spinal cord injury UPDATE

Department of Rehabilitation Medicine

Volume 24 Issue 1 • Spring 2015

INSIDE:

UW Medicine

DEPARTMENT OF REHABILITATION MEDICINE

NW REGIONAL SPINAL CORD INJURY SYSTEM

SCI and Chronic Pain

Medical Approaches to Pain Management

By Deborah Crane, MD, Assistant Professor of Rehabilitation Medicine and SCI physician at Harborview Medical Center.

This is part 1 of a 2-part SCI Forum presentation. Part 2 will appear in the next issue of the newsletter. Watch the video at sci.washington.edu/chronic_pain.

Pain is very common after spinal cord injury. Statistics vary, but generally about four out of five people with SCI report significant chronic pain. Of those, about one-third report the pain interferes with their quality of life and their daily activities.

Pain can be either nociceptive or neuropathic. Nociceptive pain means the nerve endings that are intact are actually being irritated by some sort of noxious or irritating stimulus and you are receiving true pain signals. Musculoskeletal and visceral pain are both nociceptive.

Musculoskeletal pain

Musculoskeletal pain is usually a dull or achy pain felt above your level of injury where the muscles are innervated normally or have not been affected by your spinal cord injury. It is usually triggered or worsened by movement. Treatment depends on type, location and cause of the pain.

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Swollen Feet and Legs: Edema in SCI

By Shawn Song, MD, SCI Medicine Fellow, UW Department of Rehabilitation Medicine

What is edema?

Edema is swelling caused by too much fluid in your body's tissues. Edema in the lower extremities—feet, ankles and legs— is a common problem among patients with spinal cord injury (SCI). It occurs more frequently in people with SCI compared to able-bodied individuals because paralyzed muscles are unable to pump blood that has pooled in the legs due to gravity back from the leg veins to the heart. As a result, blood collects in the legs, and fluid from the blood leaks out of the vessels into the surrounding tissue. This type of edema is termed **dependent edema** (because the legs are "dependent" or hanging down while sitting). While there are several other medical conditions that can cause lower extremity edema, dependent edema is the most common type among patients with SCI.

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PAIN, CONTINUED FROM PAGE 1

Back and neck pain

People with SCI often develop curves in the spine, such as scoliosis (sideways curve) or kyphosis (rounded back), and this abnormal posture can become uncomfortable over time.

Shoulder pain

Lack of core strength due to paralyzed muscles often leads to muscle imbalances and using shoulders to maintain posture in a way that becomes uncomfortable.

Overuse from pushing your wheelchair or using a walker over time can lead to arthritis of your shoulder joint or rotator cuff tears.

Elbow pain

People with weak trunk muscles often lean on their elbows to hold themselves upright, causing painful bursitis or arthritis.

The ulnar nerve of the arm can become pinched at the elbow over time, causing pain and weakness.

Hands and wrists

Manual wheelchair users put a lot of strain on the carpal tunnel area in the front of the wrist (carpal tunnel syndrome).

Treatments

It is important to work with your physical and occupational therapists (PTs and OTs) to make sure you are following good biomechanics so you can keep your joints as healthy as possible. There are several approaches to treating musculoskeletal pain:

Exercise can be effective in improving pain, and PTs and OTs can design an exercise program specifically for your needs.

Activity modification. Reducing or changing the way you do things can allow the painful area to rest. For example, if you are performing 12 transfers a day while you do errands all over town, think about consolidating some of your activities to do fewer transfers.

Wheelchair evaluation. If you are using a manual wheelchair and having musculoskeletal pain, a proper wheelchair fit is vitally important. A good fit enables you to have correct posture and support for your pelvis and back and to use correct body mechanics while propelling your chair.

Weight control. The less weight you have to haul around, the less strain you put on your upper body. It's hard to lose weight when you are limited in what activities you can do, but your therapists can help you find some options.

Injections. Cortisone injections can be helpful for temporary pain management. Remember to rest your upper limb immediately after getting an injection to avoid the possibility of a tendon rupture.

Surgery. Surgery is sometimes an option when other methods don't work. Keep in mind that you may need to completely rest the affected limb for several weeks and even months after major upper limb surgery. With one arm out of commission, you may need almost full time help or a stay in a nursing facility while healing.

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Neuropathic pain is complex and usually requires a combination of treatments.

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Consider a power wheelchair. Manual wheelchair users are often reluctant to switch to a power wheelchair. But if pain has reduced your mobility, switching to a power chair, at least part of the time, can actually increase your participation in activities you enjoy. Some guidelines say that if you get surgery for an upper limb issue you should use a power chair for the future because you're at risk of more upper limb injury.

