

# Focal Bone Lesions In Patients Following Ultrasound-Diathermy

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## Background

Musculoskeletal complaints such as pain and movement restriction are common indication for physiotherapy referral.

Application of heat treatment in the form of hot packs and deep heating diathermy, like ultrasound-sound diathermy are employed to relieve inflammation and promote healing.

Ultrasound-Diathermy can result in thermal injury to superficial tissue, while a less commonly recognized complication is the injury to the subcortical bone marrow.

## Objective

To describe and increase the awareness of the focal bone lesions detected on MRI in patients following ultrasound diathermy.

## Materials & Methods

### Study design

- Retrospective analysis of MR appearances of focal bone lesions found in patients who received ultrasound diathermy for musculoskeletal conditions.
- All patients underwent a telephone interview on time-lag between diathermy & MRI, number of diathermy sessions and pain level experienced during the session.

### Subjects

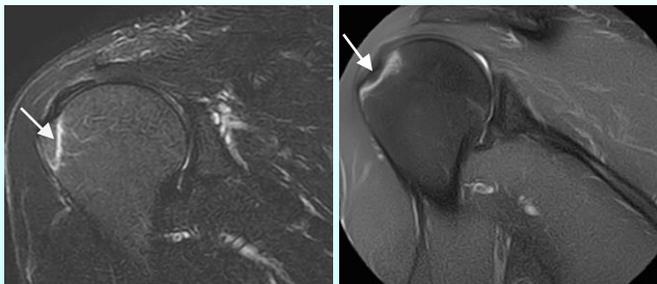
- 10 patients, including MR examinations of shoulder (n=8), ankle (n=1) & wrist (n=1)
- 2 patients had MR arthrography study while 1 patient had follow-up MR examinations. Intravenous contrast was not administered to any patients.

## Results

### MR Features

- All the MR-demonstrated lesions showed T1/Proton density hypointense signal with T2 hyperintensity and assuming rim or oblong lesional configuration.
- Lesional sites all corresponded to the site of applied USG diathermy, recalled by patients.
- Variable time lag between between the USG diathermy session and MR study, from 1 week to 24 weeks.
- Number of sessions of USG diathermy also variable, from 1 session to 7 sessions.
- Pain was experienced by all patients, 6 patients (60%) reported that to be mild and 4 patients (40%) reported it as extreme.

## Discussion & Imaging features



(a)

(b)

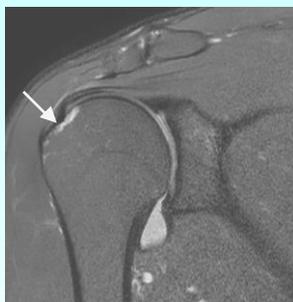


Fig. 1 35-year-old man with right shoulder pain with serial MR Shoulder done in Nov 2017(a), Dec 2017(b) and October 2018(c). T2 hyperintense crescent shaped signal was observed at the site of USG application. This abnormality shows progression from (a) to (b), when patient received USG diathermy at this site. Partial resolution of this abnormality after cessation of therapy (c) after 50 weeks.

(c)



Fig.2 A 47-year-old woman with bilateral shoulder pain with right side being more severe. Right shoulder MRI showed a crescent-shape rim of edema (White arrow) at the superficial aspect of the lesser tuberosity (subcapsularis tendon attachment). Patient received 6-7 sessions of USG diathermy therapy in past 4 weeks prior to MR examination.

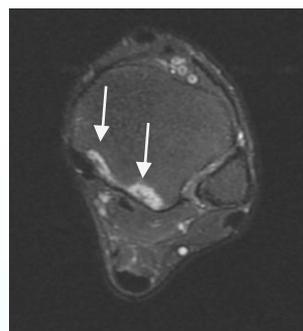


Fig.3 A 29-year-old man referred to MRI examination for recurrent left ankle sprain. It showed two rims (white arrows) of abnormal bony edema at the posterior aspects of the tibia. Patient received 6 sessions of USG diathermy in the past 4 weeks before MRI examination

- Superficial bone edema, manifesting as T2 hyperintense crescent-like signal was observed in the 10 patients. This MR feature carries resemblance to that of osteonecrosis. Osteonecrosis is classically described in sites such as hip, femoral condyle or scaphoid bone. Lesion site of our patients is however superficially located and corresponding to the sites of USG-diathermy.
- Extreme pain was reported by 4 patients (40%) during the USG diathermy sessions (not the baseline pain level). Significant pain experienced could imply the use of high-energy soundwave, and thus potentially induced injury.
- Radiologists should be aware of the possibility of this potential bony changes after USG diathermy, and not to mistake it for other pathology such as tumor, fracture or avascular necrosis.

## Conclusions

- Focal osteonecrosis could be a complication of USG diathermy. This series should raise the awareness of potential bony complication from USG diathermy therapy in both patients and operators/referring clinicians.

## Selected References

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