

LAPAROSCOPIC NON ANATOMICAL HEPATECTOMY - a single center experience.

Eppa Vimalakar Reddy., Gourang Shroff.Akella phanendra.,Bala Reddy V., Kaipu Dinesh Reddy., Raju Musham.

CORRESPONDING AUTHOR: Dr. EPPA VIMALAKAR REDDY, M.B.B.S, D.N.B [General Surgery], D.N.B [Surgical Gastro] Consultant Surgical Gastroenterologist and Laparoscopic Surgeon. Sunshine Hospital, Secunderabad, Telangana, India, 500003. CONTACT: +91 9573201103, vimalakarreddy@gmail.com

KEYWORDS: Laparoscopy, Non Anatomical, Hepatectomy, Liver Resection, Minimal Invasive

ABSTRACT:

Background: Despite advances in the field of energy devices and surgical techniques, performing Hepatectomy is still considered a difficult task. Laparoscopic Hepatectomy is probably considered a pinnacle in the field of minimal invasive surgery. In certain benign indications, such as hydatid cysts, cystic neoplasms & some hemangiomas, Laparoscopic Non-Anatomical Hepatectomy can avoid Large incisions, thereby reducing morbidity due to pain & lung complications, with early return to work. Also, Non-Anatomical Hepatectomy is technically easier to perform than Anatomical Hepatectomy, as we can avoid critical steps such as inflow & outflow control.

Method: We present a series of 6 cases, which include 3 Right & 3 Left Non-Anatomical Hepatectomies which were done in 3 cases with Hydatid Cysts (1 in left lobe & 2 In right lobe) & 3 Benign cystic neoplasms (1 in left lobe & 2 in right lobe).

Results: Average OT time was 117mins. Average Intra-op blood was 158ml. Postop average pain score was 2.8, Average ICU stay was 11 hrs , Average total hospital stay was 2.5 days. None developed bile leak or wound infection.

Conclusion: Small, Benign, Peripherally Located, Less Vascular Lesions can be Well Managed with LAPAROSCOPIC NON-ANATOMICAL HEPATECTOMY with Small Incision, Good Cosmesis, Less Pain, Faster Recovery and Less Morbidity.

INTRODUCTION:

Laparoscopic Hepatectomy is probably the pinnacle in the field of minimal invasive surgery. Anatomical Hepatectomy is more difficult compared to Non-Anatomical Hepatectomy. After nearly 10 years of increasing experience and refinement in technology⁽¹⁻⁷⁾, Laparoscopic liver surgery is now recognized as being feasible and safe⁽⁵⁾. More than 3,000 Laparoscopic Liver Resections have now been performed worldwide for the treatment of benign diseases and malignancies, and for living donor hepatectomy⁽⁸⁾.

With improved understanding of anatomy and physiology of the liver, enhanced imaging techniques to aid the diagnosis, improved anaesthesia, critical care, technical innovations aimed at reducing blood loss during surgery, technological advances in laparoscopy, improved techniques of liver parenchymal transection, postoperative nursing and physical therapy, coupled with a wider exposure to liver surgery amongst current surgical trainees, liver resection has evolved drastically⁽⁹⁾.

Achieving inflow/ outflow control in laparoscopy is a difficult task due to, 1) Risk of massive air embolism during vascular dissection, 2) Difficult ergonomics, 3) Accessibility issues.

Indications of laparoscopic non anatomical hepatectomy include, 1) Small Lesions (<5cm), 2) Peripherally Located Lesions (Segment 3, 4b, 5 and 6), 3) Less Vascular Lesions, 4) Benign Tumours and Cysts, 5) Superficial Malignant tumours less than 3 cm in diameter, 6) multiple malignant tumours in an area less than 3 cm in depth requiring local resection of tumours or segmentectomy, and 7) liver function of Child A and B^(10,11).

Contraindications include 1) large tumours >5cms, 2) Malignant tumours involving porta hepatis or close to major vessels or hepatic ducts, 3) History of upper abdomen/ biliary surgeries such as exploration of the common bile duct (CBD) or Hepaticojejunostomy (cholecystectomy is not regarded as a contraindication), 4) Extrahepatic bile duct stricture, 5) Acute suppurative cholangitis 6) Child grade C^(10,11).

