Minimally invasive liver surgery for the early detection of hepatocellular carcinoma (HCC)

Shah Faisal

Master Student of Harbin Medical University

(Department of General Surgery) The second Affiliated Hospital of Harbin Medical University

008615776856273

kingfaisal.pan@gmail.com

Correspondence author: **Professor Yujia Lin**

(Department of General Surgery) The second Affiliated Hospital of Harbin Medical University

157 Baojian Rd, Nangang, Harbin, Heilongjiang, China.

Supervisor

Xin Liu

(Department of General Surgery) The second Affiliated hospital of Harbin Medical University

Ubaid Ullah

(Department of General Surgery) The second Affiliated hospital of Harbin Medical University

Zheng Zhang

(Department of General Surgery) The second Affiliated hospital of Harbin Medical University

Haoran Wang

(Department of General Surgery) The second Affiliated hospital of Harbin Medical University

Meng He

(Department of General Surgery) The second Affiliated hospital of Harbin Medical University

Sheng Tai

(Department of General Surgery) The second Affiliated hospital of Harbin Medical University

Abstract

Background

Hepatocellular carcinoma (HCC) is the third most lethal cancer worldwide. The lack of effective biomarkers for the early detection of HCC results in unsatisfactory curative treatments.

Objective

To determine the minimally invasive liver surgery for the early detection of hepatocellular carcinoma ***Methods***

A cross-sectional study was conducted at Pakistan Kidney and Liver Institute (PKLI) Pakistan, which was performed between February 2023 to June 2024. The total number of patients in our study were 100. The number of Male patients were 72 and females were 28. For all patients, we did diagnostic tests Color Doppler Ultrasound, CT scan and AFP test . I take BMI of every patients. We also took detailed history from the patients about the signs and symptoms of HCC. For most of the patients we did RFA. Data was tabulated and analyzed by SPSS version 25.

Result

The current study included a total of 100 patients with HCC whose characteristics are summarized in Table 3. The frequency of male patients in our study were 72 and their percentage was 72.0. The frequency of female patients in our study were 28 and their percentage was 28.0.The frequency of HCC mass size 2 cm patients were 40, 3 cm total patients with HCC mass were 40 and 5 cm HCC mass patients were 20.

HCC caused by HBV patients were 66 and its percentage were 66.0 and HCV patients were 34 in our study. The symptom of HCC in our study weight loss were not present in 45 patients and were present in 55 patients.
Another symptom of HCC is Loss of appetite were not present in 63 patients and were present in 37 patients. Abdominal discomfort were not present in our study in 84 patients and were present in 16 patients. P-Value were < 0.5 in our study.
Liver biopsy were not done in 2 patients and were done in 98 patients.
Early detection of HCC on CT were 20 patients and ultrasound were 80 patients. In all patients color Doppler ultrasound shows hypoechoic mass with central vascularity.
Treatment for HCC on RFA were 80 patients and surgical resection were done in 20 patients in our study.

Conclusion

We have detected Hepatocellular Carcinoma (HCC) in early stage on diagnostic test Ultrasonography and can treat HCC easily on minimally invasive procedure that patient can recover fast and with no major complication. RFA is the best choice for treatment of HCC in early stages. Ultrasonography is non-invasive painless diagnostic test for HCC and we can also do biopsy under guidance of Ultrasound. Chronic HBV is the leading cause of HCC.

Keywords: *Hepatocellular carcinoma (HCC) Ultrasonography (US), Minimally invasive, Radiofrequency ablation (RFA).*

Introduction

Hepatocellular carcinoma (HCC) is the most common primary liver tumor, with an increasing incidence and mortality worldwide [1]. In modern medicine, hepatocellular carcinoma (HCC) represents a significant difficulty. Both clinically and epidemiologically, the incidence of HCC is rising and becoming increasingly serious. Currently, HCC is the third most common cause of death for cancer patients worldwide and the fifth most common type of cancer overall [2]. Every year, it causes approximately 600,000 new cases and over 500,000 fatalities globally [3]. Early-stage HCC is

