

Temperature Distribution During Radiofrequency Ablation

Orthopaedics / Musculoskeletal Tumors / Miscellaneous

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Introduction

Radiofrequency ablation (RFA) is an interventional method for the controlled treatment of different tumor types. With about 36% affected patients, spinal metastases represent the most common type of bone metastases in tumor patients. RFA can be used for the successful treatment of spinal tumors, but includes heat-associated risks. Temperatures = 45°C have a cytotoxic effect to the spinal cord and peripheral nerves. Therefore, temperature monitoring is recommended.

Objectives

This study investigates the temperature distribution during RFA treatments (STAR, DFine Inc.).

Methods

Ablation was performed in 8 specifically prepared lumbar vertebrae of human cadavers. In vitro conditions were simulated, which were as closely as possible comparable to in vivo setting. A tumor mimic model was used to simulate tumor mass and the mass was inserted into the vertebral body, which was stored in a saline bath to temper it to body temperature. Ablation temperature was measured with temperature sensors in the vertebral body, the neural foramen and the epidural space.

Results

Maximum temperature within the vertebral body was 46.4 ± 3.3 °C. The temperature in the neural foramen was in all cases 37°C. Similar temperatures were measured in the epidural space, with 37.3 ± 0.7 °C.

Conclusions

The results of this study indicate, that the temperature distribution of the used ablation system is within acceptable ranges. Temperature of neural foramen and epidural space did not reach a critical height. Nevertheless further investigations are necessary to investigate also the performance of the RFA.