible from steroid injections, serious side effects are common with long-term steroid use.

Narcotic drugs. Unless the patient has a terminal illness, use of these potent substances, for example, opioids, has been controversial. Doctors feared side effects, possibility of increased drug tolerance (meaning more and more is needed to have the same effect), dependence or even addiction.



Sketch shows how the DREZ operation is performed. Electrodes are positioned in the layers of the spinal cord corresponding to the person's chronic pain, and lesions are burned in to block pain.

While these dangers need to be considered, Balazy, of Craig Hospital, said narcotic drugs do have a place in treatment of chronic pain. However, because of the traditional taboos against their use, narcotic drug treatment often has been “too little, too late.”

Methadone is considered the narcotic of choice for chronic pain, Balazy says. Given by mouth, methadone is rated three times as effective as morphine, codeine and other similar drugs. Another advantage is that methadone doesn't dull the mind as do some other narcotics. In addition, methadone is relatively inexpensive.

However, some medical experts believe that narcotics are rarely effective except in addicting doses. There are adverse side effects to be weighed by the doctor as well as the person with chronic pain such as respiratory depression, sedation, constipation, antidiuretic tendencies, and reduced sex drive and/or potency.

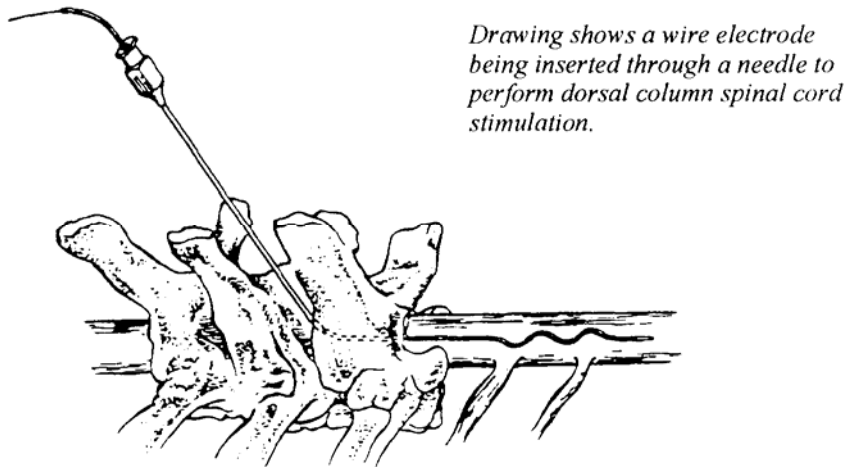
If you are required to use narcotics to get pain relief, you probably will want to plan on tapering off the dosage as your mental outlook improves and your physical activity increases. One approach to chronic pain relief involves injecting small doses of narcotics into the skin or spine to attack the pain near the source. This relief lasts longer and reduces some side effects such as respiratory or circulation problems. A surgically implanted device that will automatically give the person doses of painkillers shows promise after early tests.

According to the Northwest Regional Spinal Cord Injury System, a combination of drugs may be necessary in neuropathic pain, which is the most common type of chronic pain in the SCI population and the hardest to treat. This type of pain, at or below the level of the injury, is caused by abnormal signals from damaged nerves. To treat this pain, physicians may prescribe a combination of medications, including antidepressants at low doses, anticonvulsants (e.g., gabapentin), narcotics (e.g., morphine or codeine), nonsteroidal anti-inflammatory drugs such as ibuprofen, and others.

3. *TNS*. Transcutaneous nerve stimulation (transcutaneous means through the skin) is a medical term that includes many types of therapy: massage, manipulation, exercise, vibration, laser, acupuncture, accupressure, and low frequency electric current (TENS).

One of the most important types of therapy for chronic SCI pain is transcutaneous electrical nerve stimulation (TENS), which uses low levels of electricity applied to the pain area to block or reduce transfer of nerve pain signals.

