Cancer
UT MD Anderson

Neurosurgery Department

Peripheral Nerve Program Featured Case

Ulnar Fascicle to Brachialis Branch of Musculocutaneous Nerve

Brief History

This patient is a 30-year-old woman with a pilocytic astrocytoma of the upper cervical spinal cord. She was initially diagnosed and treated as a child.

Prior to coming to MD Anderson, she had undergone several surgeries attempting to remove the tumor. She had also undergone radiation therapy and surgery to correct spinal deformity, including screws and rods surgically inserted to fuse and stabilize her spine.

Despite surgical resection and radiotherapy, the tumor continued to grow very slowly. The combination of tumor growth and effects from multiple surgeries and radiation therapy lead to chronic, severe weakness in both her legs and left arm.

When the patient came to us, she had started to develop progressive weakness in her right arm, which she relied on for most of her activities. The weakness was most pronounced in movements of the shoulder and elbow. The weakness in elbow flexion (or bending her elbow) was preventing her from performing many daily tasks of living.

Our clinical examination, electromyography (EMG), and nerve conduction study (NCS) indicated that radiation-induced lower motor neuron disease and cervical spinal cord dysfunction (cervical myelopathy) was the reason for worsening symptoms.

We felt that attempts at resecting the tumor or further correction of the spinal deformity would risk devastating complications, canceling out any possible benefits. Therefore, we chose a more isolated goal: to improve elbow flexion strength.

To that end, we recommended a rerouting of the nerves in her arm, also known as a nerve transfer. In a nerve transfer, a healthy nerve is connected to a damaged nerve. The healthy nerve is the donor nerve. The damaged nerve is the recipient nerve.

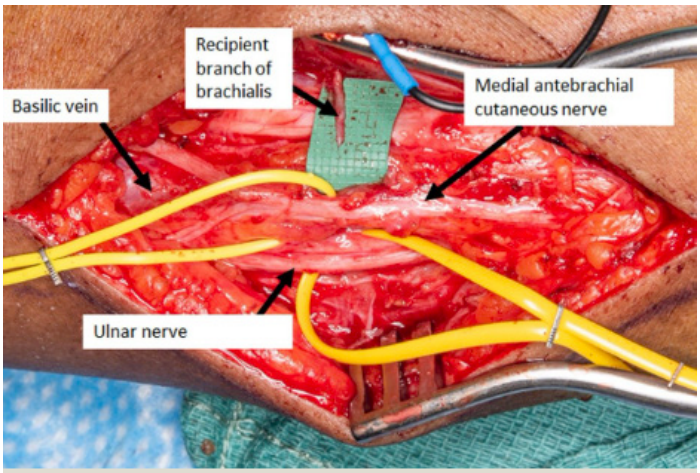
In this case, we recommended using a small portion of the ulnar nerve to be rerouted to the brachialis branch of the musculocutaneous nerve. The ulnar nerve primarily helps with hand movements; the musculocutaneous nerve helps with elbow flexion.

Key to the transfer was to only take a small portion of the ulnar nerve so as not to cause problems with hand movements. Still, we had to take enough to provide nerve signals to the muscles for flexing the elbow. A similar nerve transfer of the ulnar nerve to the biceps branch of the musculocutaneous nerve is more commonly performed. However, we chose to transfer to the brachialis branch because the patient's biceps muscle was stronger to begin with, and we didn't want to risk damaging its function.

Procedure Details

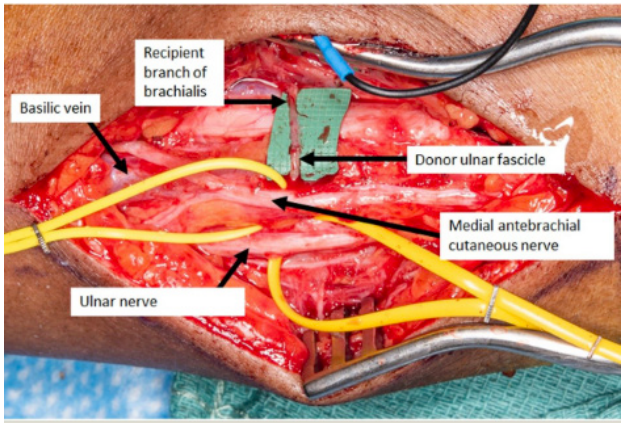
During surgery, the patient was under general anesthesia with her arm outstretched. Following incision, we identified the relevant nerves. We carefully isolated several branches of the musculocutaneous nerve. We cut one nerve branch to the brachialis muscle proximally along its origin to the musculocutaneous nerve.

We then isolated a portion of the ulnar nerve using internal neurolysis. We confirmed it to have motor function and that the remaining ulnar nerve would still carry signals to control the hand. This isolated portion served as the donor nerve.



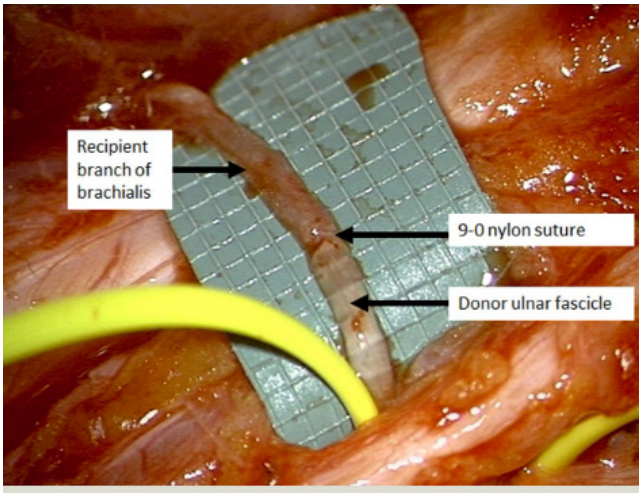
Recipient branch of brachialis dissected from musculocutaneous nerve

We cut the donor nerve and transferred it toward the isolated nerve to brachialis, tunneling underneath the surrounding nerves and soft tissue. We connected the nerve ends using a surgical microscope, very small sutures (with a thickness of only 0.040 mm) and a biocompatible glue.



Donor fascicle dissected from ulnar nerve, joined to recipient branch of brachialis

After seven months, the patient had improved functioning of her right arm. In fact, she could completely actively flex that arm. She could also perform essential activities of daily life: feeding herself with the right hand, washing her face, combing her hair and even writing. She continued physical therapy, and her functioning improved. She was able to work full time.



Completed nerve repair

Discussion

The Peripheral Nerve section at the MD Anderson Neurosurgery department has experience treating many types of nerve disorders. This case is a good example of how our team treats conditions beyond just the primary cancer; we also treat problems associated with cancer treatments.

While this patient did have a history of cancer, further tumor resection was not an option. It was also not possible to repair the damage induced by radiation. Instead, we focused on restoring function and improving quality of life through a unique and novel nerve transfer procedure.

This case involved a novel nerve transfer procedure that was uniquely tailored for our patient and is not part of the standard treatment options. Instead of transferring ulnar fascicle to the biceps branch of the musculocutaneous nerve, we transferred it to the brachialis branch.

The result was the same: successful restoration of elbow flexion and improved quality of life. This case study is also described in a published article by Larkin et al.