

The Oncologic Outcome of Laparoscopic Resection Malignant Liver Tumors

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Introduction

Liver cancer is currently the fourth leading cause of cancer-related death in the world, and the third most common among men (1). Liver cancer can be either primary, when the cancer originates from the liver, or metastatic, when cancer has spread to the liver from another part of the body. A common primary malignant liver cancer is Hepatocellular carcinoma (HCC), which arises from parenchyma cells and 80% of the time is associated with cirrhosis (2). Colorectal cancer is an aggressive metastatic tumor that is primary Adenocarcinoma, which tends to form bulky exospheric masses (3). Often time patients who are diagnosed with colorectal cancer or HCC are recommended for liver resection in order to surgically remove the tumor. Patients who undergo surgical resection of primary or metastatic liver tumors have 20-40% disease free survival rates (4). Unfortunately, patients who are diagnosed with metastatic cancer have a high rate of recurrence. Therefore, the patients need to be evaluated every 3-6 months and follow up treatment can include chemotherapy and radiation.

The healthcare community continues to evolve by exploring new technological advancements, such as **laparoscopic surgery**. Minimally invasive allows for surgeons to make smaller incisions causing less scarring, less blood loss, shorter hospital stay for the patient and decreasing the risk of infections. At the beginning; just like other minimal invasive procedures; laparoscopic techniques for the resection of liver lesions have been received with skepticism especially in malignant lesions. Continued advances in surgical technology and increased surgeon experience have overcome this skeptic approach. Laparoscopic surgery has replaced many conventional abdominal procedures over the last two decades. Liver resection has only recently been described laparoscopically due to the complication of the procedures. The first non-anatomic liver resection was described by Gagner et al. in 1992(5). The Cleveland Clinic group has been investigating the roll of laparoscopic surgery for liver tumors.

Objective

- This study will focus on the laparoscopic resection surgery option for malignant liver tumors.
- The goal of this study is to analyze the oncologic outcome of laparoscopic surgery to the treatment of malignant liver tumors** and to figure out what role it may play in the future of the liver surgery.
- It is hypothesized that more non recurrence cases will outnumber the recurrence laparoscopic malignant liver tumor cases.

Methodology

- Data was collected by using My Practice EPIC database and Filemaker, after receiving HIPAA training and approval by the Cleveland Clinic institutional review board.
- Out of the 52 patients who had laparoscopic liver resection performed, 32 were identified with a malignant liver tumor.
- The 32 patients were isolated into "Liver Tumor Database" on FileMaker.
- The data was analyzed by studying each patient's follow up history, CT scan reports, pathology results, and operative report in order to determine the disease free survival rate and to identify which patients had recurrence.
- The data was transformed to a computerized database, JMP, consisting of the number of patients, mean age, gender, mean tumor size, pathology, operative time, blood loss, and length of hospital stay.
- Statistical analysis was performed by using JMP software and Kaplan-Meier survival analysis.



Results

- Thirty two patients have undergone laparoscopic liver resection for malignant liver lesions between January 2006 and July 2009.
- Mean age was 67 ± 9.8 years. Male/female ratio was 17/15.
- Nineteen of the cases were colorectal metastasis.
- All but four patients were presented with solitary lesion. Three patients with colorectal metastasis demonstrated satellite second lesions in the close proximity of the main one.
- One patient with carcinoid tumor of the appendix presented with 15 metastatic lesions; the largest one is about 5 cm in diameter.
- Preoperative PET Scans performed in 10 patients, all reported malignant liver lesions. Mean tumor size was 2.9 ± 0.3 cm.
- Excluding HCC patients; liver metastasis were synchronous in 6 and metachronous in 17 patients. Four out of the 15 patients who received preoperative chemotherapy; demonstrated tumor size reduction before the operation.
- All operations completed laparoscopically except 4 cases, which were planned as a laparoscopic assisted right hepatectomy.
- Mean operative time was 250.3 ± 11.7 minutes. Mean estimated blood loss and length of hospital stay was 316.85 ± 489.53 ml 5 ± 2 days respectively.
- Complications were seen in six patients (18.7%). Clostridium difficile colitis (2), abscess (1) and seroma (1) at the operation site, delirium tremens (1) and pleural effusion (1).

