

Comparison of Radiofrequency Ablation and Hepatic Resection for the Treatment of Hepatocellular Carcinoma 2 cm or Less

Yuqian Huang, MD, Qin Shen, MD, Harrison X. Bai, MD, Jing Wu, MD, Cong Ma, MD, Quanliang Shang, MD, Steven J. Hunt, MD, PhD, Giorgos Karakousis, MD, Paul J. Zhang, MD, and Zishu Zhang, MD

ABSTRACT

Purpose: To compare survival outcome of radiofrequency (RF) ablation and surgical resection (SR) for treatment of hepatocellular carcinoma (HCC) ≤ 2 cm.

Materials and Methods: In this retrospective study, patients from the US National Cancer Database with HCC ≤ 2 cm received RF ablation or SR as sole treatment. Overall survival (OS) was compared using log-rank test, multivariable Cox proportional hazard regression, and propensity score matched analysis.

Results: Of 833 patients included, 620 received RF ablation and 213 received SR. The 1-, 3-, and 5-year OS rates were 90%, 64%, and 47% for RF ablation and 89%, 75%, and 62% for SR. On univariate analyses, patients who received SR had longer OS than patients who received RF ablation, but this did not achieve statistical significance ($P = .113$). On multivariate analyses, female sex (HR = 0.700; 95% CI, 0.501–0.979; $P = .037$), African American (HR = 0.611; 95% CI, 0.398–0.938; $P = .024$) and Asian ethnicity (HR = 0.427; 95% CI, 0.230–0.790; $P = .007$), and median income \geq \$48,000 (HR = 0.695; 95% CI, 0.518–0.932; $P = .015$) were associated with longer OS, whereas higher Model for End-stage Liver Disease (MELD) scores (HR = 1.023; 95% CI, 1.009–1.037; $P = .001$) were associated with shorter OS. After matching on age, sex, ethnicity, MELD score, and income, there was no significant difference in OS between the 2 treatment groups (log-rank $P = .646$).

Conclusions: There was no significant difference in OS between RF ablation and SR in treatment of HCC measuring ≤ 2 cm.

ABBREVIATIONS

CI = confidence interval, HCC = hepatocellular carcinoma, HR = hazard ratio, MELD = Model for End-stage Liver Disease, NCDB = National Cancer Database, OS = overall survival, SR = surgical resection

According to data from the World Health Organization, hepatocellular carcinoma (HCC) is the third leading cause of cancer death worldwide with the highest incidence in Asia and Africa (1). Currently, a greater number of cases are able to be diagnosed at an earlier stage of disease owing to the use of advanced imaging technologies and serum biomarkers (2). These patients with early-stage HCC are candidates for potentially curative treatments, such as transplantation, resection, and ablation (3). Orthotopic

liver transplantation is an option for patients who meet or are downstaged into the Milan or University of San Francisco criteria (4). Although this highly selective approach allows for excellent long-term survival results, the long waiting time limits orthotopic liver transplantation as a treatment option in HCC (5). In comparison, surgical resection (SR) is accepted as the first-line treatment in patients with early-stage HCC (6,7). More recently, radiofrequency (RF) ablation, used since 1990 for local ablation of liver malignancy, is increasingly accepted

From the Department of Neurology (Y.H.) and Department of Radiology (Q.She., J.W., C.M., Q.Sha., Z.Z.), The Second Xiangya Hospital, Central South University, No. 139 Middle Renmin Road, Changsha, Hunan 410011, China; and Departments of Radiology (H.X.B., S.J.H.), Surgery (G.K.), and Pathology and Laboratory Medicine (P.J.Z.), Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania. Received December 12, 2017; final revision received April 14, 2018; accepted April 16, 2018. Address correspondence to Z.Z.; E-mail: zishuzhang@csu.edu.cn

Y.H. and Q.She. contributed equally.

Figure E1 and Table E1 are available online at www.jvir.org.

