Lumbar Fusion Surgery Information Handout

Welcome to Capital Neurological Surgeons and thank you for trusting us with your neurosurgical care. Please take some time to review this handout and feel free to contact us with questions or concerns.

BASIC ANATOMY: LUMBAR SPINE

What is the lumbar spine? It is the last 5 unfused bones of the spine. There are 31 bones in the spine, 7 cervical, 12 thoracic, 5 lumbar, 5 fused sacral segments and the coccygeal fused segments. The spinal cord lives inside a large space inside the bone called ***spinal canal***; however, there are only spinal nerves in the lumbar spine in the adult patient since the spinal cord ends in the thoracic spine. Each bone has two holes, one on the left and one on the right. These two holes create tunnels called ***intervertebral foramen*** on the side that nerves travel through to leave the spine and enter the arms. Each bone is connected to another bone in the front with an ***intervertebral disc*** and two ***facet joints*** in the back. This can create three very different problems:

1. **Disc herniation/slipped disc**: The disc can be injured and be slipped/herniated, which is seen in sudden injuries such as being hit or car accident or falls.
2. **Lumbar Stenosis**: The disc can also dry out over a long period of time and old dried discs are weaker than young healthy discs. This creates stress on the intervertebral joint and the body responds by trying to make the joint stronger by adding bone. This is called *bone spurs* or *osteophytes*. Unfortunately, drying out discs is a part of aging and everybody will get this during their lifetime starting at age 40.
3. **Lumbar instability**: The connections between the bones can be weakened and it may cause the bones to slip over each other creating misalignment (***spondylolisthesis***) or wobbly movement (***instability***).

LUMBAR SPINE DISEASE: what is it and why does it hurt?

Lumbar spine disease can create pain in the back and legs. The three components of lumbar spine disease that can be addressed by surgery is

1. Pinched nerve
    a. Pinched nerves create pain because they are squeezed by disc and bone spurs as they exit from the spine through tunnels on the side called ***intervertebral foramen***. The pain is usually sharp and stabbing and electrical in nature. It can shoot into the buttocks and legs. Pinched nerves can also cause weakness of the legs and feet. Pinched nerves can also cause numbness and paresthesia, which is a feeling of pins and needles in the leg and feet. Numbness is usually a sign of a permanently damaged nerve and this usually does not improve with surgery.

2. Misalignment/instability of the spine
    a. The most common misalignment of the lumbar spine is when the bones are slipped forward called ***spondylolisthesis***. This can create severe strain in the muscle and joints of the back but it can also pinch a nerve as it deforms the tunnel through which the nerves pass. Fusion of the spine is usually required to treat this condition.

Symptoms that lumbar surgery cannot treat include

1. Arthritis
    a. This is long term chronic inflammatory changes in the joint of the spine. 100% of all people will develop arthritis in the joints of their body as they age just as 100% of all people develop wrinkles in their skin as they age. This is a function of wear and tear on our bodies. Patient reports this feels like a dull constant ache or grinding feeling in the back. Surgery does not change arthritis and cannot "cure" arthritis.
2. Myofascial syndrome
    a. Muscles, tendons, ligaments, skin and the soft tissue that makes up the neck that wraps around the spine can all be damaged. Car accidents or falls can create severe myofascial pain. Patient reports this feels like a tight squeezing feeling in the back, buttocks and legs. Surgery does not treat these symptoms.
3. Neuropathy
    a. Nerves can have injury or even disease. Just as we can have disease of the bone, disease of the skin, disease of the lungs etc., we can have disease of the nerves and this is called neuropathy. Symptoms can feel like ice water running over the arms or even a burning numbness. This is largely permanent and surgery does not treat these symptoms.
4. Spinal nerve injury
    a. Spinal nerve injury is permanent and can be life and limb threatening. Severe weakness, bowel and bladder incontinence (inability to control urination or bowel movements), numbness and neuropathic burning pains, are the common presenting symptoms.

So there is back pain that can be treated by surgery and there is back pain that cannot be treated by surgery. Patients should have an understanding of the cause of their pain so that they may have realistic expectations for surgery. So what is the surgery?

SURGERY: Lumbar laminectomy/fusion

A common surgery of the lumbar spine used to spinal instability is ***laminectomy and fusion.*** If a patient has spinal nerve compression due to ***lumbar stenosis*** or pinched nerves from *bone spurs, disc bulges or thickened ligaments*, then the surgeon can cut the bone (lamina) to create more room and shave down the bone spurs, which can decompress the pinched nerve. If the lumbar *stenosis* is caused by *instability*, then fusion of the spine is also required in addition to the *laminectomy*. Let's review the surgery in more detail.