Table 1: Patient and tumor characteristics.
All data is expressed as mean \pm SEM

Parameter	
Number of Patient	32
Mean age (years)	67 ± 9.8
M:F	17/15
Mean tumor Size (cm)	2.9 ± 0.3
Pathology	
Colorectal metastasis	19
Hepatocellular	9
Other	4
Mean Operative time (minutes)	250.3 ± 11.7
Mean operative blood loss (ml)	316.85 ± 489.53
Mean length of hospital stay (days)	5 ± 2

Figure 1: Kaplan- Meier curves for Disease Free Survival Rate.

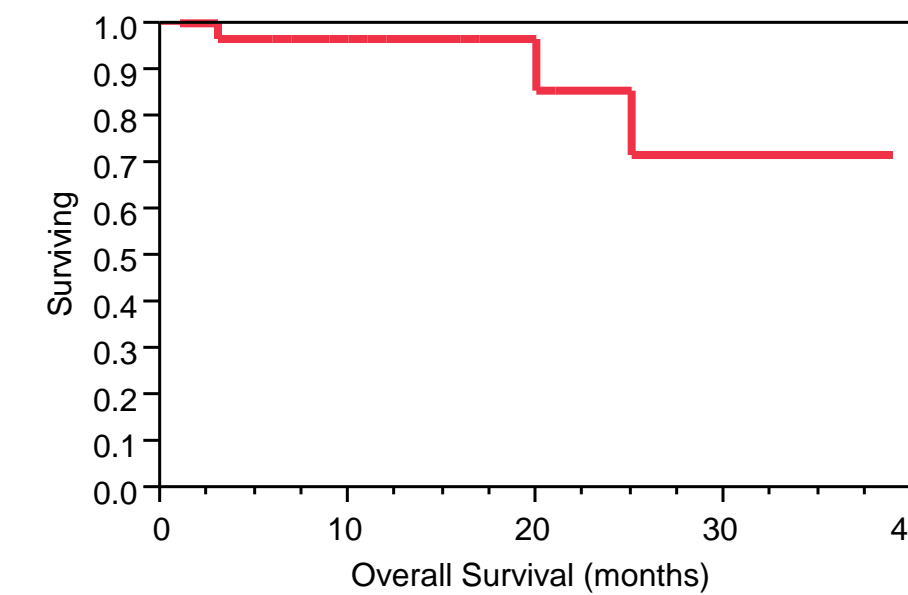
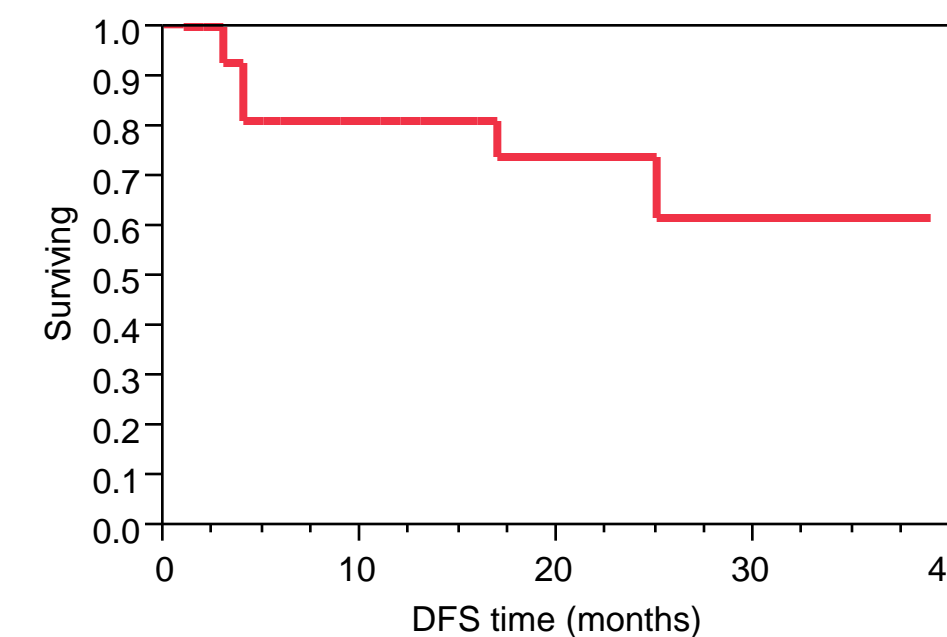
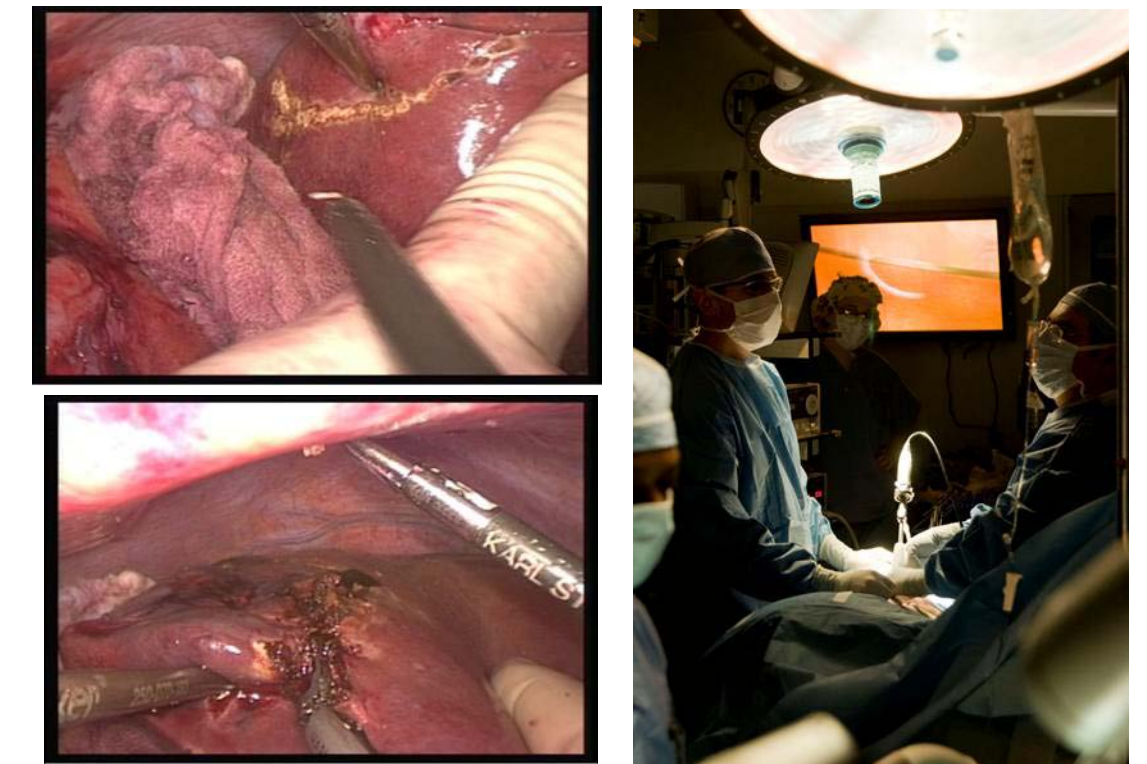


