



Scoliosis Surgery

Preparing for surgery and a hospital stay

Children with curves greater than 50 degrees may need surgery. This handout will provide you information on what to expect before, during and after scoliosis surgery.



The goal of scoliosis surgery is to stop the curve from getting worse and if possible to straighten it. The type of surgery done depends on many factors, including the type of scoliosis that your child has, their age, and the shape and location of the curve.

What types of surgery are done for scoliosis?

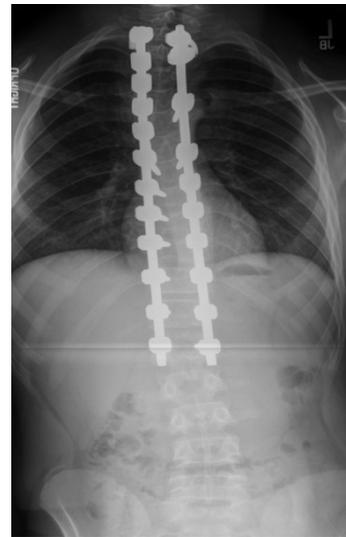
Spinal Instrumentation

Spinal instrumentation uses devices – most often rods, hooks, screws or wires – that can be attached to the spine. These devices are usually made of titanium, cobalt-chrome or stainless steel. By using instrumentation, the spine can be manipulated to a more normal alignment and held in that position for the spine to fuse. Most curves cannot be made completely straight. Between 50 and 80 percent correction is common.

In most cases the instrumentation is left in place forever. If it is removed, some of the curve may come back. Most people do not have pain from the instrumentation.



**Before
Instrumentation**



After Instrumentation

Growing Rods

In most cases instrumentation is done with a fusion (see below). In young children who still have a lot of growth left, instrumentation is sometimes done without doing a fusion (which will stop spinal growth) of the spine. This is called a “Growing Rod” technique. The rods will need to be lengthened as your child grows. Sometimes a special rod with a magnetic device that can be lengthened without surgery is possible, but not always. “Growing Rods” are not usually considered if only a small amount of growth is likely.

VEPTR is a type of growing rod that can be attached to the ribs instead of the spine. It is used mostly for young children who have rib cage problems associated with their scoliosis. The surgical applications of staples or screws (with a tethering device) to the front of the spine are other procedures that are being investigated for the growing spine. The long-term results of these procedures are not yet well known.

The Spine Surgeons and Pulmonary team at Seattle Children’s Hospital are involved with a National Study Group looking at the treatments for early onset scoliosis. Your surgeon will discuss these options with you if your child requires surgery.

Spinal Fusion

Spinal fusion is the process of making separate vertebrae grow together to form one continuous bone. Fusion is done by removing the cartilage and joints between the vertebrae, and placing bone graft (extra bone) between the vertebrae. Over time the body will hopefully grow bone between the vertebrae to form one continuous bone instead of two or more separate bones.

The process of fusion takes between 3 and 9 months. During this period you might be asked to limit sports and heavy lifting to prevent instrumentation from loosening. In special cases a brace may be used for more protection.

When fusion is complete, there is no longer any motion between the vertebrae that are fused. This will stop further deformity of the spine. It will also stop the growth in the part of the spine that is fused.

Most of the time, only the vertebrae that need to be fused to straighten the spine are fused. The rest of the vertebrae can still move. When bending forward, most of the motion happens through the hip joints, and a small amount through the spine. After a fusion your child will still be able to bend forward enough to function normally. At first, the motion in the back will seem limited and may feel awkward. Your child will adapt to the change in body position and function within a few months to a year. Most children who have a spinal fusion are able to do all of the same activities they did before without difficulty. It is not common to need physical therapy after surgery. Some activities that require exceptional spinal flexibility may be more difficult after spine fusion, such as gymnastics. Severe scoliosis curves that have not had surgery will also cause stiffness of the back in the future.

What types of surgeries are done for scoliosis?

