Surgical Intervention Evidence Based Practice

Indication of surgery

Surgical treatment for scoliosis is indicated, in general, for the curve exceeding 45 or 50 degrees by the Cobb's method on the ground that:

- 1) Curves larger than 50 degrees progress even after skeletal maturity. Thoracic curves with magnitude between 50 and 75 degrees at skeletal maturity (Risser IV or V) progressed of an average of 29.4 degrees over the 40.5 years follow-up period. Curves larger than 55 degrees at skeletal maturity (partial or total fusion of the completed iliac apophyses) progressed of more than 0.5 degrees per year. Thoracic curves with an average Cobb angle of 60.5 degrees progressed to 84.5 degrees over the 50 years follow-up period.

2) Curves of greater magnitude cause loss of pulmonary function, and much larger curves cause respiratory failure. In patients with curves between 60 and 100 degrees, total lung capacity was 68% of predicted normal values. Nearly half of the patients with thoracic curve larger than 80° degrees had shortness of breath at the average age of 42 years. Vital capacity below 45% predicted and a Cobb angle greater than 110 degrees were risk factors to develop respiratory failure and earlier death.

3) Larger the curve progress, more difficult to treat with surgery: more surgical anchors may be necessary, longer operation time, more blood loss, higher surgical complication rate may be expected.

Goals of surgery

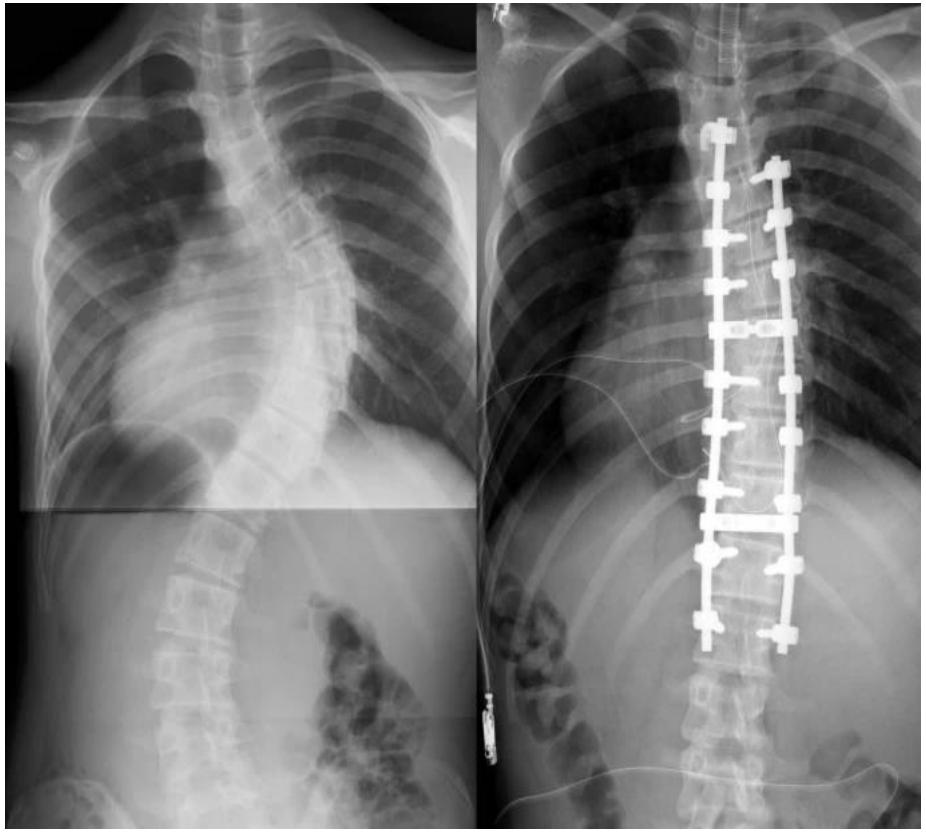
- In children, the two primary goals of surgery are to stop the curve from progressing during adulthood and to diminish spinal deformity. Most experts would recommend surgery only when the spinal curve is greater than 40 degrees and there are signs of progression. This surgery can be done using an anterior approach (through the front) or a posterior approach (through the back) depending on the particular case.

