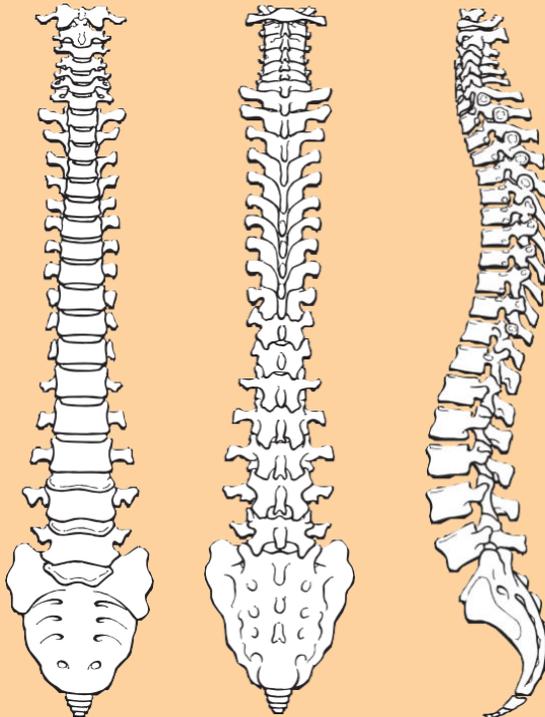




BASS

British Association of Spine Surgeons

Anterior Cervical Discectomy and Fusion

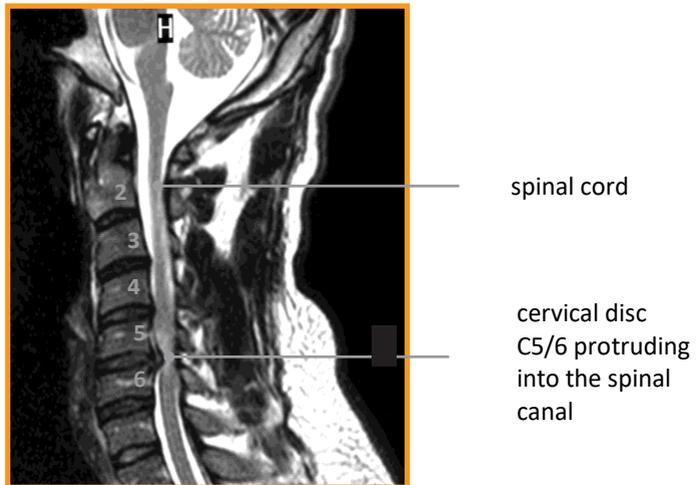


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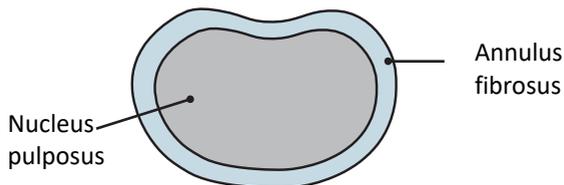
Following your recent MRI and consultation with your spinal surgeon, you have been diagnosed with cervical radiculopathy which is when a trapped nerve results in arm pain or cervical myelopathy which is when the spinal cord is trapped. Some patients have both conditions.

MRI scan showing a disc protrusion between C5 and C6



There are seven bones (vertebra) in the neck. Between each bone is a 'disc' which acts as both a spacer and a shock absorber. The disc has two parts: a soft gel-like middle (nucleus pulposus) surrounded by a tougher fibrous wall (annulus fibrosus).