Visceral pain

This refers to pain in the abdominal area. It is often described as dull, achy, or crampy pain that comes and goes. It can be vague and hard to describe, especially if you don't have normal sensation in that area. Visceral pain is caused by some sort of abdominal problem that needs treatment, such as constipation, kidney stones, ulcers, appendicitis, bladder stones, gallstones, or a gastrointestinal virus.

Neuropathic pain

In contrast to nociceptive pain, neuropathic pain is caused by abnormal communication between the damaged nerves in your spinal cord and the pain centers of your brain. The pain is often described as pins and needles, burning, throbbing or stabbing. It can be at the level of injury, where your sensation or your strength changes, above the level of injury, or below the level of injury. Usually there is not a specific trigger for the pain, and the pain is often fairly constant.

Neuropathic pain is complex and usually requires a combination of treatments. The first step is always to see if there is any medical complication causing the pain. Your health care provider can help with this.

Medications

Several different medications can be used to treat neuropathic pain, sometimes in combination.

Acetaminophen (Tylenol). Often overlooked because people may not think it's strong enough, for many patients it is helpful, especially in combination with other medications.

Antidepressants. There are two major types commonly used for nerve pain.

- TCAs or tricyclic antidepressants -- most commonly amitriptyline and nortriptyline. Major side effects are dry mouth, constipation, and urinary retention, which for some people are intolerable. Otherwise it's pretty safe, and for many people it is very effective.
- Serotonin norepinephrine reuptake inhibitors (SNRIs) can be effective in treating nerve pain. Common examples are venlafaxine (Effexor) and duloxetine (Cymbalta). The main side effects are GI or stomach upset, or high blood pressure.

Anticonvulsants. Seizure medicines such as gabapentin and pregabalin (Lyrica) also work well against nerve pain.

- First-generation anticonvulsants like carbamazepine (Tegretol), phenytoin (Dilantin), and valproate (Depakote) can be

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effective. Some of these medications require periodic blood tests.

- Second generation anticonvulsants are more common because they don't need such monitoring. These include gabapentin (Neurontin) and pregabalin (Lyrica). The main side effect is sedation, but otherwise they are usually well tolerated.

NSAIDs (nonsteroidal anti-inflammatory drugs) such as ibuprofen (Advil), naproxen (Aleve), and celecoxib (Celebrex) are not frequently used for nerve pain, but they sometimes can be helpful in combination with other drugs. Side effects are mild, but taking too much for too long can damage kidneys.

Opioids (narcotic medications)

Most people with SCI had opioids when they were first injured and still in the hospital. These drugs come in either long-acting (lasting 8-12 hours and including methadone, morphine, oxycodone, and fentanyl) or short-acting (2-4 hours, such as morphine, oxycodone, hydrocodone and hydromorphone) formulations. Short and long-acting medications are often prescribed together, to combat the spikes of intense pain that break through the long-acting dose.

Side effects of Opioids

- **Constipation.** These medicines slow down everybody's gut, so whether you've got spinal cord injury or not they're going to make you constipated. Since many people with SCI already struggle with having regular bowel movements, narcotics can make the problem much worse.
- **Dependence.** Anyone who takes opioids for a long time will develop some physiologic dependence. That doesn't mean you're a drug addict, but rather that your body has become accustomed to that medication, so that if you stop abruptly you will have some withdrawal symptoms.
- **Sedation.** Sleepiness is a common side-effect of opioids.
- **Tolerance.** This is the idea that your body starts to need more and more of the medication as time goes on in order to get the same benefit. So if 5 milligrams of a opioid really took care of your pain, after a couple months you may need to increase that to 10 milligrams. And this continues: after a few months on 10 milligrams, you'll start needing 15. That's one reason why long term use of opioids can be a problem.
- **Addiction.** This is a risk if you do not take opioids as prescribed.

Topicals

Medications that you rub onto your skin can be helpful for some kinds of pain, but they are only practical for small areas of the body.

- **Capsaicin**. The active ingredient in these creams comes from chili pepper. Capsaicin tends to work better if you use it multiple times throughout the day.
- **Lidocaine** is a numbing medicine similar to what the dentist gives you in a shot form. Lidoderm patches are stickers with the lidocaine medication impregnated in them. They can be very expensive and are not covered by many insurance companies.
- **Diclofenac or voltaren gel** is an anti-inflammatory gel.

Marijuana

Marijuana (cannabis) has been found to be effective in reducing nerve pain and spasticity in some studies of people with SCI and other disabilities. Go to http://sci.washington.edu/marijuana for a comprehensive discussion of medical marijuana for SCI pain.

