

# Repetitive Strain Injuries:

## Nerve and Circulation Problems and Related Disorders



In this article we will discuss Repetitive Strain Injuries that affect both the nerves and circulation. We will also discuss disorders that can occur as a result of RSI, share common symptoms, or are sometimes confused with RSI.

### Nerve and Circulation Problems

*Thoracic Outlet Syndrome (TOS)*. TOS is a general term used for problems stemming from nerve and/or blood vessel compression in the neck and shoulder region.<sup>1,2</sup> There are four sites that may be involved alone or in combination, each with its own specific associated symptoms and pain. In general, pain caused by TOS travels down from the neck to the arm. It may be associated with numbness or tingling that spreads over the whole hand or in the ring and pinkie fingers and the inside of the forearm. Coldness in the arms and hands is common. Weakness in the arm, forearm, or hand sometimes occurs.<sup>1,2</sup>

The four syndromes of TOS are cervical rib syndrome, scalene anticus syndrome, costoclavicular syndrome and pectoralis minor syndrome.<sup>1</sup>

- Cervical rib syndrome is primarily a result of poor posture and drooping shoulders that causes pinched nerves and compressed blood vessels in the neck.<sup>1</sup> People with an extra rib on one of the lowest cervical (neck) vertebrae are at greatest risk. About 1 in 200 people have this extra rib, and 75% of these people have an extra rib on both sides.

*Treatment:* Feldenkrais or Alexander techniques are helpful to correct posture. Manipulation and rehabilitation help to realign the body and breathing techniques improve nerve and blood vessel functioning.

- Scalene anticus syndrome occurs when nerves and blood vessels are compressed as they pass between the anterior and medial scalene muscle groups. Bending and rotating the neck to the side (e.g., cradling the phone between the shoulder and head) causes this compression. Scalene anticus syndrome is also a result of simultaneous

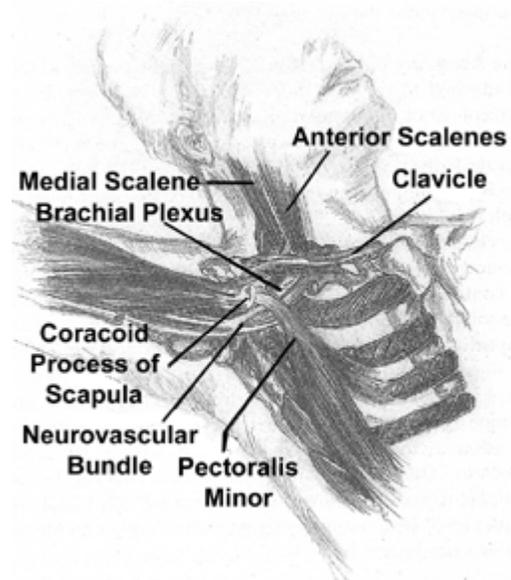


Illustration from Reference 1.

contraction of muscles that occurs with asthma or chronic coughs, or when these muscles are overused from chest breathing rather than abdominal breathing.<sup>1</sup>

*Treatment:* Realignment of the spine and learning abdominal breathing is necessary. Anyone who uses the phone a lot should use a headset.<sup>1</sup>

- Costoclavicular syndrome is the compression of the nerves and blood vessels that pass under the clavicle and over the rib cage. It may result from military posture where the chest is thrust outward and the head is back, which compresses the clavicle against the ribs. Wearing backpacks or child packs can also cause this compression due to the pressure of the straps on the shoulders and chest. Also, asthma and emphysema may cause changes in the chest wall structure that lead to costoclavicular syndrome.

*Treatment:* Realignment of the clavicle, ribs and upper back and shoulder (thoracic) vertebrae is necessary. Realigning pack straps will help prevent future compression. Feldenkrais or Alexander techniques are helpful to correct postural problems.

