

Preparing for Spinal Surgery A Guide for Patients and Families

If you or a member of your family have a spinal deformity, such as scoliosis or kyphosis, which requires spinal surgery, you probably have questions and concerns. We have prepared this guide to help answer many of your questions. In it we explain the common surgical treatment for scoliosis, how to prepare for the surgery, and what to expect afterwards.

Your orthopaedic surgeon and the nurses at the hospital are ready to answer questions and will help you understand your particular treatment. Every patient and every spinal deformity is different. Remember, no question is too simple to ask. The doctors and nurses at Wake Forest University Baptist Medical Center are here to care for you and your family.

What is a Spinal Fusion?

The goal of most spinal surgery is a solid "fusion" of the curved part of the spine. The fusion is created by operating on the bones of the spine, adding bone chips, and allowing the vertebral bones and bone chips to slowly heal together to form a solid mass of bone. The bone chips may come from your hip (iliac crest) or from the hospital's bone bank. Often the spine is also partially straightened with internal metal rods and wires. The rods and wires and sometimes a brace or cast hold the spine in place until your fusion has a chance to heal. The rods can be left in your back without causing any problems.

M E D I C A L C E N T E R

Getting Ready for Surgery

Planning Ahead

Planning for your return home must begin even before you are admitted to the hospital. After surgery you will need help taking care of yourself. Plan ahead with your family and arrange to have a parent or relative stay at home to help you for the first few weeks. If you have surgery during the school year, ask your surgeon how long you'll be away from school. Before you come to the hospital, you or your parents should make arrangements for a tutor to visit you at home after you are discharged. Call your local school system to arrange this. If your spinal fusion is for idiopathic scoliosis, you'll probably be ready to return to school six weeks after your operation.

Donating Blood

Blood transfusions are often needed during spinal surgery.

Autologous Donations

When your surgery is scheduled, your surgeon may suggest that you donate blood for yourself (called autologous blood) before the operation. When you need a transfusion during or after surgery, you can thereby receive your own blood. If you give blood before surgery, your surgeon will prescribe iron pills to replace this important element which makes up part of the blood. Since the body replaces blood very quickly, you can donate it and still be ready for surgery soon after. Contact your surgeon's office to arrange autologous blood donations. Most local Red Cross chapters and hospitals offer this service and will send your blood to Wake Forest University Baptist Medical Center before your surgery.

Designated Donations and the Blood Bank

If you are too small (less than about 90 pounds) or don't want to donate your own blood, friends or relatives may donate their blood at the Red Cross. If their blood matches yours and meets special standards, it can be used for your operation. This type of donation, called a directed donation, must be arranged ahead of time and blood donated 7 to 42 days before the operation. Properly matched blood is also available from the Wake Forest University Baptist Medical Center Blood Bank, and has proved as safe as directed donations.

Aspirin and Other Medications

Aspirin, Bufferin and non-steroidal anti-inflammatory medications such as Advil, Ibuprofen, Motrin, Nuprin, or Naprosyn may cause extra bleeding at the time of surgery. Many headache, backache or other pain medications may contain these drugs. If you are unsure of whether you should stop a medication, consult your doctor or nurse. Tylenol or Acetaminophen may be used safely.

What to Bring to the Hospital

Things to bring to the hospital include: underwear, long, snug cotton T-shirts to wear under a brace if you will be wearing one; loose, comfortable clothing; your comb or brush; conditioner for your hair if you normally use it; and, if you wish, your own pillow and a radio with a headset. Please do not bring large or valuable items.

Visiting

Parents are welcome to visit anytime, and one parent may stay overnight with you if you wish. If you are in the intensive care unit, your parent may sleep in a nearby

room provided for families. On the regular orthopaedic unit, a chair that opens into a cot is available for one parent at each bedside. You might want to talk over visiting and overnight plans with your parents before your hospital admission. All patient rooms are private or semi-private. (You might have one roommate.) Children and teenagers with special needs because of illness or other circumstances are given priority for private rooms.

