Laparoscopic liver and pancreatic surgery

Martin Brand

Laparoscopic surgery for HPB pathology

Staging laparoscopy

Pancreas Resection

- Distal pancreatectomy
- Pancreaticoduodenectomy

Liver resection

- Colorectal liver metastases
- Hepatocellular carcinoma

Socio-economic costs

Conclusion

Laparoscopic surgery for HPB pathology

- Is it safe?
- Improved peri-operative care?
- Oncologically sound?
- Does it make socio-economic sense?

Staging laparoscopy

Pancreas adenocarcinoma

Table 1 Studies assessing the role of staging laparoscopy in pancreatic adenocarcinoma

Study/years	Time period	No. of patient	Contraindication found during laparoscopy (%)	Contraindication found during laparotomy[a] (%)	Morbidity/ Mortality of LAP	Note
Conlon *et al*[4]/1999	1992-1994	115	38	8	0/0	Extended laparoscopy only
Jimenez *et al*[18]/2000	1994-1998	125	31	3	0.8/0	+ cytology
Schachter *et al*[5]/2000	1996-1999	67	45	12	-	+ LAPUS
Doran *et al*[45]/2004	1997-2002	305	15	20	-	+ LAPUS
Maithel *et al*[46]/2008	2000-2006	491	14	1.5	-	+ CA 19-9[b]

Gajoux 2010

Possible indications in pancreas cancer

- locally advanced pancreatic cancer
- apparent resectable cancer localized in the pancreatic body or tail
- lesions larger than 3cm
- equivocal findings on CT scan
- CA 19-9 level > 100-200 U/mL in the absence of jaundice

D'Angelica 2003

Hilar cholangiocarcinoma and gallbladder cancer

Table 4 Studies assessing the role of staging laparoscopy in biliary tract tumor

Study/years	Time period	No. of patient	Contraindication found during laparoscopy (%)	Contraindication found during laparotomy (%)	Morbidity/ Mortality	Note
Weber *et al*[42]/2002	1997-2001	100	35	52	0	Extrahepatic biliary carcinoma
Tilleman *et al*[44]/200	1993-2000	110	41.8	47	3%/0	Malignant proximal bile duct obstruction with ultrasonography
Connor *et al*[43]/2005	1992-2003	84	41.5	48	NA	Hilar cholangiocarcinoma with ultrasonography
Goere *et al*[41]/2006	2002-2004	39	36	37	6%/0	

Gajoux 2010

Distal pancreatectomy

Table 2
Reports comparing laparoscopic and open distal pancreatectomy

Author, Year, Reference	Cases		OR Time		Length of Stay		Complications		Fistula		Mortality	
Approach (LDP versus ODP)	LDP	ODP	LDP	ODP	LDP	ODP	LDP	ODP	LDP	ODP	LDP	ODP
Velanovich, 2006[a] [65]	15	15	NA	NA	5.0	8.0	20%	27%	13%	13%	0%	0%
Misawa et al, 2007 [66]	8	9	255	205	10.0	16.0	NA	NA	0%	22%	0%	0%
Teh et al, 2008 [55]	12	16	278	212	6.2	10.6	17%	56%	NA	NA	0%	0%
Eom et al, 2007[a] [67]	31	62	218	195	11.5	13.5	36%	24%	10%	7%	0%	0%
Kooby et al, 2008[a] [68]	142	200	230	216	5.9	9.0	40%	57%	11%	18%	0%	1%

[a]Case-controlled studies; LLP, laparoscopic left pancreatectomy; OLP, open left pancreatectomy.