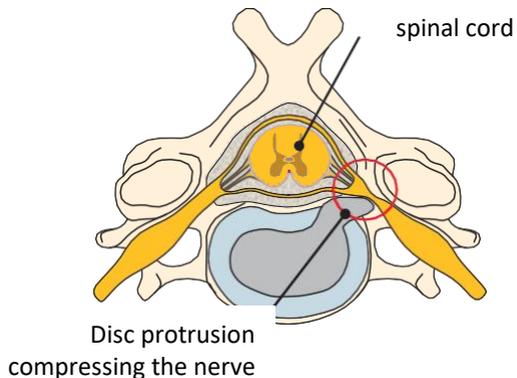
Overhead view of an intervertebral disc



The spinal cord passes through a central canal (passage) in the neck. At each disc, a nerve leaves the spinal cord on the right and left side to go into the arm. The spinal cord and nerves are surrounded by cerebrospinal fluid (CSF) and are contained within a membrane, or covering, called the dura, which is the thickness of a sausage skin.

As we get older, degeneration (wear and tear) occurs, and the disc loses its flexibility and shock absorbing characteristics. The tough fibrous wall of the disc may then weaken and split and the gel-like substance in the centre may **bulge** or push out. This bulge or **'herniation'** may cause **arm** pain when it touches a nerve or symptoms from compression (trapping) of the spinal cord.

Overhead view of disc protrusion



Nerve pain is felt in the place the nerve supplies after it leaves the spine – the arm. A nerve is like an electrical wire. It tells your muscles to move and gives your brain information about various sensations such as pain, temperature and touch. Symptoms of a trapped nerve in the neck may include shooting pain down the arm, pins and needles, numbness, increased sensitivity or weakness of the muscles in the arm or hand. The nerves in the upper part of the neck usually go into the shoulder; lower down, the nerves go into the hand.

If there is nerve damage, there may be numbness or weakness in the arm or hand. If this is significant, the specialist may recommend surgery earlier to give the nerve the best chance of recovery.

If the spinal cord is trapped, this is known as 'cervical myelopathy' and typical symptoms included clumsiness and weakness of the hands and unsteady legs when walking.

Should I have surgery?

For a trapped nerve, it is usual to operate after 8-12 weeks because most people with a trapped nerve in their neck get better naturally. This can happen if the disc or swelling around a nerve decreases with time. An image-guided steroid injection may help this but does carry risks. Tablet pain killers can also help manage the pain whilst you are waiting for it to hopefully get better. Physiotherapy may help to settle the symptoms.

Six out of 10 patients get better spontaneously by 6 weeks, while 7–8 out of 10 patients will feel better by 12 weeks. If the arm symptoms have not got better by 12 weeks then improvement is less likely. Other than signs of nerve damage, surgery is usually only considered when the pain is severe and has not got better by 8-12 weeks.

Spinal surgery is usually not a 'cure' and cannot prevent further disc degeneration. It is aimed to provide benefit with 75-85% of the patients getting an improvement in the pain or pins and needles in the arm (7 to 8 out of 10 people). This is not necessarily felt immediately but sometimes over several weeks. Numbness or weakness have less chance of improvement (even with a technically successful operation) and any improvement can take longer.

If the spinal cord is trapped, only 1 in 5 patients will get an improvement in the hand clumsiness, arm weakness or unsteady legs with the main aim of surgery, to prevent further worsening which may result in worsening weakness in the arms and legs.

Relief from neck pain is more difficult to predict and it should not be regarded as the main aim of the surgery. It is unlikely that this type of surgery would be performed for people suffering neck pain alone.

The operation

There are different techniques when performing an operation for a trapped nerve in the neck. Outcomes from all methods are very similar and the choice of operation will be decided by your surgeon, who will take into consideration the symptoms in the arm(s) and any other problems you might have such as cervical facet joint degeneration (arthritis in the joints at the back of the spine), osteoporosis (fragile bones), any spinal instability (wobbly spine) or previous neck surgery.

Generally, there are 3 surgical options with all having a similar chance of improving the arm symptoms and similar risks:

1. Anterior cervical discectomy and fusion (ACDF). This is the most common surgical procedure to free up a trapped nerve in the neck.
2. Anterior cervical discectomy and disc replacement. This is only suitable for patients with no arthritis in the joints at the back of the spine. These are usually young patients.
3. Posterior cervical foraminotomy or spinal cord decompression (laminectomy). The nerve and/or spinal cord is freed (decompressed) from the back of the spine. This will be discussed with you if it is considered an alternative option.

