Risks of Spinal Surgery

Infection

One of the more common potential complications of any surgery is a wound infection. In spinal surgery this can be a very severe problem. It occurs in 1.5 percent to 3 percent of spinal surgeries. The rate of infection is somewhat dependent on the length of the surgical procedure as well as the overall infection rate in the institution where the surgery is performed.

Superficial Infection involves the skin edges of the surgical wound and the surrounding and underlying tissues. This can usually be treated with oral antibiotics. Occasionally it is necessary to “freshen” the wound edges by surgically removing the involved tissue. This is called “debridement”. It requires returning to surgery for a minor surgery under a general anesthetic.

Deep Infection results when the infection starts in or extends to the deeper tissues. This may involve muscle or bone. It can start in or reach the disc space and result in a discitis. This can cause an abscess between the vertebrae that can lead to extension into the spinal canal. This is called an epidural abscess. This may result in pressure on the nerves in the spinal canal. This can cause pain, weakness, or even paralysis of the legs or loss of bowel and bladder function. Treatment of a deep wound infection, discitis, vertebral osteomyelitis, is surgery. It is called incision and drainage and could require multiple additional surgeries.

In the worst case, it might be necessary to remove fixation devices (rods and screws). A deep wound infection can take a long time to resolve and require prolonged IV antibiotics which may also produce complications such as kidney failure, or hearing impairment just to name a few.

The ultimate outcome of the surgical procedure may be less than the expected result had the infection not occurred. The degree of pain or deformity could be worse than that experienced before the surgery done to improve it. Patients with diabetes are at increased risk for infection.

Infection Risk by procedure:
Simple discectomy: less than 1%
Anterior approach: less than 1%
Posterior instrumentation: 4-7%

Non–Union or Pseudarthrosis

In fusion surgeries, one of the major potential complications is non-healing of the fusion. This is called a pseudarthrosis. If this occurs it can cause continued pain, loosening or breakage of the spinal screws or rods and failure of the operative procedure. When there is continued pain or the hardware loosens it is usually necessary to revise the previous surgery. This may be by removing
and replacing the hardware and reapplying graft material or by doing a supplemental surgery via a different approach.

The rate of non-healing of a fusion varies with the nature of the procedure and the state of the patients’ general health. The risk of non-union of a fusion is about 4 times higher in patients who smoke or use tobacco products. In most lumbar and cervical spinal fusion surgeries the fusion rate is 85 percent or greater.

**Neural or Dural Injury**

One of the most feared complications of any spinal surgery is the potential to be paralyzed. This is the least likely of any of the complications that might occur (less than 1%). Nerves that were affected by the condition that is being treated surgically may not improve and can even get worse in spite of the best efforts of the surgeon. Intraoperative nerve injury is rare. If it occurs the result can be numbness, weakness or pain in the extremity. There may be loss of bowel or bladder or sexual function. When this occurs in the leg(s) a brace or other assistive device(s) may be needed in order to walk.

Spinal cord injury that can result in paralysis doesn’t occur in surgeries of the lower lumbar spine since the spinal cord only extends into the uppermost levels of the lumbar spine. Spinal cord dysfunction can and does occur in surgery of the neck (cervical) or back (thoracic). There are many reasons that this can occur but when it does it can result in paralysis of the arms and or legs. Loss of bowel, bladder and sexual function may occur. This can be permanent.

The spinal cord and nerve roots are encased in a fluid filled sac. The outer wall of this sac is the dura. If, during surgery this sac is torn or punctured, spinal fluid will leak out of the sac. If this is noted at the time of surgery it can usually be repaired without difficulty. If it isn’t noted at the time of surgery or continues to leak after surgery then the wound won’t heal and it will be necessary to return to surgery to repair the leak. Sometimes the tear or puncture doesn’t leak until after the surgery as the patient’s activity level increases. Inadvertent durotomy (that is what the tear is called) usually isn’t a problem and doesn’t affect the outcome of the surgery.

**Scarring around or within the nerve roots**

Scar formation can occur any time the spinal canal is entered surgically, it can also occur because of certain spinal conditions. Scarring around the nerve is called perineural or epineural fibrosis, scarring within the nerve is intraneural fibrosis. Scar inside the dural sac of nerves is called arachnoiditis. Any or all of these can occur and when they do can lead to intractable and untreatable pain.

**Epidural Hematoma**

Sometimes bleeding into the spinal canal can occur following surgery resulting in an epidural hematoma. (Rate 0.1% - 3%) This can cause a condition known as a cauda equina syndrome. This can cause numbness of the saddle / rectal area, pain and weakness in the legs and ultimately loss of bowel, bladder and sexual function. Treatment of this condition requires rapid diagnosis
and urgent surgical evacuation of the hematoma. This condition can result in permanent dysfunction of bowel and bladder and the lower extremities. Patients who are taking blood thinning medication and/or arthritis medication and do not stop taking it as instructed before surgery may be at increased risk.

