TABLE OF CONTENTS

Page 3: The Spine
Page 4: Spine Surgery
Page 7: Before Surgery
Page 9: Pre-operative Medications
Page 10: Day of Surgery
Page 11: After Surgery
Page 13: Post-Operative Instructions
Page 16: Home After Surgery
Page 17: Post-operative Medications
Page 18: Glossary
THE SPINE

Your spine is made of 26 bones known as vertebrae (7 cervical, 12 thoracic, 5 lumbar, the sacrum and coccyx). Each vertebra is separated by a disc (except the top two neck vertebrae). Each disc has a soft, jelly-like center surrounded by a tough outer layer of fibers known as the annulus. Discs, bony structures, ligaments and strong muscles stabilize the spine. The spinal cord, which is the nerve center of the body, connects the brain to the rest of the body, and passes through the bony spine and usually ends at approximately L1 or L2. Beyond that, nerve roots are present in a fluid-filled tube. The outer layer of this tube is called the dura. At each segment, nerve roots exit/enter the spinal canal on each side (left and right). Nerve roots come from the spinal cord and carry electrical impulses to and from muscles, organs and other structures.

Compression or squeezing on the nerves in the spinal cord or nerve roots may be causing many of the different types of symptoms that you may be experiencing. These symptoms may include back pain, leg pain, weakness in the legs, numbness in the legs. Other more serious symptoms include problems with bowel or bladder function.
SPINE SURGERY

You are going to have spine surgery in the form of a spinal fusion. This is a decision reached by you and your surgeon after careful consideration. A spinal fusion entails the uniting or “welding” of the spinal vertebrae with spinal instrumentation.

**Incision:** The incision will be made in a vertical fashion in the center of your back. The length of the incision depends on how many levels need to be treated.

**Blood Loss:** The amount of blood loss expected will depend on the number of levels that need to be fused and what additional surgical steps might be needed (osteotomies, anterior fusions, etc). It is sometimes necessary to give blood transfusions either during or after surgery. If you have objections to receiving blood products, please let us know.

**Instrumentation:** Your surgeon will put in rods, screws, hooks, and/or wires (normally just rods and screws) to stabilize the affected area while the bone graft is healing or fusing. The screws are generally made of titanium, and the rods are made of either titanium or cobalt-chrome.

**No Instrumentation:** Your surgeon may choose to fuse your spine by using bone graft only. This method of getting the bone to mend is chosen in those with poor bone quality or in other cases whereby the screws and rods may cause more harm than good.

**Bone Graft:** Your own bone obtained from your spine will ALWAYS be used for the fusion, while cadaver (Allograft) bone is often also used. Your surgeon may also choose to take bone off of your hip and will discuss this with your prior to surgery. A genetically engineered protein
(BMP) may also be used to obtain a fusion. The use of BMP will be discussed with you if your surgeon feels this would be beneficial in your case. Your surgeon will choose the best instrumentation and fusion procedure for your individual needs.

**Spinal Cord Monitoring:** Spinal cord monitoring is a procedure that may be performed by a nurse during the surgery. Electrodes are placed on the scalp and other parts of the body to make sure that the spinal nerves have good blood flow. You may or may not notice some irritation to your scalp after the surgery. This irritation should resolve within a few days after the surgery.

**Expected Pain:** This can be a painful operation. Every movement that you make will be transmitted into the muscles in your back. Patients have used words such as “I feel as though I’ve been beaten up”. Often, patients will note additional painful areas distant to their back that are most likely related to being in a strange position for an extended period. Fortunately, these pains will eventually subside. The worst pain typically lasts for 2-4 weeks. Thereafter, the pain gradually begins to decrease, but may still persist for at least 3-6 months.

**Risks and Complications:**

Certainly there are risks associated with any surgery. Your surgeon would not recommend this procedure for you unless the expected benefits far outweigh the risks. We tell you about these risks not to scare you, but to make sure you have all the information you need to make an informed decision. Keep in mind that for all risks, steps are taken to minimize and/or prevent them from occurring.

