Outcome of Hepatic resection in gastroenterology and hepatology teaching hospital

***Dr.Hamid Ismael Jasim**

ABSTRACT

Background: The resection of primary and secondary liver tumors has become accepted as the only curative therapy that can be offered to patients with these cancers. Technical advances made over the last two decades have improved the ability of the surgeon to perform these procedures with decreased morbidity and mortality.**Aim:** review the indication and outcome of liver resection .**Patients and methods**: From October 2008 to February 2012.Fifteen anatomic hepatic resectionswere performed. Enucleation, non-anatomic or wedge resection was excluded from this study.**Results**: there were five men, eight women and twochildren. Age range between 1-52 years and median age 40 years. These classical hepatic resections included extended right hepatectomy one patient, right hepatectomy three patients, left hepatectomy three patients, left lobectomyfour patients, right anterior sectionectomy one patient (segments V&VIII),segments V&VI one patient,segment 4B resection two patients. The median operative time was 250 (range 95480) min. Post-operative hospitalization was 3-15 days, median 7 days. There was no mortality. Two patients developed bile leak in form of biloma were treated by percutaneous drainage under ultrasound.one patient had postoperative liver insufficiency recoveredwithi n week. TheMedianfollow up wastwenty months.One patient developedrecurrent tumor in left liver lobe eight month after right hepatectomy for hepatocellular carcinoma.**Conclusion:** major liver resection can be performed with acceptable morbidity rate and mortality with the available facilities and postoperative care.

Keywords: liver resection, hepatocellular carcinoma, hydatid cyst

Introduction:

Hepatic resection has evolved from an imprecise removal of portions of the liver, frequently accompanied by extensive hemorrhage, to a controlled, anatomy-based procedure that represents a major advance in modern surgery.

Although Berta performed the first liver resection in 1716, it was not until 1952 that Lortat-Jacob [1] reported an anatomic liver resection for cancer. Subsequently, Couinaud [2] published a comprehensive description of liver segmental anatomy in 1957.

Thereafter, because of a greater understanding of the vascular and biliary anatomy of the liver, surgeons became able to resect individual liver segments alone or in combination. 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. [3, 4]

Aims of resection:

The aim is to resect the liver with minimal bleeding and leaving adequate functional liver. It is crucial that sufficient residual functioning liver remains after resection so as to avoid hepatic insufficiency postoperatively. This is of particular concern in patients with cirrhosis where liver function may be reduced anyway, and also in patients with extensive disease where the volume of liver to be resected is considerable.[5-6]

Surgical anatomy of the liver:

The eight anatomic segments of the liver are defined by the distribution

Of the hepatic and portal venous systems. Each liver segment has anindependent biliary drainage and vascular inflow and outflow (Fig.1).[7]