now diagnosed more frequently as a result of advancements in diagnostic imaging techniques [4]. lesion found on a surveillance US for HCC, cirrhosis, chronic hepatitis B virus infection, and previous or contemporaneous diagnosis of HCC [5]. Because liver biopsies have a risk of hemorrhage, tumor seeding, and false negative results from failing to get tissue from the right place, they are not frequently performed for HCC. Liver biopsy offers a 100% specificity, a positive predictive value, and a sensitivity of 66%-93% based on the size of the tumor [6]. Liver resection (LR), liver transplantation (OLT), and radiofrequency/microwave ablation (RFA/MWA) are the main treatments available for small, isolated HCC, however the best course of action is still up for dispute [7,8,9]. The widespread use of robotic or laparoscopic minimally invasive surgical procedures in liver surgery has been linked to a further decrease in surgical complications, which is advantageous for patients with HCC who are cirrhotic [10]. When compared to open surgery, MILS is linked to lower rates of blood loss, transfusions, postoperative ascites, liver failure, and hospital stays with comparable operating times, surgical margins, and recurrence rates [11,12]. Surgery was previously only advised for patients with solitary nodules measuring less than 3 cm. New guidelines, however, recommend surgical resection as the first line of treatment for patients with a single tumor of any size or up to three nodules measuring less than 3 cm (BCLC stage 0/A). For patients with multinodular disease (BCLC stage B), surgical resection is recommended as a backup option [13]. Most patients with HCC have a history of CLD, or chronic liver disease, which damages the liver and results in multicentric oncogenicity and functional decline[14]. The three surgical treatments for HCC that are thought to be curative are hepatic resection, liver transplantation (LT), and ablation. They are linked to the most favorable results, with 70–90% 5-year survival rates. The size of the tumor, its involvement of the main arterial structures, the patient's liver function, and their clinical state must all be carefully taken into account when deciding whether to treat HCC surgically [15,16]. Since ultrasonography (US) offers low-cost, real-time, noninvasive detection, it is a significant and long-lasting tool of surveillance for hepatocellular carcinoma (HCC). Understanding pathological aspects is crucial for providing an accurate US diagnosis because US findings are predicated on these features. More information can now be provided, including the possibility of malignancy and a precise localization diagnosis of HCC, because to recent advancements in US equipment [17,18]. Because of concerns that a laparoscopic approach could degrade oncologic outcomes and result in port site seeding, laparoscopy was initially used in liver surgery for primarily benign lesions and nonanatomic resections [19, 20]. For patients with portal hypertension in particular, the benefits of MILR over open liver resection are noteworthy. In these patients, the majority of the modest documented results are predicated on open liver resection. Comparing open surgery to laparoscopy in HCC patients with portal hypertension has already demonstrated improved postoperative results [21,22].

MATERIALS AND METHODS

A cross-sectional study was conducted at Pakistan Kidney and Liver Institute (PKLI) Pakistan, which was performed between February 2023 to June 2024. The total number of patients in our study were 100. The number of Male patients were 72 and females were 28. For all patients, we did diagnostic tests Color Doppler Ultrasound, CT scan and AFP test . I take BMI of every patients. We also took detailed history from the patients about the signs and symptoms of HCC. For most of the patients we did Laproscopic RFA. Data was tabulated and analyzed by SPSS version 25.

Results

Table 1: Mean Age, BMI and Blood test (AFP) of all the enrolled patients (*n=100*)

Variables	Minimum	Maximum	Mean±SD
Age (Years)	53	77	64.71±7.397

BMI	31	39	34.60±2.629
Blood Test (AFP ng/ml)	422	763	540.60±92.304

In a current study total 100 patients were enrolled. The minimum age of patients were 53 years and the maximum age of the patients were 77 years. The mean age were 64.71±7.397 years. The minimum BMI of patients were 31 and the maximum BMI of the patients were 39 years. The mean BMI were 34.60±2.629. The maximum blood test AFP were 422 ng/ml and the maximum AFP were 763 and their mean were 540.60±92.304.