- adults who were treated as children may need revision surgery, in particular if they were treated 20 to 30 years ago, before major advances in spinal surgery procedures were implemented. Back then, it was common to fuse a long segment of the spine. When many vertebral segments of the spine are fused together, the remaining mobile segments assume much more of the load and the stress associated with movements. Adjacent segment disease is the process in which degenerative changes occur over time in the mobile segments above and below the spinal fusion. This can result in painful arthritis of the discs, facet joints and ligaments.

- A number of factors can lead to increased surgical-related risks in older adults with degenerative scoliosis. These factors include the following: advanced age, being a smoker, being overweight and the presence of other health/medical problems. In general, both surgery and recovery time are expected to be longer in older adults with scoliosis.

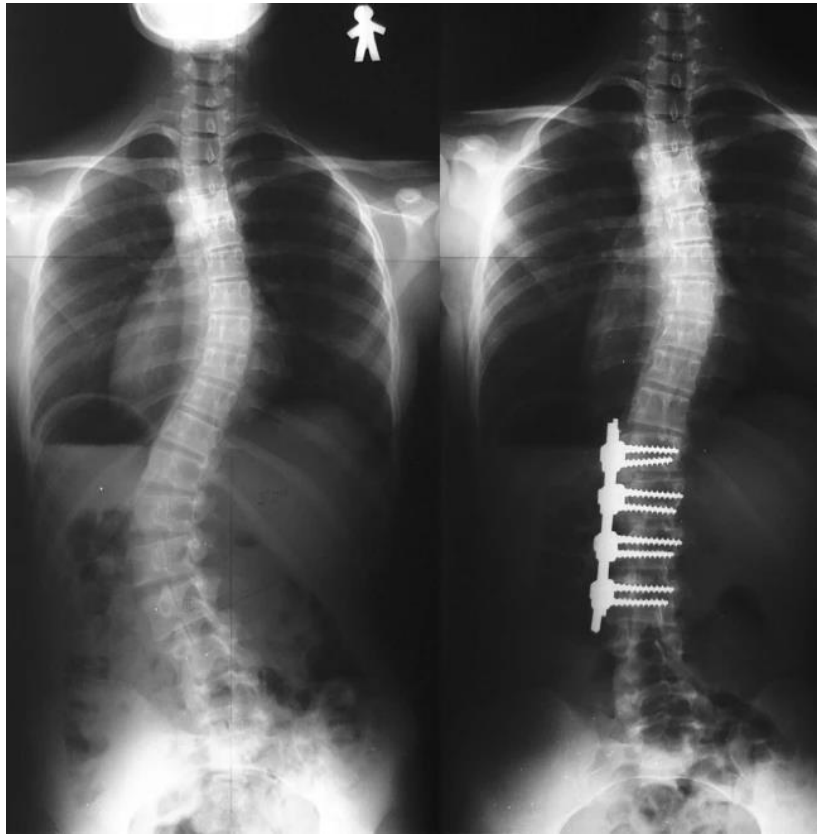
Posterior approach

- The most frequently performed surgery for adolescent idiopathic scoliosis involves posterior spinal fusion with instrumentation and bone grafting. This is performed through the back while the patient lies on his or her stomach. During this surgery, the spine is straightened with rigid rods, followed by spinal fusion. Spinal fusion involves adding a bone graft to the curved area of the spine, which creates a solid union between two or more vertebrae. The metal rods attached to the spine ensure that the backbone remains straight while the spinal fusion takes effect.



