

World Journal of *Clinical Cases*

World J Clin Cases 2020 October 6; 8(19): 4280-4687



Contents

Semimonthly Volume 8 Number 19 October 6, 2020

OPINION REVIEW

- 4280 Role of monoclonal antibody drugs in the treatment of COVID-19
Ucciferri C, Vecchiet J, Falasca K

MINIREVIEWS

- 4286 Review of simulation model for education of point-of-care ultrasound using easy-to-make tools
Shin KC, Ha YR, Lee SJ, Ahn JH
- 4303 Liver injury in COVID-19: A minireview
Zhao JN, Fan Y, Wu SD

ORIGINAL ARTICLE

Case Control Study

- 4311 Transanal minimally invasive surgery *vs* endoscopic mucosal resection for rectal benign tumors and rectal carcinoids: A retrospective analysis
Shen JM, Zhao JY, Ye T, Gong LF, Wang HP, Chen WJ, Cai YK
- 4320 Impact of *mTOR* gene polymorphisms and gene-tea interaction on susceptibility to tuberculosis
Wang M, Ma SJ, Wu XY, Zhang X, Abesig J, Xiao ZH, Huang X, Yan HP, Wang J, Chen MS, Tan HZ

Retrospective Cohort Study

- 4331 Establishment and validation of a nomogram to predict the risk of ovarian metastasis in gastric cancer: Based on a large cohort
Li SQ, Zhang KC, Li JY, Liang WQ, Gao YH, Qiao Z, Xi HQ, Chen L

Retrospective Study

- 4342 Predictive factors for early clinical response in community-onset *Escherichia coli* urinary tract infection and effects of initial antibiotic treatment on early clinical response
Kim YJ, Lee JM, Lee JH
- 4349 Managing acute appendicitis during the COVID-19 pandemic in Jiaying, China
Zhou Y, Cen LS
- 4360 Clinical application of combined detection of SARS-CoV-2-specific antibody and nucleic acid
Meng QB, Peng JJ, Wei X, Yang JY, Li PC, Qu ZW, Xiong YF, Wu GJ, Hu ZM, Yu JC, Su W
- 4370 Prolonged prothrombin time at admission predicts poor clinical outcome in COVID-19 patients
Wang L, He WB, Yu XM, Hu DL, Jiang H

- 4380** Percutaneous radiofrequency ablation is superior to hepatic resection in patients with small hepatocellular carcinoma

Zhang YH, Su B, Sun P, Li RM, Peng XC, Cai J

- 4388** Clinical study on the surgical treatment of atypical Lisfranc joint complex injury

Li X, Jia LS, Li A, Xie X, Cui J, Li GL

- 4400** Application of medial column classification in treatment of intra-articular calcaneal fractures

Zheng G, Xia F, Yang S, Cui J

Clinical Trials Study

- 4410** Optimal hang time of enteral formula at standard room temperature and high temperature

Lakananurak N, Nalinthassanai N, Suansawang W, Panarat P

META-ANALYSIS

- 4416** Meta-analysis reveals an association between acute pancreatitis and the risk of pancreatic cancer

Liu J, Wang Y, Yu Y

SCIENTOMETRICS

- 4431** Global analysis of daily new COVID-19 cases reveals many static-phase countries including the United States potentially with unstoppable epidemic

Long C, Fu XM, Fu ZF

CASE REPORT

- 4443** Left atrial appendage aneurysm: A case report

Belov DV, Moskalev VI, Garbuzenko DV, Arefyev NO

- 4450** Twenty-year survival after iterative surgery for metastatic renal cell carcinoma: A case report and review of literature

De Raffe E, Mirarchi M, Casadei R, Ricci C, Brunocilla E, Minni F

- 4466** Primary rhabdomyosarcoma: An extremely rare and aggressive variant of male breast cancer

Satală CB, Jung I, Bara TJ, Simu P, Simu I, Vlad M, Szodorai R, Gurzu S

- 4475** Bladder stones in a closed diverticulum caused by *Schistosoma mansoni*: A case report

Alkhamees MA

- 4481** Cutaneous ciliated cyst on the anterior neck in young women: A case report

Kim YH, Lee J

- 4488** Extremely rare case of successful treatment of metastatic ovarian undifferentiated carcinoma with high-dose combination cytotoxic chemotherapy: A case report

