

# Aesculap Patient Information

Minimal Invasive Disc Surgery



Aesculap Spine

**B | BRAUN**  
SHARING EXPERTISE

# Minimal Invasive Disc Surgery

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.

# Minimal Invasive Disc Surgery

## 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

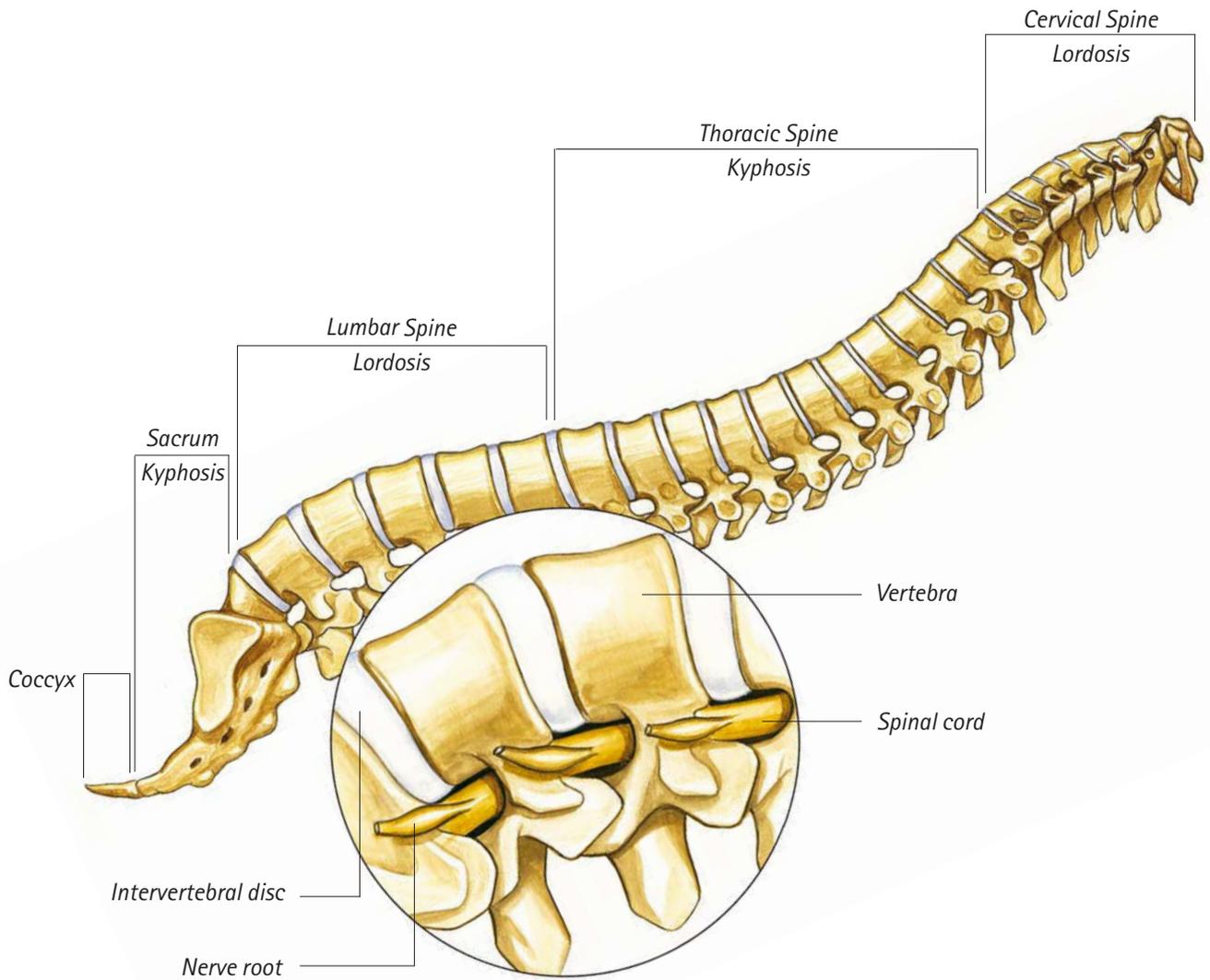
- Consists of 5 large vertebrae (L1-L5)
- Vertebrae and discs are thicker than the other vertebrae and carry most of the body's weight
- Forward curvature (lordosis)
- Allows motion, especially in flexion and extension