Anterior cervical discectomy and interbody fusion (ACDF)

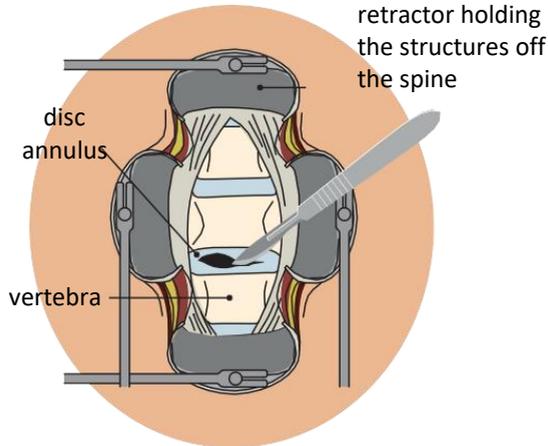
Cervical discectomy (removal of disc) and fusion involves complete removal of the cervical disc. This will remove the pressure off the nerve. The two bones either side are fused (joined) together.

The approach is made through an incision in the front of the neck, usually horizontal and slightly to one side. The oesophagus (food pipe) and the trachea (windpipe) are retracted (held back) off the spine. A microscope is used to give greater magnification of the structures. The disc space is then distracted (jacked up) to a more normal disc height to widen the space for the nerve and to help relieve the pressure. The surgeon then removes the cervical disc. More

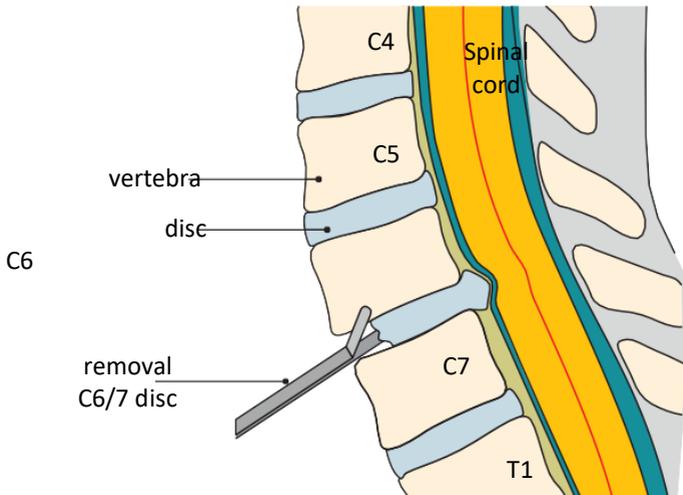
than one disc may be removed if necessary.

Removal of the disc allows the surgeon to remove bony spurs (osteophytes) pushing onto the nerves, ensuring they have more room. The disc space is then filled with a 'cage' which contains bone graft.

The skin and muscles are held off the spine before disc removal



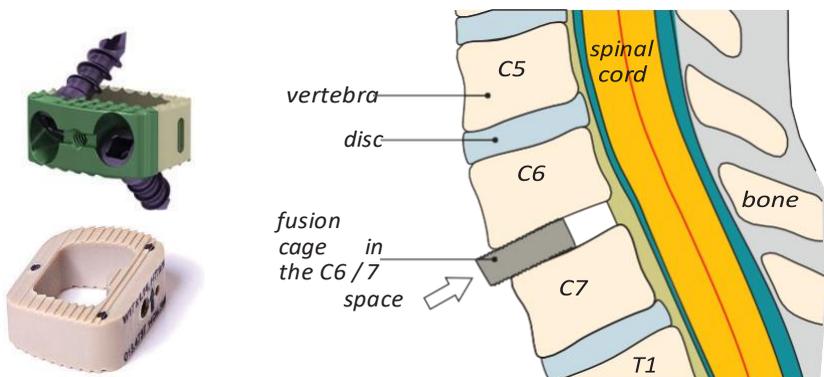
Removal of the cervical disc protrusion (side view)