Longer operating time

Less overall complications

Same all cause mortality

Shorter LOS

Merchant 2009

Whipple

Table 3.
Operative Variable and Complications

Variable	Open (n = 215)	Laparoscopic (n = 53)	p Value
Estimated blood loss, mean ± SD, mL	1,032 ± 1,151	195 ± 136	<0.001
Operative time, mean ± SD, min	401 ± 108	541 ± 88	<0.001
Packed RBC during hospitalization, mean ± SD, U	4.7 ± 7.3	0.64 ± 1.5	<0.001
ICU stay, mean ± SD, d	3 ± 6.7	1.1 ± 2.2	<0.001
Overall length of stay, mean ± SD, d	12.4 ± 8.5	8 ± 3.2	<0.001
Cardiac complications, n (%)	34 (15.8)	10 (18.9)	NS
Pulmonary complications, n (%)	34 (15.8)	7 (13.2)	NS
Reoperation, n (%)	15 (7)	2 (3.8)	NS
Pancreatic fistula, n (%)	29 (17.3)	7 (16.7)	NS
Grade A	14 (8.3)	3 (7.1)	
Grade B	5 (3)	1 (2.4)	
Grade C	10 (6)	3 (7.1)	
Post-pancreatectomy hemorrhage, n (%)	12 (5.6)	5 (9.4)	NS
Grade A	1 (0.5)	2 (3.8)	
Grade B	3 (1.4)	0	
Grade C	8 (3.7)	3 (7.1)	
Delayed gastric emptying, n (%)	32 (15.3)	6 (11.3)	NS
Grade A	12 (5.6)	1 (1.9)	
Grade B	10 (4.7)	2 (3.8)	
Grade C	11 (5.1)	3 (5.7)	
Wound infection, n (%)	45 (20.9)	6 (11.3)	NS
Intra-abdominal abscess, n (%)	32 (14.9)	10 (18.9)	NS
Accordion scale complications (100-d), n (%)			NS
Minor, 1	22 (10.2)	3 (5.7)	
Moderate, 2	63 (29.3)	9 (17)	
Severe			
3–5	53 (24.7)	13 (24.5)	
3	37 (17.2)	8 (15.1)	
4	5 (2.3)	1 (1.9)	
5	11 (5.1)	4 (7.5)	
Mortality (100-d), n (%)	19 (8.8)	3 (5.7)	NS

Asbun 2011

Liver resection (LLR)

- Louisville consensus guideline updated in 2015 Morioka
- Safe: A review of 2804 LLR's (127 publications)(*Nguyen et al. 2009*)
  - All cause mortality 0.3%
  - 10.5% morbidity
- Oncological margins (positive margins and failure to identify occult mets)
  - mCRC study 109 patients 95% negative margins with 50% 5 year overall survival
  - mCRC study 107 47% 5 year survival

Tumor and surgical procedure

Blood loss

Complications

Oncologic margin

Table II. Comparison of demographics, operative characteristics and postoperative outcomes between LLR and OLR patients

Variable	*LLR*	*OLR*	P *value*
Sex (% male)	54.6	59.6	.84
Average age (y)	60.8	62.1	.59
Tumor size (cm)	3.1	3.43	.35
No. of metastases	1.37	1.48	.14
Major hepatectomy (%)	34.7	38.6	.95
Right hepatectomy, *n* (%)	57 (23.5)	89 (24.2)	.97
Left hepatectomy, *n* (%)	22 (9.1)	56 (15.2)	.29
Left lateral segmentectomy, *n* (%)	25 (10.3)	29 (7.9)	.58
Segmental hepatic resection, *n* (%)	133 (55)	204 (55.4)	.98
Operative time (min)	248.7	262.8	.85
Blood loss (mL)	262.5	385.1	.049
Transfusion rate (%)	9.9	19.8	.004
Overall complication rate (%)	20.3	33.2	.03
Liver-specific complication rate (%)	12.8	8.8	.65
30-day mortality (%)	0.5	0.9	.92
Length of stay (d)	6.5	8.8	.01
R1 margin positivity (%)	5.5	12.6	.36
Margin width (cm)	0.81	0.83	.17
Neoadjuvant chemotherapy (%)	54.6	49.3	.92
Adjuvant chemotherapy (%)	70.7	71	.63

LLR, Laparoscopic liver resection; *OLR*, open liver resection.

Schiffman et al. 2015

Possible indications for CRCLM LLR

- Solitary mCRC tumor in the liver
- <5 cm in size
- Involving the left lateral section or right anterior hepatic segments 5 or 6
- A second small peripheral metastasis in an accessible location or near the index lesion

Anatomic left or right hepatic lobectomy can be considered, but this operation generally requires 2 surgeons with advanced laparoscopic skills and experience with liver resection

Hepatocellular carcinoma

Table 3 Results of meta-analysis comparing laparoscopic *vs* open hepatectomy (only high-quality studies)

Outcome of interest	No. of studies	No. of patients	OR/WMD	95%CI	*P* value	Heterogeneity *P* value	I^2 (%)
Operative outcomes							
Operation time (min)	6	354	4.69	-22.62, 32.00	0.74	0.0002	79
Intraoperative blood loss (mL)	6	333	-129.48	-224.76, -34.21	0.008	0.01	67
Blood transfusions requirement	7	416	0.49	0.26, 0.9	0.02	0.89	0
Postoperative outcomes							
Liver failure	2	116	0.15	0.02, 0.95	0.04	1.00	0
Cirrhotic decompensation/ascites	7	416	0.32	0.16, 0.61	0.001	0.95	0
Bile leakage	3	205	0.55	0.10, 3.12	0.50	0.86	0
Postoperative bleeding	5	287	0.54	0.20, 1.45	0.22	0.83	0
Pulmonary complications	6	384	0.43	0.18, 1.0	0.06	0.46	0
Intra-abdominal abscess	2	101	0.21	0.01, 4.53	0.32	-	-
Mortality	8	474	0.46	0.14, 1.51	0.20	0.64	0
Hospital stay	6	333	-3.19	-4.09, -2.8	< 0.00001	0.91	0
Oncologic outcomes							
Surgery margin positive rate	5	287	0.59	0.21, 1.62	0.31	0.65	0
Tumor recurrence	7	416	0.95	0.62, 1.46	0.81	0.93	0