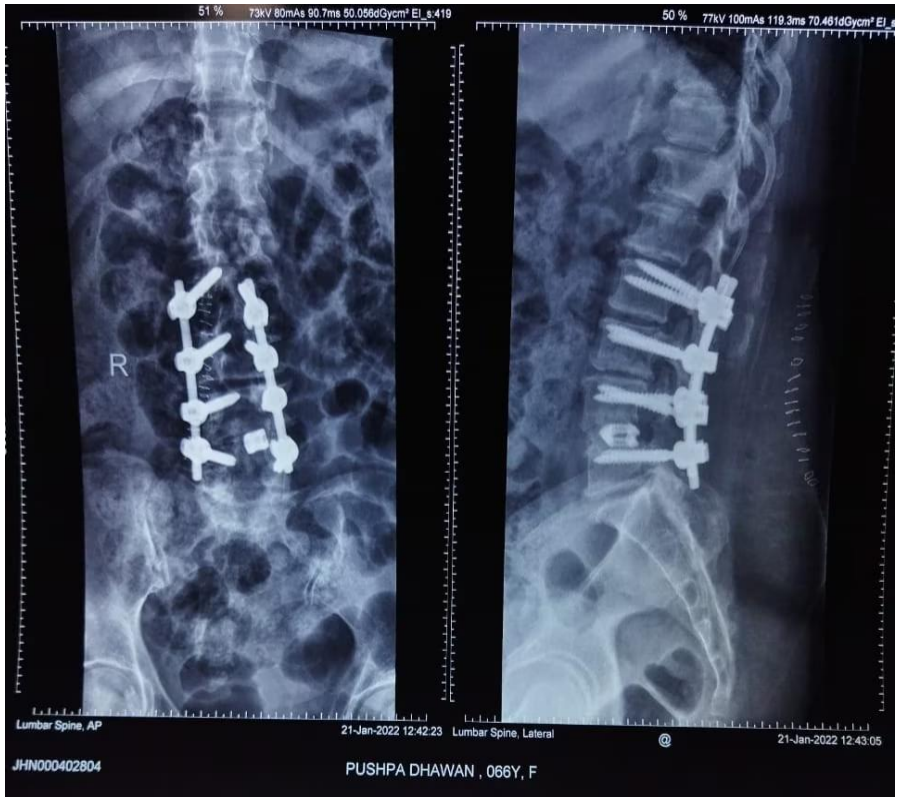
Anterior approach

- The patient lies on his or her side during the surgery. The surgeon makes incisions in the patient's side, deflates the lung and removes a rib in order to reach the spine.
- advantages: better deformity correction, quicker patient rehabilitation, improved spine mobilization and fusion of fewer segments. The potential disadvantages are that many patients require bracing for several months post surgery, and this approach has a higher risk of morbidity – although VAT has helped to reduce the latter.

