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Laser interstitial thermal therapy using an uncooled laser catheter in a diagnostic MR suite.

Hjalmar Bjartmarz, Irena Grubor, Charlotte Edvardsson, Roger Siemund and Peter Siesjö

Skane University Hospital, Departments of Neurosurgery and Diagnostic Radiology, Skane University Hospital, Lund, Sweden,

Background

Laser interstitial thermal therapy (LITT) has emerged as an alternative to open surgery for both primary and secondary brain tumors. Additionally, thermal ablation by laser can be used to eradicate epileptic foci and to treat radiation necrosis. During the procedure, a laser catheter has to be placed in the targeted lesion under navigation guidance. To control temperature during ablation MR thermography is utilized, thus the ablation procedure is commonly performed inside a dedicated intraoperative MR. As most catheter insertions are performed outside the MR camera, shorter or longer transports with the indwelling laser catheter are needed. This poses a potential hazard for unintentional catheter dislodgment during transport. Navigation procedures outside the MR camera can also result in misplacement of the catheter which can lead to abandonment of the procedure or return to the operative suite. Currently used catheters for thermal ablation necessitates a cooling procedure after ablation imposing additional risks and logistics. To minimize the above stated hazards, we here present a workflow where both catheter placement and ablation are performed inside a diagnostic MR suite using a new laser catheter without cooling.

Methods

In an open-label, pilot, exploratory, single centre, early feasibility and safety clinical phase 1-2 trial, patients with recurrent glioblastoma were included after informed consent. Patients 18-80 years with lesions < 30 mm were eligible. Single or multiple ablations were performed in a diagnostic MR suite using a MR compatible navigation system (ClearPoint® Neuro Navigation System) together with a new uncooled laser catheter and MR thermography (Tranberg Thermal Therapy System and Thermoguide Workstation).

Results

5 patients with recurrent glioblastoma fulfilling all inclusion criteria and no exclusion criteria were treated with single or multiple laser thermal ablations in a diagnostic MR suite. Laser effects between 2 and 4 W were used with ablation times between 270 and 570 seconds. The workflow was executable and sustainable without any treatment related side effects or device mis performance noted. Details of the workflow will be presented.

Conclusions

LITT using a non-cooled laser catheter inside an outpatient MRI suite was feasible and reproducible. The procedure may reduce risks associated with LITT procedures.