

## CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

The patient is an 84 year old woman who lives independently by herself. She felt a “snap” in her back, and had the sudden onset of back pain while she was moving a small table at her home. Her pain is so severe that it limits her motion. She has a history of chronic back pain and arthritis, COPD, and is on chronic steroid therapy. She has no radicular pain, numbness, tingling, or paresthesias. She has normal control of bowel and bladder function. She has moderate to severe bilateral lumbar paraspinous muscle and midline tenderness to palpation.

What is the most appropriate imaging technique for patients with new onset of acute low back pain?

- (a) lumbar myelography
- (b) nuclear medicine bone scan
- (c) plain film examination of the lumbar spine
- (d) magnetic resonance imaging of the lumbar spine

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| <b>RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION</b> |
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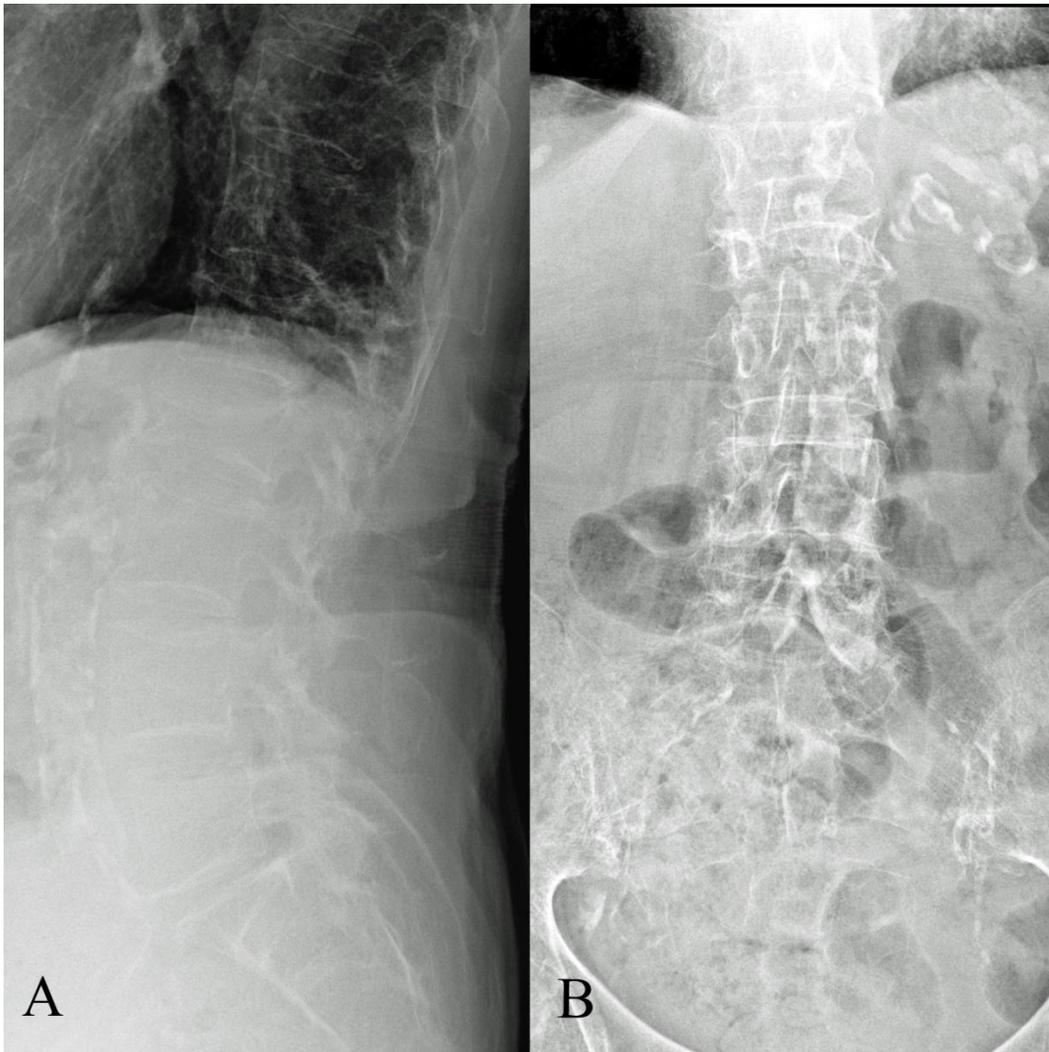
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Answer: (c), plain film examination of the lumbar spine. This is the first study of choice in this situation, as the patient appears to be at high risk for a lumbar spine compression fracture, both on the basis of her risk factors (female sex, age, COPD, and steroid use) and her relatively typical history.

