Is laparoscopic resection of hepatocellular carcinoma feasible?

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Short review

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Abstract

Background. Hepatocellular carcinoma is the most common carcinoma of the liver. Its treatment depends on the number of lesions, state of liver parenchyma, systemic liver function, presence of portal hypertension, and esophageal varices as well as the patient's other concurrent diseases. Mortality and co-morbidity are associated with the state of liver parenchyma and the liver function, which is assessed by the Child–Pugh score, and further treatment is decided based on the Barcelona Clinic Liver Cancer classification.

Methods. The advantages and disadvantages of laparoscopic resection of hepatocellular carcinoma are discussed in the article, and the results of these procedures at the Ljubljana University Medical Center are reviewed.

Results. Between 2012 and 2017, 21 laparoscopic resections of hepatocellular carcinoma were performed at the Ljubljana University Medical Center. All patients were stage 0 or A carcinoma according to the Barcelona Clinic Liver Cancer classification (T1 or T2 on TNM score). In five patients a conversion to open resection was required due to hemorrhage, insufficient visibility, extensive adhesions, and previously undiagnosed satellite hepatocellular carcinoma lesion. The laparoscopic resection compared to classic resection resulted in shorter hospitalization time (in average 7.3 days), lower incidence of complications (6.25%), or less progress of the disease (18.75%). All resections were R0 and all patients survived.

Conclusion. The laparoscopic resection of hepatocellular carcinoma is feasible in appropriately selected patients in the hands of an experienced surgeon.

Introduction

Hepatocellular carcinoma (HCC) is the fifth most common carcinoma worldwide and it accounts for 5.6% of all cancers. It is responsible for 800,000 to 1,000,000 deaths annually, which is the third-highest cancer-associated death risk [1, 2]. In 2013, 213 new patients with this type of cancer were diagnosed in Slovenia, 69 women and 144 men [3, 4].

Etiology

The main etiological factor for HCC development is the state of the liver parenchyma. In more than 80% of HCC cases, there is preexisting liver damage (liver cirrhosis). The main factors for cirrhosis are chronic hepatitis (B or C), high alcohol consumption, hemochromatosis, non-alcoholic fatty liver disease, afla-toxin toxicity, steroids, and vein obstruction [5]. The most common factor for liver cirrhosis in Slovenia is high alcohol consumption.

Statistically, more men than women are affected; the ratio is 3:1. In western countries, patients are usually diagnosed with HCC between ages 40 and 50, whereas in Asia and Africa HCC develops faster: patients are between 30 and 40 years old [5, 6].

Clinics and diagnostics

Symptoms of HCC are usually nonspecific: pain or discomfort under the right costal arch, appetite and weight loss, nausea, ascites, and jaundice. At examination an enlarged, palpable painful liver can be found. Laboratory results show increased values of serum cholesterol levels, serum calcium levels, and hypoglycemia. Moreover, the alpha-fetoprotein is a specific serum tumor marker associated with HCC.

In addition, CT and MRI scan can provide useful information about HCC by detecting possible hypervascular lesions in the liver. In some cases, the diagnosis of HCC is made by ultrasound- or CT-guided liver biopsy [5, 6].

Classification

Because the decision for treating HCC is primarily based on systemic liver function and the general condition of the patient, there was a need for specific classification for HCC instead of TNM classification. There are many different classifications: the Cancer of the Liver Italian Program (CLIP) score, the Chinese University Prognostic Index (CUPI), and the Okuda and Barcelona Clinic Liver Cancer classification (BCLC), which is the most commonly used in the western world, including Slovenia [7].

The Child–Pugh classification assesses the prognosis of chronic liver disease and includes the presence of encephalopathy and ascites, serum values of albumins, bilirubin, and prothrombin time. According to the sum of these parameters, three classes are formed: A, B, and C. The Child–Pugh score as well as the patient`s general health condition, concurrent diseases, and number and size of tumor lesions are taken into account in BCLC classification [8]. The treatment of HCC is based on BCLC staging.