**Minor Risks:** Some risks/complications are minor and can be easily treated. Consider these a “bump in the road” but nothing that will affect your ultimate recovery. We can’t list, nor can we predict every possible thing that may happen. The following are some of the more common minor complications that may occur:

- Muscle soreness / painful pressure areas (especially in the chest area)
- Skin numbness on the back near the incision
- Superficial wound infection
- Bladder infection
- Excessive Pain
- Constipation
- Ileus (temporary slowing of bowel function)
- Transient nerve irritation (pain/numbness/weakness)
- Blood clot in your leg
- Spinal fluid leak/dural tear
- Postoperative pulmonary problems
- Postoperative confusion/dementia from anesthesia/narcotics

**Major Risks:** Other more significant complications are luckily very rare but still need to be mentioned. Again, steps are taken to reduce the possibility of any risks. Some of the major risks of spine surgery are:
• Neurologic deficit, up to and including paralysis
• Pulmonary Embolism (blood clot to your lungs)
• Deep wound infection necessitating surgery / IV antibiotics
• Pseudarthrosis (nonunion of the bone) or instrumentation breakage/pullout
• Major medical problems – stroke, heart attack, etc. up to and including death cannot be predicted.

Anesthesia: You will have General Anesthesia for your surgery. Anesthesia risks include throat discomfort; injury to teeth, dental work, eyes (including blindness) & vocal cords (which may affect your ability to speak); headache, backache, nerve damage, awareness under anesthesia, allergic reactions, stroke and heart attack. The anesthesiologist will discuss this with you in more detail during your pre-operative appointment.

BEFORE SURGERY

Before your operation it may be necessary to have blood tests, a chest x-ray and/or an EKG performed to evaluate your general condition before undergoing anesthesia. Sometimes a pulmonary evaluation is required. Most adults will need to have a medical evaluation by their internist prior to surgery. If your doctor is not on staff at Vanderbilt, we may have you see an internist here who can follow you in the hospital if you have any severe medical problems.

Exercise: The stronger and more fit you are prior to having surgery, the better you will do postoperatively!!! Suggested activities are walking, swimming and deep breathing exercises. Cardio and/or aerobic exercises are also helpful if approved by your medical doctor. This is very important and will really be advantageous in your recovery after surgery!!! You may want to work with a Physical Therapist or Personal Trainer to optimize your condition preoperatively.

Dental Work: Make arrangements to have your teeth cleaned prior to surgery as you will not be able to have dental work or cleanings for 6 months postoperatively.

Shots: You may not get Immunizations and flu shots within 6 weeks before or 3 months after surgery. (Flu shots that are the inactivated virus are okay anytime.)

Home Preparation: During the time prior to your admission, you can also be getting your home “ready”. Remember, NO BLTs (bending, lifting, twisting, or stooping/squatting) are permitted during your recovery period. It is advisable to place frequently used objects at an easily obtainable height. For example, have dishes most often used in upper cabinets. Additional things to consider:

• You cannot sleep on a mattress on the floor or on a free float waterbed.
• Arrange your kitchen for convenience (frequently used items placed in easy to reach places - consider your precautions)
• Remove throw rugs.
• Have a chair with armrests and a firm seat available (not too low).
• Install adjustable height hand held shower head (optional)
• Apply non-skid stickers/mat to bathtub/shower
• Be careful with pets (dogs, cats) as you won’t want to trip over them leading to a possible fall!

Make arrangements prior to admission for someone to help with house cleaning, laundry and groceries.

• Arrange for someone to pick you up from the hospital in a reasonable vehicle.
• Arrange for someone to stay with you after you go home from the hospital until you are comfortable getting around. Length of time depends on the magnitude of surgery and your recovery. It’s better to have too much help than not enough.
• Arrange for someone to assist you with light to heavy household chores (cleaning, laundry, etc.)
• Arrange for someone to do the grocery shopping.
• Arrange for transportation for several weeks (you will not be able to drive until you are off the heavier narcotics).

Patients sometimes need adaptive equipment (a wheeled walker, an elevated toilet seat) after surgery. Hospital beds are generally not required after discharge for most spinal procedures. You will be able to sleep in your regular bed as long as it is not too low to the ground or a waterbed. An occupational and physical therapist will see you during your hospitalization and help you obtain any equipment you will need at home.

Packing: Please leave all valuables at home. You will need to bring any personal toiletry items you feel you will need during your hospital stay (toothbrush, toothpaste, a comb, brush, deodorant, lotions, etc.).