* FICMS specialized surgeon Gasteroenterology And Hepatology Teaching Hospita; L

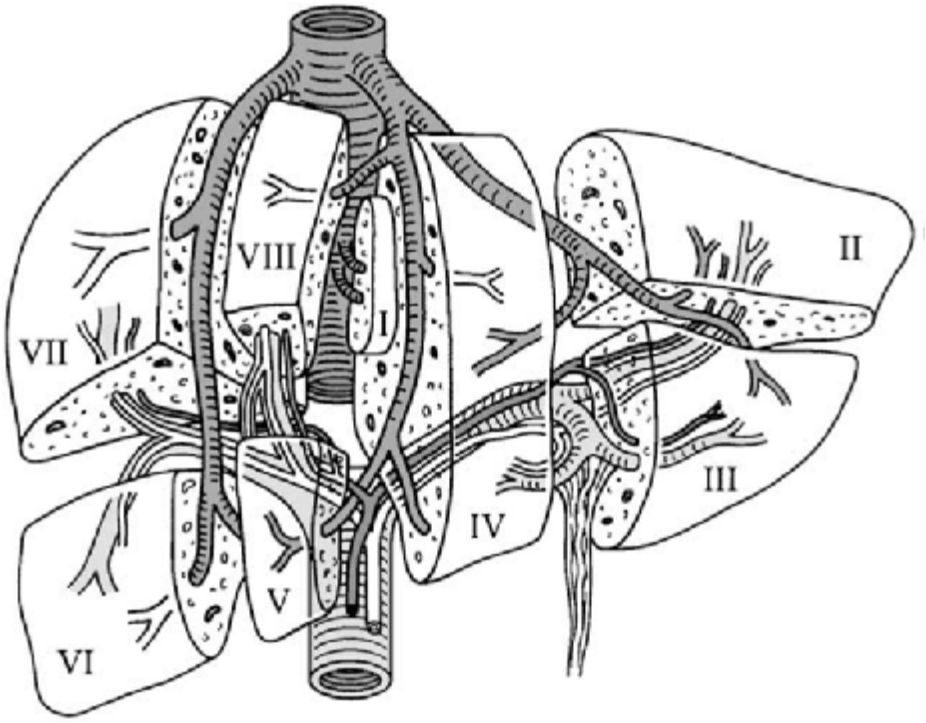

Fig. 1. Schematic diagram of liver segments as described by Couinaud. Segments are based upon the vasculobiliary structures supplying the liver parenchyma.

Consequently, it is possible to remove an individual segment withoutdisrupting the blood flow or biliary drainage of the remaining segments.
Based on the Brisbane 2000 Terminology of Hepatic Anatomy and Resection (Table 1), the liver can be divided into four sections: the right anterior section (segments V and VIII), right posterior section (segments VI and VII), left medial section (segment IV), and left lateral section (segments II and III).
[8]

Table1: The Brisbane2000Terminology ofHepatic AnatomyandResectionfromtheTerminology Committee oftheInternationalHepato-Pancreato-BiliaryAssociation

Terminology	Segments
Right anterior section	V, VIII
Right posterior section	VI, VII
Left lateral section	II, III
Left medial section	IV
Left hepatic lobe	II, III, IV
Right hepatic lobe	V, VI, VII, VIII

The fibrous sheath of Glisson encircles the hepatic artery, portal vein, and bile duct at the hilum and continues as the liver capsule. The right sectional pedicles of the liver are surgically accessible at the hilum by the posterior intrahepatic Glissonian approach described by Launois and Jamieson.[9, 10] Pedicle ligation allows inflow control before parenchymal transection. Selective clamping of a pedicle demarcates the liver segment or liver section of interest and guides the plane of resection. On occasion, control of the inflow pedicle is not recommended. For instance, in the presence of portal hypertension with associated collaterals or previous right upper quadrant abdominal surgery, dissection at the hilum may be hazardous .[11] In these cases, the segmental boundary is estimated directly or with the use of intraoperative ultrasonography. Others advocate the dye injection mapping technique as described by Makuuchi The major outflow vessels of the liver are the right, middle, and left hepatic veins. They are generally accessible outside the liver where they enter the inferior vena cava (IVC). Early control of the hepatic veins minimizes intraoperative blood loss.

The presence of a large inferior accessory vein to the right liver or a well-developed umbilical vein to the left liver provides additional flexibility in performing segment-oriented resection because they provide alternative venous drainage in the event that the right or middle hepatic veins, respectively, need to be sacrificed.

[2]The types of liver resections:

The types of liver resections are thus defined in anatomical terms. A wedge resection involves removal of less than one anatomical segment. Removal of 13 anatomical segments is called a segmentectomy. Removal of segments II and III represents a left lateral sectionectomy(left lobectomy). A left hepatectomy entails removal of the left hemiliver, including segments II, III, and IV. Removal of the right hemiliver, including segments V, VI, VII, and VIII represents a right hepatectomy. Finally, either a right or left hepatectomy including a portion of the contralateral lobe or the caudate lobe represents an extended hepatectomy.[7]Fig. 2

