STRUCTURAL PATHOLOGIES OF THE SPINE:

Idiopathic Scoliosis and treatments

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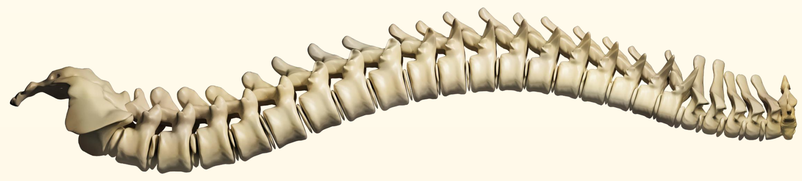
Introduction of the spine

The spine is a complex structure composed by a set of vertebrae and intervertebral discs which allows its articulation.

It's characterized by four anterior-posterior curves: cervical, thoracic, lumbar and sacral. And it's found that it isn't perfectly straight laterally speaking, exist some slight side to side curves in 90% of healthy individuals.



Scoliosis

This pathology is a three-dimensional torsional deformity of the spine and trunk. Is appraised with an "S" or "C" shape from coronal view. There are three types of scoliosis according to their etiology:

2. Congenital Scoliosis

"Congenital" means that you are born with this condition. It is due to a failure in the formation of one or more vertebrae, or the separation of them (Figure 1).

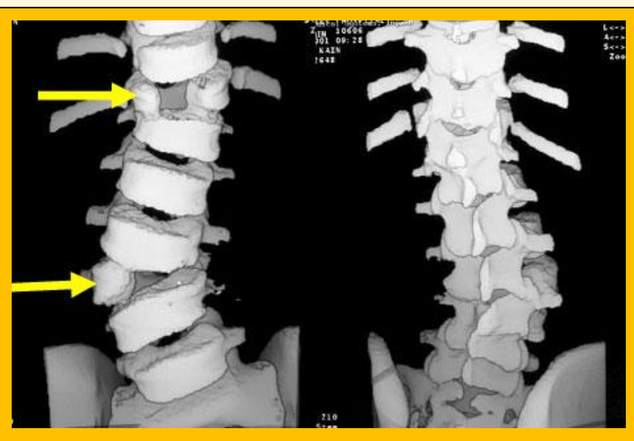


Figure 1. *Three-dimension scan of the spine showing a hemi vertebra (partially formed) at T-12 and between L-2 and L-3 vertebrae (SRS 2015).*

3. Neuromuscular Scoliosis

Any disease that affects the nervous system and muscles can lead to scoliosis. Such as muscle imbalance or weakness, cerebral palsy, muscular dystrophy or spinal cord injury.

1. Idiopathic Scoliosis

This type of scoliosis is the most common (80 to 85%). However, as the name indicates, the cause of the deformity has an unknown origin. It is considered scoliosis when there is a curvature of at least 10°, measured by the Cobb method, on a standing upright radiograph of the spine. When the curve is of 50° or more, the worsening occurs included in people who have already reached skeletal maturity. Patients with curves between 60 and 100° have reduced lung capacity by 68% of normal.

Diagnosis and treatment

The first step to follow for the treatment of scoliosis is the **observation**. It is done by patient's back clinical photography on a standing up position and flexion of the trunk. This observation is confirmed by calculating the angle using the Cobb method (defined by Dr. John Robert Cobb in 1948).

When the curve is between 20 and 40 – 45°, it is indicated the use of **braces**. The objective is to reduce the angle and realign the spine, or at least prevent the aggravation. It is also recommended combine some physical exercises to increase the neuromotor control, the stability of the spine and lung function.

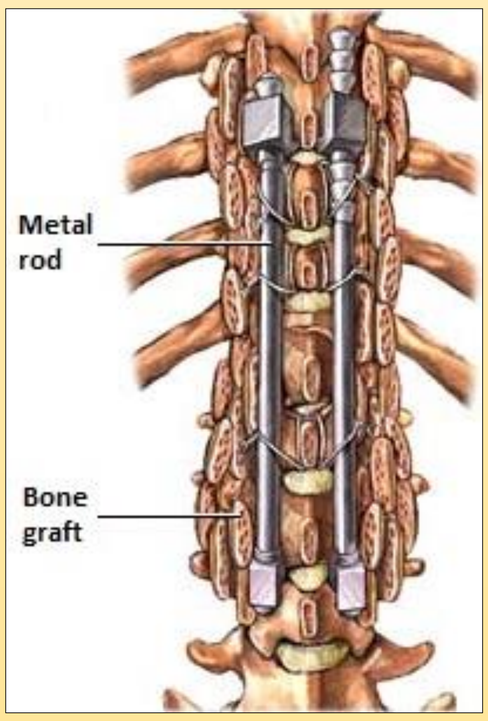


Figure 3. *Fusion surgery using bone grafts and metal rods attached to the spine (Modified from Clínica DAM 2009).*

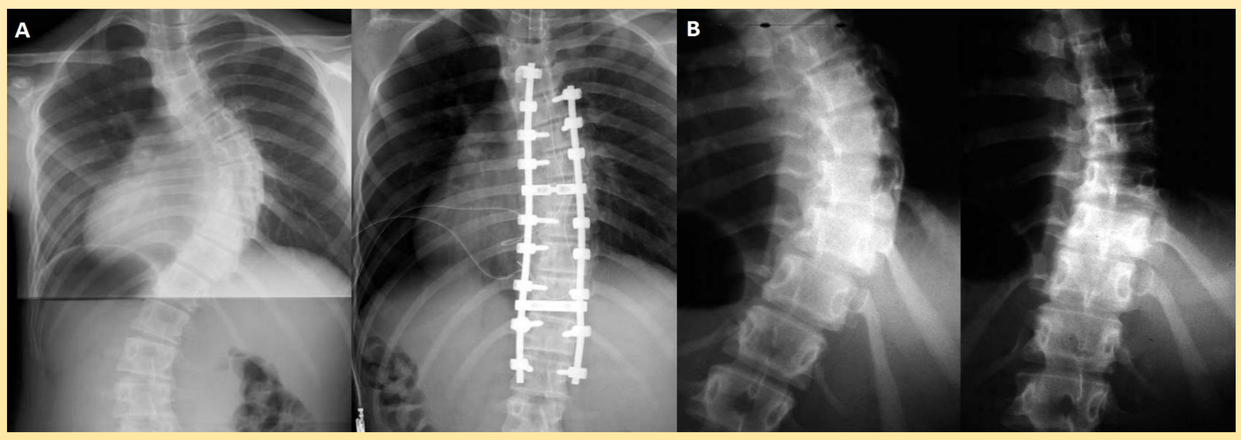


Figure 2. A. *Fusion surgery. Right thoracic curve between the T-5 and T-11 corrected from 68 to 25 degrees.* ***B.*** *Fusionless surgery. Right thoracic curve between the T-5 and T-12 corrected from 56 to 26 degrees.*

For severe (more than 45 – 50°) or progressive scoliosis is required **surgery**. On fusion surgery the curve is straighten by the use of bone grafts set into the spaces between the vertebrae to be fused (Figure 2A). To hold the bones on the right position, metal rods are used and attached to the spine with hooks, screws and/or wires (Figure 3).
However, to correct the spine curve with fusionless surgery, multiple vertebral wedge osteotomies are performed (Figure 2B).

Conclusions

Nowadays, thanks to the surgery and other less invasive techniques, it is possible to correct scoliosis or at least improve the lives of those who suffer it.

Nevertheless, we can still make further studies and research in order to anticipate and help prevent idiopathic scoliosis.

References

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