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Spinal Anatomy & Surgery Specifics

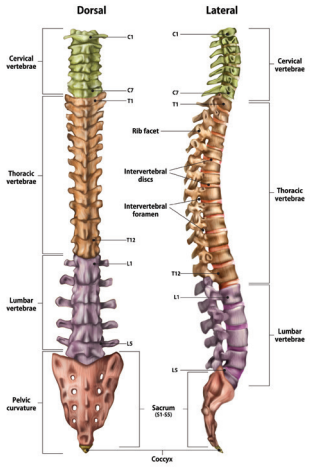
Thank you for choosing the Spine Center at The Miriam Hospital for your spine surgery. You are taking a big leap toward improving your health and well-being, and we are here for you through every part of it. Your surgeon is here to correct the problem that is limiting your functional abilities, and we are here to empower you to maximize and maintain a pain-free lifestyle.

In this packet you will find information related to your specific surgery, and everything you need to know about the surgical process and your recovery. You can feel free to call the Spine Center at any time if you have any questions related to the material in this packet, and we will answer to the best of our ability or direct you to someone who can. You can find our phone number at the bottom of every page in this packet. We realize that some of this information may be new to you, so we have included a Glossary of Terms on the inside left cover of your folder to help you navigate this information with ease.

We look forward to helping you achieve the best possible outcomes throughout this journey.

SPINAL ANATOMY

Your spine is made up of 26 bones called vertebrae - 7 cervical (neck), 12 thoracic (mid back), 5 lumbar (low back), the sacrum (scoop-shaped bone at the base of the spine) and the coccyx (tailbone). Almost all bones in the spine are separated by a disc that has a soft, jelly-like center that is surrounded by a tough outer layer of fibers. The spine is stabilized (held together) by these discs, along with bony structures, ligaments, and strong muscles.



The spinal cord passes through the bony spine and is composed of nerves that lead to and from the brain. The spinal cord controls all muscle movement and sensation for the entire body. Nerve "roots" come from the spinal cord and exit through holes in the bony spine. These nerve roots turn into nerves as they extend from the spine. These nerves carry electrical impulses to and from muscles, organs, and other structures in the body. These nerve roots can become pinched or irritated by certain spine conditions.

SPINAL DECOMPRESSION SURGERY

Spinal decompression is a term that includes several different surgeries that all have the same goal – to relieve the symptoms of spinal nerve compression. When the nerves of your spine are "compressed," it means that there is pressure on the spinal cord or nerves that exit the spinal cord that work to help us move and feel in our trunk and limbs. These spinal nerves are bundles of nerves that branch off the spinal cord and exit between two vertebrae (spinal bones). Symptoms of spinal nerve compression include pain, numbness, tingling and weakness.

Spinal nerve compression can be caused by arthritis, disc problems, injuries and tumors. Your surgeon will recommend surgery based on the cause of the problem, if other types of treatments and therapies have failed to relieve your symptoms. Types of spine decompression surgery include:

- Discectomy: removal of part or all of a spinal disc
- Foraminotomy: surgery to widen the opening where a nerve root leaves the spinal cord
- Laminectomy/laminotomy: surgery to remove part or most of a bony area that makes up the back of each vertebra to remove pressure on the nerves
- Laminoplasty: surgery to open the lamina (back part of the spinal bone), rather than removing it, to allow for more room in the canal where the spinal cord and nerves lay
- Osteophyte removal: removal of bone spurs

HOW LONG IS RECOVERY FROM SPINAL DECOMPRESSION SURGERY?

The answer varies, depending on the extent of the surgery, the number of spinal levels that require decompression, and your overall health and well-being entering the surgery. However, most people begin to feel better in about two to four weeks after surgery. Initially, you will have to limit the amount you lift, typically to less than 5 to 10 pounds. You will return to your prior level of function in about eight weeks with proper strengthening and exercise. You will be encouraged to begin a cardiovascular fitness regimen, such as walking, right away. Your outcome and recovery will be greater if you can begin this prior to surgery.

SPINAL FUSION SURGERY

Spinal fusion surgery is recommended if previous nonsurgical treatments fail to help with pain or numbness coming from the back or neck. These symptoms are often the result of significant arthritis in the spine. A fusion is a way for your doctor to control the motion of one or more segments of the spine that have degenerated and are causing your pain. Spinal fusion surgery is a procedure in which two or more vertebrae are fused together to eliminate movement between them. This limitation in motion can prevent the vertebrae from rubbing against each other or slipping out of alignment. A fusion surgery can be very effective in relieving symptoms.