Pre-Op Clinic

An appointment will be made for you at the Pre-Op Clinic several days before surgery. At the Pre-Op Clinic you will have a blood test, a urine test, and x-rays, if required by your surgeon. You will also speak with an anesthesiologist who will explain the special medications used to keep patients pain-free and in a deep sleep during surgery. In the Pre-Op Clinic, the anesthesiologist will talk to you about the pain medication you will receive after surgery and will tell you about a system called patient-controlled analgesia (PCA) which you may be able to use after your surgery. In the PCA system pain medication contained in a small pump is connected to one of your intravenous lines (IVs). With PCA, you give yourself your own pain medicine by pressing a button attached to the pump. There are lockouts (limits) to the amount of medication to make sure you receive the right amount. No one ever feels any part of surgery. In the Pre-Op Clinic a Physician Assistant will ask you questions about your health history, explain your hospital stay, and answer your questions. You may need pulmonary function tests to measure how well your lungs expand. After your tests and your visit in the Pre-Op Clinic, you may visit the Orthopaedic Clinic to be examined by an orthopaedic surgeon. The doctor will explain more about your surgery and also answer your questions.

The Night Before Surgery

The night before surgery, you will sleep at home or nearby the hospital. Remember, not to eat or drink after midnight (12 a.m.) the night before surgery, not even water, and nothing when you wake in the morning. Chewing gum and candy are not allowed. This is for your safety. It's important to have an empty stomach before anesthesia and surgery to prevent vomiting.

The Operation

On the morning of your surgery, you will return to the Pre-Op Clinic. there you will change into a hospital nightgown and one of the clinic staff will bring you and your parents to the Pre-Op Waiting Area.

Pre-Op Area

In the Pre-Op Waiting Area you will talk with a nurse. While you are in the Pre-Op Waiting Area, the anesthesiologist starts an IV in your arm or the back of your hand. To do this, he / she uses a needle but removes the needle once the IV is in place, leaving a small plastic tube inside your vein. Fluid and medicine flow into our bloodstream through this plastic tube. Before surgery a technician may attach electroencephalogram (EEG) leads with glue (small cups with wires attached) onto your scalp so the neurologist can watch your brain waves during surgery. The glue may feel wet and messy, but this procedure is painless. Your parents will meet the surgical liaison either in the Pre-Op Waiting Area or in the family waiting area. During surgery the liaison nurse checks with the operating room about every hour and a half for progress reports and then shares this information with your parents. When your surgery is finished and you are in the recovery room, this nurse will bring your parents to see you.

The Operating Room

When you are brought into the operating room the anesthesiologist will give you medicine through the IV, and you will fall into a deep sleep. When you are asleep, he / she will put a small tube in your throat through your mouth and into your airway to deliver oxygen and anesthesia gases to your lungs. The tube is usually taken out before you wake up after surgery. Sometimes it causes a sore throat after surgery, but usually you never realize it was there. (If you have a special type of scoliosis and need help breathing after the operation, the tube may be left in after surgery until you are ready to breathe on your own.) After you are asleep in the operating room, the anesthesiologist starts a second IV and an arterial line (A-line). An A-line is like an IV, but it goes into an artery in your wrist and is used to draw blood samples. Because your stomach is empty and asleep from anesthesia, you need a nasogastric (NG) tube to drain your stomach juices. The NG tube goes through your nose and down your throat into your stomach. It is placed while you are asleep. The tube is as small as a straw, but it may feel uncomfortable when you wake up. Since you receive extra fluid through the IV during surgery, the doctors and nurses measure the amount of urine your kidneys produce. While you are asleep, a nurse puts a urinary catheter (a thin flexible rubber tube) into your bladder through your urethra, the small opening through the tube which your urine flows. Your urine drains out of your body through the tube and into a plastic pouch, and you won't need to use the bathroom for a few days. (Remember: all these tubes except for one IV are placed after you are asleep, and removal later will not be painful.)

