

Challenges of Spastic Hypertonia

WHAT IS SPASTIC HYPERTONIA? _____

Spastic Hypertonia (SH) is a term that doctors are now using to offer a more complete description of spasticity and various conditions of extreme muscle tension. Spastic Hypertonia refers to uncontrollable “jerking” movement (muscle spasms), stiffening or straightening out of muscles (rigidities), shock-like contractions of all or part of a muscle or group of muscles (myoclonus), and abnormal tone in the muscles (dystonia).

UNDERSTANDING SENSATION & REFLEX _____

When people touch something hot, their first reaction to the sensation of heat is to quickly jerk away from the heat. This is an example of a reflex reaction to touch or pain. The body reacts to signals that are sent through nerves from the area of sensation to the various reflex centers of the body. The reflex center in the brain works best at identifying sensations and sending signals back through nerves in the spinal cord to tell your body how to react. Other reflex centers are located at different levels of the spinal cord, but these reflex centers are not as accurate as the brain in identifying sensations and telling the body how to react to those sensations. The body reacts best when all of the body’s reflex centers are working together to identify sensations and tell the body how to react.

AFTER A SPINAL CORD INJURY _____

Spastic Hypertonia does not occur immediately after spinal cord injury. When individuals are first injured, their muscles are weak and flexible because their body’s reflexes are absent below the level of injury. This condition is known as “spinal shock,” which can last for a few weeks or several months.

Once the spinal shock is over, reflex activity returns. However, the normal flow of nerve signals below the

level of injury is interrupted. Those signals may not reach the reflex center of the brain. If all of the body’s reflex centers cannot work together to moderate the body’s response to those signals, the reflex centers of the spinal cord attempt to moderate the body’s response. Because the spinal cord is not as efficient as the brain, the signals that are sent back to the site of the sensation are often over exaggerated. This is an over active muscle response and now referred to by doctors as Spastic Hypertonia.

Most individuals with SCI experience Spastic Hypertonia in some form, but they do not necessarily experience SH all of the time. Persons with tetraplegia and persons with incomplete injuries are more likely than persons with paraplegia and persons with complete injuries to experience SH. It is most common for individuals with SCI to experience muscle spasms that bend the elbow (flexor) or extend the leg (extensor). These spasms usually occur as a result of an automatic response to painful sensations. Many individuals who are newly injured often mistake their first movements caused by SH as a return in motor movement.

EFFECTS OF SPASTIC HYPERTONIA _____

Many individuals with SCI take advantage of their muscle spasms to help them perform activities of everyday living. For example, some individuals learn to trigger spasms in their hands and fingers to help pick up light items such as a pencil or magazine. Some people may learn to use their spasms to help empty their bladder, do pressure reliefs, transfer, dress, and even stand or walk.

It is normal for individuals who are newly injured to experience changes in their muscle tone and central nervous system soon after injury. However, a change in your spasms after your initial injury can act as a warning sign that there is a problem in areas where you may have no feeling. If you do not normally have SH and start to experience muscle spasms or if your

spasms get worse or even decrease, you should talk to your doctor. Any type of change can be a warning sign for problems such as a pressure sore, urinary tract infection, ingrown toenail, tight clothing or constipation. You may have a cyst on your spinal cord, a tumor, Guillain-Barre syndrome, transverse myelitis or a spinal cord stroke.

Possible Advantages of Spastic Hypertonia

- 1** Maintain muscle tone and mass.
- 2** Reduce bone loss and decrease the risk for osteoporosis.
- 3** Increase metabolic requirements such as promoting blood circulation and improving breathing.
- 4** Better perform daily self-care routines such as assisting in pressure reliefs to prevent pressure sores and emptying reflex bladder and bowel.
- 5** Better perform daily functions such as picking up items, transferring or walking with braces.
- 6** Warn when there is a problem in areas where the body has no feeling.

GETTING TREATMENT

You do not necessarily have a medical problem simply because you have Spastic Hypertonia. It is usually treated when the spasms interfere with normal range of motion or regular daily activities. For example, upper extremity muscle spasms may keep an individual with tetraplegia from dressing, eating or performing other daily grooming routines.

Possible Disadvantages of Spastic Hypertonia

- 1** Limit range of motion.
- 2** Cause pain due to stress put on joints and muscles.
- 3** Interfere with daily functions such driving, walking with braces, and other activities.
- 4** Cause unwanted bladder or bowel release.
- 5** Interfere with other activities such as sexual activity, sleeping, changing position, sitting or transferring.
- 6** Affect posture and ability to sit comfortably, maintain balance or change positions.
- 7** Cause scraping of the skin and increase the risk for pressure sores.
- 8** Add to cost of medications and attendant care.