- **Posterior Fusion** is done through an incision in the back. The bones and joints behind the spinal canal are fused, and the disc spaces (in front of the spinal canal) are left alone.
- **Anterior Fusion** is most often done through an incision on the side of the body. The discs are removed and replaced with bone graft. The bones are fused in front of the spinal canal.
- **Anterior and Posterior Fusion** may be needed in cases of severe spinal deformity.
- **Posterior Interbody Fusion** is the method of fusing the front of the spine through an incision in the back (posterior). The discs are removed and bone graft is placed in the front of the spine. This requires moving the nerves, or going around the spinal cord, but can avoid a separate incision on the side or abdomen.
- **Osteotomy** is when a wedge of bone is taken out of the front, back or side of the spine to correct very stiff or severe curves.
- **Spinal Decompression** is when bone or soft tissue is removed to take pressure off of the spinal cord or nerve roots. It is very uncommon in children with idiopathic scoliosis.
- **Vertebrectomy** is the complete removal of a vertebra bone. This procedure is not usually done to treat idiopathic scoliosis.

What are possible complications of surgery?

The chance of a major complication which would lead to long-term problems is very low, but not impossible. The chance of a full recovery is very high. The most common complications are:

- **Additional surgery** – There is a possibility that another surgery could be needed in the future.
- **Arthritis** – Can occur above or below the fusion, due to long-term wear and tear. Individuals with scoliosis who have not had a fusion also frequently develop arthritis in the spine as they age.

- **Blood transfusion** – Sometimes a child may bleed during or after surgery and need a blood transfusion. A machine called a cell-saver can be used during surgery to collect blood where the child is bleeding and return it to the child. A transfusion is only given when it is needed. Getting an infectious disease from transfusion is very rare.
- **Non-union or pseudoarthrosis** – Means the body did not create a complete fusion of the bones. This allows a small amount of motion to continue. The stress on the instrumentation can cause rod or screw breakage or loosening and motion within the bone, which can be painful. This problem is usually not discovered until 2 to 5 years after surgery.
- **Spinal cord injury** – The chances of a spinal cord injury for routine scoliosis surgery is rare but not impossible. The risk is higher when there is already spinal cord compression, or the deformity is very severe. If a spinal cord injury occurs, it often recovers back to normal but may take a year to do so. Spinal cord monitoring is electronic monitoring of the spine cord function during surgery. This is done for every deformity surgery and minimizes the risk of a spinal cord problem.
- **Trunk imbalance or shoulder asymmetry** – The portion of the spine that is not fused does not always correct in the way we anticipate. This can sometimes lead to an unbalanced appearance after surgery. Most trunk shifting will resolve on its own as the nervous system and muscles accommodate to the straighter spine. This can take up to 6 months. Sometimes physical therapy can help this. Rarely additional surgery is needed to correct this.
- **Wound infection** – Your child will be given antibiotics, their skin will be cleaned with special disinfectants, and all aspects of the surgery will be done in a sterile environment. Despite our best efforts, it is possible that infection can occur. Infections are usually successfully treated by washing out the wound in another surgery and giving antibiotics.

Other common problems include nausea, constipation, itching, or problems with IV lines.

How long will we be in the hospital?

Your child will need to stay in the hospital until it is safe to go home. The length of stay will vary based on the surgery they are having, their general health, physical abilities before surgery, and if additional help will be needed at home. Once your child can eat, urinate, get in and out of bed, walk safely without much help, and take pills or liquid pain medicines, they can go home. Most patients stay 3 days after surgery. If you live far from the hospital, you may consider finding lodging nearby until your child is ready to travel home.

What do we need to do before surgery?

Review and follow the instructions given on our handout “Seattle: Before Procedure Checklist” <http://www.seattlechildrens.org/pdf/PE459.pdf>

Medical OK

Your child will need to get medical clearance from their family doctor or specialists, as well as our anesthesia team, before scheduling surgery. To avoid the surgery being delayed, plan for these evaluations as soon as it is decided that surgery is needed. Please let your surgery scheduler know if you have any questions.

