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首页

期刊概况

编委会

专家学者

网上投稿

过刊浏览

期刊订阅

广告合作

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基础研究

最新目录| 下期目录| 过刊浏览| 高级检索

◀◀ 前一篇 | 后一篇 ▶▶

高强度聚焦超声消融兔腹主动脉旁肝肿瘤的安全性和有效性*

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Safety and effectiveness of high-intensity focused ultrasound ablation for liver tumor adjacent to rabbit abdominal aorta

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摘要

图/表

参考文献(0)

相关文章(15)

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摘要

目的: 观察高强度聚焦超声消融兔腹主动脉旁肝肿瘤后肿瘤剂量学、磁共振图像、病理学及生存期影响, 评价HIFU消融兔腹主动脉旁肝肿瘤安全性和有效性。方法: 分别于HIFU组(32只)和对照组(20只)实验兔建立腹主动脉旁的VX2肝肿瘤模型, HIFU组瘤兔于MR引导下的高强度聚焦超声消融肿瘤, 分析腹主动脉旁肿瘤消融剂量学, MR观察消融前后肿瘤影像学变化, 病理学观察肿瘤消融后坏死情况, 对比观察HIFU组与对照组瘤兔生存期。结果: MRI和病理学均表明MR引导下HIFU能完全消融兔腹主动脉旁VX2肝肿瘤, EEF为 25.72 ± 11.40 J/mm³ HIFU组的生存期明显高于对照组, 差异具有统计学意义($P < 0.05$)。结论: HIFU能安全有效消融兔腹主动脉旁VX2肝肿瘤并且能明显提高存活期。

关键词: 高强度聚焦超声, 兔, 腹主动脉, 肝脏肿瘤, 磁共振

Abstract:

Objective: To evaluate the safety and efficacy of high-intensity focused ultrasound (HIFU) ablation for the VX2 liver tumor near the hepatic main blood vessels of rabbits by using dosimetry and magnetic resonance imaging (MRI) and by analyzing path -ological changes and survival. Methods: Rabbits with VX 2 liver tumor adjacent to the abdominal aorta were divided into the HIFU (n= 32) and control groups (n=20). MRI-guided HIFU was employed for the ablation of the liver tumor in the HIFU group. The ablation volume and the energy efficiency factor (EEF) of the 32 ablated rabbits were further analyzed. MRI and pathology were used to compare the changes in the tumor before and after HIFU. The survival of the animals in the HIFU and control groups was also determined. Results: Both pathology and imaging showed that the rabbit liver VX2 tumor adjacent to the abdominal aorta was completely ablated, with an EEF of (25.72 ± 11.40) J/mm³. The survival rate was significantly higher in the HIFU group than in the control group ($P < 0.05$). Conclusion: HIFU ablation is safe and effective in rabbit VX2 liver tumor near the abdominal aorta. This approach significantly increases survival.

Key words: high-intensity focused ultrasound rabbit abdominal aorta liver neoplasm magnetic resonance

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