



Liver Resection- A Single Surgeon Experience with Emphasis on Utility of Intraoperative Ultrasound

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Abstract

Background: Liver is a highly vascular organ. Role of hepatic resection in the management of various liver disease has improved persistently over last few decades. Aim of our study was to understand the demographic profile of patients undergoing liver resections at our center, indication of liver resections, types of liver resections performed, post -operative complications and compare these findings with national and international data.

Design and Methods: This study was conducted in the department of Surgical Gastroenterology, Sher-I-Kashmir Institute of Medical Sciences (SKIMS) Soura Srinagar, a tertiary care Institute in our State of Jammu and Kashmir in India. A retrospective analysis of prospectively collected data of liver resection by a single surgeon was reviewed over a period of 10 years from January 2010 to January 2020. The data was analyzed for indications, operative details of technique, and type of resection.

Results: There were 122 patients in our study. 47 (38.5%) were males and 75 (61.5%) were females with a male and female ratio of 1: 1.59. Mean age was 53 ± 7 years. Only 3 patients were Child B (<7), rest had Child A score. Oriental cholangio-hepatitis (OCH) in 45 patients (36.1%) was the most common clinical diagnosis followed by carcinoma gall bladder (CaCB) in 37 cases (30.3%). Most common procedure performed was left lateral segmentectomy in 55 patients (45.1%). All liver resections were performed with Kelly clamp crushing technique and using basic bovie electrocautery. Pringles manuever was used as and when indicated. Intra-operative ultrasound (IOUS) was used routinely for guiding resection. The average procedure time was 2.6 hours. The mean blood loss was 146.5ml. In our study complications rate was 22.9%. Wound infection was observed as the most common complication in 6 patients (8.23%). The mean hospital stay was 7.5 days.

Conclusion: Liver resection even with basic electro cautery is safe and is associated with acceptable complication rate. IOUS can be helpful in difficult situation. Oriental cholangio hepatitis is the most common indication for liver resection followed by carcinoma gallbladder CaGB in our subset of patients.

Keywords: hepatic resection, Oriental cholangio-hepatitis, left lateral segmentectomy, carcinoma gall bladder

INTRODUCTION

Liver is a highly vascular and finely defined anatomic organ taking and managing the highest volume of cardiac output. With the understanding of minor

details in liver anatomy, advanced techniques and improved perioperative management with a multidisplinary team approach, the role of liver

resection in the management of various cancerous and non-cancerous disease has improved persistently over last few decades [1]. The horizons of liver resection as were practiced in the era of open surgery are now progressing and advancing to laproscopic resections and liver transplants. The advances have been because of contribution of advanced and selective vascular control, improved techniques for parenchymal transections such as cavitron ultrasonic aspirator (CUSA), waterjet, vascular staplers and radio frequency assisted resection and robot assisted surgeries [2].

In a tertiary care hospital in this sub-continent of world with limited resources with a desire to keep pace with delivery of services to the level of other advanced higher level health care system, we have gone into introspection of liver resections performed by us so that we further progress to safe, scientific and effective liver resections at our center. Aim of our study was to understand the demographic profile of patients undergoing liver resections at our center, indication of liver resections, types of liver resections performed, intra operative details, utility of intra-operative ultrasound, post-operative complication and mortality, and compare these findings with national and international data.

Patient selection, functional liver remnant and experience of surgical team are utmost-important criteria for the success of these surgeries [3].

MATERIAL AND METHOD

This study was conducted in the department of Surgical Gastroenterology, Sher-I-Kashmir Institute of Medical Sciences (SKIMS) Soura Srinagar, a tertiary care Institute in our State of Jammu and Kashmir in India. A retrospective analysis of prospectively collected data of liver resection by a single surgeon was reviewed over a period of 10 years from January 2010 to January 2020. All patients were evaluated by history and clinical examination, and investigated with complete blood count, coaguloram, liver and renal function tests. An imaging work up of all patients was done with baseline ultrasound abdomen followed by contrast enhanced computed tomography (CECT) of 64 slice available at our Institute. Contrast enhanced magnetic resonance imaging (CEMRI) liver was done selectively when indicated. The data was analyzed for indications,

