

What is cervical intervertebral disc disease?

Aging and wear can bring about structural changes in the intervertebral discs of the cervical spine, for example in the form of a protruding or herniated intervertebral disc, possibly with formation of a sequester (material that has separated from the intervertebral disc) and further morphological changes in the bony structure of the vertebrae (spondylosis, spondylarthrosis).

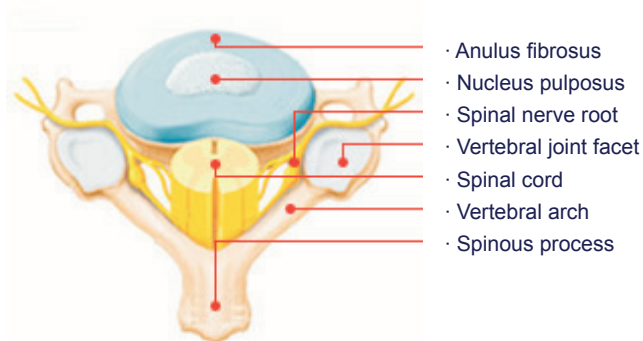
How does a herniated cervical intervertebral disc occur?

The cervical spine is highly mobile and bears the weight of the head. The intervertebral discs, which consist of an outer ring (annulus fibrosus) and an inner gelatinous core (nucleus pulposus), are located between the two adjacent vertebrae of each mobile segment. The annulus fibrosus connects the vertebral bodies by means of interpenetrating fibers (Sharpey's fibers). The central gelatinous core is 90% water and is highly elastic. The intervertebral discs absorb the high-level axial, static, eccentric, and dynamic loads acting upon the cervical spine, dampen them and distribute them. The wearing process renders the intervertebral discs brittle, cracks appear in the annulus fibrosus and structural elasticity is lost.

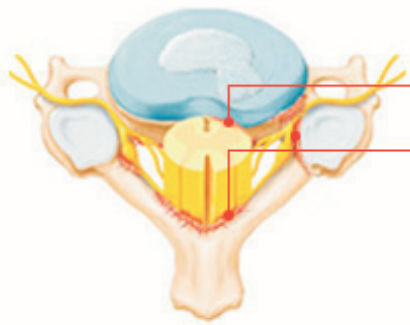
Thus it can happen that an intervertebral disc shifts within intervertebral disc space, which, assuming the annulus fibrosus is intact, then presses upon the spinal cord or a nerve root.

This condition is known as an intervertebral disc protrusion. A fully herniated intervertebral disc describes the situation when the annulus fibrosus tears, whereupon some of the gelatinous core shifts its position and presses against the spinal cord or nerve root. If the displaced intervertebral disc material separates from the disc and becomes freely mobile within the spinal cord canal, this is called a sequestered disc. A herniated intervertebral disc can be designated according to its position as medial (central), lateral (to the side) towards the spinal nerve canal or in between (mediolateral).

- Normal position of intervertebral disc with annulus fibrosus and nucleus pulposus in relation to the spinal cord

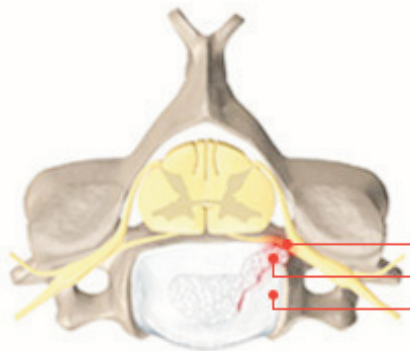


- Normal position of intervertebral disc with annulus fibrosus and nucleus pulposus in relation to the spinal cord and spinal nerves



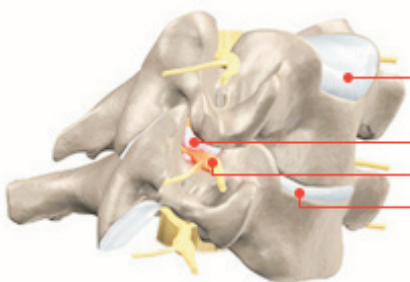
- Shift of nucleus pulposus, exerting pressure on the spinal cord
- Spondylophyte outgrowth

- Herniated intervertebral disc with torn annulus fibrosus and displaced parts of the gelatinous core exerting pressure on the spinal nerve



- Compression of the spinal nerve
- Prolapsed nucleus pulposus
- Torn annulus fibrosus

- Herniated intervertebral disc with pressure on the spinal nerve

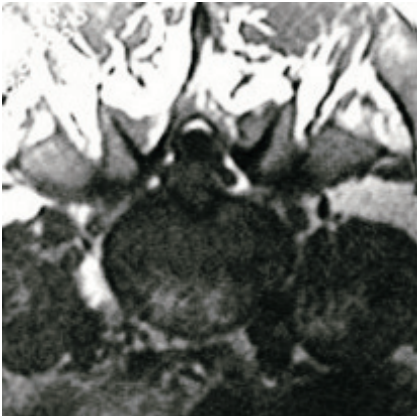


- Intervertebral disc
- Foramen intervertebrale
- Compressed spinal nerve
- Intervertebral disc

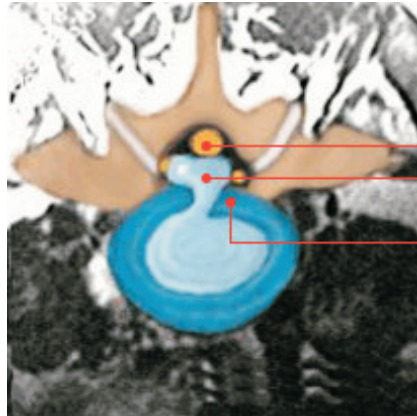
How is a herniated cervical intervertebral disc diagnosed?