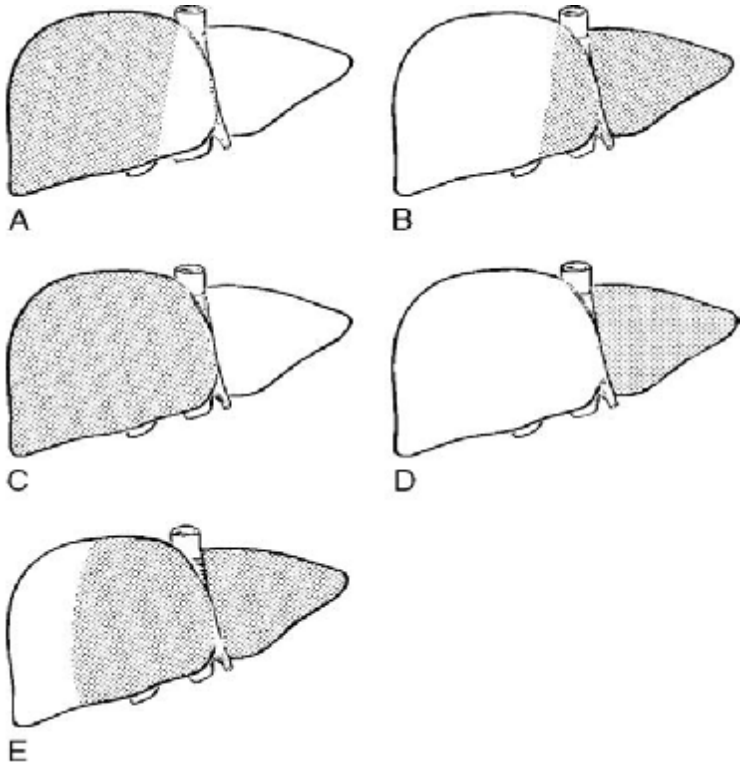

Fig. 2 Commonly performed major hepatic resections are indicated by shaded areas. A, Right hepatectomy. B, Left hepatectomy. C, Right lobectomy. D, Left lobectomy. E, Extended left hepatectomy.

Indication:

Liver resection is indicated in:[12]

1-Primary and secondary malignancy (e.g., hepatocellular carcinoma, intrahepatic cholangiocarcinoma, colorectal metastases, neuroendocrine tumors)

2-Benign neoplasia (e.g., adenoma, giant hemangioma)

3- Echinococcus multilocularis (alveolaris)

4- Abscesses refractory to conservative management

5- Other benign diseases (e.g., Caroli syndrome)

6-Living donor liver transplantation (modified technique)

7- Klatskin's tumor (modified approach to the bile duct).

8- Traumatic liver lesions

A noncirrhotic healthy liver may tolerate a resection of 80% of its volume. The enormous regenerative capacity enables functional compensation within a few weeks such a favorable outcome cannot be taken for granted, however, in extended hepatic resections. Only if reduction of the functional liver parenchyma is less than 50% can the risk of clinically significant liver insufficiency be virtually disregarded. Postoperative hepatic reserve is of particular importance after extended left hepatectomy and when all of the liver to the right of the falciform ligament is removed (right lobectomy).[13]

Patients and methods:

This is retrospective and prospective study for all patients underwent hepatic resection between October 2008 and February 2012 in gastroenterology and hepatology teaching hospital. Preoperative evaluation varied according to the disease process but included computed Tomography (CT) in all patients, In addition, over the last year intraoperative ultrasonography was used. All patients with primary hepatic malignancy were assessed to exclude the presence of extrahepatic dissemination of tumor and in patients with secondary hepatic metastases to exclude primary recurrence of tumour. Major anatomic hepatic resection was done to those patients either to relieve symptoms for benign conditions or to potentially eradicate malignant condition. Enucleation, non-anatomic or wedge resection was excluded from this study.

Principles of Operative technique in general

Prophylactic antibiotics (cefotaxim 1 g) were given intravenously at induction of anaesthesia.

prophylaxis against deep vein thrombosis as Low molecular weight heparin (enoxaparin) 4000U daily or Subcutaneous heparin 5000 units was given twice daily over the perioperative period.

Exposure was obtained by means of a midline incision, bilateral subcostal with midline extension (Mercedes incision) or J-shaped incision. With using a self-retaining retractor, the costal arch is pulled up cranially and the entire anterior surface of the liver can be exposed. After exploration of the abdomen the liver is fully mobilized by division of falciform and right and left triangular and coronaries ligaments. The gastro hepatic omentum encircled by vascular tape and prepared for Pringle's maneuver if need it. Cholecystectomy done with exploration of porta-hepatis . The inflow pedicle was controlled by two methods; either by extrahepatic control of inflow vessels by division and suturing of right or left portal vein and hepatic artery(the hepatic duct divided intrahepaticaly during parenchymal transection), or by intrahepatic mass pedicle ligation by division of Glisson sheath that enclose the all inflow pedicle using vascular stapler or suturing.