Surgery

Surgery for nerve pain is not common but may be helpful in a few specific cases, such as a pinched nerve in your spine (nerve root compression) or a peripheral nerve injury such as an ulnar nerve injury at the elbow or carpal tunnel syndrome. Likewise, syrinx formation (a cyst in the spinal cord) or nerve root tethering (nerves stuck in scar tissue) may require surgery.

Acupuncture

Acupuncture is considered a neurostimulatory technique in which needles are inserted in various points in the skin. While some people say it works well, research has not found it to be effective. It doesn't really have any negative side effects, however, and may be worth a try.

Massage therapy

There is research data that shows people with SCI use massage as a frequent pain treatment and find it effective. Some but not all insurers pay for therapeutic massage.

TENS unit

TENS stands for transcutaneous electrical nerve stimulation and uses electric current delivered through patches applied to the skin. TENS is often most useful for pain in a specific area, such as SCI pain at your level of injury, radicular or nerve root type pain, or musculoskeletal pain.

Heat and ice

Heat and ice can be helpful for individuals with muscular pain. Do not to apply heat or ice to areas of your body that don't have normal sensation, however, because you can get burns or frostbite.

EDEMA, CONTINUED FROM PAGE 1

Physical Signs

Though you can usually tell whether edema is present just by looking, legs can sometimes appear normal if the edema is mild. A reliable way to detect edema is by pressing a finger into the skin over the lower shin. If an indentation remains for several seconds after removing your finger (called "pitting"), lower extremity edema is present (see figure 1). You can also examine the skin under your sock – an indentation left by the sock is an indicator of edema.

If leg swelling is asymmetric (not the same in both legs), this may be a sign of a more serious medical condition. For example, blood clots in the veins of the leg, a bony fracture, or an abnormal bone formation called heterotopic ossification, can all result in new, asymmetric leg swelling and require immediate medical attention. You should always let your medical provider know if you have any new leg swelling, even if in both legs, since this may be a sign of a new or worsening medical condition.

Consequences

The major consequences of dependent edema involve the skin. Dependent edema, especially if long-standing, can cause the skin to become thin, fragile, and more vulnerable to breakdown. Significant foot swelling can cause shoes to fit poorly, potentially leading to pressure ulcers. If you already have a pressure ulcer, dependent edema can prevent or delay healing. Finally, dependent edema is a risk factor for infections of the skin of the legs, known as cellulitis. Be sure to seek immediate medical attention if you have edema along with new redness and/or warmth, since this may be a sign of cellulitis.

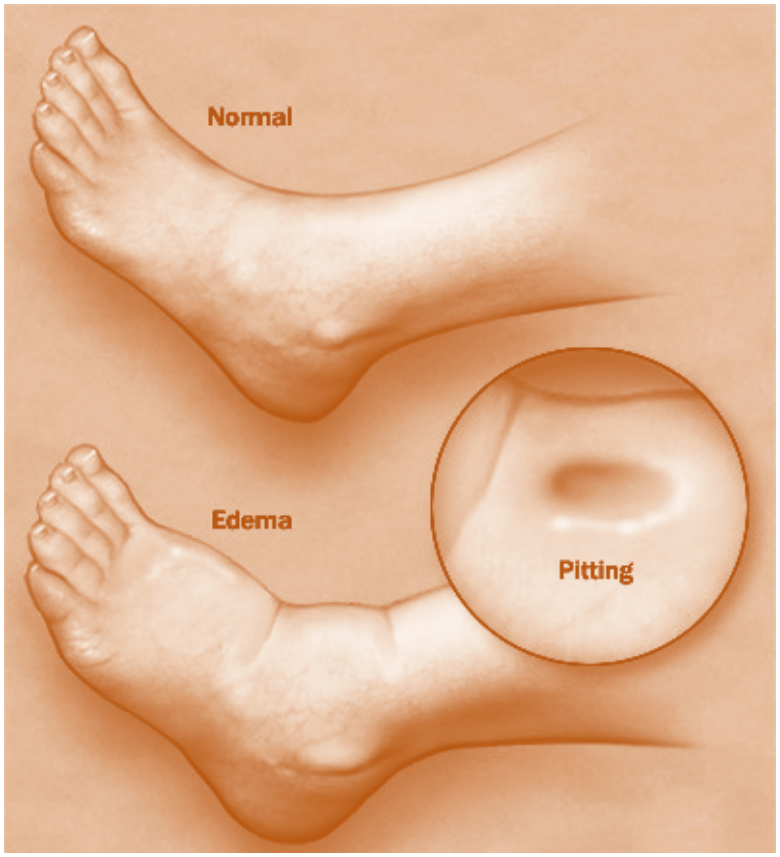

Figure 1
Credit: Mayo Foundation Medical Education and Research. Used by permission.