Laminectomy/fusion is performed under general anesthesia. There are risks to being under full anesthesia. There are concerns about patient's medical suitability for surgery in regards to the heart or lung. So prior to any surgery, patients will need to be cleared for surgery by their family doctor. EKG and labs as well as a chest x-ray may be requested. All reproductive age females will also have a urine pregnancy test provided.

The patient will be *intubated* during surgery. This means that a breathing tube will be inserted into the throat and this may cause a sore throat that should get better by 1-2 days after surgery. Patient also complains of severe dry mouth due to the anesthetics and this also resolves within 1-2 days. The surgery is performed by making a midline incision in the lower back. The large muscles of the lower back will need to be gently retracted aside to gain access to the spine. Even if the muscles are not cut, simply retracting them will cause pain and muscle spasms/cramps. Patient frequently notice that 2-3 days after surgery, their buttock/hip and legs go into painful cramps and hurt. Pain medicine, muscle relaxants prescribed after surgery can help reduce some of these pains. Rest and time will allow the pain and cramps to improve within 5-7 days but it can take up to 4 weeks in some patients.

Once these muscles are carefully retracted, we can access the front of the spine. The lamina is resected with drills and sharp instrumentation. While great care is taken to avoid injury to the spinal nerves underneath the bone, damage to these vital structures is a rare but devastating risk of surgery which can results in paralysis or death. Tearing of the lining of the spinal nerves (known as dura) can create a ***spinal fluid/cerebral spinal fluid (CSF)*** leak, which can increase infection rates and this can result in meningitis which can result in death. CSF leaks occur at a rate of 1-3% overall and usually can be treated with a few sutures and a small amount of organic glue called Duraseal. Occasionally a tube called a lumbar drain may be required to be temporarily placed and the patient kept in the hospital for 3 days while the lumbar drain helps the CSF leak heal. Once the lamina is removed, the tunnels where the nerves pass are inspected and any bone spurs or thickened ligaments causing an obstruction are shaved with instruments. At this time, spinal instruments such as ***pedicle screws*** are implanted into the bone using x-ray to guide the implantation. Risks of implantation include infections of the metal, poor placement of the screws which may cause injury to nerves or blood vessels, or may require additional surgeries to reposition the screws. While these are rare complications, the informed patient must be aware of their possibilities. The bone removed earlier in the laminectomy portion of surgery is kept and crushed and repacked into the patient next to the screws. The patient's bone fragments are usually mixed with a calcium matrix and occasional a bone stimulant called *bone morphogenic protein (BMP)* is used to promote boney fusion. Fusion rates approach 99% in most patients but can be as low as 50% in smokers. Fusion rates are also lower in menopausal women, patients with osteoporosis, and Asian or Caucasian ethnicity. The only parameter that can be controlled is tobacco smoking. Patients must NOT smoke for 1-2 years after surgery. It is the responsibility of the patient to determine if they can refrain from smoking after surgery.

The screw and rod construct is low profile and usually cannot be felt by the patient once implanted. However, it can break with strong trauma such as falls. X-rays will be taken several weeks after surgery to evaluate the screw and rods. The rod and screws are x-ray safe, MRI safe, metal detector safe, and airport safe. You may fly with them and you may swim with them. They are a permanent implant.

Once fused, most patients feel that they can move their back like normal. This is because the adjacent levels above and below the fused levels are doing more work. This can create ***adjacent level disease***. This has been shown to increase the wear and tear on the levels next to a fused level such that there is a risk of needing surgery on the adjacent level.

For some patients, a back brace is provided. This is to be worn only for activity and usually does not need to be worn during sleep. The incision is not water tight and the patient is asked to keep it dry for 2 weeks. Usually sponge baths are used for the first 5 days and then the patient may shower after 5 days, but they cannot get the incision wet. The patient may be asked to wear the brace for 6 weeks and up to 3 months or longer depending on the patient's bone quality and likelihood of a successful fusion.

After surgery, the patient will remain in the recovery room for 1-2 hours and then they are taken to the ASU on the 4th floor. The phone number to the ASU is **916-453-4214**. Once in their private room, the patient may get up and walk around or use the rest room. For dinner, the patient is requested to sit in a chair to eat. No bedrest is recommended. If you are asleep, then be in bed. If you are not asleep, then don't be in bed. Usually a physical therapist will see the patient the morning after surgery. The patient is discharged in the next 1-2 day with their pain medicine prescriptions. They will have to call to make an appointment to see me two weeks after surgery for an incision check. Follow up visit schedules are 2 weeks after surgery and 3 months after surgery. If patients have difficulties with normal activities such as getting out of bed or getting to the bathroom, then physical therapy may be ordered at the 2 week visit.

For the first two weeks, the secret of success is rest and recovery. Almost half of the patients stop their pain medications by 4 week after surgery and feel like exploring their new limits however, I advise patients maintain a low and reasonable rate of activity and advance their activity as instructed. It is the responsibility of the patient to exercise restraint and allow their body to heal completely.