

# S23 Spondylolisthesis and the Comparison of CT, MRI and X-ray

## Objective:

- Describe Spondylolisthesis and describe how imaging can help diagnose it.
- Compare how each modality is useful for diagnosing.

## What is Spondylolisthesis?

The word spondylolisthesis comes from the Greek words spondylos, which means "spine" or "vertebra," and listhesis, which means "slipping, sliding or movement." This pathology describes an instability in the spine that leads to one of the vertebral discs sliding over the other. Leading to a multitude of symptoms such as leg pain, a compression or pinching sensation in the area, back pain, back stiffness, difficulty walking or standing for long periods, pain when bending over, numbness, and weakness or tingling in the foot. The use of medical imaging is one of the only ways to truly diagnose Spondylolisthesis. In order to do this a physician will perform a physical exam and then likely order an X-ray, an MRI, or a CT scan. It is these scans that will truly diagnose spondylolisthesis.

### Fun Fact:

Spondylolysis, though having a similar name is actually a spine defect. It is a stress fracture or crack in spine bones. It's common in young athletes.

## Comparing an Image: Lumbar Spine

### X-Ray

The most common way to diagnose spondylolisthesis is through x-ray. A diagnostic x-ray takes less than a second to take a lateral, or side-to-side, image of a person's anatomy. Shortly after this image is taken it is then sent off to the radiologist to be read. While looking at the image he/she will use measurement lines to determine if one of the vertebra has shifted more forward and on top of one of the others. He/she will usually look at the posterior, or back, of the vertebra to determine the level of shift. As seen in image A the L4, or the 4th vertebra on the lumbar spine, has shifted forward.

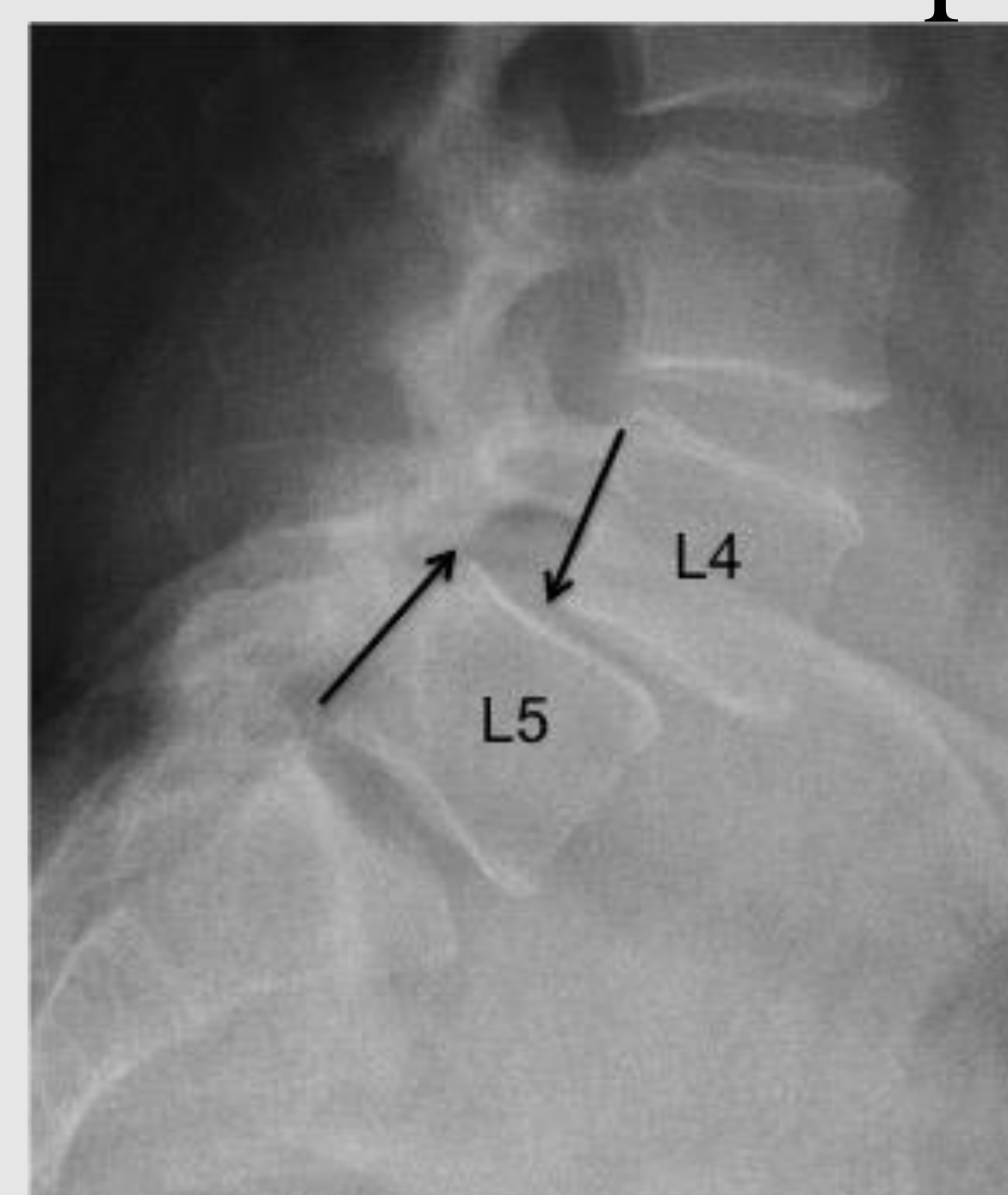


Image A

### CT Scan

If an x-ray reveals that the vertebrae has moved forward, but the doctor needs to visualize the vertebrae in more detail, a CT scan will be ordered. A CT scan will give the doctor more information about the pars interarticularis, the bones that help keep vertebrae in place. As seen in image B.



Image B

### MRI Scan

Unlike x-ray and CT that use radiation to create an image, MRI uses magnetic field and radio waves to generate an image of bone, soft tissue, nerves and muscle. If the patient's symptoms suggest that there is a pinched nerve or a collapsing disc - the padding between the vertebrae - then the doctor may order an MRI to confirm whether the slipped disc is causing damage to the tissue. As seen in image C with a complete disc collapse and anterior disc herniation.



Image C

### Conclusion:

Spondylolisthesis is a pathology that can cause one a great deal of pain, and it is through medical imaging that it can be diagnosed and treated. Each modality offers their own benefit to helping to diagnose and treat this pathology.