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ORIGINAL ARTICLE

Evaluation of Therapeutic Effect of Contrast-enhanced Ultrasonography in Hepatic Carcinoma Radiofrequency Ablation and Comparison with Conventional Ultrasonography and Enhanced Computed Tomography

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Objective: This paper aims to discuss the evaluation of the therapeutic effect of contrast-enhanced ultrasonography (CEUS) in radiofrequency ablation (RFA) for liver cancer and its application value.
Methods: A total of 80 patients (120 hepatic malignant tumor lesions) were treated using RFA, and CEUS was conducted on the liver before and after the treatment. Sixty-five patients (85/120 tumor lesions) had primary hepatic carcinoma and 11 (30/120 tumor lesions) had metastatic hepatic carcinoma (6 cases of 15 lesions had colorectal carcinoma, 3 cases of 8 lesions had lung carcinoma, and 2 cases of 7 lesions had gastric carcinoma). Four patients (5 lesions) had recurrence. Prior to the treatment, CEUS accurately guided the RFA of lesions, and after the treatment, the accuracy of CEUS was compared with conventional ultrasonography and enhanced computed tomography (CT).
Results: After the RFA, there were two cases of bile leakage, two cases of bleeding, and three cases of hydrothorax, and 20 cases had fever. In the CEUS performed after the operation, 114 of the 120 lesions (94.6%) were not filled with contrast agent in the arterial phase, venous phase, and delayed phase, indicating that the tumor lesions were totally inactivated. In the remaining six lesions, the arterial phase was enhanced partially on the edge, indicating suspected partial residues of tumor lesions. The final diagnosis was based on the aforementioned two kinds of imaging examinations in combination with the level of tumor markers, needle

Conflicts of interest: The authors declare that they have no conflicts of interest.

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biopsy, and follow-up visits of over 1 month. Based on the therapeutic effects on the tumor after the operation with the final diagnosis as the standards, the accuracy of CEUS was 94.6%, whereas that of contrast-enhanced CT (CECT) and conventional ultrasonography was 93.4% and 60.5%, respectively. A comparative analysis was performed, which indicated that the difference between CEUS and conventional ultrasonography was of statistical significance ($\chi^2 = 5.42$, $p < 0.05$). A comparison between conventional ultrasonography and CECT was also of statistical significance ($\chi^2 = 5.14$, $p < 0.05$); however, the comparison between CEUS and CECT indicated no statistical significance ($\chi^2 = 7.54$, $p > 0.05$).
Conclusion: CEUS has important value of clinical application both prior to and after RFA operations. Prior to the operation, CEUS can accurately guide the RFA treatment, whereas after the operation, CEUS is an important method to evaluate the inactivation after the treatment, and can be an important means for follow-up visits for partial treatment of hepatic carcinoma.

Introduction

Statistical reports indicate that hepatic carcinoma, one of the most common malignant tumors, is responsible for the death of 500,000 people worldwide annually. The most likely way to cure hepatic carcinoma is surgical treatment, and the most common operative procedures are hepatic transplantation and hepatectomy. Because of the shortage of donators, most patients receive hepatectomy. However, clinical symptoms in the early stage of hepatic carcinoma are not obvious when the patient visits a doctor, and hepatectomy is not a suitable option in the later stages of the disease [1]. In recent years, with the development in medical technology, radiofrequency, microwave, and transcatheter chemoembolization are used in those patients who are not able to receive operative treatments. The problem still exists though. The tumor may not be inactivated totally or may recur in a short period, and therefore, minimally invasive effect is limited. At present, the key problem is how to improve the curative effect of minimally invasive method to reduce the recurrence rate of carcinoma.

Because contrast-enhanced ultrasonography (CEUS) and contrast agent are not matured in terms technology, contrast-enhanced computed tomography (CECT) and magnetic resonance imaging (MRI) are usually used to clinically evaluate the inactivation.

Because of its improvement in examining the sensitiveness of tumor blood flow, along with the improvement in the research and application of new types of contrast agent, CEUS technology is able to make reliable assessments on the inactivation curative effect of tumor radiofrequency ablation (RFA). In addition, the technology can also determine the ablation range and whether the inactivation is thorough [2,3]. Furthermore, as CEUS technology develops and the technique improves, CEUS can also determine whether the tumor is benign or malignant in the early stage for those uncertain nodules. Therefore, patients can receive RFA earlier, which improves their survival rate. However, the technology needs further improvement. Factors such as lack of blood supply to tumors, position of tumors, fatness and body position of patients, and skills and experience of doctors will all have an impact on RFA.

The paper summarizes the clinical outcome of 80 patients with hepatic lesion prior to and after the RFA operation (120 hepatic tumor lesions) admitted to the Zhongnan Hospital. The therapeutic effects of CEUS were studied and evaluated, and we also explored the importance of CEUS in follow-up visits. The results from CEUS were compared with those from conventional ultrasonography and enhanced CT examination.

Materials and methods

The study was approved by the Ethical Committee of the Zhongnan Hospital of Wuhan University, Wu Han City, China and was performed in accordance with the Declaration of Helsinki. All treated primary hepatic carcinoma [hepatocellular carcinoma (HCC)] and metastatic hepatic carcinoma (MHC) were confirmed histologically prior to therapy. All patients enrolled into the study signed an informed consent prior to participation.

From July 2011 to May 2013, 80 hepatic carcinoma patients were hospitalized in our hospital, including 65 male and 15 female patients (age, 40—75 years; average age, of 55.4 ± 4.5 years). Of these, 65 patients had primary hepatic carcinoma (HCC), and 11 patients had MHC (6 patients with colorectal cancer, 3 with lung carcinoma, and 2 with gastric carcinoma), and the remaining four patients had postoperative recurrence. All 80 patients were determined as having hepatic carcinoma by ultrasound-guided puncture biopsy method. Prior to the RFA treatment, CEUS can examine the size, number, and distribution of tumors. If tumor lesions are near the intestine and great vessels, or widely distributed with more than three tumor lesions, the RFA treatment is generally not suitable. A total of 120 hepatic carcinoma lesions were chosen for RFA treatment. Prior to treatment, tumor lesion diameter was 1.0—6.1 cm (average, 3.8 cm). If the tumor lesion diameter was > 5 cm, we used multipolar needle; if the liver tumor lesion diameter was < 5 cm, single-polar needle was used. A total of 110 lesions received ultrasound-guided percutaneous transhepatic RFA with local anesthesia. The remaining 10 lesions received 10 ultrasound-guided RFA with general anesthesia.