Margin status in liver resections for colorectal metastases

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ABCD Arq Bras Cir Dig
2016;29(3):173-179
DOI: /10.1590/0102-6720201600030011

Original Article

BRAZILIAN CONSENSUS FOR MULTIMODAL TREATMENT OF COLORECTAL LIVER METASTASES. MODULE 3: CONTROVERSIES AND UNRESECTABLE METASTASES

Consenso brasileiro de tratamento multidisciplinar de metástase hepática de origem colorretal
Módulo 3: Controvérsias e metástases irressecáveis

Orlando Jorge Martins **TORRES**[1,2,6], Márcio Carmona **MARQUES**[2,6], Fabio Nasser **SANTOS**[1], Igor Correia de **FARIAS**[2,6], Anelisa Kruschewsky **COUTINHO**[3], Cássio Virgílio Cavalcante de **OLIVEIRA**[1,4,5], Antonio Nocchi **KALIL**[1,2,4,6], Celso Abdon Lopes de **MELLO**[3], Jaime Arthur Pirola **KRUGER**[1,4,5,6], Gustavo dos Santos **FERNANDES**[3], Claudemiro **QUIREZE JR**[1,4,5,6], André M. **MURAD**[3], Milton José de **BARROS E SILVA**[3], Charles Edouard **ZURSTRASSEN**[*], Helano Carioca **FREITAS**[3], Marcelo Rocha **CRUZ**[3], Rui **WESCHENFELDER**[3], Marcelo Moura **LINHARES**[1,4,5,6], Leonaldson dos Santos **CASTRO**[1,2,6], Charles **VOLLMER**[6], Elijah **DIXON**[6], Héber Salvador de Castro **RIBEIRO**[1,2,6], Felipe José Fernandez **COIMBRA**[1,2,5,6]

MARGINS STATUS

Torres OJ, et al. Arq Bras Cir Dig 2016;29:173-9

ANNALS OF SURGERY
Vol. 230, No. 3, 309–321

Recurrence

Clinical Score for Predicting Recurrence After Hepatic Resection for Metastatic Colorectal Cancer

Analysis of 1001 Consecutive Cases

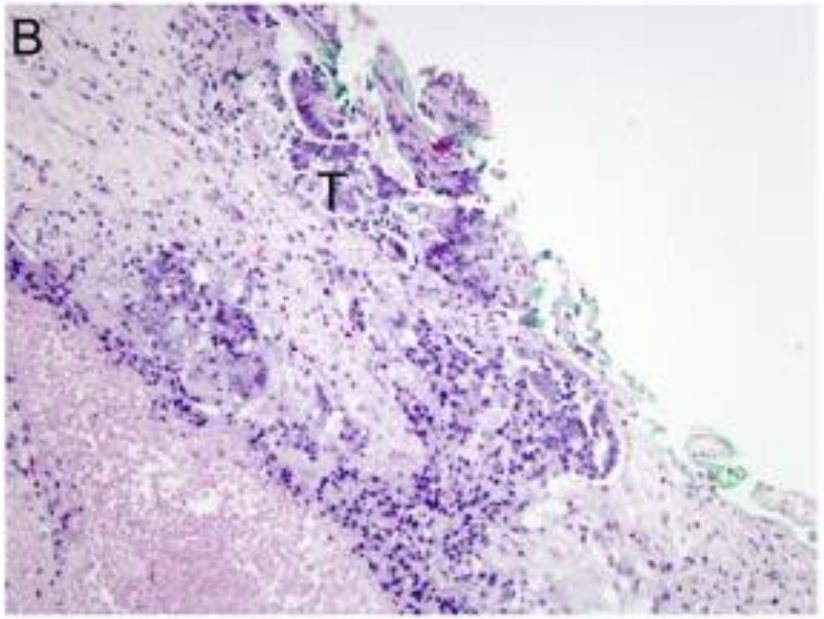
Yuman Fong, MD,*† Joseph Fortner, MD,† Ruth L. Sun, BA,*† Murray F. Brennan, MD,† and Leslie H. Blumgart, MD, FRCS*†

IN OUR HANDS

Table 4. MULTIVARIATE PREDICTORS OF RECURRENCE

	Hazard	Coefficient	p
Positive margin	1.7	0.5	0.004
Extrahepatic disease	1.7	0.5	0.003
>1 tumor	1.5	0.4	0.0004
Carcinoembryonic antigen >200 ng/ml	1.5	0.4	0.01
Size >5 cm	1.4	0.3	0.01
Node-positive primary	1.3	0.28	0.02
Disease-free interval <12 months	1.3	0.25	0.03
Bilateral tumor	0.9	−0.1	0.4

Fong Y, et al. Ann Surg 1999;230:309-21



- Tumor in seg 4 (resected by laparoscopy).
- Histology of the resection margin (positive).
- CT after 10 months (clear signs of recurrence).

Quesada R, et al. Surg Oncol 2017;26:229-35

Positive (R1) resection margin

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REVIEW

Quantification of risk of a positive (R1) resection margin following hepatic resection for metastatic colorectal cancer: An aid to clinical decision-making

Fenella K.S. Welsh[a,*], Paris P. Tekkis[b], Tom O'Rourke[a], Timothy G. John[a], Myrddin Rees[a]

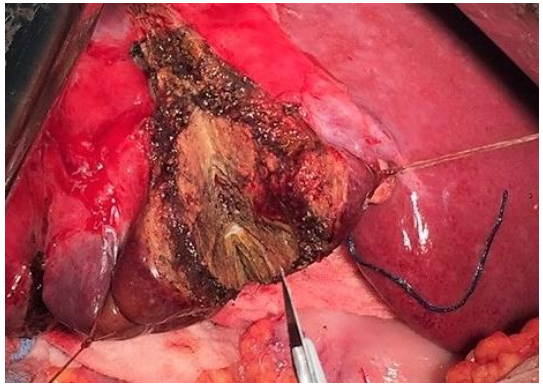
- Non-anatomical resection
- Extended resection
- >3 hepatic metastases involving >50% of the liver
- Repeat hepatic resection
- Bilobar disease
- Abnormal pre-operative LFTs

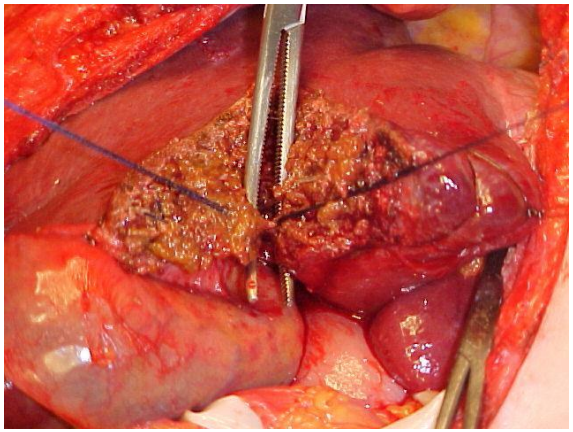
Risk

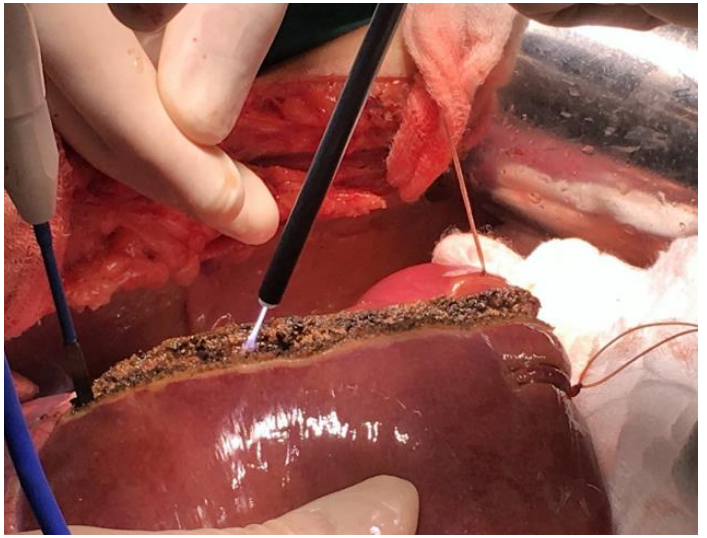
Welsh FKS, et al. Surg Oncol 2008;17:3-13

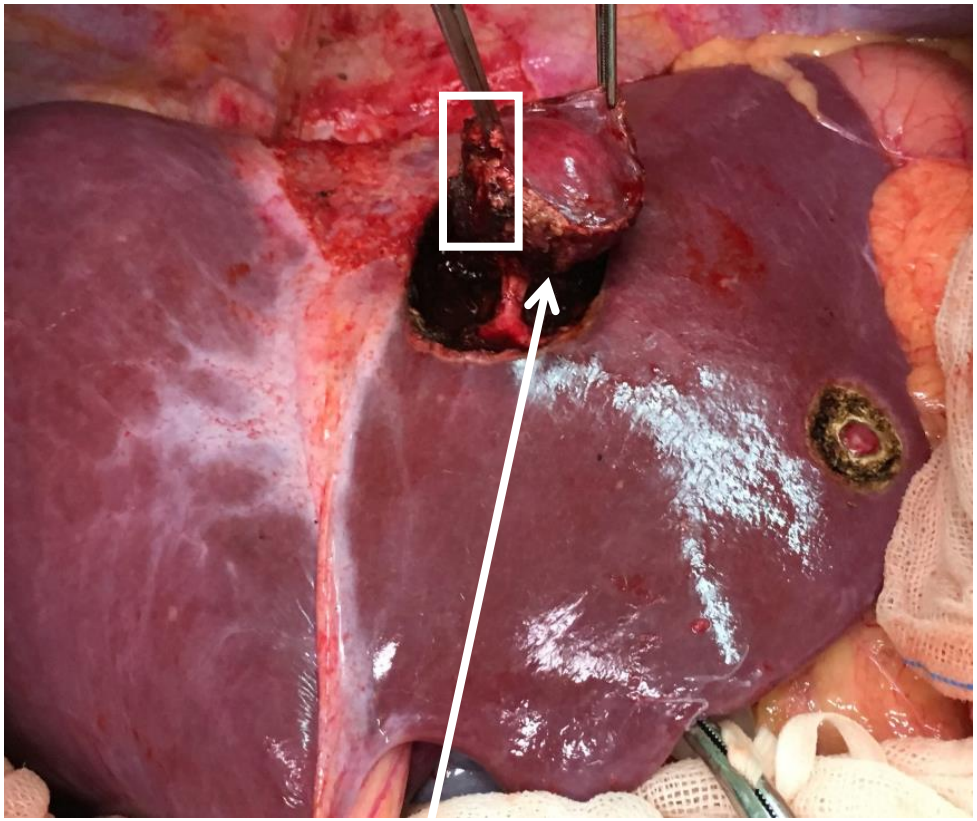
ACCURATE ASSESSMENT OF MARGINS STATUS

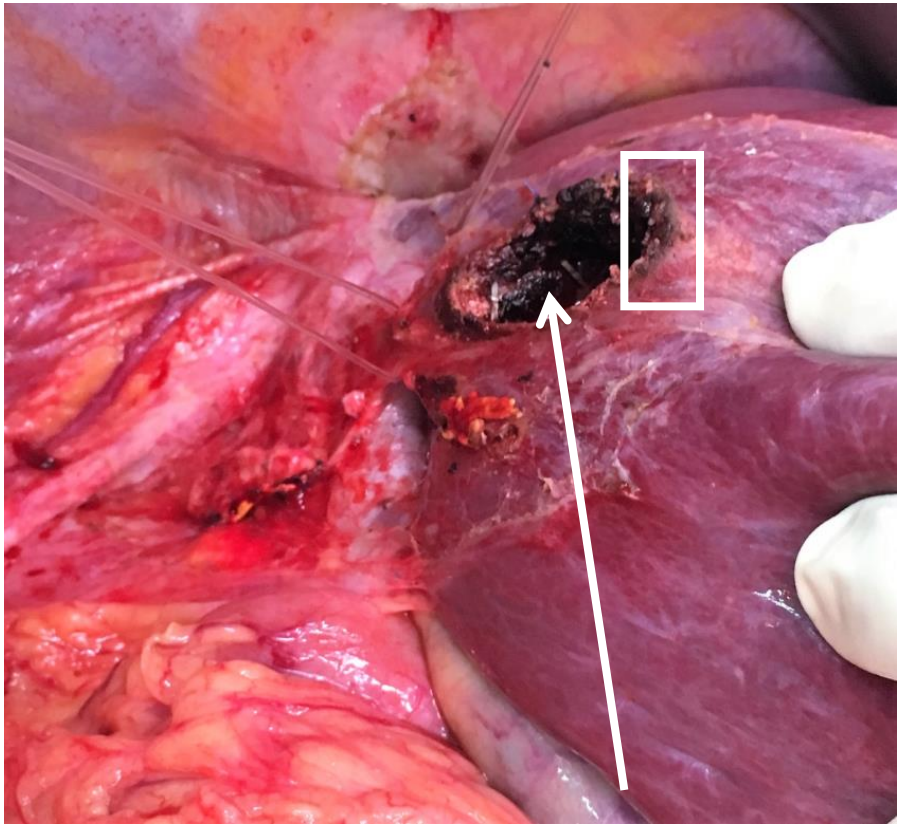
- Vaporize
- Aspirate
- Ablate
- Fracture
- Coagulate