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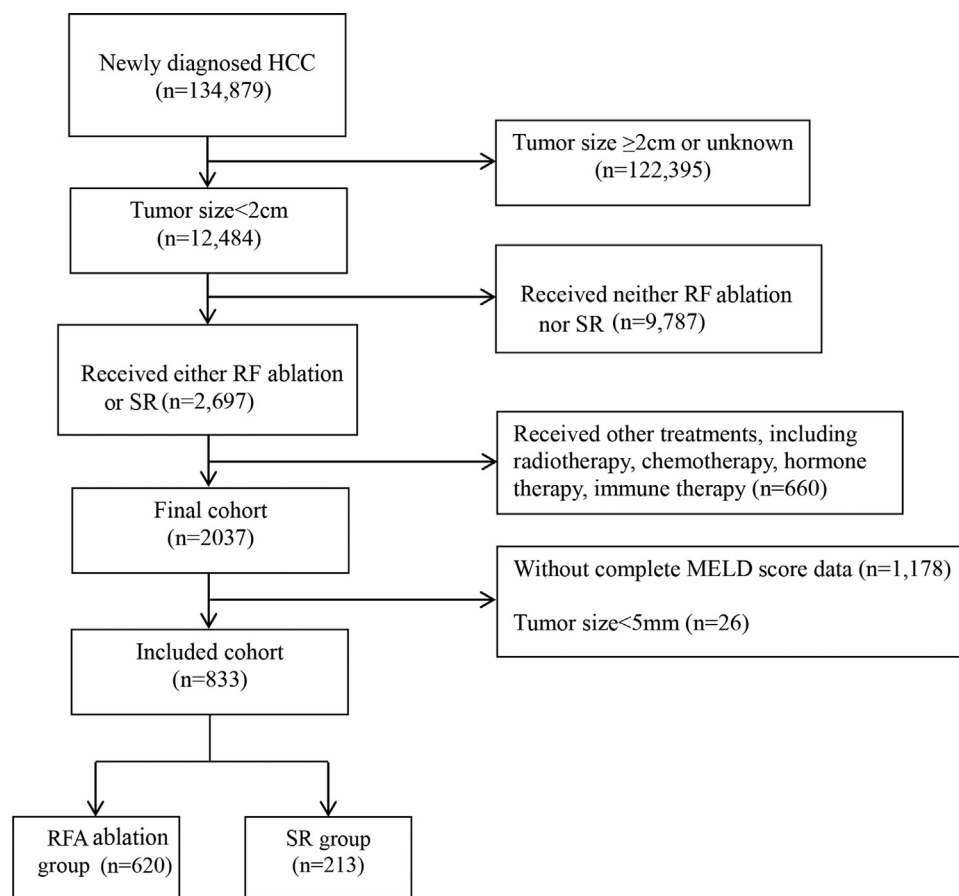


Figure 1. Flowchart of patient selection and subgroup analyses.

as an alternative to SR in small HCC, with the advantage of being less invasive and more cost-effective (8,9).

It is currently controversial whether SR or RF ablation results in better outcomes for early-stage HCCs. Multiple studies, including 3 randomized controlled trials and 9 meta-analyses, have been performed over the past 10 years to address this issue with contradictory results (10–21). Some studies found no difference between RF ablation and SR in survival (10,15,22), whereas others found that SR was associated with longer overall survival (OS) and lower recurrence rates compared with RF ablation (11,23,24). A retrospective study comparing RF ablation and SR for treatment of HCC ≤ 2 cm found that RF ablation resulted in longer OS, but not recurrence-free survival, compared with SR (8). Given the contradictory results, this study compared the OS of patients receiving only RF ablation or SR for treatment of HCC measuring ≤ 2 cm in a large national cohort.

MATERIALS AND METHODS

Study Populations

This is a retrospective analysis of patients from the National Cancer Database (NCDB) with a diagnosis of HCC based on *International Classification of Diseases for Oncology, Third Edition* site code 8170. Established in 1989, the

NCDB is a comprehensive, nationwide facility-based oncology dataset that captures nearly 70% of all newly diagnosed malignancies in the United States. The data used in this study are derived from a deidentified NCDB data file.

Patients with tumor size measuring between 5 and 20 mm from the years 2004–2014 were included. According to the surgical codes from the *Facility Oncology Registry Data Standards* manual, which identified definitive therapeutic surgical procedures, patients who received either RF ablation (surgical code 16) or SR (surgical code 20–60) as the only treatment were included in the analyses. The Charlson-Deyo score described the comorbid conditions of patients. Patients were excluded if they received additional therapies, such as radiation therapy, chemotherapy, hormone therapy, and immune therapy. Patients without data to calculate Model for End-stage Liver Disease (MELD) score were excluded.

From 2004 to 2014, there were 134,879 patients with a new diagnosis of HCC in the NCDB. Only 833 patients met the inclusion criteria and were included in final cohort. **Table E1** (available online at www.jvir.org) compares included and excluded patients. Of these patients, 620 patients (74.4%) received RF ablation, and 213 patients (25.6%) received SR. A flowchart of patient selection is shown in **Figure 1**. The overall median age was 60 years (range, 16–86 y); median tumor size was 15 mm (range,

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