Kim HB, Lee HJ, Hong R, Park SG

- 4494** Acute amnesia during pregnancy due to bilateral fornix infarction: A case report
Cho MJ, Shin DI, Han MK, Yum KS
- 4499** Ascaris-mimicking common bile duct stone: A case report
Choi SY, Jo HE, Lee YN, Lee JE, Lee MH, Lim S, Yi BH
- 4505** Eight-year follow-up of locally advanced lymphoepithelioma-like carcinoma at upper urinary tract: A case report
Yang CH, Weng WC, Lin YS, Huang LH, Lu CH, Hsu CY, Ou YC, Tung MC
- 4512** Spontaneous resolution of idiopathic intestinal obstruction after pneumonia: A case report
Zhang BQ, Dai XY, Ye QY, Chang L, Wang ZW, Li XQ, Li YN
- 4521** Successful pregnancy after protective hemodialysis for chronic kidney disease: A case report
Wang ML, He YD, Yang HX, Chen Q
- 4527** Rapid remission of refractory synovitis, acne, pustulosis, hyperostosis, and osteitis syndrome in response to the Janus kinase inhibitor tofacitinib: A case report
Li B, Li GW, Xue L, Chen YY
- 4535** Percutaneous fixation of neonatal humeral physeal fracture: A case report and review of the literature
Tan W, Wang FH, Yao JH, Wu WP, Li YB, Ji YL, Qian YP
- 4544** Severe fundus lesions induced by ocular jellyfish stings: A case report
Zheng XY, Cheng DJ, Lian LH, Zhang RT, Yu XY
- 4550** Application of ozonated water for treatment of gastro-thoracic fistula after comprehensive esophageal squamous cell carcinoma therapy: A case report
Wu DD, Hao KN, Chen XJ, Li XM, He XF
- 4558** Germinomas of the basal ganglia and thalamus: Four case reports
Huang ZC, Dong Q, Song EP, Chen ZJ, Zhang JH, Hou B, Lu ZQ, Qin F
- 4565** Gastrointestinal bleeding caused by jejunal angiosarcoma: A case report
Hui YY, Zhu LP, Yang B, Zhang ZY, Zhang YJ, Chen X, Wang BM
- 4572** High expression of squamous cell carcinoma antigen in poorly differentiated adenocarcinoma of the stomach: A case report
Wang L, Huang L, Xi L, Zhang SC, Zhang JX
- 4579** Therapy-related acute promyelocytic leukemia with FMS-like tyrosine kinase 3-internal tandem duplication mutation in solitary bone plasmacytoma: A case report
Hong LL, Sheng XF, Zhuang HF
- 4588** Metastasis of esophageal squamous cell carcinoma to the thyroid gland with widespread nodal involvement: A case report
Zhang X, Gu X, Li JG, Hu XJ

- 4595** Severe hyperlipemia-induced pseudoerythrocytosis - Implication for misdiagnosis and blood transfusion: A case report and literature review
Zhao XC, Ju B, Wei N, Ding J, Meng FJ, Zhao HG
- 4603** Novel brachytherapy drainage tube loaded with double 125I strands for hilar cholangiocarcinoma: A case report
Lei QY, Jiao DC, Han XW
- 4609** Resorption of upwardly displaced lumbar disk herniation after nonsurgical treatment: A case report
Wang Y, Liao SC, Dai GG, Jiang L
- 4615** Primary hepatic myelolipoma: A case report and review of the literature
Li KY, Wei AL, Li A
- 4624** Endoscopic palliative resection of a giant 26-cm esophageal tumor: A case report
Li Y, Guo LJ, Ma YC, Ye LS, Hu B
- 4633** Solitary hepatic lymphangioma mimicking liver malignancy: A case report and literature review
Long X, Zhang L, Cheng Q, Chen Q, Chen XP
- 4644** Intraosseous venous malformation of the maxilla after enucleation of a hemophilic pseudotumor: A case report
Cai X, Yu JJ, Tian H, Shan ZF, Liu XY, Jia J
- 4652** Intravesically instilled gemcitabine-induced lung injury in a patient with invasive urothelial carcinoma: A case report
Zhou XM, Wu C, Gu X
- 4660** Bochdalek hernia masquerading as severe acute pancreatitis during the third trimester of pregnancy: A case report
Zou YZ, Yang JP, Zhou XJ, Li K, Li XM, Song CH
- 4667** Localized primary gastric amyloidosis: Three case reports
Liu XM, Di LJ, Zhu JX, Wu XL, Li HP, Wu HC, Tuo BG
- 4676** Displacement of peritoneal end of a shunt tube to pleural cavity: A case report
Liu J, Guo M
- 4681** Parathyroid adenoma combined with a rib tumor as the primary disease: A case report
Han L, Zhu XF

ABOUT COVER

Peer-reviewer of *World Journal of Clinical Cases*, Prof. Adrián Ángel Inchauspe, obtained his MD in 1986 from La Plata National University (Argentina), where he remained as Professor of Surgery. Study abroad, at the Aachen and Tübingen Universities in Germany in 1991, led to his certification in laparoscopic surgery, and at the Louis Pasteur University in Strasbourg France, led to his being awarded the Argentine National Invention Award in 1998 for his graduate work in tele-surgery. He currently serves as teacher in the Argentine Acupuncture Society, as Invited Foreigner Professor at the China National Academy of Sciences and Hainan Medical University, and as editorial member and reviewer for many internationally renowned journals. (L-Editor: Filipodia)

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (*WJCC*, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The *WJCC* is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, PubMed, and PubMed Central. The 2020 Edition of Journal Citation Reports® cites the 2019 impact factor (IF) for *WJCC* as 1.013; IF without journal self cites: 0.991; Ranking: 120 among 165 journals in medicine, general and internal; and Quartile category: Q3.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Yan-Xia Xing; Production Department Director: Yun-Xiaojuan Wu; Editorial Office Director: Jin-Lai Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Semimonthly

EDITORS-IN-CHIEF

Dennis A Bloomfield, Sandro Vento, Bao-Gan Peng

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

October 6, 2020

COPYRIGHT

© 2020 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>

Retrospective Study

Percutaneous radiofrequency ablation is superior to hepatic resection in patients with small hepatocellular carcinoma

Yan-Hua Zhang, Bo Su, Pei Sun, Ru-Meng Li, Xiao-Chun Peng, Jun Cai

ORCID number: Yan-Hua Zhang 0000-0003-3468-903X; Bo Su 0000-0002-7608-0487; Pei Sun 0000-0003-1130-2277; Ru-Meng Li 0000-0003-1461-8445; Xiao-Chun Peng 0000-0001-9443-0439; Jun Cai 0000-0002-9652-0910.