Do not bring your home medications to take in the hospital as they will be provided by the hospital pharmacy. This includes narcotics! It is a good idea to bring a list of your medications and the dosages so they can be correctly ordered for you. We will give you prescriptions for postoperative pain medication.

Hospital gowns are available for you to wear. It is easier to wear the hospital gown due to all the various IV lines and tubes and so we are able to easily check your dressing and incision. You may bring rubber-soled slippers and a robe for out-of-bed activities. Loose-fitting clothing with elastic waistbands are recommended after discharge as they are easier to put on and take off and you may have some postoperative swelling.

Day Before Surgery: Light meals are recommended the day prior to surgery. Nothing to eat or drink after midnight the night before your surgery. You can brush your teeth, just do not swallow any water.
PRE-OPERATIVE MEDICATIONS

Some medicines can make you bleed longer so need to be stopped preoperatively.

- **ASPIRIN** products and **BLOOD THINNERS** (Coumadin, Persantine) need to be stopped 1 WEEK prior to surgery. Talk to the ordering physician for instructions on stopping.
- **Stop all NON-STEROIDAL ANTI-INFLAMMATORY medications/arthritis medicines** (such as Advil, Aleve, Ibuprofen, Motrin, Clinoril, Indocin, Daypro, Naprosyn, Celebrex, Vioxx, etc.) **1 WEEK** before surgery. Tylenol products are suggested.
- **Stop the following herbs at least 1 WEEK** before surgery:
  - Chondroitin
  - Danshen
  - Feverfew
  - Fish Oil
  - Garlic tablets
  - Ginger tablets
  - Ginko
  - Ginsen
  - Quilinggao
  - Vitamin E
  - Co Q10

Other medications to stop include:

- Bone strengthening medications need to be stopped 1 week before surgery. Forteo may be resumed 1 week postop. Fosamax and Reclast may be resumed at 3 months postop.
- Some medications such as **Insulin** and **Prednisone** have specific instructions that may need to be adjusted prior to your surgery. Please let your surgeon know all medications you are on.

Medications for **blood pressure**, **heart** and **breathing** may need to be taken with a small sip of water the morning of surgery. During your pre-operative anesthesia appointment, the anesthesia staff will let you know what medications, if any, you should take.

**After surgery**, you should avoid all anti-inflammatory medications, including aspirin, Ibuprofen (Advil, Motrin), and Naproxen (Aleve), as well as any other prescription anti-inflammatories. It has been shown that anti-inflammatories decrease bone healing. Do not resume these medications until your surgeon says that it is okay to do so, which is usually 6 months after your surgery. You may take Tylenol at any time (no more than 3000 mg of Tylenol in 24 hours).
ON THE DAY OF SURGERY:

On the day of the operation you will be asked to arrive approximately 2 hours prior to your operation. You will check in and then be taken to a Waiting Area. Approximately one hour before the operation you will be called to the Holding Area where you will meet the anesthesiologist. The anesthesia staff will then place catheters in your arms for the intravenous fluids and then will begin to medicate you. The scheduled time of your surgery is really just an approximation. Much depends on when the last case finished. Sometimes we can be off by more than a few hours.

When you finally get to the Operating Room, you generally will not see your surgeon, as he is often in a different room finishing up the surgery before your case. The staff working with the surgeon will assist the anesthesiologists and you will be put under general anesthesia. It is usually 30-60 minutes from the time that you enter the room until the surgeon makes the incision.

At the conclusion of the procedure, it usually takes 30-60 minutes to wake you up and put you on the hospital bed before you are taken to the Recovery Room. At the conclusion of the case, the surgeon will speak with your family.

AFTER SURGERY

Patients will be taken to the Recovery Room. After your stay in the recovery room, you will be transferred to an Orthopaedic floor. Sometimes after extensive reconstructions, patients will go the ICU 1-2 days or the floor where vitals can be monitored closely. If the anesthesiologist decides that the breathing tube should be kept in place following surgery, patients will be taken directly to the ICU.

