

## Efficacy of Percutaneous Microwave Ablation in Exophytic Hepatocellular Carcinoma

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### Abstract:

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**Background:** Exophytic hepatocellular carcinoma (HCC) need a multidisciplinary approach management tailored to individual patient for a better outcome. Microwave ablation is one of the commonly used ablative modality to treat HCCs. **Objective:** The aim of this study was to evaluate the efficacy of percutaneous microwave ablation (MWA) for exophytic HCC. **Methods:** A prospective study was conducted on 40 cases with exophytic HCC. Microwave ablation was performed percutaneously for all patients with followed up. **Results:** 80 % of cases showed complete ablation while 20 % of cases have incomplete ablation. Only 18.8 % of cases showed recurrence, while no recurrence in 81.2 % of cases. The complications of MWA were reported by 15 % of cases and were minor complications. There was significant decrease in alpha fetoprotein (AFP) after MWA. **Conclusion:** This study showed that microwave ablation can be safely performed for exophytic HCCs with effective and satisfactory outcomes.

**Keywords:** Percutaneous microwave ablation, Exophytic hepatocellular carcinoma, Alpha fetoprotein.

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## Introduction

Hepatocellular carcinoma (HCC) is the commonest primary cancer of the liver <sup>(1)</sup>. Incidence is increasing and HCC has risen to become the 5th commonest malignancy worldwide and the 3<sup>rd</sup> leading cause of cancer related death, exceeded only by cancers of the lung and stomach <sup>(2)</sup>. Exophytic HCC is an extra-hepatic mass which predominantly lies outside the margins of liver but originates from within the liver and simulates other types of primary tumor <sup>(3)</sup>. Not only are exophytic liver tumors very rare, but their diagnosis presents a challenge due to the uncertainty of the tumor origin <sup>(4)</sup>. Considering treatment of exophytic HCC, many studies were conducted primarily on radiofrequency ablation (RFA) <sup>(5)</sup>. The individual analysis for microwave ablation (MWA), however, was still with little performance <sup>(6)</sup>. The aim of this study was to evaluate the efficacy of percutaneous microwave ablation (MWA) for exophytic HCC.

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## Patients and Methods

A prospective study was done in Kafr El Sheikh Liver Research Center. This study was conducted on 40 cases with exophytic hepatocellular carcinoma. Exophytic tumor, with a portion of tumor exceeding the margin of liver and extruding to the abdominal cavity, is surrounded by insufficient normal liver parenchyma, putting it at the risk of rupture when treated with thermal ablation. Therefore, we investigate the complications and prognosis of the microwave ablation of exophytic tumors. The study was performed after approval from research ethical committee in Benha faculty of medicine. Prior to their enrollment in the study, all patients provided appropriate written informed consent for their participation, data publication, and photo usage for publication.

Hepatocellular carcinoma was diagnosed using contrast-enhancing CT/MR imaging and elevated alpha-fetoprotein <sup>(7)</sup>.

Exophytic hepatocellular carcinoma was prescribed by US showing hypoechoic lesion exceeding hepatic capsule <sup>(8)</sup>.

### Inclusion Criteria:

Patients diagnosed with hepatocellular carcinoma without previous treatment (naïve), having one or more exophytic tumors as described before. Also, patients with liver function corresponding to Child-Pugh Class A (5 or 6 point) or B (7 point) were included.

### Exclusion criteria:

Decompensated hepatic patients (Child-Pugh Class C), end stage kidney or critical heart disease, obstructive jaundice either related or non-related to the targeted lesion, HCC with portal vein thrombosis, or extra-hepatic metastases were excluded.

### Methodology:

All patients underwent liver function testing including: bilirubin, albumin, alanine aminotransferase, and aspartate aminotransferase. Prothrombin time and international Neutralization Ratio (INR) were evaluated for all patients. Serum alpha-fetoprotein (AFP) was evaluated. All patients underwent abdominal ultrasonography, and triphasic computed tomography (CT).