The Spinal Fusion

The most common operation for scoliosis is a posterior fusion, but some patients require an anterior fusion or sometimes both an anterior and posterior fusion.

Posterior Fusion

If you are undergoing a posterior fusion (the spine is operated upon from behind), your incision (cut) will run straight down the middle of your back. The incision length varies depending on how much of your spine is fused, and your surgeon will explain your particular operation. To hold the spine straight surgeons use one or two metal rods and hooks and / or wires. There are several types of instruments named after the surgeon or hospital who designed them: Harrington, Luqué, Cotrel-Dubousset (CD), Texas Scottish Rite Hospital (TSRH), and Drummond. Your surgeon will also take small pieces of bone from your hip (the bone grows back later) or freeze-dried, bone-bank bone and place them along your spine. This is called a bone graft. The graft grows together with your spine and becomes solid, preventing further curvature. If you have a hip graft, you will have an incision over the hip where the graft is taken.

Anterior Fusion

If you have an anterior fusion (the spine is operated on from the front), you will have one of two possible incisions. When the operation is only on the thoracic spine, the incision will be on one side of your rib cage from back to front. When the operation is on both the thoracic and lumbar spine, the incision will be across your lower rib cage and down the front of the abdomen. The surgeon may use screws with staples and a rod to hold your spine straight. Some fusions of this type are called Dwyer, Zielke, or TSRH anterior fusion. If your surgeon opens your chest cavity during the spinal fusion, you will need a "chest tube" to drain the fluid that collects outside your lungs and to keep your lungs expanding properly. The chest tube is covered by a bulky bandage (dressing) and is attached to a plastic container which collects the drainage. It remains in place for two days and is easily removed by our surgeon.

Anterior and Posterior Fusion

Some special cases of scoliosis require both anterior (front) and posterior (behind) operations. Usually, these can be done on the same day, but sometimes must be done at separate operations spaced one to two weeks apart. Your surgeon will decide this before your admission.

Wake-Up Test

During surgery you undergo a "wake-up" test to check the function of the nerves in your back that control movement in your legs and feet. This lasts for a few seconds and is not painful. No one ever remembers the test. The anesthesiologist temporarily decreases the amount of medication you receive, and asks you to wiggle your toes. You will then go back into a deep sleep for the rest of your operation.

Bandage

At the end of the operation your surgeon puts a bulky, soft bandage over the incision. This bandage usually remains in place for three to five days.

After the Operation

The Recovery Room (PACU)

When you arrive in the Post Anesthesia Care Unit (PACU) after surgery, you will feel groggy and sleepy. You may not remember the PACU, because you will be slowly waking up from the anesthesia.

A nurse will be with you checking your blood pressure, heart rate, and breathing, and asking you to take deep breaths while she / he listens to your lungs. The nurse will also ask you to wiggle your fingers and your toes. Over your nose and mouth or near your face, an oxygen mask will gently blow a cool mist of oxygen-rich air mixed with tiny water droplets.

If you are feeling pain, the PACU nurse will give you pain medicine through the IV. Your IVs, NG tube, and urinary catheter will still be in place. Soon after you arrive in the recovery room, a technician may take x-rays to check the rods and hooks in your back.

When the nurse has you settled in the PACU, she / he will ask your parents to visit for a few minutes. After a stay of an hour or two in the PACU, most patients usually go to the ICU.

The Intensive Care Unit (ICU)

In the ICU you will feel very groggy, and you may not remember much about this time later on. You will probably feel some pain or discomfort in your back, and the nurses will continue to give you pain medication through the IV. Your oxygen mask remains in place in the ICU and nurses listen to your chest frequently and ask you to take deep breaths to clear your lungs. The nurse also encourages you to use a breathing machine, called the spirometer, which helps you take deep breaths, you should use it every hour while you are awake. Before surgery your nurse may help you practice with the spirometer.

