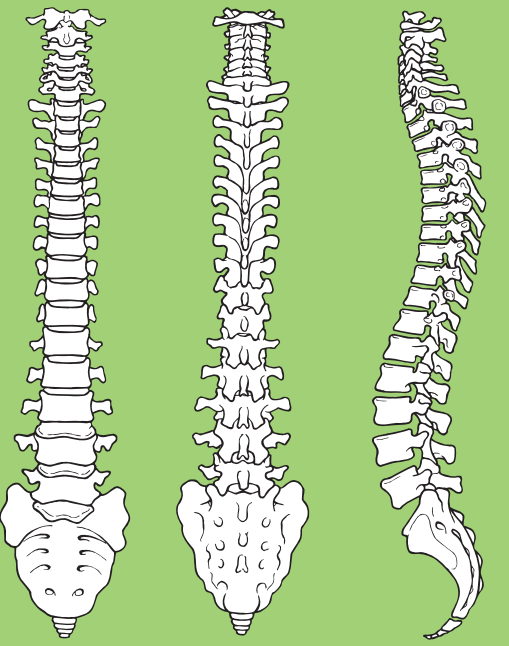
BASS
British Association of Spine Surgeons

Lumbar Decompression and Stabilisation for Degenerative Spondylolisthesis



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Following your recent investigations and consultation with your spinal surgeon, you have been diagnosed with **degenerative lumbar spondylolisthesis**.

This is the forward slippage of one lumbar vertebra (bone of the spine) on the vertebra below it. The slippage occurs because of wear and tear on the joints that link at the back of the vertebra (facet joints), so much so that the spine is unable to maintain its proper position. The degree of spondylolisthesis may vary from mild to severe. Symptoms may include lower back pain and pain in the thighs and buttocks, stiffness, muscle tightness and tenderness in the area of the slippage.

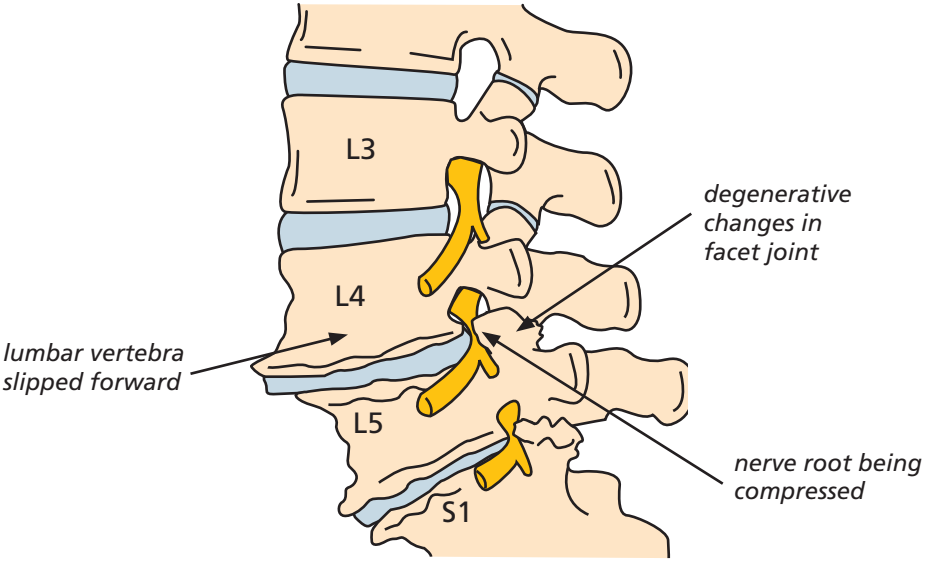
If too much slippage occurs, it can create narrowing of the spinal canal (spinal stenosis).

The normal spinal column has a central canal (or passage) through which the spinal cord passes down. To each side of the canal, spinal nerve roots branch out at every level. The spinal cord stops at the top of the lumbar spine (lower back) and from this point tiny nerve rootlets splay out like a horse's tail forming the cauda equina. The spinal cord, nerve roots and cauda equina are protected by a tough outer membrane, or covering, called the dura mater.

