The Cold Hand

Have you noticed that you have cold hands even in mild weather when others around you do not? Do you experience pain in your fingers at cold temperatures? Do you have to wear gloves when handling frozen foods in the grocery store? Have you noticed your hands changing color like white, blue or red? Do you have problems healing minor wounds on your fingertips?

If you answered 'yes' to any of these questions then you might have a cold hand disease that can be treated. Most cold hand diseases occur because of blood flow to your hands. In any of these cases, the most important step you can take toward better hand health is to be examined by a hand specialist.

Causes

To understand what causes hands to be cold, you must first understand how the body keeps hands warm in a normal situation.

Automatic Regulation

Our bodies keep our hands warm primarily by regulating the blood flow that travels from the heart, down the arm, all the way to our fingertips—more blood to the hands means pink, warmer hands; less blood flow means colder (and sometimes painful) hands. Blood that flows into our hands usually travels by only two arteries: the radial artery and the ulnar artery **(Figure 1)**. These arteries course through the forearm into the hand on either side of the wrist. When looking at your palm, the radial artery travels on the thumb side and the ulnar artery on the small finger side. Both arteries join together in the palm and send off branches to each finger.

Vasoconstriction and Vaso-occlusion

In the cold hand, disease of the blood vessels in the hand can cause a decrease in blood flow to the hands in two major ways: *vasoconstriction* and *vaso-occlusion*. Vasoconstriction refers to the blood vessels of the hand and wrist becoming smaller in diameter. There are normal muscles around all the major arteries of our body that are regulated automatically to constrict and decrease blood flow or to relax and increase blood flow. This automatic regulation is a normal process that allows the body to send more blood and warmth to the critical organs of your body (like you heart, lungs, and brain) and temporarily decrease the blood flow to your hands and feet.

Cold hand diseases that occur from *vasoconstriction* happen when the normal process of temporarily applying more muscle pressure to your blood vessels becomes abnormally strong or prolonged. With less blood flow to the hands, the oxygen content of the fingers is depleted and they can turn a blue color **(Figure 2)**—a process called *cyanosis*.

When the fingers are warmed up again, the increased blood flow causes a red color; this process is frequently accompanied with a new onset of pain. After a while, the fingers return to their normal skin color, which can be associated with swelling and tingling. Repeated and increasingly prolonged depletion of blood flow to the fingers can cause ulcers in the skin and tissue death (also called *necrosis*, **see Figure 3**).

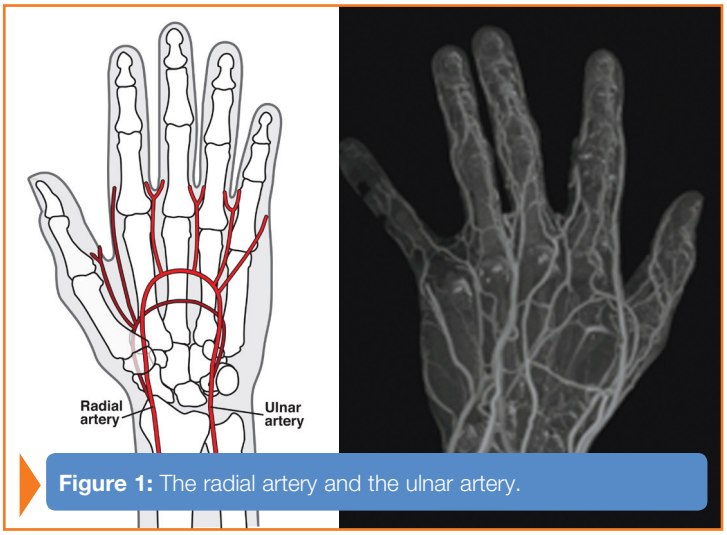

Figure 1: The radial artery and the ulnar artery.

Figure 2: Cyanosis in the hand.

Figure 3: Necrosis in the fingertips.

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The Cold Hand *(continued)*

The other cause of cold hand or fingers is vaso-occlusion, which happens when one or more of the blood vessels in the hand or wrist become blocked.

Raynaud's Disease and Raynaud's Phenomenon

There are many specific diseases of blood vessels that can cause vasoconstriction and vaso-occlusion. One of the most common vascular diseases is Raynaud's. In this disease process, there is an abnormal reaction in the hand when it is exposed to cold.

