

Aesculap Patient Information

Minimal Invasive Posterior Lumbar Spine Surgery



Aesculap Spine

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Anatomy of the Spine



The spinal column is one of the most important and mobile structures of the human body. It supports and stabilizes the upper part of our body (trunk) and represents the centre of our musculoskeletal system, making our motion sequences possible.

The shape of the vertebrae and the height of the intervertebral discs differ depending on the spinal region. According to those characteristics, the vertebrae are divided into regions:

- Cervical Spine
- Thoracic Spine
- Lumbar Spine
- Sacrum
- Tailbone (Coccyx)

The human spine usually consists of 33 vertebrae, which are flexibly connected by intervertebral discs. By adult age, the vertebrae of the sacrum fuse together. The adjacent tailbone is attached to the sacrum by fibrous tissue, which permits slight movements of this spinal region. Due to that fact, the adult spine consists of 24 flexibly connected vertebrae.

The single anatomical structures are finely adapted to each other, in order to create a highly flexible yet resilient construct which serves for many functions.

The main purpose of the elements of the spinal column and vertebrae is the protection of the spinal cord.

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Anatomy of the Spine

Cervical Spine / Lordosis

- Also called neck
- Consists of 7 small vertebrae (C1-C7)
- Forward curvature (lordosis)
- Shows the highest range of motion within the spine
- Begins at the base of the skull and ends above the shoulders

Thoracic Spine / Kyphosis

- Consists of 12 vertebrae (T1-T12)
- Backward curvature (kyphosis)
- Compared to the rest of the spine it shows a very low range of motion
- Shows connection points for ribs

Lumbar Spine / Lordosis

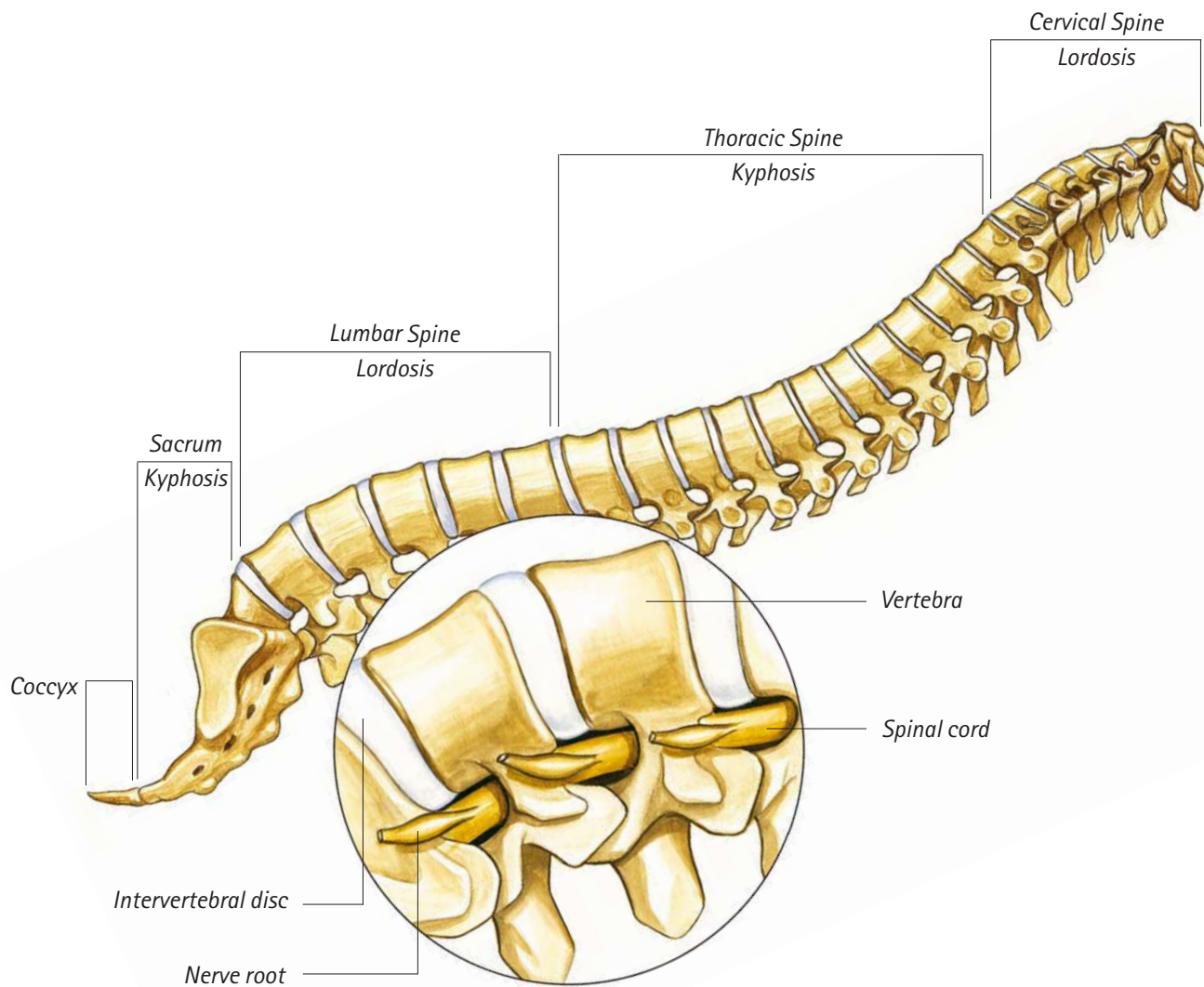
- Consists of 5 large vertebrae (L1-L5)
- Vertebrae and discs are thicker than the other vertebrae and carry most of the body's weight
- Forward curvature (lordosis)
- Allows motion, especially in flexion and extension