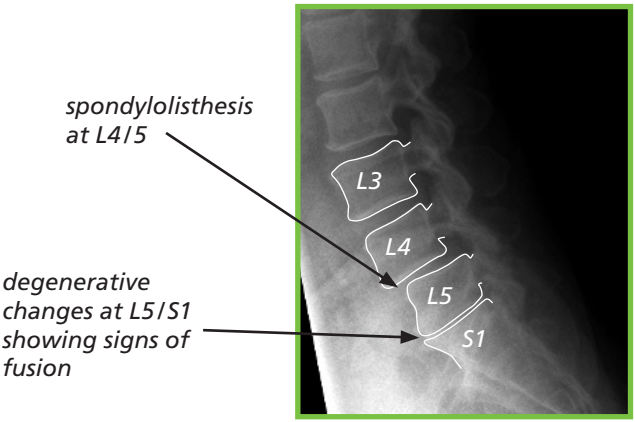
In spinal stenosis, the spinal nerve roots and/or cauda equina become trapped or compressed by narrowing of the canal.

When nerves are compressed they can produce symptoms of pain, numbness and tingling in the legs where the particular spinal nerve supplies. In some cases severe pain and even weakness are experienced.

Diagram showing spondylolisthesis at L4 / L5



X-ray showing spondylolisthesis at L4 / L5



Treatment varies depending on the severity of the condition. Most patients only require treatment such as physiotherapy, medication and manipulative therapy, combined with some lifestyle changes.

For patients whose pain does not settle with treatment or where the slippage continues and/or nerve compression has occurred, surgery may be necessary. Surgery would involve taking the pressure off the nerves (decompression), as well as dealing with the instability of the spine by deciding whether an internal system of screws, rods and bone graft to hold together the vertebra is required.

Occasionally, the surgeon will remove the intervertebral disc, the structure between the bones of the spine (vertebra) and fuse that space with a cage and bone graft (lumbar interbody fusion). This can enable the surgeon to heighten the canal that the nerve root travels through and to achieve an all round (360 degree) spinal fusion. The most common way of performing this is to remove the facet joint on one side of the spine to gain access to the disc (transforaminal lumbar interbody fusion [TLIF]).

Sometimes radical decompression surgery can further weaken the spine's stability, so the exact extent of surgery can only be decided during the procedure.

The operation

The operation is performed under general anaesthetic so you are fully asleep. First, an incision is made in the midline of your back and the muscles are lifted off the bony arch (lamina).

When decompression of the nerve roots is required, a high-speed burr (like a dentist's drill) can be used to thin the bone and gain access into the spinal canal. Bone is then clipped away and the facet joints, which are directly over the nerve roots, are cut back to relieve the pressure on the nerves. The stability of the spine is then assessed at this point. Bone graft may be all that is required at this stage to stabilise the spine through a spinal fusion. The graft is laid between the outer segments of the spine and your own bone will, over time, grow into the bone graft. There are several techniques to get the bone graft needed for spinal fusion:

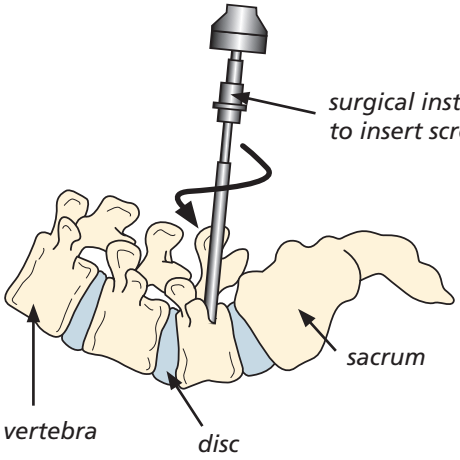
- **patient's own bone (autograft bone).** The bone that is removed during surgery can be used as a bone graft. If more is needed then it can be taken from the pelvis (iliac crest), but this can result in complications including chronic pain from the bone graft site, infection and pelvic fractures so, for the most part, artificial bone is now used;
- **donor bone (allograft bone).** This eliminates the need to use your own bone. The donor bone graft acts as a calcium scaffolding which your own bone grows into and eventually replaces; or
- it is also possible to use **artificial bone (bone substitutes).**

If there is concern that slippage of the vertebra could worsen after the surgical decompression, an internal system of support would be necessary and a system of screws and rods would be used. These are called pedicle screws because they are placed into the part of the vertebra of the same name, which goes directly from the back of the spine to the front. These screws then act as firm anchor points to which rods can be connected.

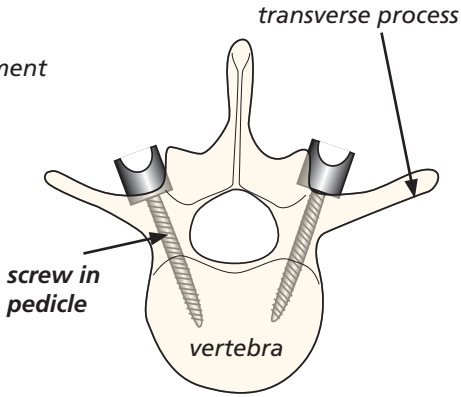
The screws are placed on both sides of the vertebra, above and below the unstable spinal segment. This construction prevents movement at the segment that is being fused. Bone graft is then laid between the outer segments of the spine, in between the transverse process (intertransverse region).