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Long-standing edema can cause skin to become thin, fragile, and more vulnerable to breakdown.

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Treatment

Leg elevation

Elevating the legs reduces the effect of gravity and helps the fluid that has collected in the lower legs to drain back to the heart. The higher your legs are relative to the level of your heart, the faster fluid will drain out of your legs. For example, lying in bed with the feet at the level of your heart is generally better than raising your legs while seated. However, lying in bed is not always practical, so you can extend your legs from a seated position or perform tilt-backs in a power wheelchair at regular intervals to minimize fluid collection in the legs. Small studies have shown that elevating the feet by as little as 30 degrees for 15 minutes reduces the amount of lower extremity edema.

Precautions

- Take care to protect your skin while elevating your legs. If you are sitting down with knees straight and heels resting on a chair, make sure your heels are on a cushioned surface for no longer than 15 minutes in order to prevent a pressure ulcer.
- Another concern is the possibility of increased urine output as the lower extremity edema resolves. For example, if you have significant dependent edema and get into bed, the fluid from your legs returns to circulation, and your urine output overnight may be greater compared to during the day. You therefore may need to self-catheterize more frequently at night as a result of increased urine output.

Compression stockings

There are two main types of compression stockings—gradient and anti-embolism. Gradient compression stockings are the type appropriate for the majority of SCI patients. Gradient compression stockings are constructed so that the compression level is highest (or tightest) at the ankle and less at the

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top of the hose. This pressure gradient helps to minimize fluid collection in the legs and return blood to the heart. Gradient compression stockings come in different compression levels and can also be custom-made. There are also different lengths of stockings, from knee-high to thigh-high.

You should put on the compression stockings in the morning before getting out of bed, as your legs will have the least amount of fluid at that time. Make sure the stockings do not bunch or wrinkle as this can cause increased pressure over these areas. Consult a medical professional to determine the compression level and appropriateness of gradient compression stockings.

Precautions

- You should not wear compression stockings if you have peripheral artery disease (PAD). If there is any question of PAD, you will need to have a vascular evaluation including an ankle-brachial index.
- You should not wear compression stockings if you have active cellulitis of the lower extremities.
- If you are susceptible to autonomic dysreflexia, speak to your SCI physician before using compression stockings.
- If you have impaired hand function you will need to be supervised the first time you put on compression stockings to make sure you are putting them on correctly.
- Make sure to closely monitor your skin for evidence of irritation or breakdown when first using compression stockings and remove stockings at the first sign of skin irritation.

Medications

Diuretic medications, which help the body shed water, can treat some forms of edema. However, we do not recommend routine use of diuretics for dependent edema, as these medications can have unwanted side effects, especially related to low blood pressure.

Summary

1. Dependent edema is a common problem among individuals with SCI.
2. Dependent edema is caused by blood pooling in the leg veins, with fluid from the blood then leaking out of the vessels into the surrounding tissue.
3. Potential consequences of dependent edema include fragile skin, pressure ulcers, and infection of the skin called cellulitis.
4. New or asymmetric leg swelling may be a sign of a more serious medical condition and requires medical attention.
5. Treatments include leg elevation and compression stockings.
6. Compression stockings should be prescribed by a medical professional.
7. Patients should closely monitor the skin over their legs for signs of irritation when elevating them or when first using compression stockings.

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UW Researchers Publish Landmark Study of Depression and SCI

Depression is a common problem in people with spinal cord injuries, and serious depression (called major depressive disorder or MDD) occurs in 25% to 30% of this population. MDD not only lowers quality of life but also has a negative effect on rehabilitation, independence, employment and social and leisure activities. It even can contribute to the development of pressure ulcers and urinary tract infections. Unfortunately, there has been little research to identify effective treatments for MDD in people with SCI.

In response, Charles Bombardier, PhD, and Jesse Fann, MD, at the University of Washington (UW), conducted a randomized, double-blind, placebo-controlled trial called Project to Improve Symptoms and Mood After SCI (PRISMS), to determine the effectiveness and tolerability of the antidepressant medication venlafaxine hydrocholoride extended-release (XR) for MDD in individuals with SCI. This study included 133 individuals with SCI and MDD from outpatient clinics at six SCI treatment centers in the U.S. (including the UW). Seventy-four percent of participants were male, with an average age of 40 and average of 11 years since injury. Participants were randomly (by chance) assigned to receive 12 weeks of treatment with either venlafaxine XR or placebo (fake pill). Each participant completed depression interviews before and after treatment. This was a double-blind study, meaning neither the participants nor the investigators knew who was assigned to which group until the study was finished.