WHAT CONDITIONS COULD BENEFIT FROM SPINAL FUSION SURGERY?

- Degenerative disc disease (DDD) is a condition where spinal discs (cushions) between the vertebrae (bones) break down and cause narrowing between the joints. This can result in nerve compression and arthritis, causing debilitating symptoms.
- Spondylolisthesis is caused when one vertebra (spinal bone) slips forward on another, causing compression of the spinal cord and/or nerves. This is typically a result of instability caused by a fracture (break) of part of the vertebrae that connects the joints between the bone (also known as spondylosis). This can be a result of arthritis, injury or trauma, or can be genetic. Spondylolisthesis can result in pain in the lower back, buttocks and legs.
- Spine fractures (cracks in the bone), although sometimes caused by a traumatic injury, can also result from spinal degeneration, such as osteoarthritis. Those with osteopenia or osteoporosis are also more prone to spinal fractures, which can lead to deformity or instability.
- Scoliosis and kyphosis (abnormal spine curvatures) are two deformities of the spine that have several potential causes. Some people are born with scoliosis, but it can also develop during adolescent growth, after injuries or degeneration, or result from certain genetic disorders. Osteoporosis and certain diseases can also cause scoliosis and kyphosis.

HOW DOES SPINAL FUSION SURGERY WORK?

Spinal fusion surgery relies on your ability to heal with your own bone tissue, which will ultimately fuse your spinal segments together. To start, your surgeon will place a cage-like device between the two vertebrae that will be fused. This device traps bone materials and growth factors and will help to stimulate new bone to grow. They may also use screws that stabilize the vertebrae while new bone is growing.

In some cases, your surgeon will perform a minimally invasive surgery with the use of a specialized robot, which will allow for greater visualization and significantly less blood loss, as the surgical devices are much more precise.

HOW LONG IS THE RECOVERY FROM SPINAL FUSION SURGERY?

Full recovery from spinal fusion surgery can take up to six months with a strict physical therapy and exercise regimen, in order for you to regain strength and function. Initially, you will have to limit the amount you lift, typically to less than 10 to 15 pounds. You will be encouraged to begin a cardiovascular fitness regimen, such as walking. Your outcome and recovery will be greater if you can begin this prior to surgery.

After you heal from spinal fusion surgery, there should be no restrictions for the activities you enjoy doing.

CERVICAL SPINE (NECK) SURGERY

Your cervical spine consists of the first seven bones in your spine. These bones are called vertebrae and play an important

role in protecting your spinal cord and the nerves that go into your arms and hands. In between each of these bones are spinal discs, which are like cushions and "separators" for the bones, and are filled with a jelly-like substance. The discs not only help to keep the bones apart to allow for enough room for the nerves to exit the spine, but they bend and squish as we move, and they play a role in keeping our bones in place on top of each other.

Certain conditions, such as herniated discs or bone spurs, can press on the spinal cord or spinal nerves. This can result in symptoms such as pain, numbness, tingling or weakness in the areas that the nerve supplies. When all attempts to treat your neck symptoms have failed, your surgeon may recommend cervical spine surgery. There are several types of cervical spine surgeries, and your surgeon will choose what is best for you, according to your specific medical case.

Surgeries are separated into either anterior or posterior cervical surgeries, depending on whether the surgery is approached from the front (anterior) or back (posterior) of the neck.

ANTERIOR (FRONT) CERVICAL SURGERIES

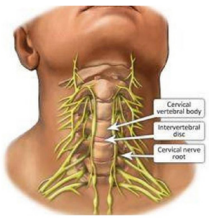
When the neck is approached from the front during surgery, your surgeon will easily be able to see the disc space. Examples of anterior surgery include:

- Anterior cervical discectomy and fusion (ACDF)
- Anterior discectomy and arthroplasty (artificial disc)
- Anterior corpectomy and fusion: removal of the body of the vertebra and two discs

When a disc must be removed, the space between the bones will need to be held together (fused) with a piece of bone to maintain the normal shape of your neck. Sometimes this involves the use of plates and screws.

Typically, people who have anterior cervical surgery return home after spending one night in the hospital. Unless your surgeon tells you otherwise, you should plan to go home either the day of or the day after your surgery.

