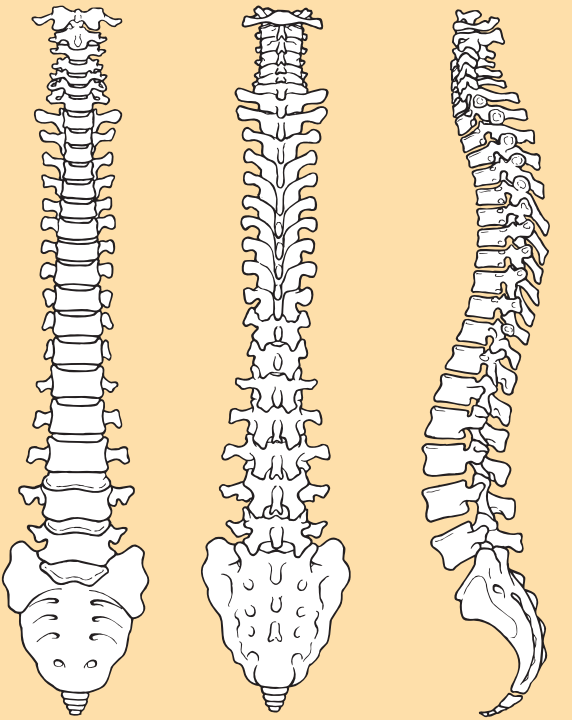
BASS
British Association of Spine Surgeons

Anterior Lumbar Interbody Fusion



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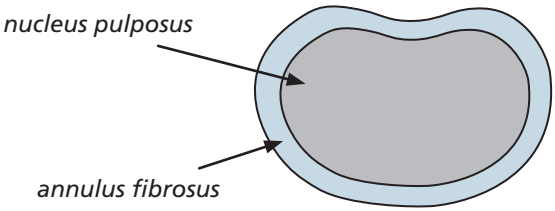
Following your investigations and consultation with your spinal surgeon, the possibility of you undergoing **lumbar spinal interbody fusion** has been discussed with you. This is an operation where the intervertebral disc, the structure between the bones of the spine (vertebrae), is removed and the space fused with a bone graft.

The healthy intervertebral disc acts as both a spacer and a shock absorber and is composed of two parts: a soft gel-like middle (nucleus pulposus) surrounded by a tougher fibrous wall (annulus fibrosus).

Overhead view of an intervertebral disc (simplified)



Sometimes the intervertebral discs can lose their flexibility, elasticity and shock absorbing characteristics and the tough layer of ligaments that surrounds the disc may weaken and no longer be able to contain the gel-like substance in the centre. This disc degeneration can cause inflammation in the surrounding area and some of these discs can be a source of continuing back pain and pain in the thighs and buttocks, stiffness, muscle tightness and tenderness. This is known as discogenic pain (pain arising from the disc).

MRI scans may show changes that are due to the natural aging process of the spine and almost everyone will have such changes in their middle age but this does not necessarily indicate disease. Diagnosis is made after listening carefully to a patient's symptoms and carrying out a physical examination. Sometimes diagnosis is made following a discography investigation.

Treatment varies depending on the severity of the condition. Most patients only require treatment such as physiotherapy and medication, combined with some lifestyle changes. For patients whose pain does not settle with treatment, surgery may be necessary.

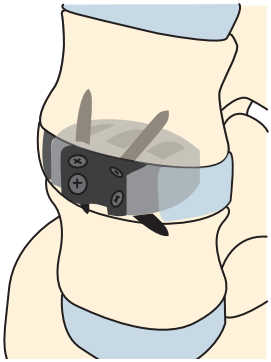
Surgery for lower back pain caused by degenerative disc disease is only considered an option for patients who:

- have not had sufficient pain relief from extensive non-surgical treatment (such as physiotherapy, medications and pain management programmes) for at least a year;
- have ongoing lower back pain that limits their ability to perform everyday activities at work or at home; or
- have received a diagnosis that a specific disc is the pain generator and other possible causes of the lower back pain have been considered and ruled out.

The decision to have a lumbar interbody spinal fusion operation to treat lower back pain caused by degenerative disc disease is a very personal one. For the most part, degenerative disc disease is a non-progressive type of back condition and for the majority of people their symptoms will improve over time (up to ten years). Patients need to carefully consider the risks and possible complications along with the potential benefits of surgery, as well as consider the full range of alternatives to interbody fusion surgery.

Technically, there is a wide variety of surgical procedures that can be performed to fuse the spine, including different cages or spacers (hollow blocks) to insert into the disc space with a bone graft. The approach to the spine can also vary but in this case will be from the front, through the abdomen, by anterior lumbar interbody fusion (ALIF).

Anterior lumbar interbody fusion (ALIF)



Once the diagnosis of degenerative disc disease and the decision to undergo spinal interbody fusion have been made, the goal is then to obtain a solid fusion and stop the movement at that level.

The operation

The operation is performed under general anaesthetic so you are fully asleep. First, an incision is made through the abdomen. The abdominal contents lay inside a large sack (peritoneum) that can be retracted (moved to the side), allowing the surgeon access to the front of the spine without actually entering the abdomen.

The large blood vessels (aorta, common iliac artery and vena cava) that lie over the front of the spine are carefully moved aside. Sometimes surgery is performed in conjunction with a vascular surgeon, who will mobilise the blood vessels if there are any concerns or difficulty with this.