Sacrum / Kyphosis

- Consists of 5 fused vertebrae (S1-S5)
- Backward curvature (kyphosis)
- Connects to the pelvis

Coccyx

- Also called tailbone
- Usually consists of 4 vertebrae
- Attachment point for spinal muscles



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Pathology of the Spine

Degenerative Disc Disease (DDD)

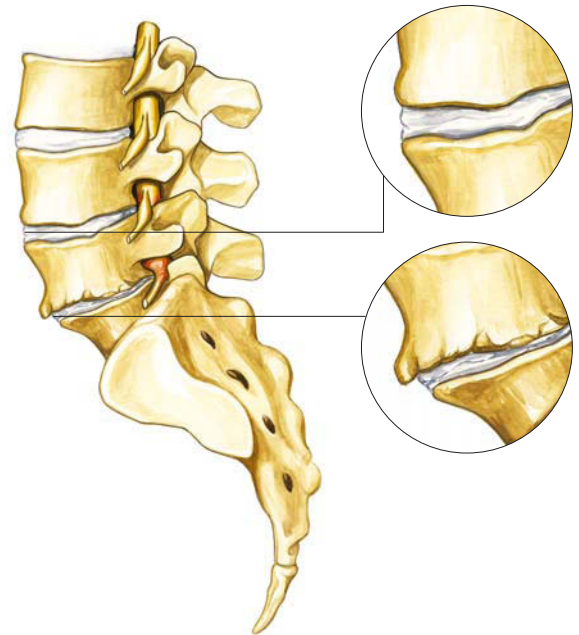
During the natural aging process of the spine, the intervertebral disc will exhibit changes in its consistency with a varying degree of degeneration. In this case the intervertebral disc gradually loses the ability to function efficiently and maintain height, and can lead to back pain.

Vertebral Displacement (Spondylolisthesis)

Describes the forward displacement of a vertebra in relation to the vertebrae below. Often the lumbar spine is affected by this spinal condition, because it bears the most weight relative to other regions of the spine.

Intervertebral Disc Herniation

The affected intervertebral disc shows tears in the outer structure, so that the inner gelatinous part of the disc bulges out beyond the damaged structure. Due to the bulge of the herniated disc, the spinal cord and its nerve roots can become pinched, which can lead to various symptoms.



Degenerated intervertebral disc with osteophytes

Spinal Stenosis

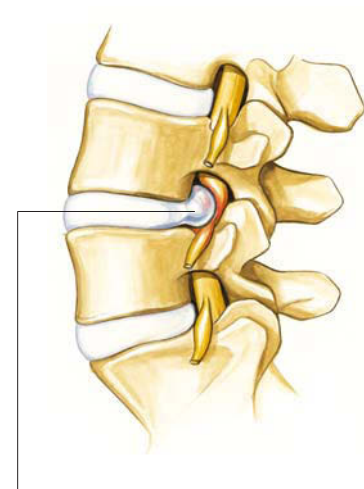
Spinal stenosis describes an abnormal narrowing of the space where the spinal cord and the corresponding nerve roots pass. This narrowing causes a serious restriction of the spinal cord and the nerve roots resulting in neurological deficits.