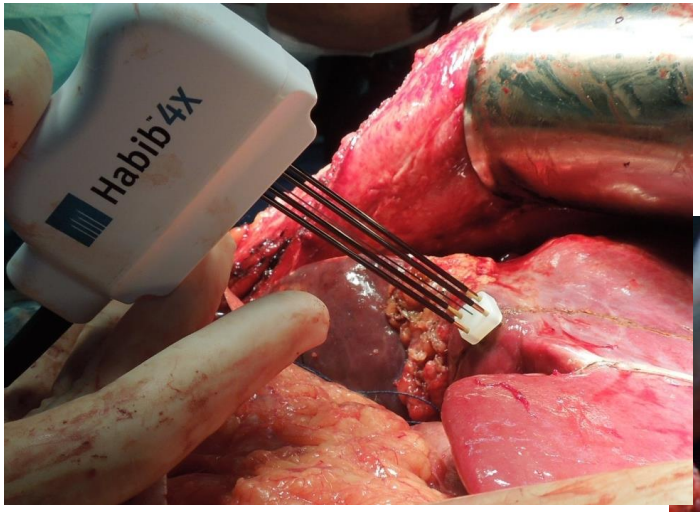


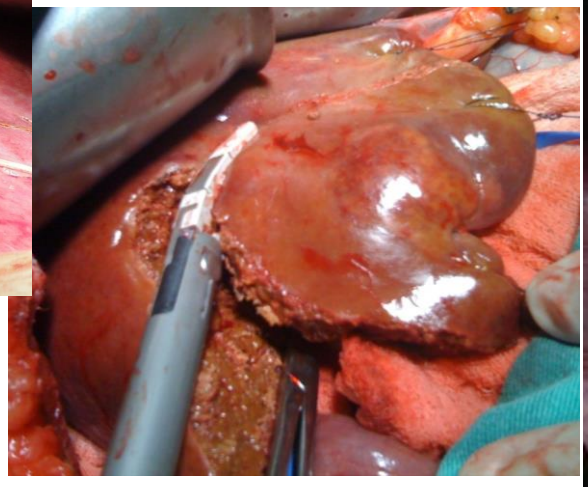


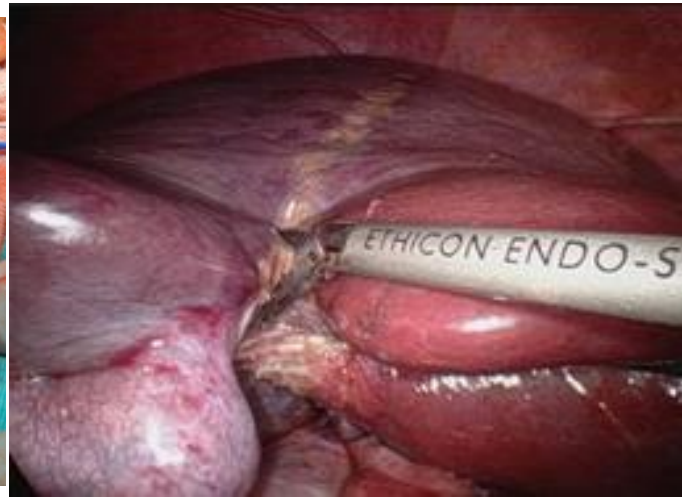
Pathology

Surgical

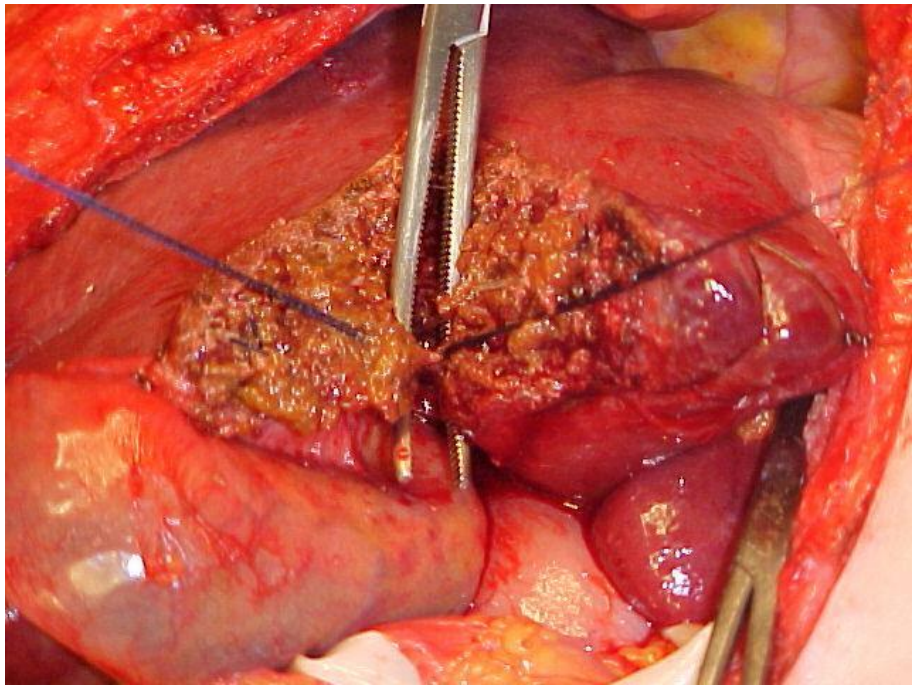
A NEW PERSPECTIVE



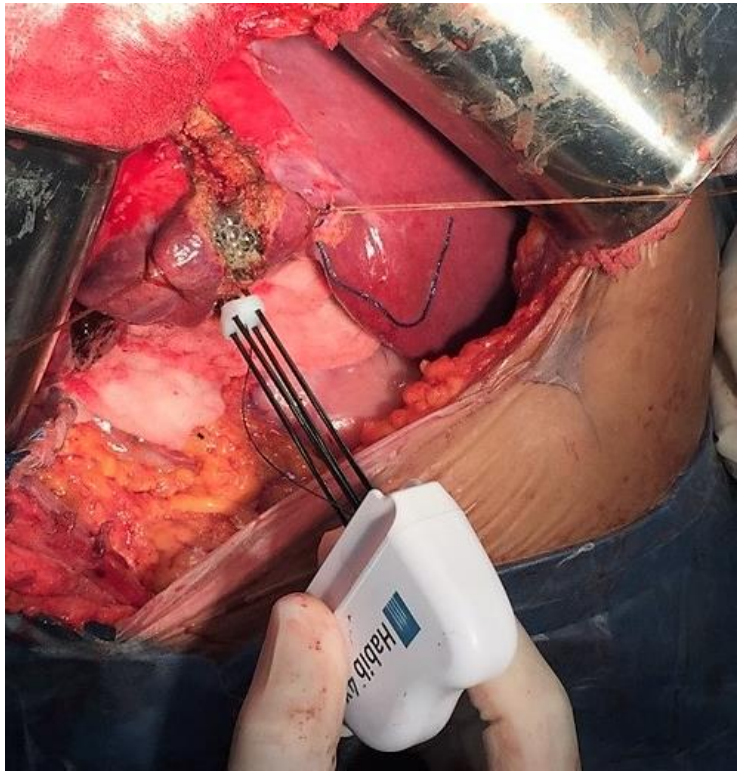




- Bipolar coagulator (Ligasure®)
- Ultrasonic dissector:
  - SonoSurg®
  - Harmonic®
- Ultrasonic surgical Aspirator (CUSA®)
- Argon Beam
- Radiofrequency ablation



Kelly



Radiofrequency

Technique

Surgical Oncology 26 (2017) 229–235

Contents lists available at ScienceDirect

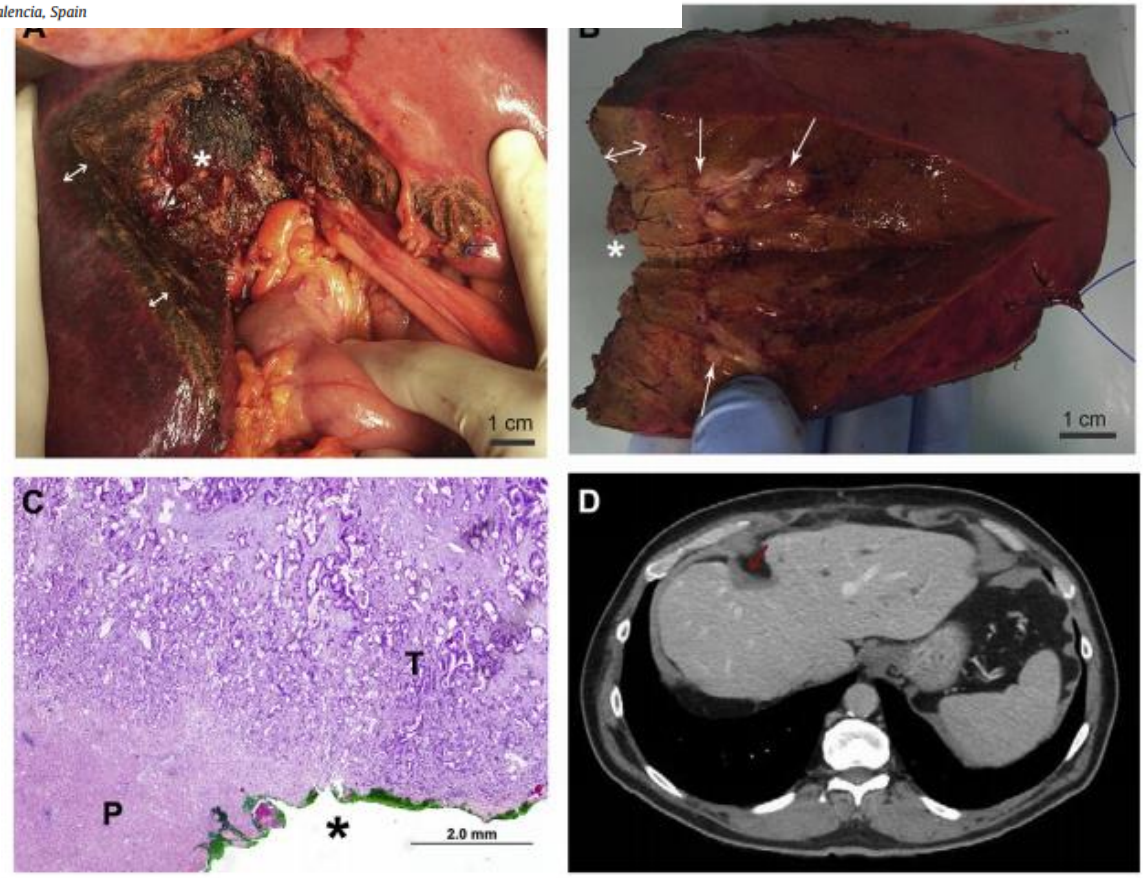
Surgical Oncology

journal homepage: www.elsevier.com/locate/suronc

The impact of radiofrequency-assisted transection on local hepatic recurrence after resection of colorectal liver metastases

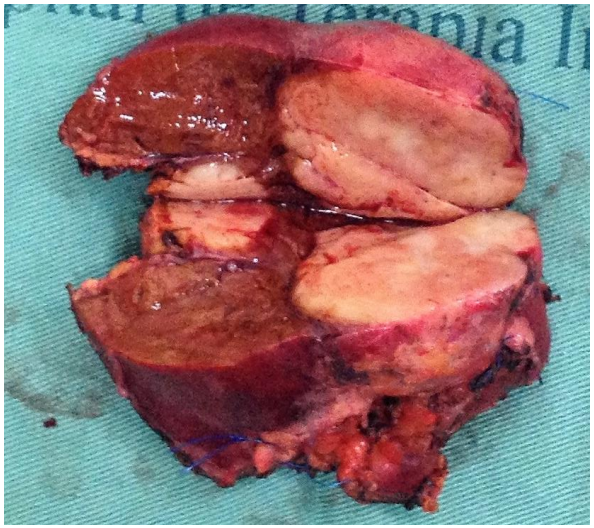
R. Quesada, MSc, PhD [a, *], A. Moreno [b], I. Poves [a, c], E. Berjano [d], L. Grande [c], F. Burdío [a, c]

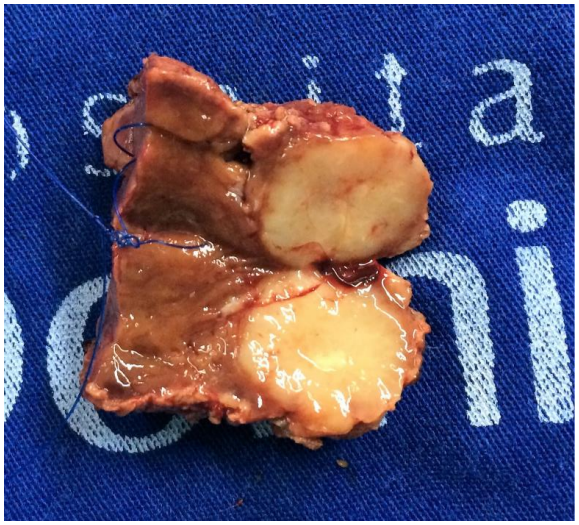
[a] Cancer Research Group HBP, Institut Hospital del Mar d'Investigacions Mèdiques, Barcelona, Spain
[b] School of Medicine, Universitat Pompeu Fabra and UAB, Barcelona, Spain
[c] Department of Surgery, Hospital del Mar, Barcelona, Spain
[d] BioMIT, Electronic Engineering Department, Universitat Politècnica de València, Valencia, Spain



- **Radiofrequency assisted transection … associated with a deep thermal lesions may reduce local hepatic recurrence, especially in case of margin invasion during transection.**

Quesada R, et al. Surg Oncol 2017;26:229-35





≥ 10mm

≥ 4mm

≥ 1mm

Hamady ZZR, et al. Ann Surg 2014;259:543-8

Hayashi H, et al. Oncol Rep 2009;21:601-7

Wakai T, et al. Ann Surg Oncol 2008;15:2472-81

Microsatellite lesions

Annals of Surgical Oncology **15**(9):2472–2481
DOI: 10.1245/s10434-008-0023-y

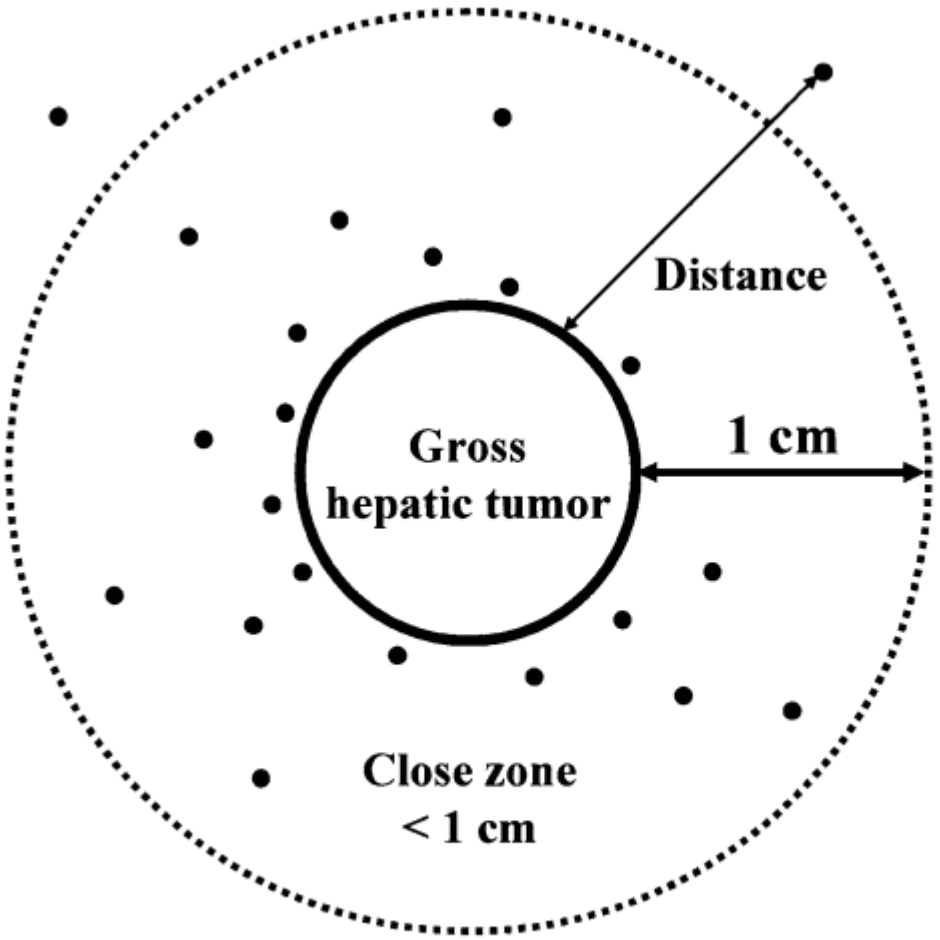
Appraisal of 1 cm Hepatectomy Margins for Intrahepatic Micrometastases in Patients with Colorectal Carcinoma Liver Metastasis

Toshifumi Wakai, MD, PhD,[1] Yoshio Shirai, MD, PhD,[1] Jun Sakata, MD, PhD,[1] Vladimir A. Valera, MD, PhD,[1] Pavel V. Korita, MD,[1] Kouhei Akazawa, PhD,[2] Yoichi Ajioka, MD, PhD,[3] and Katsuyoshi Hatakeyama, MD, PhD, FACS[1]

2008

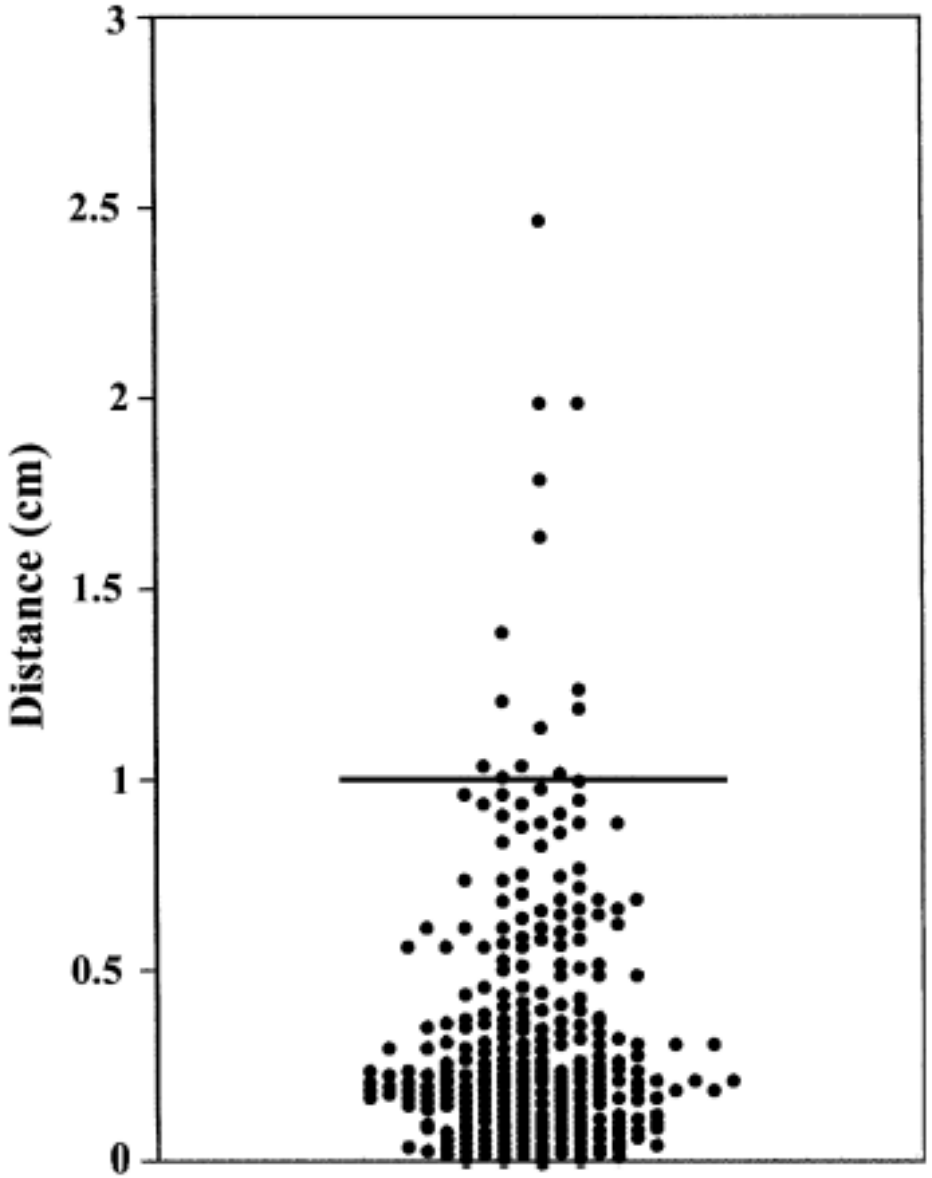
Wakai T, et al. Ann Surg Oncol 2008;15:2472-81

