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Fluoroscopy-guided radiofrequency ablation for small hepatocellular carcinoma: a retrospective comparison with ultrasound-guided ablation

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AIM: To compare the therapeutic efficacy of fluoroscopy-guided radiofrequency ablation (F-RFA) and ultrasound-guided RFA (US-RFA) in treatment of small hepatocellular carcinoma (HCC).

MATERIALS AND METHODS: Between January 2006 and January 2012, 93 patients with small HCCs underwent percutaneous RFA. In 42 patients with 46 HCCs invisible on US, F-RFA was performed following intra-arterial iodised oil injection (group A). The remaining 51 patients with 58 HCCs received US-RFA (group B). Technical effectiveness, complications, local tumour progression, and patient survival were retrospectively compared between the two groups.

RESULTS: Technical effectiveness was achieved in 45 HCCs of group A (97.8%) and 64 HCCs of group B (96.6%; p=0.65). There was no major complication in either group. The 1-, 3-, and 5-year local tumour progression rates were lower in group A than those of group B with marginal significance (0%, 3.7% and 3.7% in group A, and 13%, 13%, and 13% in group B; p=0.05). The 1-, 3-, and 5-year patient survival rates were 100%, 58.3%, and 51.2% (group A), and 82.4%, 54.9%, and 46.1% (group B; p=0.26).

CONCLUSIONS: F-RFA is a feasible and safe treatment for small HCC invisible on US. Its therapeutic efficacy was comparable with that of US-RFA.

Introduction

Percutaneous radiofrequency ablation (RFA) is now accepted as one of the curative treatments for small hepatocellular carcinoma (HCC).[1] Ultrasonography (US) is the most commonly used imaging technique for targeting tumours during the procedure[2]; however, tumour localisation can be problematic in some cases, because many HCCs are not visualised on US due to their unfavourable location or isoechogenicity with the surrounding cirrhotic liver parenchyma.[3] Computed tomography (CT) is another imaging method that is commonly used for ablation therapy, but tumours invisible on US are also frequently invisible on unenhanced CT.[4]

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To address this limitation, many strategies have been developed including contrast-enhanced US,[5] CT/magnetic resonance imaging (MRI)–US fusion imaging,[6] and percutaneous coil placement.[7] Fluoroscopy-guided RFA (F-RFA) shortly following intra-arterial iodised oil injection is one of these alternative targeting strategies.[8] Intra-tumoural retention of iodised oil provides radiographic contrast to the index lesion, and thus, it can serve as a landmark to facilitate targeting an index tumour under fluoroscopic guidance. Recently, several studies suggested that F-RFA had excellent technical feasibility in treating US-invisible HCC[6,9–11]; however, there have been only limited data, including case reports or small case series. Moreover, to confirm its clinical usefulness, not only technical feasibility but also therapeutic efficacy should be verified; however, to the authors' knowledge, there has been no study comparing the therapeutic efficacy between this technique and conventional targeting methods. Therefore, the purposes of the present study were to retrospectively assess the technical feasibility of F-RFA for small HCCs invisible on US and to compare the therapeutic efficacy of F-RFA with that of US-guided RFA (US-RFA).

Materials and methods

Patients

This retrospective study was approved by the hospital institutional review board. The requirement to obtain informed consent was waived. A search of the department database identified 191 patients who had undergone percutaneous RFA for HCC between January 2006 and January 2012. Ninety-eight patients were excluded because[1] HCCs were larger than 3cm (n=26) or[2] the patient received previous treatment for index tumour (n=72). Therefore, 93 patients with 104 small HCCs were enrolled in this study. In 42 patients with 46 HCCs, F-RFA was performed following intra-arterial iodised oil injection (group A). F-RFA was attempted only when the tumours were invisible on US because their isoechogenecity to the liver parenchyma (12 tumours) or unfavourable location (subphrenic [30 tumours] or subcapsular [4 tumours]). The remaining 51 patients with 58 HCCs received conventional US-RFA (group B; Fig 1).

All patients underwent routine physical examination and laboratory tests. Contrast-enhanced liver CT and/or MRI was performed within 2 weeks before treatment. The diagnosis of HCC was based on American Association for the Study of Liver Diseases (AASLD) guidelines[12] as follows: typical vascular pattern (hypervascular in the arterial phase, and wash-out in the portal/delayed phase) of liver nodule in at least one of the contrast-enhanced CT or MRI studies, or a serum alpha-fetoprotein value exceeding 200 ng/ml. Histopathological confirmation was obtained in nine patients of group B because of atypical imaging findings (moderately differentiated [n=6], poorly differentiated [n=3]). There was no significant difference in patients' backgrounds and tumour characteristics between the two groups (Table 1).

Procedures

Written informed consent was obtained from each patient before the procedures. All procedures were performed on an inpatient basis by two interventional radiologists with 15 and 10 years of experience of chemoembolisation and RFA at the beginning of this study. The patients received 0.05–0.1 mg fentanyl citrate and 1–5 mg midazolam for conscious sedation. Five to 10 ml of 1% lidocaine was used for local anaesthesia. Prophylactic antibiotics were not routinely used before or after the procedure.

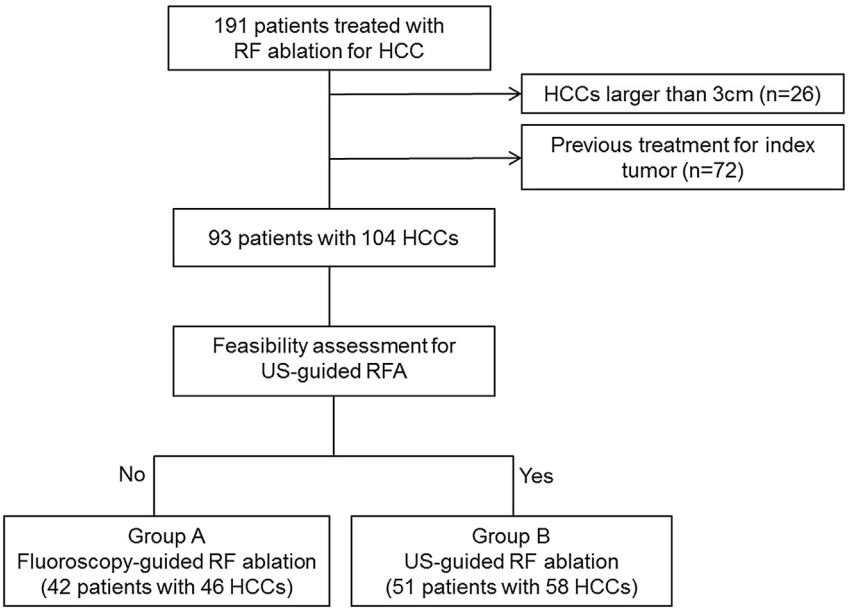

Figure 1 Patients selection and study groups.