- IT IS NOT UNCOMMON FOR PATIENTS TO RETURN FROM SURGERY WITH FACIAL AND BODY SWELLING. THIS IS DUE TO POSITIONING IN SURGERY AND IV FLUIDS. The facial swelling generally resolves in 1-2 days. Rarely patients may have a very swollen tongue for the first few days postop as well.
- You may have a cardiac monitor on to watch your heart rate and rhythm.
- You may have oxygen to make breathing easier.
- You will wear elastic, thigh-high stockings (TED hose) and/or inflatable plastic wraps (sequential pumps) on your legs. Both the TED hose and sequential pumps are used to help prevent blood clots.
- You will have a Foley catheter. This is a tube that is placed into the bladder to drain urine. The catheter will be inserted after you are asleep in surgery. The Foley catheter will be removed once you are able to get out of bed fairly easily.
- You will have one or more drains (Hemovacs) near your back, front, and/or side incision(s). These drains collect excess bleeding and drainage from under the skin. This keeps your wound from swelling and helps the doctors estimate your blood loss.
- Your diet will be advanced slowly. You will begin with ice chips & sips of water, then advance to a clear diet and then to a regular diet.
- Please remember that during your hospital stay you will have a list of “as needed
medications” or “PRN” meds, as the medical staff refers to, that will always be available to you. These medications will be for symptoms such as muscle spasms, nausea, indigestion, pain and itching. PLEASE speak to your nurse if you have any symptoms that are not being controlled so she can go over the “PRN” med list with you.

- An Incentive Spirometer (IS) is also used to help you measure how deeply you breathe. Make it a personal contest to continue to increase the number reached by the “rising ball” of the device, thus demonstrating improved lung function! Family members, please remind your loved one to use the IS frequently in the hospital.

- You will almost always be asked to sit on the side of the bed and also to get out of bed to stand and/or sit in a chair on the 1st postop day, and to start walking as soon as possible.
- It is very common for the patient to report numbness around the incision(s) after surgery. This is expected with any skin incision and the area of numbness gradually shrinks with time but may take up to 1-2 years.
  - Some patients complain that their feet/legs/back “feel funny” – you may have various feelings or sensations that can’t be explained – if this is the case, normally your body will take care of it over time.

**Pain Management:** Pain is an uncomfortable feeling that tells your body something has happened. Receptor nerve cells in and beneath your skin sense pain and send the “message” of pain to your brain. Pain medicine blocks these messages or reduces their effect on your brain. Some pain is expected and we will do our best to manage it. Too much pain medicine is not good for your heart, lungs, stomach or your brain. If you feel that your pain is not at a manageable level, please tell your doctor or nurse.

After your surgery, you will be on special pain medicines to help keep you comfortable. Morphine and Dilaudid are most commonly used. A special pump, called a Patient-Controlled Analgesia pump or PCA, may be used to administer your pain medicine. **The button is only for your use, not to be pushed by the nurse or your family.** We make sure your PCA is set up so you don’t give yourself too much medicine. Alternatively, you may receive pain medicine by mouth with additional IV medicine given by the nurse if needed.
POSTOPERATIVE INSTRUCTIONS

**Bathing:** If the incision is not draining any fluid, you will be able to shower **5 days** after surgery. Steri-strips are used on the outside of the incision - the stitches underneath the skin dissolve on their own and if they get wet, they dissolve too quickly and wound problems may develop. You may gently wash the area **around** (not over) the incision and pat it dry but no showers for the first 5 days after surgery. **Tub baths are not allowed for 4 weeks.**

**Incision(s):** Generally, patients are sent home with glue or steri-strips (small tape strips) on their incision(s). Family members/caregivers will not need to apply anything to the incision(s) at home, they just need to check them daily to observe for wound problems. Allow the steri-strips to fall off on their own. If they are still there 2 weeks postop someone may remove them.

If you have any drainage, redness, swelling, warmth or increased pain at the incision site, or if you run a temperature >101.5 CONTACT YOUR DOCTOR.

![Incision Image](image1)

**Toileting:** Low toilet seats can make regular toileting very difficult and unsafe for patients who have had back surgery. Depending on the type, location and surrounding area of your toilet, you may be instructed in using a raised toilet seat and/or toilet rails.

**Therapy:** Physical Therapy (PT) will work with you in the hospital on activity and ambulation. Occupational Therapy (OT) will work on bathing/dressing/etc.
Activities:

**Turning in Bed:**
Tighten your stomach muscles. Bend your knees slightly toward your chest. Roll to one side, keeping your ears, shoulders and hips in line. Be careful not to bend or twist at the waist.

**Getting Out of Bed:**
Tighten your stomach muscles. Turn onto your side. Push your body up with one elbow and the other hand. At the same time, gently lower both legs to the floor. Keep your stomach muscles tight.

