Spine University’s Guide to Neurological Complications in Lumbar Spine Surgery
Introduction

The number of spine surgeries being done these days has increased and so has the complexity of the procedures. Spine surgery is actually very safe and the risk of experiencing a complication is low. But, complications can occur in any invasive procedure and spine surgery is no different. Because of the location of the surgery, when complications do occur, they can be severe.

Nerve injuries associated with spine surgery are called neurological injuries.

How severe the injury is and what part of the body it affects depends on the injury itself - where in the spine the injury is and if it happened intra-operatively or is the result of something postoperatively.

Anatomy

The lumbar spine is the lower part of your spinal column. It is just above the sacrum, a triangular bone at the base of the spine that fits between the two pelvic bones, and the coccyx at the end of your spine.

Your spine is built with vertebrae, small bones that lie one on top of the other. Between the vertebrae is a gel cushioning that the spine needs as you move about. The gel acts like a shock absorber. These are the discs or intervertebral discs.

There are usually five vertebrae in the lumbar section, but some people may only have four, while others may have six. Each vertebra has a number; the one closest to the thoracic spine is L1 and this goes up in number as the spine goes down. The lowest vertebra, just above the sacral spine, is L5 (or L6 if there is an extra one). In between each vertebra are two joints that help give flexibility. These joints are called facet joints.

Cerebrospinal fluid

Cerebrospinal fluid (CSF) surrounds your brain and spine to protect it. In the spine the fluid is surrounded by a membrane called the dura.

Nerves

Nerves that run from your brain down the spine go through the spinal cord. A bony ring that goes down the back of the spinal column protects it. The nerves then branch off each vertebra, to the left and right. They leave the spinal area through a small tunnel, called the neural foramen. If you imagine the nerves as a telephone or electricity wire bringing service into the community, this is the wire that goes through the spinal cord, but the wires that go to each individual home are the ones that run through the neural foramen.

Each vertebral level is responsible for a certain set of nerves and nerve function. If the lumbar spine is injured at a specific level, the nerves at that level are the ones that will be affected. In the lumbar section, the nerves lead towards your legs and some of your organs, as well as the skin and body tissues below the waist.

Neurological Injuries - Classification

Nerve injuries associated with spine surgery are called neurological injuries. They are usually categorized according to the way the injury happened (direct or indirect) and when they happened (during or after surgery). Complications that happen during surgery are called intra-operative complications, while those that happen after surgery are called post-operative complications.

Direct Injuries

Direct injuries are those that are caused by a direct source – a piece of equipment touching the wrong spot, a piece of the bone breaking, or something similar.

Laceration

A laceration is a tear. A tear can occur in the dura. If the tear is noticed during surgery, the surgeon may be able to stitch it closed. However, sometimes the repair doesn’t hold
or the tear isn't noticed. When this happens, the cerebrospinal fluid (CSF) can leak out of the spinal area. This puts you at risk for developing an infection.

A CFS leak can lead to severe headaches or a collection of fluid under the skin. If the leak is large, a repair may be needed. If the leak is small, it may heal on its own.

Occasionally, an instrument can cause a laceration of the nerve root, causing nerve damage.

**Compression**

Occasionally, a complication called a compression or contusion of a nerve root can happen during surgery. If this happens, the surgeon may not be aware that there has been pressure on the nerves. If a patient has had compression of nerve roots during lumbar surgery, the surgeon may notice that the patient develops weakness or even paralysis below the level of the surgery.

**Traction**

To perform some procedures sometimes the surgeon must apply some traction on the back to make room for the instruments. If there is excessive traction, this could result in nerve damage.

**Avulsion**

An avulsion is the tearing away of something. One of the possible complications that can occur during spinal surgery is that a nerve root can be pulled away. This complication is very rare. It is much more likely to occur when there is a great amount of scarring after multiple previous spine surgeries.

**Indirect Injuries**

Indirect injuries are those that are not direct and identifiable like a tear or an avulsion, but they're caused by other actions.

**Disruption of Blood Supply**

During the surgery, it's possible that something could happen in the spine that blocks the blood flow to the spinal cord. This could be pieces of bone compressed against each other, for example. If the blood can't reach the spine, then the cells don’t get the nourishment and oxygen they need. This can cause cell death or ischemia. This could result in numbness or loss of feeling from waist down.

**Gradual Compression**

After spinal surgery, it's possible that a hematoma, or collection of fluid builds up. If this hematoma is lying next to nerve roots, it can start putting pressure on them, gradually building up as the hematoma expands. The results can be paralysis or numbness below the waist.

**Intra-operative Injuries**

Injuries that happen during surgery can happen for a number of reasons, including surgeon error. To reduce the risk of complications you should always choose a surgeon that has a high level of experience with the procedure. You should make sure that you provide your surgeon with any history and complications of previous operations on your spine.