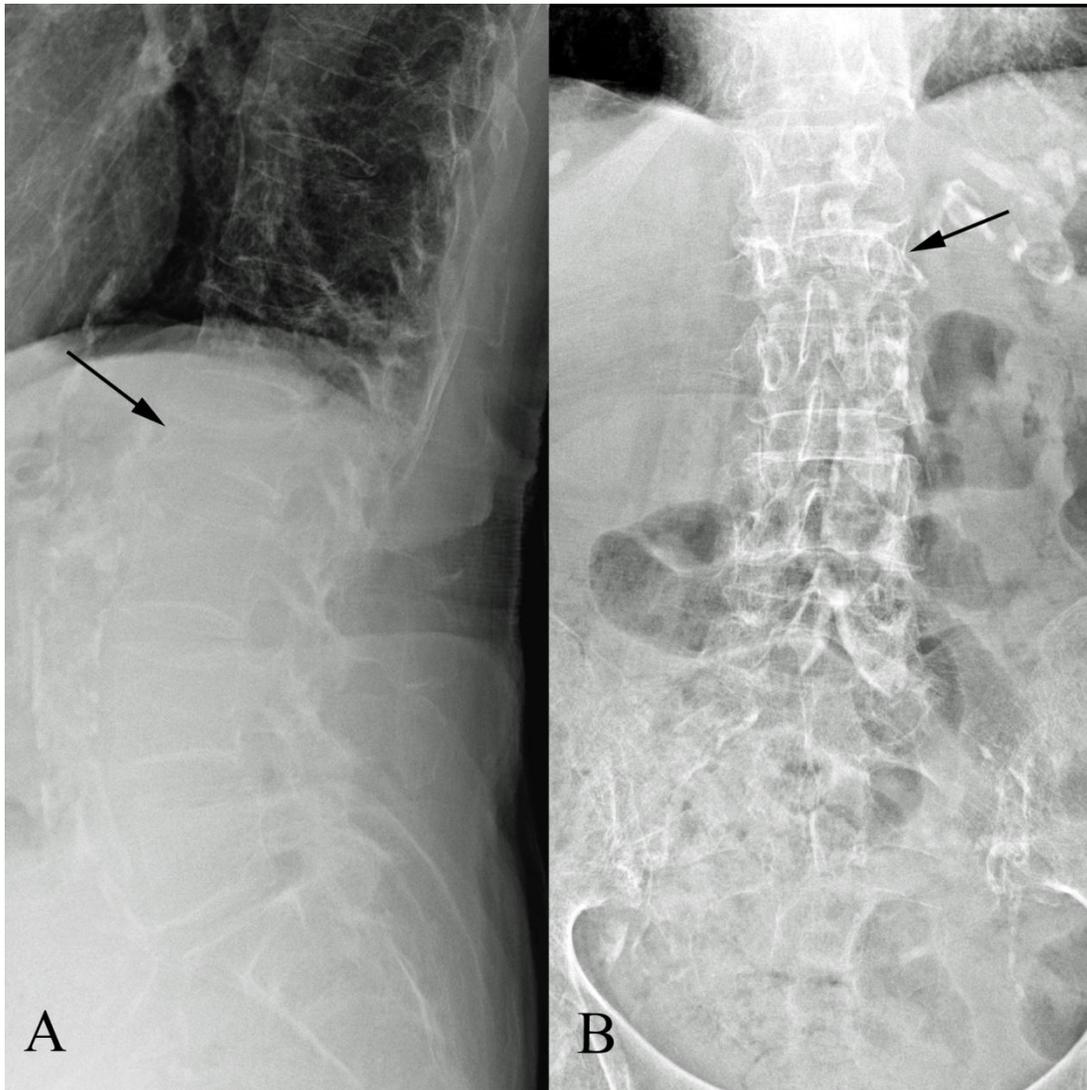
The other studies are generally used after the plain film is obtained, and may or may not be necessary, depending on the results of the plain film examination, so (a), (b), and (d) are all incorrect.