**Sit Down / Stand Up**
Use your arms to lift up and guide down. Keep your ears, shoulders, and hips in line. Brace your abdominal muscles, bend at the hips keeping your back straight and use your leg muscles to lower / raise yourself onto the front of the chair.

**Standing and Turning**
If you stand for a long time, change your position frequently by shifting your weight from one foot to the other. DON’T TWIST. Turn your whole body as a unit.

**Bending and Lifting**
During the first 6 weeks, avoid bending or lifting anything weighing more than 15 pounds. When you lift something, keep it close to your body so that your leg and arm muscles do the work. Remember to brace your abdominal muscles, stoop at the hips and knees keeping your back straight and the three curves of your spine balanced. This will help prevent pain and further injury to your spine.

**Walking**
Walking is EXCELLENT exercise. Walking helps your pulmonary, cardiovascular and digestive systems. It also prevents blood clots from forming and it increases muscle strength and endurance. Once you are home it is important to continue walking activities.

**Stairs**
Your physical therapist will practice stairs with you before you go home. You should use a handrail when possible. Never use a walker on the stairs. Your therapist may have special instructions for you depending on your home environment and physical abilities.
Getting in and out of the car: The car should be mid-size or larger. DO NOT attempt to get into the back seat of a compact car (2 doors). The patient should sit in the front passenger seat slightly reclined and as far back as possible.

- **To enter the car:** Walk up to the passenger door, turn and back up until you feel the car behind your legs. Reach back and place your left hand on the dashboard or car door and place your right hand on the back of the front seat. Bend your legs and gently sit down. Scoot hips back and slowly turn your body as you put your legs inside the car.

- **To exit the car:** Gently turn your body while placing your legs outside the car. Scoot forward until your feet are on the ground. Push up to a standing position by placing your arms on the dashboard or car door and back of the seat.

Driving: You may ride as a passenger whenever you feel you can tolerate this activity. You should sit in the front passenger seat, slightly reclined if possible. It is suggested that you start with short distances, or on longer trips allow breaks to stop and walk around. Driving is generally permitted approximately 4-6 weeks after surgery if you are off of the stronger pain medication.

When driving home postoperatively, it is recommended that you stop every 1-1 ½ hrs and get out of the car and walk in order to get your heart pumping and your blood circulating (this will prevent blood clots from forming).

You should not drive while taking strong pain medications.
HOME AFTER SURGERY

Your First Few Weeks
You should feel a little stronger each day. Keep moving as much as you can without increased pain. Walking is the best and only exercise you will perform. Usually you are able to return to desk-type work by 6 weeks postoperatively depending on your progress and the magnitude of surgery. We recommend half days for the first couple weeks.

Six Weeks and After
By about the sixth week, your back is well on the way to healing. If you’re using correct posture and movements and exercising regularly, you should feel better and be able to do more each week. Continue to let pain be a warning to slow down.

Preventing Setbacks
Increased pain for more than two hours after an activity usually means you’ve done too much too soon. Don’t just reach for the pain pills. Take pain as a warning sign to slow down and pay attention to your posture and movements. Make sure you’re bracing your abdominal muscles and keeping your ears, shoulders and hips in line.

Sexual Relations
Lying on your back so you have the support of the mattress is preferable. Side-lying positions may be more comfortable since you won’t bear any weight. Avoid arching your back. Avoid a lot of back motion or stress on your spine.

Pets
If you have pets you may need assistance to care for them after surgery. You will not be able to lift heavy bags of dog/cat food or bend down to the floor to fill their dishes. You will not be able to walk your dog using a leash if it is a large dog that pulls. Too often a dog will take off and jerk you as you try to hold onto the leash and that can cause injury to your spine. Also, it is very easy to trip over your pet. Please make arrangements for assistance with pet care after your surgery.
POST-OPERATIVE MEDICATIONS

Narcotics: You will be given prescriptions for pain medication when you are discharged. Take all medication as directed and wean off the narcotics gradually. If you were taking narcotics preoperatively, do not take those with the prescriptions given to you by Dr. O’Neill. It is recommended that you wean your narcotic use slowly and not abruptly. If you are taking 2 narcotic tablets every 4 hours PRN, wean to 1 tablet every 4 hours, then 1 tablet every 5 hours and so on until you are able to stop narcotics all together. You may be given specific weaning instructions when you are discharged.

