CONDITION

Spinal cord injury

Spinal cord injury is damage that disrupts communication between the brain and body

WHAT IT IS
Damage disrupting signals through the spinal cord

BODY SYSTEM
Nervous system

MAIN SYMPTOMS
Weakness, numbness, paralysis, bladder or bowel changes

WHAT CAUSES IT
Trauma, compression, or reduced blood flow

HOW IT IS DIAGNOSED
Neurological examination with CT and MRI

MAIN TREATMENT
Emergency stabilization, possible surgery, and rehabilitation

CAN IT BE CURED?
No - damaged cord tissue may not regrow

IS IT AN EMERGENCY?
Yes - new weakness or numbness after injury

LONG-TERM OUTLOOK
Lifelong effects range from mild limitations to major disability

Overview

A spinal cord injury is damage to the bundle of nerves that carries messages between your brain and the rest of your body. The spinal cord runs through the spinal canal, which is formed by the bones of your spine.

An injury can interrupt movement, sensation, bladder and bowel control, sexual function, breathing, and automatic functions such as blood pressure control. The effects occur at and below the injured part of the cord.

An injury in the neck can affect the arms, trunk, and legs. This is often called tetraplegia or quadriplegia. An injury lower in the spine may affect the trunk and legs but not the arms. This is called paraplegia .

A spinal cord injury may be described as:

"Complete" does not mean that the spinal cord has necessarily been cut in two. It is a medical classification based on a detailed nerve examination. Early findings may change as swelling settles and spinal shock resolves.

Spinal cord injury is different from a simple spinal fracture. A spinal bone can break without damaging the cord, while the cord can sometimes be injured without an obvious fracture.

- Complete: no movement or feeling remains in the lowest sacral nerves
- Incomplete: some movement or feeling remains below the injury

Symptoms

Symptoms depend on the level of the injury and how much of the cord is affected. They may begin immediately after trauma or become clearer as swelling or bleeding develops.

Possible symptoms include:

After a major injury, spinal shock can temporarily reduce reflexes, muscle tone, movement, and sensation below the damaged area. It can last for days or longer. This is different from neurogenic shock , a dangerous circulation problem that may cause low blood pressure and a slow heart rate.

Symptoms do not always match how serious an injury looks from the outside. Someone may be awake and have little pain but still have spinal cord damage.

- Weakness or inability to move part of the body
- Numbness, tingling, burning, or loss of temperature sensation
- Loss of bladder or bowel control
- Neck or back pain
- Difficulty breathing or coughing
- Changes in sexual sensation or function
- Muscle stiffness, spasms, or unusually limp muscles
- Changes in blood pressure, heart rate, or temperature control

Causes and risk factors

Most spinal cord injuries happen when a sudden force fractures, dislocates, compresses, or stretches the spine. Common situations include road crashes, falls, sports injuries, and

violence.

The spinal cord may also be damaged by:

Damage from a tumour, infection, or inflammatory condition is often described as a non-traumatic spinal cord injury. Treatment then also focuses on the underlying cause.

Anyone can have a spinal cord injury. Risk may be higher during activities involving speed, heights, diving, physical contact, or unsafe equipment. Conditions that weaken bones or narrow the spinal canal can make serious cord damage more likely after a fall or other trauma.

Alcohol or drug use may increase risk when it contributes to unsafe driving, falls, violence, or poor decisions around water and sports.

- Bleeding or swelling around the cord
- A loss of blood flow to the cord
- A slipped disc or other tissue pressing on the cord
- Complications of surgery or a medical procedure
- Tumours, infection, or inflammation affecting the spine

Diagnosis

A suspected spinal cord injury is assessed as an emergency. Until the spine has been evaluated, emergency teams may limit movement and support the head and neck to reduce the chance of further harm.

The first assessment checks breathing, circulation, alertness, and other injuries. A neurological examination then tests muscle strength, light touch, pinprick sensation, and reflexes. Sensation and muscle control around the lowest part of the spinal cord help determine whether the injury is complete or incomplete.

Imaging may include:

Doctors repeat nerve examinations because swelling, sedation, pain, or other injuries can affect the first results. Blood tests may help assess blood loss, infection, organ function, or problems that could affect surgery, but they do not confirm spinal cord injury by themselves.

- CT scan: detailed X-ray images that are especially useful for fractures and spinal alignment
- MRI scan: images of the spinal cord, discs, ligaments, bleeding, and other soft tissues
- X-rays: sometimes used in selected situations, although they show less detail than CT

Treatment and management

Emergency care aims to prevent further cord damage while supporting breathing and blood flow. This may include careful spinal movement precautions, oxygen or breathing support, blood pressure management, and treatment of other injuries.

Some people need surgery to remove pressure from the spinal cord, repair instability, or realign and stabilize the spine. Stabilization may involve metal screws, rods, or plates. Whether surgery is appropriate and when it is performed depend on the injury, imaging findings, overall health, and other trauma.

There is no medicine that reliably repairs established spinal cord damage. Medicines may instead be used to manage pain, muscle spasms, blood pressure, blood clots, bladder problems, or other complications. High-dose steroid treatment is not a routine choice for every spinal cord injury and requires specialist assessment of possible benefits and harms.

Rehabilitation often begins while you are still in hospital. It may involve:

Assistive technology can increase independence. Examples include adapted controls, environmental control systems, standing equipment, and devices that help with hand function or mobility.

- Physiotherapy for strength, movement, positioning, and breathing
- Occupational therapy for dressing, bathing, cooking, work, and equipment
- Bladder and bowel management
- Skin care and pressure-relief training
- Wheelchair, brace, walking-aid, or transfer training
- Support for communication, relationships, sexuality, and mental health
- Planning for home access, education, driving, or employment

Complications

Spinal cord injury can affect many body systems. The type of complication depends partly on the injury level and how much movement and sensation remain.

