CONDITION

Radial nerve dysfunction

Radial nerve dysfunction is weakness or numbness caused by pressure on or damage to the radial nerve in the arm.

WHAT IT IS
Damage or compression affecting the radial nerve

BODY SYSTEM
Nervous system

MAIN SYMPTOMS
Wrist drop, weak finger straightening, hand numbness, arm pain

WHAT CAUSES IT
Pressure, injury, fracture, or less often systemic illness

HOW IT IS DIAGNOSED
Neurological examination, nerve conduction tests, and electromyography

MAIN TREATMENT
Pressure relief, splinting, therapy, and sometimes surgery

CAN IT BE CURED?
Sometimes - reversible compression or repairable injury

IS IT AN EMERGENCY?
Sometimes - sudden weakness or major arm trauma

LONG-TERM OUTLOOK
Many compression injuries improve over weeks to months

Overview

The radial nerve runs from the neck, through the armpit and along the back of the upper arm. It then travels past the elbow into the forearm and hand.

This nerve helps control the muscles that straighten your elbow, wrist, fingers and thumb. It also carries feeling from part of the back of the hand and arm.

Radial nerve dysfunction happens when the nerve is compressed, stretched, inflamed or cut. Clinicians may describe this as a radial nerve injury, palsy or neuropathy. "Neuropathy" simply means that a nerve is not working normally.

The effects depend on where the nerve is affected. An injury high in the arm can cause broader weakness than an injury near the wrist. One of the best-known signs is wrist drop , in which the

wrist cannot be held up normally.

Many pressure-related injuries recover, but healing can take weeks or months. More serious damage, such as a nerve cut during trauma, may require surgery and may not recover fully.

Symptoms

Symptoms may begin suddenly after an injury or prolonged pressure. In other cases, they develop gradually.

Possible symptoms include:

The exact pattern can help locate the affected part of the nerve.

Compression in the armpit may weaken elbow, wrist and finger movement. This can happen if poorly fitted crutches press into the armpit.

An injury around the middle of the upper arm usually weakens the wrist and fingers while leaving elbow extension relatively strong. This is a common location for pressure-related injury and for nerve problems associated with a broken upper-arm bone.

A branch called the posterior interosseous nerve mainly controls movement. If this branch is affected near the elbow, you may have trouble straightening your fingers and thumb without much numbness.

A superficial branch of the radial nerve carries sensation rather than muscle signals. Problems in this branch can cause numbness, tingling or pain on the thumb side of the back of the hand without muscle weakness.

- Difficulty lifting the wrist, called wrist drop
- Weakness when straightening the fingers or thumb
- A weak grip because the wrist cannot be held in a useful position
- Numbness or tingling on the back of the hand, often near the thumb
- Pain, burning or unusual sensitivity in the arm or hand
- Muscle thinning if the problem continues for a long time

Causes and risk factors

Prolonged pressure is a common cause. This may happen when someone sleeps deeply with an arm trapped under their body or hanging over a firm edge. Alcohol, sedating medicines or reduced awareness can make this more likely because the person may not change position.

Other causes include:

Diabetes and some other conditions can make nerves more vulnerable to injury. Lead exposure and wider disorders of the nerves can sometimes cause similar weakness, often involving more than one limb.

Radial nerve dysfunction is usually an acquired condition rather than an inherited one. However, some inherited nerve disorders can make nerves unusually sensitive to pressure.

- A fracture of the humerus, the long bone of the upper arm
- A dislocated elbow or another significant arm injury
- A deep cut, puncture wound or crush injury
- Pressure from poorly fitted crutches
- A tight cast, splint or bandage
- Repeated pressure or movement around the elbow or forearm
- A lump, cyst or other growth pressing on the nerve
- Complications from surgery or an injection near the nerve

Diagnosis

A healthcare professional will ask when the symptoms started and whether there was an injury, prolonged pressure or repetitive activity. They will also ask about medical conditions, medicines, alcohol use and possible workplace or environmental exposures.

During the examination, they may check your ability to straighten the elbow, wrist, fingers and thumb. They will test sensation in different parts of the hand and compare both arms. Reflexes, grip and the strength of other muscles may also be checked.

This examination helps distinguish radial nerve dysfunction from conditions affecting the brain, spinal cord, nerve roots in the neck or other arm nerves.

Nerve conduction studies measure how quickly and strongly electrical signals travel through a nerve. Electromyography , often shortened to EMG, measures electrical activity in muscles. Together, these tests can help locate the injury, estimate its severity and show whether nerve fibres are recovering.

Testing may be delayed for a short period after a new injury because some changes take time to appear. Repeat testing can sometimes show whether healing is occurring.

Ultrasound or MRI may be used if entrapment, a mass or a torn nerve is suspected. X-rays are useful when a fracture or joint injury may be involved. Blood tests are not required in every

case, but they may be used to look for diabetes, vitamin problems, lead exposure or another underlying condition.

Treatment and management

Treatment is based on the cause, location and severity of the nerve damage.

Pressure on the nerve should be removed where possible. This may involve changing an activity, correcting the fit of crutches or adjusting a cast under medical supervision. Do not remove or alter a cast yourself unless you have been instructed to do so.

A wrist splint can hold the hand in a more useful position while the nerve recovers. It may improve grip and help prevent the wrist and fingers from becoming stiff.

Physical or occupational therapy can help maintain joint movement and muscle flexibility. A therapist may suggest safe exercises, ways to protect numb skin and practical changes for dressing, writing, computer use or work.

Pain may be managed with ordinary pain relief or medicines intended for nerve pain. These medicines reduce symptoms but do not directly repair the nerve. The right option depends on your health, other medicines and the type of pain.

