





## Post-operative management

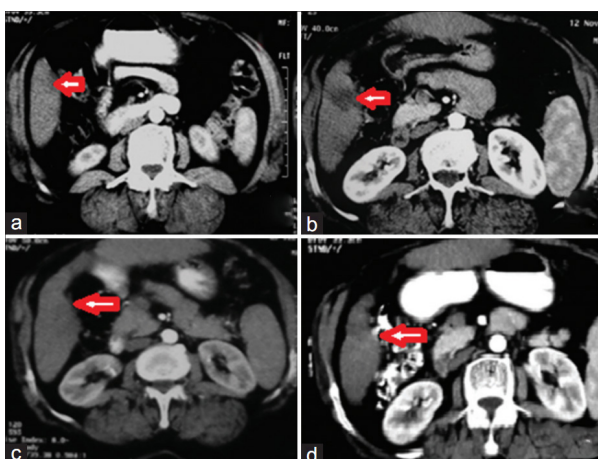
Five patients were transferred to the Intensive Care Unit and were under observation until patients became stable. A naso-gastric tube was left for 24 h. Patients started oral fluids when intestinal sounds became audible, and gradually returned to a normal diet. Ambulance was started as early as possible. Drains were removed when below 100 mL (usually the 4th day). Hospital stay keep as short as possible to avoid hospital acquired infection, ranging from 5 days to 7 days.

In the same period, 20 consecutive patients with HCC (12 males, 8 females; average age: 54.3 years; range: 48-66 years) underwent percutaneous RFA at Zagazig University Hospitals, Interventional Radiology Department [Figure 4].

Thirteen of them were treated using the Radionics cool tip needle (4 ablated by the single probe and 8 by the cluster probe). Seven patients were treated using the Rita needle with expandable hooks. Fifteen patients were treated with a single electrode insertion, 4 with double insertions and in one case, by three insertions. Only 1 patient received a second session of RFA due to a residual tumor detected by the 1-month follow-up triphasic CT study.

Local anesthesia was performed on the entry site of the skin to the liver capsule along the needle track with 10 mL of 2% xylocaine. Most of the patients undergoing RFA were treated under general intravenous (IV) anesthesia.

The objective in treating the tumors was to ablate the entire tumor and an at least 1 cm tumor-free margin



**Figure 4:** (a) Arterial contrast enhanced triphasic computerized tomography shows right lobe (segment 6) hepatocellular carcinoma about 16 mm × 14 mm; (b) arterial phase 1 month after RFA; (c) arterial phase 3 months after RFA; (d) arterial phase 9 months after RFA. In b, c and d, no enhancement of the ablated right lobe. Significant decrease in mass size is noted. RFA: radiofrequency ablation

of normal liver. The deepest ablations were performed before the superficial ones to minimize the possibility of micro bubbles that might obscure visualization of the deepest portions of the tumor and thus prevent complete ablation. In our cases, we ablated the tract before removal of the needle.

## Post-ablation care

IV antiemetic was given. Strong IV analgesics were given to control pain. All patients were observed clinically for 2-3 h in the Radiology Department to detect any acute complications (like bleeding, shock and injury to other organs) and to start IV fluid. Prophylactic antibiotics were started and continued for 3 days.

## RESULTS

### Sociodemographic characteristics of patients

We compared tumor characteristics in the two different treatment groups (Child-Pugh score, tumor number, tumor diameter and AFP levels), as shown in Table 1.

#### Group A: Resection

A total of 20 consecutive patients with HCC (13 males, 7 females; average age: 53.4 years; range: 45-62 years) underwent HR. The etiology of the patients' underlying liver disease were characterized by 20 patients with chronic hepatitis (hepatitis B: 3; hepatitis C: 14; hepatitis B + C: 3). On the other hand, 17 had Child A and 3 had Child B, according to the Child-Pugh scoring system.

#### Group B: Radiofrequency ablation

A total of 20 consecutive patients with HCC (12 males, 8 females; average age: 54.3 years; range: 48-66 years) underwent RFA interventional in the Radiology Department. The etiology of the patients' underlying liver disease was characterized by 20 patients with chronic hepatitis (hepatitis B: 4; hepatitis C: 14; hepatitis B + C: 2). Of these patients, 12 had Child A and 8 Child B.

