

# Hepatic Resection in Kurdistan Center for Gastroenterology and Hepatology: A Single Center Experience

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## Abstract

**Background and objectives:** Liver resection has become definitive management for several benign and malignant conditions. The aim of the study is to review the short-term outcome of hepatic resection, including extent of resection, the original pathology, blood loss, blood transfusion, morbidity and mortality. **Methods:** This is a case series study included 25 patients underwent hepatic resection to treat benign conditions or to potentially eradicate malignant conditions between 1st January 2016 to 31st August 2017 in three hospitals belongs to Kurdistan Center for Gastroenterology and Hepatology. Data regarding socio-demographics and short term outcome, including extent of resection, blood loss, blood transfusion, morbidity and mortality were collected and analyzed. **Results:** The total number of patients that underwent hepatic resection was 25. There were 5 male, 20 female. Age ranged between 5-77 years with mean age of 45.8 years. The indications for resection were malignant disease in (44%) and benign diseases in (56%). The mean estimated blood loss was  $904.0 \pm 597.7$ . The mean blood transfusion was 800 ml packed red blood cell. The postoperative recovery was smooth in (64%) and complicated in (36%). The mortality rate was (4%). **Conclusions:** hepatic resections can be done with acceptable early postoperative outcomes despite limited resources and low volume set-up, morbidity, mortality, estimated blood loss and average transfusion requirement was high which can be further minimized with better meticulous surgical technique and use of novel energy devices. **Keywords:** hepatic resection; Short term outcome, Blood loss, Blood transfusion.

## Introduction

Hepatectomy is defined as a surgical resection of the liver (removal of all or part). Dr. Ichio Honjo (1913–1987) was credited as a first surgeon who resected liver<sup>1</sup>. Hepatectomy is divided into two main types; anatomical or non-anatomical. Anatomic resection includes complete removal of at least one Couinaud's hepatic segment containing the pathology with corresponding hepatic territory and portal vein. Resection of the diseased part with its safety margin without concerning to segmental, sectional or lobar anatomy is called non-anatomic resection<sup>2</sup>. Because of a greater understanding of the vascular and biliary anatomy; the liver surgeons have become able to resect single liver segment alone or in combinations. With improvements over the last 2 decades in surgical technology and perioperative management,

liver resection is now practiced widely with reduced morbidity and minimal mortality<sup>3</sup>. Hepatic resection is the only curative treatment for many liver tumors. Numerous strategies available to reduce blood loss during hepatic resections like several intra operative maneuvers, including the administration of aprotinin, low central venous pressure (CVP) anesthesia ( $\leq 6$  mmHg), temporary hepatic vascular inflow occlusion (Pringle maneuver), ultrasonic dissection (Cavitron Ultrasonic Surgical Aspirator CUSA) and the use of the Cell Saver to recycle autologous blood intra operatively<sup>4</sup>. Indications for liver resections include primary and secondary malignancy (hepatocellular carcinoma, colorectal metastases, intrahepatic cholangiocarcinoma and neuroendocrinetumors), benign neoplasia (hepatic adenoma, giant hemangioma), echinococcus multilocularis (alveolaris), traumatic liver lesions and abscesses

refractory to conservative management<sup>5</sup>. The aim of the study is to review the short-term outcome of hepatic resection, including extent of resection, the original pathology, blood loss, blood transfusion, morbidity and mortality.

## Patients and methods

This is a case series study included all 25 patients underwent hepatic resection between 1st January 2016 to 31st August 2017 in three hospitals in Kurdistan region of Iraq (Faruk Medical City, Shorsh Teaching Hospital and Shar Teaching Hospital).

Inclusion criteria were all resectable liver tumor and symptomatic liver lesion while exclusion criteria were unresectable liver lesion and liver cirrhosis.

Patients who had space occupying lesion in their liver in the form of benign or malignant lesions were enrolled in the study and were investigated by renal function test, liver function test, complete blood counts (CBC), serological test for viral markers like Hepatitis B Virus and Hepatitis C Virus.

Hepatic resection was done to those patients either to treat benign conditions or to potentially eradicate malignant condition. All patients with primary hepatic malignancy were assessed by triphasic computed tomography (CT) scan or magnetic resonance imaging (MRI) to evaluate the pathology of liver and assess the respectability of tumor and to exclude the presence of extra hepatic dissemination of tumor and in patients with secondary hepatic metastases from colorectal cancer they were sent for positron emission tomography scan ,to exclude primary recurrence of tumor and to exclude the presence of extra hepatic metastases of tumor.