Bowel Regimen:
- You may be given a prescription for a stool softener/laxative combination (e.g. Senna-S)
- If it has been 3 days since your last bowel movement, increase the Senna-S to 2 tablets twice a day. (This is the maximum dose allowed.)
- If you do not have a bowel movement for 5 days, take Miralax as directed in addition to the Senna-S.
- If you have not had a bowel movement for 6 days, take a suppository as directed on packaging.
- If no bowel movement for 7 days postop use a Fleets Enema - dosing per package
- If this does not give you results, contact our office for further instructions.
- If at any time you are nauseated, have vomiting, abdomen is swollen and hard and/or you have severe abdominal cramping, please contact our office immediately.

Acetaminophen (Tylenol): Today more than 600 over-the-counter (OTC) and prescription (Rx) medications contain Acetaminophen or Tylenol. Some patients exceed the recommended dose either by accidentally taking multiple acetaminophen-containing products without realizing it, or by not following dosing instructions. The liver warning on the OTC label states that severe liver damage may occur if more than 4,000 mg of Acetaminophen is taken in a 24 hour period. Narcotics such as Percocet, Vicodin and Norco have Acetaminophen (Tylenol) in them, either 325 mg or 500mg per tablet. It is VERY important that you are aware of the dosage and do NOT combine it with other products containing Acetaminophen.

NSAIDS: Do not use any NSAIDs (Non-steroidal anti-inflammatory medications) such as Ibuprofen, Motrin, Advil, Aleve, Celebrex, etc. for a minimum of 6 months postop. These medications slow the fusion healing process. Tylenol is suggested once narcotics are no longer needed.

Bone strengthening medication: Forteo may be resumed 1 week postop, Fosamax and Reclast may be resumed at 3 months postop.
GLOSSARY OF TERMS

**Anterior** - The front portion of the body. It is often used to indicate the position of one structure relative to another.

**BMP** – Bone morphogenetic protein. A genetically engineered bone substitute (protein) that helps your bones fuse. Used in combination with your own bone. BMP is not yet FDA-approved for all types of surgery, but surgeons may use the medicine for whatever application they feel is appropriate for the patient. This is called using it “off-label”. We are actively studying this medicine to see how effectively it works. Clearly all data and our experience shows that it is very safe. Currently BMP is FDA-approved for use in the anterior spine with cages. Use of the product posteriorly is “off-label”.

**Bone Graft** – Bone, which is harvested from one location in an individual and placed in another individual (allograft bone) or in a different location in the same individual (autogenous bone)

**Cervical Spine** – Seven spinal segments (C1-C7) between the base of the skull (occiput) and the thoracic spine.

**Coccyx** - The region of the spine below the sacrum, also known as the tailbone.

**Decompression** – This procedure is carried out to relieve pressure on the spinal cord or nerve roots. The pressure may result from fracture fragments, disc fragments, bone spurs, tumors or infections.

**Decompression Laminectomy** – A posterior approach decompression done by removing the lamina and spinous process.

**Disc Degeneration** – The loss of the fluid content, structure and functional integrity of the disc.

**Discectomy** – The excision of the intervertebral disc material that may be described as herniated, implying “bulging” or “ruptured” through the ligaments. If the central fragment of disc material has torn through a hole in the ligament, it is called an extruded fragment or extruded disc. The term herniated nucleus pulposus (HNP) is a catchall phrase for all of these conditions.

**Facet** – A posterior structure of a vertebra which articulates with a facet of an adjacent vertebra to form a facet joint that allows motion in the spinal column. Each vertebra has two superior and two inferior facets.

**Foramen** – An opening allowing for the emerging of spinal nerve roots between two vertebrae.

**Foraminotomy** – A procedure carried out in conjunction with disc surgery. The foramen (openings for the individual nerve roots to pass from the spine) may become narrowed because of disc impingement, intervertebral collapse, and spondylolisthesis. The surgical widening of the foramen is an attempt to relieve the pressure on the nerve roots.
**Fusion** – The uniting of two bony segments together to remove motion, relieve pain and prevent deformity progression.

**Iliac Bone** – A part of the pelvic bone that is above the hip joint. Using iliac bone graft is not commonly done anymore.