- Pectoralis minor syndrome is the result of a tense pectoralis minor muscle that compresses the nerves and blood vessels as they travel down to the arm. This leads to rib pain in the upper chest and upper-arm soreness. The pectoralis minor muscle is shortened and strained in anyone who performs repetitive forward motions. Computer use, repetitive factory work, sports such as tennis, playing musical instruments such as the violin, viola, and cello, and body building that overworks the chest and upper back muscles could cause this syndrome.<sup>1</sup>

*Treatment:* Modification of the behavior causing the muscle tension is imperative. Myofascial massage of the affected muscles, ultrasound, electrical muscle stimulation, and ice to the neck and front of the shoulders is helpful. Manipulation and stretching exercises to lengthen the tightened chest, forearm and shoulder muscles is very important.<sup>1</sup>

Hand-Arm Vibration (HAV) Syndrome. HAV has similar pain patterns to carpal tunnel syndrome (CTS). People who work with tools or objects that involve vibration, such as buffers, grinders, sanders, or jackhammers, are at risk for HAV. Blood vessels and nerves change as a result of repeated vibration. Tingling and numbness in some or all fingers may result from compression of both the median and ulnar nerves. Muscle weakness and paleness or whiteness of the skin may result from decreased blood flow. Muscles often ache, with pain going up the arm. Loss of sleep is uncommon, as opposed to sufferers of CTS who frequently lose sleep from pain.

*Treatment:* Elimination of vibration is the treatment for this syndrome.<sup>1,3</sup> This contrasts with CTS, where workers are often able to return to work. If the person is a smoker, smoking cessation is a critical part of treatment.<sup>3</sup> HAV can be avoided by minimizing exposure to vibration, selecting low-vibration tools, and using antivibration gloves.<sup>4</sup>

Focal Dystonia (Writer's Cramp). This disorder is an involuntary cramping of the hand due to misfired brain signals.<sup>2</sup> It can be progressive if not treated, resulting in involuntary movements of the fingers and jerky handwriting. Focal Dystonia is caused by gripping a writing tool, paint brush, or input device (especially a stylus) too tightly and overusing the small muscles of the hand rather than moving from the shoulder and using the larger muscles of the arm. This disorder has been known since 1713 as the "disease of the scribes."

*Treatment:* Use of the whole arm without tightly gripping was suggested in 1888 by W.R. Gowers to avoid this disorder. Although there is no cure, some people are successfully treated with serial injections of botulinum toxin and technique retraining.<sup>2</sup>

### **Associated Disorders**

*Raynaud's Disease or Phenomenon.* There are two types of Raynaud's phenomenon. The primary form, generally called Raynaud's Disease, has no underlying disease or medical condition. The secondary form, called Raynaud's Phenomenon, is less common than the first, but is more serious and complex. Connective tissue diseases are the most common cause of secondary Raynaud's including scleroderma, mixed connective tissue disease, and lupus erythematosus.<sup>5</sup> Repetitive Strain Injuries, smoking, rheumatoid arthritis, nerve problems, and injuries such as frostbite or surgery can also increase the risk of Raynaud's phenomenon.<sup>6</sup>

In either type of Raynaud's, blood flow to the extremities is limited due to the constriction of the small blood vessels that feed the skin, known as vasospasm. This usually affects the fingers or toes, but can also affect the nose, lips, and ear lobes. These body parts become numb and white or blue due to the loss of circulation. If not treated, Raynaud's can lead to more serious problems such as skin ulcers and gangrene.<sup>5,7</sup>

This disorder appears to be an overreaction of the body's normal response to cold.<sup>5,6</sup> Normally, in order to preserve the body's core temperature, blood to the skin surface is directed from surface blood vessels to those deeper in the body.<sup>6</sup> With Raynaud's, there is a spasmodic contraction and often collapse of the small surface blood vessels triggered by very brief exposure to cold, such as reaching into a freezer. For this reason, it's important for people with either form of Raynaud's to avoid ice therapy to the extremities (hands and feet). Episodes can also occur in response to stress. After an episode, the blood vessels return to normal, blood floods the extremities causing them to turn red, and sensation returns.<sup>7</sup> An episode can last 1 minute or several hours.<sup>7</sup>

Raynaud's is more common in women<sup>2</sup> and is usually diagnosed between the ages of 15 and 40.<sup>6</sup>

*Treatment:* Prevention is the best remedy, which involves primarily self-care. Keep warm and avoid chilling the extremities. When going out in cold weather, wear thick gloves, socks, and a hat that covers your ears. Air conditioning can trigger an attack; so don't turn it up too high. Use insulated drinking glasses for cold liquids and wear gloves when reaching into a freezer. Control stress. Get regular exercise to promote healthy circulation.<sup>7,8</sup> Quit smoking because nicotine causes constriction of the skin-level blood vessels.<sup>2,6</sup> Avoid drugs that are linked to Raynaud's: beta-blockers (for high blood pressure), ergotamine preparations (for migraine), some agents used in chemotherapy, and over-the-counter drugs that cause constriction of the blood vessels (i.e., vasoconstriction) such as some cold medications.<sup>2,6</sup>

