KATARZYNA MACKENZIE

PLASTIC SURGEON

Nerve Repair and Reconstruction

With so many bones, ligaments, tendons, and joints keeping hands and wrists working, there is ample opportunity for injury. In fact, the hand is one of the most commonly injured parts of the body. With a wealth of international experience in hand trauma surgery Dr Mackenzie can offer the latest techniques in nerve repair and reconstruction, tendon repair and reconstruction and neuroma management.

Despite the many advances made in microsurgical techniques and instrumentation, the functional outcome of a repaired nerve will never be exactly the same as before the injury.

Length of surgery	1-3 hours, depending on the extent of injury
Anaesthesia	Regional or general anaesthetic
Hospital stay	Day case
Risks/complications of surgery	Frequent: Swelling, stiffness, discomfort on movement Infrequent: Infection, bleeding (haematoma), delayed wound healing, painful scar, damage to the nerve, neuroma, adhesions, complex regional pain syndrome, no improvement
Recovery	2 to 4 weeks resume light activities, such as using a keyboard or writing with a pen 5 to 6 weeks resume medium activities, such as light lifting or shelf stacking 6 to 8 weeks resume heavy activities, such as heavy lifting or building work 6 to 8 weeks resume sporting activities 3-9 months until final result
Driving	8-10 weeks
Hand position	Elevation above the heart level
Follow up	1 week, 6 weeks, 3 months, 6 months
Duration of results	Results can unpredictable with nerve surgery

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Referral expectations

You need to bring with you to your appointment:

- Any letters or reports from your GP or hospital
- Any X-Rays, CT or MRI films and reports
- All medicines you are taking including herbal and natural remedies
- Your ACC number, if you have one

What is a nerve?

A nerve is like a wire that carries messages back and forth to the brain. The messages to the brain are information about feeling (sensory impulse) and from the brain to tell the muscles to contract (motor impulse). Many small fibers are bundled inside each nerve to carry the messages. There is an outer layer that insulates and protects the nerves.

What happens when a nerve is injured?

There are three basic types of injury to a nerve:

- Nerve is bruised and stops working properly for a short period of time. All the inner cables (nerve fibres) remain intact. With this type of injury the nerve normally recovers fully and leaves no deficit. This is called a neurapraxia. If the nerve is bruised or traumatized but is not cut, it should recover over 6-12 weeks
- The inner cables (nerve fibres) of the nerve are damaged but the outer layer remains intact. For the nerve to recover the inner cables (nerve fibres) have to grow back down the tubes. Recovery from this type of injury is unpredictable
- The nerve is completely divided. Here both the outer layer and inner cables (nerve fibres) are divided. This type of injury requires the nerve to be repaired if it is to recover

How long does it take for the nerve to regenerate?

Factors that may affect results after nerve repair include:

- Age (he younger you are, the quicker and the better the recovery time)
- Type of wound
- Type of nerve (sensory vs motor)
- Level and cause of the injury (the higher up your arm the injury occurs, the slower the recovery time for your hand)
- Delay between injury and repair

The important thing to remember is that nerves take many months to repair themselves. The nerve grows back at about 1mm per day and the final result may not be known for two years or more.

Sensory nerves can recover sensation months or years after injury; however, motor nerves have a time limit for healing otherwise the muscle will waste away.
Muscle power or skin sensation may never return to pre-injury levels.

What are the symptoms and signs of a nerve injury?

The signs and symptoms of nerve injuries can be different depending on the nerve injured, the type of injury, and the severity of the injury. They include:

- Numbness-loss or alteration of sensation
- Loss of muscle power which may result in weakness of grip or a feeling of clumsiness
- Pain which is variable in its intensity. In a chronic nerve injury, the pain can occasionally be intense. Gentle touching or stroking of the skin in the affected area may produce an unpleasant feeling
- Sensitivity to the cold
- Colour change in the skin
- Changes to the amount of sweat in certain areas
- Thinning of the pulps of the fingers
- Loss of the normal skin creases at the joints
- Visible wasting of the muscles

What is the treatment?