Please let your doctor know if you have any of the following:

- Other surgery or dental work planned before or after the surgical date. We recommend no dental work be done until 6 months after surgery.
- Infections, including dental infection
- A history of MRSA infection, or exposure to a close contact or family member with MRSA
- Diabetes
- Asthma
- Heart conditions
- History of blood clots or bleeding problems in your family
- Hepatitis or liver disease
- Rheumatoid arthritis or chronic inflammatory disease
- Psoriasis
- Chronic bladder or diarrheal disease

Medicines

- It is important that you bring to your pre-operative appointment all medicines and herbal supplements your child is taking, so that we can confirm the medicines, dose and schedule.
- Children under the care of a medical provider should ask for instructions on stopping or continuing medicines before surgery. The pre-anesthesia appointment will address this also (PASS).
- Most of the time your child will take their normal medicine with a sip of water on their regular schedule before surgery. There are some exceptions.
- Do not give ibuprofen (Motrin or Advil), aspirin or naproxen (Aleve) for at least 14 days before surgery. These medicines can increase the risk of bleeding from the surgery site. Ask your doctor if you think you will need an alternative medicine during that time that will not interfere with clotting. You may be asked to take one of these types of medicines the night before surgery by your surgeon—this is safe to do for that one night.
- Stop taking all over-the-counter supplements 2 weeks before surgery. These medicines can contain chemicals that can interfere with anesthesia, blood clotting and healing.
- If your child is taking an anticoagulant (like aspirin, Coumadin, or Lovenox), call your surgeon for the stop date, and confirm this with the prescribing doctor.

Bathing

It is important that the skin is clean before surgery to reduce the risk of developing an infection after surgery. You will be given a special soap to use for several nights before surgery. If you misplace it, a shower with regular soap should still be done. Your child will be asked to wipe their entire body with a special cleanser at the hospital just before the surgery. See Seattle Children's information on bathing: "Hibiclens Bathing and Antibiotic Ointment Instructions: Prevent Surgical Site Infections"
<http://www.seattlechildrens.org/pdf/PE611.pdf>

Eating

Two to four business days before the surgery, you will receive a phone call with information that will include when your child needs to stop eating and drinking before surgery. **The surgery may need to be rescheduled if these instructions have not been followed.**

For 2 to 3 weeks before surgery, your child should increase their caloric and protein intake. Children often will not have much appetite for a week or so after surgery and commonly lose several pounds. Healing takes a lot of protein and calories. Increase protein and caloric intake, including between-meal supplements or snacks.

Avoiding Constipation

Anesthesia, back surgery and pain medicine all cause constipation. Each child is different, but a child can be considered constipated if they do not have at least one bowel movement a day or only have small, hard bowel movements. If your child has a history of constipation please tell your surgery team prior to the surgery. To prevent constipation try these steps:

Give your child plenty of liquids to drink. Start with having them drink more each day. They should drink enough to keep their urine pale or clear. Dark yellow urine is too concentrated and means they need more liquids. Water is a good choice. Prune and grape juices help some children.

Add more fiber to your child's diet. Changing to whole grains is a great place to start. Processed grains such as white flour and white rice can also add to constipation.

Have your child eat lots of fruits and vegetables. Aim for 5 servings a day. One serving equals about ½ cup. High-fiber fruits such as cherries, prunes, pears and raisins are excellent. Bananas and, for some children, apples can make constipation worse. Some high-fiber vegetables are beans, peas, celery and broccoli.

Increase bran. Offer foods such as graham crackers, granola, bran muffins and shredded wheat. Older children may have popcorn. Fibercon cookies are another great source of bran and are found at some drug stores.

Offer sugar-free or diet Gummy Bears. These contain a sugar called sorbitol which is not absorbed in the body. This type of Gummy Bears act like a laxative for children. Only sugar-free and diet Gummy Bears work in this way.