The National Spinal Cord Injury Statistical Center (NSCISC) keeps a national database recording the incidence of medical complications for individuals with spinal cord injury. According to NSCISC, 42.7% of individuals with SCI are treated for “spasticity severe enough to have warranted a trial of medication or surgical treatment at admission, at discharge and at annual follow-up” within one year after injury.

QUALITY OF LIFE

The goal of all treatments is to improve quality of life (QOL). However, many individuals do not know when treatment is necessary. It may be hard to decide if SH is having more of a positive or negative impact on your QOL. You can ask yourself the following questions to help you decide whether or not treatment is right you:

- ◆ Do your spasms limit your independence by keeping you from doing things for yourself and participating in activities that you want to do?
- ◆ Do you need more personal assistance because of your Spastic Hypertonia?
- ◆ Do your spasms put you at risk for losing control of you power chair, car or van?
- ◆ Do you lose sleep because of your spasms?
- ◆ Do your spasms put you at risk for other medical problems such as a pressure sore?

TREATMENT FOR SPASTIC HYPERTONIA

If you decide that treatment for Spastic Hypertonia may improve your QOL, you should talk with a doctor who is familiar with individuals with SCI. Some treatment options can be dangerous, and even life-threatening, if not properly monitored by a doctor. There are other important factors to consider in deciding on treatment.

- ◆ What is the cause (etiology) of your SH?
- ◆ Do you have a support network if you need help in taking your medication or applying a splint?
- ◆ Do you need transportation to and from the doctor to get treatment and follow-up examinations?
- ◆ Do you have other current medical problems such as a lack of balance, numerous infections, high/low blood pressure, depression?
- ◆ Do you live in an area where you can get treatment?
- ◆ What treatments are covered by medical insurance or will you have to pay for treatment?

TREATMENT OPTIONS

Rehabilitation

Daily *Range of motion* and regular stretching as prescribed by a physical therapist can promote relaxation of the spastic muscles. *Standing devices*, or standing frames, have shown to be a helpful treatment in reducing SH for some individuals because standing can counteract the flexor tendency promoted by sitting.

Medications

The most widely used option for treating SH is medications. Some medications are taken by mouth (oral) or by feeding tube (enteral feeding). Other medications can be delivered by a skin patch (transdermal system), which provides a more balanced blood drug level throughout the day. Your doctor may first prescribe oral medications because they are usually effective for individuals with SCI.

Benzodiazepines [Diazepam (Valium®), Clonazepam (Klonopin® or Rivotril®)] act on the central nervous system and result in a decrease of overactive muscles and fewer painful spasms. These drugs are sedative/hypnotics and used mainly for nighttime spasms and sleep disturbances. Common side effects are dizziness, drowsiness, impaired memory and attention, and loss of strength. These medications can be addictive for some individuals, so a sudden stop in use may cause symptoms of withdrawal.

Baclofen (Lioresal®) is another medication that works through the central nervous system. It helps to improve passive range of motion and reduces muscle spasms, pain and tightness. Daily functioning and activities of daily living may not improve with baclofen use. Some individuals reported side effects such as dizziness, drowsiness, weakness, fatigue and nausea.

Dantrolene sodium (Dantrium®) is a medication that works differently than benzodiazepines and baclofen. It acts at the muscle, rather than on the central nervous system, where it interferes with muscle contraction. Dantrolene improves passive movement, decreases muscle tone and reduces muscle spasms, tightness and pain. Its use has been limited with individuals with SCI because it is not selective for spastic muscles. Dantrolene can cause generalized weakness to all muscles, including the respiratory muscles. This drug

is metabolized in the liver and requires a blood test to monitor liver enzymes. The most common side effects are dizziness, drowsiness, diarrhea, fatigue and weakness.

Tizanidine (Zanaflex®) is a medication that reduces SH by acting on the central nervous system. It does not reduce the strength of muscles as much as other types of oral or transdermal medications. It is a short acting drug and should be taken during daily activities when the relief of SH is most important. Some individuals may experience side effects such as sedation, dizziness, and low blood pressure.

Several other drugs are currently being studied to determine their effectiveness on spastic hypertonia. One drug, *Clorazepate* (Tranxene®), has been reported to have less of an effect on sedation, memory and recall.

