PROCEDURE

Spinal cord stimulation

Spinal cord stimulation uses an implanted device to reduce selected types of long-term pain.

PURPOSE
Reduce long-term pain and improve daily function

PROCEDURE TYPE
Therapeutic; minimally invasive trial, then surgical implantation

WHERE IT IS DONE
Operating theatre or outpatient procedure suite

ANAESTHESIA
Local with moderate sedation; sometimes general for permanent implantation

HOW LONG IT TAKES
About one to two hours for each procedure

PREPARATION
Fasting, medication review, and a temporary blood-thinner plan

RECOVERY
Usually same day; no driving after sedation or implantation

MAIN RISKS
Infection, bleeding, nerve injury, and device movement

RESULTS
Trial benefit judged over several days; programming continues afterward

Overview

Spinal cord stimulation, or SCS, is a treatment for certain types of long-term pain. It uses thin electrical leads placed near the spinal cord and a small pulse generator, similar to a pacemaker, placed under the skin.

The electrical signals change how pain messages are processed before they reach the brain. They do not repair the original injury or remove every pain signal. The goal is to reduce pain enough to improve sleep, movement, work, or other daily activities.

Treatment usually has two stages. First, you have a temporary trial. If the trial provides meaningful benefit, you may choose to have a permanent system implanted. A successful trial does not guarantee lasting relief.

Different devices produce different patterns of stimulation. Some cause a gentle tingling sensation called paraesthesia. Others are designed to work without a noticeable sensation.

Why the procedure is performed

Spinal cord stimulation may be considered when pain has continued despite appropriate treatments such as rehabilitation, medicines, or previous surgery.

It is used mainly for neuropathic pain, meaning pain linked to irritated or damaged nerves. Examples include persistent nerve pain after back surgery, complex regional pain syndrome, and painful diabetic neuropathy. It may also be offered for selected forms of limb or chest pain caused by poor blood flow.

The evidence is not equally strong for every condition. In particular, the benefit for nonspecific low back pain remains uncertain. Your pain specialist should explain what evidence applies to your diagnosis and what a realistic result would be.

Treatment goals should be personal and measurable. Less pain may be one goal, but being able to walk farther, sleep better, return to an activity, or reduce some pain medicine may matter just as much.

Who should and should not have it

You may be considered for spinal cord stimulation if your pain has lasted for months, has a nerve-related pattern, and has not improved enough with less invasive care. You must also be able to understand the device, take part in the trial, and attend programming appointments.

Assessment commonly includes a review of your physical health, pain treatments, daily function, expectations, and emotional wellbeing. A psychological assessment does not mean that your pain is imaginary. It helps identify stress, depression, substance use, or expectations that could affect the result.

The procedure may be avoided or delayed if you have:

Elective implantation is usually postponed during pregnancy. Pacemakers, defibrillators, or other implanted devices do not always rule out SCS, but compatibility must be checked carefully.

- An active infection
- A bleeding problem that cannot be safely corrected

- Blood-thinning treatment that cannot be safely interrupted
- A medical condition that makes anaesthesia or surgery unsafe
- Untreated mental health or substance-use problems that would interfere with care
- Difficulty operating, charging, or caring for the device without support

How to prepare

Your treating facility's own instructions take priority because fasting, medication, and arrival requirements differ between centres and types of anaesthesia.

Give the team a complete list of medicines, supplements, allergies, implanted devices, and previous reactions to anaesthesia. Tell them about fever, a new infection, broken skin near the planned procedure area, or recent antibiotic treatment.

Blood thinners like warfarin or apixaban can increase the risk of bleeding around the spinal cord. These include prescription anticoagulants and antiplatelet medicines. Do not stop one on your own. The prescriber and procedure team should give you a coordinated plan.

You may need to stop eating and drinking before sedation or general anaesthesia. Arrange for an adult to take you home and follow any instructions about showering or skin preparation. Wear loose clothing that will not press on the dressings.

Before the trial, discuss which activities will show whether treatment is helping. Keep your usual pain and activity notes if the team asks you to.

What happens during the procedure

For a trial, you usually lie face down. Monitoring equipment checks your heart rate, blood pressure, and oxygen level. The skin on your back is cleaned and numbed with local anaesthetic. Sedation may help you relax, but you may remain awake enough to answer questions.

Using live X-ray guidance, the clinician passes a needle into the epidural space, which is the area outside the protective covering of the spinal cord. One or more thin leads are guided to the planned position. The leads are connected to an external pulse generator and secured under a dressing.

The trial commonly lasts several days. You test the stimulation during ordinary activities while keeping the dressing and external equipment dry.

For permanent implantation, leads are placed or secured near the spinal cord. Some systems use leads inserted through a needle. Others use a wider "paddle" lead placed through a small opening in the back bones. The leads are connected under the skin to a pulse generator, usually placed in the buttock, side, or abdomen. The incisions are then closed and covered.