Results showed that venlafaxine XR was well tolerated by most patients and an effective antidepressant for decreasing core symptoms of depression and improving SCI-related disability.

These findings were published in the *Journal of the American Medical Association Psychiatry*:

JAMA Psychiatry. 2015 Mar 1;72(3):247-58. **Venlafaxine extended-release for depression following spinal cord injury: a randomized clinical trial.** Fann JR, Bombardier CH, Richards JS, Wilson CS, Heinemann AW, Warren AM, Brooks L, McCullumsmith CB, Temkin NR, Warms C, Tate DG; PRISMS Investigators.

Read more research findings from the Northwest Regional SCI System investigators at *http://sci.washington.edu/projects_and_research/abstracts.asp*.

literature review

The articles previewed below were selected from a recent screening of the National Library of Medicine database for articles on spinal cord injury. In the judgment of the editors, they include potentially useful information on the diagnosis or management of spinal cord injury. You may obtain copies of the complete articles through your local medical library or from UW Health Sciences Library Document Service (http://www.lib.washington.edu/ill).

CELL-BASED THERAPIES

■ The known-unknowns in spinal cord injury, with emphasis on cell-based therapies - a review with suggestive arenas for research.

In spite of extensive research, the progress toward a cure in spinal cord injury (SCI) is still elusive. Seven known gray areas in SCI cure research are: i) the gap between animal models and humans; ii) uncertainty about the time, route and dosage of cells applied; iii) source of the best cells for therapy; iv) inability to address the vascular compromise during SCI; v) lack of non-invasive methodologies to track the transplanted cells; vi) need for scaffolds to retain the cells at the site of injury; and vii) physical and chemical stimuli that might be required for synapses formation yielding functional neurons. To improve outcomes, further research is needed on scaffolds for retaining the transplanted cells at the lesion, chemical and physical stimuli that may help neurons become functional, a meta-analysis of timing of the cell therapy, mode of application and larger clinical studies.

Dedeepiya VD, William JB, Parthiban JK, et al.
Expert Opin Biol Ther. 2014 May;14(5):617-34.

■ Autograft-derived spinal cord mass following olfactory mucosal cell transplantation in a spinal cord injury patient: Case report.

Human neural stem cells and cell transplantation are being investigated as potential therapies for spinal cord injury (SCI), neurodegenerative diseases and other conditions. However, significant concerns have been raised over the safety of this experimental therapeutic approach due to the possibility of tumor formation. This report describes the case of an 18-year-old women with T10-11 complete SCI who, three years after injury, underwent olfactory mucosal cell implantation at the site of injury. This procedure took place outside the U.S. She developed back pain 8 years later, and imaging showed a spinal cord tumor at the site of cell implantation, which had to be surgically removed. Intraoperative findings revealed an expanded spinal cord with a multicystic mass containing large amounts of thick mucus-like material. Histological examination and immunohistochemical staining revealed that the mass was composed mostly of cysts lined by respiratory epithelium, submucosal glands with goblet cells, and intervening nerve twigs. This is the first report of a human spinal cord mass complicating spinal cord cell transplantation and neural stem cell therapy. Given how many years it took for the tumor to develop, patients with cell transplantation and neural stem cell implantation should be monitored for many years.

Dlouhy BJ, Awe O, Rao RC et al.
J Neurosurg Spine. 2014 Oct;21(4):618-22.

INFECTION

■ Community-associated Clostridium difficile infection among veterans with spinal cord injury and disorder.

The impact of community-associated Clostridium difficile infection (CA-CDI) on patients with spinal cord injuries and disorders (SCI/Ds) is not fully understood. The authors examined CA-CDI cases among veterans with SCI/D, comparing them with community-onset, healthcare facility-associated (CO-HCFA) cases. Generally, patients with CA-CDI had less comorbidity, less severe CDI, and lower likelihood of antibiotic exposure.

Balbale SN, Johnson S, Burns SP, et al.
Infect Control Hosp Epidemiol. 2014 May;35(5):577-80.

HEART DISEASE

■ Self-reported physical activity and risk markers for cardiovascular disease after spinal cord injury.

