

Frequently Asked Questions about Nerve Transfers in Patients with Spinal Cord Injury

Q: Who is a candidate for this procedure?

A: The surgery can only provide benefits to patients with certain types of spinal cord injury. To be eligible, a patient must have quadriplegia with a **motor level C6 or C7 spinal cord injury**. Because the procedure relies on working nerves above the C6 and C7 level; the procedure will not benefit patients with C1 through C5 level injuries.

Other important factors are: controlled spasticity, normal flexion at the elbow, supple joints with no contracture at the hand, wrist and fingers.

Unfortunately, with spinal cord injuries, we don't have a way to make the central nervous system regenerate. For lower extremity paralysis, there is nothing nearby that we can "steal" to use for nerve transfers. This is unlike the upper extremity nerve transfer surgery for a motor level C6 or C7 spinal cord injury, because in the arm there are expendable nerves nearby that can regenerate. They can reach the muscle at the elbow area by regenerating the short distance from the elbow area before the muscle becomes unresponsive.

In paralysis of the lower extremities, the distance is too far to get a nerve transfer to work, unfortunately.

Q. What do I need to do to be considered for this surgery?

A. Please see the checklist at our website nerve.wustl.edu.

If you think you are a candidate for nerve transfer for a C6 or C7 spinal cord injury, you should share the enclosed information with your personal physician. Your doctor should review the information to see if *he or she* thinks you may be a candidate as well.

If your doctor thinks a referral is appropriate, he or she should send the following:

- A comprehensive letter of introduction from your primary care or rehabilitation medicine physician detailing the ASIA/ICSHT classification of your spinal cord injury and description of the functional use of both hands. We must know if elbow flexion and wrist extension are intact. The letter will also need to describe the condition of your upper extremities with joint stability, range of motion, spasticity, and contracture.
- Progress notes of physical therapy/rehabilitation program.
- Operative notes from previous spinal surgeries and surgeries to the shoulders, arms, and hands.
- Demographics (address, phone number, date of birth, etc.) and health insurance information.
- Complete the General Health Questionnaire for Patients with Quadriplegia form.

We will contact you within 30 days of receiving the completed information to let you know if we think you might be a suitable candidate. All materials may be faxed to (314) 367-0225, ATTN: Dr. Ida Fox and Marci Bailey, RN. Alternatively, materials may be mailed to:

Washington University School of Medicine
Division of Plastics & Reconstructive Surgery
ATTN: Dr. Ida Fox and Debbie Graham
660 S. Euclid Ave.
Campus Box 8238
St. Louis, MO 63110

Q: What age of patients are eligible for this surgery?

A: We believe this procedure will have the best results in patients between the ages of 17 and 50.

Q: Who will do the surgeries?

A: Dr. Ida Fox, a Washington University plastic and reconstructive surgeon at Barnes-Jewish Hospital, is director of this program. She is Board Certified in Plastic Surgery and holds a Certificate of Added Qualifications in Hand Surgery. She specializes in nerve surgery, including transfer and repair. She also has extensive experience working with trauma patients, including those with spinal cord injury. Dr. Fox trained with Dr. Susan Mackinnon, who developed the procedure.

Q: What if I have other health issues?

A. Each case will be evaluated individually. A thorough review of the completed screening form, medical records and a recommendation from your physician will help us determine if we think this procedure can help you. Other health issues and previous surgeries will be considered to determine if they might negatively impact the outcome of this surgery.

Q: My spinal cord injury was a long time ago. Can this still work?

A: Yes. If the joints of the wrist and hand are not stiff, this procedure may still work even if it has been years since the initial spinal cord injury. In fact, this procedure will work best in people who have had a spinal cord injury for at least 12 months and they must demonstrate neurological stability for a minimum of six months after injury.

Q: What are the expected outcomes?

A: We aim to restore the ability to pinch the thumb and index finger, which would allow patients to be able to feed themselves, write without assistance, and restore some basic independence.

Q: Is the surgery done on the spinal cord?

A: No. The surgery is done on the nerves within the arm.

Q: How does this procedure work?