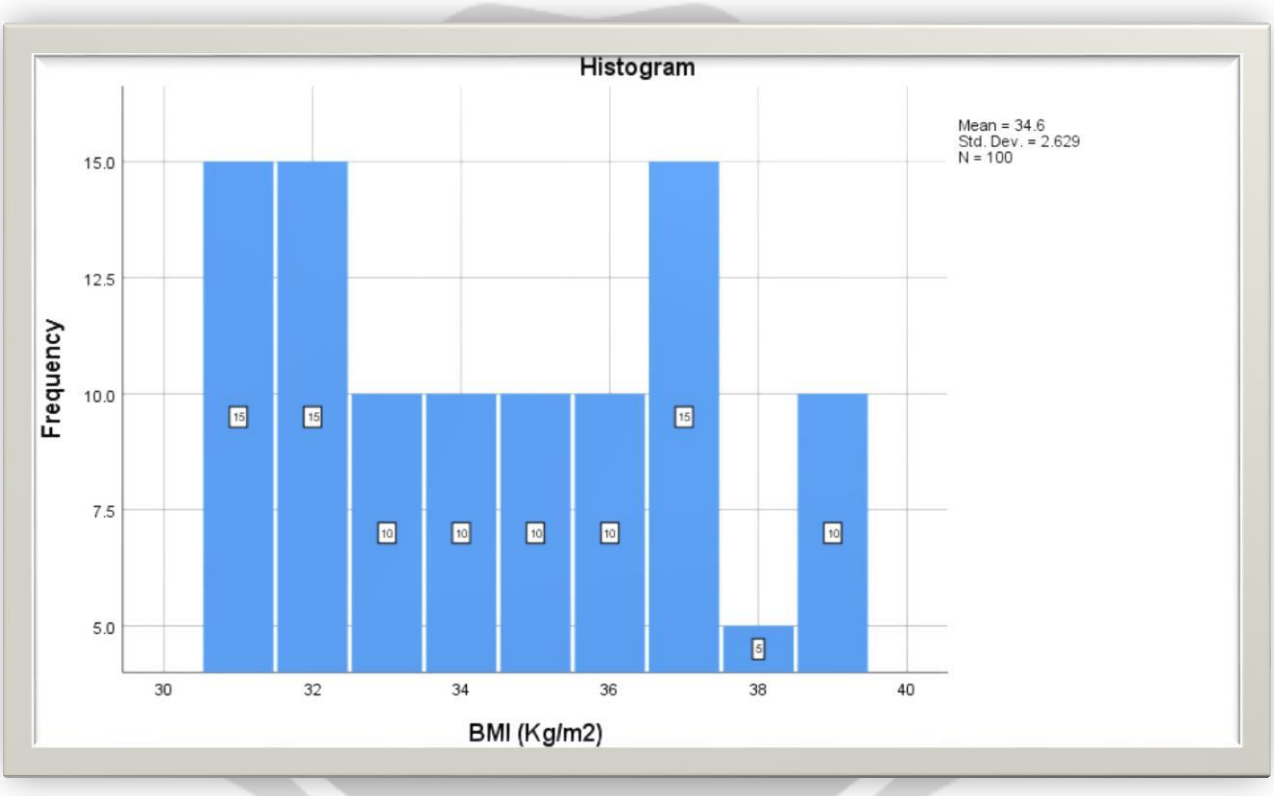

Figure 1: Histogram of BMI (Kg/m2) of all Patients.

Table 2: Frequency and Percentage of Gender (n=100)

Gender	Frequency	Percent	Valid Percent
F	28	28.0	28.0
M	72	72.0	72.0
Total	100	100.0	100.0

In the above table 2, the frequency of Female patients were 28 and the percentage were 28.0. The cumulative percent were the same 28.0. The frequency of male patients were 72 and the percentage were 72. Total number of patients were 100 (100 %) in our study.

