Incisionless Transcranial MR-guided Focused Ultrasound in Essential Tremor: Cerebellothalamic Tractotomy

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Introduction

Targeting of the subthalamus was explored in the past by different functional neurosurgical groups applying the radiofrequency technique to treat patients suffering from essential tremor (ET). Recent advances in magnetic resonance guided focused ultrasound technology (MRgFUS) offer the possibility to perform thermocoagulation of the cerebellothalamic fiber tract in the subthalamus without brain penetration, allowing a strong reduction of the procedure-related risks and increased accuracy. We present here the first results of the MRgFUS cerebellothalamic tractotomy (CTT).

Methods

21 consecutive patients suffering from chronic, therapy-resistant ET were treated with an MRgFUS CTT. 3 Patients received bilateral treatment with 1 year interval. Primary relief assessment indicators were the Essential Tremor Rating Scale (ETRS) taken at follow up (3 months to 2 years) with accent on the Hand Function subscores (HF16 for treated hand and HF32 for both hands) and handwriting. Patients with HF32 above 28 points over 32 (Group 1) were analysed separately from the rest (Group 2).

Results

Mean ETRS score for all patients was 57.6+/-13.2 at baseline, and 25.8+/-17.6 at 1 year (n=10). The HF16 score reduction was 92% in Group 2 at 3 months and stayed stable at 1 year (90%). Group 1 showed only an improvement of 41% at 3 months and 40% at 1 year. Nevertheless, two patients of Group 1 treated bilaterally had an HF16 score reduction of 75% and 88% for the dominant hand at 1 year after second side.

Learning Objectives

Description of functional neurosurgical options against Essential tremor

References

Conclusions

CTT with MRgFUS was shown to be an effective and safe approach for patients with therapy-refractory essential tremor, combining neurological function sparing with precise targeting and the possibility to treat patients bilaterally