Following physical and neurological examinations, the presence of a herniated disc can be confirmed by means of computer or magnetic resonance tomography.

- Herniated intervertebral disc with torn annulus fibrosus, prolapsed gelatinous core, pressure on spinal cord and spinal nerve root



Nuclear magnetic resonance tomography

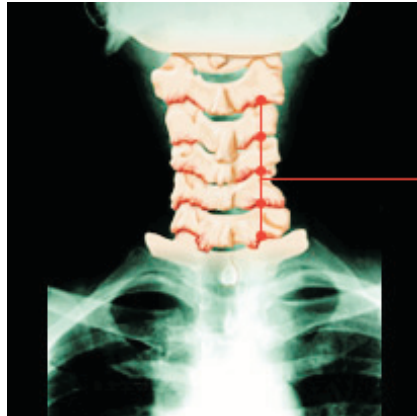
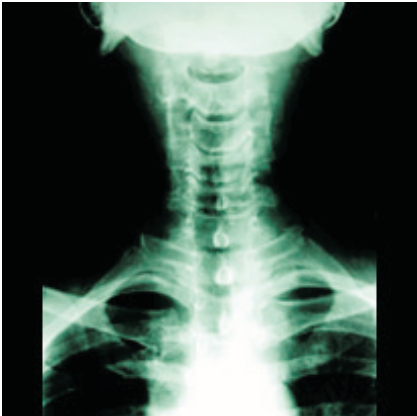


Sketch

- Spinal cord
- Prolapsed nucleus pulposus
- Torn annulus fibrosus

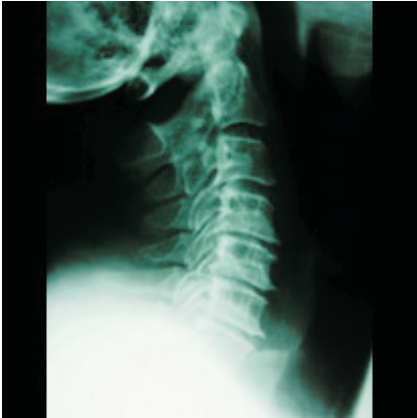
Conventional x-rays of the cervical spine in 2 planes can provide indirect evidence of a degenerative intervertebral disc process by confirming a loss of height in the intervertebral disc spaces.

- Cervical spine, AP view, with signs of osteochondrosis and spondylosis



- Spondylosis, osteochondrosis

- Cervical spine seen from the side, showing pronounced reduction of the height of the intervertebral spaces and spondylotic osteophytes



- Spondylotic osteophytes
- Thinning of the intervertebral discs

A contrast myelography can provide further information on the position of the prolapsed intervertebral disc in relation to the spinal structures.

Electrophysiological examinations can be used to obtain information as to whether neural structures have been damaged.

What are the symptoms of a herniated cervical intervertebral disc?

The general symptoms are cervical spine pain, muscle pain in the neck, and a shift in posture in an attempt to counteract the first two. The symptoms always depend on the segment in which the prolapse has occurred. Pressure on the spinal nerves can result in radicular symptoms as follows:

Segment	Areas of pain or dysesthesias	Characteristic muscle	Reflex weakened
C5	Shoulder and side of the upper arm	m.deltoideus	
C6	Radial upper and lower arm, thumb	m.biceps, m.brachioradialis	Radius periosteum
C7	Back of lower arm, middle and index fingers	Ball of the thumb, m. pronator teres	Triceps
C8	Back of lower arm, pinky and ring finger	Ball of pinky, mm. interossei, digital flexor	

Sensory dysfunctions and motor deficits may occur. A mass prolapse with massive pressure on the spinal cord will be accompanied by signs of myelon compression as follows:

- Uncertain gait, weakness in legs
- Weakness and dysesthesias (sensory defects) in hands
- Loss of bladder and colon control
- Sexual impotence
- Fine motor deficits
- Reflexes weakened or absent

How is a herniated cervical intervertebral disc treated?

Conservative treatment is generally sufficient for mild symptoms not complicated by neurological dysfunctions.

- Medication with non-steroid antiphlogistics, painkillers, muscle relaxants
- Physiotherapeutic exercises, isometric exercises and massages

Surgery is an option if the pain persists despite suitable conservative treatment and if the neurological symptoms worsen; it is urgently indicated in case of acute compression of the myelon with neurological deficits. There are a number of surgical methods available for treatment of degenerative diseases of the intervertebral discs of the cervical spine which can be done from the back (dorsal) or from the front (ventral). The objective of all methods is to eliminate the pressure on the neural structures caused by the prolapsed intervertebral disc components (decompression).

Depending on the specific findings in each case, the following surgical options may be used:

- Ventral microsurgical nucleotomy with Cloward-Robinson fusion
- Ventral uncoforaminotomy with Cloward-Robinson fusion
- Ventral decompression with implantation of a cervical intervertebral disc prosthesis