With Raynaud's, there are actually two vascular disease processes with the same name. When a patient has hypersensitive reaction to cold and no other vascular disease, this process is called Raynaud's disease (or primary Raynaud's); there is no other cause for the changes in the hand blood flow except for this abnormal reaction to cold exposure. Raynaud's disease often develops in women in their teens and early adulthood. Primary Raynaud's is thought to be at least partly hereditary, although the specific genes have yet to be identified. Raynaud's disease is not associated with ulcers or tissue loss.

When a patient experiences abnormal reactions to cold and has another vascular disease (such as lupus, scleroderma or rheumatoid arthritis), this process is called Raynaud's phenomenon (or secondary Raynaud's). As opposed to Raynaud's disease, Raynaud's phenomenon is associated with possible ulcers and tissue loss. Diseases associated with Raynaud's phenomenon include:

- Systemic lupus erythematosus
- Scleroderma
- Systemic sclerosis
- Rheumatoid arthritis
- CREST syndrome
- Sjogren's syndrome
- Buerger's disease (Thromboangitis Obliterans)
- Obstructive arterial disease

Diagnosis

One critical aspect to treating cold hand disorder is to determine the cause of why your hands become abnormally cold. Most people have the simple cold hand condition type where the cause is located in the blood vessels of the hands and/or feet, but nowhere else. However, a smaller group of people have a related systemic disease (as mentioned above) that can significantly affect other parts of the body. Your hand specialist can help you get evaluated by other specialists (like a rheumatologist, a hematologist or oncologists) to determine if you might have one of these cold hand-related systemic diseases. If you do have one of these illnesses, then treatment exists to help you and decrease its chances of affecting other organ systems.

Treatment

Treatment can include behavioral counseling, drug therapy, injections, and surgical treatment.

Behavioral Counseling

A hand surgeon may help you identify behaviors that may be helpful or harmful to blood flow in your the hands. Doctors educate patients on a range of behavioral topics, including:

- Proper hand hygiene (e.g., correct moisturizing options, appropriate skin care)
- Wearing warm and protective hand wear (e.g., guidance in glove type choices and usage)
- Healthy temperature regulation
- Biofeedback
- Smoking cessation

Drug Therapy

In many cases, doctors may prescribe medicines that both reduce the risk of developing blocked or constricted blood vessels and improve blood flow through the hands and fingers.

Effective medications include:

- *Calcium channel blockers:* oral and topical medications used to relax the muscles that place pressure on blood vessels.
- *Antidepressants:* used with calcium channel blockers to regulate pressure in the blood vessels and help maintain a proper amount of blood flow throughout the entire hand.
- *Anticoagulants (blood thinners):* oral medications used to reduce the risk of blood clotting and other blockages of blood flow through upper limb vessels.
- *Phosphodiesterase (PDE) inhibitors:* oral medications like Viagra and Cialis that are used to increase blood flow for erectile dysfunction have also been preliminarily shown to aid in increase blood flow to the hands to treat cold symptoms.

Injections

Most commonly recognized as a cosmetic procedure, botulinum toxin (e.g., Botox®, Allergan Inc., Bovine CA) injections are now used as a highly effective treatment for cold hands syndrome. In a simple outpatient procedure, the botulinum toxin is injected into the hand to relax muscles surrounding constricted blood vessels. Botulinum toxin paralyzes and relaxes the muscles, allowing blood vessels to dilate and increase in diameter. As the vessels dilate, more blood can flow through to supply the rest of the hand and the fingertips. This procedure may provide relief of cold hand symptoms in certain individuals for up to three months.

Surgical Treatment

Surgery is often the best treatment option for complex cold hand diseases. A hand surgeon may perform a range of advanced techniques, including:

- *Sympathectomy:* a microsurgical technique used to separate the nerves and vessels in the forearm, palm *(palmar sympathectomy)* or fingers *(digital sympathectomy)*. When nerves are separated, the vessels become larger, allowing increased blood flow through the hands and fingertips.
- *Aneurysm repair:* repair of an aneurysm by inserting a stent to strengthen a weak blood vessel, or aneurysm removal followed by replacement with a graft of healthy vascular tissue.
- *Thrombectomy:* blood clot removal using microsurgery techniques.
- *Vascular bypass:* a procedure that redirects blood flow around an obstructed segment of the blood vessel.