Possible complications include pressure injuries, urinary infections, kidney or bladder problems, constipation, loss of bone strength, joint stiffness, chronic nerve pain, muscle spasms, blood clots, and breathing infections. Reduced sensation can make burns, cuts, or pressure damage harder to notice.

People with injuries at or above about the sixth chest vertebra may develop autonomic dysreflexia . This is a sudden, uncontrolled rise in blood pressure, often triggered by a full bladder, blocked catheter, constipation, tight clothing, or skin irritation. Symptoms can include a pounding headache, sweating or flushing above the injury, blurred vision, anxiety, and goosebumps below the injury. It requires immediate action and urgent medical assessment.

Changes in mobility, independence, work, relationships, and body image can also affect emotional health. Anxiety, depression, grief, and sleep problems are treatable and should not be dismissed as an unavoidable part of the injury.

Prevention

Not every spinal cord injury can be prevented. Injuries caused by unexpected falls, illness, reduced blood flow, or unavoidable complications may occur despite sensible precautions.

Risk can be reduced by using seat belts and suitable child restraints, avoiding driving while impaired, wearing recommended protective sports equipment, and following workplace safety procedures.

Check water depth before diving and enter unfamiliar water feet first. Reduce fall hazards at home, particularly if you have poor balance, weak bones, or medicines that cause dizziness. Safe firearm storage and non-violent conflict support may also reduce injury risk.

These steps lower risk but cannot guarantee that an injury will not happen.

Living with it and what to expect

Recovery is usually fastest during the first months, but changes can continue for longer. An incomplete injury generally leaves more potential for improvement than a complete injury, although no examination can promise exactly how much function an individual will regain.

Early recovery may include improvement as swelling settles and spinal shock ends. Longer-term gains often come from nerve recovery, strengthening muscles that still work, learning different ways to complete tasks, and using equipment effectively. Rehabilitation does not mean the injury was minor; it helps you make the best use of the function you have.

Some effects may remain lifelong. You may need ongoing plans for bladder and bowel care, skin checks, exercise, pain, spasms, bone health, and equipment maintenance. Needs can change with ageing, weight changes, pregnancy, new health conditions, or years of wheelchair use.

Many people return to family roles, education, work, driving, sport, relationships, parenting, and community life. The amount of support and adaptation needed differs. Peer support and specialist spinal rehabilitation services can help with practical decisions that may not be obvious during the first hospital stay.

Routine follow-up may include monitoring skin, breathing, bladder and kidney health, bowel function, pain, muscle tone, mobility, mood, and equipment fit. New symptoms should not automatically be blamed on the old injury.

When to get medical help

Call emergency services after a significant head, neck, or back injury if there is new weakness, numbness, loss of movement, severe neck or back pain, loss of bladder or bowel control, or difficulty breathing. Do not move the injured person unless there is immediate danger. Keep the head and neck as still as reasonably possible while waiting for help.

Seek emergency help for signs of autonomic dysreflexia, particularly a sudden pounding headache, sweating, flushing, or vision changes in someone with a higher-level spinal cord injury.

Urgent medical assessment is also appropriate for:

Arrange routine follow-up for persistent pain, increasing spasms, repeated urinary infections, skin problems, equipment difficulties, low mood, sleep problems, or changes that interfere with daily life.

- New or worsening weakness or loss of sensation
- Fever with breathing problems, confusion, or feeling seriously unwell
- A red, swollen leg or sudden chest pain and breathlessness
- A pressure wound with spreading redness, discharge, or fever
- A catheter that is not draining with bladder pain or autonomic symptoms
- Severe or unexplained changes in bladder or bowel function

Common questions

Can a spinal cord injury heal completely?

Some people, especially those with incomplete injuries, regain substantial movement or sensation. Others have permanent loss of function. Current treatment can support recovery

and independence, but it cannot reliably regrow severely damaged spinal cord tissue.

Can you walk again after a spinal cord injury?

Walking may be possible if enough nerve and muscle function remains. Some people walk independently, some use braces or walking aids, and others use a wheelchair. The injury level, completeness, early recovery, general health, and rehabilitation all influence mobility.

What is the difference between complete and incomplete injury?

A complete injury has no preserved movement or sensation in the lowest sacral nerve areas. An incomplete injury leaves some function below the damaged level, including in those sacral areas. A specialist neurological examination determines the classification.

Does a spinal cord injury affect bladder and bowel control?

It often can. The nerves that coordinate bladder and bowel function may no longer communicate normally with the brain. A planned routine, medicines, catheter equipment, or other methods can help protect health and improve predictability.

Can someone with a spinal cord injury have sex or children?

Often, yes. Sensation, arousal, orgasm, erection, ejaculation, fertility, and pregnancy may be affected in different ways. Sexual health and fertility specialists can discuss options, safety, contraception, pregnancy, and assisted reproduction when needed.

Is paralysis always immediate?

Not always. Weakness or numbness may worsen as swelling, bleeding, or pressure develops. Any new neurological symptom after a neck or back injury needs emergency assessment, even if the person could move normally at first.

Sources

- Spinal Cord Injury - National Institute of Neurological Disorders and Stroke
- Spinal injury: assessment and initial management, NICE guideline NG41 - National Institute for Health and Care Excellence
- Spinal cord injury - World Health Organization
- Spinal Cord Injury - American Association of Neurological Surgeons
- International Standards for Neurological Classification of Spinal Cord Injury, revised 2019 - American Spinal Injury Association

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