Cardiovascular disease markers (hypertension, blood glucose and a blood lipid panel) were analysed in a group of 134 wheelchair-users (103 men, 31 women) with paraplegia due to SCI of at least a year's duration. Participants reported on the type and extent of their physical activity. Physical activity of at least 30 minutes a day positively influenced diastolic blood pressure. No other reductions in cardiovascular disease risk markers were seen after controlling for age. Men had significantly higher systolic and diastolic blood pressures than women, lower high-density lipoprotein cholesterol, higher low-density lipoprotein cholesterol/high-density lipoprotein cholesterol ratio and higher triglycerides. No other significant differences between men and women were found. These results indicate a positive effect of physical activity, but it cannot be concluded that recommendations about physical activity in cardiovascular disease prevention for the general population apply to wheelchair-users with spinal cord injury.

Flank P, Fahlström M, Boström C, et al.
J Rehabil Med. 2014 Oct;46(9):886-90.

■ Ambulatory blood pressure monitoring in spinal cord injury: clinical practicability.

After SCI, the loss of autonomic control over the cardiovascular system can cause blood pressure (BP) changes that may lead to increased cardiovascular disease (CVD) risk. Subjects with complete tetraplegia show the worst BP changes. Outpatient management of BP in this population is becoming increasingly important. In addition, SCI subjects are living longer and their risk for CVD may be increased. The use of ambulatory blood pressure monitoring (ABPM) allows insights into circadian BP profiles and have been shown to supply important information about CVD risks in able-bodied subjects. ABPM can be a helpful, non-invasive tool to look at changes in circadian BP patterns and factors related to episodes of orthostatic hypotension and autonomic dysreflexia. Further, abnormal patterns in ABPM, such as a loss of nocturnal dip, have been shown to be associated with increased risk for CVD in the able-bodied population. Therefore, presence of potentially life-threatening AD events as well as abnormal ABPM patterns, also might pose potential CVD risk factors in the SCI population. This relation is not well documented yet in patients with SCI but will be particularly important for people with complete tetraplegic who show adverse circadian BP profiles. The use of ABPM in this population might help detect these profiles and monitor the efficacy of various treatment strategies. Although further research is required in this area, we suggest that ABPM should be used to assess BP changes in patients with SCI.

Hubli M, Krassioukov AV.
J Neurotrauma. 2014 May 1;31(9):789-97.

WALKING

■ Understanding therapeutic benefits of overground bionic ambulation: exploratory case series in persons with chronic, complete spinal cord injury.

Two men and one woman aged 26 to 38 years with chronic complete SCI (American Spinal Injury Association Impairment Scale grade A) between the levels of T1 and T10 participated in an overground bionic ambulation (OBA) program using the Ekso Bionic lower extremity robotic exoskeleton. The program consisted of one-hour training sessions three times per week for six weeks. Even though there was little or no improvement in either activation of leg muscles or exercise conditioning after the program, participants reported lower overall

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pain severity, lower intensity of at-level neuropathic pain, and reduced sleep problems. Whether extended use would result in more favorable changes remains to be determined in follow-up studies.
Kressler J, Thomas CK, Field-Fote EC, et al.
Arch Phys Med Rehabil. 2014 Oct;95(10):1878-1887.

■ **Repetitive mass practice or focused precise practice for retraining walking after incomplete spinal cord injury? A pilot randomized clinical trial.**
A randomized, single-blind, crossover design was used to contrast 2 methods of retraining, one emphasizing precise, visually guided walking over obstacles and on targets (Precision Training), the other emphasizing mass practice of walking on a treadmill (Endurance Training). Twenty-two participants, at least 7 months postinjury, started Precision or Endurance Training. Each phase of training was 5 times per week for 2 months, followed by a 2-month rest. Both forms of training led to significant improvements in walking, with Endurance Training resulting in bigger improvements in walking distance, especially for high-functioning walkers. The largest improvements in walking speed and distance occurred in the first month of Endurance Training, with minimal changes in the second month of training. In contrast, improvements in walking skill occurred over both months during both types of training. Retention of over ground walking speed, distance, and skill was excellent for both types of training. Intensive walking training is effective in improving over ground walking in this population. Visually guided tasks for training individuals with chronic spinal cord injury were not better than mass practice on a treadmill.
Yang JF, Musselman KE, Livingstone D, et al.
Neurorehabil Neural Repair. 2014 May;28(4):314-24.

