

Nerve injuries

What is a nerve?

A nerve is like a telephone cable that provides services to a number of houses. There is an outer layer that protects the multiple thin inner cables (nerve fibres) that go to each house. The inner cables are the wires that carry messages back and forth to the brain which is like a telephone exchange. The messages to the brain are information about feeling and from the brain to tell the muscles to contract.

What happens when a nerve is injured?

There are three basic types of injury to a nerve.

1. Where the 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.
2. Where the inner cables (nerve fibres) of the nerve are damaged but the outer layer remains intact.
3. Where 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.

To continue with the telephone cable analogy. When the inner cables (nerve fibres) are damaged the part of the cable that is beyond the level of the injury dies leaving an empty tube. The inner cable above the level of the injury remains alive as it is nourished by the nerve cells close to or within the spinal cord. For the nerve to recover the inner cables (nerve fibres) have to grow back down the tubes. Recovery from this type of injury is more unpredictable.

It is only possible for the Surgeon to repair the outer layer but not the tiny inner cables (nerve fibres). We know that not all of the inner cables (nerve fibres) will repair themselves and that many that do repair themselves get connected to the wrong house. This means that there will be many wrong numbers obtained after a repair. The brain is like the telephone exchange operator and will try hard to make sense of the new numbers but cannot fully cope. What this means is that after a nerve repair there will always be a residual and permanent loss of function.

Recovery after any nerve injury is variable. Unfortunately nerves recover less well as we grow older. This is in part due to the ability of the younger nervous system to adapt to loss of normal function in a nerve.

What are the symptoms of a nerve injury?

- Loss or alteration of sensation.
- Loss of muscle power which may result in weakness of grip or a feeling of clumsiness.
- Pain. This is variable in its intensity. In a chronic nerve injury the pain can occasionally be intense. A lot of people notice sensitivity to the cold. Less often gentle touching or stroking of the skin in the affected area may produce an unpleasant feeling.

What are the signs of a nerve injury?

- Testing sensation will demonstrate varying degrees of loss of feeling.
- There may be dryness of the skin due to loss of normal sweating.
- Testing individual muscles will show weakness.

Later on after a nerve injury there are further changes such as thinning of the pulps of the fingers, loss of the normal skin creases at the joints, visible wasting of the muscles. The Surgeon may elicit a feeling of electricity by tapping along the line of the nerve (Tinel's sign).

What is the treatment?

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.

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.

What is the outcome after nerve repair?

The result of a nerve injury depends on many variables as detailed above. Your Surgeon will be able to outline to you what you can expect. The important thing to remember is that nerves take many months to repair themselves. The nerve grows back at about 1mm per day. The final result may not be known for two years or more.

What are the complications of a nerve injury?

Where the nerve is injured and the inner cables (nerve fibres) are damaged the fibres that can't find their way down the empty tubes will sprout out and form a bundle of unconnected nerve ends which is called a neuroma. These endings are still connected and this means that a neuroma can produce a lot of unpleasant sensations if it is knocked or tapped.

Sometimes a nerve is badly damaged over a long length and it may not be possible to repair the ends directly. Sometimes after a repair the nerve does not show any signs of healing. In either of these situations it may be necessary to repair the nerve by putting in nerve grafts which are segments of other nerves. This will leave a small loss of sensation in the skin where the nerve graft is taken from.

There are other potential problems after a nerve repair which your Surgeon or Therapist will be able to advise you about.