Surgery may be considered when the nerve has been cut, trapped by scar tissue or compressed by a growth. It may also be needed for certain fractures or when testing shows severe damage without expected recovery. Procedures may release pressure, repair the nerve or use a nerve or tendon transfer to restore some movement.

Not everyone needs surgery. Many injuries caused by temporary compression improve as the nerve resumes normal signalling or damaged nerve fibres slowly regrow.

Complications

Weak wrist and finger movement can make gripping, lifting, typing and other everyday tasks difficult. A splint and therapy may reduce these effects during recovery.

Long-lasting weakness can lead to muscle loss. Joints may become stiff, and muscles or tendons can shorten into a fixed position called a contracture.

Reduced sensation increases the risk of unnoticed cuts, burns and pressure injuries. Checking the skin and using care around hot surfaces can help prevent this.

Some people develop persistent nerve pain or uncomfortable sensitivity. Severe nerve damage can leave lasting weakness or numbness even after treatment.

Complications are more likely when the nerve has been cut, badly crushed or compressed for a prolonged period. Delayed treatment of the underlying cause can also reduce the chance of full recovery.

Prevention

Not every case can be prevented. Fractures, accidental wounds and pressure from an internal growth may occur without warning.

You can reduce avoidable pressure on the radial nerve by changing position during long periods of sitting or resting. Avoid resting the upper arm against a hard edge for extended periods.

Crutches should support weight through the hands, not by pressing into the armpits. A healthcare professional or therapist can check their height and fit.

Follow safety practices when using tools or performing repeated arm movements. Taking breaks and adjusting the work area may reduce ongoing pressure near the elbow or forearm.

Seek advice if a cast or splint feels increasingly tight or causes new numbness, tingling, colour change or weakness. Do not place objects inside a cast to scratch the skin.

Living with it and what to expect

The course depends on how badly the nerve was injured.

If the nerve was temporarily compressed but its internal structure remains intact, improvement may begin over days to weeks. Strength and sensation can continue to return over several months.

When nerve fibres have been damaged, recovery is slower because they must regrow along the arm. Progress may happen gradually over many months. Sensation, pain and muscle strength do not always improve at the same rate.

A completely cut nerve will not usually reconnect by itself. Surgical repair may allow some recovery, but the result depends on the injury level, the time before repair and how far new nerve fibres must travel.

Follow-up may include repeated strength examinations or nerve tests. These appointments are important even when the condition is not urgent because they show whether recovery is following the expected pattern.

During recovery, a splint and activity changes may make work and daily tasks easier. Most

people can remain active, but tasks requiring strong wrist or finger extension may need temporary adjustment.

Recovery cannot be promised. Some people regain normal or nearly normal function, while others have lasting weakness, numbness or pain. Rehabilitation and, in selected cases, reconstructive surgery can help improve function when recovery is incomplete.

When to get medical help

Call emergency services for sudden arm weakness when it could be a stroke, especially if there is also:

Emergency care is also appropriate after a major arm injury if the hand is cold, pale or blue; there is severe bleeding; a bone or deep tissue is exposed; or pain and swelling are rapidly worsening.

Seek urgent medical assessment for new wrist or finger weakness, particularly after an injury. You should also get prompt help if a cast or bandage is followed by increasing pain, numbness, swelling, colour change or difficulty moving the fingers.

Arrange a routine appointment for persistent tingling, numbness or pain on the back of the hand, or for weakness that is mild but not improving. Follow-up is also important if known radial nerve dysfunction worsens or recovery stops progressing.

- Facial drooping
- Trouble speaking or understanding speech
- New weakness or numbness on one side of the body
- Sudden loss of balance, vision or coordination
- A sudden, severe headache

Common questions

Can sleeping on my arm cause radial nerve dysfunction?

Yes. Deep or prolonged sleep with the upper arm pressed against a firm surface can compress the nerve. Symptoms may include wrist drop and numbness on the back of the hand. New weakness still needs medical assessment because other conditions can look similar.

How long does radial nerve damage take to heal?

Temporary compression may improve over weeks to months. Damage to the nerve fibres can

take many months to recover. A cut or severely crushed nerve has a less predictable course and may need surgery.

Does wrist drop always mean the radial nerve is damaged?

No. Radial nerve dysfunction is a common cause, but problems in the neck, spinal cord or brain can also affect wrist movement. Sudden weakness with facial or speech changes should be treated as a possible stroke.

Can it heal without surgery?

Many pressure-related injuries heal without surgery. Splinting, therapy and removal of the pressure may be enough while the nerve recovers. Surgery is more likely when the nerve is cut, severely trapped or not showing expected recovery.

Is radial nerve dysfunction the same as carpal tunnel syndrome?

No. Carpal tunnel syndrome affects the median nerve at the wrist and often causes numbness in the thumb, index and middle fingers. Radial nerve dysfunction more often affects wrist or finger straightening and sensation on the back of the hand.

Should I exercise a weak wrist or hand?

Gentle movement can help prevent stiffness, but exercises should match the location and severity of the injury. Forceful or poorly chosen exercises may increase pain or strain weak joints. A physical or occupational therapist can provide an appropriate plan.

Sources

- MedlinePlus Medical Encyclopedia: Radial nerve dysfunction , U.S. National Library of Medicine
- Merck Manual Professional Edition: Mononeuropathies , Merck & Co.
- American Family Physician: Peripheral Nerve Entrapment and Injury in the Upper Extremity , 2021;103(5):275-285
- Latef TJ, Bilal M, Vetter M, Iwanaga J, Oskouian RJ, Tubbs RS. Injury of the Radial Nerve in the Arm: A Review , Cureus. 2018;10(2):e2199
- StatPearls: Radial Nerve Injury , StatPearls Publishing, National Center for Biotechnology Information