Immediate nerve repair

If there is a wound and there are signs of a nerve injury then an operation will be necessary to look at the nerve and if there it has been partly or completely cut. The operation is performed as a day case under regional or general anaesthesia. Dr Mackenzie uses magnifying glasses (loups) or microscope to directly repair the cut nerve if possible. The cut ends are matched up together under magnification and very fine sutures are placed around the outer surface to hold them together. If the repair is in an area where if stretched the stitches could break, a protective splint is placed for two to three weeks afterwards.

If there is a space between the ends of the nerve, it may be necessary to take a piece of nerve (nerve graft) from a donor part of the body (forearm, leg) to fix the injured nerve. This may cause permanent loss of feeling in the area where the donor nerve graft was taken.

Once the insulating cover of the nerve is repaired, the nerve generally begins to heal three or four weeks after the injury. Nerves usually grow 1mm per day, depending on the patient's age and other factors mentioned above. With an injury to a nerve in the arm above the fingertips, it may take up to a year before feeling returns to the fingertips. The feeling of pins and needles in the fingertips is common during the recovery process. While this can be uncomfortable, it usually passes and is a sign of recovery.

Having the nerve repaired reduces the risk of a neuroma forming and allows the nerve a chance to recover and restore function. If nerve recovery is not satisfactory, procedures such as nerve grafting or tendon transfers may be necessary to restore function to your hand.

If there is no wound, then it is likely that a "wait & see" policy will be adopted. Under these circumstances further investigations may be carried out to try and assess the damage to the nerve. This is done using neurophysiology testing where the nerves are stimulated with an electric current and the speed at which the nerve conducts is measured. In addition, very fine needles may be inserted into an affected muscle and recordings made of the activity in that muscle. This information can help to decide what level of damage there has been to the nerve which can help in planning further treatment and giving information on the potential outcome of the injury.

Later nerve surgery

Nerve Freeing (Neurolysis)

- Neurolysis refers to the procedure of 'freeing up' a nerve surgically
- If there has been previous surgery or trauma, scar could form around or within the nerve. A tethered nerve would have reduced excursion which could result in shooting pain when the joint is moved
- If the constriction is severe, conduction of that nerve may be impaired leading to loss of functions (sensory and/or motor)
- Neurolysis involves meticulously releasing any scar or constricting tissue around or within a nerve
- Procedure is performed under magnification (loupes or microscope) to ensure that normal neural tissue is preserved

Nerve grafting, burying and wrapping for neuromas
(see information sheet for neuroma management)

What is the recovery after nerve repair?

It is very important to elevate your hand as often as possible, following your operation as it helps to reduce the swelling. You may be encouraged to move your fingers to reduce swelling and prevent stiffness.

You can expect some mild pain, swelling, and stiffness after your procedure. It may take from 4 to 9 months for swelling and stiffness in your hand and fingers or thumb to go away completely. If stiffness, swelling, or pain persist after surgery, hand physiotherapy will be recommended.

Although the scar may be red and tender for several weeks, it is seldom troublesome in the longer term.

You can have a bath or shower 48 hours after your operation, but keep your wounds dry until they have healed. It is helpful to wear a large plastic bag over your arm for showering or bathing.
You can drive a car at about 4-6 weeks, provided your hand is comfortable and you are able to control a motor vehicle safely.

It can take many months for the nerve to finish growing after an injury depending on many factors including the length that the nerve that needs to grow. It can also take this long for muscles to work well again. There might be numbness, pain or a “pins and needles” feeling during the healing period.

Physical therapy is sometimes needed after a nerve injury.

If a sensory nerve has been injured, care must be taken not to burn or cut fingers because there is no feeling in the affected area.

With a nerve injury, the brain may need to be "re-educated." After the nerve has recovered, sensory re-education may be needed to improve feeling to the hand or finger.

When can I return to work?

This will depend on the type of work you do, but it may be 3-4 weeks after your operation. Office workers may need a 2-4 from work. Heavier activities with the affected hand are restricted for 6 to 8 weeks.

What are the complications of a nerve repair surgery?

Complications associated with this surgery can include:

- Infection – this can be settled by taking antibiotics
- Swelling and stiffness
- Painful scar
- Minimal or no improvement
- Neuroma formation- unpleasant sensations if it is knocked or tapped
- Bleeding
- Wound healing problems
- Delayed wound healing
- Loss of sensation in the skin where the nerve graft is taken from
- CRPS-complex regional pain syndrome