≥ 10mm



Wakai T, et al. Ann Surg Oncol 2008;15:2472-81

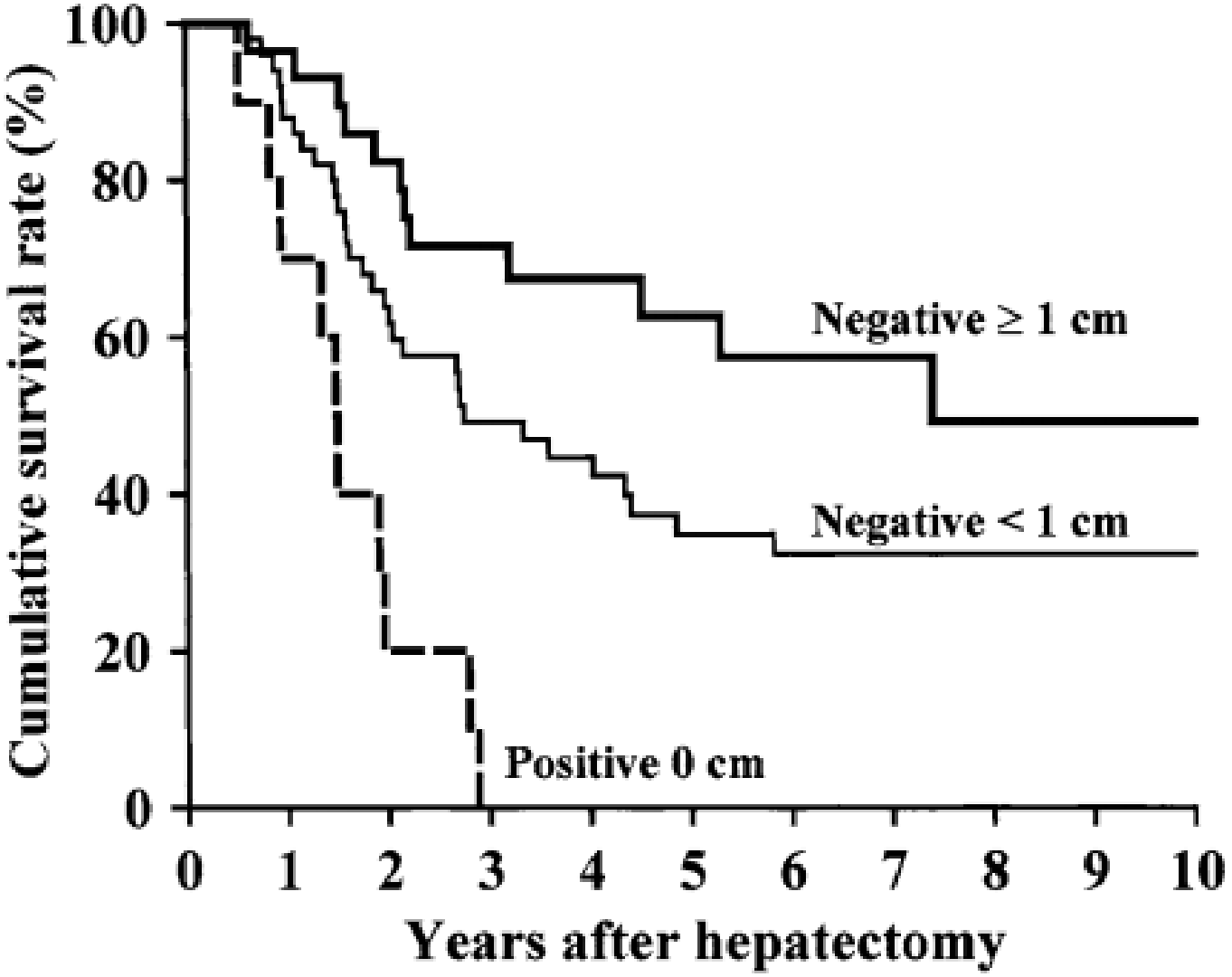
≥ 10mm



- 95% - 1 cm

Wakai T, et al. Ann Surg Oncol 2008;15:2472-81

≥ 10mm



Wakai T, et al. Ann Surg Oncol 2008;15:2472-81

≥ 10mm

- The current recommendation of ≥ 1 cm hepatectomy margin should remain the goal for patients with colorectal liver metastases.

Wakai T, et al. Ann Surg Oncol 2008;15:2472-81

Microsatellite lesions

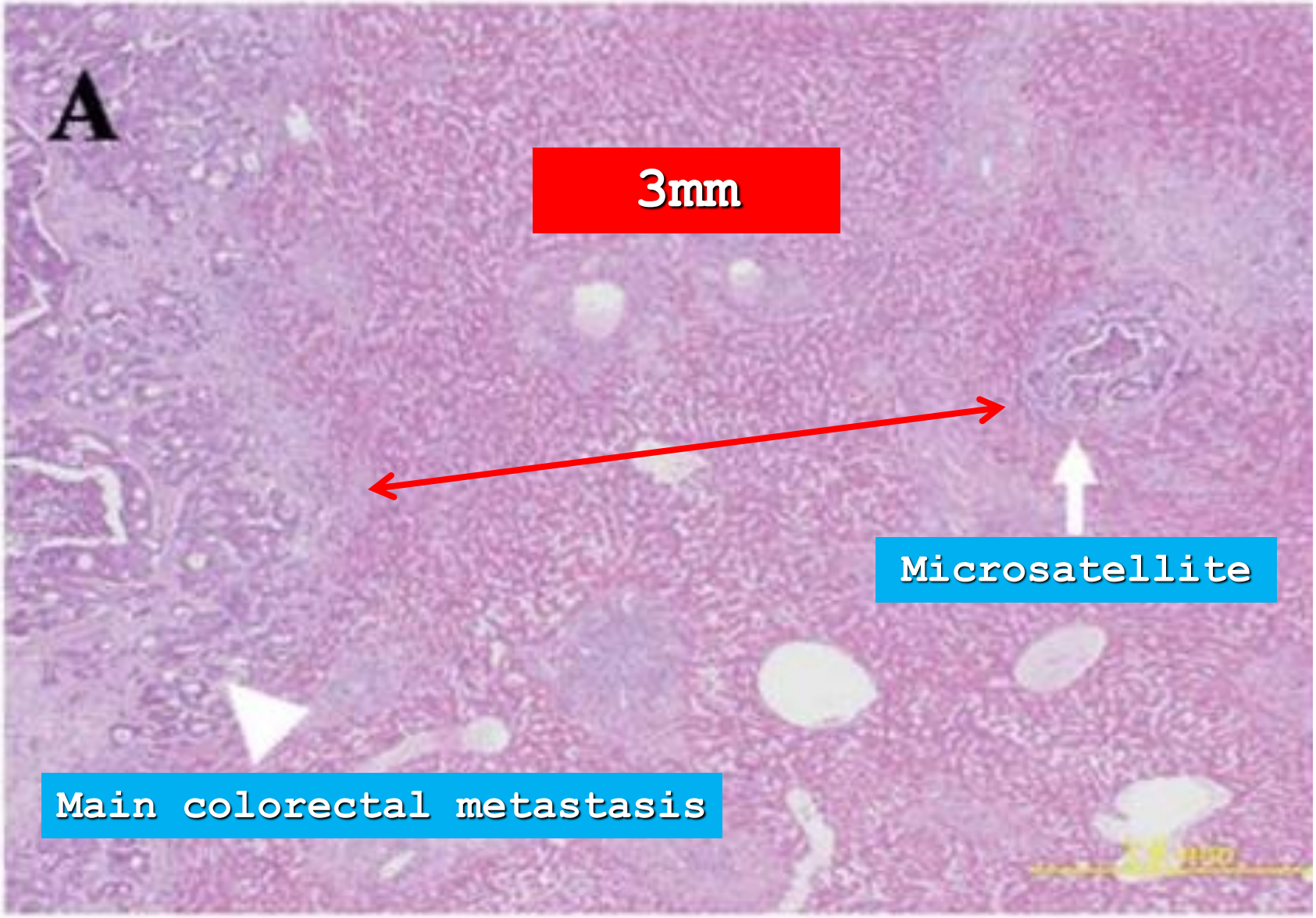
Presence of microsatellite lesions with colorectal liver metastases correlate with intrahepatic recurrence after surgical resection

HIROYUKI HAYASHI[1,2], KAZUKI NABESHIMA[1], MAKOTO HAMASAKI[1], YUICHI YAMASHITA[2], TAKAYUKI SHIRAKUSA[3] and HIROSHI IWASAKI[1]

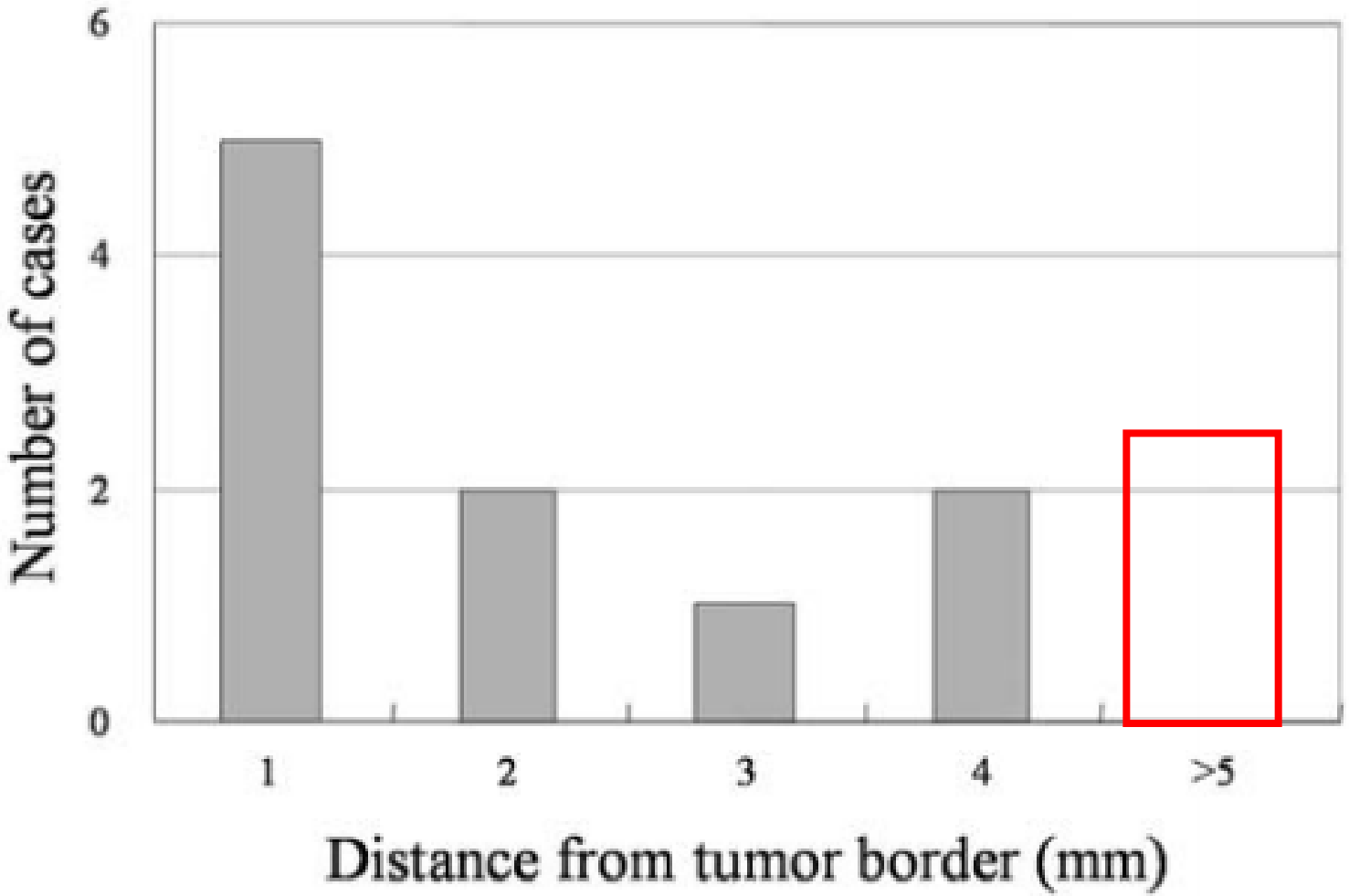
Departments of [1]Pathology, [2]Gastroenterological Surgery and [3]Thoracic, Endocrine and Pediatric Surgery, Fukuoka University Hospital and School of Medicine, 7-45-1 Nanakuma, Jonan-ku, Fukuoka 814-0180, Japan

2009

Hayashi H, et al. Oncol Rep 2009;21:601-7



Hayashi H, et al. Oncol Rep 2009;21:601-7



Hayashi H, et al. Oncol Rep 2009;21:601-7

- Microsatellite metastases were detected in 55.5% of the cases.
- Worse overall survival
- Found within 4 mm from the main metastases
- 70% were located within 2 mm of the tumor border

Hayashi H, et al. Oncol Rep 2009;21:601-7

One-Millimeter Cancer-Free Margin Is Curative for Colorectal Liver Metastases

A Propensity Score Case-Match Approach

Zaed Z. R. Hamady, PhD, FRCS,† J. Peter A. Lodge, MD, FRCS,† Fenella K. Welsh, FRCS,* Giles J. Toogood, DM, FRCS,† Alan White, MRCS,† Timothy John, FRCS,* and Myrddin Rees, FRCS**

2014

TABLE 2. Overall Disease-Free Survival (DFS) Stratified by Resection Margin Clearance and Illustration of Univariate and Multivariate Analyses

Margin	Number (2715)	Median DFS, Mo (95% CI)	(%) Disease-Free Survival 1-Yr	3-Yr	5-Yr	10-Yr	Univariate Analysis *P*			Multivariate Analysis HR (95% CI)	*P*
<1 mm	663	19.8 (17.4–22)	69	34	25	21	Ref			Ref	
1–4.9 mm	852	24.2 (21–27)	72	42	33	27	<0.001	Ref		1.5 (1.3–1.7)	<0.001*
5–9.9 mm	439	24 (21–27)	73	40	32	28	0.007	0.998	Ref	1.0 (0.9–1.2)	0.285**
≥10 mm	761	26 (21–31)	77	42	33	29	<0.001	0.331	0.445	1.0 (0.8–1.2)	0.487***

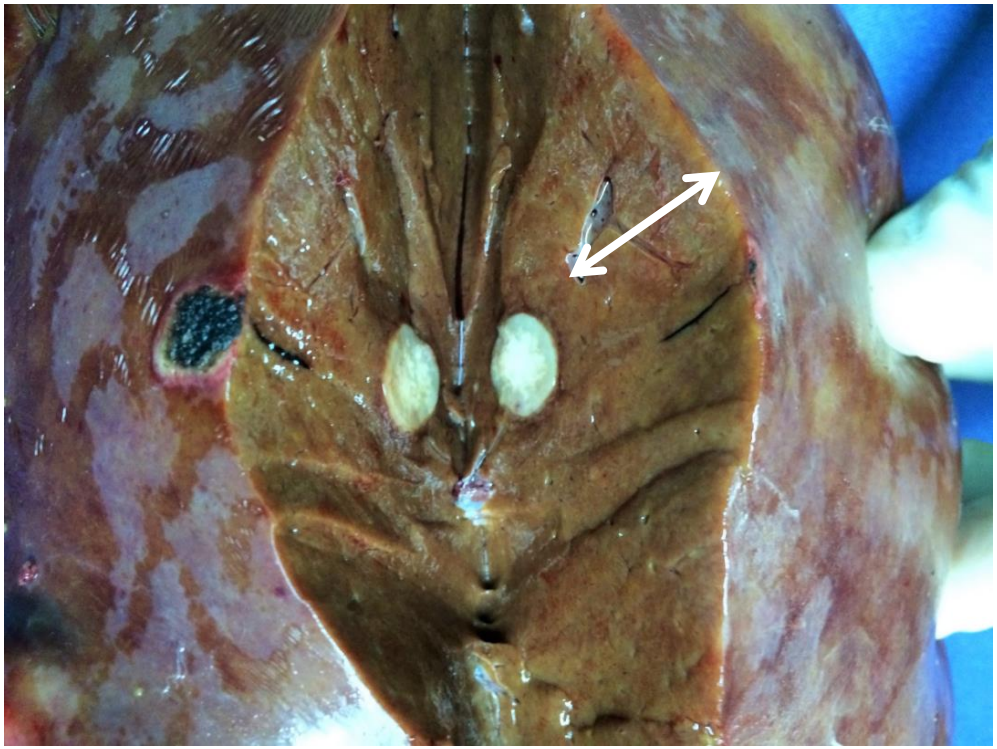
*Compared with <1 mm, **compared with 1–4.9 mm, ***compared with 5–9.9 mm.