Stabilisation

- 1 Bone graft.** This is used to fuse (join together) and stabilise the spine. When it is placed in the spine, new bone will grow into the bone graft over 3-6 months - this is a biological process known as spinal fusion. There are several techniques to get the bone graft needed for spinal fusion:
 - **artificial bone (synthetic bone)** These are bone-like substances and are most commonly used;
 - **patient's own bone (autograft bone).** Usually from local bone taken from the operation site.
- 2 Intervertebral fusion cage.** This is like a hollow Lego brick which props up the disc space between the two bones (vertebra). It is a tight fit and gives immediate stability. The cage is available in different width, height and depths to fit your spine. It is made from carbon fibre, PEEK (reinforced plastic) or titanium metal. The cage can be filled with bone graft or artificial bone. In some instances, it may be appropriate to fix the cage with screws into the bone above and below.

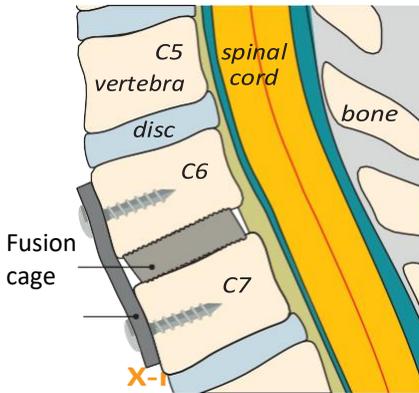
Example of fusion cages and the placement in the disc space (side view)



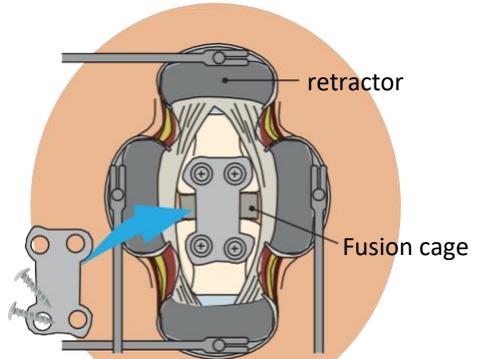
3 Anterior plate fixation. A metal (titanium) plate can be applied to the front of the cervical spine to add stability and prevent the graft or cage moving. Generally though, for most patients, a well-fitting cage means that this is not required. It may be necessary if more than two levels are operated on or your surgeon feels that your bone healing might be slow or if you have a ‘wobbly’ (unstable) spine. The plate is placed over the area and is screwed into the vertebral bodies above and below the disc space.

Anterior plate fixation

Side view



Front view



X-ray plate and cages in position



Risks and complications

As with any surgery, there are risks and complications associated with this procedure. These include:

- **Swallowing** problems are common after surgery on the front of the neck and will start to improve 1-2 days after surgery. It is advisable to eat 'soft' food for a few days to help with this. It usually settles but 1 in 10 people can have some problems with swallowing long-term.
- **Damage to a nerve.** This occurs in less than 1 out of 100 cases of first-time surgery but is more common in revision or 're-do' surgery where injuries can occur in up to 10 out of 100 cases. If this happens, you may get weakness in the muscles supplied by that particular nerve and/or numbness, tingling or hypersensitivity in the area of skin it supplies;
- **Injury to the small nerve that supplies the vocal cords.** This nerve is not visible during the surgery and may be bruised during the surgery and may recover. The nerve is permanently injured in 1 in 100 patients. This gives a hoarse voice;
- Less than 1 in 100 patients can experience a **droopy eyelid** due to stretching of a small nerve (sympathetic chain);
- Operations higher in the neck can result in **damage to the nerve that supplies the tongue** resulting in loss of control of the tongue. This usually recovers and occurs in less than 1 in 100 operations.
- **Tearing of the outer lining or covering which surrounds the spinal cord and nerves (dura).** This occurs in less than 1 out of 100 cases. It is more common if the spinal cord is trapped and in 're-do' surgery. Usually, the tear in the dura is repaired with stitches, a patch or a special glue. If the tear does not heal, you may get cerebrospinal fluid (CSF) leaking from the wound, headaches or, very rarely, meningitis. Although rare, the problems of leakage can persist. This could result in you having to return to theatre to enable the surgeon to revise the repair of the dura but the risk of a second operation being required is less than 1 out of 2000;