TENS units include small battery-powered, portable devices that can be worn for regular use. TENS is reported effective in about 30-40% of people with chronic pain. But the treatment usually provides relief only for the symptom rather than the cause. (An exception is healing chronic skin ulcers and improving blood circulation in cases of pain caused by lack of good circulation). A 1982 study by J.N. Campbell and D. M. Long reported in *Diagnosis and Treatment of Chronic Pain* found TENS to be least successful for central origin pain and peripheral neuropathy (diseases of the smaller nerves). But TENS has been found to be effective in treating accidental or surgical trauma, and can reduce the need for narcotic treatments.



While TENS isn't addictive, there are precautions in its use. Skin reactions or burns can occur, particularly with skin having no sensation or with people unable to communicate or understand. People with heart problems are at even greater risk, especially those with pacemakers. Implanted metal can distort or concentrate the electrical current.

4. *Acupuncture*. Acupuncture may also block or reduce pain signals. It has been reported to be successful in treating spasms, tension, migraine headaches and phantom limb pain. Muscle and skeletal problems (such as arthritis but not rheumatoid, and bursitis) seem to respond best to acupuncture treatment, as does acute pain. But a thorough knowledge of the acupuncture points of the body is required, and placement of the needle — whether electrical or not— must be very accurate. Although chronic pain may not be cured by acupuncture treatment, some medical experts believe it may be worth trying because of the low rate of complications.

5. *Nerve blocks*. Nerve blocks are used for chronic pain therapy, diagnosis and prognosis. Blocking the nerve pathways can be done through injection of substances like alcohol into the nerve or by applying heat or cold. Similarly, freezing a peripheral nerve stops the flow of pain signals but doesn't change the structure of the nerve. Finally, small thermal lesions (burns) made surgically in the nerve can permanently interrupt the flow of pain signals. Unfortunately, relief of chronic pain by nerve injections usually are only temporary.

Nerve blocks also are used for diagnosis of an injury and prognosis, whereby the neurosurgeon can test the effects of surgery to see whether or not it gives the patient the relief he or she wants. The person can experience the effects of the interruption of the nerve signals (denervation) before deciding to go ahead with surgery.

6. *Diet.* In the early 1960s, a Swedish researcher found that peripheral pain results from an acid increase in the surroundings of the nerve endings. The finding led him to believe that if he could reduce this acid content, the pain would be reduced. Olov Lindahl, the researcher, has treated pain sufferers by giving them alkaline-ash food and alkaline medications by mouth. Over 20 years about 70% of patients were reported pain-free within 2-6 months.

7. *Surgery.* One surgical development in the treatment of chronic pain in spinal cord injuries is the DREZ (dorsal root entry zone) operation that stops the pain signals in the dorsal roots, the nerve branches radiating from the spinal cord in the back or chest area. (See diagram). This procedure may benefit certain patients with central of pain; however, these people need specialized monitoring equipment, according to the Secondary Conditions of Spinal Cord Injury presentation by Arnie Jackson, M.D., given at the Alabama Department of Rehabilitation Services conference, An In-depth Analysis of Medical Disabilities by Specialists in Their Fields held on August 29, 2000. Chemical “removal” of nerve portions has also been used to treat pain and spasticity of paraplegia, multiple sclerosis, and other neurological problems as has surgical nerve blocks through creation of lesions.

8. *Electrical stimulation.* Stimulation of peripheral nerves has been used successfully to relieve pain that couldn't be relieved by surgery or temporary nerve block. Usually the person who got relief from this method had responded to TENS treatment. For deafferentation (nerve interruption) which may occur in spinal cord injury, stimulation of the spinal cord rather than peripheral nerves is used for pain in the lower extremities. The technique involves implanting an electrode next to the affected nerve. A related pain-relieving technique is deep brain stimulation, which involves implanting electrodes in the brain. Studies suggest that spinal cord stimulation has a variable rate of early success and a low rate of long-term effectiveness. Deep brain stimulation also has a low rate of early success and an even lower long-term success, according to *Management of Chronic Central Neuropathic Pain Following Traumatic Spinal Cord Injury*, Evidence Report/Technology Assessment: Number 45 (September 2001), from the Agency for Healthcare Research and Quality, Rockville, MD.