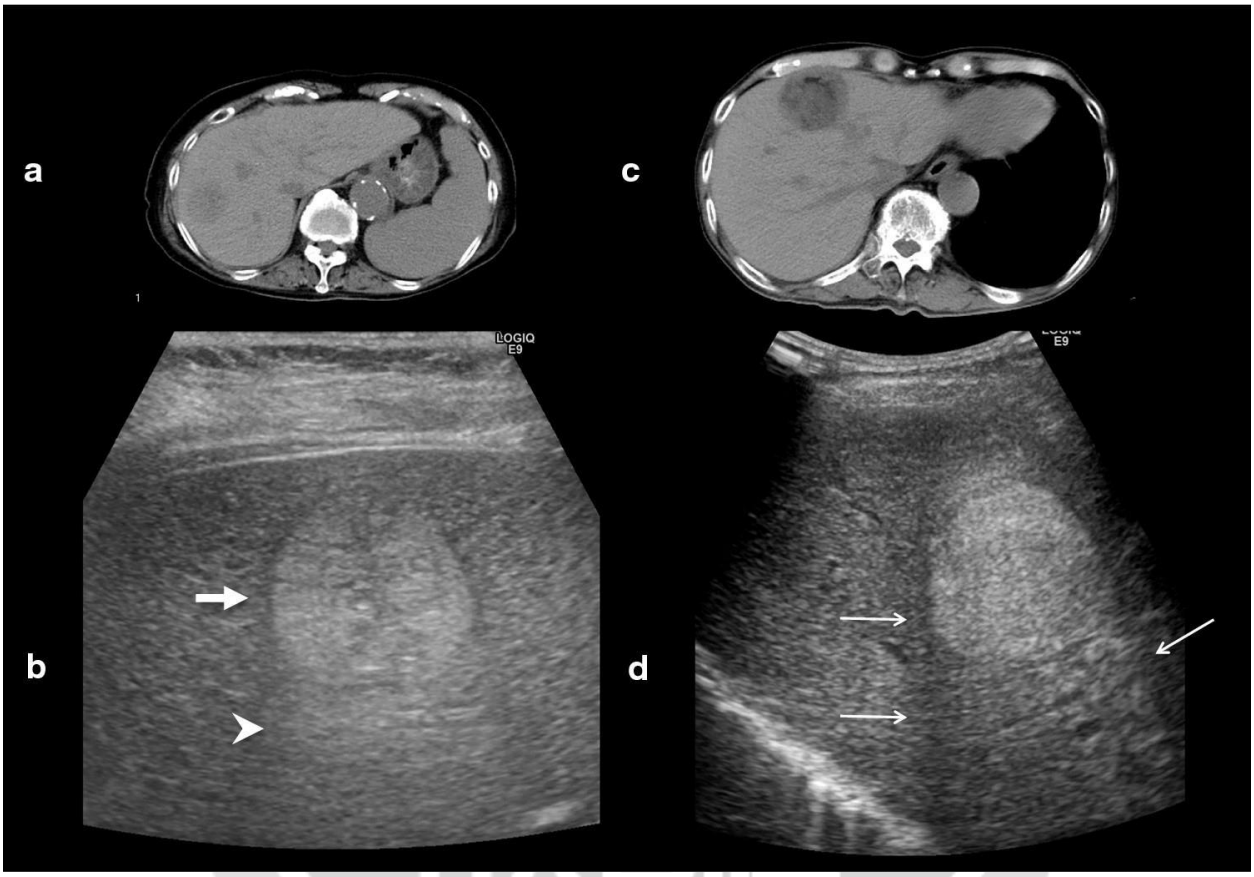

Table 3: *Patient characteristics of enrolled patients (n=100)*

Variables		
Gender	Frequency	Percentage
Male	72	72.0
Female	28	28.0
HCC Mass Size (cm)		
2 cm	40	40.0
3 cm	40	40.0
5 cm	20	20.0
Causes		
HBV	66	66.0

HCV	34	34.0
Symptoms		
Weight Loss		
NO	45	45.0
YES	55	55.0
Loss of Appetite		
NO	63	63.0
YES	37	37.0
Abdominal Discomfort		
NO	84	84.0
YES	16	16.0
Liver Biopsy		
NO	2	2.0
YES	98	98.0
Early detection of HCC on		
CT Scan	20	20.0
Ultrasound	80	80.0
Color Doppler Ultrasound		
Hypoechoic mass with central vascularity	100	100.0
Treatment		
RFA	80	80.0
Surgical resection	20	20.0

