

*Research Article***Evaluation of Different Methods of Liver Transection**

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Abstract

Introduction: Hepatic resection remains a challenging surgical procedure due to the risk of major bleeding during parenchymal transection compounded by the complex biliary and vascular anatomy of the liver. **Aim of the study: This study aims to evaluate outcomes of different methods of liver resection namely.** Clamp crush technique, Ligasure, Harmonic scalpel. **Patients and Methods:** This study was conducted in Hepatobiliary Surgery Unit in El Minia University Hospital prospectively from March 2016 including 30 patients who underwent liver resection as a definite treatment. **Results:** From March 2016 (prospectively), thirty patients who underwent liver resection for hepatic focal lesions at El Minia University hospital were randomly allocated in to three groups (clamp crush, harmonic and ligasure group) by means of sealed envelope they were prospectively analyzed for preoperative data: age, gender, BMI, child-Pugh classification, condition of the liver parenchyma, liver functions and planned extent of resection. **Conclusion:** There are different methods of liver transection among of them we used 3 methods in this study each of them has advantages and drawbacks.

Keywords: Liver Transection, Hepatic resection

Introduction

Hepatic resection remains a challenging surgical procedure due to the risk of major bleeding during parenchymal transection compounded by the complex biliary and vascular anatomy of the liver. In addition it remains one of the most common indications for blood transfusions in surgery, reported to be required in up to 36% of patients, according to the type of resection and the technique used⁽¹⁾.

Prior to the introduction of modern transection techniques, mortality rates were high, mostly due to increased blood loss. Although today, mortality rates are much more acceptable, as a consequence of major blood loss excessive transfusion requirements and biliary complications (5-15% rate of biliary leakage), liver resection surgery is still associated with considerable morbidity⁽²⁾.

Reducing the perioperative transfusion rate is a major factor in improving perioperative outcomes, both in open and in laparoscopic surgery, since it not only increases the risk of operative morbidity and mortality, but may also jeopardize long-term survival after resection of liver malignancies because the associated

immunosuppression leads to a higher risk of tumour recurrence⁽³⁾.

Kelly-clasia (Clamp Crush technique) in combination with inflow occlusion (Pringle manoeuvre) has been used for many years to prevent bleeding during parenchymal transection. However, inflow occlusion is not without risk and may lead to hepatic ischemia reperfusion injury, especially in patients with decreased hepatic reserve⁽⁴⁾.

In recent years, various novel devices including Ultrasonic Dissector (UD), LigaSure (bipolar sealer), Ultrasonic Scalpel, TissueLink (saline-coupled monopolar sealer), water-jet dissectors, saline-coupled bipolar sealer and other devices for transection and coagulation of the liver parenchyma have been developed and used for hepatic resection alone or in combination, based upon liver function and the depth of liver resection⁽⁵⁾.

Aim of the study

This study aims to evaluate outcomes of different methods of liver resection namely

1. Clamp crush technique.
2. Ligasure.

3. Harmonic scalpel.

In the term of total operative time, transection time, ischemia time, intraoperative bleeding, the need for blood transfusion and post-operative mortality & Morbidity, hospital stay, liver enzymes and complications.

Patients and Methods

This study was conducted in Hepatobiliary Surgery Unit in El Minia University Hospital prospectively from March 2016 including 30 patients who underwent liver resection as a definite treatment.

Cases were randomized into three groups using the closed envelope method. The envelopes were drawn and opened by a nurse not engaged in the study.

Informed consent was obtained from all cases included in the study, after a careful explanation of the nature of the intervention and possible management with its morbidity.

Patients

Inclusion Criteria:

This study included all patients indicated for liver resection in normal liver and cirrhotic liver child –pugh A and early B.

Exclusion criteria:

This study excluded patients with:

- Child classification C, Late B.
- Patients with severe morbidity preventing surgical intervention.
- Patients with HCC associated with distant metastasis and portal vein thrombosis.