≥ 1mm

Hamady ZZR, et al. Ann Surg 2014;259:543–8

- This study provides evidence that achievement of 1-mm margin width should be considered the standard of care for patients with CRLM in the modern liver resection practice, at least when ultrasonic dissection is used.

Hamady ZZR, et al. Ann Surg 2014;259:543–8

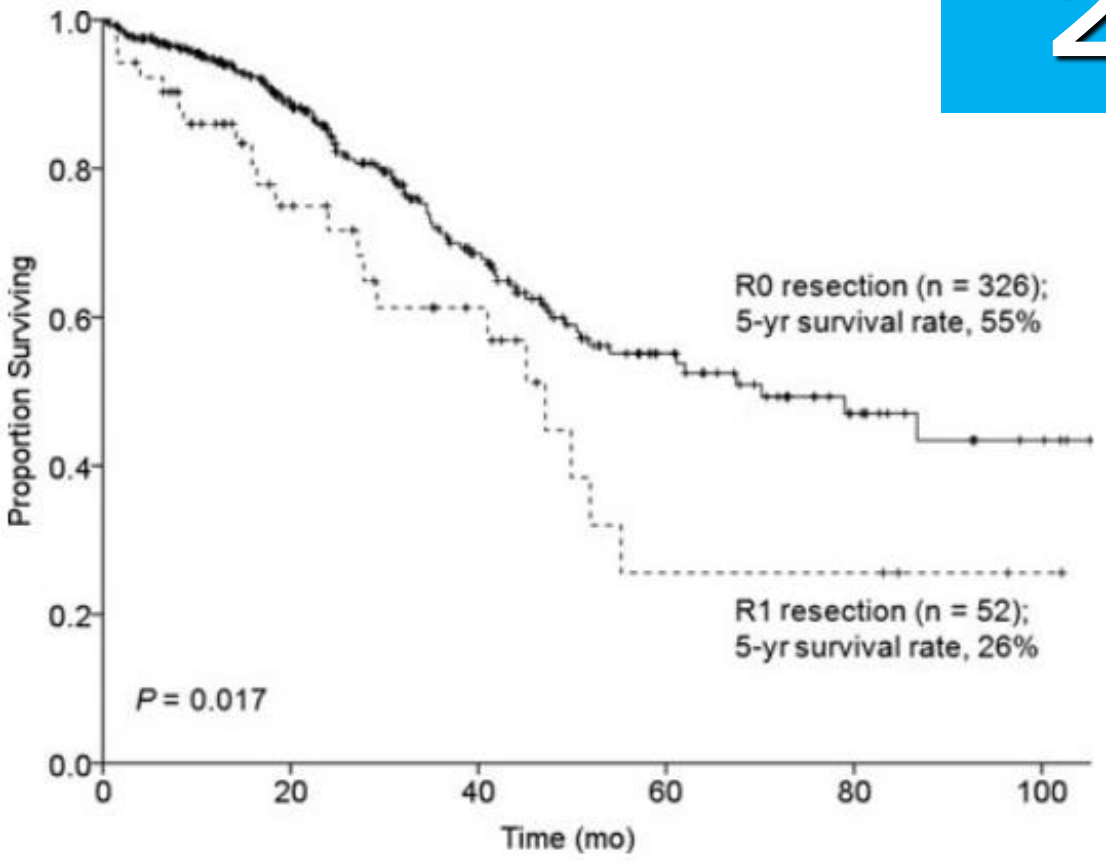


Chemotherapy

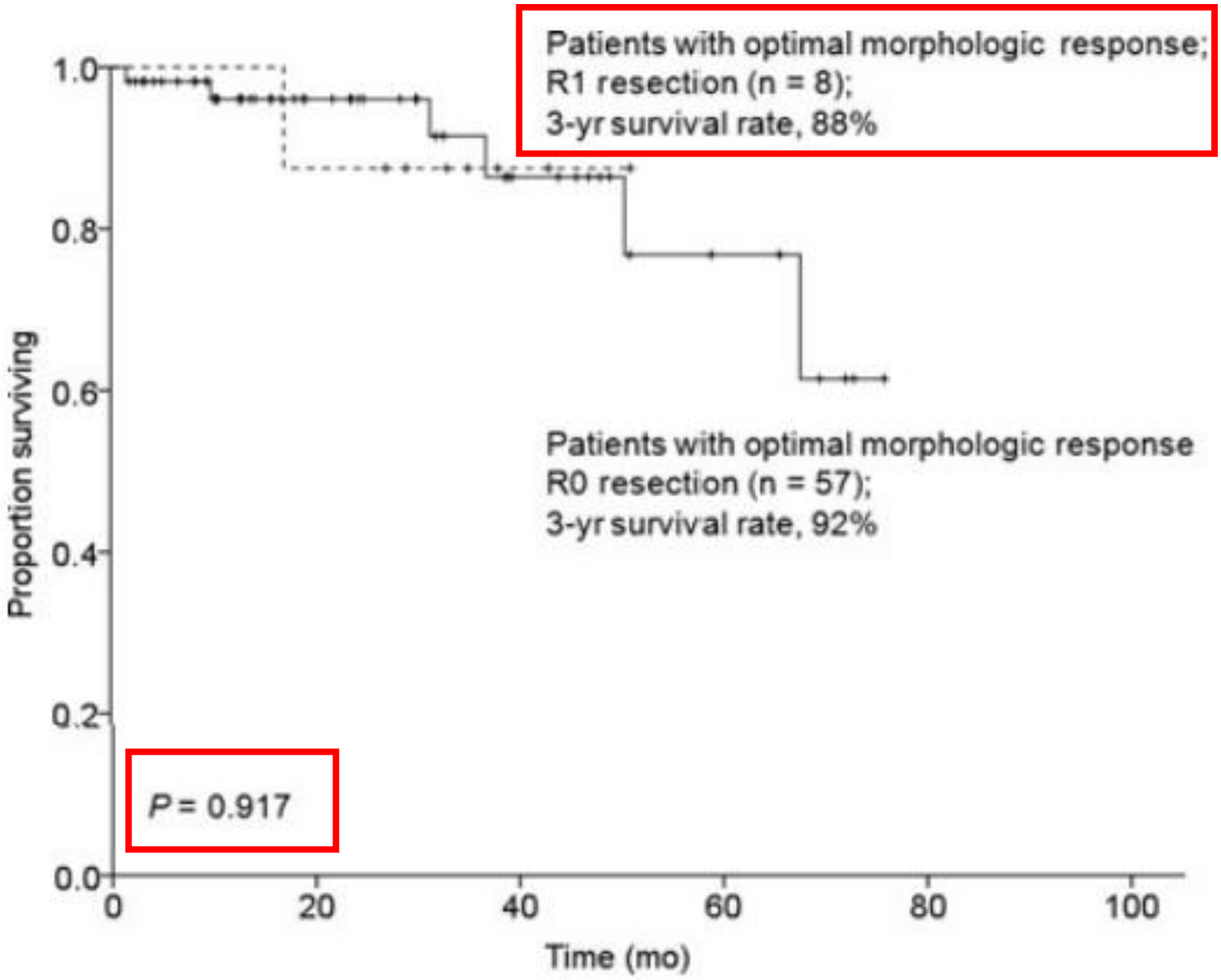
Margin Status Remains an Important Determinant of Survival After Surgical Resection of Colorectal Liver Metastases in the Era of Modern Chemotherapy

Andreas Andreou, MD, Thomas A. Aloia, MD, FACS,* Antoine Brouquet, MD,* Paxton V. Dickson, MD,* Giuseppe Zimmitti, MD,* Dipen M. Maru, MD,† Scott Kopetz, MD, PhD,‡ Evelyne M. Loyer, MD,§ Steven A. Curley, MD, FACS,* Eddie K. Abdalla, MD, FACS,* and Jean-Nicolas Vauthey, MD, FACS**

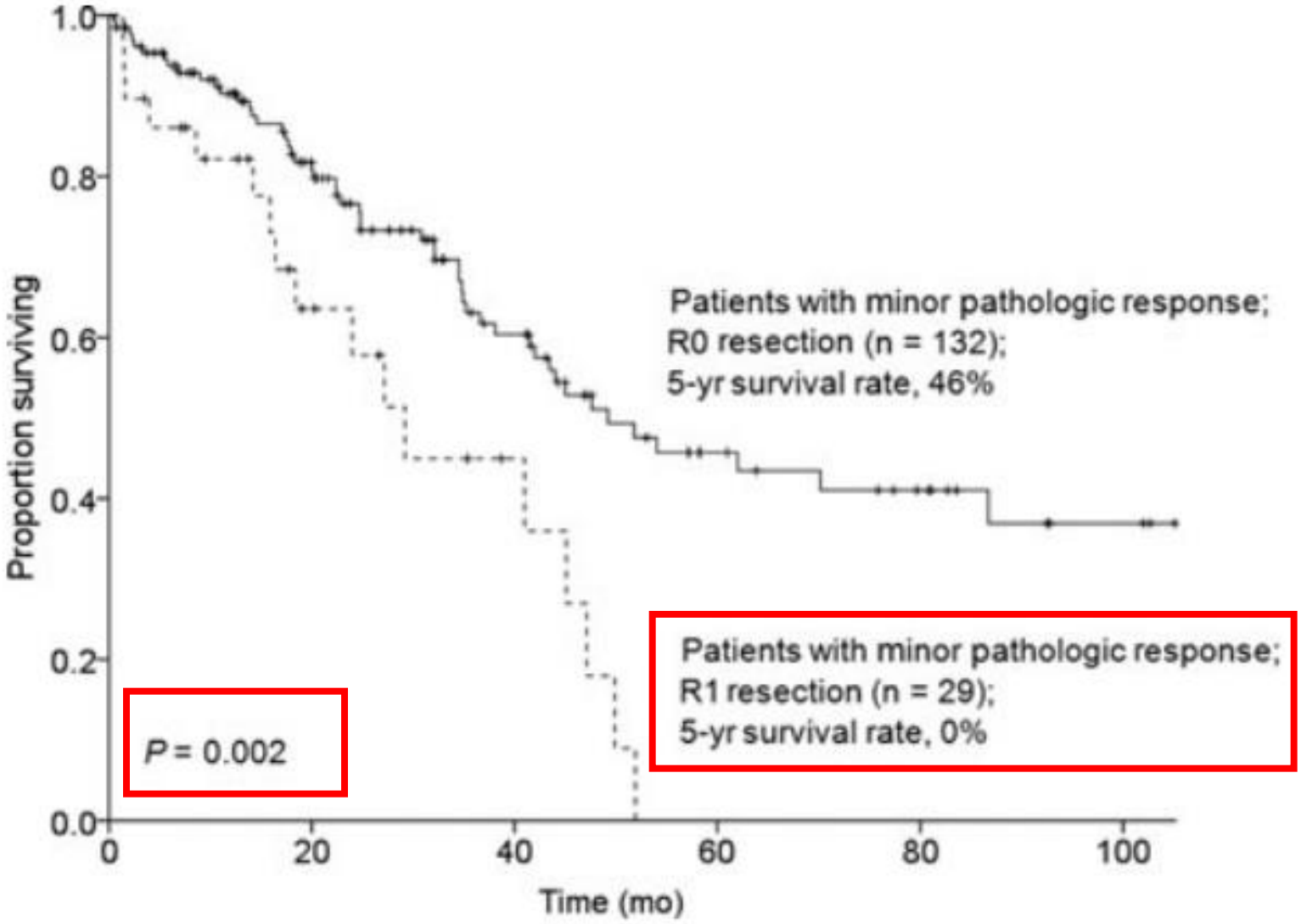
2



Andreou A, et al. Ann Surg 2013;257: 1079–88



Andreou A, et al. Ann Surg 2013;257: 1079–88



Andreou A, et al. Ann Surg 2013;257: 1079–88

- Continued emphasis on achieving R0 resection in patients with CLMs.
- Modern chemotherapy combined with aggressive surgical strategies has resulted in improved long-term OS.
- For patients with unfavorable tumor biology, only if R0 resection is deemed feasible.

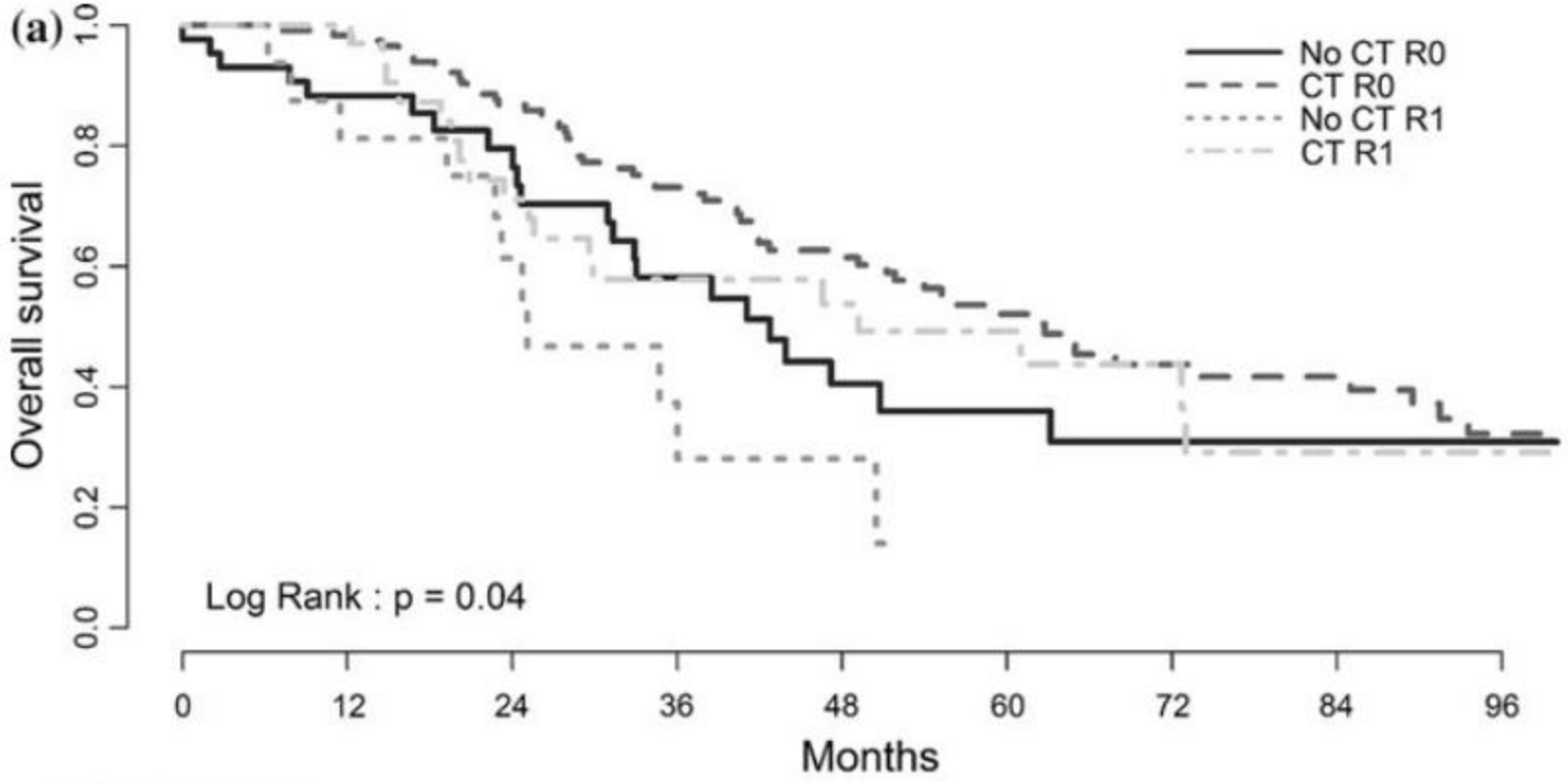
Andreou A, et al. Ann Surg 2013;257: 1079-88