After the bone graft grows and fuses to the spine (after many months), the rods and screws are no longer needed for stability. However, most surgeons do not recommend removing them except in rare cases.

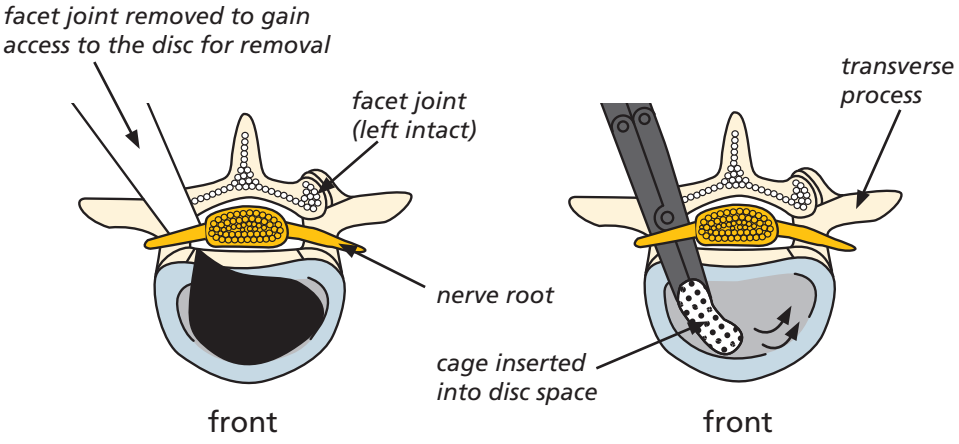
Side view of pedicle screw placement



Overhead view of pedicle screw in vertebral body

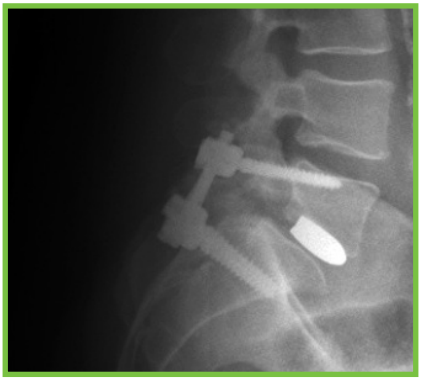


Transforaminal lumbar interbody fusion (TLIF)



X-rays showing the stabilisation system in place, side and front views

X-ray showing the cage in place, side view



Risks and complications

As with any form of surgery, there are risks and complications associated with this procedure.

These can include:

- damage to the nerve root and the outer lining or covering which surrounds the nerve roots (dura). This is reported in < 5% of cases (fewer than 5 out of 100 people). It may occur as a result of the bone being very stuck to the lining and tearing it as the bone is lifted off. Often the hole or tear in the dura is repaired with stitches or a patch. This could result in back or leg pain, weakness or numbness, leaking from the wound, headaches or, very rarely, meningitis;

- recurrent leg pain as a result of scarring;
- problems with positioning during the operation which might include pressure problems, skin and nerve injuries and eye complications including, very rarely, blindness. A special gel mattress and protection is used to minimise this;
- infection. Superficial wound infections may occur in 2–4% of cases (up to 4 out of 100 people). These are often easily treated with a course of antibiotics. Deep wound infections may occur in < 1% of cases (fewer than 1 out of 100 people). These can be more difficult to treat with antibiotics alone and sometimes patients require more surgery to clean out the infected tissue. This risk may increase for people who have diabetes, reduced immune systems or are taking steroids;
- blood clots (thromboses) in the deep veins of the legs (DVT) or lungs (PE). This occurs when the blood in the large veins of the leg forms blood clots and may cause the leg to swell and become painful and warm to the touch. Although rare, if not treated this could be a fatal condition if the blood clot travels from the leg to the lungs, cutting off the blood supply to a portion of the lung. It is reported as happening in fewer than 1 out of 700 cases. There are many ways to reduce the risk of blood clots forming. The most effective is to get moving as soon as possible after your operation. Walk regularly as soon as you are able to, both in hospital and when you return home. Perform the leg exercises illustrated in the 'Preventing Blood Clots' leaflet and keep well hydrated by drinking plenty of water. Ladies are also advised to stop taking any contraceptive which contains the hormone oestrogen four weeks before surgery, as taking these during spinal surgery can increase the chances of developing a blood clot;
- difficulty with screw placement, including injury to the nerves or screw breakage;
- bleeding. You must inform your consultant if you are taking tablets used to thin the blood, such as warfarin, aspirin or clopidogrel. It is likely you will need to stop taking them before your operation as they increase the risk of bleeding;
- bone graft non-union or lack of solid fusion (pseudoarthrosis). This can occur in up to 5% of cases (5 out of 100 people). See below for factors which can affect fusion;

