

Injuries to the lower cervical spine are major traumas and frequently occur in combination with neurological complications.

- Cervical spine, from the side (C1-Th1)



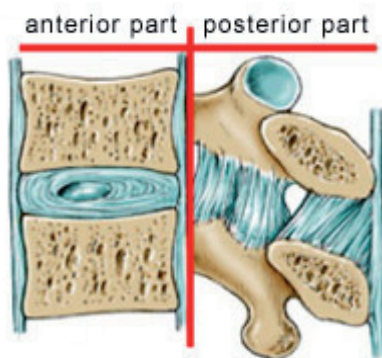
- Cervical spine, from the rear (C1-C7)



How are the fractures of the lower cervical spine classified?

Based on the AO classification system, Aebi introduced a classification system for fractures of the lower cervical spine (C3-C7) that refers to the anterior column (vertebral body and intervertebral disc) and the posterior elements of the vertebra (vertebral joints and ligamentous apparatus).

- Anterior and posterior elements of the vertebra



Type A fractures are injuries that occur mainly in the anterior column:

- A1: Solely or primarily bony injury
 - A1.1: Uniform compression
 - A1.2: Marginal fracture without visible ligament injury
 - A1.3: Wedge fracture without visible ligament injury
- A2: Osteoligamentous lesion
 - A2.1: Vertebral body fracture, multifragmentary, one upper plate affected, 1 intervertebral disc injured
 - A2.2: A2.1 + 2 intervertebral discs affected
 - A2.3: Fragmented fracture, posterior wall dislocated by less than 3 mm, posterior elements not visibly injured

- A3: Solely or primarily ligamentous lesion
- A3.1: Rupture of the anterior longitudinal ligament and intervertebral disc
- A3.2: Traumatic disc hernia

Type B fractures are injuries that generally occur in the posterior elements:

- B1: Solely or primarily osseous lesion
- B1.1: Isolated fracture of the posterior elements
 - (1) Spinous process
 - (2) Arch
 - (3) Both
- B1.2: Fracture of the small vertebral joints without dislocation
 - (1) Unilateral
 - (2) Bilateral
- B1.3: Combination of B1.1 and B1.2
 - (1) Spinous process
 - (2) Arch
 - (3) Both
- B2: Osteoligamentous lesion
- B2.1: Fracture of posterior elements with subluxation
 - (1) Spinous process
 - (2) Arch
 - (3) Both
- B2.2: Facet fracture (shearing) + subluxation of adjacent facets
 - (1) Unilateral
 - (2) Bilateral
- B2.3: Massa articularis rupture (fracture through pedicle and arch)
 - (1) Unilateral
 - (2) Bilateral
- B3: Solely or primarily ligamentous lesion
- B3.1: Rupture of the posterior ligamentous complex with subluxation in the vertebral joints (bilateral)
- B3.2: Rupture of the posterior ligamentous complex with asymmetrical subluxation in the vertebral joints (unilateral)

Type C fractures are injuries that affect both the anterior column and the posterior elements:

- C1: Solely or primarily osseous lesion
- C1.1: Burst fracture of the vertebral body in combination with burst fracture of the posterior elements (arch, spinous process)
- C1.2: Horizontal fracture through vertebral body with burst of the posterior elements (arch, spinous process)
- C2: Osteoligamentous lesion
- C2.1: Luxation fracture with fracture in posterior elements
 - (1) Arch and/or processus spinosus

- (2) Facet fracture
- (3) (1) + (2) combined

C2.2: Wedge fracture of the vertebra with rupture of the posterior ligament complex

- (1) Osteoligamentous
- (2) Solely ligamentous

C2.3: Vertebral body fracture (fissure in anterior superior portion + posterior fragment with dislocation greater than 3 mm in the spinal canal) (tear drop fracture)

- (1) Osteoligamentous
- (2) Solely ligamentous

C3: Solely or primarily ligamentous injury

C3.1: Solely luxation, unilaterally hooked

C3.2: Solely luxation, bilaterally hooked

C3.3: Rupture of the disc and dorsal luxation with rupture of the posterior ligamentous complex

What symptoms may occur in fractures of the lower cervical spine?

The following symptoms may be present, depending on the fracture type:

- Pain (local, movement-induced, radiating)
- Medullary symptoms with incomplete or complete paraplegia
- Radicular symptoms
- Increased neck circumference due to prevertebral internal hemorrhaging
- Spinal shock
- Specific symptoms of additional secondary injuries

How is the injury diagnosed?

If a cervical vertebra fracture is suspected, an accident victim must be treated with utmost caution. Examination, positioning, and transport must be carried out safely and gently so as not to provoke any worsening of the initial status.

The clinical and neurological examinations provide information on:

- The vertebral height of the injury (reference muscles, reflex status, sensomotor status)
- Medullary or radicular symptoms
- Any secondary injuries

Radiological diagnostics are done with conventional x-ray images of the cervical spine in 2 planes, where the cervical spine should be held under gentle tensile traction.

The most important signs of instability in conventional x-ray images are:

- Segmental sagittal shift
- Expansion of the intervertebral disc space
- Subluxation of the facet joints
- Widening of the prevertebral soft tissue shadow as sign of internal hemorrhaging.
- Bony detachment of the anterior margin of the vertebra close to the base plate (tear drop sign), indicating discoligamentous instability.

Computer tomography with reconstruction images allows for the precise imaging of the destroyed portion of the vertebra. An MRT scan is a good method of obtaining clear images of existing injuries of the spinal cord, spinal nerves, and ligamentous apparatus.

How are injuries of the lower cervical spine treated?

If a cervical vertebra injury is suspected, the patient must be safely immobilized without delay with rigid orthotic devices (e.g. "stiff neck") until the diagnosis can be confirmed. The following conditions are absolute surgical indications:

- Complete tetraplegia
- Incomplete paraplegic syndrome
- Fractures with radicular deficits due to root compression
- Unstable fractures without neurological complications

Depending on the initial findings, surgical methods employing either dorsal or ventral access may be used.

- Cloward-Robinson ventral fusion
- Ventral corpectomy and bridging spondylodesis with titanium cage and plate
- Ventrodorsal repositioning spondylodesis with ventral and dorsal instrumentation
- Solely dorsal repositioning and fusion
- Dorsal decompression with dorsally instrumented fusion