

Is trans-cranial MR-guided focused ultrasound a repeatable treatment option? Report of a successfully re-treated patient

Cesare Gagliardo¹, Francesca Valentino¹, Rosario Maugeri¹, Giuseppe Cosentino¹, Maurizio Marrale¹, Alessandro Napoli², Domenico Gerardo Iacopino¹, Carlo Catalano², Massimo Midiri³

¹University of Palermo, Palermo, Italy

²Sapienza University of Rome, Rome, Italy

³Universita Degli Studi Di Palermo, Palermo, Italy

Background: In recent years, transcranial Magnetic Resonance-guided Focused UltraSounds (tcMRgFUS) treatments for functional neurological disorders are giving a new thrust to the field of therapeutic brain lesioning. This technique has been proven safe and effective in selected patients. Here we present the case of a patient affected by tremor combined with parkinsonism who underwent a second tcMRgFUS thalamotomy because of relapsing tremor after a few months from the first tcMRgFUS treatment.

Methods: A 72-year-old, right-handed man, who came to our observation because of a disabling tremor affecting mainly his upper right limb and refusing any invasive surgical procedure. His past medical history was notable for arterial hypertension, diabetes mellitus and hereditary hemochromatosis (homozygous H63D mutation). Patient underwent a tcMRgFUS thalamotomy (target: left VIM) which resulted in a meaningful reduction of 46.9% of the global tremor at the FTM, with a persistent reduction of 57.1% of the treated hand tremor and a 33.9% improvement in patient's quality of life at a 3 months follow-up. Four months after the treatment, a progressive recurrence of the disabling tremor on the right upper limb was noticed by the patient. The decision to re-treat the patient was taken.

Results: The re-treatment session was planned six month after the former and, again, the treatment resulted in an immediate and complete relief from right upper limb tremor. At a clinical and electrophysiological assessment performed six months after the second treatment, a clinical benefit on postural and kinetic tremor of the right upper limb persisted; patients showed only a slight and inconstant resting tremor. A significant reduction of 41.7% of the global tremor was reported by the FTM scale, with a persistent reduction of 71.4% of the treated hand tremor. Moreover, an improvement of 29.2% in patient's quality of life was reported by the QUEST questionnaire.

Conclusions: Since tcMRgFUS doesn't use ionizing radiations and it is incision-less, repeated and staged treatment procedures have always been hypothesized. Our report suggests that tcMRgFUS re-treatment might be actually a feasible, safe and effective option in selected patients in whom an optimal clinical outcome is not achieved after the first treatment session. During the re-treatment session no technical issues were faced focusing the HI-FU beam in proximity to the previously targeted area and it was still possible to exploit the typical closed-loop feedback and control system which characterizes tcMRgFUS procedures. However, future well-designed studies in large samples are needed to assess the possible risks of retreatment and the optimal timing of reintervention.

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