Laparoscopic resection of HCC

The first laparoscopic hepatectomy was performed by Gagner in 1992, and interest in this kind of technique has grown ever since. At first it was used for biopsy and treatment of small liver lesions, but it later spread and has become an important treatment option for liver metastasis as well as HCC [1]. Lately it has become the gold standard for the treatment of HCC with one subcapsular lesion with a radius smaller than 5 cm located in the left liver lobe or anterior segments of the right liver lobe [9]. With the development and improvement of surgical instruments (scalpels, dissectors, staplers, intraoperative ultrasound, etc.), operations became safer and the outcome improved. This goes hand in hand with the improvement of surgical skills and growing experience [9].

Laparoscopic resection (LR) is the method of choice in stage O and A of BCLC classification; however, due to strict criteria only approximately 27% of all HCC lesions can be operated on laparoscopically [10]. The main criteria for LR is the location of the HCC lesion, and LR is therefore indicated when the lesion is in anterolateral liver segments, but unfortunately not when the lesion is in posterosuperior segments.

The advantages of LR when compared to classical hepatectomy are numerous: shorter operating time, shorter hospitalization time, reduced

blood loss, less need for transfusion and analgesics, and lower morbidity and mortality. Moreover, when there is a need for reoperation there are fewer postoperative abdominal adhesions. Reduced blood loss and less need for transfusion were recognized as the consequence of pneumoperitoneum and laparoscopic camera enlargement effect, which both resulted in better postoperative hemostasis [10]. In laparoscopic redo operations, independently of the primary open or laparoscopic approach, there was less blood loss, a lower need for transfusion, lower mortality, and lower ascites incidence when compared to open redo operations. Meta-analysis, which included 244 patients with open hepatectomy and 165 patients with LR of HCC, showed no statistically important differences in HCC recurrence or patient survival [1, 11]. Contraindications for LR are a large tumor lesion, an unfavorable location (posterosuperior liver segments), vascular invasion, rupture or inflammation of the lesion, decompensated liver cirrhosis, portal hypertension, esophageal varices (more than grade 1), and thrombocytopenia [1, 2].

In some cases, complications connected to LR can occur, such as technical difficulty of parenchyma resection, insufficient hemostasis, and air embolism. Due to the need for suitable technical support and surgical skills, LR is currently limited to larger medical centers [10].

Methods

At the Department of Abdominal Surgery at the Ljubljana University Medical Center, 21 laparoscopic resections of HCC were performed between January 1st, 2012 and December 31st, 2017. There were 15 male and six female patients, between 41 and 85 years old. All the patients were stage 0 or A carcinoma according to the BCLC classification (T1 or T2 on the TNM score).

Results

In five procedures (23.5%), a conversion to open operation was required due to hemorrhage and insufficient hemostasis, insufficient visibility, large adhesions, and a previously undiagnosed satellite lesion near the targeted HCC lesion.

The hospitalization time of patients operated on laparoscopically (16 patients) was between 4 and 21 days, on average 7.3 days. Most of the patients (12/16; 75%) were hospitalized between 4 and 6 days. Patients with conversion to open procedure were hospitalized longer: between 7 and 18 days, on average 13 days.

All resections were R0 and all patients survived. All patients were still alive during this review and most of them have continued their gastro-oncological treatment.

In three patients there was progression of the disease on average 4 years after the procedure. One patient had a local recurrence and was later treated with a liver transplantation. In one patient, there was a need for an additional operation in which extirpation of lymph nodes in the hepatoduodenal ligament was performed.

Conclusion

Laparoscopic resection of HCC is a gold standard for treatment of early stages of this disease. Based on our analysis, laparoscopic surgery for HCC treatment proved to be safe when performed by an experienced surgeon on appropriately selected patients with favorable outcomes. These include successful treatment with a low incidence of complications, a low rate of progression and recurrence of the disease, and shorter hospitalization when compared to the open procedure.

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