A prophylactic antibiotic (cefotaxim 1 g) was given intravenously at induction of general anaesthesia. Exposure was obtained by means of a midline incision, right subcostal incision, bilateral subcostal with midline extension (Mercedes incision) or J-shaped incision or donor incision. Self-retaining retractor (Thompson Retractor) was used whenever available (it was available in one hospital). After exploration of the abdomen the liver is fully mobilized by division of falciform and right and left triangular and coronaries ligaments. Intra-

operative ultrasound was not performed because it was not available. parenchymal transection have been done mostly by crush clamp technique ( Kellyclysis method ) and unipolar diathermy, but Harmonic Scalpel Energy System and LigaSure vessel sealing system have been used less as these two devices were available in private hospital and not available in governmental hospitals because of economic crisis and shortage supply. Temporary hepatic vascular inflow occlusion (Pringle maneuver) was used only when significant bleeding was encountered. Less attention was paid to lowering of the central venous pressure to below 5 mm HG to reduce venous bleeding during transection. Amount of intraoperative blood loss in milliliter and amount of blood transfusion were calculated. Lastly single corrugate drain placed in the developed cavity with colostomy bag to measure the output of drain because ideal drain like Jackson- Pratt was not available, and abdominal wall is closed in one layer. Patients with major hepatic resection were monitored in high dependency unit in the immediate postoperative period. Oral feeding was started as soon as the bowel sounds returned the early mobilization was encouraged.

This clinical trial was approved by the ethical committee of Kurdistan Board for Medical Specialties, Erbil, Kurdistan Region- Iraq and informed written consent was obtained from each patient before surgery.

At the time of discharge from hospital, details of patients were collected on database which included demographics and clinical data like operative blood loss which calculated from bottle of suction device, amounts of blood transfused, and complications. Complications or death occurring either within 30 days or before hospital discharge were regarded as perioperative or short term outcome. More data regarding complications, deaths was added to database at the time of 6- weeks out patients follow up.

## Results

The total number of patients was 25. There were 5 male (20%), 20 female (80%). Age ranged between 5-77years with mean age of 45.8 years.

**Table (1):** Age distributions of the enrolled cases

Age in years	Frequency	Percentage
< 10	1	4%
11-20	1	4%
21 - 30	2	8%
31 - 40	6	24%
41 - 50	5	20%
51 - 60	2	8%
> 60	8	32%
Mean ± SD	45.8 ± 18.6	

Hepatic resection was performed by right lobectomy in 4 patients (16%) , left lobectomy in 4 patients (16 %), left lateral segmentectomy in 4 patients (16 %) right posterior sectionectomy in 5 patients ( 20%) , extended right hepatectomy in 1 patient (4%) and other resection like non anatomical in 7 patients (28%) . The most frequently

used incision was donor incision 21 patients (84%), other incision were Mercedes in two patients (8%), midline incision in one patient (4%) and right subcostal in another patient (4%).

**Table (2):** Types of hepatic resection

Type of resection	No.	%
Left lobectomy	4	16.0%
Left lateral segmentectomy	4	16.0%
Right posterior sectionectomy	5	20.0%
Extended right hepatectomy	1	4.0%
Other (Non – anatomical)	7	28.0%

Thompson’s retractor was used in 10 patients (40%). The most common indications for which hepatic resection were used for were benign conditions; Table 3 shows indications for liver resection.

**Table (3):** Indications for hepatic resection according type

Malignant pathology (No. %)	11(44%)	Benign pathology (No. %)	14(56%)
Hepatocellular carcinoma	2(8%)	Hydatid cyst	1(4%)
Intrahepatic cholangiocarcinoma	2(8%)	Hepatic tuberculosis	4(16%)
Hepatoblastoma	1(4%)	Liver cell adenoma	4(16%)
Metastatic colorectal cancer	5(20%)	Hepatoolithiasis	3(12%)
Carcinoma of gallbladder	1(4%)	Amoebic liver abscess	1(4%)
		Biliary papillomatosis	11(4%)

Amount of blood loss and blood transfusion is presented in Table 4.

**Table (4):** Amount of intraoperative blood loss and transfusion

Blood loss and transfusion (ml)	No.	%	
Amount of blood loss	100 - 500 ml	9	36.0%
	501 - 1000 ml	9	36.0%
	1001 - 1500 ml	4	16.0%
	1501 - 2000 ml	3	12.0%
	Mean ± SD ( ml)	904.0 ± 597.7	
Amount of blood transfusion	No blood transfusion	6	24.0%
	500 ml	6	24.0%
	1000 ml	9	36.0%
	1500-2000 ml	4	16.0%
Mean of transfused blood( ml)	800 ml		

The post operative recovery was smooth in 16 patients (64%) and complicated in 9 patients (36%) which are shown in Table 5.