**Internal Fixation** – The immobilization of bone fragments or joints with implants (metal screws, rods, etc.) in order to promote healing or fusion.

**Interspinal or intervertebral disc** – The structure that normally occupies the space between two moving vertebrae. It is more prominent in the cervical and lumbar spines. It is much like a radial tire. The centermost portion of the disc (nucleus pulposus) is normally composed of a clear gelatinous material that varies in consistency from a firm jelly material to a very thick and less pliable substance. This core is then surrounded by numerous layers of fibrous (fibrocartilaginous) material called the annulus fibrosus. That structure goes to the normal margins of the vertebral body. There is a thick ligament (approximately 2mm) that covers the anterior part of the vertebral body called the anterior longitudinal ligament, and on the spinal canal side posteriorly is the posterior longitudinal ligament.

**Kyphosis** – The normal forward curvature of the thoracic spine. The condition “kyphosis” refers to an abnormal increase in this forward curvature.

**Lamina** – An anatomical portion of a vertebra. For each vertebra, two lamina connect the pedicles to the spinous process as part of the neural arch.

**Laminectomy** – An operation for removal of part or all of the lamina of a vertebra commonly performed in order to be able to remove an intervertebral disc protrusion or to decompress a nerve root.

**Lordosis** – The normal mild “swayback” curve of the lumbar spine.

**Lumbar spine** – Five mobile segments of the lower back (L1 to L5). These are the largest of the vertebral segments and provide most of the bending and turning ability of the back, in addition to bearing most of the weight of the body.

**Nerve Root** – The portion of a spinal nerve in close proximity to its origin from the spinal cord.

**Pedicle** – The part of each side of the neural arch of a vertebra. It connects the lamina with the vertebral body.

**Posterior** – Located behind a structure, such as relating to the back side of the body.

**Pseudarthrosis** – an area of the spinal fusion where the bone did not heal (fuse). Often found with broken instrumentation and, in some instances increased pain, although not always.
Sacral spine – (sacrum) - The five fused segments of the lower spine that connect to the pelvis and have four foramen on each side.

Sciatica – A lay term indicating pain along the course of a sciatic nerve, especially noted in the back of the thigh and below the knee.

Spinal Canal – The long canal between the vertebral bodies anteriorly and the lamina and spinous processes posteriorly through which the spinal cord passes. The spinal cord and nerve roots extend to the level of the second lumbar segment in adults. Below this level are numerous nerve roots from the spinal cord that resemble a horse’s tail and is referred to as such (cauda equina). The thick outer covering of the spinal cord is called the dura.

Spinal Fusion – A surgical procedure to permanently join bone by interconnecting two or more vertebrae in order to prevent motion.

Spinal Stenosis – Reduction in the diameter of the spinal canal due to arthritic overgrowth of bone and soft tissue, which may result in pressure on the spinal cord or nerve roots.

Spinous Process – The portion of the vertebrae that protrudes posteriorly from the spinal column. The spinous processes create the “bumps” felt on the midline of the back.

Spondylolisthesis – A defect in the construct of bone between the superior and inferior facets with varying degrees of displacement so the vertebra with the defect and the spine above that vertebra are displaced forward in relationship to the vertebrae below. It is usually due to a developmental defect or the result of a fracture.

Spondylolysis – (also referred to as a stress fracture or a pars fracture) - Fracture of a posterior portion of the vertebra. A defect in the neural arch between the superior and inferior facets of vertebrae without separation at the defect and therefore no displacement of the vertebrae. It may be unilateral or bilateral and is usually due to a developmental defect but may be secondary to a fracture.

Thoracic (dorsal) spine - Twelve spinal segments (T1-T12) incorporating the 12 ribs of the thorax. Other than a slight increase in size from top to bottom, they are fairly uniform in appearance.

TLIF – Transforaminal Lumbar Interbody Fusion – a way to do an anterior fusion (front of the spine) from a posterior approach. Usually performed in the lower lumbar spine (i.e. L4-5, L5-S1).

Vertebra – One of the bones of the spinal column. A cervical, thoracic, or lumbar vertebra has a cylindrically shaped body anteriorly and a neural arch posteriorly (composed primarily of the laminae and pedicles as well as the other structures in the posterior aspect of the vertebra) that protect the spinal cord. The plural of vertebra is vertebrae.