

Early Hand-Assisted Laparoscopic Resection of Ruptured Hepatocellular Carcinoma

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ABSTRACT

Laparoscopic liver resection has increasingly been used as a therapeutic modality in hepatocellular carcinoma (HCC). However, its use in the treatment of spontaneously ruptured HCC has not been well documented. We describe a case of spontaneously ruptured HCC successfully treated with hand-assisted laparoscopic liver resection.

Key Words: Hand-assisted laparoscopy, Laparoscopy, Hepatectomy, Hepatocellular carcinoma, Ruptured.

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INTRODUCTION

The first laparoscopic liver resection (LR) was reported more than 20 years ago in 1992.¹ Since then, laparoscopic LR has been increasingly adopted worldwide, with numerous case series from various institutions in Europe, Asia, and the United States reported in the literature.²⁻⁵ However, because of the technical complexity of the totally laparoscopic approach, various other minimally invasive approaches have been described for LR, including the hand-assisted laparoscopic (HALS) and laparoscopic-assisted (hybrid) approaches.^{2,6} There has been no clear demonstrable advantage or definitive selection criteria for the various approaches, although in general the hand-assisted or hybrid approaches have been used for more “technically challenging” operations such as major hepatectomy, resection of larger tumors, tumors close to major vasculature, and tumors arising from difficult locations such as the right posterior or superior segments.⁶ A recent review reported that HALS LR comprise only 16.5% of LRs performed worldwide.

Spontaneously ruptured hepatocellular carcinoma (HCC) occurs in as many as 15% of HCC patients and is associated with a mortality rate as high as 75% secondary to liver failure.^{7,8} Early resuscitation attempts and hemostasis frequently via arterial embolization are imperative in the initial management of ruptured HCC. Subsequently, delayed LR is usually performed as a definitive treatment.^{7,8}

Immediate urgent LR is rarely performed because of the reported low resection rate of 12.5% to 31% and the high mortality rate of 16% to 100%.^{7,8} However, in highly selected patients who are hemodynamically stable with a good functional liver reserve, an early one-stage procedure may be considered.⁸ The role of laparoscopic LR for ruptured liver tumors has only been discussed in 2 previous studies.^{7,9} Belgaumkar et al reported a delayed second-stage laparoscopic LR for ruptured liver tumors in 3 patients, and we recently reported the first case of early totally laparoscopic LR of a ruptured HCC.^{7,9}

In the present study, we report a case of spontaneously ruptured HCC treated with HALS LR. To the best of our knowledge, this is the first report of HALS LR for ruptured HCC.

CASE REPORT

A 69-year-old man with chronic hepatitis B presented with a 5-day history of right-sided abdominal pain associated with a mass. He was clinically well and hemodynamically stable at presentation. A computed tomography scan demonstrated a 4.5-cm mass in segment VI, with surrounding hemoperitoneum (**Figure 1**). There was no radiologic evidence of active hemorrhage. The patient remained hemodynamically stable and his hemoglobin level was 9.8 g/dL. His liver function tests were normal and α -fetoprotein level was 1.0 μ g/L. The patient was urgently admitted



Figure 1. Computed tomography scan of the 4.5-cm exophytic HCC with hemoperitoneum.

and had a transfusion of 1 unit of blood before his semi-urgent surgery was performed 30 hours after his presentation. A HALS nonanatomic resection of the ruptured HCC was performed. A 12-mm infraumbilical port for the laparoscope and two 12-mm epigastric ports were first inserted. Diagnostic laparoscopy demonstrated the ruptured tumor with hemoperitoneum and blood clots in the peritoneal cavity (**Figure 2**). A decision was made to perform HALS LR, and an 8-cm right iliac fossa transverse incision for the hand-port (Gelport, Applied Medical, Rancho Santa Margarita, California) was then created (**Figure 3**). The clots were evacuated via the hand-port and the blood was suctioned. Subsequently, parenchymal transection was performed using the Ligasure (Covidien, Boulder, Colorado) monopolar cautery and clips without the Pringle's maneuver, and the specimen was extracted via

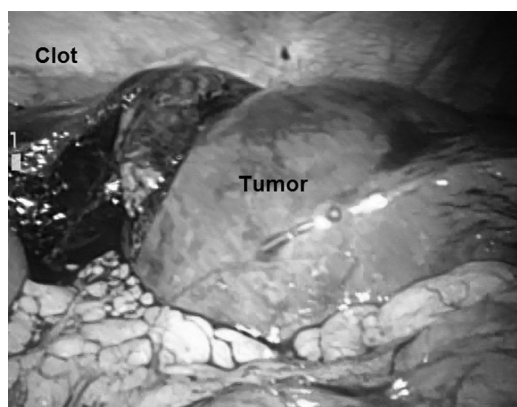


Figure 2. Intraoperative photo of the ruptured HCC with adherent clot.