## IMAGING STUDY AND QUESTIONS



Imaging questions:

- 1) What type of study is shown in the figure?
- 2) Are there any abnormalities?
- 3) What is the most likely diagnosis?
- 4) What is the next step in management?

**IMAGING STUDY QUESTIONS AND ANSWERS**

- 1) What type of study is shown in the figure? Lateral (A) and frontal (B) plain films of the lumbar spine.
- 2) Are there any abnormalities? The L2 level shows abnormal loss of height. There is diffuse decreased density.
- 3) What is the most likely diagnosis? Osteoporotic fracture of L2
- 4) What is the next step in management? Comparison with prior films to evaluate age of the fracture.

**PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP**

The patient did not have a prior lumbar spine plain film examination, but there was a prior thoracic spine MR, which had been done six months before, which showed multiple thoracic compression fractures as well as the L2 fracture. Therefore, the L2 fracture seen on the plain film was probably not the cause of the patient's pain. The patient was in such severe pain that she was admitted to the hospital, and an MR was obtained the next day. This study (shown below) demonstrated an old L2 fracture, along with a new L1 fracture.



84 year old woman with persistent severe back pain after moving a small table. A. Sagittal T1 weighted MR study shows a compressed L2 vertebral body with marrow signal intensity similar to other normal levels. L1 shows abnormal marrow through its superior aspect (arrow). B. Sagittal short-tau inversion recovery (STIR) image demonstrates normal signal intensity at L2, but abnormal increased signal at L1 (arrow).

## SUMMARY

**Presenting symptom:** Back pain is a ubiquitous disorder, and is a common cause of physician visits in the United States. 90% of people experience back pain at some point in life, and half of working people have pain every year. In this case, the patient had multiple risk factors for osteoporosis (female sex, age, steroid use, and previous similar fractures) and had minor trauma, supporting a presumptive diagnosis of an osteoporotic compression fracture.

**Imaging work-up:** Plain films are generally obtained as the first examination in patients with back pain, particularly elderly patients such as the one presented here who have features suggesting an osteoporotic fracture as the likely cause of pain. In many cases, the plain film will provide all of the necessary information to treat the patient. However, in some cases further imaging is required. In this case, the most obvious abnormality on the plain film, the L2 compression deformity, turned out to be a chronic finding and unrelated to the patient's acute symptoms. Although very difficult to appreciate on the original plain films for a number of reasons (demineralization, obliquity of the central beam to the spine, and differences in density between the chest and abdomen), it is possible to appreciate subtle loss of height at the L1 level. This subtle abnormality on the plain film examination is strikingly obvious on the MR.

**Establishing the diagnosis:** When a patient's MR study shows abnormal marrow signal, the main issue is to differentiate benign from malignant disease. In the case presented here, the risk factors for osteoporosis, the presence of prior osteoporotic fractures, and the clinical history of minor trauma all strongly support an osteoporotic fracture as the diagnosis. Furthermore, the imaging pattern, with a sharp distinction between normal and abnormal marrow, also favors a benign osteoporotic fracture.

**Take-home message:** Plain films are usually obtained in elderly patients with the new onset of back pain, but may need to be supplemented with MR depending on the clinical circumstances.

### FURTHER READING

Renfrew, DL. Spine pain. Chapter 6 of *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at [www.symptombasedradiology.com](http://www.symptombasedradiology.com).

Staiger TO, Gatewood M, Wipf JE, Deyo RA. Diagnostic testing for low back pain. UpToDate, accessed 3/14/2011.

Wheeler SG, Wipf JE, Staiger TO, Deyo DA. Approach to the diagnosis and evaluation of low back pain in adults. UpToDate, accessed 3/14/2011.