operative details of technique, and type of resection. The study also analyzed post-operative complication, hospital stay and readmission rate following these resections. All major resections were done under intermittent Pringle inflow occlusions only. We used basic cautery and Kelly clamp dissection techniques. We excluded patients with child B (>7) and C cirrhosis, severe coagulation disorder and ASA 2 or more and inadequate functional liver remnant (FLR). On the basis of investigation, the preliminary diagnosis was established and surgical resection was planned accordingly. The patients were optimized pre-operatively. We routinely used an IOUS to guide our selection of vascular pedicles and picking up the exact location of deep lesions. In some major liver resection Priangles manuever was used with release every 15 minutes. In no case total vascular occlusion was used. Majority of the times the vascular pedicle of concerned side of resection was controlled initially during the procedure. On average systolic blood pressure of 100 was tried and maintained intra-operatively by anesthetists. The post-operatively morbidity and mortality till discharge from hospital and in the follow-up period up to 30 days after discharge from the hospital was recorded.

The final data were recorded on a predesigned study Performa and was managed in Microsoft Excel. Data analysis was performed using SPSS software. The values of various parameters were presented as mean \pm SD, in absolute numbers and as percentage.

RESULTS

There were 122 patients in our study. 47 (38.5%) were males and 75 (61.5%) were females with a male and female ratio of 1: 1.59. Mean age was 53 ± 7 years. In our study, the mean hemoglobin and platelet count was 11.57gm/dl and 1.4 lac/dl. Mean AST and ALT were 37.1.U and 52 I.U respectively. The mean ALP observed was 1971.U. In all patient initial abdominal ultrasonography was done for preliminary diagnosis. CECT abdomen was done in all cases in our series with almost consistent finding in majority of cases on intra-operative confirmation. All the patients were assessed for Child score. In our study, only 3 patients were Child B (<7) whereas rest had Child A score. (Table 1)

Oriental cholangio-hepatitis (OCH) in 45 patients (36.1%) was the most common established clinical

diagnosis in our study followed by carcinoma gall bladder (CaGB) in 37 cases (30.3%). Indications for resection are tabulated in table 2. Different resections offered to our patient population is listed in table 3. Most common procedure performed was left lateral segmentectomy in 55 patients (45.1%). The average procedure time was 2.6 hour (156 mins), ranging from 1 hour to 5 hours. In our study, the mean blood loss was 146.5ml. 39.3% cases had less than 100 ml blood loss and 23% cases had more than 200 ml blood loss, with the maximum blood loss of 600 ml. Different intra-operative details are mentioned in table 4. In our study complications rate was 22.9%. Wound infection was the most common complication in 6 patients (8.23%). Bile leak was seen in 6 (4.9%) cases. Pulmonary complications such as pleural effusion, basal atelectasis and pneumonia were seen in 5 patients (4%) [Table 5]. The mean hospital stay was 7.5 days with standard deviation of 4.49 days with minimum stay of 3 day and maximum of 35 days.

DISCUSSION

Liver surgery has been described for centuries in literature. However, it wasn't until development in general anesthesia and antibiotics that formal liver resections became more prevalent. In the last 60 years, technological advances have led to a rapid improvement in various technique in liver resection. The continual success of liver surgery and progression to laparoscopic resections is owed to not only improved transection techniques, but also to advances in perioperative care, anesthesia, and post-operative care [4]. The present study of 122 cases from our institute for last 10 years extending from 2010 to 2020 is about demographics, clinical presentation, investigation, diagnosis, type of surgical intervention, operative time, intraoperative blood loss, hospital stay and peri-operative complication. The analyzed data from the results and observation of this study were compared with the previous studies.

Most common procedure performed in our study was left lateral segmentectomy in 45 patients (36.8%) with most common indication being oriental cholangio-hepatitis (OCH). Various treatment options for OCH include choledochoduodenostomy, choledochojejunostomy or hepaticojejunostomy when there is bilateral disease; but in unilateral disease resection of the liver on the diseased side is universally accepted. [5,6]

Segment 4B and 5 resections as a part of extended radical cholecystectomy or completion cholecystectomy for cases of stage IB and II Ca GB is a common and successful treatment option of early gallbladder cancers. [7]. Some surgeons suggest aggressive surgeries like extra hepatic bile duct resection and extended hepatectomies for locally advanced gallbladder Ca [8]. Present study had 30% of liver resections done for this indication.