9. *Physical treatment.* Physical treatment tackles problems that aggravate the chronic pain. Therapists and physicians treat through range of motion and stretching exercises to reduce spasticity, joint contractures, joint inflammations, spinal alignments problems, or muscle atrophy (weakening and shrinking).

Changes in your wheelchair, sitting posture, and seat cushion may be recommended to prevent pain, pressure sores, scoliosis (curvature of the spine), joint contractures, and other problems. In addition, the therapist aims to improve your overall physical condition through aerobic exercises and to improve the efficiency of movement in your wheelchair. Finally, therapists recognize the therapeutic value of recreational exercise in managing pain through diversion of attention from the pain itself.

10. *Psychosocial*. Some studies have found that pain may increase depending on the person's mental state. For example, anger has been associated with severe pain as has higher verbal intelligence, anxiety, and negativity. So it seems that controlling anger, anxiety, and negative feelings may help reduce chronic pain.

Some types of behavioral control have been found to be effective in pain control. Researchers have found that imagining a pleasant or distracting event (emotive imagery) can be effective in pain management. A number of studies have shown that preparing patients for pain and giving them a sense that they can exert some degree of control over the sensation will raise their pain threshold or tolerance. Patients who were given descriptions of the pain, its type and how long it might last asked for less pain medication in a post-surgery recovery room. Other behavioral techniques such as relaxation, deep and slow breathing, diversion of attention, and changing the painful sensation through fantasy have been shown to be effective

Chronic pain is challenging to treat and live with. But there are methods of relief available. You should realize that a number of treatments may be called for, however, and that none may be 100% effective. Your chances of finding relief are better if you are an active partner with your doctor or therapist in searching for the most effective treatments.

Chronic Pain Terminology

Arachnoiditis (a-rack'-noyd-i-tu.s) — Inflammation of one of the three membranes covering the spinal cord and brain. The membrane resembles a spider's web. Arachnoiditis has been associated with use of oil-based contrast substances in neural examinations.

Avulsion (ah-vul'-shun) — Tearing away of a portion of tissue or nerve.

Cord cyst (kord sist) — A sac-like growth on the spinal cord sometimes associated with spinal cord injury. To relieve the pain, neurosurgeons may try to create permanent drainage, or block the pain through burning lesions at key points in the nerves.

Cordotomy (kor-dot'-uh-me) — Surgically dividing a portion of the spinal cord.

Cystic myelopathy (is'-tick mi-il-op'-ah-the) — Cystic changes in the spinal cord from the area of injury upward. Examples are arachnoiditis and tethering of the cord (connection of the cord to the spinal column bones that restricts movement).

Deafferentation (dee-af-fur-en-tah'-shun) — Refers to sensory nerve fibers that have been interrupted or eliminated.

Denervation pain (dee-nerve'vay-shun) — Caused by an abnormality in the normal nerve signals to the brain and a resulting lack of equilibrium in the dorsal horn. Frequently found in paraplegics or others with sensation loss.

Dorsal horn (door'-sol horn) — The horn-shaped portion of the spinal cord made up of the front column and the back column of the cord. Often involved in chronic pain.

Dysesthesia (dis-thez'-i-uh) — Impairment of any sense, especially sense of touch.

Also refers to unpleasant sensation caused by normal stimuli

Peripheral (purr-riff-fur-ul) pain — Pain in the branches of the nerve system in extremities or other body regions away from the spinal cord. Not central pain

Psychosocial (sigh'-ko-so-shal) — Relating to the mind and social influences.

TENS (transcutaneous electrical nerve stimulation) — Sending electric current through the skin to relieve pain.

Tetraplegic (tett'-ruh-plegic) — Medical term for quadriplegic.

TNS (transcutaneous nerve stimulation) — Many different forms of therapy using through-the-skin stimulation to provide pain relief. Includes mechanical, heat, electrical, and chemical methods. Examples: Massage, manipulation, exercise, vibration, laser, acupuncture, and low-frequency electric current.