Author contributions: Peng XC designed and supervised the study; Zhang YH, and Su B processed the study; Zhang YH, Peng XC, and Cai J wrote the manuscript; Zhang YH, Sun P and Li RM contributed to tables and figures; Peng XC and Cai J acquired funding; all authors read and approved the final manuscript; Peng XC and Cai J contributed to the manuscript equally as corresponding authors.

Supported by Natural Science Foundation of Hubei Province, China, No. 2017CFB786; Hubei Province Health and Family Planning Scientific Research Project, China, No. WJ2016Y10; Jingzhou Science and Technology Bureau Project, China, No. 2017-93; and the College Students Innovative Entrepreneurial Training Program in Yangtze University, China, No. 2019376.

Institutional review board statement: The study was reviewed and approved by the Ethics Committee of Health

Yan-Hua Zhang, Jun Cai, Department of Oncology, First Affiliated Hospital, Yangtze University, Jingzhou 434023, Hubei Province, China

Bo Su, Pei Sun, Ru-Meng Li, Xiao-Chun Peng, Laboratory of Oncology, Center for Molecular Medicine, School of Basic Medicine, Yangtze University, Jingzhou 434023, Hubei Province, China

Corresponding author: Jun Cai, MD, PhD, Professor, Department of Oncology, First Affiliated Hospital, Yangtze University, No. 1 Nanhuan Road, Jingzhou 434023, Hubei Province, China. 2911152289@qq.com

Abstract

BACKGROUND

It is not known whether percutaneous radiofrequency ablation (PRFA) has the same treatment efficacy and fewer complications than laparoscopic resection in patients with small centrally located hepatocellular carcinoma (HCC).

AIM

To compare the effectiveness of PRFA with classical laparoscopic resection in patients with small HCC and document the safety parameters.

METHODS

In this retrospective study, 85 patients treated with hepatic resection (HR) and 90 PRFA-treated patients were enrolled in our hospital from July 2016 to July 2019. Treatment outcomes, including major complications and survival data, were evaluated.

RESULTS

The results showed that minor differences existed in the baseline characteristics between the patients in the two groups. PRFA significantly increased cumulative recurrence-free survival (hazard ratio 1.048, 95%CI: 0.265–3.268) and overall survival (hazard ratio 0.126, 95%CI: 0.025–0.973); PRFA had a lower rate of major complications than HR (7.78% vs 20.0%, $P < 0.05$), and hospital stay was shorter in the PRFA group than in the HR group (7.8 ± 0.2 d vs 9.5 ± 0.3 d, $P < 0.001$).

CONCLUSION

Based on the data obtained, we conclude that PRFA was superior to HR and may reduce complications and hospital stay in patients with small HCC.

Science Center of Yangtze University, No. CJYXBEC2018-108.

Informed consent statement: All study participants, or their legal guardian, provided informed written consent prior to study enrollment.

Conflict-of-interest statement: No potential conflicts of interest were disclosed.

Data sharing statement: Technical appendix, statistical code, and dataset available from the corresponding author at pxcwd789@sina.com.

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Manuscript source: Unsolicited manuscript

Received: June 16, 2020

Peer-review started: June 16, 2020

First decision: July 24, 2020

Revised: July 27, 2020

Accepted: August 26, 2020

Article in press: August 26, 2020

Published online: October 6, 2020

P-Reviewer: Iannitti D, Kao JT

S-Editor: Wang DM

L-Editor: Webster JR

P-Editor: Xing YX



Key Words: Percutaneous radiofrequency ablation; Hepatic resection; Hepatocellular carcinoma; Efficacy; Safety; Cancer

©The Author(s) 2020. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: In this retrospective study, the effectiveness of percutaneous radiofrequency ablation (PRFA) with classical laparoscopic resection in patients with small hepatocellular carcinoma (HCC) was compared and the safety parameters determined. PRFA treatment reduced the incidence of complications compared with resection and significantly improved overall survival as well as recurrence-free survival. Therefore, PRFA was superior to hepatic resection and may reduce complications and mortality in patients with small HCC.