The nurse checks your IV frequently. The IVs replace fluids, give blood if needed, and administer medications. To check function and sensation, your nurse will also ask you to wiggle your toes and move your feet frequently and will gently squeeze your toes to check your feeling in them. Right after surgery you will lie on your back for

a few hours. After that it is important that you change your position every few hours. When you need to turn on your side or back, call your nurse to assist you into a comfortable position.

In the ICU your NG (nasogastric) tube will remain in place emptying your stomach since your stomach takes longer to "wake up" than you do. When your stomach begins to gurgle, a sign that it is functioning again, your nurse will remove the NG tube and give you sips of fluid. This usually happens on the second or third day after surgery. In the ICU your urinary catheter remains in place in your bladder. Your urine drains out of your body into a container and will be measured and discarded by the nurse. Those who spend time in the ICU usually return to the regular orthopaedic unit on the first or second day after spinal fusion. Your orthopaedic surgeon will decide when you are ready.

Return to the Orthopaedic Unit

When you are transferred to the orthopaedic unit, your IV and bulky back bandage will still be in place. Most likely, your urinary catheter (draining your urine) will also remain in place, along with your NG tube (draining your stomach) and oxygen mask. If you underwent an anterior (front) spinal fusion your chest tube may still be in place. Remember, each person is different.

Pain Medication

Your nurse checks your vital signs and the warmth and feeling in your feet regularly. If you feel pain or discomfort, ask her for medication. You will be able to receive an injection of pain medication every three to four hours. If you are receiving pain medicine through the PCA (patient-controlled analgesia) pump, you can give yourself pain medication whenever you feel you need it up to a pre-set amount. Some patients worry that they will become addicted to pain medication and try to avoid it. Since you need strong drugs for only a short time after surgery, addiction is not a problem. In fact, pain medicine helps you to move freely and breathe more deeply, thus promoting healing and recovery. Once you begin to drink and eat small amounts of food, you will take pills instead of injections for pain.

Lungs

Your nurse checks your lungs and breathing every few hours. To keep your lungs clear and well expanded you need to take deep breaths and use the spirometer every one to two hours while you are awake. Eventually, your lungs stay clear, and you can use the spirometer just for fun. If you have a chest tube, it will probably be removed several days after you return to the orthopaedic unit. After the chest tube is removed an x-ray is taken to check the expansion of your lungs.

Activity

When you return to the orthopaedic unit you may still feel weak and need help turning from side to side. If your surgeon allows it, you may raise the head of your bed to watch television. When your surgeon says you may get out of bed, nurses will help you to sit up in a chair. Some patients are up the day after surgery, and others have to wait a few days. The pace of recovery usually depends on the type and extent of the spinal fusion and your previous health. Those with certain types of scoliosis may need to stay on bed rest until a cast or brace is ready. Gradually, you will increase the amount of time you sit up, and then slowly you will start walking. A physical therapist will work with you to teach you the correct way to get out of bed and walk without twisting your spine. Getting out of bed for the first time can be uncomfortable, but it gets easier with time.

Eating

Your IV remains in place for a few days, so your body receives enough fluids while you are unable to drink very much. Your IV is removed after you are drinking fluids, no longer need medication through it, and no longer need blood transfusions. Except for the tug of the adhesive tape, IV removal doesn't hurt.

When your digestive system is working again and your NG tube is removed, you will be given sips of fluid. At first the nurse will give you water and ice chips. Go very slowly. Remember, your stomach has been empty. It may take several weeks for your appetite to return to normal. Try eating six small meals instead of three large ones each day. Ask your nurse which foods are best to eat.

After you are eating again, you'll need to move your bowels. At first, this can be difficult since you have not been eating regularly. Your nurse may give you a laxative or suppository to help you move your bowels. A few days after your surgery your urinary catheter is removed. (This isn't painful.) In a few hours you will feel your bladder fill up and will need to use the bedpan or urinal. When you are allowed out of bed, you may use the bathroom.