**Complications from positioning**

Positioning for spinal surgery can result in undesirable problems—fortunately, these almost always resolve. These include, but are not limited to:

**Pressure injuries**

Due to the length of some spinal surgeries and the need for special padding and positioning, the patient may experience bruising on the chest, breasts or the fronts of the thighs. This is more common in heavier patients. In severe cases the nerve in the groin called the lateral femoral cutaneous nerve may be irritated resulting in burning pain or numbness in the front of the thigh. Heel soreness or soreness on the top of the foot can also occur.

**Peripheral nerve injuries**

Surgery done on the back is done with the patient lying prone (face down). The arms are extended beside the head. This can result in stretching of the nerves to the arm or pressure on the nerves in the arm pit or at the elbow. These areas are carefully padded and protected but nerve dysfunction can still occur and result in weakness and/or numbness of the arm. This can also occur from pressure on the nerves at the elbow or in the forearm. Pressure on the peroneal nerve at the knee can cause weakness of the ankle commonly known as a foot drop. Neuropraxia from positioning occurs in up to 0.7 percent of patients undergoing spinal surgery.

**Blindness**

The prone position for spinal surgeries has an increased risk of a rare complication known as perioperative ischemic optic neuropathy. This can result in permanent blindness. It occurs rarely in up to 0.12 percent of cases. It is more common in patients with Type I diabetes.

**Transfusion Related Complications**

Bleeding that occurs during spinal surgery can be of a great enough amount to necessitate blood transfusion. Blood transfusion carries with it the risk of disease transmission. These include but are not limited to AIDS and hepatitis. Please refer to our website for more information on risks of blood transfusion.

**Complications Unique to Anterior Lumbar Procedures**

**Great Vessel Injury**
The iliac arteries and veins are mobilized during anterior approaches to the lower lumbar spine. These vessels can be torn or perforated resulting in massive blood loss. This can result in exsanguination and death. This is a very rare but potentially life threatening complication. It can occur in up to 2.9 percent of patients.

**Genitofemoral nerve irritation**

The genitofemoral nerve lies on the surface of the psoas muscle which is positioned along the sides of the lower lumbar spine. This nerve is frequently irritated due to the surgical exposure and the presence of blood in the retroperitoneum subsequent to the surgery. The result of this is burning, numbness or pain in the groin and/or scrotum on the left side in men, or the groin and/or vulva and vagina in women. This usually resolves in the post-operative period but may take up to 3 months to do so and rarely persists to some degree.

**Ureteral Injury**

The ureter is the tube that carries urine from the kidney to the bladder. In anterior lumbar spinal surgery, there is the potential for this structure to be injured by pressure from the retractors or by direct trauma. The worst result of this would be the need for urologic procedures and even external drainage of urine. The ultimate risk is loss of the kidney. This is a very rare complication.

**Complications of Bone Grafts**

Iliac crest grafts are bone grafts that are removed from the patient’s own bony pelvis. These are harvested from the posterior iliac crest in patients undergoing posterior spinal surgery and from the anterior iliac crest for patients undergoing anterior spinal surgery.

Harvests of iliac crest grafts for spinal surgery are associated with a very high incidence of long term pain and dysfunction. About 26 percent of patients undergoing posterior iliac crest graft harvest will experience prolonged or permanent pain and discomfort. This can include numbness in the “hip”. This is associated with a limp in some cases.

Anterior iliac crest grafts are also associated with pain and dysfunction. These include numbness in the anterior thigh, weakness of thigh muscles, and limp. There is also the risk of avulsion fracture of the anterior iliac spine, or fracture of the pelvis. There is also a very rare complication of hernia formation through the defect in the pelvis created by removal of full thickness grafts.

In recognition of these potential complications iliac crest grafts are being used less often in favor of other strategies for bone grafting. Iliac crest graft still is the “gold standard” for obtaining fusion. There are many circumstances where its use is the preferred method. Although we take every precaution to avoid the morbidities associated with iliac grafts they still occur. Whenever possible we use grafting techniques that do not require the use of iliac crest bone graft.

**Allografts**
We frequently make use of cadaver bone grafts in spinal surgery. These are usually structural bone grafts that are taken from cadavers which are commercially prepared. These grafts have the potential to transmit disease although to the best of our knowledge this has never been reported in bone transplants.

This type of tissue doesn’t undergo rejection.

**Adjacent Segment Disease**

Spinal fusion for any reason can increase the forces on the discs immediately adjacent to the fused level. This can occur as a result of the ongoing degenerative process. It can also be the result of or be accelerated by the fusion. It can result in conditions that require additional surgeries.