Microwave ablation was performed percutaneously under real-time ultrasound guidance using a GE LOGIQ 5 Pro US scanner (USA) with a 3.5–5 MHz probe. Ablation procedure was performed under general anesthesia with propofol (Diprivan). Microwave ablation was performed using as HS AMICA microwave delivery system (HS Hospital service S.P.A Roma, Italy). The aim of treatment was to completely destroy tumors, as well as the surrounding 0.5–1.0 cm normal appearing liver tissue (safety margins). Percutaneous ethanol was used to ablate the HCC margins as the tumor was seen protruding toward any organ lumen. Risk of complication increases when HCC is exophytic. Ethanol in such cases acts both as coolant as well produces chemical ablation of HCC margins, thereby producing synergistic necrotizing

effects with larger ablation volumes than those achieved by MWA alone <sup>(9)</sup>. Hydrodissection and balloon interposition can also be used to prevent thermal injury to adjacent organs by its insulation and convection effects secondary to increased distance and fluid interposition between the ablation zone and surrounding organ <sup>(10)</sup>. All patients in this study with exophytic hepatocellular carcinomas, either there was fat surrounding the shrunken liver preventing any direct injury to the adjoining organ(s) or we off-centered the needle position to reduce any risk of injury. For avoiding complications, positioning needle as parallel to the vessels as possible, use of ultrasound guidance for real-time placement of needle for avoiding any vital structure. Contrast-enhanced triphasic CT imaging was performed at 1 month after ablation. If irregular peripheral enhancement occurred, which represents residual unablated tumor, this sign indicates incomplete ablation. If complete ablation is achieved, routine triphasic CT and serum tumor marker were repeated every 3 months <sup>(11)</sup>. Complete ablation is defined as absent enhancement in tumor observed in contrast enhanced CT. If residual tumor is found, an additional microwave ablation procedure was performed after 1 month and then followed again by Triphasic CT <sup>(12)</sup>.

**Follow up:** All patients were assessed by clinical examination and imaging with Triphasic CT after 1- and 3-month interval to assess: recurrence, morbidity (including pain, jaundice, or ascites), and mortality. Also, we evaluate the possible complications of microwave ablation including infection, bleeding, pain, fever, or right-side pleural effusion.

**Statistical analysis:** The SPSS (Statistical Package for Social Sciences) version 15 (IBM SPSS Inc., Chicago, IL, USA) was used to code, process, and analyze the data that were gathered. Frequencies and relative percentages were used to display qualitative data. Difference between qualitative variables was calculated using chi square test ( $\chi^2$ ) and Fisher exact. Standard deviation (SD) or mean  $\pm$  SD was used to express quantitative data. For parametric data, the independent samples t-test was employed. Statistical significance was considered if P value < 0.05.

## Results

The age of cases ranged from 34 to 68 years old with mean  $\pm$  SD of  $52.6 \pm 9.02$  years old. There was 62.5 % male while only 37.5 % were female. In our study, all cases were subjected to liver function test and complete blood count analysis. The results showed that the mean  $\pm$  SD of SGOT was  $32.9 \pm 12.7$ , SGPT was  $35.3 \pm 13.01$ , Hb was  $10.75 \pm 1.23$ , INR was  $1.8 \pm 2.45$ , Total bilirubin was  $0.69 \pm 0.29$ , and albumin was  $4.11 \pm 0.16$  (Table 1). Regarding the size of focal lesions, there were 55 % of focal lesions were less than 3 mm while 45 % of focal lesions were ranged in size between 3 to 5 mm. Focal lesion was presented in the right lobe of liver in 70 % of cases while the focal lesion was presented in the left lobe of liver in 30 % of cases indicating that right lobe is the most affected by HCC (Table 2). The numbers of sessions were evaluated: 80 % of cases needed only one session, 7.5 % of cases needed two sessions, 7.5 % of cases needed three sessions, and 5 % of cases needed four sessions (Table 3).

**Table 1:** Laboratory findings of the studied cases

Laboratory investigations	Mean $\pm$ SD
SGOT (U/L)	$32.9 \pm 12.7$
SGPT (U/L)	$35.3 \pm 13.01$
Hb (g %)	$10.75 \pm 1.23$
INR (ratio)	$1.8 \pm 2.45$
Total bilirubin (mg/dl)	$0.69 \pm 0.29$

Albumin (g/dl)	4.11 ± 0.16
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**Table 2:** Size and site of focal lesion by CT

Size of tumor	Number	Percentage %
< 3mm	22	55
3 – 5 mm	18	45
Site of tumor		
Right lobe	<b>28</b>	70
Left lobe	12	30

**Table 3:** Number of MWA sessions in the studied cases with HCC

Number of sessions	Number	Percentage %
Once	32	80
Twice	3	7.5
Three sessions	3	7.5
Four sessions	2	5

The outcome was determined by CT performed 1 month after percutaneous MWA. The results revealed that 80 % of cases showed complete ablation while 20 % of cases have incomplete ablation and therefore there needed another session (Table 4). The complications of MWA included infection, bleeding, pain, fever, and rt side pleural effusion in 15 % of cases. In contrast, 85 % of cases showed

no complications of MWA (Figure 1). It was found that there was significant decrease in AFP after 3 months of ablation with p value < 0.0001. The outcome of MWA was assessed also by determining recurrence rate after MWA. Only 18.8 % of cases showed recurrence while no recurrence in 81.2 % of cases (Table 5). The survival rate in our study was 95 % and only 2 cases died (Table 6).