Limit dairy products to 2 to 3 servings per day. Cheese and eating too many dairy products can make constipation worse. Keep other constipating foods to an occasional treat.

In some instances, we may recommend a bowel prep (strong laxatives) to minimize the chance of severe constipation after surgery.

What can we expect when coming to the hospital?

Please come on time. The process of parking and checking in to the hospital requires at least 15 minutes more than the drive to the hospital, and can take even more sometimes. If you are late it is possible your surgery could be cancelled due to other constraints on our operating room facilities and staff. The nurse and the anesthesiologist will ask you questions about your child's health and the medicines they take. Hospital regulations require that your surgeon or someone from their team talks to you before you go into the operating room to confirm the procedure that is to be done and to mark the surgery site.

During surgery all vital functions such as blood pressure, heart rate, fluid balance, and kidney function will be watched by the anesthesia and surgery team. We may use the following devices to monitor your child during and after surgery:

- **Spinal cord monitoring** – involves placing tiny electrical needles into the skin of the head, neck, trunk, arms and legs to watch the function of the spinal cord during surgery.
- **IV (intravenous catheter)** – a small tube into a vein (usually in the arm) to give fluids and medicines.
- **Arterial line** – a small tube placed in the artery of the wrist or leg to closely monitor blood pressure.
- **Central venous access line** – a tube placed into the larger veins near the neck and close to the heart to watch fluid balance. Used for patients with serious heart or lung disease or those patients having extensive surgery.
- **Bladder Catheter** – used to monitor and collect urinary output for the first day following surgery.
- **Ace wraps, compression stockings or calf pumping devices** – May be used in children with a previous history of blood clotting or those using birth control.

These devices are usually placed after anesthesia, so that there is no pain.

What can we expect in the operating room?

Once in the operating room and asleep, your child will be placed on the operating table. If the incision is to be made on your child's back, they will be placed on a padded frame to let their stomach hang free. This helps to minimize bleeding.

Special positioning and padding will be used to make your child comfortable and to protect their nerves, skin, joints, face and eyes. Your child may be sore at the areas they are lying on after surgery, especially if the procedure is long. The most common problems are a sore neck, shoulder and chest wall, and some tingling in the fingers or thighs. These may take a few days to go away. It is not common to last longer, but not impossible.

If spinal cord monitoring is used, it may take an hour or longer from the time you leave your child until the surgery begins to place all of the monitors, IVs, catheters and arterial lines.

During surgery your child's bodily functions are monitored by the anesthesiologist, and supported in any way that is needed with oxygen, medicine and fluids.

X-rays or fluoroscopy may be used during surgery to assess the placement of instrumentation and confirm the position of the surgical site.

After the surgery is finished, a dressing is placed on the wound and your child will be taken to the recovery room to wake up. It is usually between one and three hours until your child is awake enough to move to a hospital room and you can see them.

After extensive procedures, or in the case of substantial medical problems, your child may be taken to the Intensive Care Unit until they are ready to go to a regular hospital room.

What can we expect while recovering in the hospital?

The goal of your child's hospital stay is to get your child functioning enough on their own to return home as quickly and safely as possible. Your care is supervised by your surgeon who is helped by a team of nurses, aides, physical therapists, occupational therapists, pharmacists and other doctors as needed. Because Seattle Children's is a teaching institution, residents and fellows (Licensed physicians and surgeons still in a training program) will probably be involved in your care under your surgeon's guidance.

Activity and Movement

When your child moves around there is muscle activity at their incision site that will cause some pain. The nurses and physical therapists will help show them ways to move that will cause the least amount of pain. They will not rip out stitches or hardware by moving.

Sitting is safe after surgery, but it may be uncomfortable. Sitting in a chair instead of lying in the bed can also help breathing to return to normal more quickly.