A: In this procedure, called the brachialis to anterior interosseous (AIN) nerve transfer, we take a donor nerve from the upper arm that helps to make the elbow flex (*see Figure below*). It can be used as a donor because the biceps muscle also works to make the elbow flex. We connect the donor nerve to a recipient nerve (AIN). The rewiring of these nerves allows you to control flexion of the thumb and tip of the index finger to pinch or pick things up.

Further nerve or tendon transfer surgery may be offered as well depending on what is working in your arm.

Q: How long will it take after surgery to see some function in my hands and fingers?

A: We begin to see restoration of movement and function in the hand and fingers at a year or longer after surgery with intensive physical therapy. Because the nerve transfer involves cutting the donor nerve and splicing it to the recipient nerve, the nerve will need to regenerate from where it was cut to get back down to the muscle. The nerve grows at 1 inch a month. In addition, a nerve transfer involves crisscrossing the nerve signal, and the brain will need to relearn how to use and strengthen that muscle. It takes time to retrain the brain to understand that nerves that used to bend the elbow now provide pinch.

Q: Will I have to have physical and/or occupational therapy?

A: Yes, you will have to have intensive physical and occupational therapy to relearn how to control and strengthen the muscles for at least 12 months.

Q: How long will I be in the hospital?

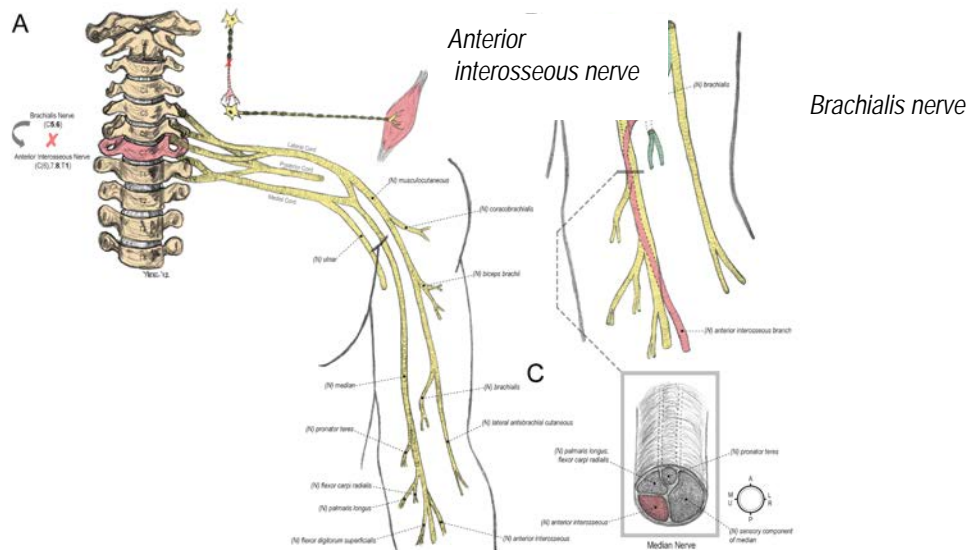
A: Expected length of stay for nerve transfer surgery is one to three nights. After the surgery, 100% assistance will likely be required for transfers and other functions. Because of this, you may require admission to a rehabilitation or extended care facility or returning home with a caregiver. You may also require placement of a urinary catheter.

Q: When can I resume normal activity?

A. For nerve transfer alone, once the skin is healed, at about 2-4 weeks, pre-surgery level activities may be resumed. If tendon transfers are done as well, complete rest of the involved arm for one month is required; activity is then gradually increased and pre-surgery level activities can usually be resumed three months after surgery. You may need assistance with activities of daily living, bowel and bladder care, and transfers.

Q: Will my hand function be restored to pre-spinal cord injury function?

A: No, this procedure may provide pinching function in the thumb and index finger, allowing you to pick up food and write without assistance, but will not return you to pre-spinal cord injury function.



This figure illustrates the surgical nerve transfer of the brachialis nerve (C6 level) to the anterior interosseous nerve (C8 level) bypassing the spinal cord injury at the C7 level. This nerve transfer allows the nerves “connected” to the brain to innervate the nerve that cannot communicate with the brain.