Citation: Zhang YH, Su B, Sun P, Li RM, Peng XC, Cai J. Percutaneous radiofrequency ablation is superior to hepatic resection in patients with small hepatocellular carcinoma. *World J Clin Cases* 2020; 8(19): 4380-4387

URL: <https://www.wjgnet.com/2307-8960/full/v8/i19/4380.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v8.i19.4380>

INTRODUCTION

Hepatocellular carcinoma (HCC) has a high mortality among all cancers worldwide^[1]. Most patients with HCC have decreased liver function and require treatment to completely excise the lesion and effectively mitigate further damage to the liver^[2]. Hepatic resection (HR) is recommended for patients with a single small HCC lesion up to 2 cm, which is a curative strategy and prevents recurrences. However, the operation takes a heavy toll on the patient's body. Therefore, clinicians have employed other methods including percutaneous radiofrequency ablation (PRFA), percutaneous ethanol injection, and laparoscopic radiofrequency ablation (LRFA) therapy^[3]. PRFA therapy is effective for controlling local tumours with improved survival and is the current standard for early-stage HCC requiring ablative treatments^[4-11]. Although studies have demonstrated the superiority of LRFA to PRFA for patient survival^[12], LRFA is more invasive than PRFA with higher risks of complications and requires general anaesthesia^[13]. When percutaneous ablation treatments cannot be used, HR is a suitable alternative for the treatment of small HCC^[14]. However, the most optimal treatment for patients with HCC has not been fully investigated. Thus, we aimed to compare the effectiveness and safety of PRFA with HR and investigate the recurrence, mortality, and survival rates in patients with HCC.

MATERIALS AND METHODS

Patients

We enrolled 175 patients with small HCC in our hospital from July 2016 to July 2019, of whom 85 received HR and 90 were treated with PRFA. This study was approved by the ethics committee of Yangtze University (Jingzhou, China) and all patients provided informed written consent to participate in this study.

Hepatic resection and percutaneous radiofrequency ablation treatment

For HR, patients were placed under general anaesthesia, a 1 cm sub-umbilical incision was made, and a trocar with a diameter of 1 cm was inserted to determine the location of the tumour. The hepatic ligament was then removed and labelled on the surface of the liver 2 cm adjacent to the tumour. Finally, we completely resected the entire hepatic segment or lobe^[15]. For PRFA we used computed tomography (CT) or magnetic resonance imaging (MRI) for ultrasonography guidance in real-time. We intercostally or subcostally inserted a 17-gauge cooled-tip electrode of 2-3 cm. The ablation procedures generally lasted 12 min with a 3 cm electrode and 6 min with a 2 cm electrode, and a power of 80 W-100 W was typically used. The lesions were assessed one and eight weeks after PRFA by CT or MRI. We defined complete ablation as

hypoattenuation of the target area and the surrounding liver parenchyma, which was confirmed by radiology^[12].

Follow-up

During the 2.0 ± 0.5 -year follow-up period, the patients were followed up by CT or MRI examinations every 3–4 mo in the first two years after PRFA treatment. We also measured liver function and α -fetoprotein levels. Previously published definitions and guidelines were used to define patient outcome and oncologic response^[16]. CT or MRI during the follow-up period showing any tumour growth along the ablated or resected locations were considered recurrences and were managed accordingly depending on liver function and tumour characteristics.

Statistical analysis

All data were analysed by SPSS 20.0. We compared the continuous data of the two groups using the Student's *t*-test and the categorical data were examined by the χ^2 -test. Univariate logistic regression and multivariate Cox proportional-hazards regression were used to analyse the variables that significantly affected the recurrence or survival rates. The recurrence-free and overall survival were examined by Kaplan–Meier plot. Statistical significance was set at $P < 0.05$.

RESULTS

Patient characteristics

Table 1 compares the baseline characteristics of the study participants in the HR and PRFA groups. We observed that a higher proportion of patients who received HR had liver cirrhosis and multiple tumours (C2) and exhibited higher TNM stages compared with patients who received PRFA. These data were consistent with the results of liver function tests such as decreased albumin levels. Furthermore, we also found that the PRFA group showed lower AFP levels, which is a tumour marker for HCC. Additionally, there were no differences in the distribution or location of HCC tumours between the two groups. Patients who received PRFA had a significantly lower occurrence of complications compared with the HR group, which was paired with reduced hospitalisation duration.

Hepatocellular carcinoma recurrence during follow-up

Our univariate and multivariate analyses revealed that levels of serum albumin and AFP, the number of tumours (especially C2 tumours), and hospital duration in the PRFA group significantly affected the recurrence-free survival (Table 2). Similarly, the PRFA procedure, serum albumin and AFP levels, and hospital duration predicted overall survival of patients with HCC (Table 3).

Survival analysis

PRFA significantly increased cumulative recurrence-free survival (hazard ratio 1.048, 95%CI: 0.265–3.268) and overall survival (hazard ratio 0.126, 95%CI: 0.025–0.973) compared with HR (Figure 1) and was a significant predictor of both outcomes (Figure 2).

DISCUSSION

In recent years, clinicians have aimed for effective, precise, and minimally invasive treatments for patients with HCC, and PRFA and laparoscopic surgery have gradually become the primary recommended treatments^[17]. Compared with traditional open cholecystectomy, laparoscopic surgery is advantageous due to less trauma and bleeding and shorter recovery times with comparable survival and recurrence rates^[18]. PRFA is a newly developed local treatment that relies on heat to induce necrosis of the tumour and surrounding tissues and has been demonstrated to achieve the same clinical effect as open surgery for patients with single small HCC up to 3 cm in size^[19,20]. PRFA can be easily performed and is repeatable with little damage to liver function^[21]. However, the best choice of therapy for patients with HCC requires further study.

