

Recovery after brachial plexus surgery continues for longer than previously thought

Brachial plexus injuries (BPIs) are severely debilitating injuries in which the nerves exiting the spinal cord at the level of the cervical and upper thoracic spine are damaged. Because these nerves power the musculature of the upper extremity, injuries to these nerves can result in weakness or even paralysis of the arm. This may manifest as inability to move the shoulder, elbow, fingers, or the entire arm, in addition to loss of feeling in these areas. Acute, traumatic BPIs are the result of high-impact injuries like car or motorcycle accidents where people are flung forward and experience painful tension or direct blows to the area between the neck and shoulder where the brachial plexus is most vulnerable to injury.



Revolutionary new surgical techniques have enabled major strides in plexus reconstruction, using portions of uninjured nerves to connect to severed or damaged nerves. As these new nerve connections mature, they restore function to the muscles that were previously knocked out when the original nerve was injured. Ideally these 'nerve transfers' are performed within 6-7 months after the original injury to optimize recovery of function. We defined functional recovery as the ability to move the limb against gravity by activating the previously injured muscle and measured the range of motion and strength of the recovered muscles as a measure of success of the surgery. Conventional wisdom held that after surgical reconstruction, patients' functional recovery stopped improving somewhere between 2 to 3 years after surgery. Because of this, many researchers stopped examining their patients past this period because it was assumed that recovery was essentially complete. However, our physicians encourage long-term follow-up with our patients regardless of diagnosis, and many of our patients return years down the line for either follow-up of a previous diagnosis or consultation for new or different issues. In the course of seeing our patients with such long-term follow-up, we observed that our patients following brachial plexus reconstruction seemed much improved with the passage of additional time.

We reviewed our patient charts from two hospitals over 2 ½ decades and identified 11 adult male

patients age 17 to 73 (35 years old on average) who were between 7 and 22 years from the date of surgery for their brachial plexus injury. We compared range of motion and strength data at 2-3 years following surgery with the same variables at an average of 11 years following surgery and found that patients' shoulders and elbows had improved in all parameters of recovery.

Although the reasons for the continued recovery cannot be stated with certainty, nerve testing (also called electromyography) suggests that new nerve connections with muscle may be branching to nearby muscle fibers, allowing for better nerve-muscle communication and activation. Maturation of these new connections may also allow explain the increase in muscle size and strength, which in turn could facilitate increases in range of motion.

Admittedly our study is limited in that, because we didn't have data from multiple visits between 2 and 11 years, we can't say for certain when functional recovery definitely stops, nor can we explain with certainty what causes the continued recovery. However, knowing that recovery continues for longer than previously thought gives new hope to patients, improves expectations of surgical reconstruction of these devastating injuries, and provides an opportunity for physicians to continue their involvement in a patient's long-term care.

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[Shoulder and Elbow Recovery at 2 and 11 Years Following Brachial Plexus Reconstruction.](#)

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