Advantage of laparoscopic surgery include: 1) magnified visual field, 2) smaller scars and reduced surgical trauma, 3) reduced pain, 4) early ambulation, 5) shorter hospital stay and earlier return to work, 6) reduced rate of complications such as ascites and liver failure, particularly in patients with liver cirrhosis and portal hypertension, 7) less blood loss and need for transfusion, 8) less post op adhesions, 9) reduced physiological stress and effect on immunological function⁽¹¹⁾.

Limitations like, 1) significant learning curve, 2) difficulty in controlling bleeding, 3) risk of gas embolism, and 4) lack of tactile feedback⁽¹¹⁾.

PATIENTS CHARACTERISTICS:

A total of 6 laparoscopic non anatomical hepatectomies were performed , 3 of which were for hydatid cyst and 3 for benign cystic lesion, the patient characteristics are a 1) 31/F, 6cm x 6cm, Hydatid cyst in Right lobe of liver, Peri GB, involving Segment 5&6. 2) 52/F, 5cm x 4 cm, Hydatid cyst in Left lobe of liver, involving Segment 4b&3. 3) 42/F, 4cm x 4cm, Pedunculated complex cystic lesion in Right lobe of liver, involving Segment 6. 4) 40/M, 3cm x 4cm, Hydatid cyst in Right lobe of liver, involving Segment 7&8. 5) 55/F, 4cm x 4cm, Benign biliary cystadenoma in Left lobe of liver, involving Segment 4b&3. 6) 39/F, 6cm x 5cm, Benign biliary cystadenoma in Right lobe of liver, involving Segment 4b&5.

OPERATIVE PROCEDURE:

After thorough preoperative evaluation and imaging, patients were taken up for laparoscopic non anatomical hepatectomy.

Patient was kept in supine leg split position with Reverse Trendelenburg position with sand bag under upper back. 10 mm Umbilical port for camera with 30° Laparoscope and remaining subcostal ports placed as needed. Specimen extracted through umbilical port in bag.

Parenchymal transection was done under Low CVP using Ligasure, CUSA, Harmonic, Monopolar and Bipolar. Metal and Hemolock clips for larger vessels and ducts. None of the patients required conversion to open.

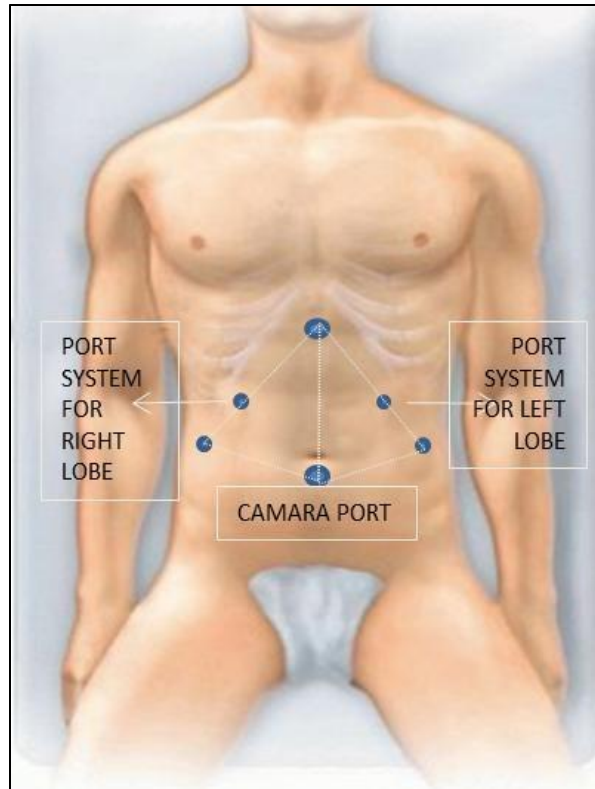


FIGURE 1: PORT SYSTEM USED.

RESULTS:

A total of 6 cases underwent laparoscopic non-anatomical hepatectomy, characteristics of which are tabulated below,

The age ranged from 31 years to 55 years (31-40 yrs=2, 41-50yrs=2, 51-60yrs=2). Five out of Six cases were females, (M:F=1:5). Four out of Six lesions were on right side. Two was peri-gallbladder. Another was a pedunculated lesion hanging from the liver margin. Three cases were Hydatid cysts, one was a Symptomatic cystic lesion, two Benign biliary cystadenoma.

Average OT time was 117 mins (45mins–180mins). Average Intra-op blood 158ml (50ml-250ml). Drain kept in Four out of six cases. Post op average pain score was 2.8, Average ICU stay was 11 hrs, Average total hospital stay 2.5 days. None developed bile leak or wound infection.

