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A quantitative study of post-biopsy radiofrequency cauterization

Abstract

Percutaneous image-guided needle biopsy is typically performed in highly vascular organs or in tumors with rich macroscopic and microscopic blood supply. The main risks related to this procedure are bleeding and implantation of tumor cells in the needle tract. From numerous conducted studies, it was found that heating the needle tract using a radiofrequency (RF) ablation system has a potential to minimize these effects. However, this solution requires the use of specially designed RF needles which would make the procedure relatively expensive and complicated. Thus, in order to solve this problem, we propose a simple solution by using readily available biopsy needles connected to an RF generator. In order to do so, we have designed and developed an adapter to interface between these two devices. A bovine liver has been used as a sample tissue for the experimental procedure. The delivery of the RF was varied by varying the values for delivered power, power delivery duration, and insertion depth. The results showed that the size of the coagulation necrosis region is affected by all of the parameters tested. In general, the size of the region is enlarged with higher delivery of RF power, longer duration of power delivery, and shallower needle insertion.

Keywords — RF ablation, biopsy needle interface