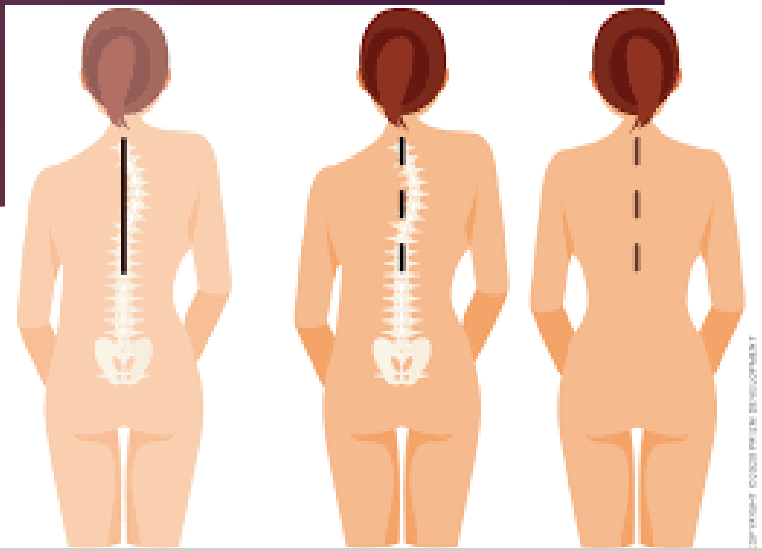


Decompressive laminectomy

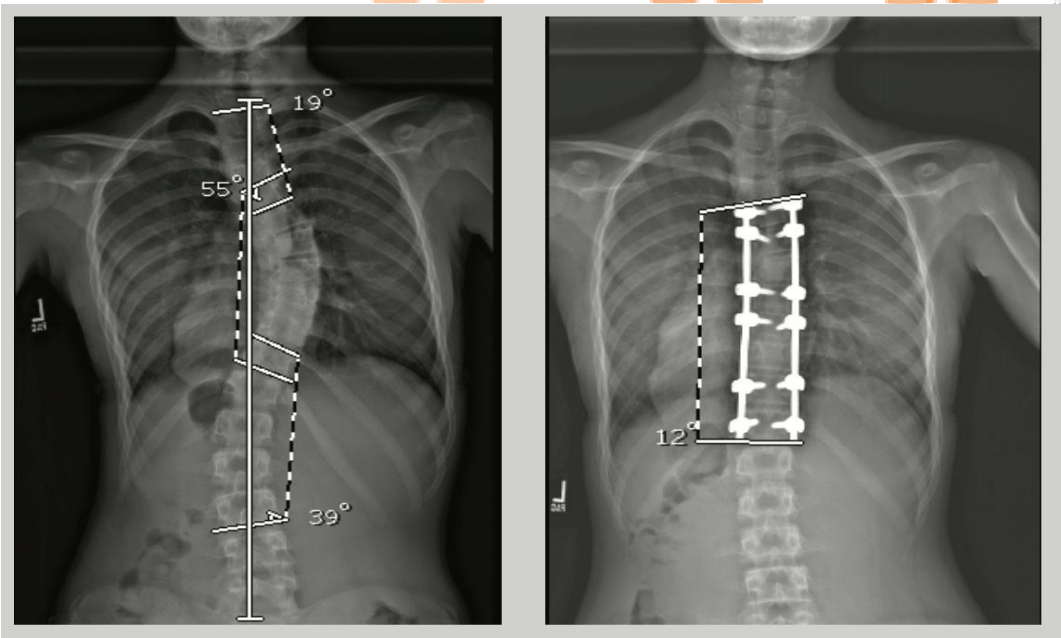
- The laminae (roof) of the vertebrae are removed to create more space for the nerves. A spinal fusion with or without spinal instrumentation is often recommended when scoliosis and spinal stenosis are present. Various devices (like screws or rods) may be used to enhance fusion and support unstable areas of the spine.



Minimally invasive surgery (MIS)



- Fusion can sometimes be performed via smaller incisions through MIS. The use of advanced fluoroscopy (X-ray imaging during surgery) and endoscopy (camera technology) has improved the accuracy of incisions and hardware placement, minimizing tissue trauma while enabling a MIS approach. It is important to keep in mind that not all cases can be treated in this manner and a number of factors contribute to the surgical method used.



Daily activities after operation

- 1. Washing Depending on how far down your back your surgery goes, you may not be able to sit to the bottom of the bath. If you have a shower over your bath you could use a bath board. The occupational therapist will advise and assess you for this. If you are required to wear a brace, this should be removed once you are sitting on the bath board and then replaced before you get out of the bath. Your occupational therapist will show you how to transfer in and out of the bath. If you have a separate shower, you can stand or sit on a shower chair. Your occupational therapist will advise you about this.

2. Dressing It is best to wear loose fitting clothing and front opening garments if possible. Try and sit to dress and undress as this provides more stability. Lower body dressing such as underwear, trousers, socks and shoes might be more difficult as you may not be allowed to bend down. You can get assistance from a family member and/or your occupational therapist who will show you some techniques which may include using a “helping hand” device. Shoes should be comfortable and have low heels. Slip on shoes are easier to manage than laces. If you are required to wear a brace, you will need to wear a close fitting seamless T shirt underneath the brace. Never wear your brace directly onto your skin.

3. Before you go home Before you go home, make sure you are comfortable in your brace or plaster jacket. Inspect your skin regularly. If the brace is rubbing or digging, please let a member of staff know who will contact the Orthotics department. If you have a problem with your brace once you are home, please contact the Orthotics team via the main switchboard on the number at the end of this booklet. You will have an X-ray before you go home. There will be dressings on your wounds that the nurses will need to change. Once your wounds begin to heal, the dressings can be removed. This could be before you go home. If your dressings are still in place when you leave the hospital your practice nurse at your GP's will review them. You should be able to get in and out of bed by yourself, sit, walk, get on and off the toilet, in and out of a bath or shower, and go up and down stairs by the time you are ready to leave the hospital.

