STUDY OF INTERSTITIAL HYPERTHERMIA USING A THERMOFUSE SYSTEM

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Purpose: Using intersitial implantation, one needle implantation procedure provides for two complimentary treatment modalities of radiotherapy and hyperthermia with adequate dose and temperature distribution, subsequently improving the local control. Problems of interference of heat delivery and temperature measurement exist when we use microwave or radiofrequency as the heating source. This study aims at investigating the heat distribution using interstitial thermofuse system.

Material and Methods: Thermofuse hyperthermia system was used to study on phantom, pork and alive pigs. Volume needle implantation with 3-5 planes, 5 needles per plane were implanted. They were devided into 3 groups with 10, 12 and 15 mm needle spacing. Thermocouples were used to measure the temperature distribution inside and outside implantation areas. The data were analyzed and compared.

Results: In the study of phantom, pork and alive pigs, the implantation volume could achieve ideal and effective hyperthermia temperatures at 10, 12 mm spacing through the adjustment of water temperature before circulation. In alive pigs, with a 15 mm needle spacing, the implanted volume could not achieve ideal temperatures. The temperatures were significantly decreased by 1.4-2.0°C in the areas near the vessels.

Conclusion: This study shows that interstitial hyperthermia using thermofuse system is able to precisely provide effective hyperthermia temperature without the interference of physics parameters in thermo-measurement in implanted tumor areas. The accuracy of heat delivery and temperature measurement is better than other external hyperthermia systems. We estimate that the combination with radiotherapy can improve the treatment effect of solid tumors. It is expected more beneficial, especially for those solid tumors with relatively long survivals.

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