### 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



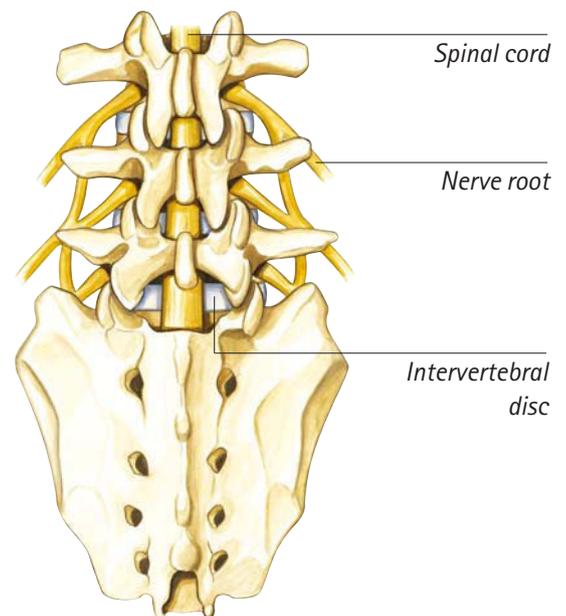
# Minimal Invasive Disc Surgery<sup>1</sup>

The spinal cord is a slender cylindrical shaped structure composed of nervous tissue. It begins from the back of the head and extends down to the intervertebral disc space between the first and second lumbar vertebra and is protected by the surrounding bony structures of the vertebra.

The spinal cord is the biggest nerve structure of the body and is an essential part of the central nervous system. It works as a conduit for motion information, sensory information (e.g. sense of touch) and as a coordination system for certain reflexes.

The lateral openings (foramina) of the vertebrae permit the passage of the spinal nerve roots, which emerge from the spinal cord at each level on both sides of the vertebra. The nerve roots are responsible for movements and stimulating feeling like pain.

The intervertebral discs are placed between each pair of vertebrae allowing the spine to show a large range of motion. Due to its shock absorbing characteristics, the intervertebral discs work mainly as protection system for the vertebrae, brain and other spinal structures.



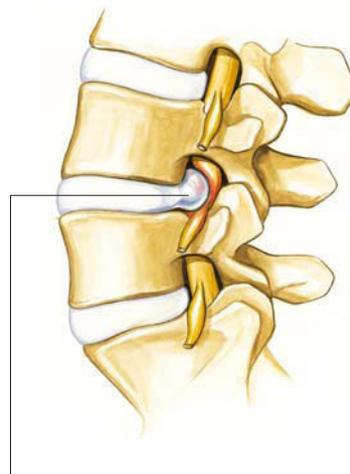
## The Herniated Disc

The intervertebral disc has a flat shape. A distinction is made between the outer fiber ring (annulus fibrosus) and the gelatinous core (nucleus pulposus). This construction is comparable to a water cushion which allows a uniform distribution of forces on the adjacent vertebral bodies during a load. If a loosening of the fiber ring and the gelatinous core occurs, it may come to a protrusion of the intervertebral disc in the direction of the spinal canal and the nerve roots. When the fiber ring tears, the intervertebral disc tissue leaks into the vertebral canal (herniated disc). This leads to a compression of the nerve roots. The effects of compressed nerve roots can be:

- Back pain
- Extension of pain into legs
- Sensory dysfunction (deafness)
- Loss of muscle function (Paralysis)
- Disturbed urination and / or stool
- Disturbed sexual function

In the majority of cases, the 4<sup>th</sup> and 5<sup>th</sup> lumbar intervertebral disc is affected of disc herniation, rare the 2<sup>nd</sup> and 3<sup>rd</sup>.

The exact diagnosis is made by the physician through the individual patient medical history (anamnesis), clinical examination and imaging procedures (X-ray image, computer tomography, magnetic resonance imaging or myelography).