4. Once you are home: You should aim to start indoors and progress to outdoor walking within the first weeks of being at home. There are no specific exercises however we recommend getting back to a normal routine keeping in mind your precautions. Remember moving is just as important as resting! Getting in/out of a car You should use a car with reclining seats. Have someone recline the front passenger seat for you. Stand with your back to the car, sit down on the edge of the seat supporting yourself with your hands on the doorframe or dashboard. Move your bottom back, then lean back against the seat (mind your head) and swing your legs in, being careful not to twist your back. Get yourself into a comfortable position. You may adjust the seat back to a more upright position. Do recline it again before getting out. Be careful not to twist your back when putting your seatbelt on.

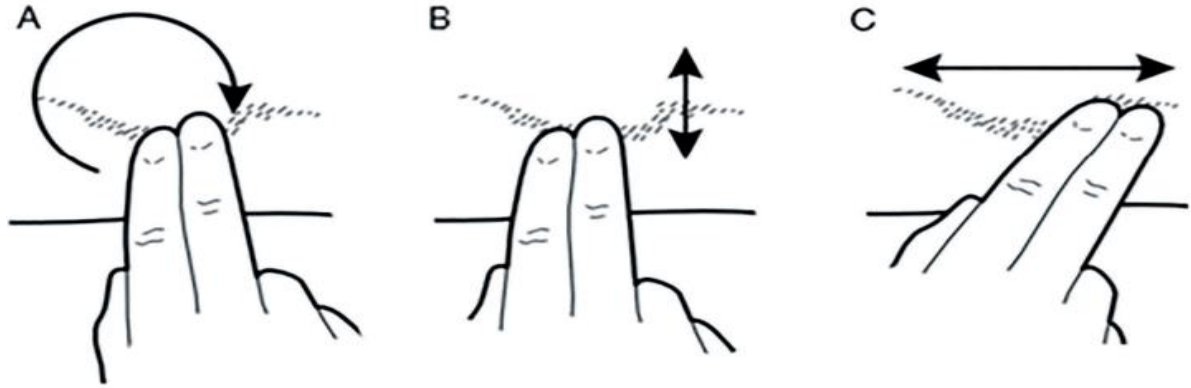
5. Keeping your brace clean Wipe the inside and outside with a damp cloth – DO NOT use hot water. DO NOT use a hairdryer or radiator to dry the brace. Canvas fronts may be hand washed and towel dried only. Sleeping Your mattress should be firm and should be as high as your kneecap when standing next to it. Sitting Sit upright and straight with both feet flat on the floor. Ideally choose a chair that has a firm seat and a supportive backrest. The seat should be as high as your kneecap when standing next to it. Avoid sitting on low, soft armchairs or sofas, on the floor or on beanbags as this causes you to bend your hips and strain your spine. Aim to gradually increase the time you spend sitting and standing each day.

6. A gradual return to school is recommended so that you build up your sitting tolerance. You may find a full day at school/college too tiring initially. Most students return to school/college between 4 - 6 weeks after surgery. This does vary from person to person and could depend on your travelling arrangements to and from school. Make sure your teacher knows you cannot do P.E. until the precautionary period has finished. Keep your bags to a minimum weight. Use two small bags, one in each hand or a small lightweight rucksack with a total weight of 2kg. The rucksack should have 2 wide shoulder straps and be adjusted and worn closely fitting to the body. Have a locker at school to avoid carrying heavy books to and from school or have a second set of books at home. Ask the school or a friend for help if you get into difficulties. Try to avoid the main rush when walking from one classroom to the next. Try and walk with a friend if possible. If you are about to sit a public examination, please consult your Head Teacher as it may be possible to make special arrangements for you. The Hospital School Teacher can discuss this with you

7. Hobbies and sport Avoid any strenuous exercise, especially if pulling or pushing is involved. Contact or high impact sports i.e. rugby, football, netball, hockey, horse riding, skiing should not be attempted until about one year after your operation, and then only when given permission by your Consultant. Non contact sports, including swimming and cycling, may be started earlier, however ask your consultant first. Every sport should be resumed gradually.