Methods

Patients enrolled in this study were scheduled for anatomical liver resection. All patients signed a written consent, accepted and were aware about the procedure in treatment they will receive according the ethical committee of El Minia university hospital.

Results

From March 2016 (prospectively), thirty patients who underwent liver resection for hepatic focal lesions at El Minia University hospital were randomly allocated in to three groups (clamp crush, harmonic and ligasure group) by means of sealed envelope they were prospectively analyzed for preoperative data: age, gender, BMI, child-Pugh classification, condition of the liver parenchyma, liver functions and planned extent of resection.

Intraoperative data as regard total operative time, transection time, ischemia time, total blood loss, the need for blood transfusion, extent of resection and amount of blood transfusion.

Postoperative data as regard liver enzymes, hospital stay, complications, and morbidity.

Data were statistically analyzed by (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.). $P < 0.05$ was considered significant.

C: Total operative time

In the study, the total operative time for clamp crush method ranged from 120-180 minutes with mean 147.56 ± 23.24 & for harmonic 90-140 minutes with mean 116.27 ± 17.49 and for ligasure 115-160 minutes with mean 135.22 ± 22.87 P value 0.010 (significant).

Total operative time among the studied groups

ethod of transection	Total operative time		ANOVA	
	Range	Mean \pm SD	f	P-value
Clamp crush	120 - 180	147.56 \pm 23.24	5.443	0.010*
Harmonic	90 - 140	116.27 \pm 17.49		
Ligasure	115 - 160	135.22 \pm 22.87		

Discussion

During the last 20 years, liver surgery has undergone substantial changes mainly due to technical and medical innovations and is considered to offer the best opportunity of cure in cases of primary as well as secondary liver tumors⁽⁶⁾.

Liver resection has been increasingly performed over the last 2 decades worldwide because of improved postoperative outcomes and evidence that this approach offers the only chance of cure in many patients⁽⁷⁾. These technical innovations have mainly focused on minimizing bleeding during transection of the hepatic parenchyma⁽⁸⁾. Over the last years, several technological advances have focused on different techniques for hepatic parenchymal transection. These include ultrasonic dissection, hydro-dissection, microwave coagulators, radiofrequency coagulators, and stapling with vascular staplers⁽⁹⁾. On the other hand, the classic clamp-crush technique (Kelly-klasias technique) is a simple method avoiding the need for special equipment⁽¹⁰⁾. Each of those hepatic transection techniques has its own advantages and disadvantages, but they share the same objectives including decreasing the blood loss during parenchymal transection, shortening the duration of parenchymal transection, avoidance of unintended injury of intrahepatic and adjacent structures, and adequate sealing of small bile ducts to prevent postoperative biliary leaks⁽¹¹⁾.

The current study was done prospectively in the specialized hepatobiliary center of El-Minia University hospital from March 2016 to March 2019 on thirty patients indicated for liver

resection, transection of the liver parenchyma was performed by the conventional clamp crush technique, ligasure vessel sealing system and harmonic scalpel. (10 for each method)

This number is smaller than in the study by⁽¹²⁾ which was comparative study between ligasure and conventional clamp crush technique and included 30 patients for each group with total number 60 cases, also smaller than the number in the study of⁽¹³⁾ which was comparative study between conventional clamp crush technique and harmonic liver resection in living donor

liver resection, which included 72 cases 36 case for each group. Small number in the study due to short duration of the study and limited numbers of cases in our locality.

Conclusion

There are different methods of liver transection among of them we used 3 methods in this study each of them has advantages and drawbacks. As regard the ligasure and harmonic safe procedure associated with minimal operative and transection time but it is costly in comparison with the clamp crush technique and harmonic scalpel is associated with significant increase in ALT in the 1st and 3rd postoperative day.

As regard Clamp-crush technique is advocated as a simple, easy, safe, and cheap method for hepatic parenchymal transection. It avoids the need for special complex equipment and subsequent added costs. Not associated with significant increase in blood loss, transfusion requirements, and perioperative morbidities or mortality.

It is associated with significant increase in the operative time and transection time.

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