The Egyptian Journal of Radiology and Nuclear Medicine xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

The Egyptian Journal of Radiology and Nuclear Medicine

journal homepage: www.sciencedirect.com/locate/ejrnm

Original Article

Therapeutic response and risks of radio-frequency in treatment of hepatocellular carcinoma in patients with portal hypertension

Medhat Ibraheem Mohammad Ahmad

Department of Radiology, Sohag University Hospital, Sohag, Egypt

ARTICLE INFO

Article history:
Received 24 March 2017
Accepted 13 July 2017
Available online xxxx

Keywords:
Radiofrequency ablation
Hepatocellular carcinoma
Portal hypertension

ABSTRACT

Objective: To investigate the therapeutic response of radiofrequency ablation for treatment of hepatocellular carcinoma and the consequence of portal hypertension on the survival final results.
Patients & methods: 168 patients with portal hypertension undergo radiofrequency ablation in the act of treatment of HCC (≤5 cm). Therapeutic response and prognostic outcomes were then analyzed. Overall survival was assessed using Kaplan-Meier method and multivariate analysis was achieved using the Cox regression model.
Results: Primary and secondary complete ablation of HCC was obtained in 86.3% & 100% of patients respectively. Complication occurred in 13.6% of patients, and thrombocytopenia and prolonged prothrombin time were independent risk factors of complication. Overall survival after the follow-up period of about 25 months was 74.4%. Two elements based on multivariate analysis had been recognized as prognostic factors for poor survival: Thrombocytopenia (HR = 1.008, P = .004), and left lobe location of the tumor (HR = 0.392, P ≤ .03).
Conclusion: This current study has shown that most cirrhotic patients with portal hypertension can tolerate RF ablation of HCC. The improved patient selection in terms of simple parameters such as platelet count, and prothrombin concentration, we will improve the outcome of RF ablation.

1. Introduction

The dismal association of cirrhosis and hepatocellular carcinoma (HCC) gives interventional radiologists a problematic challenge because treatment options for HCC are usually restricted by the poor liver status in these patients. Portal hypertension is a natural progression of cirrhosis, when meeting with HCC in one patient, they have an important impact on management and prognosis [1]. The position of portal hypertension with surgical resection of HCC is controversial because of a high operative risk and poor prognosis. Associated abnormal liver function reserve may have a higher chance of postoperative complications including bleeding, infection, intractable ascites, liver failure and mortality [2].

Radiofrequency (RF) ablation treatment is less invasive and less normal liver tissue is sacrificed during the treatment process. Its efficacy in local control of small HCC is currently well established [3,4], as well as its good tolerance and low morbidity and mortality [5]. The majority of studies seem to show that RF ablation of HCC in cirrhotic patients increases survival, despite excess mortality due to cirrhosis.

The usual tolerance of RF ablation also makes it possible to treat HCC with portal hypertension in cirrhotic patients, as this group of patients could be expected to develop liver failure in the years to come due to the increase in the degree of fibrosis [6]. The intention of the study is to document the sequels of RF ablation of HCC in patients with liver cirrhosis and portal hypertension to determine the risk factors of treatment in this group of patients.

2. Patients and methods

2.1. Patients and selection criteria

We planned to investigate the therapeutic response and risks of RF ablation in patients with HCC and concomitant Portal hypertension. A retrospective analysis was carried out on medical records of patients diagnosed with HCC who had been included in prospective databases at our center. Between January 2012 and December 2016, 168 consecutively enrolled patients with solitary HCC who underwent RF ablation at our center. The diameter of HCC was

Peer review under responsibility of The Egyptian Society of Radiology and Nuclear Medicine.
E-mail address: mandw20022002@hotmail.com

https://doi.org/10.1016/j.ejrnm.2017.07.007
0378-603X/

≤5 cm, and all patients had been diagnosed with portal hypertension, based on [1] splenomegaly in association with thrombocytopenia (platelet count < 100,000/μL, or [2] esophageal varices detectable at endoscopy. Esophago-gastric endoscopic examination was not performed routinely in our series. Esophageal varices was diagnosed in 121 patients with significant upper gastrointestinal bleeding. Splenomegaly was based on the long axis of the spleen >10 cm on computed tomography [7]. According to the guidelines of our center, RF ablation was selected for patients with Child-Pugh class A, and who had a well-preserved liver functions. Written knowledgeable consent became acquired from all patients for RF ablation treatment. Treatment decision was adopted after taking the advice of our regional HCC-dedicated multidisciplinary meeting (MDT).

