55 yo male with MC accident 4 months ago, right knee stuck under MC. Persistent right knee pain.
Presumed bone marrow abnormality due to thermal injury

Focal Bone Abnormality as a Complication of Ultrasound Diathermy: A Report of Eight Cases
Background: Heat used in Physiotherapy

• Superficial- Raise temperature of soft tissues skin surface
  – Hot packs, hot tub, heating pads, infrared lamps (infrared lasers)

• Deep or diathermy therapy- used to raise temp of deeper soft tissues
  – Shortwave, microwave and ultrasound
  – Ultrasound- energies of less than 0.1 W/cm2 for deep soft tissue injury and bone healing. Safe?
Summary Thermal Related Bone Marrow Abnormality

• MRI findings
  – subcortical rim, dome or arc of low T1, high T2 (similar to osteonecrosis)
  – Location is key to differentiate from osteonecrosis
    • Smaller
    • Superficial/subcortical, thinner overlying soft tissue and on the side facing the body surface
  – Normal subchondral bone plate and cartilage
    • Differentiate from OC injury
  – History
Thermal Related Bone Marrow Abnormality Discussion

- Specifically US diathermy
  - No consensus in the literature regarding the efficacy of ultrasound diathermy
  - Low intensity US has shown efficacy
    - time to healing in both fresh diaphyseal (tibia) and metaphyseal (distal radius) fractures
    - Decreased likelihood of delayed union of tibial fx and a loss of reduction in distal radial fractures
  - Mechanism of therapeutic effects unsure
  - Unsure if Bone marrow changes on MRI correlated with pain/symptoms but do know imaging changes are potentially reversible
  - Degree of changes possibly dose related (higher energy)
- Laser assisted meniscectomy and chondroplasty
- Occasional complication of osteonecrosis
- Is thermal related bone marrow abnormality on spectrum of injury? With more severe injury resulting in irreversible osteonecrosis?