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Introduction

Pre-procedural planning is required before performing interventional pain procedures. Patients should present with both signs and symptoms of a spinal pain disorder and should have spinal imaging prior to undergoing invasive procedures. Advanced spinal imaging is often reviewed prior to spinal injections. MRI is one advanced imaging modality that is often preferred due to superior imaging of soft tissues and neural elements. Prior to advanced imaging, plain x-ray films of the spine are often performed first, to rule out severe bony pathology. However, simple x-rays can sometimes have visual artifact, leading to errors in diagnosis.

Methods

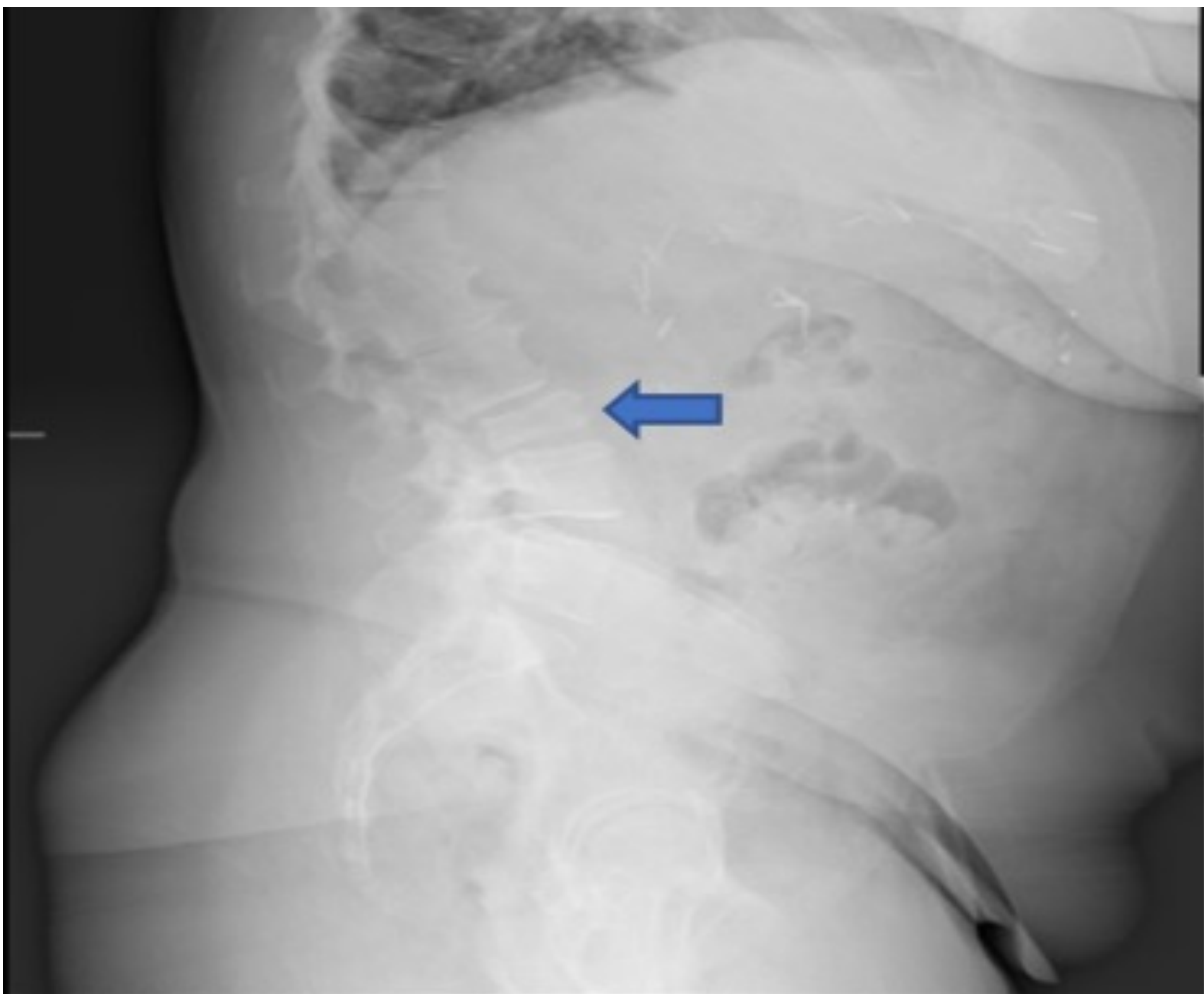
Given that this case report has had patient identifiable information removed, it is exempt from IRB review requirements- as is UT Southwestern policy.

Case Report

A 53 year old female presented for evaluation of persistent low back pain and reported a medical history of scoliosis. She reported 6 months of low back pain that radiated to her superior thighs bilaterally. On exam, she had tenderness in the lumbar region, but negative bilateral straight leg raise, 5/5 strength in all myotomes, and normal reflexes. A previous x-ray of the lumbar spine was read as normal, but the patient reported an interval fall, so further assessment of her back pain was performed with additional scoliosis films and lumbar MRI. The scoliosis x-ray revealed a significant L4 compression fracture with 50% vertebral body height loss. The follow-up MRI, however, showed minimal spondylolisthesis with no evidence of L4 vertebral abnormalities. Given the discrepancy, a repeat lumbar x-ray was again ordered and this image was consistent with normal L4 vertebral body height

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Images



Initial scoliosis film showing compression fracture



Repeat Xray showing no fracture

Results

Radiology specialists compared the new x-ray to the scoliosis film and determined that the abnormality at L4 was actually a misregistration artifact. This phenomenon is when an image appears shifted, causing perceived pathology in otherwise normal structures. After final review of all images, conservative management with physical therapy and medical management were pursued.

Discussion

Misregistration artifact is an issue that can occur with any imaging modality due to patient movement during the exam. MRI is one imaging modality affected by both motion as well as chemical shifts, as magnetic resonance frequencies differ amongst densities such as adipose and water. Registration artifact is an even greater concern in MRI imaging. This case illustrates the profound changes in images that can occur with misregistration artifact, even on plain x-ray. Due to discrepancies in x-ray and MRI findings, repeat imaging was performed. Due to the possibility of errors in imaging, it is often beneficial to have multiple imaging studies for full diagnostic work-up, prior to any interventional procedure. In this case, the patient may have been offered vertebral augmentation, when she did not in fact have any compression fracture of her lumbar vertebrae.

Types of Misregistration Artifacts

Motion	Chemical Shift	Susceptibility
- Caused by movement of the patient during the scan, causing ghostly remnants to appear - Results in subtracted images that cause the image to be obscured and can occur in any imaging	- Caused by protons of different substances resonating at different frequencies - Results in spatial misalignment of structures and commonly seen in MRIs	- Caused by difference in magnetic fields of interfering materials - Can cause loss of signal or distorted signals and commonly seen in MRIs

References

1. Barrett J & Keat N. Artifacts in CT: Recognition and Avoidance. Radiographics. 2004;24(6):1679-91.
2. Zaitsev M, Maclaren J, Herbst M. Motion Artifacts in MRI: A Complex Problem with Many Partial Solutions. J Magn Reson Imaging. 2015;42(4):887-901.