Exposure of the extra hepatic portions of the appropriate hepatic veins and of the retrohepatic vena cava by division of venous branches between ties. For left lobectomy (segments II and III) or extended right hepatectomy including segments IV and VIII, the falciform ligament was used as a guide to the individual ligation of the extrahepatic segmental pedicles. Transection of the liver was by means of a crush clamp technique, mono-and bi-polar diathermy, in addition to ligation of vascular and biliary structures.

Haemostasis was achieved using argon beam coagulation for small vessels and suture of larger vessels or bile duct branches.One or two tube drains (28 Fr) were left in place for the detection of bleeding or bile leakage. Patients were nursed in an intensive care unit with continuous monitoring of vital signs; hourly urine volumes were recorded after operation for 24 h. Monitoring of hepatic function included measurement of blood glucose and prothrombin time, on an individualized basis according to the extent of resection and preoperative liver function.

Data collection:

At the time of discharge from hospital, patient details were entered on a database which included age and sex, date of operation and hospital discharge, operative blood loss and number of units of blood transfused, and complications. Complications or deaths occurring either within 30 days or before hospital discharge were considered as perioperative. Complications were considered to be minor if discharge was not delayed and as major if discharge was delayed or further intervention was required. Further information regarding complications, deaths and tumor recurrence was added to the database at the time of 6-week, 6-month and annual outpatient follow-up

Table2: age distributions

Age in years	NO	%
<20	3	20%
20-29	1	6.66%
30-39	4	26.66%
40-49	6	40%
=50	1	6.66%
Total	15	100%

Results:

Between October 2008 and February 2012, fifteen hepatic resections were undertaken in five men, eight women and two children. The median age of patients undergoing resection was 40(range 152 years). Table2The indications for resection were benign disease in eight patients, including complicated hydratid cyst infour patients, Symptomatic hemangioma in two and biliary reconstruction type E4 Strasberg classification (loss of hepatic duct confluence) in two patients. Among the seven resections for malignant disease, Hepatocellular carcinoma(HCC) in two patients, Intra-hepatic cholangiocarcinoma(ICC) in one patient, Colorectal hepatic metastases in one patient, small bowel metastases in one patient and Hepatobla stoma in two patients. (Table 3). The fifteen classical hepatic resections included extended right hepatectomy one patient, right hepatectomy three patients, left hepatectomy three patients, left lateral lobectomy four patients, right anterior sectionectomy one patient (segments V&VIII),segments V&VI one patient, segment 4B resection two patients. (Table 4). The median operative time was 250 (range 95480) min. Transfusion requirement was similar for resections of benign or malignant disease The median of 3 units blood transfusion was given (range 0-9 units) one of them who had large right lobe hepatocellular carcinoma withpartial invasion of inferior vena cava needs nine units of blood intra-operatively.

The Post-operative hospitalization was 3-15 days, median 7 days. There was no mortality. Minor perioperative morbidity occurred infour patients (26%) and included atelectasis or chest infection responding to physiotherapy and antibiotics (2 patients), reactive right pleural effusions (one), wound infection (one). Major morbidity occurred inthree patients(20%) and resulted in prolongation of hospital stay, two patients developed bile leakin form of biloma treated by percutaneous drainage under ultrasound.one patient has postoperative liver insufficiency recover within week.no hepatorenal failure or postoperative bleeding(table 5).One patient hadrecurrent tumor in left liver lobe 8month after right hepatectomy for hepatocellular carcinoma (late complication).

The median follow-up for patients resected for malignantdisease was 20 months. No mortality reported