**Table 4:** Results of MWA in treatment of studied cases

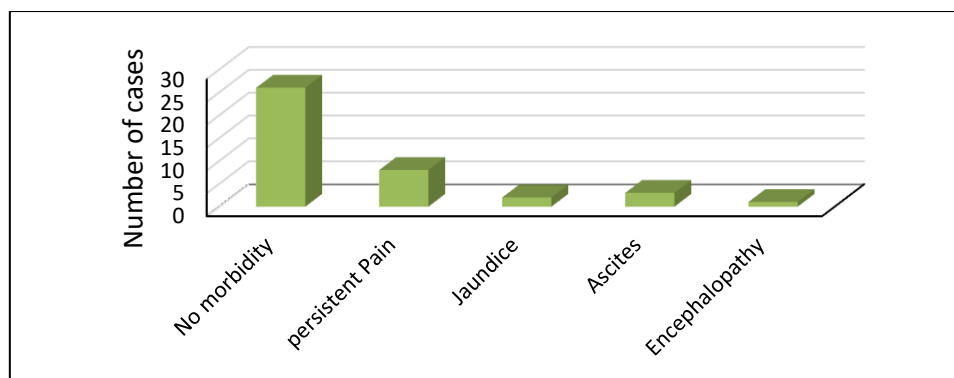
Results	Number	Percentage %
Complete ablation	32	80
Incomplete ablation	8	20

**Table 5:** Recurrence rate after 3 months

Recurrence	Number	Percentage %
No recurrence	31	77.5
Presence of recurrence	9	22.5

**Table 6:** Survival rate after 3 months

Mortality	Number	Percentage %
No mortality	38	95
Mortality	2	5



**Figure 1:** Complications of MWA

## Discussion

Exophytic HCC is an extra-hepatic mass which predominantly lies outside the margins of liver but originates from within the liver<sup>(13)</sup>. Previous studies showed that thermal ablation of subcapsular tumors can induce serious complications, such as hemorrhage, seeding, local recurrence and thermal damage of peripheral viscera<sup>(14,15)</sup>. A few studies suggested comparable efficacies of thermal ablation between exophytic and non-exophytic tumors and low rates of serious complications in both cases<sup>(16, 17)</sup>.

In this study, exophytic HCC is noticed to be common among male. This was in line with

low Moteleub et al.,<sup>(18)</sup> who reported that there was a male predominance in their studied sample: 19/25 (76.0%) were male. The sex disparity appears to be mediated by the stimulatory effects of androgens and the protective effects of oestrogen in the development and progression of HCC<sup>(19)</sup>.

It was found that there was significant decrease in alpha-fetoprotein before and after MWA with p value < 0.0001 in the current study. This was in line with El Sayed et al.,<sup>(20)</sup> who reported that their study was carried out on 52 patients proved to have HCC. There was significant decline in AFP level one month after ablation compared with that before the procedure (36.96 ng/mL + 46.8, P <

0.001).

The results of this study revealed that 80 % of cases showed complete ablation while 20 % of cases have incomplete ablation and therefore there needed another session. This was in the track with Xu et al.,<sup>(21)</sup> who reported that at 1 month after MWA, enhanced CT/MRI examinations showed that 143 patients (143/150, 95.33%) achieved complete tumor ablation. A small proportion of the patients (7/150, 4.67%) who had partial tumor ablation underwent re-ablation treatment with MWA and achieved complete tumor ablation.

The estimation of outcome of MWA in these results was assessed also by determining the recurrence rate after MWA. Only 18.8 % of cases showed recurrences while no recurrence in 81.2 % of cases. This was in line with Baker et al.,<sup>(22)</sup> who reported that the local recurrence rates of 8.5% at 10.9 months median follow up (0–80 months). Regional recurrence occurred in 34.8% of patients at 10.9 months median follow up. Soliman et al.,<sup>(23)</sup> reported that no local recurrence at a median of 6 month after MW treatment. Poggi et al.,<sup>(24)</sup> recorded recurrence in 10.5% of patients with large lesions, while Ding et al.,<sup>(25)</sup> recorded a local recurrence rate of 40.9% in large-sized (5–8 cm) lesions. The recurrence rate in this study could be due to small sized lesions (3 – 5 mm).

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## Conclusion:

This study showed that microwave ablation can be safely performed for exophytic HCCs with effective and satisfactory outcomes.

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