Showering

The bulky bandage on your back may be changed to a smaller bandage after your return to the orthopaedic unit. After this the nurse checks your incision and changes your dressing as needed to observe the healing. Usually, you can take a shower five days after surgery.

Brace

Your surgeon will decide if you need a brace after your spinal fusion. If you do need one, the nurses will spend time with you and your family teaching you about brace

care. If you have idiopathic scoliosis and a posterior fusion you will probably not need a postoperative brace. If you have idiopathic scoliosis and have an anterior fusion alone, you probably will need a postoperative brace for six months.

Post-Operative X-Rays

When you are feeling better, your surgeon may send you for spinal x-rays to check for proper alignment of your fusion.

Going Home

When you begin walking around, going up and down stairs, eating normal food, and feeling much less pain in your back, you'll start to think about going home.

Your surgeon will tell you when you can expect to go home about a day ahead of time. Your nurse will give you and your family important instructions on how to care for your brace, how to manage your diet and medications, how to care for your incision, what problems to watch for, and when to call the doctor. Generally, no special equipment is needed at home. If you live more than one hour away from the hospital, arrange for a vehicle that you can lie down in on the ride home.

Your strength will return gradually after surgery, but you may be able to walk, sit and shower daily right away. Plan to walk every day, increasing the distance as you feel stronger, but check with your surgeon before participating in other activities. Ask your surgeon when you may return to specific sports (usually not before six months after the operation).

You will not be able to return to school or work right away, but your surgeon will let you know when you can. As mentioned earlier, you will need to arrange for a tutor at home through your local school system.

Before you leave the hospital, please schedule a follow-up visit with your orthopaedic surgeon. If you have any questions when you return home, call your surgeon or your nurse from the orthopaedic unit.

Glossary of Terms

- **Anterior Fusion-** fusion performed on the front of the spine, usually by replacing intervertebral discs with bone chips.

- **Autologous Blood Donation-** blood donation by the patient for use by the patient during a future operation.
- **Bone Age-** an x-ray of the left hand and wrist is compared to the average appearance of the bones at different ages. An estimate of remaining growth is obtained.
- **Bone Bank Bone-** bone graft obtained from donors.
- **Bone Graft-** pieces of bone used to create a fusion. Bone graft is obtained from the patient's iliac crest, ribs or from the bone bank.
- **Boston Brace-** a type of spinal orthosis (brace) developed at the Children's Hospital of Boston. The Boston Brace System starts with prefabricated, symmetric spinal orthotic modules of different sizes. Individual braces are customized to fit a particular patient's body shape and spinal curvature. The brace or orthosis is designed according to a "brace blueprint" drawn from the spinal x-ray. The Boston Bracing system is commonly used throughout the United States and Europe.
- **Brace-** a semi-rigid plastic (and sometimes metal and leather) device which pushes on the muscles and ribs adjacent to the spinal column. The brace (also called an orthosis) is designed to lessen the abnormal spinal curvature while worn.
- **C-D Rods-** Drs. Cotrel and Dubousset designed this popular form of spinal instrumentation, which was the first type of rod system to use multiple hooks on one rod which could be turned in either direction. C-D, TSRH, and other similar systems are popular because they offer more strength of fixation, more points of attachment to the spine and can help preserve or restore normal spinal contours of thoracic kyphosis and lumbar lordosis.
- **Designated Blood Donation-** blood donated by family or friends for use by a patient during a future operation.
- **Disc-** the intervertebral disc is a strong, rubbery and gelatin-like structure which normally separates the individual vertebral bodies and allows movement between them. Discs are usually removed from the portion of the spine undergoing anterior fusion and replaced with bone chips to create a fusion.
- **Endotracheal Tube-** a tube which passes through the mouth into the trachea (breathing tube or airway), and is used to provide anesthesia and air during an operation.
- **Foley or Urinary Catheter-** a tube which is placed in the bladder to allow

drainage of urine.