In this study, we found that hospitalization duration was significantly shorter and complications were less frequent in the PRFA group than in the HR group, and this

Table 1 Baseline characteristics of the study participants, *n* (%)

	HR (<i>n</i> = 85)	PRFA (<i>n</i> = 90)	<i>P</i> value
Gender (M/F)	47 (55.3)/38 (44.7)	52 (57.8)/38 (42.2)	0.740
Age (yr)	63.5 ± 7.6	62.8 ± 8.5	0.414
Cirrhosis aetiology			0.915
HCV	58 (68.2)	59 (65.6)	
HBV	12 (14.1)	13 (14.4)	
Other	15 (17.7)	18 (20)	
Platelet count (10 ³ /mm ³)	125 ± 58	118 ± 62	0.442
Total bilirubin (mg/dL)	1.05 ± 0.49	1.08 ± 0.51	0.692
PT (INR)	1.13 ± 0.06	1.14 ± 0.18	0.627
Albumin (g/dL)	3.87 ± 0.32	4.02 ± 0.40	0.007
AFP (ng/dL)	82.68 ± 7.85	80.24 ± 7.24	0.034
Tumour size (cm)	1.82 ± 0.24	1.76 ± 0.32	0.164
Number of tumours			0.012
1	63 (74.1)	82 (91.2)	
2	12 (14.1)	4 (4.4)	
≥ 3	10 (11.8)	4 (4.4)	
TNM stage			< 0.001
I	61 (71.8)	84 (93.3)	
II	24 (28.2)	6 (6.7)	
Subcapsular tumour	35 (41.2)	48 (53.3)	0.107
Complications	17 (20)	7 (7.8)	0.033
Postoperative haemorrhage	4 (4.71)	1 (1.11)	0.331
Bile leak	2 (2.35)	1 (1.11)	0.960
Subphrenic collection/abscess	3 (3.53)	1 (1.11)	0.573
Infected ascites	4 (4.71)	2 (2.22)	0.626
Liver failure	1 (1.18)	0 (0)	0.977
Pleural effusion	3 (3.53)	2 (2.22)	0.948
Hospital mortality	0	0	-
Days of hospital stay during initial therapy	9.5 ± 0.3	7.8 ± 0.2	< 0.001

HR: Hepatic resection; PRFA: Percutaneous radiofrequency ablation; HCV: Hepatitis C virus; HBV: Hepatitis B virus; PT: Prothrombin time; INR: International standardised ratio; AFP: Alpha fetoprotein.

was consistent with the results of other studies^[22,23]. Also there were higher recurrence rates in patients treated by HR compared with PRFA. This could be due to the higher TNM stages of HCC tumours in patients treated with HR. Furthermore, these patients were more likely to have multiple tumours. PRFA did not significantly affect recurrence-free survival and was consistent with a previous study, although it did improve overall survival^[24]. However, PRFA may reduce HCC recurrence, which would lead to reduced patient mortality. Our data indicated that PRFA was a contributing and prognostic factor for improving overall survival, liver function, and tumour characteristics. Furthermore, local progression of HCC, intra-segmental recurrences, and recurrences less than 12 mo after treatment were more frequent after HR, which was not attributable to a selection bias. Studies have reported that HCC lesions less than 2 cm in diameter may harbour highly proliferative tumour cells, thus it is critical to locate micro invasions or microsatellites.

In conclusion, PRFA was superior to HR for the survival of small HCC patients,

Table 2 Univariate logistic regression and multivariate Cox proportional-hazards regression for recurrence-free survival of patients with hepatocellular carcinoma who received hepatic resection or percutaneous radiofrequency ablation

Variables	Univariate logistic regression	Cox proportional-hazards regression	
	<i>P</i> value	Hazard ratio (95%CI)	<i>P</i> value
Albumin (g/dL)	0.018	0.325 (0.109–0.875)	0.020
AFP: normal <i>vs</i> abnormal	0.037	1.658 (1.135–3.258)	0.023
Number of tumours			
1		1.000	0.023
2		5.784 (1.387–20.268)	0.015
3		7.458 (0.896–87.257)	0.056
TNM stage	< 0.001		
I			
II			
Days of hospital stay during initial therapy	0.028	1.058 (1.005–1.224)	0.027
HR <i>vs</i> PRFA	0.043	1.045 (0.325–2.838)	0.039

AFP: Alpha fetoprotein; TNM: Tumor Node Metastasis; HR: hepatic resection; PRFA: Percutaneous radiofrequency ablation.

Table 3 Univariate logistic regression and multivariate Cox proportional-hazards regression for the overall survival of patients with hepatocellular carcinoma who received hepatic resection or percutaneous radiofrequency ablation

Variables	Univariate logistic regression	Cox proportional-hazards regression	
	<i>P</i> value	Hazard ratio (95%CI)	<i>P</i> value
Albumin (g/dL)	< 0.001	0.058 (0.008 – 0.425)	0.003
AFP: normal <i>vs</i> abnormal	0.0346	1.647 (1.057 – 3.269)	0.018
Days of hospital stay during initial therapy	0.013	1.325 (1.057 – 1.523)	0.006
HR <i>vs</i> PRFA	0.026	0.114 (0.015 – 0.846)	0.035

AFP: Alpha fetoprotein; HR: Hepatic resection; PRFA: Percutaneous radiofrequency ablation.

especially those with peripheral tumours. In addition, it safeguarded liver function and reduced the complication and recurrence rates compared with HR. Therefore, we recommend PRFA as the standard treatment for patients with HCC.