Figure 3: sex distributions

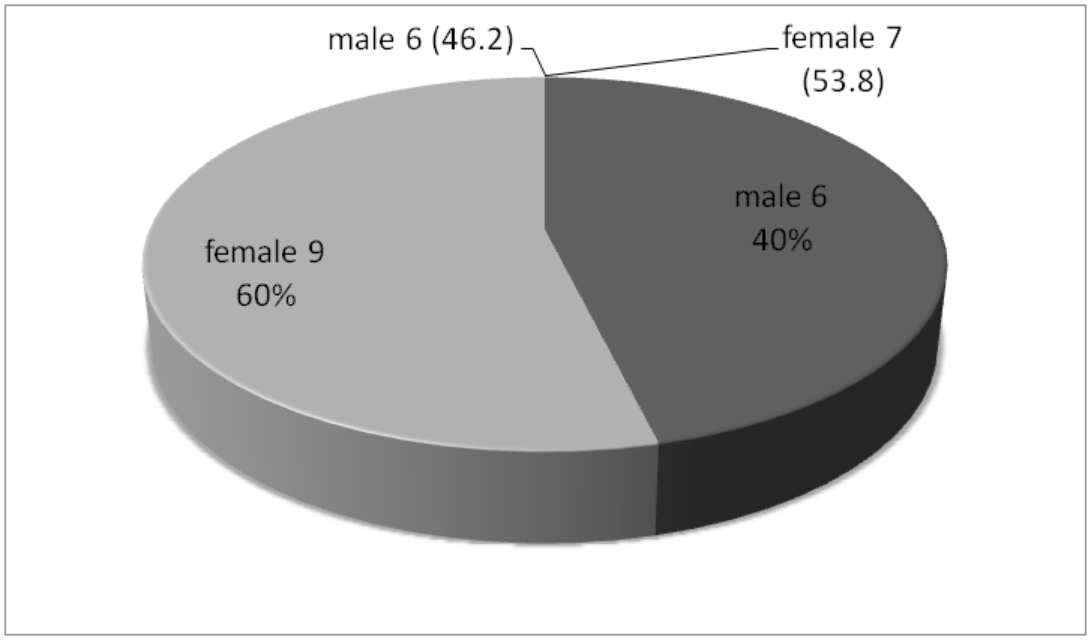

Table 3: Indications for hepatic resections in 15 patients

diagnosis		patients	percentage	
malignancy	Hepatocellular carcinoma	2	13.33%	46.67%
	Intrahepatic cholangiocarcinoma	1	6.66%	
	Hepatoblastoma	2	13.33%	
	Colorectal metastases	1	6.66%	
	Small bowel metastases	1	6.66%	
benign	hemangioma	2	13.33%	53.33%
	Hydatid cysts	4	26.66%	
	Biliary stricture	2	13.33%	
Total		15	100%	

Table 4: types of resections

Types of resections	No. of cases	%
Extended right hepatectomy	1	6.66%
right hepatectomy	3	20%
Left hepatectomy	3	20%
left lateral sectionectomy (left lobectomy)	4	26.66%
right anterior sectionectomy	1	6.66%
Segments V&VI	1	6.66%
segment IV b resection	2	13.33%
Total	15	100%

Table 5: Morbidity following hepatic resections

Postoperative complications		No. of cases	%	
minor	atelectasis	2	13.33%	26.66%
	Plural effusion	1	6.66%	
	Wound infection	1	6.66%	
major	postoperative liver insufficiency	1	6.66%	20%
	bile leak	2	13.33%	
Total		7	46.66%	

Discussion:

Good postoperative outcome of hepatic resections mainly depends upon limited operative bleeding and sufficient functional reserve of the nonresected liver. Increased knowledge of intrahepatic anatomy andintroduction of operative ultrasound have allowed the developmentof an accurate surgical technique, thus reducing the risk of bleeding during resection. Temporary vascular occlusion of hepatic inflow (HPC) has been reported to be effective in reducing bleeding from intraparenchymal arterial and portal branches. [13,14,15]

Most recently published series of hepatic resection have demonstrated an apparent decrease in postoperative mortality rates. Whereas most series have focused on the management of specific hepatic pathology, a few authors have reviewed their entire experience in recent years.[16, 17, 18, 19]

The median age of patient in our study was 40 years which is younger than age of patient in other study[16,17,18] and the age of the patents not regard as prognostic factor in outcome of liver resections[20,21,22,23]In this study we have 15 cases of anatomical liver resections which regarded as limited numbers due to high selection of cases because of limited postoperative supportive care and no facility of liver transplant for patients developing postoperative liver failure so all our patient selected for liver resections were normal liver function or Child A classifications.

While the indications for surgery mainly for benign diseases 53.33% and hydatid cysts half of these cases. Iwatsuki and Starzl study 411 cases of liver resections benign diseases were 44.28% most of cases were cavernous haemangioma55%[18] while Terkivatan et al. he had focal nodular hyperplasia the main indication for liver resections in benign disease.