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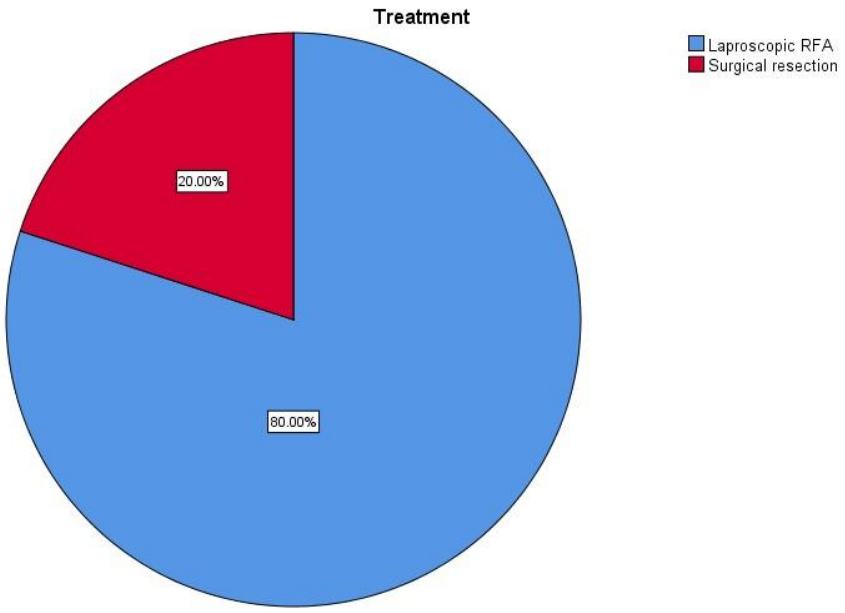

Figure 2: Pie chart shows treatment of HCC, 80 % Patients was treated by RFA and 20 %

Patients was treated by Surgical resection

Table 4: *Patient complication of enrolled patients (n=100)*

Variables		
Complications	Frequency	Percentage
Ascities	5	5.0
Blood loss	11	11.0
NO	78	78.0
Pleural effusion	6	6.0
Total	100	100.0

The Patients with complication of ascities were 5 and its percentage were 5.0. The Patients with complication of blood loss were 11 and its percentage were 11.0. The Patients with no complication were 78 and its percentage were 78.0. The Patients with complication of pleural effusion were 6 and its percentage were 6.0.

Discussion

The clear connection between the existence of liver cirrhosis and occurrence of HCC means that early detection and monitoring of patients at risk is particularly important. It can be assumed that 90% of all HCC arise in patients with liver cirrhosis [23]. However, patients whose HCC was discovered during screening have a far better prognosis than those whose disease was discovered after symptoms appeared [24]. On the other hand, sensitivity and specificity of an alpha-fetoprotein (AFP) tumor marker alone in at-risk groups research were only 55% and 87%, respectively [25]. In contrast, an HCC screening program's ultrasound examination produced results with a specificity of over 90% and a sensitivity of 60% to 90%. Due to the limited sensitivity, the guideline limits the screening examination to half-yearly ultrasound controls instead of recommending routine measurement of AFP. Patients should have abdominal sonography every six months [26]. The recommended course of action for this round hepatic mass is fine-needle aspiration biopsy if the hepatic focus has a diameter of less than 2 cm and contrast-enhanced cross-sectional imaging shows no typical contrast activity. This is because a second imaging process fails to improve the sensitivity and specificity in tumors between 1 and 2 cm, and in 20% of cases, results in false-negative findings [27]. Comprehensive recommendations for the diagnosis and management of HCC are provided by the new guideline. To improve the survival rate of patients with advanced disease, however, a considerable deal of work still needs to be put into developing new choices for systemic treatment. The introduction of predictive markers that could lead to personalization of the treatment of patients with HCC represents another important area of future research [28].

Conclusion

We have detected Hepatocellular Carcinoma (HCC) in early stage on diagnostic test Ultrasonography and treat HCC easily on minimally invasive procedure that patient can recover fast and with no major complications. RFA is the best choice for treatment of HCC in early stage. Ultrasonography is non-invasive painless diagnostic test for HCC and we can also do biopsy under guidance of Ultrasound. Chronic HBV is the leading cause of HCC.

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