Motor Point Blocks

Chemodenervation is the use of chemicals injected directly into the muscle to interrupt the flow of nerve impulses to the spastic muscles. Some of these chemicals include Botulinum Toxin Type A (BOTOX® and Dysport®), Botulinum Toxin B (Myobloc®), and Phenol and Alcohol. They work by reducing muscle contractions and allowing a more normal position or function of the involved limb. The overall effect is a temporary, localized muscle weakening. Each chemical has advantages and disadvantages, so you should talk to your doctor about any possible risks or side-effects to the treatment.

Surgical

Individuals who choose surgery as an option should understand that most of these procedures are nonreversible. For example, once a nerve is cut, there is no procedure to restore the nerve function.

Orthopedic surgery is done to correct or counterbalance the effects of SH through various procedures to muscles, tendons or bones. There are four common types of these orthopedic surgeries.

- 1 Contracture release either partially or completely cuts a tendon to release a contracted muscle. A contracture is an abnormal joint posture due to persistent muscle shortening. When muscles are not stretched regularly, the tendons shorten and tighten,

which limits the muscle's full range of motion.

- 2 **Tendon transfer** moves the attachment point of a spastic muscle. This means that the muscle can no longer pull the joint into a deformed position.
- 3 **Osteotomy** is removing a small wedge from a bone to allow it to be repositioned or reshaped.
- 4 **Arthrodesis** is the fusing together of bones that normally move independently.

Dorsal root rhizotomy is a treatment rarely used for individuals with SCI. The procedure interrupts the reflex arcs or sensory inputs to the spinal cord when the nerve roots are cut, burned or chemically injured.

Intrathecal

Intrathecal medication is a fast growing treatment option. First, an Intrathecal Pump (IP) is surgically implanted into the abdomen. The difference in the IP and other surgical options is that the IP surgery is reversible. Second, the IP has a reservoir of medicine (usually the same baclofen used as an oral medication). The medicine is pumped through a small tube directly to the fluid surrounding the spinal cord.

Advantages of the Intrathecal Pump

- 1 Medicine is sent directly to the nerve cells where it is needed.
- 2 Medicine dosage can be adjusted as needed.
- 3 Much less medication is needed than if it were taken orally, which reduces side effects.
- 4 Reservoir is easily refilled by injection when needed.
- 5 Surgery is reversible.

Disadvantages of the Intrathecal Pump

- 1 Requires surgery to implant the pump.
- 2 Expensive.
- 3 Tubing can become disconnected or kinked.
- 4 Risks include infection, baclofen overdose, pump dysfunction, and developing symptoms of withdrawal.

EVALUATING TREATMENT _____

You should keep in close contact with your doctor and continue to reevaluate your current quality of life (QOL). Your doctor may know of new treatment options that may improve your QOL. When evaluating your treatment, ask yourself;

- a) Am I more or less independent in my daily activities since I began treatment?
- b) Do I have problems with concentration or memory?
- c) Do I have more or less pain than I did before treatment?

You may decide that your current treatment is not improving your QOL. You may want to consider another treatment option, or you may also decide that no treatment is the right option for you.

AGING AND SPASTIC HYPERTONIA _____

It is believed that aging results in an overall decrease in Spastic Hypertonia. In the normal process of aging, your nerve conduction slows down, muscle mass and size decrease, and blood circulation within the spinal cord can diminish. Plus, many individuals become more comfortable with their SH as they get older. They know what triggers their spasms. They either try to avoid those triggers or learn to use their spasms to improve their ability to perform everyday activities. Finally, NSCISC reports the number of individuals treated for spasticity gradually declines from 42.7% in the first year after injury to under 35% after 10 years of follow-up.

CONCLUSION _____

Spastic Hypertonia is common for individuals with SCI. However, not all individuals choose treatment. If you decide that treatment for SH might improve your quality of life, it is up to you and your doctor to choose the treatment option that is best for you.

Published by:

Office of Research Service
619 19th Street South - SRC 529
Birmingham, AL 35249-7330
(205) 934-3283 or (205) 934-4642 (TTD only)
Please check out our website at www.spinalcord.uab.edu

Date:

December, 2001

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The University of Alabama at Birmingham provides equal opportunity in education and employment.

This publication is supported by grant #H133B980016 from the National Institute of Disability and Rehabilitation Research, Office of Special Education and Rehabilitative Services, U.S. Department of Education, Washington, DC. Opinions expressed in this document are not necessarily those of the granting agency.