SPASTICITY

■ **Effects of vibration on spasticity in individuals with spinal cord injury: a scoping systematic review.**
Spasticity can lower quality-of-life by causing pain and fatigue, contributing to the development of contractures, pressure ulcers, infection, and negative self-image, and may interfere with a wheelchair user's seating, transfers, and wheeling. Both whole-body vibration (WBV) and focal vibration (FV) have been used for spasticity management in individuals with SCI. To understand the effects of vibration on spasticity in SCI, the authors searched the published research literature and analyzed the strength of the findings. They found some encouraging results linking WBV and FV to improved spasticity, but the evidence is weak because of the limited number of studies. They hope researchers will conduct randomized controlled trial studies on vibration to provide clinicians and patients with a more clear direction on the use of vibration to manage spasticity for those with SCI.
Sadeghi M, Sawatzky B.
Am J Phys Med Rehabil. 2014 Nov;93(11):995-1007.

PAIN

■ **Rotator cuff surgery in persons with spinal cord injury: relevance of a multidisciplinary approach.**
Thirty-eight patients with SCI (four with quadriplegia; 34 with paraplegia) received multidisciplinary medical and surgical consultations for pain in one or both shoulders. The participants' average time since injury was 26.4 years. The main activities that triggered or aggravated shoulder pain were transfers, wheelchair propulsion, and lifting the arm above shoulder level. In two participants, pain was due to orthotic-assisted gait. Surgical management was guided by the intensity of the pain and its functional impact. Surgery was performed on 38 shoulders in 28 patients (33 were laparoscopies and 5 were open surgeries), followed by post-operative rehabilitative care of several months to two years or more. The mean pain intensity rating in the operative and nonoperative groups was 0 and 1.6, respectively, at rest and 2 and 4.9, respectively, during severest peaks. Functional independence also improved after surgery. When the surgical decision was based on a multidisciplinary assessment involving both surgeons and rehabilitation providers, no negative results were reported.
Fattal C, Coulet B, Gelis A, et al.
J Shoulder Elbow Surg. 2014 Sep;23(9):1263-71.

■ **Long-term outcomes of a multidisciplinary cognitive behavioral program for coping with chronic neuropathic spinal cord injury pain.**
A total of 29 subjects with a spinal cord injury and chronic neuropathic pain participated in this unblinded multicenter randomized controlled trial. Participants were randomly assigned to an immediate intervention group or to a waiting list control group within each participating rehabilitation center. The control group was invited to go through the treatment program after a waiting period of 6 months. The treatment was a multidisciplinary program of 10 three-hour sessions over a 10-week period and comprised educational, cognitive, and behavioral elements targeted at coping with chronic neuropathic pain. Pain measurements taken before and after the treatment showed significant improvements in pain intensity, pain-related disability, anxiety and participation in activities. These findings highlight the potential of a multidisciplinary cognitive-behavioral approach in treating a common, debilitating problem in persons with SCI.
Heutink M, Post MW, Luthart P, et al.
J Rehabil Med. 2014 Jun 13;46(6):540-5.

UROLOGICAL PROBLEMS

■ **Bladder stones in patients with spinal cord injury: a long-term study.**
This retrospective follow-up study assessed the occurrence of bladder stones in patients with SCI. In a database of 2,825 SCI patients between 2004 and 2012, 93 (3.3%) underwent surgery for bladder stones. The rate of bladder stones by method of bladder management was 11% for suprapubic catheter (SPC), 6.6% for transurethral catheter (TC), 2% for intermittent catheterization (IC), and 1.1% for reflex micturition (RM). The mean time period to stone development was 95 months, with the TC group having the shortest time interval (31 months), followed by the SPC group (59 months), individuals performing IC (116 months) and RM (211 months). Bladder stone recurrence rate was 23% overall and most frequent in the TC group (40%), followed by SPC (28%) and IC (22%), whereas no recurrences occurred in the RM group. In SCI patients, bladder management has an important role in the development of bladder stones. Indwelling catheters (TC/SPC) have the highest risk to develop bladder stones and should be avoided if possible. If unavoidable, SPC is superior to TC.
Bartel P, Krebs J, Wöllner J, et al.
Spinal Cord. 2014 Apr;52(4):295-7.

■ **Surgical management of urolithiasis in spinal cord injury patients.**
Urolithiasis (kidney stones) is a common condition in persons with spinal cord injury. Surgical management of stones in this population is less successful and has a higher rate of complications than the general population. Shock wave lithotripsy (SWL) has a low clearance rate of 44-73 %. Percutaneous nephrolithotripsy is indicated for larger nephrolithiasis, but multiple procedures may be required to clear the stones. Ureteroscopy has been associated with low success rates because of difficulty in obtaining ureteral access. Recently, good results have been reported with the combination of endoscopic and laparoscopic techniques. Surgical management of urolithiasis in patients with SCI should be performed in high-volume centers in light of the technical challenges and higher rate of perioperative complications.
Nabbout P, Slobodov G, Culkin DJ.
Curr Urol Rep. 2014 Jun;15(6):408.