Figure 2: Kaplan- Meier curves for Overall Survival Rate.



Conclusions

- The findings of this study confirm many advantages of laparoscopic liver resection surgery.
- Such as shorter hospital stay for the patient, less blood loss, and a decrease in the risk of infections.
- Most importantly, there were no local recurrences in any of the patients who undergone laparoscopic liver surgery. Ensuring that the laparoscopic liver surgery was effectively able to remove the malignant tumor.
- The Disease Free Survival Rate was 20.4 ± 1.8 months. The Overall Survival Rate was 23.69 ± 1.12 months after the laparoscopic liver resection, confirming the success of the surgery.
- Moreover, twenty- five patients had no sign of recurrence after surgery. The early oncologic results confirm the safety of laparoscopic resections for malignant liver tumors.
- This will further strength the data and help establish laparoscopic liver resection surgery as the standard of care even in malignant liver lesions.



Picture 1&2 : Laparoscopic liver surgery performed by Dr. Eren Berber, M.D., and Adrian Harvey, M.D.

Recommendations

- This research project is an on going project due to the oncologic outcomes are long term. For the future, it is recommended to use a larger patient population.
- In addition, investigational studies can help establish laparoscopic liver surgery worldwide as the standard of care.
- Study results can be further used in deciding which treatment option is preferred for patients, the open or laparoscopic procedures, to remove malignant liver lesions.