**Table (5):** Early Postoperative complications (first 30 days).

Types of complications	No.	%
bile leak	4	16.0%
Chest infection	2	8.0%
Superficial surgical site infection	1	4.0%
Chest infection and bile leak	1	4.0%
Intra operative death	1	4.0%
Total	9	36%

One patient died. He was a 5-year-old male, known case of hepatoblastoma and partial responder to chemotherapy, underwent extended right hepatectomy. Unfortunately, he did not recover from general anesthesia.

Bile leaks were 16% and all were low output less than 200 ml per day and all were treated by percutaneous drainage under ultrasound guide.

## Discussion

Several factors have transformed hepatectomy into a safer operation including deeper knowledge of hepatic anatomy, better preoperative assessment of patients and their hepatic function, development of imaging examinations and improvement of operative techniques<sup>6</sup>, but in the developing world with limited resources and scarcity of technology for proper preoperative workup and energy devices for bloodless surgery, hepatic resection is not still performed routinely in many centers since it is considered a difficult procedure associated with major blood loss and serious postoperative complications<sup>7</sup>. Better postoperative outcome of liver resections largely depends upon decrease operative bleeding and sufficient functional reserve of non-resected liver. Increased knowledge of intra hepatic anatomy and introduction of operative ultrasound have allowed the development of an accurate surgical technique, thus reducing the risk of bleeding during resection. Temporary vascular occlusion of hepatic inflow has been reported to be effective in reducing bleeding from intraparenchymal arterial and portal branches<sup>8-10</sup>.

In the current study, the indications for surgery were mainly for benign diseases (56%), unexpectedly, (16%) of cases were hepatic adenoma and another 16% of cases were hepatic tuberculosis. This result agrees with some studies and contradicts others. In the study of Jasim Hl

et al<sup>11</sup> in 15 cases of liver resection the indications for surgery mainly were for benign diseases (53.33%) and hydatid cysts half of these cases. But in the Iwatsukiet al study, from 411 cases of liver resections benign diseases were (44.28%) and most of cases were cavernous haemangioma (55%)<sup>12</sup>. While in Terkivatanet al study, he had focal nodular hyperplasia the main indication for liver resections in benign disease<sup>13</sup>. Our explanation for high rate of liver tuberculosis is that Iraq regarded as endemic area for tuberculosis.

Regarding malignant disease of liver; in this study were (44%), of them (20%) were for secondary hepatic malignancy from colorectal cancer like in most of reported study of liver resection for hepatic malignancy<sup>14-16</sup>. The majority of pathologies (55.72%) in Iwatsukiet al study were malignant conditions<sup>12</sup> which is higher than that of this study (44%).

There are different reports in the literature regarding hepatectomy outcome. In an analysis of 2313 hepatectomies using data from several institutions, there was a mortality rate of (2.5%) and a morbidity rate of (19.6%)<sup>17</sup>. In Lopes et al study postoperative complications (within the first 30 days) occurred in (23.7%), and mortality rate was (13.2%)<sup>18</sup>. In this study, the mortality rate was 4% which was a child 5 years old not recovered from anesthesia and the early postoperative complication (within the first 30 days) was 32%.

The mean estimated blood loss (EBL) in this study was 904± 597ml which is slightly more than others. In Begum S et al study, mean EBL was 665ml<sup>19</sup>.

Amount of blood transfusion in current study was 800 ml of packed red blood cell (RBC) which is comparable to the result of Lopeset al which was between 500- 1250 ml packed RBC<sup>20</sup>, explanation of such high rate of blood loss and replacement is lack of modern device like Cavitron Ultrasonic Surgical Aspirator (CUSA), LigaSure vessel sealing system, vascular stapler and Harmonic device.

Bile leakage following hepatectomy is a common and sometimes challenging clinical problem with incidences ranging from 3% to 15%<sup>18, 21, 22</sup> but in this study bile leak was 16% and were treated by percutaneous drainage under ultrasound guide, also in other study like Begum etal<sup>17</sup>; bile leak was (5.3%). High bile leak rate in this study

may be due to lack of intra operative cholangiography in 2 hospitals out of 3, which help to delineate bile leak and biliary anatomy and anomalies.

Limiting factors in current study were small sample size, deficiency in the sophisticated equipment and devices like Thompsons retractor, CUSA, LigaSure vessel sealing system, vascular stapler, Harmonic device, hypotensive technique, intra operative cholangiography, intra operative ultrasound and lack of proper Intensive Care Unit (ICU) which required in such operations particularly in governmental hospitals as well as lack of liver transplant facility which might be needed in some cases which affect on mortality and morbidity .

## Conclusions

Hepatic resections can be done with acceptable early postoperative outcomes despite limited resources and low volume set-up, morbidity, mortality, estimated blood loss and average transfusion requirement was high which can be further minimized with better meticulous surgical technique and use of novel energy devices.

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