Hydatid disease of liver was another indication for which liver resection was done in our study. In our series 6 cases under went resection for hydatid pathology when the lesion was at feasible site. Study done by Ibrahim et al concluded that, hepatic resection for liver hydatid is a radical procedure; but it is safe and effective option for treatment of liver hydatidosis when the entire segment or lobe is diffusely involved by this pathology [9]. There are many proponents of doing resection of the cyst with pericyst along with segment involved to avoid spillage and chances of recurrence.

As for HCC with proper Barcelona clinic staging, we have operated only 3 cases. The literature suggest resection is an optimal treatment for all stage 0 and stage 1 disease. The debate of liver transplant being an appropriate treatment option in this scenario in the background of CLD is finding new horizons [11].

The operating time in the study was variable depending on the indication and procedure planned. The average procedure time was 2.6 hours (156mins), ranging from 1 hour to 5 hours and is in accordance to other studies [4].

We had a complication rate of 22.9%. Literature suggests complication of liver resection varying from 4 to 40 %. The complication is defined usually in light of definitions of international study group of liver surgery [12-13]. The risk factors for complications after liver resections are pathological background of the liver itself and the indications of resection. Operative time, number of transfusions and tumor size are other independent risk factors [14].

CONCLUSION

Liver resection even with basic electro cautery is safe and is associated with acceptable complication rate. IOUS can be helpful in difficult situation. Oriental cholangio hepatitis is the most common indication for

liver resection followed by Ca GB in our subset of patients.

Table 1

Demographic Details and Clinical Variables

Gender	Frequency	Percentage
Male	47	38.5
Female	75	61.5
Age		
> 60	47	38.5
<60	75	61.5%
Symptoms		
Ruq pain	73	59.8%
Fever	12	9.9%
Nausea	12	9.9%
Weight loss	7	5.6%
Jaundice	4	3.3%
Asymptomatic	14	11.5%
Child Score		
A	119	97.5%
B (score < 7)	3	2.5%
C	NIL	0
Asa score		
I	88	72.13%
II	34	27.86%
III	NIL	0%

Table 2

Indications for Resection

Diagnosis	Frequency	Percentage
OCH	45	36.9
CaGB	37	30.3
CRLM	10	8.2
Hemangiomas	6	4.9

Hydatid	6	4.9
Trauma	6	4.9
Hepatocellular carcinoma	3	2.5
Other diagnosis	9	7.3

OCH- oriental cholangiohepatitis

CaGB- carcinoma gallbladder

CRLM- colorectal liver metastasis

Table 3

Types of Resection

Resection type	Frequency	Percentage
LLS	55	45.1
IVb/V or wedge resection	36	29.5
LH	13	10.7
RH	10	8.2
NAR	7	5.7
ST	1	0.8

LLS- left lateral sectionectomy

IVb/V- segment IVb and V resection

LH- left hepatectomy

RH- right hepatectomy

NAR- non-anatomical resection

ST- segmentectomy

Table 4

Intra Operative Details

Liver resection type	N	Mean Resection Time (hrs)	Mean Blood loss (in ml)	Intra-operative hypotension	Need of Blood transfusions
LLS	55	2.6	96.7	7	3
IVb/v resection	36	2.45	129.7	1	1
LH	13	2.77	276.9	2	1
RH	10	2.9	266	3	1
NAR	7	2.57	211.4	2	1
ST	1	4	150	1	1

All	122	2.6	146.5	16	9
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LLS- left lateral sectionectomy

LH- left hepatectomy

RH- right hepatectomy

NAR- non-anatomical resection

ST- segmentectomy

Table 5

Complication

Complication	Frequency	Percentage
Wound infection	10	8.2
Bile leak	6	4.9
Pulmonary complication	5	4.09
Hemorrhage	4	3.2
Ascities	2	1.6
Biliary fistula	1	0.81
Overall morbidity	28/122	22.95%

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