World J Surg (2013) 37:2647–2654
DOI 10.1007/s00268-013-2186-3

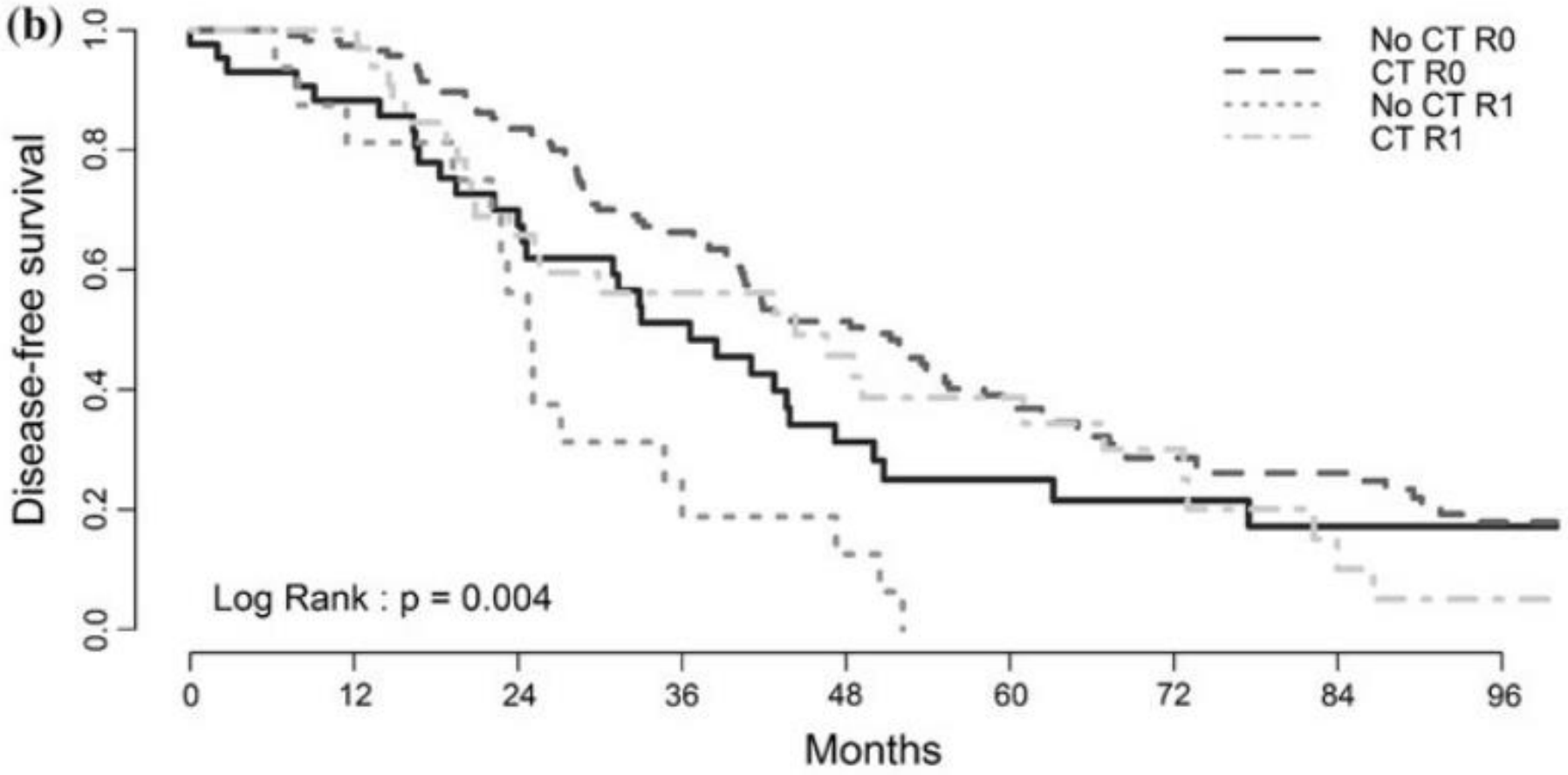
World Journal of Surgery

Prognostic Impact of Positive Surgical Margins After Resection of Colorectal Cancer Liver Metastases: Reappraisal in the Era of Modern Chemotherapy

Hadrien Tranchart · Mircea Chirica · Matthieu Faron · Pierre Balladur · Leila Bengrine Lefevre · Magali Svrcek · Aimery de Gramont · Emmanuel Tiret · François Paye



Tranchart H, et al. World J Surg 2013;37:2647–54



Tranchart H, et al. World J Surg 2013;37:2647–54

- A positive surgical margin after LR of CRLM remains a significant negative prognostic factor in the era of effective chemotherapy regimens.
- Postoperative chemotherapy reduces recurrence rates after R1 resection of CRLM.

Tranchart H, et al. World J Surg 2013;37:2647–54

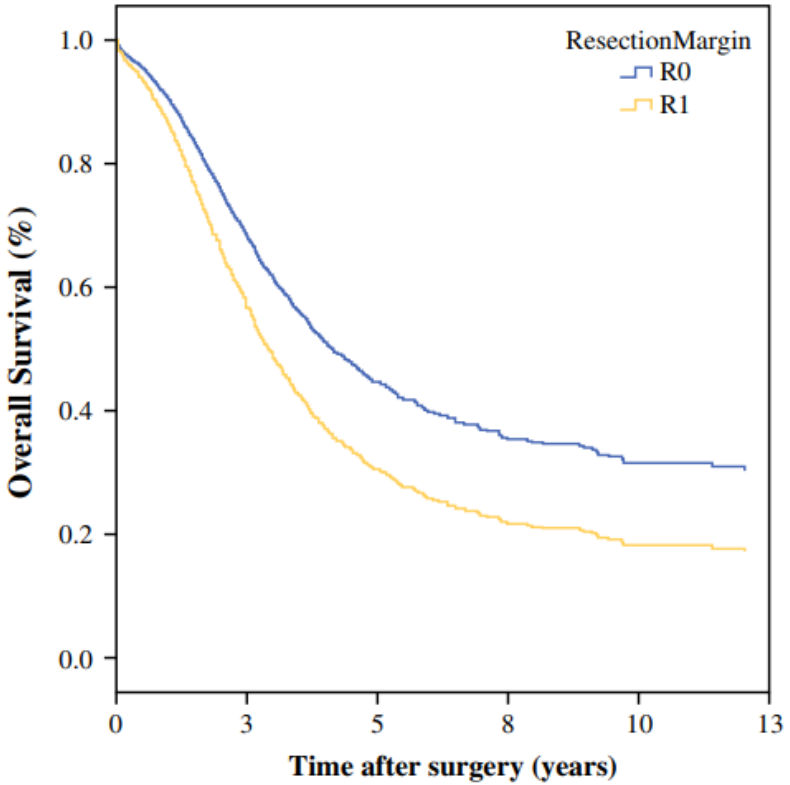
Ann Surg Oncol (2015) 22:173–179
DOI 10.1245/s10434-014-3953-6

Annals of
SURGICAL ONCOLOGY
OFFICIAL JOURNAL OF THE SOCIETY OF SURGICAL ONCOLOGY

ORIGINAL ARTICLE – HEPATOBILIARY TUMORS

Impact of Margin Status and Neoadjuvant Chemotherapy on Survival, Recurrence After Liver Resection for Colorectal Liver Metastasis

Sanjay Pandanaboyana, MBBS, MS, MPhil, FRCS, Alan White, MBChB, MRCS, Samir Pathak, BSc, MBChB, MSc, MRCS, Ernest L. Hidalgo, FRCS, Giles Toogood, FRCS, J. P. Lodge, FRCS, and K. R. Prasad, MBBS, MS, FRCS



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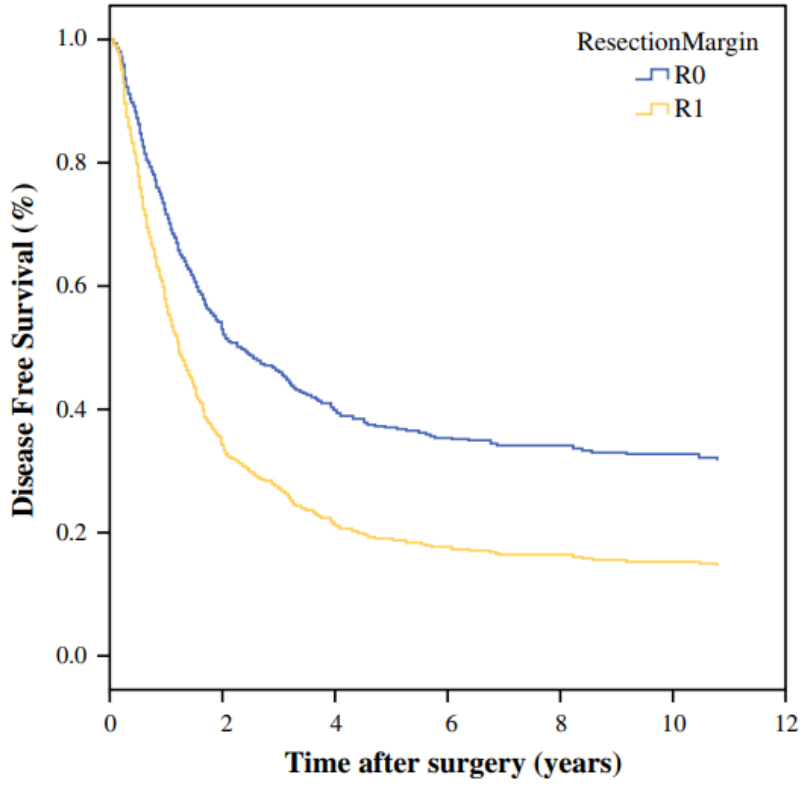


Pandanaboyana S, et al. Ann Surg Oncol 2015;22:173–9

Neoadjuvant chemotherapy

Positive margin

- Does not seem to improve survival
- Does not have impact on recurrence
- Does not reduce the need for redo

Pandanaboyana S, et al. Ann Surg Oncol 2015;22:173-9

J Gastrointest Surg (2017) 21:1831–1840
DOI 10.1007/s11605-017-3557-0

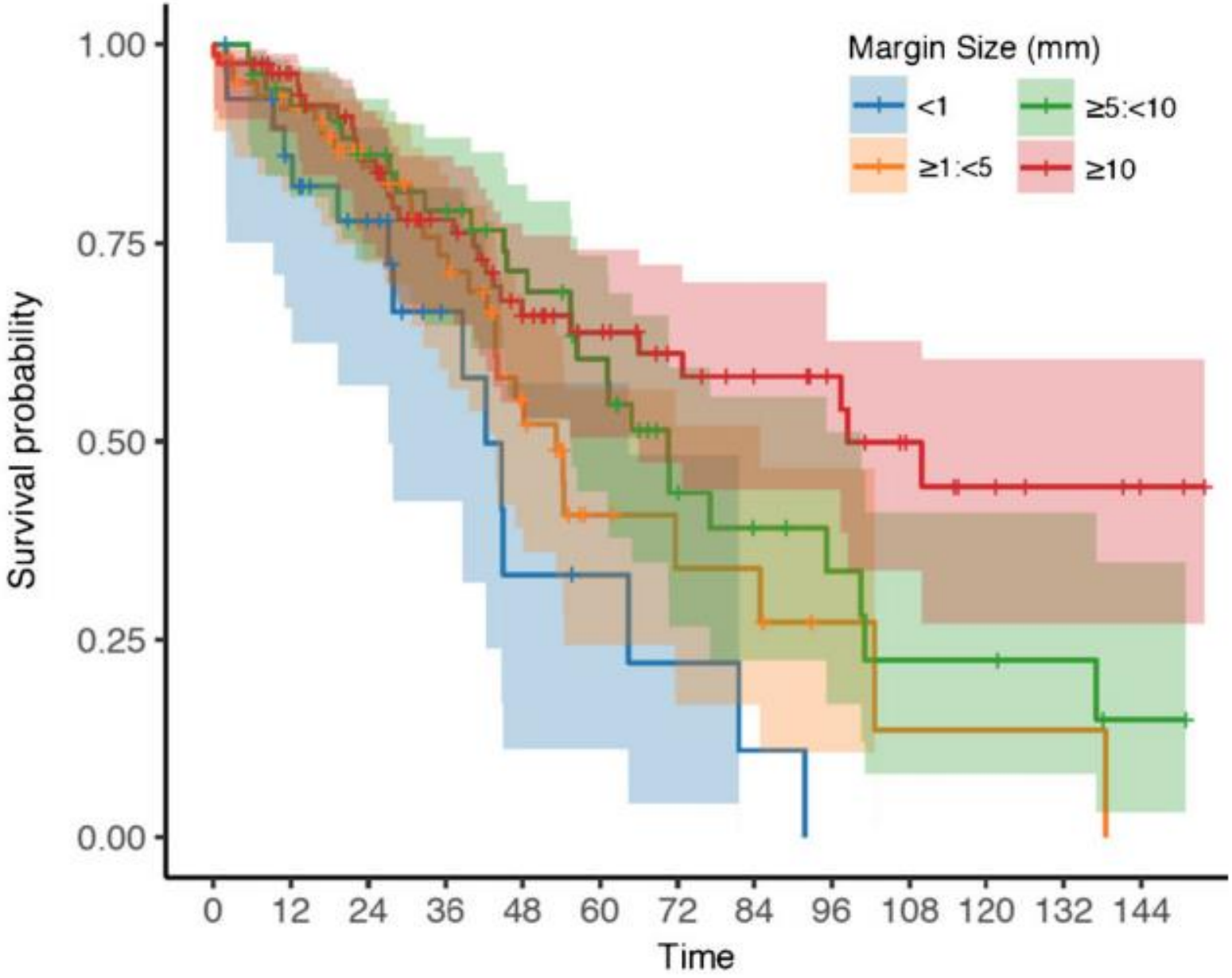
ORIGINAL ARTICLE

Prognostic Significance of Surgical Margin Size After Neoadjuvant FOLFOX and/or FOLFIRI for Colorectal Liver Metastases

Cynthia L. Miller[1,2] · Martin S. Taylor[3] · Motaz Qadan[1] · Vikram Deshpande[3] · Steven Worthington[4] · Robert Smalley[2] · Chey Collura[1] · David P. Ryan[5] · Jill N. Allen[5] · Lawrence S. Blaszkowsky[5] · Jeffrey W. Clark[5] · Janet E. Murphy[5] · Aparna R. Parikh[5] · David Berger[1] · Kenneth K. Tanabe[1] · Keith D. Lillemoe[1] · Cristina R. Ferrone[1]

Table 2 Disease-free and overall survival according to margin size (95% confidence interval)

	3-year	5-year	10-year
Disease-free survival			
≥ 1–< 5 mm	10% (3–20%)	6% (2–17%)	–
≥ 5–< 10 mm	28% (16–41%)	16% (7–28%)	16% (7–28%)
≥ 10 mm	46% (34–57%)	41% (29–53%)	39% (26–50%)
Overall survival			
< 1 mm	66% (42–82%)	33% (11–57%)	–
≥ 1–< 5 mm	74% (59–84%)	41% (24–57%)	14% (1–40%)
≥ 5–< 10 mm	79% (65–88%)	60% (44–74%)	22% (8–41%)
≥ 10 mm	78% (67–86%)	64% (51–74%)	44% (27–60%)



Miller CL, et al. J Gastrointest Surg 2017;21:1831-40

No chemotherapy

- Positive margins had a 3.3-fold increased risk of death.

Chemotherapy

- No significant difference in risk of death between patients with positive and negative margins.

Miller CL, et al. J Gastrointest Surg 2017;21:1831-40

- R0 resection for CRLM in the era of modern chemotherapy is important
- Patients with positive margins should receive additional post-liver resection chemotherapy for improved survival.
- No evidence of a long-term survival benefit from wider margins.