- **Recurrent arm pain**, as a result of scarring;
- **Bleeding.** You **must** inform your consultant if you are taking tablets used to 'thin the blood', such as warfarin, aspirin, rivaroxaban or clopidogrel. It is likely you will need to stop taking these before your operation. Taking non-steroidal anti-inflammatories (NSAIDs) medication such as ibuprofen and naproxen could also increase your risk of bleeding and your surgeon will advise you if you need to stop taking these in advance of your operation;
- **Bleeding in the wound and swelling in the windpipe** (laryngeal oedema), which could result in difficulty breathing or swallowing. This is rare but if it occurs, it may be necessary to take you back to theatre to try to stop the bleeding;
- **Infection.** Superficial wound infections may occur in up to 4 in 100 patients. These are often easily treated with a course of antibiotics. Deep wound infections may occur in fewer than 1 in 100 patients. 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, an impaired immune system or are taking steroids;
- **Blood clots (thromboses) in the deep veins of the legs (DVT) or lungs (PE).** These occur when the blood clots in the large veins of the leg and may cause the leg to swell and become painful and warm to touch. Although rare, if not treated this can 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. This happens in fewer than 1 out of 100 cases. There are many ways to reduce the risk of a blood clot forming. The most effective is to get moving as soon as possible after your operation. Walk regularly as soon as you can, both in hospital and when you return home. Perform the leg exercises as shown to you by the physiotherapist and keep well hydrated by drinking plenty of water. Female patients are also advised to stop taking any medication which contains the hormone oestrogen (like the

combined contraceptive or HRT) four weeks before surgery, as taking this during spinal surgery can increase the chances of developing a blood clot;

- **Bone graft non-union or lack of solid fusion (pseudoarthrosis).** This can occur in up to 5 out of 100 cases but only rarely results in the need for further surgery;
- **Cage movement** can occur in up to 2 out of 100 cases, with 1 out of 100 requiring re-operation. In extremely rare cases movement can cause severe damage and paralysis;
- **Pain can develop** from problems at other levels in the neck (adjacent level disease). The risk is cumulative at 1 percent each year such that 20 years after your surgery there is a 20% (1 in 5) chance that you will require further surgery to your neck.

There are also very rare but serious complications that in extreme circumstances might include:

- **Damage to the spinal cord and paralysis** (the loss of use of the arms and legs, loss of sensation and loss of control of the bladder and bowel). This can occur through bleeding around the spinal cord after surgery (haematoma). If this happens, every effort will be made to reverse the situation by returning to theatre to remove the haematoma. Sometimes, paralysis can occur from damage or reduction of the blood supply to the nerves or spinal cord. Unfortunately, this is not reversible;
- **Damage to the trachea (windpipe) or oesophagus (food pipe).** This is reported in fewer than 1 in 100 cases;
- **Stroke, heart attack or other medical or anaesthetic problems;**
- Extremely rarely, **death**, as a result of damage to major blood vessels around the spine, which is reported as happening in 1 out of 10,000 cases; or
- **General anaesthetic fatal complications** which have been reported in 1 out of 250,000 cases.