2.2. Diagnosis and staging of HCC

Contrast-enhanced triphasic CT and US were performed for planning before the RF ablation session in all patients. The diagnosis of HCC was assigned by using the noninvasive criteria defined by the American Association for the Study of Liver Disease recommendations, which consisted of arterial hyper enhancement with washout seen on portal or delayed-phase images [8].

2.3. RF ablation techniques

RF ablation was performed on an inpatient basis. All RF ablation procedures were conducted percutaneously under general anesthesia and ultrasound guidance, the same as described in previous studies [9].

RF ablation was performed using RITA (RITA Medical Systems, AngioDynamics) system powered by 200 W generator. A 15-gauge multitined expandable electrode which could be deployed up to 5 cm was used in all procedures.

RF Ablation procedures were carried out by one operator (M.I), and based on tumor size, shape, and location.

To perform ablation, two grounding pads are applied to the thighs of the patient. The tip of the needle is advanced with the prongs retracted, to the desired location, and then the prongs are partially deployed. Full deployment of the prongs is performed when the target temperature (usually 105 °C) is achieved. The ablation is carried out to at least 10 min for smaller HCC and >20 min for tumors >5 cm in diameter. After complete ablation, the needle tract is ablated with a tract ablation program while removing the needle.

The aim was to obtain complete ablation of HCC with at least 0.5 cm safety margin around the tumor; multiple overlapping ablation techniques were used whenever necessary according to the volume of the tumor and to the spread of hyperechogenic area induced by RF energy deposition during the procedure.

2.4. Post procedural follow-up

The length of hospital stay after each RF ablation procedure did not exceed 24 h to notice any kind of complications using all means available diagnostic methods, if indicated.

The response to RF ablation was determined as incomplete or complete ablation based on triphasic CT examinations performed one month after each ablation procedure. Complete ablation; indicated by the absence of enhancing tissue at the tumor site; and incomplete ablation when enhancing tissue was still observed at the tumor site.

Patients with a complete ablated HCC were subjected to follow-up program using ultrasound and tri-phasic CT examinations every 3 months.

Table 1
Baseline characteristics of study population (168 patients).

Characteristics	Data
Age (year)	
<70	103 ± 10.6
≥70	65 ± 11.5
Sex	
Female	43 (25.6%)
Male	125 (74.4%)
Etiology of cirrhosis	
HBV	65(38.7%)
HCV	81 (48.2%)
Mixed (B/C)	22 (13.1%)
Lesion lobe	
Left lobe	40 (23.8%)
Right lobe	128 (76.2%)
Lesion sub capsular	
No	164 (97.6)
Yes	4 (2.4%)
Platelet (10^9/L)	
Mean ± SD	(74.1 ± 65)
Median (Rang)	76 (37–99)
Prothrombin activity (%)	
Mean ± SD	73.1 ± 15.5
Median (Rang)	73 (7–100)
Albumin (g/L)	
Mean ± SD	39.5 ± 7.8
Median (Rang)	40 (3–54)
Bilirubin (mg/dL)	
Mean ± SD	16.5 ± 11.3
Median (Rang)	12 (3–52)
Alfa fetoprotein (ng/mL)	
Mean ± SD	37.3 ± 64.8
Median (Rang)	7 (1–250)
Lesion size (mm)	
Mean ± SD	26.9 ± 9.6
Median (Rang)	25 (10–50)
Esophageal varices	
With	121 (72%)
Without	47 (28%)

In the case of residual tumoral tissue detectable on CT scan 1 month after the procedure, an additional RF ablation was attempted with the same RF devices if the patient still met the inclusion criteria required for the first procedure.

If residual viable tumor persisted after the second RF ablation procedure, it was considered treatment failure. For these patients, other possible treatment options were considered, such as hepatic resection, liver transplantation, and Trans-arterial chemoembolization (TACE).

For tumors considered completely ablated on CT examination performed 1 month after the last RF ablation procedure, local tumor progression was defined by the appearance of a nodular or irregular ring of enhancement in contact with the ablation zone. Distant intrahepatic tumor progression was defined as the emergence of one or multiple tumor(s) not adjacent to the ablation zone.

Overall survival was defined as the interval between the last RF ablation treatment and the death or the date of the most recent follow-up visit.

2.5. Statistical analysis

Statistical analysis were operated using the statistical software package SPSS for Windows, version 16 (SPSS Inc., Chicago, IL, USA). Patients and tumors characteristics were expressed as categorical and continuous variables. Categorical variables were given as frequencies and proportions and compared with chi-square test. Con-