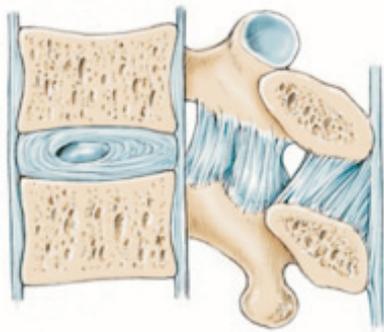


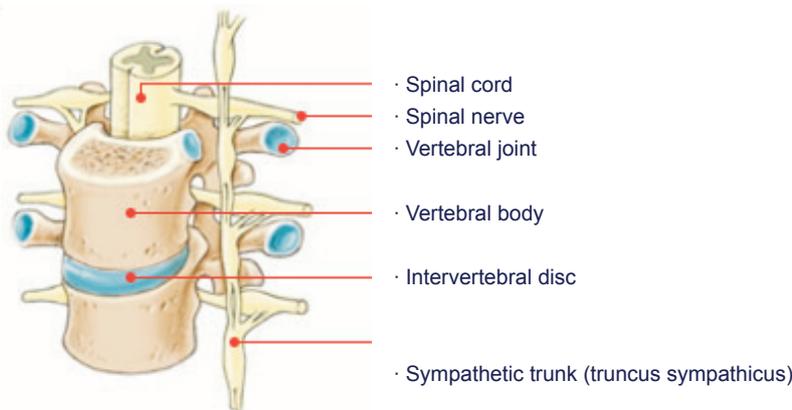
**What is a “spinal column injury”?**

The spinal column is the central axial organ in the human body. It absorbs and distributes very high levels of static and dynamic forces. It also protects the spinal cord (myelon) and the emerging spinal nerves. In a trauma, various forces may be brought to bear on the spinal column, potentially resulting in fractures and dislocations of the bony structures of the vertebra and vertebral joints, damage to the joint cartilage and rupture of the stabilizing ligamentous apparatus, and injuries to the intervertebral disc, the spinal cord, and the spinal nerves.

- Vertebral segment with ligamentous structure in cross-sectional view



- Vertebral segment with spinal cord and spinal nerves



Attempts to treat spinal column injuries have been made for centuries, from as far back as early historical times. The Egyptian physician and vizier Imhoptep (2682-2613 B.C.) was the first author to whom a papyrus document describing the clinical picture of a complete spinal cord severance, including all of the major symptoms, is ascribed.

Around 1400 B.C. Hippocrates developed an extension table he used to treat vertebral fractures and deformities of the spinal column with extension. Paulus of Aegina, who probably lived and worked in Alexandria in the 7th century A.D., was the first to instruct physicians in a surgical textbook that “any piece of bone pressing upon the spinal cord must be removed.” Various manual therapy and extension methods were described thereafter as treatments of vertebral fractures.

The discovery of x-rays by the physicist Wilhelm Conrad Röntgen – who first presented their effect and potentials to the public in January 1896 – was a milestone in diagnostics that opened the door to further developments in spinal column surgery.

In recent decades the surgical treatment of spinal column injuries has seen a rapid series of developments regarding the materials and surgical techniques used. Today, even complicated findings can be operated on successfully due to the highly differentiated intensive care medical methods available for preoperative and postoperative treatment of the severely injured.

### What injury mechanisms are relevant to the spinal column?

In a trauma, various forces may act upon the spinal column, resulting in specific patterns of injury in the different structures of the spinal column.

The following forces can be defined:

- Extension forces (tensile forces)
- Compression forces
- Flexion forces
- Rotation forces
- Translation (shearing forces)

In most cases, spinal column injuries are caused by the direct or indirect impact of force as a result of automobile or sports injuries, or by falls from considerable heights.

Fractures of the lumbar and thoracic vertebrae are more frequent than cervical spine fractures, however the cervical spine injuries cause neurological complications more often than injuries to the thoracic or lumbar spine.

### What are the objectives of treatment of spinal column injuries?

- Restoration of stability and form
- Maintenance or restoration of the spinal column axes
- Avoidance or reduction of neurological complications
- Prevention of loss of function
- Greatest possible freedom from pain

### What are the advantages or disadvantages of both surgery and the conservative treatment of spinal column injuries?

#### Conservative treatment:

Advantages:

- No invasive procedure that involves the risks posed by surgery and anesthesia

Disadvantages:

- Long immobilization phase with increased risk of secondary complications such as thrombosis, pneumonia, decubitus, reduction of muscle mass, and bone density
- Long period of mobile and positional instability of a vertebral fracture
- Mobilization phase is more difficult

**Surgical treatment:**

## Advantages:

- Reconstruction of the fractured vertebral elements
- Restoration of the correct spinal column axes
- Reconstruction of the ligamentous apparatus
- Prevention or reduction of neurological complications through the surgical decompression of a pinched spinal cord or spinal nerves
- Postoperative positional and mobile stability
- Reduction of pain
- Good functional results after healing
- More rapid mobilization and reintegration of injured person into normal life

## Disadvantages:

- Surgical risk of wound infections, secondary hemorrhaging, or organ injuries
- Anesthesia risk