- although rare, the surgery may make your symptoms worse than before; and
- there are also very rare but serious complications that in extreme circumstances might include damage to the cauda equina and paralysis (the loss of use of the legs, loss of sensation and loss of control of the bladder and bowel). This can occur through bleeding into the spinal canal after surgery (a haematoma). If an event of this nature was to occur, every effort would be made to reverse the situation by returning to theatre to wash out the haematoma. Sometimes, however, paralysis can occur as a result of damage or reduction of the blood supply of the nerves or spinal cord and this is unfortunately not reversible; and a stroke, heart attack or other medical or anaesthetic problems, including death, which is reported as happening in 1 out of 250,000 cases under general anaesthetic.

Factors which may affect spinal fusion and your recovery

There are a number of factors that can negatively impact on a solid fusion following surgery, including:

- smoking;
- diabetes or chronic illness;
- obesity;
- malnutrition;
- osteoporosis;
- post-surgery activities (see note of recreational activities); and
- long-term (chronic) steroid use.

Of all these factors, the one that can compromise fusion rate the most is smoking. Nicotine has been shown to be a bone toxin and it inhibits the ability of the bone-growing cells in the body (osteoblasts) to grow bone. Patients should make a concerted effort to allow their body the best change for their bone to heal by not smoking.

What to expect after surgery

Immediately after the operation you will be taken to the recovery ward, where nurses will regularly monitor your blood pressure and pulse.

Oxygen will be given to you via a face mask for a while, to help you to recover from the anaesthetic. You will have an intravenous drip for about 24 hours or until you are able to drink adequately again after the anaesthetic.

A drain (tube) may come out of your wound if there has been significant bleeding during the operation; this prevents any excess blood or fluid collecting. This will be removed when the drainage has stopped, usually after 24 hours.

You will have some discomfort or pain after surgery but the nursing staff will give you appropriate medication to control this.

Usually, on the first or second day after your operation, the physiotherapist will help you out of bed. They will also show you the correct way to move safely.

Going home

You will normally be able to leave hospital when you and your physiotherapist are happy with your mobility. This is usually 3–6 days after your operation.

Please arrange for a friend or relative to collect you, as driving yourself or taking public transport is not advised in the early stages of recovery. If you will need hospital transport please inform one of the nurses as soon as possible.

Wound care

Your wound will usually be closed with clips. You may shower if you are careful when you get home but bathing should be avoided for two weeks, until the wound is completely dry. Please do not remove your wound dressing, unless it accidentally gets wet, until your clips are removed. If a new dressing is required then a simple dry dressing from the pharmacist (chemist) is sufficient.

Please contact your GP if you have:

- any redness around the wound;
- wound leakage; or
- a high temperature.

The ward will tell you if a community (district) nurse has been arranged to come to your home to remove the clips, or ask you to arrange an appointment with your GP practice nurse for the clips to be removed. This will usually be 10 days after your surgery.

Date of clip removal: ..... / ..... / .....

Recreational activities

Walking is the best activity to do after your surgery. It promotes healthy circulation and aids the healing process. You should have a gradual return to normal activity over the coming weeks.

Driving

Sitting for prolonged periods after your surgery is not advisable, including driving a car. If you have no altered sensation or weakness in your legs then you may return to driving when you feel safe to do so, but don't travel long distances without taking regular breaks to stretch your legs. Please discuss driving with your surgeon before you leave hospital.

Lifting and carrying

Please refer to the physiotherapy advice sheet and other advice from your physiotherapist. You should avoid heavy lifting and carrying for several weeks.

Follow-up

You will be sent a clinic appointment for 8–12 weeks after your surgery. If you have any queries before this appointment please contact the nurse specialist for your consultant's team.

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If you have any questions about the information in this booklet, please discuss them with the ward nurses or a member of your consultant's team.

Produced, researched and revised by spinal nurse specialist Helen Vernau at The Ipswich Hospital NHS Trust, in association with and on behalf of the BASS Consent and Patient Information Committee.

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