Miller CL, et al. J Gastrointest Surg 2017;21:1831-40

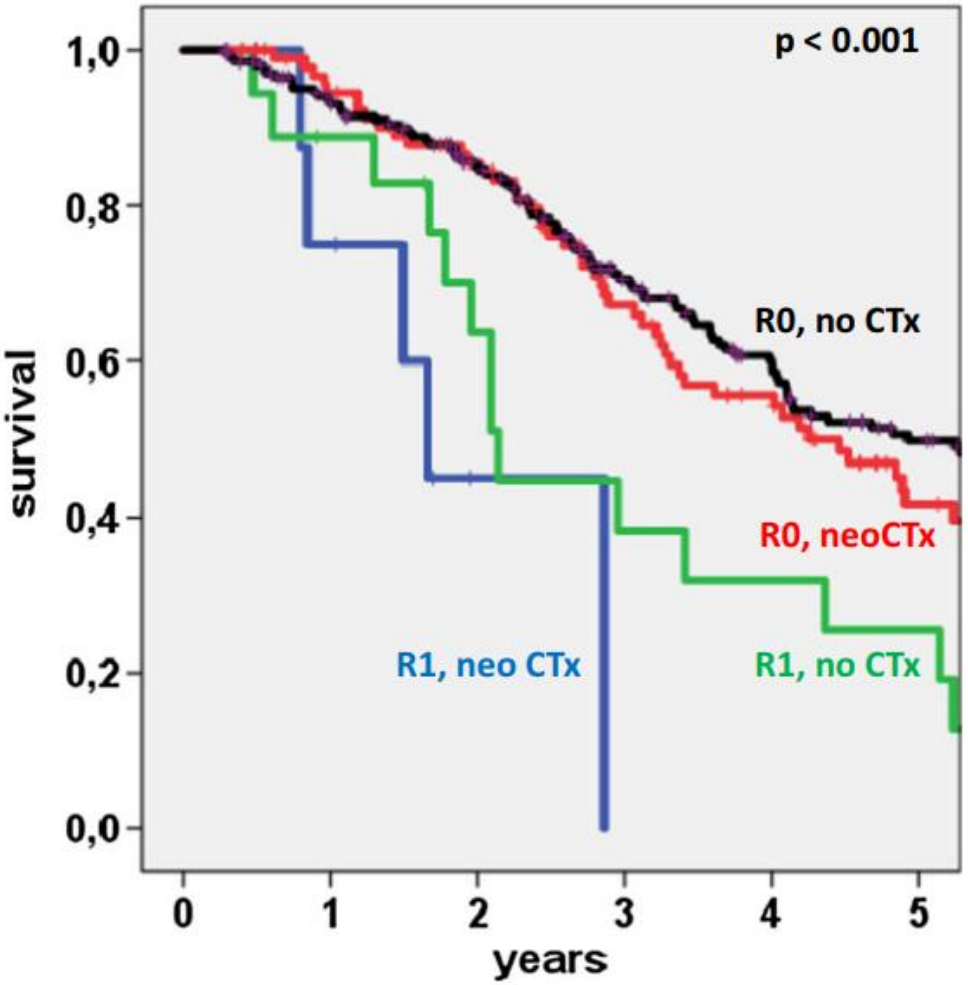
Int J Colorectal Dis
https://doi.org/10.1007/s00384-017-2916-3

ORIGINAL ARTICLE

Chemotherapy

Prognostic influence of hepatic margin after resection of colorectal liver metastasis: role of modern preoperative chemotherapy

Frank Makowiec[1,2] · Peter Bronsert[2,3] · Andrea Klock[1] · Ulrich T. Hopt[1] · Hannes P Neeff[1,2]



Makowiec F, et al. Int J Colorectal Dis 2017

Table 4 Multivariate survival analysis of 334 patients after first resection of isolated colorectal liver metastases

Parameter	*p*	RR	95% CI
Positive hepatic margin	< 0.001	3.2	2.0–5.2
Age > 65 years	0.005	1.6	1.1–2.1
Size (metastasis) > 30 mm	(0.07)	(1.3)	–

Makowiec F, et al. Int J Colorectal Dis 2017

- **Margin status remains the strongest independent prognostic factor.**
- **Despite a liver-only metastatic disease, survival was relatively poor in patients with positive margins.**
- **In our series, this prognostic effect was equally present after neoadjuvant chemotherapy for CLM.**

Makowiec F, et al. Int J Colorectal Dis 2017

Original article

Bevacizumab

Prognostic impact of margin status in liver resections for colorectal metastases after bevacizumab

K. Sasaki[1], G. A. Margonis[1], N. Andreatos[1], A. Wilson[1], M. Weiss[1], C. Wolfgang[1], T. N. Sergentanis[2], G. Polychronidis[3], J. He[1] and T. M. Pawlik[1]

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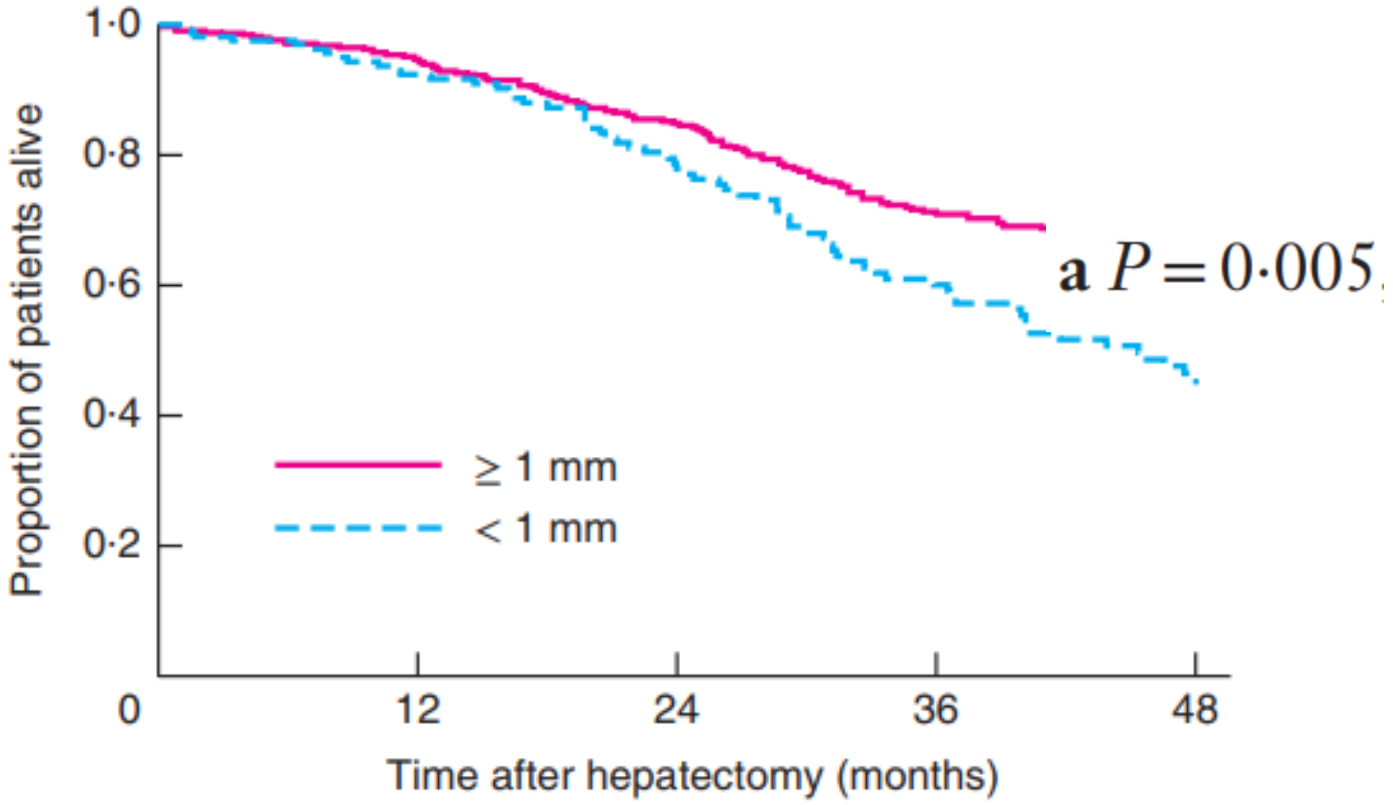
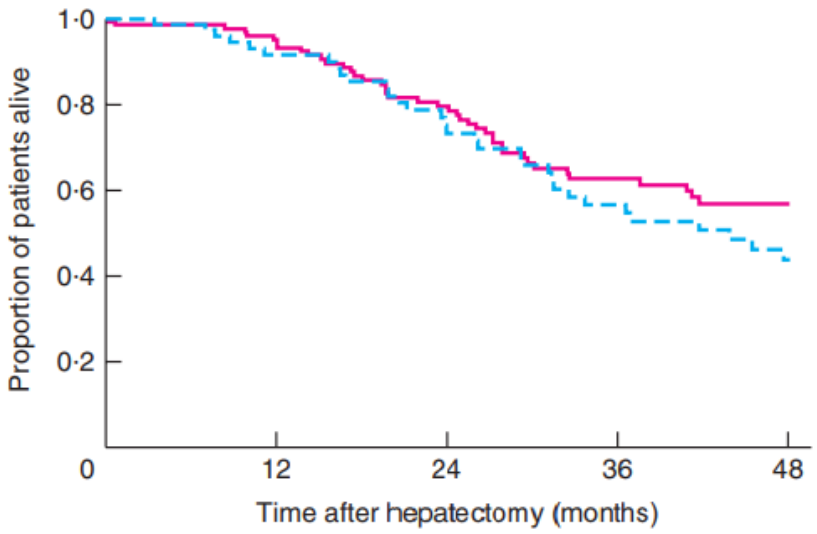


Sasaki K, et al. Br J Surg 2017

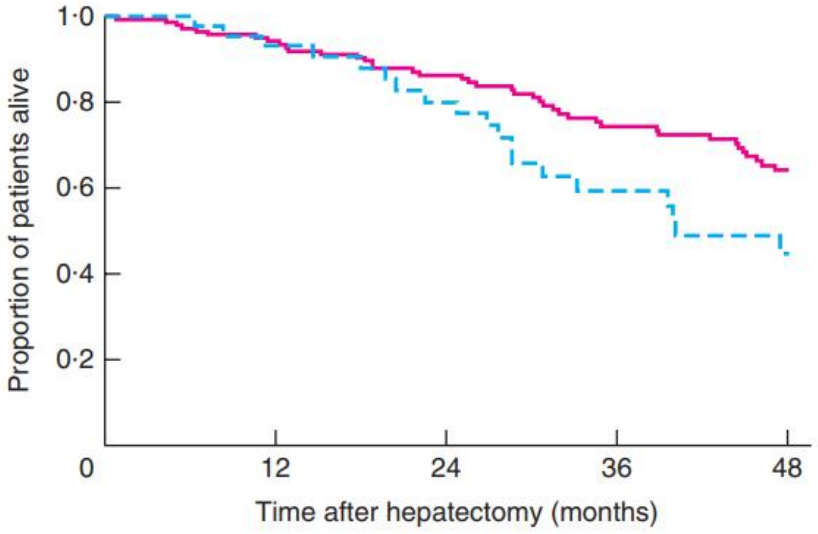
b $P = 0{\cdot}010$



No. at risk					
≥ 1 mm	154	124	102	79	61
< 1 mm	49	40	30	18	11

b Preoperative chemotherapy without bevacizumab

c $P = 0{\cdot}081$



No. at risk					
≥ 1 mm	136	106	77	47	36
< 1 mm	78	62	41	30	17

c Preoperative chemotherapy with bevacizumab

Sasaki K, et al. Br J Surg 2017

- Although the impact of resection margin status on long-term oncological outcomes appears to vary depending on the receipt of preoperative bevacizumab, achieving a macroscopically and microscopically negative (R0) resection should remain a fundamental operative goal.

Sasaki K, et al. Br J Surg 2017

RAS Mutation

Ann Surg Oncol
DOI 10.1245/s10434-016-5187-2

Annals of
SURGICAL ONCOLOGY
OFFICIAL JOURNAL OF THE SOCIETY OF SURGICAL ONCOLOGY

ORIGINAL ARTICLE – HEPATOBILIARY TUMORS

RAS Mutation Predicts Positive Resection Margins and Narrower Resection Margins in Patients Undergoing Resection of Colorectal Liver Metastases

Kristoffer Watten Brudvik, MD, PhD[1], Yoshihiro Mise, MD, PhD[1], Michael Hsiang Chung, BS[1], Yun Shin Chun, MD[1], Scott E. Kopetz, MD[2], Guillaume Passot, MD, PhD[1], Claudius Conrad, MD, PhD[1], Dipen M. Maru, MD[3], Thomas A. Aloia, MD[1], and Jean-Nicolas Vauthey, MD[1]

[1]Department of Surgical Oncology, The University of Texas MD Anderson Cancer Center, Houston, TX; [2]Department of Gastrointestinal Medical Oncology, The University of Texas MD Anderson Cancer Center, Houston, TX; [3]Department of Pathology, The University of Texas MD Anderson Cancer Center, Houston, TX