CONCLUSION

Based on the data obtained, we conclude that PRFA was superior to hepatic resection and may reduce complications and hospital stay in patients with small HCC. Therefore, increased clinical application of PRFA will prove PRFA as the standard treatment for patients with small HCC.

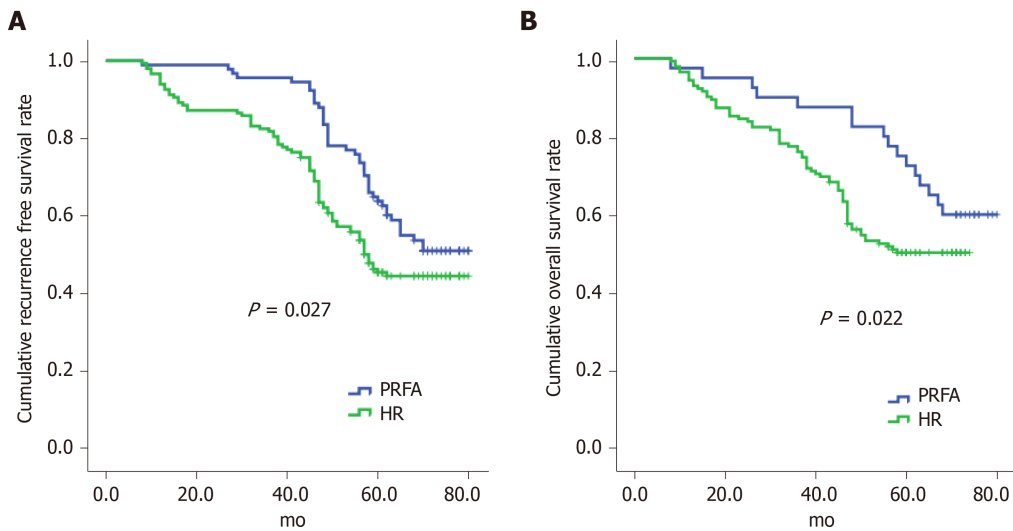


Figure 1 Comparison of cumulative recurrence-free survival and overall survival of patients with hepatocellular carcinoma treated with hepatic resection or percutaneous radiofrequency ablation. A: Cumulative recurrence-free survival; B: overall survival of patients. PRFA: Percutaneous radiofrequency ablation; HR: Hepatic resection.

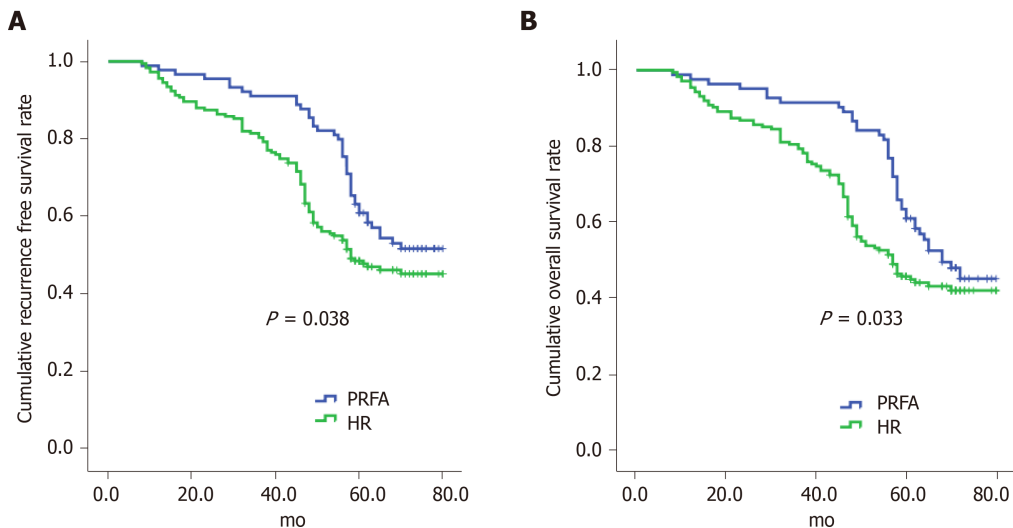


Figure 2 Kaplan-Meier curves of cumulative recurrence-free survival and overall survival of patients with hepatocellular carcinoma treated with hepatic resection or percutaneous radiofrequency ablation. A: Cumulative recurrence-free survival; B: Overall survival of patients. PRFA: Percutaneous radiofrequency ablation; HR: Hepatic resection.

ARTICLE HIGHLIGHTS

Research background

It is not known whether percutaneous radiofrequency ablation (PRFA) has the same treatment efficacy and fewer complications than laparoscopic resection in patients with small centrally located hepatocellular carcinoma (HCC).

Research motivation

This retrospective study aimed to compare the effectiveness of PRFA with classical laparoscopic resection in patients with small HCC and document the safety parameters, to provide an experimental basis for the clinical treatment of small HCC.

Research objectives

To determine whether PRFA has the same effect as surgical resection with fewer complications in patients with small HCC, in order to provide more specific options for HCC treatment.

Research methods

In this retrospective study, 85 patients treated with hepatic resection and 90 PRFA-treated patients were enrolled in our hospital from July 2016 to July 2019. Treatment outcomes, including major complications and survival data, were determined.