[24]Malignant diseases of liver form 46.67% of our patients of liver resections mainly primary hepatic malignancy 5cases (71%) and secondary hepatic malignancy only 2 cases (29%) while secondary hepatic malignancy was the main indication in most of reported study of liver resection for hepatic malignancy.[25, 26, 27]

In cases of biliary stricture Partial segments IV and V resection allows adequate exposure of the confluence and the isolated left or right hepatic ducts. Anterior exposure of the ducts allows an anastomosis in well-preserved, nonischemic, nonscarred, or noninflamed ducts. Parenchyma removal also allows the free placement of the jejunal limb, without external compression and tension, obtaining a high quality anastomosis with excellent long-term results. [28]

we had two patients with E4 Strasberg biliary injury managed by partial segments IV resection for perfect biliary reconstruction with uneventful postoperative recovery.Miguel et al. had 94 cases which form 33% of the patients had Iatrogenic biliary Injuries they treated by biliary reconstruction After Partial Resection of Segments IV and V and 91% of them have excellent results and the patients returned to normal life and activity. [28]

Most of types of liver resections done in our study except central hepatectomy and extended left hepatectomy which have high incidence of bleeding and postoperative liver insufficiency respectively. [29, 30, 31] Left lateral sectionectomy was the main type of resections 4cases (26.66%) while Finch et al. had the right hepatectomy the main type of liver resections. [32]Major morbidity following hepatic resections occurred in 3patients(20%) postoperative liver insufficiency and bile leak treated conservatively while in other studies major morbidity was 12-28%. [18,19,21,32]

No operativemortality in our study due to proper selection and limited numbers of the patients while reported mortality was 0.5-17.6 %.(table6). [18,19,21,32]

The concept of an ideal margin of resection for malignant liver tumors has been traditionally regarded as 1 cm[33] Wakai et al.[34] confirmed that colorectal metastasis to the liver should be resected with a 1 cm margin (based on the distribution of intrahepatic micrometastasis) and Shi et al. [35]

concluded that a 2-cm margin is necessary while resecting hepatocellular carcinomas. However, other studies evaluating the influence of the surgical resection margin in patients with hepatocellular carcinomas, hepatoblastomas, and colorectal metastasis to the liver seem to indicate that more than the size, it is the presence of a negative margin that is a principal indicator of long-term survival. [36, 37]

this assumes significance when major resections are undertaken wherein the question of the function of the remnant liver is of prime concern. In our study all liver resections for malignant diseases were negative resections margin.

The median follow-up for patients resected for malignant disease was 20 months, and we had one patient had recurrent tumor which form 14% of all malignant tumors of the liver, Gleisner et al, reported the 1-year risks of any site recurrence were 24.4% for resection of colorectal liver metastases[38] and Bronowicki et al. had 20% tumor recurrence one year after resection of hepatocellular cancer.[39]

In some centres a more radical approach to the management of hepatic malignancy has been advocated. There is increasing evidence that some patients who develop recurrent hepatic tumour following previous resection of colorectal metastasis will benefit from further hepatic resection.[40, 41]

Table 6 comparison with other studies

Parameter	Ong and Lee 1975[21]	Iwatsuki and Starzl 1988[18]	Finch et al. 1998[32]	Huang et al. 2009[19]	This study 2012
No. of patient	125	411	129	2008	15
Duration. Years	10	24	8	29	3
Age range. Median	------	1-81	21–80 59	2–83 47	1-52 40
Male: female	82:43	-------	70:59	1279:729	6:9
Benign: malignant	55:70	142:269	31:98	834:1174	8:7
Main type of resection	----	Rt. trisegmentectomy	Rt. hepatectomy	------	Lf. lateral sectionectomy
Major morbidity	28%	12%	22%	14%	20%
mortality	17.6%	3.2%	4%	0.5%	0%

Conclusion:

1-Resectional therapy for both primary and secondary liver tumors has been clearly shown to have potential curative benefit for a significant proportion of patients and Surgery continues to remain an important modality of treatment of malignant hepatic neoplasms amenable to resection.

2- More accurate imaging modalities have allowed betterselection of patients who are potential candidates forresection.

3-Major hepatic resection could be done with low morbidity and mortality.