WMD: Weighted mean difference; OR: Odds ratio.

Xiong 2012

Socio-economic costs

- Length of procedure
- Equipment
- Post-operative morbidities
- Length of stay
- Return to work

Table 4 Total hospital costs for laparoscopic versus open hepatectomy

Authors	Currency	Open	Laparoscopic	Difference	% diff	*p* value
Polignano et al. [10]	GBP	14,298	11,727	−2571	−18 %	0.04
Tsinberg et al. [20]	USD	47,358	36,784	−10,574	−22.3	0.04
Vanounou et al. [11]	USD	18,043	15,104	−2939	−16.3 %	
Bhojani et al. [18]	CAD	12,523	11,376	−1147	−9.2	0.07
Stoot et al. [14]	EUR	6580	5969	−611	−9.3	0.06
Canon et al. [12]	USD	69,728	58,401	−11,327	−16.2 %	
Abu Hilal et al. [17], LLS	GBP	10,121	8356	765	−17.4	0.0001
Abu Hilal et al. [17], RH	GBP	14,050	14,054	+4	0	NS
Dokmak et al. [16]	EUR	11,504	7475	−4029	−35 %	0.001
Medbery et al. [13]	USD	26,751	25,679	−1072	−4 %	NS
Kawaguchi et al. [19]	USD	11,858	12,046	+188	+2 %	NS
Bell et al. [15]	GBP	5593	3594	1999	−35 %	0.001

Cleary 2016

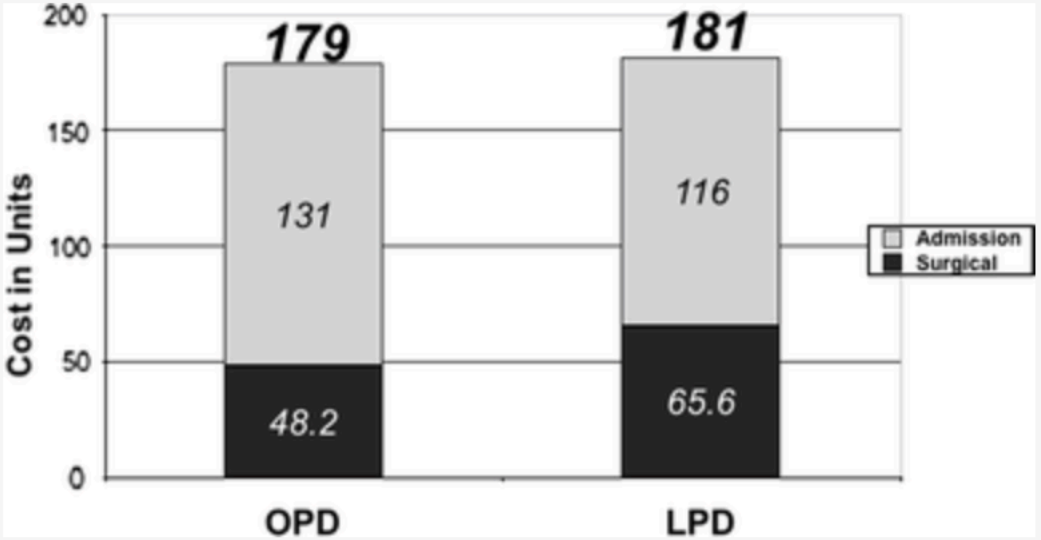

Fig. 1

Total cost LPD and OPD. The total cost, shown at the *superior* aspect of the *bar graph*. The total cost is made up of the surgical cost, *lower* aspect of the *bar graph*, and the admission cost, *upper* aspect of the *bar graph*. $p = 0.95$

Mesleh 2013

Laparoscopic surgery for HPB pathology

- Is it safe? 
- Oncologically sound? 
- Improved peri-operative care? 
- Does it make socio-economic sense? 

Within the surgeon's training and comfort zone

IRCAD 2014