Research results

The results showed that minor differences existed in the baseline characteristics between the patients in the two groups. PRFA significantly increased cumulative recurrence-free survival (hazard ratio 1.048, 95%CI: 0.265–3.268) and overall survival (hazard ratio 0.126, 95%CI: 0.025–0.973); PRFA had a lower rate of major complications than HR (7.78 *vs* 20.0%, *P* < 0.05), and the hospital stay was also shorter in the PRFA group than in the HR group (7.8 ± 0.2 d *vs* 9.5 ± 0.3 d, *P* < 0.001).

Research conclusions

Based on the data obtained, we conclude that PRFA was superior to hepatic resection and may reduce complications and hospital stay in patients with small HCC.

Research perspectives

The clinical application of PRFA should be increased to prove PRFA as the standard treatment for patients with small HCC.

REFERENCES

- 1 **Zhang J**, Qi YP, Ma N, Lu F, Gong WF, Chen B, Ma L, Zhong JH, Xiang BD, Li LQ. Overexpression of Epcam and CD133 Correlates with Poor Prognosis in Dual-phenotype Hepatocellular Carcinoma. *J Cancer* 2020; **11**: 3400-3406 [PMID: 32231746 DOI: 10.7150/jca.41090]
- 2 **Kulik L**, El-Serag HB. Epidemiology and Management of Hepatocellular Carcinoma. *Gastroenterology* 2019; **156**: 477-491.e1 [PMID: 30367835 DOI: 10.1053/j.gastro.2018.08.065]
- 3 **Xia Y**, Li J, Liu G, Wang K, Qian G, Lu Z, Yang T, Yan Z, Lei Z, Si A, Wan X, Zhang H, Gao C, Cheng Z, Pawlik TM, Wang H, Lau WY, Wu M, Shen F. Long-term Effects of Repeat Hepatectomy vs Percutaneous Radiofrequency Ablation Among Patients With Recurrent Hepatocellular Carcinoma: A Randomized Clinical Trial. *JAMA Oncol* 2019 [PMID: 31774468 DOI: 10.1001/jamaoncol.2019.4477]
- 4 **Nishikawa H**, Kimura T, Kita R, Osaki Y. Radiofrequency ablation for hepatocellular carcinoma. *Int J Hyperthermia* 2013; **29**: 558-568 [PMID: 23937321 DOI: 10.3109/02656736.2013.821528]
- 5 **Donadon M**, Solbiati L, Dawson L, Barry A, Sapisochin G, Greig PD, Shiina S, Fontana A, Torzilli G. Hepatocellular Carcinoma: The Role of Interventional Oncology. *Liver Cancer* 2016; **6**: 34-43 [PMID: 27995086 DOI: 10.1159/000449346]
- 6 **Toshikuni N**, Tsutsumi M, Takuma Y, Arisawa T. Real-time image fusion for successful percutaneous radiofrequency ablation of hepatocellular carcinoma. *J Ultrasound Med* 2014; **33**: 2005-2010 [PMID: 25336489 DOI: 10.7863/ultra.33.11.2005]
- 7 **Izumi N**. Recent advances of radiofrequency ablation for early hepatocellular carcinoma. *J Gastroenterol Hepatol* 2011; **26** Suppl 1: 115-122 [PMID: 21199522 DOI: 10.1111/j.1440-1746.2010.06543.x]
- 8 **Facciorusso A**, Serviddio G, Muscatiello N. Local ablative treatments for hepatocellular carcinoma: An updated review. *World J Gastrointest Pharmacol Ther* 2016; **7**: 477-489 [PMID: 27867681 DOI: 10.4292/wjgpt.v7.i4.477]
- 9 **Shiina S**, Tateishi R, Arano T, Uchino K, Enooku K, Nakagawa H, Asaoka Y, Sato T, Masuzaki R, Kondo Y, Goto T, Yoshida H, Omata M, Koike K. Radiofrequency ablation for hepatocellular carcinoma: 10-year outcome and prognostic factors. *Am J Gastroenterol* 2012; **107**: 569-77; quiz 578 [PMID: 22158026 DOI: 10.1038/ajg.2011.425]
- 10 **Osaki Y**, Nishikawa H. Treatment for hepatocellular carcinoma in Japan over the last three decades: Our experience and published work review. *Hepatol Res* 2015; **45**: 59-74 [PMID: 24965914 DOI: 10.1111/hepr.12378]
- 11 **Moreno-Luna LE**, Yang JD, Sanchez W, Paz-Fumagalli R, Harnois DM, Mettler TA, Gansen DN, de Groen PC, Lazaridis KN, Narayanan Menon KV, Larusso NF, Alberts SR, Gores GJ, Fleming CJ, Slettedahl SW, Harmsen WS, Therneau TM, Wiseman GA, Andrews JC, Roberts LR. Efficacy and safety of transarterial radioembolization versus chemoembolization in patients with hepatocellular carcinoma. *Cardiovasc Intervent Radiol* 2013; **36**: 714-723 [PMID: 23093355 DOI: 10.1007/s00270-012-0481-2]
- 12 **Eun HS**, Lee BS, Kwon IS, Yun GY, Lee ES, Joo JS, Sung JK, Moon HS, Kang SH, Kim JS, Shin HJ, Kim TK, Chun K, Kim SH. Advantages of Laparoscopic Radiofrequency Ablation Over Percutaneous Radiofrequency Ablation in Hepatocellular Carcinoma. *Dig Dis Sci* 2017; **62**: 2586-2600 [PMID: 28744835 DOI: 10.1007/s10620-017-4688-6]
- 13 **Takahashi H**, Akyuz M, Aksoy E, Karabulut K, Berber E. Local recurrence after laparoscopic radiofrequency ablation of malignant liver tumors: Results of a contemporary series. *J Surg Oncol* 2017; **115**: 830-834 [PMID: 28320045 DOI: 10.1002/jso.24599]
- 14 **Santambrogio R**, Bruno S, Kluger MD, Costa M, Salceda J, Belli A, Laurent A, Barabino M, Opocher E, Azoulay D, Cherqui D. Laparoscopic ablation therapies or hepatic resection in cirrhotic patients with small hepatocellular carcinoma. *Dig Liver Dis* 2016; **48**: 189-196 [PMID: 26675381 DOI: 10.1016/j.dld.2015.11.010]
- 15 **Molina V**, Sampson-Dávila J, Ferrer J, Fondevila C, Díaz Del Gobbo R, Calatayud D, Bruix J, García-