Things which may affect your outcome

There are factors that can affect the outcome of your surgery:

- **Smoking.** Nicotine has been shown to be a bone toxin. Patients should make every effort to allow their body the best chance for their bone to heal by not smoking, ideally 2–3 months before the operation;
- **Diabetes** increases the risk of infection which is further increased with poor diabetic control. If the blood test showing diabetic control is high, your surgery may be postponed;
- **Obesity.** This makes the surgery more difficult and therefore increases the risk of damaging structures during your surgery.

Before surgery

You will have a 'pre-operative assessment' before your surgery. The aim is to make the surgery as safe as possible for you. You will be asked to discuss any medical problems and any tablets you take. You will also have blood tests and swabs taken. Instructions will be given if you need to stop any tablets before your surgery.

Your hospital stay

You will be admitted on the day of your surgery and your surgeon will see you before the operation. Immediately after the operation you will be taken on your bed to the recovery ward where nurses will regularly monitor your blood pressure and pulse.

A drain (tube) may be placed near the surgical incision to prevent any excess blood or fluid collecting under the wound. It is also likely that you will be sitting up in bed immediately after the operation as this will help to reduce any swelling in your neck. The drain will be removed by the nursing staff when the drainage has stopped, usually the next day after surgery.

It is very normal to experience some level of discomfort or pain after the surgery. The nursing and medical staff will help you to control this with medication. The symptoms in your arms may vary due to increased swelling around the nerves. As the nerves become less irritated and swollen, your pain should slowly start to settle. This can take up to three months.

It is important not to suddenly stop taking certain pain relief medication, such as morphine, or 'nerve pain killers' (gabapentin, pregabalin or amitriptyline). It will be necessary to gradually 'wean' yourself off them – your GP can advise you if necessary.

The ward physiotherapist will visit you after the operation to make sure you are confident and safely mobile. You will be encouraged to practice climbing stairs with the physiotherapist if this is appropriate. You will not need a neck collar and will be encouraged to keep your neck gently mobile. Once you are safe enough to manage at home you will be discharged, usually the next day after surgery. Please arrange for a friend or relative to collect you, as driving yourself or taking public transport is not advised in the initial stages of recovery.

Wound care

Skin wound closure will usually be with absorbable sutures (stitches) although the ends may need trimming. You will be advised by the ward nurse to arrange an appointment with your GP's practice nurse, usually 7-10 days after the operation, for them to be trimmed. The dressing can be removed after 3 days.

You may bath or shower 48 hours after surgery if you are careful but you must avoid the dressing getting too wet. Most dressings used are 'splash-proof' but if water gets underneath, then it will need to be changed. A simple dry dressing from a pharmacy is sufficient to use. When shaving, care should be taken to avoid the area until it is fully healed.

Please contact your hospital or your GP if you think your wound might be infected. Symptoms could include:

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

Once the wound has healed and if the scar is sensitive to touch, you can start to massage around the scar using a non-perfumed cream or oil to encourage normal sensation and healing.

Driving

Normally you will be advised to avoid driving for 2–4 weeks depending on your recovery and individual situation. If you have no altered sensation or weakness in your arms and you can move your head around freely, then you may resume driving if you feel safe to do so but you must be confident to do an emergency stop. It is advisable not to travel for long distances initially (no longer than 20 minutes) without taking a break. If you have altered sensation, weakness or clumsiness in your arms or legs, please ask your surgeon when you can consider driving again.

Recreational activities

It is important to keep as mobile as you can after surgery, so get up and move about regularly (every 20 minutes or so). Walking outside is fine but increase your walking distance gradually and be careful not to trip over when on uneven ground. You should avoid lifting anything heavy for the first six after your operation.

Try to avoid stretching and reaching up above your head for the first few weeks after surgery, as this can cause nerve irritation and arm pain which can slow down your recovery.

You can return to light recreational activities such as swimming and gentle fitness exercises after 6 weeks. You can return to all sporting activities after 3 months. A graduated return to sport is then advisable. Avoid flying for six weeks (and long-haul flights for three months) because of the increased risk of deep vein thrombosis (DVT) after surgery.

