Pain Palliation of Bone Metastasis: Initial Clinical Experience Using High Intensity Focused Ultrasound Therapy with Magnetic Resonance Guidance

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PURPOSE

To determine the efficacy of non-invasive high intensity MR guided focused Ultrasound (MRgFUS) treatment for palliation of bone metastasis pain in patients not candidated for External Beam Radiotherapy (EBRT)

METHOD AND MATERIALS

Under the IRB approval 18 patients with 21 lesions underwent MRgFUS treatment using the ExAblate 2000 system (InSightec). Treatments were done in a single session, in an ambulatory setting. 12 patients underwent prior EBRT with a mean 6 months recurrent pain. In 6 patients MRgFUS treatment was performed as first treatment modality. Effectiveness of pain palliation was evaluated at follow-up using the visual analog pain score (VAS) and measurable changes in analgesics intake. For tumor control perfusion T1w-images were obtained pre- and post-treatment in order to determine the non-perfused sonication-related area.

RESULTS

All patients and all lesions were treated. Mean follow-up time was 4 months. At base line VAS was 7.1; it was 4.8 at 3 days, 3.0 at two weeks and 2.6 and 2.4 at one and four months respectively. No heating related adverse event were recorded during this clinical application; patient medication intake was considerably reduced. Variable degree on non-perfused volume was observed after treatment, mainly within the pericortical region. Deeper penetration of the acoustic energy is at present desirable even if technically difficult to achieve with the current system.

CONCLUSION

MRgFUS is a promising noninvasive treatment modality for successful palliation of bone metastasis pain in patients who are not candidate for EBRT.

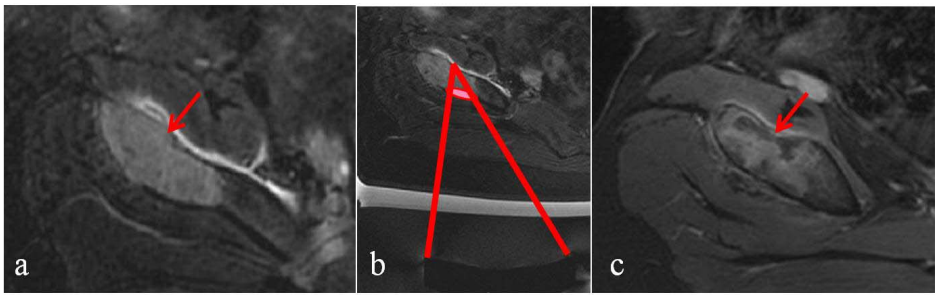

Fig.1: a) Bone metastasis from breast cancer involving the right iliac crest (arrow); b) lesion treatment using MRgFUS; c) imaging of coagulative necrosis caused by high-energy ultrasound beam immediately after the sonication (arrow).

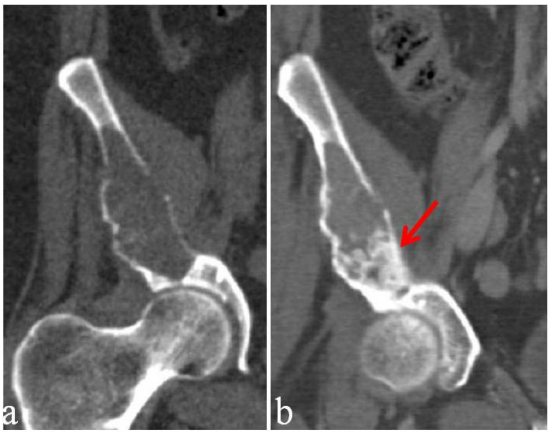

Fig.2: a) CT imaging of the same lesion before the treatment; 2 months after MRgFUS, CT demonstrated partial remineralization of the inferior portion of the lesion (arrow).