Public transport Travel sitting down on buses, tubes, trains etc. if possible. Always wear a seat belt when available.

8. Looking after your scar After scoliosis surgery you will have a scar at the site of surgery, usually in the middle of your back or on your side or sometimes both. The length of the scar will vary from person to person depending on the extent of the surgery. To begin with your scar will be red and may be swollen, but should settle down with time. To reduce stress on the scar whilst it is healing, avoid reaching too far forward or high above your head with your arms for up to 3 months. Everyone's skin is different and most people do not have any problems with their scars, however, we recommend the following massage technique as it can help to soften the scar tissue and make it flatter, paler, cooler and smoother. Massage can be commenced once all stitches are removed and the wound is fully healed. This will be from 6 weeks onwards. Do not massage the scar before 6 weeks post-surgery. Use an unperfumed moisturising cream or lotion. Massage the scar and any tight/hard areas lying close to the scar for 5-10 minutes. For optimal results you should complete this 2 or 3 times per day. It may take several months to achieve a flat and moveable scar. A scar can take up to 18 months to mature fully. Protect the scar from direct sunlight for the first 12 months after surgery. If you are planning to expose the scar to sunlight then wear a high factor sun block.



Surgical Treatment for congenital scoliosis

- Spinal fusion. In this procedure, the abnormal curved vertebrae are fused together so that they heal into a single, solid bone. This will stop growth completely in the abnormal segment of the spine and prevent the curve from getting worse.
- Hemivertebra removal. A single hemivertebra can be surgically removed. The partial correction of the curve that is achieved by doing this can then be maintained using metal implants. This procedure will only fuse two to three vertebrae together.

- Growing rod. Growing rods do not actually grow but can be lengthened with minor surgery that is repeated every 6 to 8 months. The goal of a growing rod is to allow continued growth while correcting the curve. One or two rods are attached to the spine above and below the curve. Every 6 to 8 months, the child returns to the doctor and the rod is lengthened to keep up with the child's growth. When the child is full grown, the rod(s) are replaced and a spinal fusion is performed.
- Rehabilitation. Young children usually recover quickly from surgery and are discharged from the hospital within 1 week. Depending on the operation, a child may need to wear a cast or brace for 3 to 4 months.

Surgical treatment of neuromuscular scoliosis

- The main indications for surgical treatment in this patient population are progressive deformity with unacceptable truncal shift or pelvic obliquity that affects standing or sitting balance/positioning.
- These patients may have had attempts at non-operative intervention, but often have received no prior treatment. In the non-ambulatory patient population, skin ulcerations, difficulty with hygiene and inability to be positioned adequately in a wheelchair are among common sources of caregiver dissatisfaction, which may lead families to seek surgical care

If your child needs spine surgery to treat neuromuscular scoliosis, the type of surgery recommended will depend on the degree of your child's spinal curve, your child's age and stage of growth.

The most common spine surgeries are:

- Implanting growing rods — This procedure is appropriate for children who are still growing.
- Spinal fusion— This procedure is best suited for children who have reached skeletal maturity or for whom growing rods are not a consideration.
- A third option, vertical expandable prosthetic titanium ribs (VEPTR), may be recommended for children with neuromuscular scoliosis that is also affecting their rib and lung development, causing thoracic insufficiency syndrome. Left untreated, thoracic insufficiency syndrome can be fatal.

- Because of the need for a long and extensive instrumentation and fusion, most NMS patient undergo a posterior spinal fusion. There are limited reports of isolated anterior instrumentation procedures for the management of NMS.
- Indications for the use of combined anterior and posterior procedures for NMS have changed over time. In the past, combined procedures were common in this patient population.
- Indications for the anterior portion of the intervention included rigid deformities, severe pelvic obliquity, poor posterior bone for fusion or a historically high risk of instrument failure and pseudarthrosis with posterior-only surgery.

Thank you