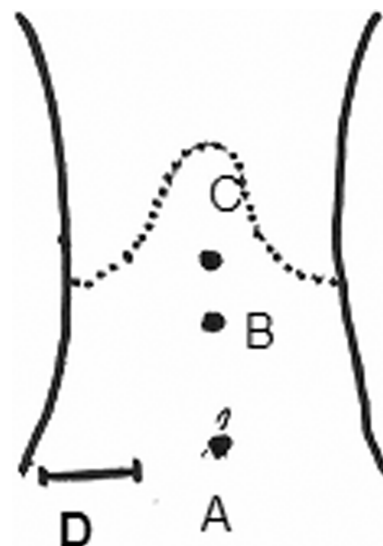


Figure 3. Schematic diagram of the port sites and incision on the patient's abdomen.

the hand-port incision. After the resection was completed, a thorough wash-out of the entire abdominal cavity was performed with 2 L of fluid. The estimated blood loss was 500 mL and the operative time was 165 minutes. No intraoperative blood transfusion was needed. The patient had an uncomplicated recovery and was discharged on postoperative day 5. The resected specimen measured $8 \times 4 \times 4$ cm and weighed 80 g. Final histologic results confirmed a 4.5-cm HCC with 17-mm tumor-free resection margins.

DISCUSSION

Spontaneous rupture of HCC is associated with a mortality rate as high as 75%.⁸ The optimal management of ruptured HCC remains controversial, although the most commonly adopted management approach advocated by most clinicians today is that of initial resuscitation and hemostasis followed by definitive treatment via delayed LR.⁸ Currently, hemostasis in patients with ruptured HCC is best achieved via transarterial embolization rather than with open surgical methods.^{8,10}

The definitive treatment and only curative option for ruptured HCC is LR. Early resection was advocated in the past because of the fear that delayed LR may result in a diminished resection rate secondary to tumor spread.⁸ However, with mortality rates as high as 100% reported with emergency LR, the more widely accepted treatment approach today is that of delayed staged LR. The optimal timing for staged liver resection remains unknown, with

intervals from 10 to 126 days reported in the literature.⁸ It is our opinion that LR for ruptured HCC should be performed as early as possible after the patient has been completely stabilized and resuscitated. Ideally, the patient's tumor stage and liver reserve should also be completely evaluated before surgery.

Laparoscopic LR is now an established treatment option for HCC.^{2,11–13} Numerous studies have demonstrated that oncologic outcomes such as resection margins and disease-free survival were comparable with open resection.² Furthermore, laparoscopic LR is associated with improved perioperative and short-term outcomes such as decreased hospital stay and decreased blood loss.² HALS LR has been advocated by some authors as an alternative to pure laparoscopy,^{6,13} especially for “technically difficult” resections.⁶ Hand control of the liver may theoretically allow for a better margin of resection, decrease blood loss by direct compression, and improve surgical exposure.^{6,14,15} It may be adopted during the learning curve by surgeons beginning to perform laparoscopic liver surgery. It can also be used as a salvage approach when complications such as bleeding arise during pure laparoscopy as an alternative to open conversion. Nonetheless, these theoretical advantages over the totally laparoscopic approach have never been proven.²

The application of laparoscopic LR for ruptured HCC has not been well documented in the literature. The use of laparoscopy in an emergent setting of hemoperitoneum and shock has been limited because of real concerns about poor visualization, limited exposure, and extended operating times.^{9,10,16} To date, only 2 studies—a case series of 3 patients by Belgaumkar et al⁷ and our recent case report⁹—have been the only studies to describe and report the feasibility of laparoscopic LR in the treatment of ruptured liver tumors. Belgaumkar et al reported 3 cases of staged, purely laparoscopic LR for ruptured liver tumors.⁷ LR was performed at an interval of 4 to 21 days after presentation. Two of the patients had ruptured HCCs and one had a ruptured adenoma. Our report described a case of early totally laparoscopic LR for ruptured HCC.⁹

To our knowledge, this is the first reported case of early HALS LR for ruptured HCC. Although the tumor was in an accessible position in segment VI, and the pure laparoscopic approach would have been technically feasible, we decided to adopt the HALS approach. We believe the hand-assisted technique may provide several additional advantages over pure laparoscopy in the setting of ruptured HCC. Placement of the hand may allow the blood

clots to be quickly and more efficiently evacuated compared with laparoscopic suction. This would enable better visualization of the surgical field. Moreover, if active hemorrhage is observed from the ruptured tumor surface, the hand will allow for quick and easy hemostasis of the bleeding with the application of direct pressure. Other authors have also reported that the hand-assisted technique may allow shorter operating times compared with pure laparoscopy, which may be especially advantageous in the emergency setting.^{6,14}

Here we have demonstrated that early resection should be considered in selected patients with ruptured HCC without the prior need for angioembolization. Ideal candidates to consider for this management approach would be hemodynamically stable patients without evidence of ongoing bleeding whose tumor has been staged and liver reserve deemed to be adequate. However, it is not possible to define whether open resection, HALS, or total laparoscopy is the appropriate surgical approach for these patients. The choice of surgical approach would depend on various factors such as the clinical stability of the patient; the complexity of the operation, which is dependent on tumor location and size; and the technical expertise and experience of the operating surgeon.

In conclusion, this report demonstrates that early HALS resection of ruptured HCC is technically feasible. This surgical approach should be considered in patients with spontaneously ruptured HCC and should be added to the armamentarium of all surgeons who treat HCC.

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