**Table 1: Tumors characteristics in the two different treatment groups**

Underlying cirrhosis	Group A	Group B
	HR (n = 20) (%)	RFA (n = 20) (%)
Child-Pugh score		
A	17 (85)	12 (60)
B	3 (15)	8 (40)
Number of tumors		
Single	18 (90)	13 (65)
Multinodular	2 (10)	7 (35)
Tumor diameter maximum 7.5 cm		
≤ 3 cm	5 (25)	4 (20)
> 3 cm	15 (75)	16 (80)
AFP levels (ng/mL)		
≤ 20	3 (15)	2 (10)
> 20	17 (85)	18 (90)

RFA: radiofrequency ablation; AFP: alpha-fetoprotein; HR: hepatic resection

## Treatment mortality and morbidity

We found the difference in overall survival in the two different treatment groups regarding child type as shown in Table 2.

### Group A: Resection

There was no operative mortality (within 30 days of surgery) after resection; mean hospital stay was 6 days. One- and two-year survivals were 85% (17) and 70% (14) respectively.

Post-resection complications varied greatly. Wound infection (seroma) occurred in 4 patients and were managed conservatively via repeated dressing and antibiotic administration according to the culture obtained from the wound. Incisional hernia occurred in 2 patients. Hernioplasty was performed in one of them while the other one refused. Chest complications were the most common complications, big incision and severe pain limits respiration, leading to retained secretions and chest infections. Chest complications occurred in 8 patients. Ascitis occurred in 3 patients and were managed medically. One patient developed recurrence after 18 months (this patient was managed by RFA but was excluded from our results, as RFA was done after finishing the study).

### Group B: Percutaneous radiofrequency ablation

There was no in-hospital mortality after RFA; the mean hospital stay ranged from 4 h to 24 h with a mean of 7 h. One- and two-year survival was respectively, 80% (16) and 65% (13).

Pain after procedures was present in all patients (mild to moderate pain presented in 16 patients which was managed using analgesia. Severe pain presented in 4 patients and was managed using sedation). Pain lasted for 24-72 h in most patients. Delayed pain occurred in 2 patients lasting for 1 week. This was attributed to the proximity of the ablated lesions to the diaphragm. Pain occurred either isolated or as a part of the post-ablation syndrome that occurred in 12 patients with flu-like manifestations including low-grade fever, pain, malaise, myalgia, nausea, and vomiting.

**Table 2: Overall survival by patient and child type in the two different treatment groups**

	1 year (%)	2 years (%)
Total patients		
HR (n = 20)	17 (85)	14 (70)
RFA (n = 20)	16 (80)	13 (65)
Child A		
HR (n = 17)	15 (75)	13 (65)
RFA (n = 12)	10 (50)	9 (45)
Child B		
HR (n = 3)	2 (10)	1 (0.5)
RFA (n = 8)	6 (30)	4 (20)

RFA: radiofrequency ablation; HR: hepatic resection

One case developed a new lesion detected 4 months post-procedure at the follow-up triphasic CT study managed by a second session.

Cholecystitis developed in 1 patient with a segment 5 nodule adjacent to the gall bladder wall. Bile duct injury developed in another patient 1 month post-procedure.

## DISCUSSION

HCC accounts for more than 90% of primary liver cancer, the third most common cause of cancer-related death. It is the fifth most prevalent cancer in men and the seventh in women.<sup>[5,6]</sup> The prognosis for untreated HCC is generally poor. Curative treatment consists of surgical resection, RFA, and liver transplantation.<sup>[7]</sup>

Management of cirrhotic HCC involves several specialties.<sup>[8]</sup> To correctly select candidates for resection, it is essential to consider not only the tumor characteristics, but also the accurate estimate of liver function with the aid of imaging. The risk of incorrect staging of associated cirrhosis may result in post-operative liver failure, followed by chronic decompensated cirrhosis.<sup>[9]</sup>

The high mortality and morbidity associated with chronic liver disease limits liver resection in cirrhotic patients.<sup>[10]</sup> Liver transplantation is the choice of treatment, with the best results in terms of long-term survival, but this option is feasible in a small number of patients because of the shortage of donors.<sup>[11]</sup> However, current progresses in liver resection techniques and in post-operative follow-up have improved the resection results in terms of operative risk and long-term survival.<sup>[9,12]</sup>

Indications for resection depend on the size, number and location of lesions as well as the estimation of remnant liver volume (RLV). The best candidates are patients with a single peripheral lesion, which permits the preservation of more than 50% of RLV.<sup>[13]</sup>

Tumor location is an essential assessment parameter. With regard to peripheral lesions, no matter how bulky the mass is, resection may be performed with a curative intent and anatomically, without compromising a large parenchymal volume.<sup>[14]</sup> In contrast, a small central lesion (< 3 cm) may require the sacrifice of a significantly great parenchymal volume, with risk of post-operative liver failure, so RFA is preferable if possible.<sup>[15]</sup>

Surgical resection of HCC remains the gold standard. Unfortunately, its usefulness has been limited by many factors, including tumor multiplicity and poor hepatic reserve to tolerate surgery. Other techniques