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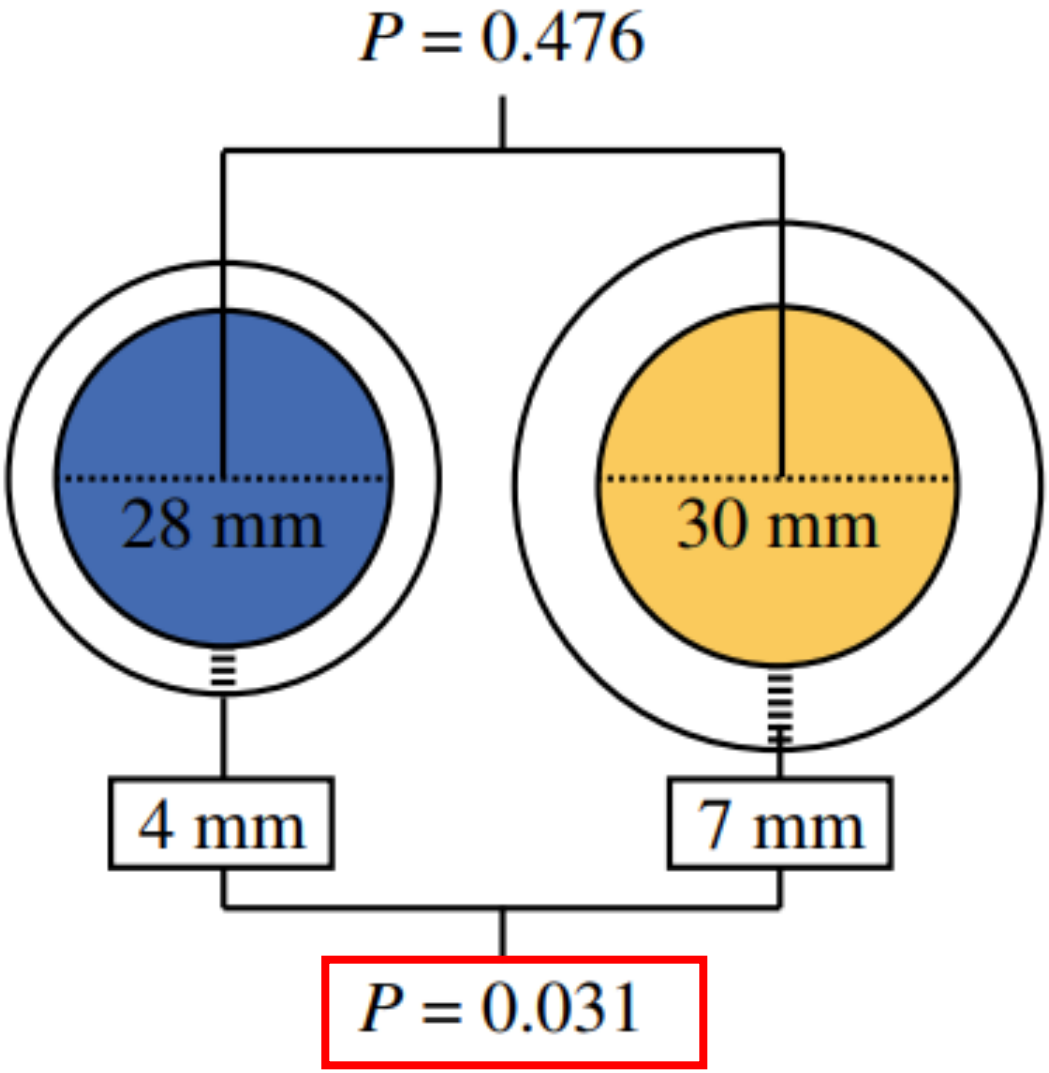
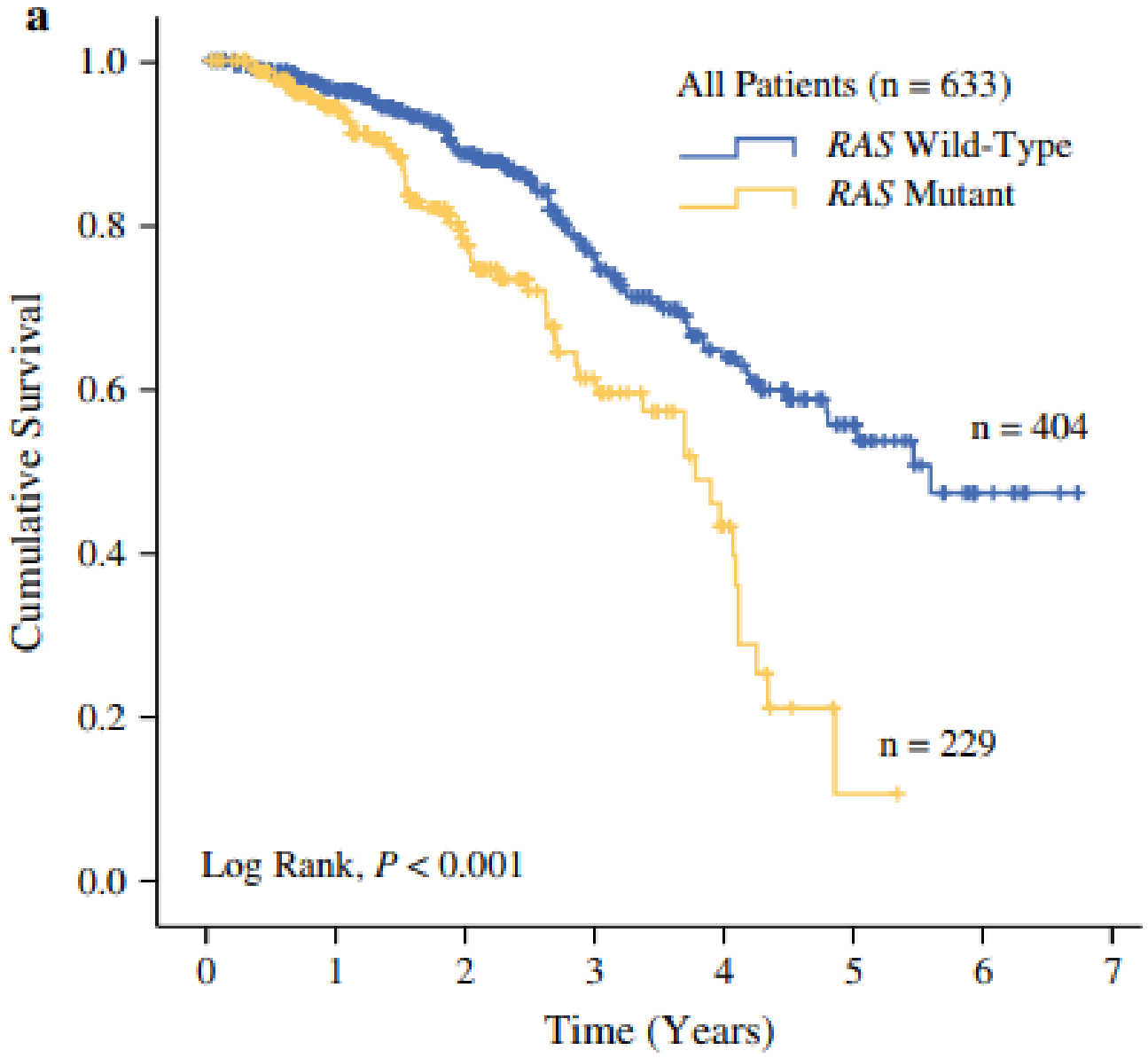
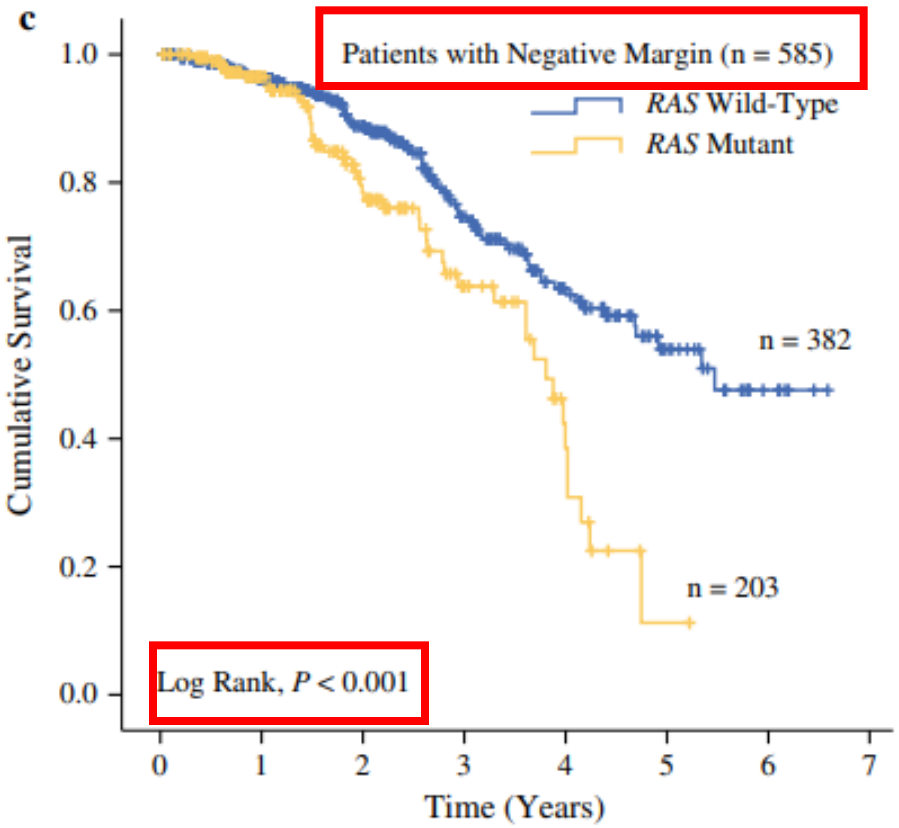
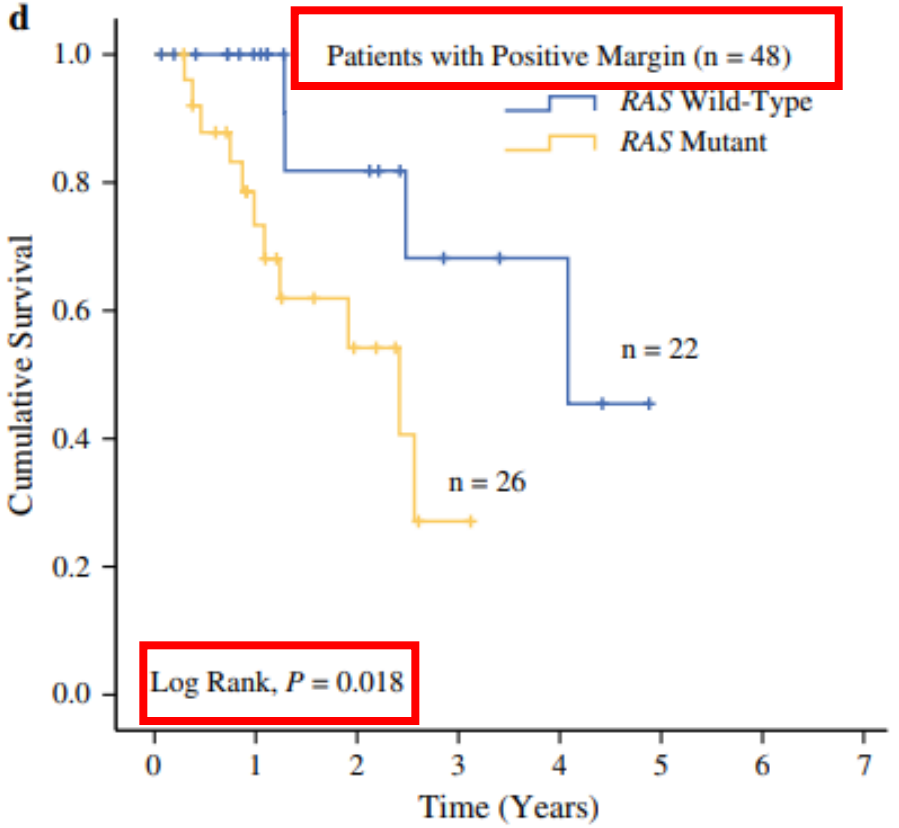
Brudvik KW, et al. Ann Surg Oncol 2016



Brudvik KW et al – Ann Surg Oncol 2016


a
1.0
0.8
0.6
0.4
0.2
0.0
Cumulative Survival
All Patients (n = 633)
RAS Wild-Type
RAS Mutant
n = 404
n = 229
Log Rank, P < 0.001
0
1
2
3
4
5
6
7
Time (Years)





Brudvik KW et al – Ann Surg Oncol 2016

- ***RAS*** **mutations are associated with positive margins in patients undergoing resection of CLM. Tumors with *RAS* mutation should prompt careful efforts to achieve negative resection margins.**

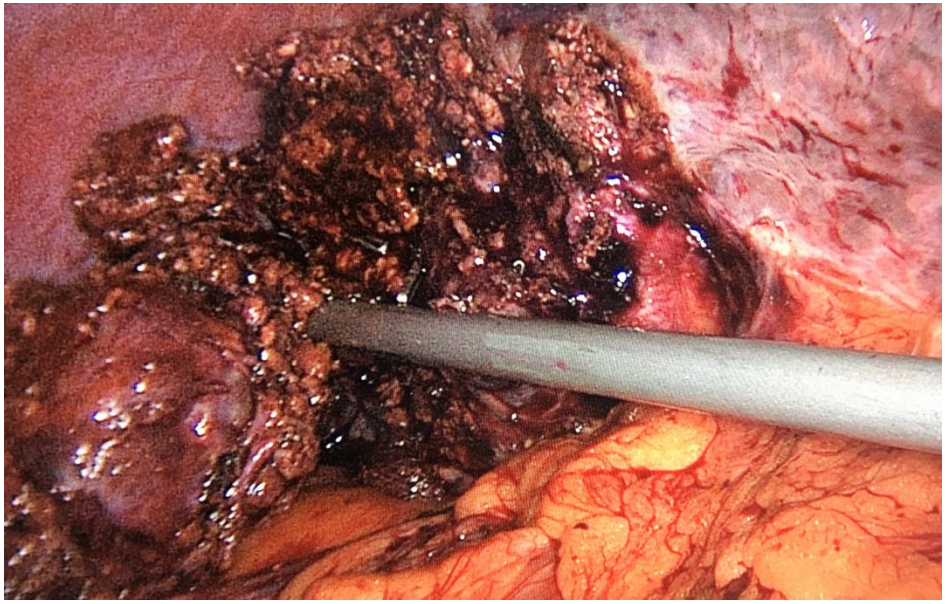
Brudvik KW et al – Ann Surg Oncol 2016

Laparoscopic hepatectomy

Surg Endosc
DOI 10.1007/s00464-014-3999-3

Impact of surgical margins on overall and recurrence-free survival in parenchymal-sparing laparoscopic liver resections of colorectal metastases

Roberto Montalti · Federico Tomassini · Stéphanie Laurent · Peter Smeets · Marc De Man · Karen Geboes · Louis J. Libbrecht · Roberto I. Troisi



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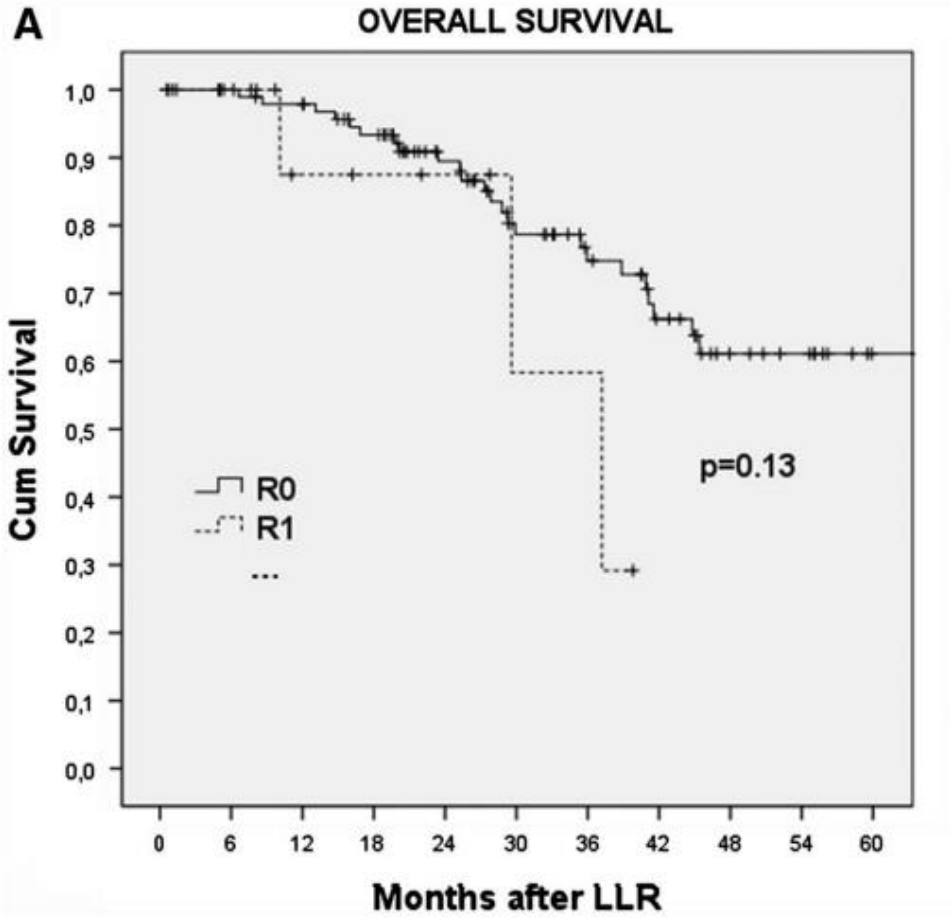
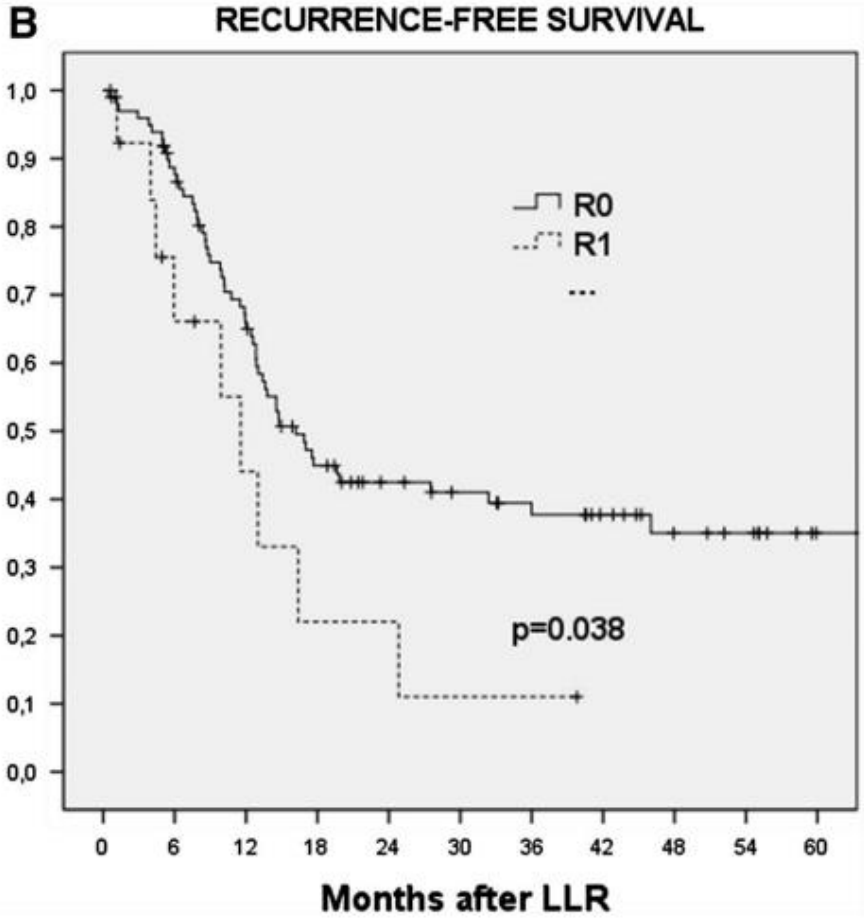
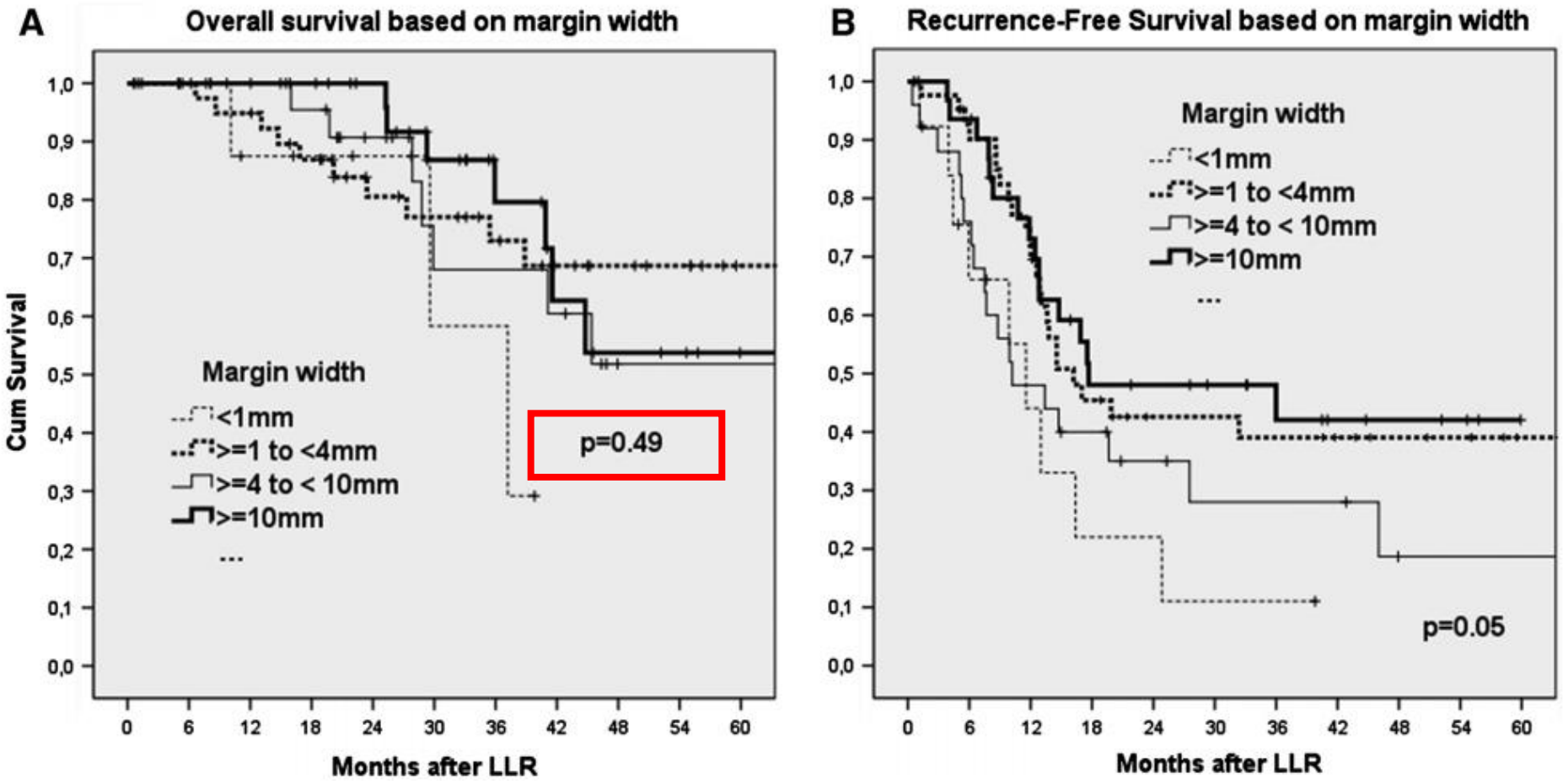
Montalti R, et al. Surg Endosc 2015