- **Fusion-** a continuous mass of bone which solidifies and immobilizes the desired part of the spine. A fusion is created by adding bone graft to the surfaces of vertebra and then immobilizing that part of the spine with instrumentation or with a cast. A solid fusion cannot bend or curve as time passes.
- **Harrington Rod-** designed by Dr. Harrington, the Harrington rod was the first modern means of spinal instrumentation which reliably produced correction and immobilization.
- **Hook-** a hook is that portion of the spinal instrumentation which grasps the vertebra.
- **I.S.I.S.-** a computerized system used to document the three-dimensional contour of the spine using light beams and a scanning device.
- **ICU-** Intensive Care Unit
- **Iliac Crest-** the iliac crest is the large flat portion of the pelvis bone from which the bone graft is taken.
- **Incision-** the cut made through the skin for the purposes of operation.
- **Inclinometer-** a simple device using a level to measure the "rib hump". Useful for detecting and screening for scoliosis.
- **Instrumentation-** the metal rods, hooks, screws, etc. which are attached to the spine to change spinal shape and immobilize the spine while fusion occurs.
- **IV-** the intravenous line delivers fluid and medicines through a hollow tube inserted in a vein.
- **Kyphosis-** curvature of the spine with the convexity pointing toward the back. It is normal to have some kyphosis in the thoracic (chest area) spinal column. Sometimes there is too much kyphosis in the thoracic spine, called "hyperkyphosis", Scheurmann's kyphosis, or "round back". When there is not enough kyphosis in the thoracic spine (as is usually the case with idiopathic scoliosis), it is called thoracic hypokyphosis.
- **Lordosis-** curvature of the spine with the convexity toward the front. It is normal to have lordosis in the cervical (neck) and lumbar (waist area) portions of the spine.
- **Luqué Rods, Wires-** named for Dr. Luqué, these spinal rods use sublaminar

wires (looped around the back part of each vertebra) for attachment. Luqué type instrumentation is commonly used in paralytic scoliosis such as that seen in cerebral palsy.

- **Milwaukee Brace**- the Milwaukee Brace was the first modern spinal orthosis used for scoliosis, and in its modified form, is still used for Scheurmann's kyphosis and some spinal curves.
- **Moiré Photograph**- Moiré photography uses light projected through a grid and then photographed to record the three-dimensional shape of the back.
- **NG Tube**- the nasogastric tube passes through the nose down the back of the throat and into the stomach to drain fluid from the stomach after an operation.
- **Orthosis**- a spinal brace.
- **PACU**- post-anesthesia care unit - the recovery room.
- **Posterior Fusion**- a fusion performed on the posterior or back surface of the spine.
- **Rib Hump**- the prominence formed by ribs on the convexity of a curve, caused by rotation of the spine and attached ribs.
- **Risser Sign**- the top of the pelvis bone matures in predictable stages referred to as Risser stages. These give some indication of growth remaining in the spine.
- **Scoliometer**- a simple instrument used to measure the size of the rib hump. Frequently used for scoliosis screening and follow-up.
- **Scoliosis**- lateral (sideways) curvature of the spine greater than 15 degrees. (Fifteen degrees or less of sideways curvature in adults is probably normal and should probably not be called scoliosis).
- **Skeletal Maturity**- when the bones (and spine) are finished growing, skeletal maturity has been reached.
- **Spinal Column**- the spinal column is composed of individual vertebral bones, ligaments, and discs. It surrounds the spinal cord.
- **Spinal Cord**- the spinal cord travels through the spinal column and consists of nerves which carry and receive signals to and from the arms, legs, and many internal organs.
- **Sublaminar Wires**- See Luqué Instrumentation.

- **TLSO (Thoraco-Lumbar-Sacral-Orthosis)**- a brace or spinal orthosis which does not extend above the shoulders.
- **TSRH Rods**- similar to C-D rods, named after the Texas Scottish Rite Hospital.
- **Vertebra**- individual bones which comprise the spinal column.
- **Vertebral Body**- the front portion of the individual vertebra.



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M E D I C A L C E N T E R