Scoliosis / Deformity

Viewed from the back, a typical spine shows a straight contour. In the case of a scoliosis or deformity, the spine shows abnormal sideways curvatures which influence the posture in a critical way.

Vertebral Breakage (Fracture)

Vertebral fractures are caused by trauma (e.g. accidents) or unfavorable spinal conditions such as osteoporosis. The consequences of a fractured vertebra can be serious. Bone fragments can pinch or damage the spinal cord and the nerve roots.



Herniated intervertebral disc

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Your surgeon has determined that a spinal surgery is required to treat your spine. In this context, the surgeon may point out that you could benefit from the advantages of minimally invasive surgery.

The following patient information will provide you with the essential information on minimal invasive posterior lumbar spine surgery. For further information or additional questions we kindly ask you to contact your surgeon.

What is a Minimal Invasive Surgery?

The term 'minimal invasive surgery' generally describes a surgical technique that allows the surgeon to access the body through small incisions. In view of a spinal surgery, this means that the surgeon generally operates through small skin incisions in your back.

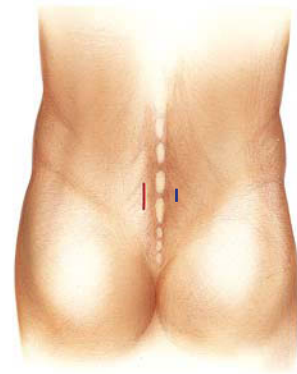
The access to the spine is performed by using specialized instruments such as gentle retraction blades. Through these the surgeon is able to treat your spine while keeping the incision small.

What are the Benefits of a Minimal Invasive Surgery?

Through small incisions and the use of special instruments, the surgeon can access the spine, while sparing the surrounding muscles and spinal tissues.

Compared to a traditional open surgical technique the minimally invasive approach may lead to:

- Quicker recovery and return to normal activities^{1,2}
- Shorter hospital stay^{1,2}
- Less post-operative pain^{2,3}
- Less blood loss and need for blood transfusion^{2,3}
- Less damage to skin and spinal musculature^{2,3}
- Less risk of infection^{1,2,4}



Mini-Open incision (left) and MIS incision (right)

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How is a minimally invasive back surgery done?

Depending on your spine condition, your surgeon will plan an individual treatment plan including the surgical procedure and special instructions for your post-operative recovery.

The first step during a minimally invasive back surgery is represented by the skin incision and the retraction of the spinal muscles and surrounding tissues. In some cases, your surgeon performs a decompression, which creates more space for the spinal cord, by removing a portion of the back part of the vertebral body (laminectomy). It is also possible that your surgeon decides to perform a micro discectomy, which is a partial removal of intervertebral disc material that compresses the nerves or the spinal cord.

It may also occur that you and your surgeon determine an interbody fusion is the correct procedure. This is when he (the surgeon) removes the entire intervertebral disc and replaces it with an implant that restores the intervertebral disc height. The cleaning of the disc space from cartilaginous tissue allows bone growth into the disc space.

You have decided together with your surgeon to insert screws and rods in the back of your spine to stabilize the vertebrae and to enhance the fusion process.



Removal of the intervertebral disc through minimal skin incision



Posterior screws and rods

References

¹ Singh K. *Minimally Invasive Spine Surgery: An Algorithmic Approach*. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. 2013.

² Schwarcz A, Kasó G, Büki A, Dóczi T. [The use of minimally invasive instrumental spinal surgical technique in lumbar diseases of degenerative or traumatic origin]. *Ideggyogy Sz.* 2013 Mar 30; 66 (3-4): 121-6. Hungarian. PubMed PMID: 23750428.

³ Hsiang J, Yu K, He Y. Minimally invasive one-level lumbar decompression and fusion surgery with posterior instrumentation using a combination of pedicle screw fixation and transpedicular facet screw construct. *Surgical Neurology International*. 2013 Jan 1; 4(1); 125.

⁴ Rhee J, Wiesel S, Boden S, Flynn J. *Operative Techniques in Spine Surgery*. Philadelphia: Lippincott Williams & Wilkins. 2013.

Notes

This patient information is provided by Aesculap Spine and is intended to provide you with general information about how a minimally invasive spine surgery can be performed by your surgeon.

A detailed consultation with your surgeon can not be replaced by this patient information.

Please contact your surgeon for additional information and clarification of questions about the anatomy and pathology of the spine.