Recovery and what to expect afterward

Pain or tenderness around the lead and generator sites is expected after implantation. It should gradually improve. Your team may recommend simple pain relief or prescribe short-term medication.

You can usually drink and eat once you are alert and not feeling sick. Start with light food if sedation or anaesthesia has upset your stomach.

During a trial, avoid bending deeply, twisting, stretching overhead, or lifting heavy objects because these movements can shift the leads. After permanent implantation, activity limits continue while the incisions heal and the leads settle. Follow the specific lifting, bathing, and wound-care instructions from your facility.

You cannot drive home. Sedation, anaesthesia, pain, and some pain medicines can make driving unsafe. Later, follow the device instructions about driving with stimulation turned on; some systems or settings should be switched off while driving.

People with desk-based jobs may return sooner than those whose work involves lifting, climbing, or repeated twisting. Recovery may take several days to a few weeks, depending on the procedure and your work.

Risks and possible complications

Possible complications include:

Any procedure involving sedation or anaesthesia also has risks, including breathing problems, nausea, or medication reactions. Your individual risk is affected by your health, medicines, and the type of lead being used.

- Infection of the skin, leads, or implanted generator
- Bleeding, including bleeding near the spinal cord
- A spinal-fluid leak causing a headache that worsens when upright
- Lead movement, breakage, or equipment failure

- Pain over the generator or lead sites
- Uncomfortable stimulation or stimulation in an unwanted area
- Loss of benefit or inadequate pain relief
- Skin damage over the device
- Nerve or spinal cord injury
- A need to reposition, replace, or remove part of the system

Results and follow up

You will usually judge the trial over several days rather than immediately after lead placement. Pain scores matter, but the team will also ask about function, sleep, medication use, and whether you could do activities that normally trigger pain.

If the trial does not provide worthwhile benefit, the temporary leads are removed. This does not prevent you from pursuing other pain treatments.

After permanent implantation, the device is programmed and adjusted over several visits. Finding the most useful settings may take time. You will also need routine appointments to check wound healing, pain control, battery function, and the condition of the equipment.

Some generators need regular recharging. Others eventually need a replacement procedure when the battery runs out. Carry your device identification card. Before an MRI scan, surgery, security screening, or another procedure, tell the relevant team that you have a spinal cord stimulator. MRI access is determined by the exact device, lead arrangement, and scanning conditions.

Alternatives

Spinal cord stimulation is optional. Alternatives depend on the type and source of your pain.

You may also choose not to have another procedure and focus on function, symptom management, and support.

- Continued non-surgical care: Exercise, physiotherapy, pacing, sleep support, and psychological pain therapies avoid implant risks but may not provide enough relief on their own.
- Pain medicines: Medicines may reduce symptoms without surgery, but benefits can be limited by side effects or loss of effectiveness.

- Injections or nerve procedures: Steroid injections, nerve blocks, or radiofrequency treatment may suit a specific pain source. Their effects are often temporary and they do not help every type of nerve pain.
- Further corrective surgery: Surgery may address a clear structural problem, such as pressure on a nerve. It involves surgical risk and may not improve pain if no correctable cause is present.
- Peripheral nerve stimulation: This targets a particular nerve rather than the spinal cord. It may be less suitable when pain covers a broad area.
- An implanted medicine pump: This delivers medicine around the spinal cord. It avoids electrical stimulation but brings medication-related risks and requires refilling.

When to call your healthcare team

Contact your healthcare team promptly for increasing wound pain, redness, warmth, swelling, drainage, fever, a severe headache that worsens when standing, new stimulation problems, or equipment becoming visible through the skin.

Seek emergency medical care for:

Routine programming questions, gradual changes in pain relief, charging difficulties, and return-to-work planning can usually be handled during normal clinic hours.

- New weakness or numbness in one or both legs
- Loss of bladder or bowel control
- Numbness around the genitals or buttocks
- Severe back pain with rapid neurological changes
- Trouble breathing, collapse, or signs of a severe allergic reaction

Common questions

Will I be asleep?

You may receive local anaesthetic with moderate sedation for the trial. Some permanent implants use deep sedation or general anaesthesia. The plan also depends on whether you need to respond while the leads are positioned.

Can I drive home?

No. Arrange for a responsible adult to take you home. Do not drive again until the effects of

sedation and pain medicine have passed and your team says it is safe.

How painful is it?

The numbing injection can sting, and you may feel pressure during lead placement. Tenderness around the incisions and generator pocket is common afterward. Severe or rapidly increasing pain needs medical review.

How long does the trial last?

A trial usually lasts several days. Your facility will tell you when the leads will be removed and how to protect the dressing.

When will I know if it works?

You will assess the temporary system during the trial. A permanent device may need several programming sessions before you know which settings are most useful.

Can I have an MRI afterward?

Some systems allow MRI scans only under specific conditions, while others limit the body areas that can be scanned. The exact device and leads must be checked before every MRI.

Sources

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