

Smoke up the Chimney: Osseous Infarcts in a Patient with Knee Pain. A Case Report



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INTRODUCTION

- Osteonecrosis (ON) results from impaired circulation to an area of bone, resulting in ischemic death of cellular components of bone and marrow
- Death of a weight-bearing portion of a joint is associated with fracture and collapse of subchondral bone
- Femoral head is most often affected, then humeral head and knee (distal femur and proximal tibia)

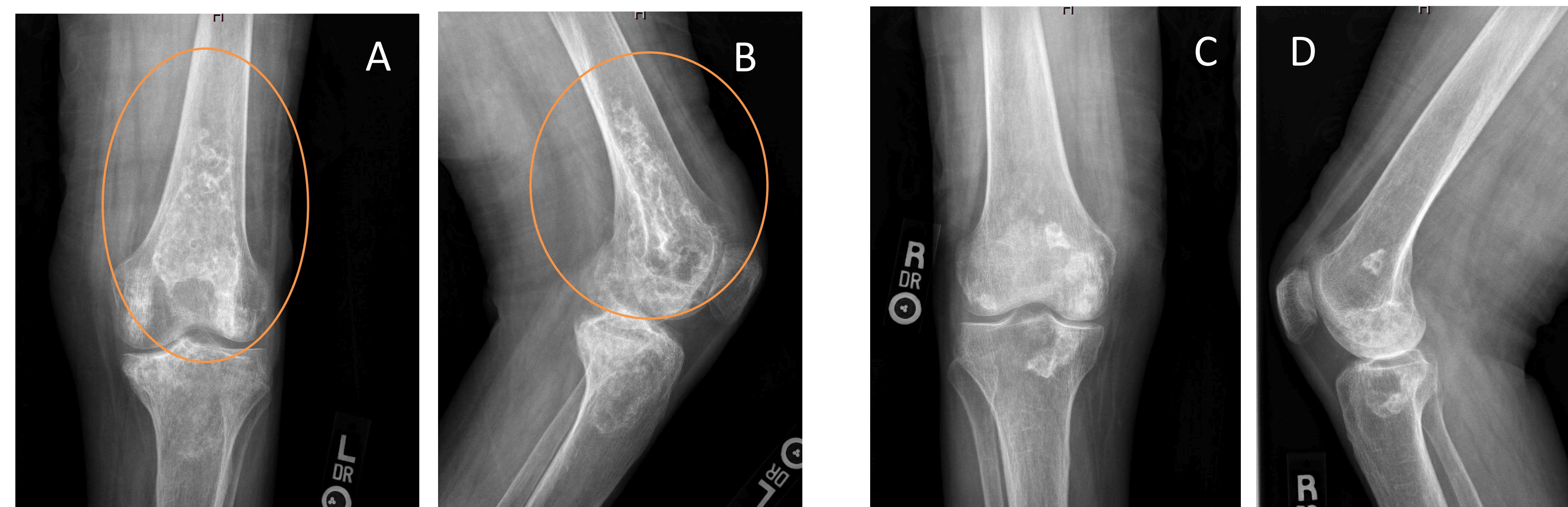
CASE PRESENTATION

- A 67-year-old female with history of rheumatoid arthritis (RA), coronary artery disease, peripheral vascular disease (PVD), chronic obstructive pulmonary disease, tobacco use, avascular necrosis (AVN) of bilateral hips and stroke presented with left knee pain after a fall onto both knees one month previously
- 7/10 pain, constant since fall
- Reported no swelling
- Alleviated by ice, elevation
- Ambulating with a walker in the home and power wheelchair in the community