Recommendations:

1-livertransplant availability very important as complementary and alternative for liver resection for treatment of liver lesion and also availability of Techniques such as pre-operative portal vein embolization and modern instruments ofliver parenchymal transection allow resection to be performed with minimal morbidity and mortality

2- Surgery is the best treatment of early hepatic malignancy and screening tests such as á fetoprotein and abdominal ultrasound in chronic liver

References:

1. Lortat-Jacob JL, Robert HG, Henry L. Un cas d'hepatectomie droit reglee. Memoires de la Academie de Chirurgie 1952;78:24451.
2. K.H. Liau, L.H. Blumgart, R.P. DeMatteo. Segment-oriented approach to liver resection.Surg Clin N Am 2004;84:543561
3. Lai ECS, Fan ST, Chu KM, Wong J. Hepatic resection for hepatocellular-carcinoma an audit of 343 patients. Ann Surg 1995;221:2918.
4. Jarnagin WR, Gonen M, Fong Y, DeMatteo RP, Ben-Porat L, Little S, et al. Improvement in perioperative outcome after hepatic resection: analysis of 1,803 consecutive cases over the past decade. Ann Surg 2002;236:397406.
5. Ekberg H, Tranberg KG, Andersson R, Jeppsson B, Bengmark S. Major liver resection: perioperative course and management. Surgery 1986; 100: 18.
6. Farid H, O'Connell T. Hepatic resections: changing mortality and morbidity. Am Surg 1994; 10: 74853.
7. Ming-Hui Fan, Alfred E. Chang. Review Resection of liver tumors: technical aspects. Surgical Oncology 2002 ; 10:139152
8. Terminology Committee of the International Hepato-Pancreato-Biliary Association.IHPBA Brisbane 2000 Terminology of Liver Anatomy & Resections. Hepato-Pancrea to Biliary Association 2003; 3:3339. Available at: www.ihpba.org. (Liver Resection Guidelines).
9. Launois B, Jamieson GG. The importance of Glisson's capsule and its sheath in the intrahepatic approach to resection of the liver. Surgery Gyneacology and Obstetrics 1992;174:1558.
10. Launois B, Jamieson GG. The posterior intrahepatic approach for hepatectomy or removal of segments of the liver. Surgery Gyneacology and Obstetrics 1992;174:1558.
11. Blumgart LH. Liver resection for benign disease and for liver and biliary tumors. In:Blumgart LH, Fong Y, editors. Surgery of the liver and biliary tract. London: WB Saunders 2000; 16391713.
12. Panco Georgiev, Pierre-Alain Clavien. Liver Resections: in Pierre-Alain Clavien Michael G. Sarr Yuman Fong :Atlas of Upper Gastrointestinal and Hepato-Pancreato-Biliary Surgery, Springer 2007;339-340
13. Blumgart LH. .Liver Resection for Benign Disease and for Liver and Biliary Tumors : in Leslie H. Blumgart, Jacques Belghiti, William R. Jarnagin et al. Blumgart: surgery of the liver, biliary tract and pancreas, 4th ed. Saunders Elsevier 2007;2734 -2924
14. Pringle JH. Notes on the arrest of hepatic hemorrhage due to trauma. Ann Surg 1908;48:5419.
15. Huguet C, Gavelli A, Bona S. Hepatic resection with ischemia of theliver exceeding one hour. J Am Coll Surg 1994;178:4548.
16. Strong RW, Lynch SV, Wall DR, Ong TH. The safety of elective liver resection in a special unit . Aust N Z J Surg 1994;64: 5304.
17. Scheele J, Stangl R. Segment oriented anatomical liver resections. In: Blumgart LH, ed. Surgery of the Liver and Biliary Tract. Vol. 2. 2nd ed. Edinburgh: Churchill Livingstone, 1994: 155778.
18. Iwatsuki S, Starzl TE. Personal experience with 411 hepatic resections . Ann Surg 1988; 208: 42134.
19. HUANG Zhi-qiang, XU Li-ning, YANG Tao et al. Hepatic resection: an analysis of the impact of operative and perioperative factors on morbidity and mortality rates in 2008 consecutive hepatectomy cases. Chin Med J 2009;122(19):2268-2277
20. John Spiliotis, Anastassios C. Datsis, Archodoula Vaxevanidou et al.Role of age on the outcome of liver surgery a single institution experience.Surgical Practice 2009; 13: 3235
21. G. B. Ong and N. W. Lee.Hepatic resection.Br. J. Surg. 1975;62: 421-430
22. Ishak KG, Rabin L. Benign tumors of the liver. Med Clin North Am 1975; 59: 9951013.