**Off Label Uses of Medical Devices or Materials**

Medical device promotion and sale are regulated by the FDA. There are many devices and drugs in use that have not been submitted to the FDA for approval for applications commonly used by doctors. FDA approval or lack thereof may not limit the surgeon’s use of a particular device or treatment. We are obligated to inform our patients of their use in non-approved applications. We utilize a number of devices and products in an “off label” manner. These include, but are not limited to:

- **InFuse BMP** – this is a substance that helps to promote bone growth and fusion. It is used in specific applications in an on label manner such as in an anterior lumbar interbody fusion cage. Our use is off label when we use it in conjunction with some other type of interbody graft or device. The use in posterior spinal fusion is also off label. We use BMP in conjunction with other substances to promote fusion (demineralized bone matrix and your own bone taken from bone that is being removed for decompression).

- **Interbody plastic cages** are also used. These are PEEK, a type of plastic, implants that are inserted between the vertebral bodies where the disc was. This material is very inert and allows us to restore and support the interval between the vertebrae. These devices also serve as a vessel in which we place the BMP. Risk associated with these off label uses are not clearly defined but seem to be very low or no higher than those associated with the "on label” use.

- **Spinal Screws** - Surgical fusion and stabilization of an unstable spine is often supplemented with screws placed into the spine. Depending on the specific location of and part of the spine that the screw is being applied to their use may not be approved for this application by the FDA. This is often because these devices have not been submitted to the FDA for the specific use. The risks associated with their use are specific to the area
in which they are being used. This is related to the anatomy of the region and not the screw itself.

- **Pedicle Screws** - Pedicle screw fixation to the spine is the standard of care for most spinal surgeries that involve the lumbar and thoracic spine. They are also used in some areas of the cervical spine. The risk of pedicle screw insertion is injury to the nerve root that exits the spine below the pedicle in question. This occurs due to placement of the screw outside the confines of the pedicle. Not every breach of the pedicle during placement of a pedicle screw results in nerve irritation or dysfunction. In fact most do not. In the thoracic and lumbar spine there is also the risk of spinal cord injury from screw misplacement. Spinal cord injury could result in paralysis.

  About 10 percent of all pedicle screws breech the pedicle. This is especially true in the thoracic spine in cases of deformity correction (scoliosis).

**ANTERIOR CERVICAL SURGERY**

**Infection**

Risk of infection in the anterior neck is very low. (Less than 1%) When it occurs the risks are those of infection in spinal surgery.

**Pseudarthrosis**

If it does occur it is usually associated with continued or worsening neck pain and or the return of arm pain, numbness, or weakness.

In those cases where a plate and screws has been used the plate or screws can loosen or break. This may require removal and revision surgery. In some cases non-union of an anterior cervical fusion can be treated by posterior cervical surgery with screws and rods or plates and additional bone graft.

Patients who smoke cigarettes or use nicotine are at increased risk for not healing their fusion. Also use of non-steroidal anti-inflammatory medicine (Advil, Aleve, Nuprin etc.) after fusion surgery is associated with lower healing rates and we ask that you not take any until we establish that your fusion is healed.

**The complications listed below are the most common that occur in conjunction with any surgery. Those listed above are specific to spinal surgery.**

**General Anesthesia**

All surgery carried out under general anesthesia could result in cardiac or respiratory arrest that might result in permanent brain damage or death. This is a very rare complication unless you
have a risk for heart or lung problems that were undiagnosed or untreated before surgery. The risk of death from a general anesthetic in an otherwise healthy patient undergoing elective surgery is very small and is largely related to other health problems that you might have.

**Blood Clots (Deep Vein Thrombophlebitis and Pulmonary Embolus)**

Any time a person is put under general anesthesia or is at bed rest there is a risk for the development of blood clots in the legs. These are called deep vein thrombophlebitis. If the clot dislodges and goes to the lung it is called a pulmonary embolus which can result in death. Precautions are taken to lessen this risk. The most important action to lessen this risk is to be up walking as soon as possible after your surgery. DVT can also result in persistent swelling and pain in your leg called a post phlebitic syndrome.

**Lung Problems (Atelectasis and Pneumonia)**

These conditions can occur following a general anesthetic and are much more common in people who smoke. The risk of these complications is lessened by taking deep breaths after surgery and by being mobile and out of bed.

**Urinary Tract Infection**

In the event that you have to have a urinary catheter or that you have difficulty urinating after surgery a urinary tract infection could occur. This is treated with fluids and antibiotics. In extreme cases resistant to antibiotics this could cause kidney failure, sepsis and death.

**Factors which increase the overall risk of complications:**

- Body Mass Index greater than 35 equals a fivefold increase in complications.
- Decreased serum albumin or malnutrition equals a sixteen fold increase in complications.
- Being over 65 years of age equals a 10-15 percent increase in complications.
- Risk factors are additive.