We encourage walking as much as your child can tolerate. The sooner they get up and walk the more quickly they will recover. However, this may be hard to do at first, and we want them to ask for the help of the nurse or therapist to get up the first few times.

Avoid bending, twisting and lifting as much as feasible during the first 6 weeks after surgery. If the incision is on the neck or upper back between the shoulder blades, your child should avoid pulling hard on things with their arms. Pulling puts stress on the muscle and skin incision.

Bracing

Most patients do not need to wear a brace after scoliosis surgery. There are special circumstances under which it may be necessary. Our brace team and your doctor will give you instructions for how to use, wear and care for the brace if it is needed.

Diet and Bowel Function

Bowel and intestinal function is affected by anesthesia and surgery. Pain medicine can also add to the problem. Your child's appetite also may be poor for a few days. In most cases it will be 4 to 5 days until things function normally and allow a bowel movement. Stool softeners, bowel stimulants and laxatives may be needed. Activity also helps the return of normal bowel function. Your child will not be required to have a bowel movement before discharge from the hospital, as long as they are eating, drinking, and passing gas.

Fever

Most patients have a fever for the first 2 to 4 days after surgery. This is due to inflammation at the surgery site and the lungs shrinking during anesthesia (atelectasis). Fever in the first few days after surgery does not usually indicate there is an infection. Deep breathing and walking can help expand the lungs and reduce the fever.

Pain

After a surgery, some pain is normal. It is unrealistic to expect to have no pain at all. The amount of pain that people have varies, even for the same procedures. We will try our best to keep your child as comfortable as possible. Pain medicines do not fully take away pain. There are limits to how much medicine your child can have.

At first, pain medicine will be give given through the IV by a machine called a PCA (push a button to get a dose). Pain medicine taken by mouth in pill or liquid form usually lasts longer and gives more even pain relief, but may not be tolerable within the first day. A special pediatric pain control team may be in charge of the pain medicines for the first few days after surgery. Sometimes it takes a day or two to figure out which medicines work the best, and what dose is needed for your child.

All pain medicines have side effects. These can include nausea, vomiting, itching, constipation and sleepiness. We want to promote the most comfort with the least amount of side effects. Medicines may be ordered to treat side effects if they occur.

You know your child best. We encourage you to take an active part in your child's recovery by talking with your care team about how your child shows pain and what comforts them. In addition to medicine given to your child while in the hospital, encourage age-appropriate coping tools to treat pain and provide support. Distraction by activities or conversation seems to help patients cope better with pain.

Showering

If there is no drainage from the incisions, your child may be able to shower 3 to 4 days after surgery with the wound uncovered. Do not get in a bathtub, hot tub or pool until 2 to 3 weeks after surgery or directed by your surgeon.

To Learn More

- Orthopedics
206-987-2109
- www.orthopedics.seattlechildrens.org
- www.seattlechildrens.org

Free Interpreter Services

- In the hospital, ask your child's nurse.
- From outside the hospital, call the toll-free Family Interpreting Line 1-866-583-1527. Tell the interpreter the name or extension you need.

Sleep

Your child may have trouble sleeping in the hospital. Napping during the day, lack of normal activity, medicines and the unusual environment all lead to this. Medicine to help your child sleep can be prescribed if needed.

When can we go home?

You will go home when the physical therapists, nurses and your doctor feel that you are able to safely function at home and proper support is in place. Your child will need to eat, urinate and be able to control pain with pills or liquid pain medicine. This may occur faster than you anticipate. Once all of the criteria to go home have been met, your insurance company may not pay for any more hospital days.

Seattle Children's offers interpreter services for Deaf, hard of hearing or non-English speaking patients, family members and legal representatives free of charge. Seattle Children's will make this information available in alternate formats upon request. Call the Family Resource Center at 206-987-2201.

This handout has been reviewed by clinical staff at Seattle Children's. However, your child's needs are unique. Before you act or rely upon this information, please talk with your child's healthcare provider.

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