



Laparoscopic liver resection compared to open approach in patients with colorectal liver metastases improves further resectability: Oncological outcomes of a case-control matched-pairs analysis

R. Montalti^a, G. Berardi^e, S. Laurent^b, S. Sebastiani^a,
L. Ferdinande^c, L.J. Libbrecht^c, P. Smeets^d, A. Brescia^e,
X. Rogiers^a, B. de Hemptinne^a, K. Geboes^b, R.I. Troisi^{a,*}

^aDept. of General & Hepato-Biliary Surgery, Liver Transplantation Service,
Ghent University Hospital and Medical School, De Pintelaan 185, 2K12 IC, 9000 Ghent, Belgium
^bDept. of Gastroenterology-Abdominal Oncology Unit, Ghent University Hospital and Medical School,
De Pintelaan 185, 9000 Ghent, Belgium

^cDept. of Pathology, Ghent University Hospital and Medical School, De Pintelaan 185, 9000 Ghent, Belgium

^dDept. of Radiology, Ghent University Hospital and Medical School, De Pintelaan 185, 9000 Ghent, Belgium

^eDept. of General Surgery, Sant'Andrea Hospital, "La Sapienza" University of Rome, Italy

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Abstract

Aims: Liver resection is considered the standard treatment of colorectal metastases (CRLM). However, to date, no long term oncological results and data regarding repeat hepatectomy after laparoscopic approach are known. The aim of this study is to analyze single center long-term surgical and oncological outcomes after liver resection for CRLM.

Methods: A total of 57 open resections (OR) were matched with 57 laparoscopic resections (LR) for CRLM. Matching was based mainly on number of metastases, tumor size, segmental position of lesions, type of hepatectomy and type of resection.

Results: Morbidity rate was significantly less in the LR group ($p = 0.002$); the length of hospital stay was 6.5 ± 5 days for the LR group and 9.2 ± 4 days for the OR group ($p = 0.005$). After a median follow up of 53.7 months for the OR group and 40.9 months for the LR group, the 5-y overall survival rate was 65% and 60% respectively ($p = 0.36$) and the 5-y disease free survival rate was 38% and 29% respectively ($p = 0.24$). More patients in the LR group received a third hepatectomy for CRLM relapse than in the OR group (80% vs. 14.3% respectively; $p = 0.015$).

Conclusions: Laparoscopic resection for CRLM offers advantages in terms of reduced blood loss, morbidity rate and hospital stay. It provides comparable long-term oncological outcomes but can improve further resectability in patients with recurrent disease.

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Keywords: Laparoscopic liver resection; Colorectal liver metastases; Oncological outcome

Introduction

Despite the significant progress achieved in recent decades in terms of screening programs, chemotherapies and surgical treatments, colorectal cancer is still an

important health issue that affects nearly one million people worldwide with around 500.000 deaths each year.^{1–3} About 65% of all colorectal cancer patients develop distant metastases, of which the liver is the most common site. The standard of care for patients with resectable colorectal liver metastases (CRLM) is surgical resection.^{4–6} The alternative of laparoscopic liver resection had difficulty in gaining acceptance due to its complexity, the risk of bleeding, the fear of inferior oncological results and the long learning curve required.^{7,8} Laparoscopic liver resection (LR) was

Abbreviations: CRLM, Colorectal liver metastases; LR, Laparoscopic liver resection; OR, Open liver resection; DFS, Disease free survival rate.

* Corresponding author. Tel.: +32 9 332 5519; fax: +32 9 332 3891.

E-mail address: roberto.troisi@ugent.be (R.I. Troisi).

Table 1
Patient's matching and perioperative characteristics.