Spinal Cord Injury Update is supported by grant H133N110009 from the National Institute on Disability and Rehabilitation Research (NIDRR), U.S. Department of Education, Office of Special Education and Rehabilitative Services (OSERS), to the Northwest Regional Spinal Cord Injury System (NWRSCIS), one of 14 model SCI care systems nationwide. Project Director: Charles Bombardier, PhD.

To add your name to the mailing list, contact the editor, Cynthia Salzman, at the University of Washington, Department of Rehabilitation Medicine, Box 356490, Seattle WA 98195-6490; 206-685-3999; *csalzman@uw.edu.*

Visit the NWRSCIS at *http://sci.washington.edu.*

SCI studies at the UW now recruiting…

SCI-CARE Study

The Northwest Regional SCI System is seeking participants for a study designed to improve care for people with SCI who are dealing with pain, low mood, or being less physically active than they want to be. Learn more about this study and find out if you qualify by calling 206-744-3608 (Toll Free 866-495-7015) or send an email to *scicare@uw.edu*.

Co-Motion Study

UW researchers are seeking individuals with traumatic SCI at C6 or below for a study examining the effectiveness of a 16-session physical activity program for improving health and fitness. To learn more and find out if you might be eligible to participate, call 206-221-4079.

Read the newsletter online at *http://sci.washington.edu/info/newsletters*

62-8859

ADDRESS SERVICE REQUESTED

Spinal Cord Injury Update
Spring 2015 • Volume 24, Number 1
UNIVERSITY OF WASHINGTON
Rehabilitation Medicine, Box 356490
Seattle, Washington 98195–6490

Spinal Cord Injury Update Reader Survey 2015

We would like to hear from our readers. Please help us improve the information we send to our subscribers by completing the short survey below. If you prefer to complete this survey online, go to *http://sci.washington.edu/readersurvey*. Thank you very much.

1. Please tell us whether you are a (check only one):
   - ☐ Person with a spinal cord injury.
   - ☐ Family member or friend of someone with a spinal cord injury.
   - ☐ Health care provider (please specify) _____
   - ☐ Other (please specify): _____

2. How long have you been receiving or reading this newsletter? (Check one.)
   - ☐ This is my first issue.
   - ☐ Less than one year.
   - ☐ About 1–2 years
   - ☐ About 2–5 years
   - ☐ More than five years

3. Where do you live?

City_____ State _____ Country (if not U.S.) _____

4. For each of the questions below, please **check the box** that most closely matches your opinion.

a. The information in the newsletters has been useful to me, my family or my patients.

☐ Strongly Agree ☐ Agree ☐ Unsure ☐ Disagree ☐ Strongly disagree

b. I have learned new information from the newsletters.

☐ Strongly Agree ☐ Agree ☐ Unsure ☐ Disagree ☐ Strongly disagree

c. I have changed a behavior or taken some action based on information from the newsletters.

☐ Strongly Agree ☐ Agree ☐ Unsure ☐ Disagree ☐ Strongly disagree

d. **For persons with SCI only**: Information in the newsletters has helped improve my health or quality of life.

☐ Strongly Agree ☐ Agree ☐ Unsure ☐ Disagree ☐ Strongly disagree

e. **If you do not have an SCI**: Information in the newsletters has helped improve the health or quality of life of my family member, friend, patient(s) or client(s) with SCI.

☐ Strongly Agree ☐ Agree ☐ Unsure ☐ Disagree ☐ Strongly disagree

5. How often have you visited our Web site in the past year (*http://sci.washington.edu*)?

☐ Never ☐ 1–2 times ☐ 3–5 times ☐ 6 or more times

6. We currently have more than 45 videos on our Web site (*http://sci.washington.edu/videos*). Approximately how many of our videos have you watched? _____

7. If you have watched any of our videos, how would you rate them overall?

☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

8. **For persons with SCI only.** To help us plan future programs and research, please let us know your top three concerns having to do with living with a spinal cord injury.

1. _____
2. _____
3. _____

9. Please feel free to add any further comments or suggestions.

_____

_____

_____

_____

Please fold here, tape shut (no staples!) and mail with address on outside.

SCI UPDATE NEWSLETTER SURVEY
NORTHWEST REGIONAL SPINAL CORD INJURY SYSTEM
DEPARTMENT OF REHABILITATION MEDICINE
UNIVERSITY OF WASHINGTON
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