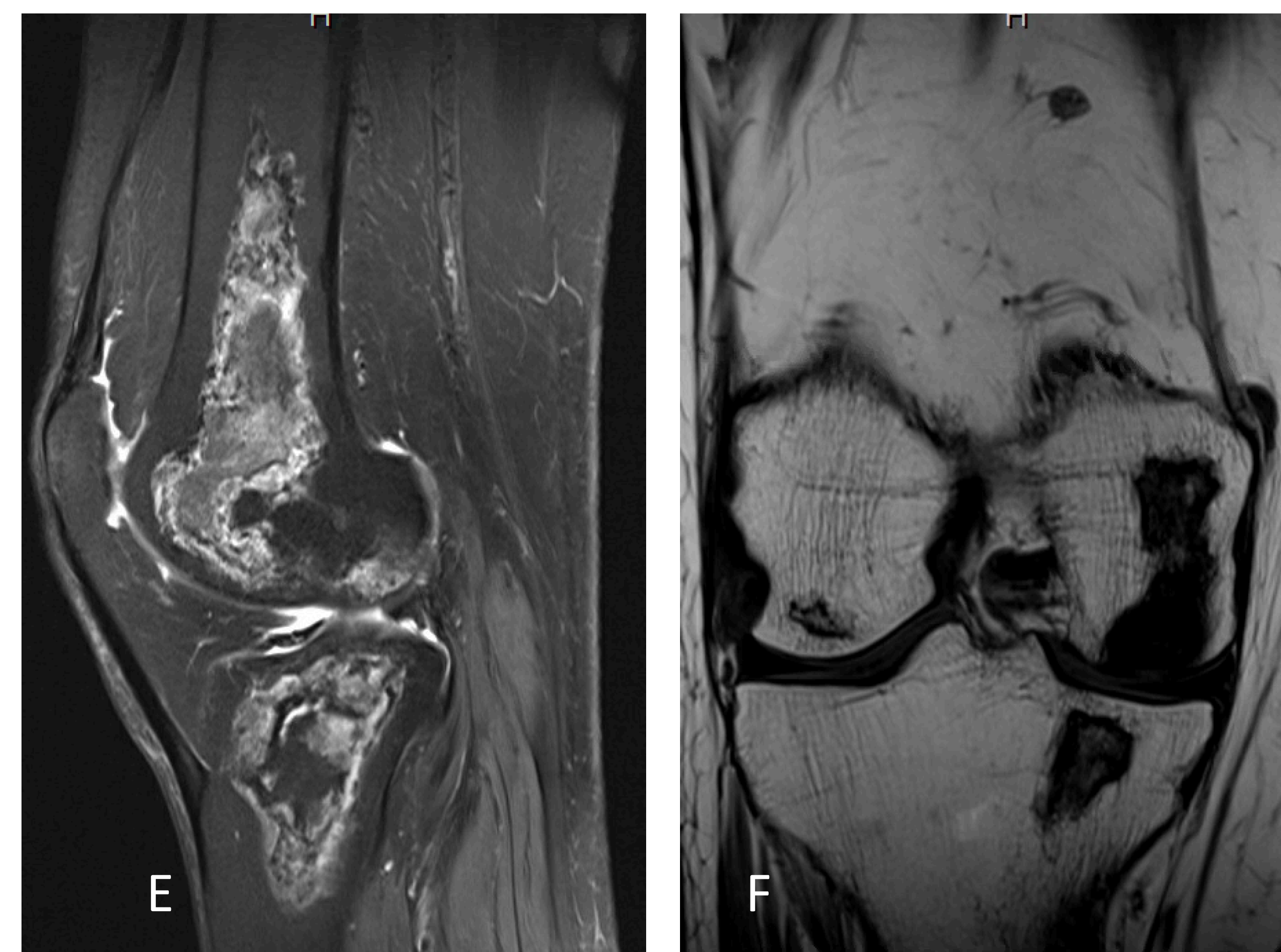
PHYSICAL EXAMINATION

- No significant knee effusion bilaterally
- Left knee tenderness at medial joint line and patellar tendon
- Right knee tenderness at lateral joint line
- Passive knee range of motion 90 degrees flexion, full extension without increased pain bilaterally
- Lower extremity strength deficient but at least anti-gravity throughout major muscle groups bilaterally
- Valgus and varus stress tests negative bilaterally
- Left McMurray's + for pain

IMAGING STUDIES



A-D: Bilateral knee x-rays. **A** (AP left knee), **B** (lateral left knee), **C** (AP right knee), **D** (lateral right knee). There is diffuse osseous demineralization which decreases radiographic sensitivity for detection of osseous pathology. No acute fracture or malalignment is identified. The joint spaces are preserved. There is osteonecrosis of the distal femur and proximal tibia. Classic "smoke up the chimney" appearance circled.



E (T2 weighted MRI of Left Knee): Bones: There are large areas of geographic serpiginous and heterogeneous signal abnormality in the distal femur and proximal tibia. Findings compatible with large bone infarcts of the distal femur and proximal tibia.

F (T1 weighted MRI of Right Knee) Multifocal osseous infarcts involving the medial and lateral femoral condyles as well as the proximal tibia. High-grade articular cartilage loss over the posterior weightbearing aspect of the medial femoral condyle.

DISCUSSION

- Patient was diagnosed with bilateral distal femur/proximal tibia osteonecrosis. These imaging findings have been referred to as "smoke up the chimney" based on the radiographic appearance of calcified fatty acid material in long bone, correlating to low signal intensity serpiginous areas on MRI
- Knee osteoarthritis is related to chronic loss of articular cartilage, while knee osteonecrosis may present acutely with subarticular bone abnormalities (spontaneous osteonecrosis of the knee, or SONK)
- Osteonecrosis may also occur secondarily due to systemic diseases, steroid use, or post-arthroscopy
- The subacute knee pain in this case was more consistent with a flare of underlying knee osteoarthritis after a fall, given that findings of osteonecrosis were also present on x-rays from 5 years earlier.
- This patient had osteonecrosis chronically with risk factors including PVD, tobacco use, and prior oral steroid use
- This diagnosis does not require immediate procedural or pharmacological intervention. She was prescribed physical therapy for range of motion, strengthening and stabilization. Patients should be followed symptomatically and may eventually require total knee replacement
- Evidence is limited for other joint-preserving procedures (arthroscopy, core decompression, or osteochondral autograft transfers) or bisphosphonates

CONCLUSION

- This case of bilateral distal femur/proximal tibia osteonecrosis is remarkable for subacute knee complaints, chronic classic "smoke up the chimney" radiographic findings and multifocal location.

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