Work

Returning to work is dependent on both your recovery and your job. Most people are off work for an initial 3–4 weeks but if you are in a strenuous job you may need up to eight weeks. It is always sensible to discuss with your employer if you can return on 'light duties' and reduced hours at first. There is usually nothing to stop you doing computer or office work at an earlier date provided you can keep moving about. The hospital will issue you with a fitness to work (off work) certificate or you may ask your GP.

Follow-up

You will see your surgeon in clinic 6 to 8 weeks after your surgery. If you have any queries about the information in this booklet, please contact the secretarial team on 0114 2632115.



What is the British Spine Registry (BSR)?

The British Spine Registry aims to collect information about spinal surgery across the UK. This will help us to find out which spinal operations are the most effective and in which patients they work best. This should improve patient care in the future.

The Registry will enable patient outcomes to be assessed using questionnaires. These will allow surgeons to see how much improvement there has been from treatment.

This has worked for hip and knee joint replacements through the National Joint Registry. We need your help to improve spinal surgery in the UK.

What data is collected?

Your personal details allow the BSR to link you to the surgery you have had. They also allow us to link together all the questionnaires you complete. If you need any further spinal surgery in the future, details of previous operations will be available to your surgeon.

Personal details needed by the BSR are your name, gender, date of birth, address, email address and NHS number.

Your personal details are treated as confidential at all times and will be kept secure. This data is controlled by the British Association of Spine Surgeons (BASS) and held outside the NHS. Personal details will be removed before any data analysis is performed, retaining only age and gender. Your personal data and email address will not be available to anyone outside BASS

and its secure IT provider. Anonymised data may be released to approved organisations for approved purposes, but a signed agreement will restrict what they can do with the data so patient confidentiality is protected.

Your personal data is very important, as this will allow us to link details of your diagnosis and surgery with any problems or complications after surgery. You may also be asked to complete questionnaires before and after surgery to work out how successful the surgery has been. This will only be possible if we can connect you to the questionnaires through your personal details.

Do I have to give consent?

No, your participation in the BSR is voluntary and whether you consent or not, your medical care will be the same. Your personal details cannot be kept without your consent. This will be obtained either by asking you to physically sign a consent form or electronically sign one through an email link to a questionnaire or at a questionnaire kiosk in the outpatient clinic.

You can withdraw your consent at any time or request access to your data by:

- going to the patient section of the BSR website at www.britishspineregistry.com; or
- writing to us at the BSR centre (see address on next page). Please state if you are happy for us to keep existing data but do not want to be contacted, or whether you want your data to be anonymised (so it cannot be identified).

Research

Your consent will allow the BSR to examine details of your diagnosis, surgical procedure, any complications, your outcome after surgery and your questionnaires. These are known as 'service evaluations' or 'audits'. Operation and patient information, including questionnaires in the BSR, may be used for medical research. The

purpose of this research is to improve our understanding and treatment of spinal problems. The majority of our research uses only anonymised information which means it is impossible to identify individuals. From time to time, researchers may wish to gather additional information. In these cases we would seek your approval before disclosing your contact details. You do not have to take part in any research study you are invited to take part in and saying no does not affect the care you receive.

All studies using data from the Registry will be recorded on the BSR website at www.britishspineregistry.com

Children

Parents are asked to consent for data to be collected from their child. Looking at the outcome of spinal surgical procedures is just as vital in children as it is in adults.

Further information

The BSR website at www.britishspineregistry.com contains more information, including details of any studies and any information obtained through the Registry data.

To contact the BSR, write to:

The British Spine Registry
Amplitude Clinical Services
2nd Floor
Orchard House
Victoria Square
Droitwich
Worcestershire
WR9 8QT

Please feel free to write any questions you may have on this page, which can be answered on your next visit

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