<u>AGE/SEX</u>	<u>SIDE</u>	<u>SEGMENT</u>	<u>SIZE (CM X CM)</u>	<u>DIAGNOSIS</u>	<u>OT TIME (MINS)</u>	<u>BLOOD LOSS (ML)</u>	<u>DRAIN</u>	<u>PAIN SCORE</u>	<u>TOTAL HOSPI STAY (DAYS)</u>	<u>ICU STAY (HRS)</u>	<u>BILE LEAK</u>	<u>WOUND INFECTION</u>
31/F	RT	5,6	6X6	HYDATID	180	250	YES	4	3	20	N	N
52/F	LT	4B,3	5X4	HYDATID	135	150	YES	3	3	16	N	N
42/F	RT	6	4X4	COMPLEX CYST	60	50	NO	2	2	4	N	N
40/M	RT	7,8	3X4	HYDATID	165	200	YES	3	3	18	N	N
55/F	LT	3,4B	4X4	BENIGN BILLARY CYSTADENOMA	120	150	NO	2	2	4	N	N
39/F	RT	4B,5	6X5	BENIGN BILLARY CYSTADENOMA	45	150	YES	3	2	4	N	N
43				AVERAGE:-	117.7	158		2.8	2.5	11		

FIGURE 2: PATIENT DATA AND RESULTS.

DISCUSSION:

Since the first laparoscopic liver resection was described in 1992⁽¹⁾, Laparoscopic Liver Resection has been widely and rapidly accepted in the field of hepatobiliary surgery because laparoscopic surgery is associated with a reduced need for narcotic pain relief, shorter hospital stay, earlier return to work, and less physiological stress than the open abdominal surgery⁽¹²⁾, but it is a technically challenging procedure as expertise in both laparoscopy and open liver surgery are essential. Liver parenchymal transection carries the risk of massive haemorrhage and bile leakage, both of which can be challenging to manage laparoscopically.

Nguyen et al in 'World review of laparoscopic liver resection' reviewed 2,804 cases, 50% of the cases resected were malignant tumours, and 45% were benign lesions. The majority of cases were hepatic cyst (24%). The remainder were focal nodular hyperplasia (18%), haemangioma (18%), adenoma (13%), hepatolithiasis (8%), cystadenoma (3%), other benign liver lesions (7%) or not documented (9%)⁽⁸⁾.

Various methods described in literature include, Totally Laparoscopic approach, The Hand-assisted approach, The Laparoscopic-assisted open "hybrid" technique, Gas-less abdominal lift, Thoracoscopic approach and robotic-assisted approach⁽⁸⁾.

In the current study, the average age of the patients is 43yrs (31-55yrs). Five out of six cases were females, consistent with *Francesco et al*, average age 44yrs and 84% females.

Koffron et al reported 300 minimally invasive liver resections (MILR) and compared with 100 contemporaneous open liver resections that were matched for age, type of resection, benign versus malignant origin, and liver cirrhosis. Compared with the open resection group, the MILR resections fared better in operative time (99 vs 182 minutes), blood loss (102 vs 325 mL), transfusion requirement (0.007% vs 0.08%), length of stay (1.9 vs 5.4 days), and overall operative complications (9.3% vs 22%)⁽¹³⁾.

Nguyen et al in 'World review of laparoscopic liver resection' quoted Average OT Time range from 99 to 331mins, Average Blood Loss range from 50 to 659ml and Mean Hospital stay 1.2 to 15.3days⁽⁸⁾. Francesco et al quoted Average OT Time of 191mins, Average Blood Loss 285ml and Mean Hospital stay 6days⁽¹⁴⁾. Jun-hua ai et al quoted Average OT Time of 245 mins, Average Blood Loss 460ml and Mean Hospital stay 8.2days⁽¹¹⁾. E.Vibert et al quoted Average OT Time of 180mins⁽¹⁵⁾. In our study, the average OT time was 117mins, average blood loss 158ml, none of the patients required blood transfusions, average length of hospital stay was 2.5 days, none had bile leak or wound infection, consistent with literature data.

The trend consistently showed that operative time and blood lost significantly decreased with increased experience. The variability of hospital stay may be due to a cultural and health systems bias⁽⁸⁾.