Occasionally, although not often, complications can occur because of faulty or broken equipment. This can damage the nerve directly or break off a piece of bone that may damage the nerve.

**Positioning**

When patients are positioned for their surgery, it's important that the patient's abdomen (stomach area) hangs free – this keeps pressure off the spinal area and reduces the amount of bleeding. When performing spinal surgery, the surgeon needs to be sure that the spine lines up (aligns) exactly as it should. If there are any deviations it can put too much pressure
on the nerves in the spine (compression) or it can pull on them too much (traction). Either of these actions could cause the nerves to become damaged.

Anesthesia

Not all patients who have back surgery have general anesthetic. Some have an anesthetic injected directly into the spinal or epidural area just outside the spinal canal. This freezes the body below the injection site. This type of anesthetic removes the possible side effects and risks of general anesthetic.

Although uncommon, there are some risks. If the needle that is used to insert the catheter (tube) that brings the medication into the spine touches a nerve or causes a laceration in the dura, this could affect the nerves or cause bruising or blood build up that can press on the nerves (compression).

Procedure Specific Risks

Some of the procedures have specific risks of their own although uncommon. One procedure is grafting other bone to the spine to stabilize it and make it stronger. The bone graft can be taken from the patient or from a donor. If it is taken from the patient, the site where the graft is taken from could experience pain for a few months after surgery, sometimes longer.

Postoperative Complications

Early Complications

When a patient wakes up after back surgery, the surgeon usually does a careful neurological assessment to check for any damage or injury that may have happened during the surgery. This also tells the surgeon that if there are any problems later on that weren’t present right after surgery, that the problem happened postoperatively and not intra-operatively.

If complications are found within two weeks of the surgery, this is almost always caused by fragments of bone from the disc (damage to the nerve), an abscess or internal build-up of fluid (compression), or the breaking through of a graft.

Repeat Disc Herniation

If the surgery was for a disc herniation (bulging disc, slipped disc, or ruptured disc – all are terms for the same thing), there is a slight chance that some bone fragments are left behind after surgery. If this happens, usually, the patient wakes from the surgery and already feels a lot of pain radiating down into the legs.

Epidural Complications

A possible complication after surgery is called an epidural hematoma, a collection or pooling of blood in the epidural space. This could be caused by too much bleeding during surgery. Patients who have this problem don't usually feel pain right away. It can build up to an intense pain and a weakened ability to use the legs. This is a surgical emergency and must be fixed right away.

Rarely, there is a complication called an epidural abscess, an infection in the epidural space. The symptoms for this show up about two to four weeks after surgery. This is also a surgical emergency.

Pseudomeningocele

If there was a tear in the tissue surrounding the spinal canal, it can cause a problem called a pseudomeningocele. This is a collection or pooling of cerebrospinal fluid, the fluid that runs up and down along your spine. This complication is more common in lumbar surgery than surgery higher up on the spine. If this happens, surgery may be needed to repair the tear.

Bowel and Bladder Problems

Sometimes, the nerves that control the bladder and bowels are affected by the surgery. This
means that patient may no longer have control over bowel movements or urination. People who have lost control over their elimination are said to be incontinent. Some types of incontinence are treatable. For example, if you were to lose control of your bowels, sometimes diet and bowel training may help you regain control. Other times, the nerves heal themselves after a while or the injury may be repaired. There are times, however, that the problem cannot be fixed.

**Sexual Dysfunction**

While sexual dysfunction can happen to both men and women, it’s more obvious when it happens to men. If the nerves that affect the penis are injured during surgery, a man may no longer be able to develop an erection or may not be able to maintain an erection.

There are treatments that are available for certain types of erectile dysfunction (the inability to have an erection). Men who develop erectile dysfunction should speak to their doctor to see if any available treatments would be suitable for them.

As with incontinence, sometimes the injured nerves can heal themselves or treatment may reduce swelling and pressure on the nerves.

**Weakness or Paralysis**

If the nerves have been damaged by either pressure from fluid build-up, hardware failure or tiny pieces of discs that have been left behind, this can cause pain, weakness, numbness or even total paralysis in certain muscles. The muscles affected depend on where in the spine this has happened.

Weakness and numbness can also be caused by an infection. As much as surgeons and the surgical team try to prevent infection, statistics show that about one percent of patients who have back surgery develop an infection.

Neurological complications from back surgery are not common. However, they can and do happen from time to time. While the surgeon's role is to try to prevent them as much as possible, the patient also has a role. This means telling your surgeon if you take any medications and being sure to follow all instructions before and after surgery. After surgery it's important to report any problems as soon as possible so they can be addressed as soon as possible.
Notes