- Valdecasas JC, Fuster J. Benefits of laparoscopic liver resection in patients with hepatocellular carcinoma and portal hypertension: a case-matched study. *Surg Endosc* 2018; **32**: 2345-2354 [PMID: [29218665](#) DOI: [10.1007/s00464-017-5930-1](#)]
- 16 **Guo WX**, Sun JX, Cheng YQ, Shi J, Li N, Xue J, Wu MC, Chen Y, Cheng SQ. Percutaneous radiofrequency ablation versus partial hepatectomy for small centrally located hepatocellular carcinoma. *World J Surg* 2013; **37**: 602-607 [PMID: [23212793](#) DOI: [10.1007/s00268-012-1870-z](#)]
 - 17 **Lai C**, Jin RA, Liang X, Cai XJ. Comparison of laparoscopic hepatectomy, percutaneous radiofrequency ablation and open hepatectomy in the treatment of small hepatocellular carcinoma. *J Zhejiang Univ Sci B* 2016; **17**: 236-246 [PMID: [26984844](#) DOI: [10.1631/jzus.B1500322](#)]
 - 18 **Chen J**, Li H, Liu F, Li B, Wei Y. Surgical outcomes of laparoscopic versus open liver resection for hepatocellular carcinoma for various resection extent. *Medicine (Baltimore)* 2017; **96**: e6460 [PMID: [28328863](#) DOI: [10.1097/MD.00000000000006460](#)]
 - 19 **Choi EJ**, Choi YM, Kim HJ, Ok HG, Chang EJ, Kim HY, Yoon JU, Kim KH, Byeon GJ. The Effects of Thoracic Epidural Analgesia during Percutaneous Radiofrequency Ablation for Hepatocellular Carcinoma. *Pain Res Manag* 2018; **2018**: 4354912 [PMID: [30581515](#) DOI: [10.1155/2018/4354912](#)]
 - 20 **Kim HY**, Park JW. Clinical trials of combined molecular targeted therapy and locoregional therapy in hepatocellular carcinoma: past, present, and future. *Liver Cancer* 2014; **3**: 9-17 [PMID: [24804173](#) DOI: [10.1159/000343854](#)]
 - 21 **Jeong Y**, Yoon SM, Han S, Shim JH, Kim KM, Lim YS, Lee HC, Kim SY, Park JH, Lee SW, Ahn SD, Choi EK, Kim JH. Propensity Score Matching Analysis of Changes in Alpha-Fetoprotein Levels after Combined Radiotherapy and Transarterial Chemoembolization for Hepatocellular Carcinoma with Portal Vein Tumor Thrombus. *PLoS One* 2015; **10**: e0135298 [PMID: [26252472](#) DOI: [10.1371/journal.pone.0135298](#)]
 - 22 **Xu XL**, Liu XD, Liang M, Luo BM. Radiofrequency Ablation versus Hepatic Resection for Small Hepatocellular Carcinoma: Systematic Review of Randomized Controlled Trials with Meta-Analysis and Trial Sequential Analysis. *Radiology* 2018; **287**: 461-472 [PMID: [29135366](#) DOI: [10.1148/radiol.2017162756](#)]
 - 23 **Feng K**, Yan J, Li X, Xia F, Ma K, Wang S, Bie P, Dong J. A randomized controlled trial of radiofrequency ablation and surgical resection in the treatment of small hepatocellular carcinoma. *J Hepatol* 2012; **57**: 794-802 [PMID: [22634125](#) DOI: [10.1016/j.jhep.2012.05.007](#)]
 - 24 **Nishikawa H**, Inuzuka T, Takeda H, Nakajima J, Matsuda F, Sakamoto A, Henmi S, Hatamaru K, Ishikawa T, Saito S, Nasu A, Kita R, Kimura T, Arimoto A, Osaki Y. Comparison of percutaneous radiofrequency thermal ablation and surgical resection for small hepatocellular carcinoma. *BMC Gastroenterol* 2011; **11**: 143 [PMID: [22204311](#) DOI: [10.1186/1471-230X-11-143](#)]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