Special Note: After anterior cervical spine surgery, it is common for people to have difficulty swallowing (dysphagia). To visualize your spine during surgery, your surgeon will need to move your windpipe and esophagus away from their normal resting place, which may cause some throat soreness, scratchiness or the feeling that something is stuck in the throat. This is almost always temporary and will resolve on its own within the first few weeks after surgery.



POSTERIOR (BACK) CERVICAL SURGERIES

The neck is approached from the back during surgery when pressure needs to be alleviated on the spinal cord or the nerves. Examples of posterior cervical surgeries include:

- Foraminotomies: creating a space over the nerve root by widening the opening it exits through
- Laminectomies: removal of the bone on the back of the vertebra
- Laminectomy and fusion: removing the bone in the back of the vertebra and fusing it to the next vertebra
- Laminoplasty: expanding the existing bone without fusing it to the next level

In addition to any of the above, your surgeon may choose to fuse the bones of different levels to maintain spine alignment.

Typically, people who have posterior cervical surgery return home after spending one to two nights in the hospital. Unless you are told otherwise, you should plan to go home one to two days after your surgery.

LUMBAR (LOW BACK) SURGERY

Your low back (lumbar spine) consists of the last five bones (vertebrae) of your spine and are located above your sacrum (the scoop-shaped triangular bone at the base of your spine). These vertebrae play an important role in protecting your spinal cord and the nerves that go into your legs and feet. In between the bones are soft discs that are filled with a jelly-like substance. The discs help to provide a space and a cushion between the bones and play a role in holding them in place.

Certain conditions, such as a herniated disc or bone spurs, can press on (compress) the spinal cord or spinal nerves. When compression to the spinal cord or nerves occurs, patients may experience symptoms such as difficulty with balance, bowel, and bladder function; or difficulty with walking or pain and numbness in the area that nerve supplies.

When all attempts at treating your lower back symptoms have failed, lumbar spine surgery may become a treatment option. There are several types of lumbar spine surgeries, and your surgeon will choose what is best for you according to your specific medical case.

Surgeries for the lumbar spine are classified as anterior, lateral or posterior lumbar surgeries, depending on whether the surgery is approached from the front (anterior), side (lateral), or back (posterior).

POSTERIOR (BACK) LUMBAR SURGERIES

A posterior approach is used when the bone that lies over the nerves needs to be removed. This is done to help take pressure off the spinal cord or nerves or to place screws and rods in place to keep things from moving.

Examples of posterior lumbar surgeries include:

- Discectomies: removal of a piece of disc material
- Foraminotomies: creating a space over the nerve root by removing bone from the opening it exits through
- Laminotomy: partial removal of the lamina bone over the disc space
- Laminectomy: removing the entire bone (lamina) on the back of the vertebra
- Laminectomy and fusion: removing lamina and fusing one level to the next
- Posterior lumbar interbody fusion (PLIF): removing the disc from behind and placing a device into the disc space to maintain original disc height
- Transforaminal lumbar interbody fusion (TLIF): removing the joint where the vertebrae come together to alleviate nerve compression and placing a device to maintain original disc height

ANTERIOR (FRONT) LUMBAR SURGERIES

When the surgery is approached from the front, your surgeon will be able to access the disc space more easily. Examples of anterior surgery include:

- Anterior lumbar interbody fusion (ALIF)
- Anterior discectomy and fusion
- Anterior corpectomy and fusion: removal of entire vertebral body and two discs

If a disc is removed completely, the space between the vertebrae will need to be fused with a piece of bone to maintain your spine's normal shape; sometimes the fusion requires the use of plates and screws.

In many cases, patients who undergo anterior lumbar surgery require another surgical team to provide access to the spine from the abdominal area. This team is familiar with mobilizing your abdominal organs away from the front of the spine, so that the disc can be removed safely.

Note: Sometimes your surgeon will recommend both an anterior and a posterior approach to appropriately address your specific medical needs.

LATERAL (SIDE) LUMBAR SURGERIES

A lateral approach is used when direct decompression of the nerves is not required. This exposure to the spine is from your side and allows access to some disc levels without the need for going through the abdominal cavity (anterior) and without the need for going through the back muscles (posterior). Examples of lateral lumbar surgeries include:

- Direct lateral interbody fusion: removal of the disc and placement of a device to maintain normal disc height
- Oblique lateral interbody fusion: removal of the disc with placement of device to maintain normal disc height
- Lateral corpectomy: removal of the entire vertebral body