23.Foster JH, Adson MA, Schwartz SI, et al. Symposium: benign liver tumours. Contemp Surg 1982; 21: 67102.
24.Tu¨rkan Terkivatan, Johannes H. W. de Wilt, Robert A. de Man et al.Indications and Long-term Outcomeof Treatment for Benign Hepatic Tumors.Arch Surg. 2001; 136:1033-1038
25.Rees M, Plant G, Wells J, Bygrave S. One hundred and fifty hepatic resections: evolution of technique towards bloodless surgery. Br J Surg 1996; 83: 15269.
26. Jamieson GG, Corbel L, Campion JP, Launois B. Major liver resection without a blood transfusion: is it a real objective ? Surgery 1992; 112: 326.
27. Sitzmann JV, Greene PS. Perioperative predictors of morbidity following hepatic resection for neoplasm. A multivariate analysis of a single surgeon experience with 105 patients . Ann Surg 1994; 219: 1317.
28. Miguel Angel Mercado, Carlos Chan, Hector Orozco , et al. Long-term Evaluation of Biliary Reconstruction after Partial Resection of Segments IV and V in Iatrogenic Injuries . J Gastrointestinal Surgery 2006;10:7782
29. Scudamore CH, Buczkowski AK, Shayan H, Ho SG, LegiehnGM, Chung SW, et al. Mesohepatectomy. Am J Surg 2000;179:356-60.
30.Lesurtel M, Selzner M, Petrowsky H et al. How should transection of the liver be performed? A prospective randomized study in 100 consecutive patients:comparing four different transection strategies. Ann Surg 2005;242:814-22.
31.Capussotti L, Muratore A, Amisano M et al. Liver resection for large-size hepatocellular carcinomas in 47 non-cirrhotic patients--no mortality and long-term survival. Hepatogastroenterology 2006; 53: 768-772
32.M. D. Finch, J . L. Crosbie, E. Currie et al.An 8-year experience of hepatic resection: indications and outcome.British Journal of Surgery 1998; 85:315319
33.Lau WY, Leung TW, Ho SK, Chan M, Machin D, Lau J, et al. Adjuvant intra-arterial iodine-131-labelled lipiodol for resectable hepatocellular carcinoma: a prospective randomised trial. Lancet 1999;353:797-801.
34.Wakai T, Shirai Y, Sakata J, Valera VA, Korita PV, Akazawa K, et al. Appraisal of 1 cm Hepatectomy Margins for Intrahepatic Micrometastases in Patients with Colorectal Carcinoma Liver Metastasis. Ann Surg Oncol 2008;15:2472-81.
35.Shi M, Guo RP, Lin XJ, Zhang YQ, Chen MS, Zhang CQ, et al.Partial hepatectomy with wide versus narrow resection margin for solitary hepatocellular carcinoma: a prospective randomized trial.Ann Surg 2007;245:36-43.
36.Elias D, Cavalcanti A, Sabourin JC, Lassau N, Pignon JP, Ducreux M,et al. Resection of liver metastases from colorectal cancer: the real impact of the surgical margin. Eur J Surg Oncol 1998;24:174-9.
37.Shukla PJ, Barreto SG, Qureshi SS, Hawaldar R, Shrikhande SV,Ramadwar MR, et al. Hepatoblastomas: a single institution experience of 18 cases. Pediatr Surg Int 2008;24:799-802.
38.Ana L. Gleisner, Michael A. Choti, MD,Lia Assumpcao et al.Colorectal Liver Metastases Recurrence and Survival Following Hepatic Resection, Radiofrequency Ablation,and Combined ResectionRadiofrequency Ablation.Arch Surg 2008;143(12):1204-1212.
39.Jean-Pierre Bronowicki, Karim Boudjema, Laurence Chone4 et al.Comparison of resection, liver transplantation and transcatheter oily chemoembolization in the treatment of hepatocellular carcinoma.Journal of Heparology 1996; 24: 293-300
40. Fong Y, Blumgart LH, Cohen A, Fortner J, Brennan MF.Repeat hepatic resection for metastatic colorectal cancer. Ann Surg 1994; 220: 65762.
41. Hemming AW, Langer B. Repeat resection of recurrent hepatic colorectal metastases. Br J Surg 1994; 81: 15534.