If an episode is triggered, react immediately by reducing stress or getting to a warm environment quickly. Warm the extremities with warm water. It only takes about 20-30 minutes to cause potentially serious tissue or bone damage.<sup>7</sup>

Consider trying biofeedback that can help train a person to increase blood flow to the extremities as well as to reduce stress.<sup>6,7,8</sup> Taking 100 mg of niacin twice daily may be helpful.<sup>9</sup> There is strong evidence that fish oil supplements with Omega-3 fatty acids can help prevent vasospasms. The usual dose is about 3 grams of EPA/DHA per day.<sup>10</sup> Pharmaceutical grade fish oil is best because it contains no pollutants or mercury and it is more concentrated than other fish oil supplements.<sup>11</sup>

Medications are generally only prescribed for some cases of secondary Raynaud's phenomenon. Calcium-channel blockers seem to be the most effective and safest drugs.<sup>5</sup> They relax smooth muscle and dilate the small blood vessels, decreasing the frequency and severity of episodes in about 75% of patients.<sup>5</sup> Alpha blockers are sometimes effective. They counteract the effects of norepinephrine, a hormone that constricts blood vessels. Nonspecific vasodilators may also be effective.<sup>5</sup>

*Reflex Sympathetic Dysfunction and Dystrophy (RSD).* Also known as Complex Regional Pain Syndrome (CRPS)<sup>12</sup>, RSD is a condition of burning pain, stiffness, and extreme sensitivity to touch. It is a disturbance of the sympathetic (unconscious) nervous system that controls blood flow and sweat glands, most commonly affecting the arms and legs. Usually it occurs following injuries such as bullet or shrapnel wounds or surgery<sup>12</sup>, but it can arise if Repetitive Strain Injury or other conditions are not treated properly.<sup>2, 13</sup> It can also occur from certain diseases such as heart attack, infection, cancer, stroke<sup>14</sup>, or even minor traumas such as sprain, dislocation, fracture, crush injury, or pricks of the finger or toe.<sup>13</sup> In some cases, the cause is unknown. The disorder is unique because it simultaneously affects the nerves, skin, muscles, blood vessels, and bones. RSD has three phases. The first phase (acute) may last up to three months and includes pain and swelling, increased warmth in the affected body part, joint pain during movement, excessive sweating, and occasionally excessive hair and nail growth.<sup>13,14</sup> If treated during this phase, remission is common.<sup>12</sup> Beyond three months, the disorder may quickly spread to affect an entire limb, and changes to bone and muscle may be irreversible.

Unfortunately, RSD is often mistaken for thoracic outlet syndrome, carpal tunnel syndrome, rotator cuff injury, or cubital tunnel syndrome.<sup>2</sup> Surgery to treat such misdiagnosed disorders is likely to aggravate RSD.

*Treatment.* Early treatment is essential. Physical therapy will counteract immobility, trigger point injections (or medication taken orally) can help reduce symptoms.<sup>2, 12,14</sup> Massage, moist heat, and soaking in salt water helps.<sup>2</sup> Acupuncture has been reported to relieve pain for many patients.<sup>15</sup> Recently there is research indicating that Vitamin C may help prevent RSD.<sup>16</sup> Transcutaneous electrical stimulation (TENS), brief pulses of electricity applied to nerve endings under the skin, help some patients. In advanced cases, surgical interruption (i.e., cutting the nerves) of the affected portion of the sympathetic nervous system is necessary to relieve pain.<sup>12</sup> Although this ends the pain instantly, results are often disappointing for other reasons, like loss of sensation.<sup>12,14</sup>

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This article and all of our articles are intended for your information and education. We are not experts in the diagnosis and treatment of specific medical or mental problems. When dealing with a severe problem, please consult with a healthcare or mental health professional and research the alternatives available for your particular diagnosis prior to embarking on a treatment plan. You are ultimately responsible for your own health and treatment!

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