	Open surgery (n = 57)	Laparoscopic surgery (n = 57)	P value
Gender (F/M)	23/34	20/37	0.56
Age >70y	15/57 (26%)	15/57 (26%)	0.99
Mean	61.7 ± 11	63.5 ± 10	0.37
ASA score (I-II-III)	2-38-17	3-33-21	0.61
Previous abdominal surgery ^b	4/57 (7%)	4/57 (7%)	0.99
Bilateral distribution of metastases	6/57 (11%)	6/57 (11%)	0.99 ^a
Median Clinical Risk Score ³²	2 (0–4)	2 (0–4)	0.86
Positive nodes of primary tumor	41/57 (72%)	43/57 (75%)	0.67
Disease free interval <1y	38/57 (67%)	35/57 (61%)	0.55
Preoperative CEA level >200 ng/ml	5/57 (9%)	7/57 (12%)	0.30
N. of metastases > 1 (percentage ; range)	20/57 (35%; 1–5)	20/57 (35%; 1–7)	0.99 ^a
Max. size (mm) ≥ 50 (percentage ; range)	15/57 (26%; 3–167)	15/57 (26%; 5–196)	0.99 ^a
Synchronous ^c /Metachronous metastases	28/29	31/26	0.57
Mean time interval (months)	12.6 ± 15	13.3 ± 17	0.81
Localization of primary (colon/rectum)	30/27	33/24	0.57
Dukes stage			0.52
A	5/57 (9%)	2/57 (3%)	
B	11/57 (19%)	12/57 (21%)	
C	14/57 (25%)	19/57 (33%)	
D	27/57 (47%)	24/57 (42%)	
Type of hepatectomy			
Minor/Major	44/13	44/13	0.99 ^a
Type of resection			
Wedge resection	15/57 (26%)	15/57 (26%)	0.99 ^a
Monosegmentectomy	12/57 (21%)	12/57 (21%)	0.99 ^a
Bisegmentectomy	8/57 (14%)	8/57 (14%)	0.99 ^a
Right hepatectomy	8/57 (14%)	8/57 (14%)	0.99 ^a
Right extended hepatectomy	1/57 (2%)	1/57 (2%)	0.99 ^a
Left Hepatectomy	4/57 (7%)	4/57 (7%)	0.99 ^a
Left Lateral sectionectomy	5/57 (9%)	5/57 (9%)	0.99 ^a
Mixed ^d	4/57 (7%)	4/57 (7%)	0.99 ^a
Position of tumor (A-L/P-S) ^e	29/28	29/28	0.99 ^a
Neoadjuvant Chemotherapy	39/57 (68%)	41/57 (72%)	0.68
Biological addition ^f	11/39 (28%)	15/41 (37%)	0.42
Adjuvant Chemotherapy	33/57 (58%)	33/57 (58%)	0.99

^a Matched parameters.

^b Considering supra-mesocolic surgery.

^c Synchronous was defined as metastases diagnosed within 6 months from primitive tumor.

^d Mixed procedures were as follows: 1 Left lateral sect + Wedge segm IV, 1 Left lateral sect + wedge segm VI, 1 Bisegm + RFA segm VII, 1 Bisegm + wedge segm VIII.

^e A-L = Antero-lateral segments, P-S = Posterior-superior segments.

^f Considered when Bevacizumab or Cetuximab was added to protocol.

first performed for minor hepatic resections such as left lateral sectionectomies and wedge resections for lesions located in the antero-lateral liver segments with good outcomes.⁹ The evolution of technology and experience made it possible to broaden the indications enabling resections of lesions in the posterior and superior liver segments previously considered unfeasible.^{10,11} Several experiences of LR have been published showing that this approach is associated with a lower morbidity rate, less bleeding and a shorter hospital stay than the standard technique.^{10,12–15} Other advantages are reduced tissue damage, surgical trauma and overall costs.^{16,17} The achievement of R0 resections in both laparoscopic and open surgery led to the same oncological outcomes according to short and middle term results described in the literature.¹⁸ Nguyen et al. described an international series of 109 patients undergoing minimally invasive liver surgery

for CRLM, with good results and with low grades of mortality and morbidity.¹⁹ Furthermore, other studies compared perioperative and short-term outcomes. Only a few, however, focused on oncological results.^{18,20–27} The aim of this study is to analyze single center long-term surgical and oncological outcomes after liver resection for CRLM. It compares the laparoscopic approach with the traditional open surgery in a 1:1 case control matched-pairs analysis, focusing on preoperative oncological characteristics, surgical margins, patterns of recurrences, and repeated surgical treatment in case of tumor relapse.

Materials and methods

Between January 2005 and October 2012, 846 liver resections were performed in our institution, 293 of which

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