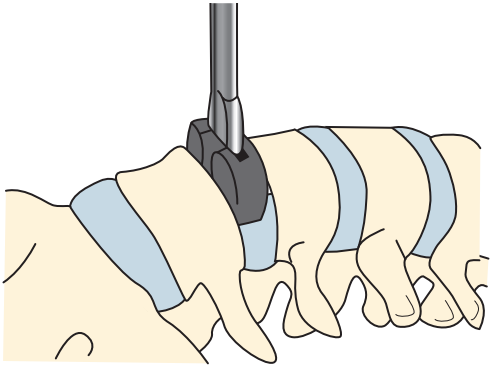
After the blood vessels have been moved aside, a 'window' is cut in the anterior ligament and fibrous wall of the disc (annulus fibrosus), retaining as much of it as possible to provide stability for the cage. The disc material (nucleus pulposus) is then removed and the cage, containing bone graft, is placed in the space created. Some cages require screwing into the vertebral body above and below them. 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).** This is usually taken through an incision over the ileac crest (pelvis);
- **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
- **artificial bone (bone substitutes).**

In the past, patient's own bone was more commonly used. 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.

Diagram of cage placement



X-rays showing ALIF cage in place, side and front views

Risks and complications

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

These can include:

- **Damage to the large blood vessels which may result in excessive blood loss.** This is reported as happening in up to 15 out of 100 cases, although it is less common in the hands of an experienced spine or vascular surgeon. Usually small tears in the vessels can be controlled reasonably simply, though there remains the very small risk of catastrophic bleeding that could, in extremely rare circumstances, lead to death.

- **Infection.** Superficial wound infections may result in up to 4 out of 100 cases. These are often easily treated with a course of antibiotics.
- **Deep wound infections may result in fewer than 1 out of 100 cases.** 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 legs to the lungs, cutting off the blood supply to a portion of the lung. It is reported as happening in fewer than 1 in 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.
- **Sympathetic nerve damage.** There are small nerves directly over the disc space which can be damaged during surgery. These nerves are responsible for many involuntary organ functions, including the heart rate, peristalsis (gut movement), kidney function and, in men, the ability to ejaculate. If these nerves are damaged it can cause problems including:
    - **Retrograde ejaculation (men only).** This is a condition where the valve that causes the ejaculate to be expelled outward during intercourse does not work and the ejaculate takes the path of least resistance, which is up into the bladder. The sensation remains largely the same and this condition does not cause impotence (the inability to have an erection) but it can unfortunately make conception very difficult. This is reported

in fewer than 1 in 100 cases and can resolve over time (a few months to a year).

- **Warm leg.** This sensation is felt in just one leg, the same side as the surgery has been performed. This can resolve over time but may be a permanent sensation.
- **Paralytic ileus.** This is a condition where there is an interruption of the normal bowel contraction and the bowel temporarily 'goes to sleep'. It can be a common side effect of abdominal surgery or nerve damage in this type of surgery. Symptoms include constipation and bloating and occasionally vomiting. Diagnosis can be confirmed by a doctor listening to the abdomen with a stethoscope and hearing no bowel sounds. Food should be avoided until sounds are heard and flatus (gas) passed again. This condition can occur in 11 out of 100 cases.

- **Problems with positioning during the operation which might include skin injuries or pressure problems.** Special gel mattresses and heel protection is used to minimise this.
- **Bone graft non-union or lack of solid fusion (pseudoarthrosis).** This can occur in up to 5 out of 100 cases. (See note below on factors which can affect fusion.)
- **Cage / Implant movement can occur in up to 2 out of 100 cases with 1 out of 100 requiring re-operation.** In extremely rare cases, cage movement can cause severe damage and cauda equina syndrome (paralysis, bladder or bowel incontinence).
- **Ongoing pain.** ALIF surgery is a complex procedure and not all patients get complete relief with this.
- There are also very rare but serious complications that in extreme circumstances might include a stroke, heart attack or other medical or anaesthetic problems.

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;
- obesity;
- osteoporosis;
- long-term (chronic) steroid use.
- diabetes or chronic illnesses;
- malnutrition;
- post-surgery activities (see note on recreational activities);

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 inhibit 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 chance 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, until you have bowel sounds and are able to drink adequately again.

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 from 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 2–3 days after your operation.

Please arrange for a relative or friend 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 dissolvable stitches. You may shower when you get home if you are careful, but baths should be avoided for two weeks, or until the wound is completely dry. Please do not remove your wound dressing – unless it gets accidentally wet. If a dressing is required then a simple dry dressing from the pharmacist (chemist) is sufficient.

Please contact your GP if you have:

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

Please arrange an appointment with your GP practice nurse for two weeks' time, to check the wound.

Date of appointment: ..... / ..... / .....

Recreational activities

Walking is the best activity to do after your surgery. It promotes healthy circulation and aids the healing process. You should avoid activities which involve repetitive bending or twisting in the first few months. Sports should also be avoided until you can discuss them with your consultant during your follow-up appointment. Once the bone fuses, a gradual return to normal activity is then advised.

Driving

Sitting for prolonged periods is not advisable after your surgery, 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 a few months after your surgery.

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.

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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