

SIX MONTHS POST MR GUIDED FOCUSED ULTRASOUND SURGERY OF UTERINE LEIOMYOMA: CORRELATION OF VOLUME CHANGE WITH NON-PERFUSION TREATMENT VOLUME AND SONICATION NUMBER

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PURPOSE

To evaluate the effect of MR guided Focused Ultrasound (MRgFUS) treatment on leiomyoma volume 6 months post-treatment, and to correlate volume change with initial leiomyoma size, non-perfused volume, total number of sonications, and therapeutic treatment temperatures.

METHOD AND MATERIALS

This is a retrospective analysis of MRgFUS in 31 fibroids (22 patients), part of a prospective phase III trial, with symptomatic leiomyomas who underwent MRI prior to, immediately after, and 6 months after MRgFUS. MR images were obtained using a 1.5-T magnet (GE Medical Systems). MRgFUS was based on T2-weighted outline of the target volume. Therapeutic sonications were delivered with MRgFUS system (ExAblate 2000, Insightec Inc.). Temperature-sensitive MR imaging was performed during the sonication to monitor tissue localization and temperature. Using 3D Slicer software, leiomyoma volume was calculated before and 6 months after treatment. The non-perfused tissue volume was calculated immediately after and 6 months after treatment. Therapeutic sonications were defined as sonications within 10% of peak power. Mean temperature of a sonication was the average of a 3X3 voxel region of interest around the hottest value. Statistical methods used two-sample Wilcoxon signed rank and Spearman's rank coefficient.

RESULTS

There is a significant 12.5% decrease in leiomyoma volume at 6 months post treatment ($p=0.008$). There is a moderate correlation between non-perfused leiomyoma treatment volume and sonication number ($r=0.05$) and mean and peak treatment temperature $>55^{\circ}\text{C}$ ($r=0.06$). Low negative correlations exist between leiomyoma volume change and initial size ($r=-0.3$), non-perfused leiomyoma volume at treatment ($r=-0.3$), 6 months post-treatment ($r=-0.4$), sonication number ($r=-0.3$) and mean ($r=-0.3$) and peak ($r=-0.4$) treatment temperature $>55^{\circ}\text{C}$.

CONCLUSIONS

MRgFUS of uterine leiomyomas reduces leiomyoma volume 6 months post-treatment. A moderately positive correlation exists between non-perfused treatment volume and sonication number and treatment temperature. However, there is a low correlation between volume change and initial leiomyoma size, non-perfused volumes, sonication number and therapeutic treatment temperature.