Another consideration is the increased cost of laparoscopic liver surgery due to use of disposable equipment or devices in the operating room. However, studies by Buell et al and Koffron et al show that there were no financial disadvantages to the laparoscopic approach, as the added costs of equipment/devices were offset by shorter operative times and lengths of stay^(8,13,16).

CONCLUSION:

Small, Benign, Peripherally Located, Less Vascular Lesions can be Well Managed with LAPAROSCOPIC NON-ANATOMICAL HEPATECTOMY with Small Incision, Good Cosmesis, Less Pain, Faster Recovery and Less Morbidity.

CONFLICTS OF INTEREST & SOURCE OF FUNDING: NONE DECLARED.

REFERENCES

1. Gagner M, Rheault M, Dubuc J. Laparoscopic partial hepatectomy for liver tumor. *Surg Endosc* 1992; **6**: 97–98.
2. Hashizume M, Takenaka K, Yanaga K, Ohta M, Kajiyama K, Shirabe K *et al.* Laparoscopic hepatic resection for hepatocellular carcinoma. *Surg Endosc* 1995; **9**: 1289–1291.
3. Azagra JS, Goergen M, Gilbert E, Jacobs D. Laparoscopic anatomical (hepatic) left lateral segmentectomy – technical aspects. *Surg Endosc* 1996; **10**: 758–761.
4. Katkhouda N, Hurwitz M, Gugenheim J, Mavor E, Mason RJ, Waldrep DJ *et al.* Laparoscopic management of benign solid and cystic lesions of the liver. *Ann Surg* 1999; **229**: 460–466.
5. Cherqui D, Husson E, Hammoud R, Malassagne B, Stephan F, Bensaid S *et al.* Laparoscopic liver resections: a feasibility study in 30 patients. *Ann Surg* 2000; **232**: 753–762.
6. Descottes B, Lachachi F, Sodji M, Valleix D, Durand-Fontanier S, Pech de Laclause B *et al.* Early experience with laparoscopic approach for solid liver tumors: initial 16 cases. *Ann Surg* 2000; **232**: 641–645.
7. Gigot JF, Glineur D, Santiago Azagra J, Goergen M, Ceuterick M, Morino M *et al.* Laparoscopic liver resection for malignant liver tumors: preliminary results of a multicenter European study. *Ann Surg* 2002; **236**: 90–97.
8. Nguyen KT, Gamblin TC, Geller DA(2009) World review of laparoscopic liver resection-2,804 patients. *Ann Surg* 250: 831–841.
9. Parul J Shukla, Savio G Barreto, Surgery for malignant liver tumours. *J Cancer Res Ther* – July-September 2009, vol-5 ,issue-3.
10. X. Cai, *Laparoscopic Hepatectomy: Atlas and Techniques*, 171. Springer Science+Business Media Dordrecht and Zhejiang University Press 2015. DOI 10.1007/978-94-017-9840-2_7.
11. Ai Jun Hua, Li Jian Wel, Chen Jian, Bie Ping, Wang S-g, et al. (2013) Feasibility and Safety of Laparoscopic Liver Resection for Hepatocellular Carcinoma with a Tumor Size of 5–10 cm. *PLoS ONE* 8(8): e72328. doi:10.1371/journal.pone.0072328.
12. Sarpel U, Hefti MM, Wisniewsky JP, Roayaie S, Schwartz ME, et al.(2009) Outcome for Patients Treated with Laparoscopic Versus Open Resection of Hepatocellular Carcinoma: Case-Matched Analysis. *Ann Surg Oncol* 16: 1572–1577.

13. Koffron AJ, Auffenberg G, Kung R, et al. Evaluation of 300 minimally invasive liver resections at a single institution: less is more. *Ann Surg.* 2007;246:385–392; discussion 392–394.

14. Francesco Ardito; Claude Tayar; Alexis Laurent; Mehdi Karoui, MD; Jerome Loriau; Daniel Cherqui. Laparoscopic Liver Resection for Benign Disease. *Arch Surg.* 2007; 142 (12):1188-1193.

15. E. Vibert, T. Perniceni, H. Levard, C. Denet, N. K. Shahri and B. Gayet. Laparoscopic liver resection. Wiley InterScience (www.bjs.co.uk). DOI:10.1002/bjs.5150.

16. Buell JF, Thomas MT, Rudich S, et al. Experience with more than 500 minimally invasive hepatic procedures. *Ann Surg.* 2008;248:475– 486.