*Herniated intervertebral disc*

# Minimal Invasive Disc Surgery

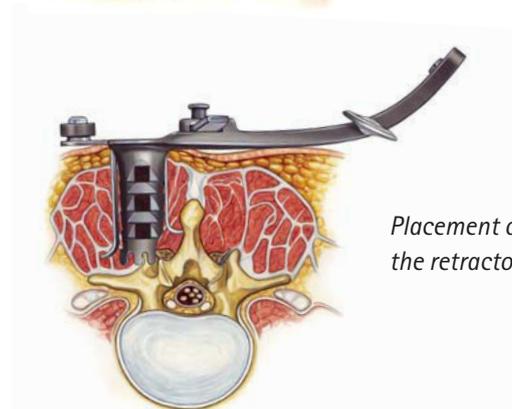
The aim of the surgery is to eliminate the side effects of a herniated disc and achieve the regression of any preexisting paralysis or sensory disturbance. Since the introduction of minimal invasive spine technologies, spine surgeries have become more tissue-conserving, with reduced blood loss, and shorter hospital stays.<sup>2,3,4</sup>

The first step of a minimal invasive disc surgery is the execution of a small and longitudinal skin incision (approximately 3 cm). The skin incision is performed laterally to the spinal midline to facilitate the access to the intervertebral disc.

In the next step, blunt dissection is performed to achieve access to the spine. With a special instrument (retractor) a tubular canal to the spine is created.



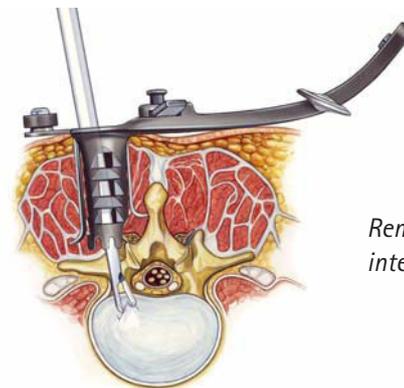
*Spinal incision*



*Placement of the retractor*

Under microscopic view, the herniated disc can clearly be displayed and removed. Subsequently, the remaining degenerated intervertebral disc tissue is removed from the intervertebral space. Thus, the pinched nerve root is relieved and can recover.

It may also occur that your surgeon determines that replacing the intervertebral disc with an implant that restores the intervertebral disc height. The cleaning of the disc space from castilaginous tissue allows bone growth into the disc space.



*Removal of the intervertebral disc*



*Replacement of the intervertebral disc with an interbody implant*

# Minimal Invasive Disc Surgery

## What Happens After the Surgery?

It is the aim after surgery to get back to life as soon as possible, but at the same time respecting and protecting the wound area.

Usually, the physiotherapy program starts on the first day after the surgery. The program is intended to strengthen the abdominal and back muscles and to learn good behaviors that are appropriate for the healing spine.

The exercises should be continued even after your discharge from hospital.

Please make sure that you avoid the following movements:

- Abrupt bending
- Lift weights from forward flexed position
- Fast rotating motion
- Gardening
- Prolonged sitting
- Long walks

During this rest phase it is important to pay attention on a balanced diet.

A weight gain stresses your spine.

## References

- <sup>1</sup> Dickman C, Fehlings M, Gokaslan Z. *Spinal Cord and Spinal Column Tumors: Principles and Practice*. New York: Thieme. 2006.
- <sup>2</sup> Singh K. *Minimally Invasive Spine Surgery: An Algorithmic Approach*. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd. 2013.
- <sup>3</sup> Schwarcz A, Kasó G, Büki A, Dóczy T. [The use of minimally invasive instrumental spinal surgical technique in lumbar diseases of degenerative or traumatic origin]. *Idegyogy Sz*. 2013 Mar 30; 66 (3-4): 121-6. Hungarian. PubMed PMID: 23750428.
- <sup>4</sup> 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 was created in cooperation with Dr. D. Zevgaridis, Dr. C. Thomé and Prof. Dr. P. Schmiedeck.

This patient information is intended to provide you with general information about the anatomy and pathology of the human spine.

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.

