MR-guided laser-induced thermotherapy (LITT) of liver metastases: Comparison of colorectal cancer mets versus breast cancer mets and other primary tumors regarding survival rates

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Purpose: Evaluation of the survival rate of patients with liver metastases of different primary tumors treated with MR-guided laser induced thermotherapy.

Methods and Materials: 278 consecutive patients 28 to 84 years of age (mean 59 y) with a total of 822 liver metastases were treated with MR-guided LITT under local anesthesia. 533 liver metastases of colorectal cancer (175 patients), 126 liver metastases of breast cancer (48 patients) and 163 metastases of a variety of other primary tumors (55 patients) were treated with a total of 2138 laser applications. 1000 laser applications were performed by the use of a conventional laser application set (SOMATEX, Berlin Germany). For 1138 laser applications an irrigated internally cooled power laser application system (SOMATEX, Berlin, Germany) was used. MR thermometry was performed using the T1-weighted thermometry method. A FLASH-2D sequence (TR/TE/flip angle = 102/8/70°) was used in all patients. Cumulative survival times were calculated with the Kaplan-Meier method.

Results: All patients tolerated the procedure under local anesthesia well. MR thermometry demonstrated a reliable monitoring method during heating. The contrast enhanced follow-up studies obtained 24-48 h after MR-guided LITT demonstrated a very good correlation between the area of decreased signal intensity and the obtained coagulative necrosis. The obtained volume of coagulative necrosis was varying up to the factor 3.2 in different metastases for identical power and time settings. In the colorectal cancer group (Fig 1) the mean survival time was 40.01 months (95% confidence interval 35.09 – 44.95 months), the median survival was 36.43 months (95% confidence interval 29.65 – 43.21 months). In the breast cancer group the mean survival 40.03 months. The statistical evaluation for equality of survival distribution revealed no statistically significant differences between the two groups (Breslow-test p>0.01, Tarone-Ware-test p>0.01). No severe LITT related complications or side effects were observed in our patient series.

Conclusion: In patients with liver metastases the local tumor destruction using minimally invasive percutaneous MR-guided LITT under local anesthesia results in improved clinical outcomes independent of the primary tumor. MR thermometry proved to be a non-replaceable basis for minimal invasive treatment.

References:


Figure 1
Survival of patients after LITT of liver metastases of colorectal cancer.