Montalti R, et al. Surg Endosc 2015



Montalti R, et al. Surg Endosc 2015

- Laparoscopic parenchymal-sparing surgery of CRLM does not compromise the oncological outcome.
- R1 margins are a risk factor for tumor recurrence but not for overall survival.
- The presence of multiple lesions is the only independent risk factor of R1 margins and also the major disadvantage of this technique.

Montalti R, et al. Surg Endosc 2015

DOI:10.1111/hpb.12204 HPB

ORIGINAL ARTICLE

Margin status after laparoscopic resection of colorectal liver metastases: does a narrow resection margin have an influence on survival and local recurrence?

Nadya Postriganova[1,2], Airazat M. Kazaryan[1,3], Bård I. Røsok[4], Åsmund A. Fretland[1,4], Leonid Barkhatov[1] & Bjørn Edwin[1,4,5]

[1]Intervention Centre and [4]Department of Hepatopancreatobiliary Surgery, Oslo University Hospital – Rikshospitalet, Oslo, Norway, [2]Department of Hospital Surgery, Moscow State University of Medicine and Dentistry, Moscow, Russia, [3]Department of Surgery, Telemark Hospital, Skien, Norway, and [5]Institute of Clinical Medicine, Medical Faculty, University of Oslo, Oslo, Norway

- Bipolar coagulator (Ligasure®)
- Ultrasonic dissector:
  - AutoSonix®
  - SonoSurg®
  - Harmonic®
- Ultrasonic surgical Aspirator (CUSA®)

Postriganova N, et al. HPB 2014;16:822-9

Table 4 Recurrence in the liver in patients submitted to laparoscopic liver resection for colorectal metastasis

Parameters	Group 1 ($n = 33$)		Group 2 (margin: ≥ 1 mm to < 3 mm) ($n = 31$)	Group 3 (margin: ≥ 3 mm to < 10 mm ($n = 55$)	Group 4 (margin: ≥ 10 mm) ($n = 36$)	*P*-value	Total ($n = 155$)
	1a (positive margin) ($n = 17$)	1b (margin: > 0 mm to < 1 mm) ($n = 16$)					
Overall recurrence, *n* (%)	17 (51.5%)		11 (35.5%)	28 (50.9%)	17 (47.2%)	0.316	73 (47.1%)
	8 (47.1%)	9 (56.3%)					
Recurrence in the liver, *n* (%)	14 (42.4%)		10 (32.3%)	19 (34.5%)	8 (22.2%)	0.349	51 (32.9%)
	7 (41.2%)	7 (43.7%)					
Recurrence including local (margin), *n* (%)	2 (6.1%)		0	1 (1.8%)	0	0.232	3 (1.9%)
	1 (5.9%)	1 (6.3%)					
Re-resection for recurrence in the liver, *n* (%)	13 (92.9% of all recurrences in the liver)		5 (50.0%)	9 (47.4%)	3 (37.5%)	0.023	30 (58.8%)
	6 (85.7%)	7 (100%)					
Ablation for recurrence in the liver, *n* (%)	1 (7.1% of all recurrences in the liver)		1 (10.0%)	1 (5.3%)	3 (37.5%)	0.102	6 (11.8%)

Postriganova N, et al. HPB 2014;16:822-9

- Patients with margins of < 1 mm achieved survival comparable with that in patients with margins of ≥ 10 mm.
- When modern surgical equipment that generates an additional coagulation zone is applied, the association between resection margin and survival may not be apparent.

Postriganova N, et al. HPB 2014;16:822-9

Vascular margin

Langenbecks Arch Surg (2015) 400:683–691
DOI 10.1007/s00423-015-1332-9

ORIGINAL ARTICLE

Safety analysis of the oncological outcome after vein-preserving surgery for colorectal liver metastases detached from the main hepatic veins

Federico Tomassini[1,5] · Italo Bonadio[1,6] · Peter Smeets[2] · Karen De Paepe[1] · Giammauro Berardi[1] · Liesbeth Ferdinande[3] · Stéphanie Laurent[4] · Louis J. Libbrecht[3] · Karen Geboes[4] · Roberto I. Troisi[1]

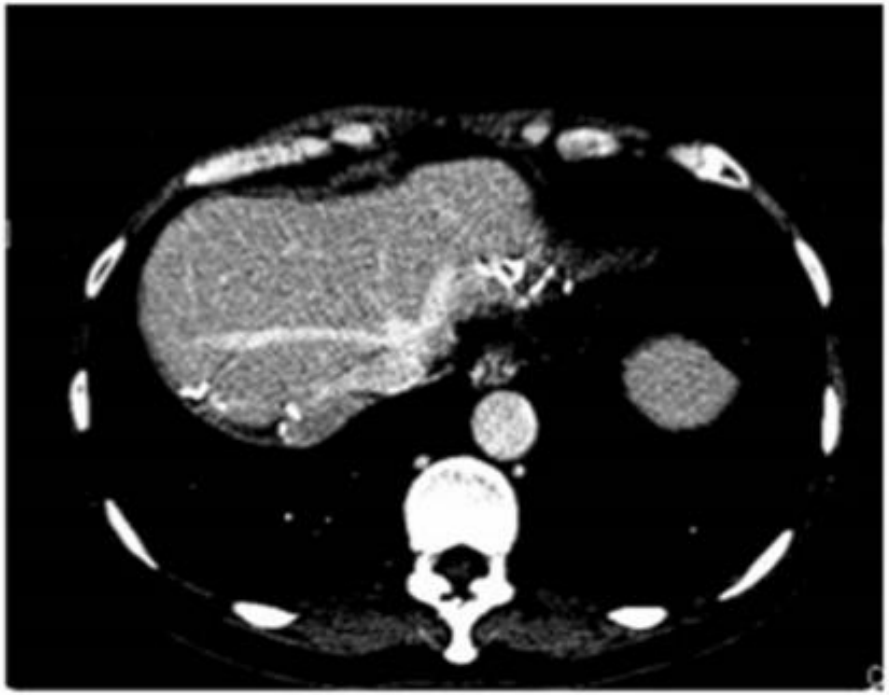
6

Pre-operative

A1. Preserving the Left Hepatic Vein (arrow)

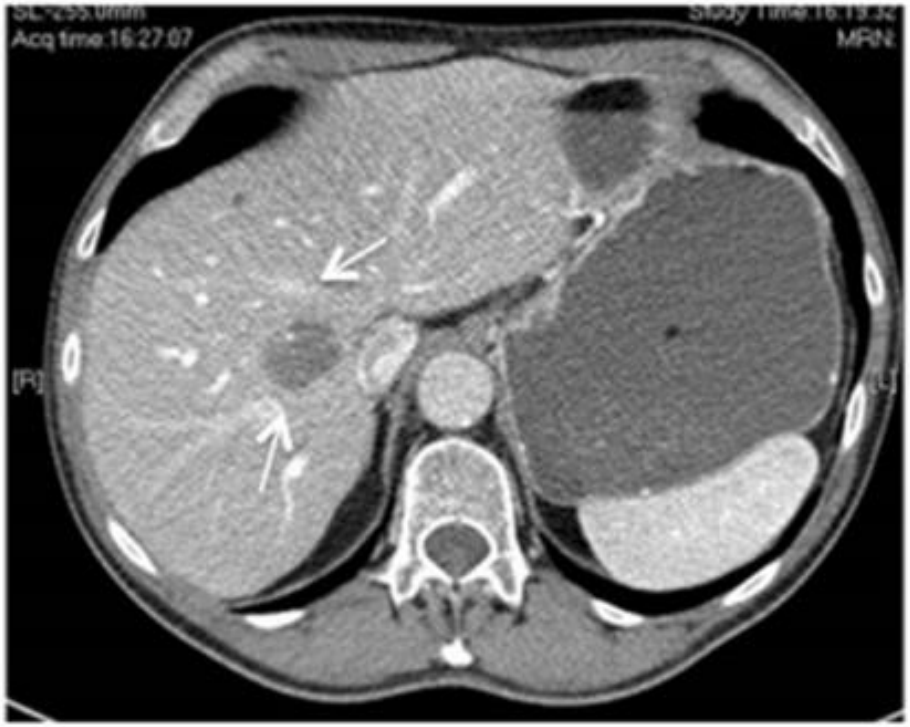
Post-operative

A2. Follow-Up at 12 months (no edge recurrence)



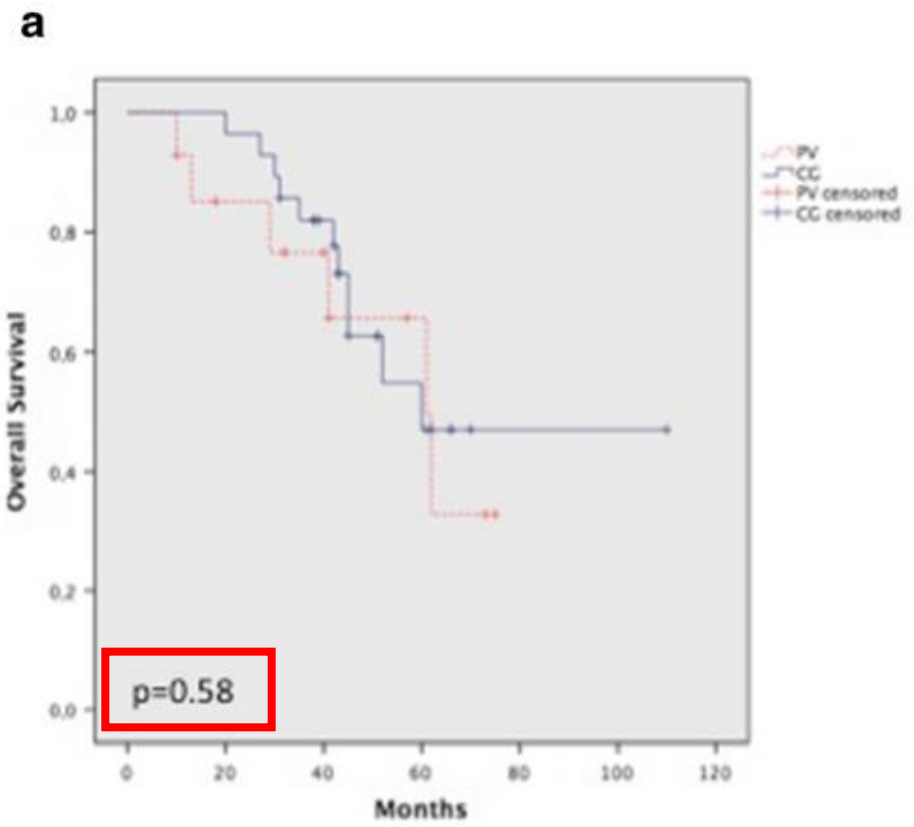
Tomassini F, et al. Langenbechs Arch Surg 2015;400:683-91

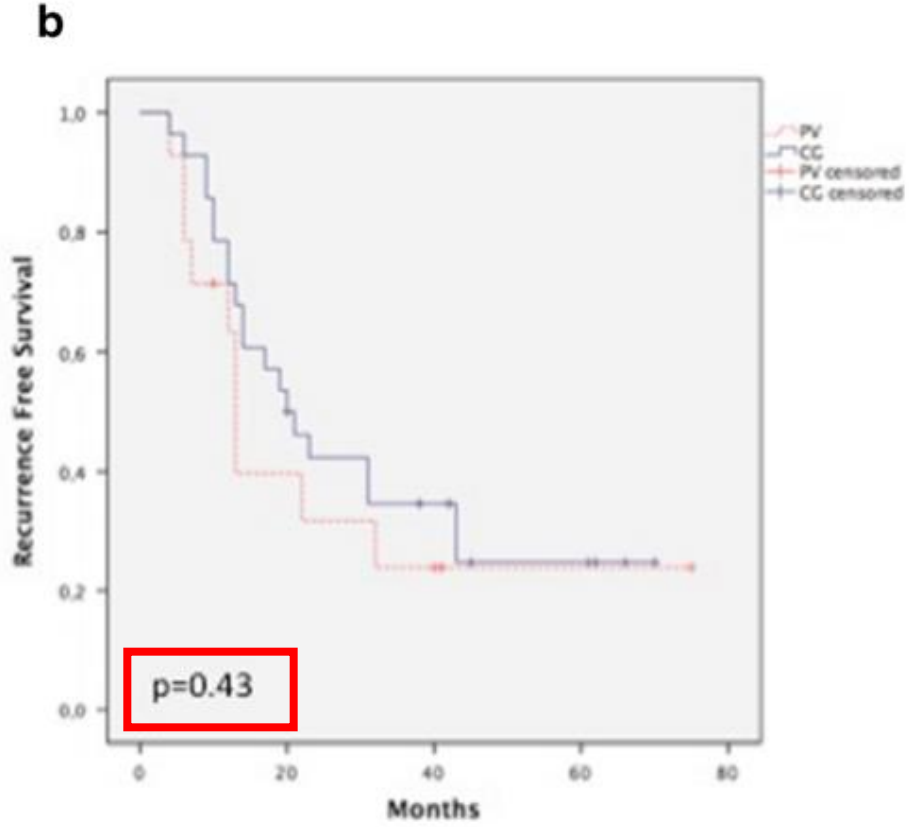
B1. Preserving Middle HV and Right HV (arrows)



B2. Follow-Up at 15 months (fluid collection, no local recurrence)

Tomassini F, et al. Langenbechs Arch Surg 2015;400:683-91





Tomassini F, et al. Langenbechs Arch Surg 2015;400:683-91

Recurrence patterns	VP (14)	CG (28)	*p*
Tumor recurrence, *n* (%)	10 (71.4)	20 (71.4)	0.99
Site of recurrence			
Liver	2/10 (20)	5/20 (25)	0.99
Liver and other	6 (60)	8 (40)	0.442
Other	2 (20)	7 (35)	0.674
Tumor recurrence on the venous cutting edge	0/7 (0)	–	–
Tumor recurrence on the cutting edge	0/7 (0)	1/13 (7.7)	–
Second hepatectomy (repeat), *n* (%)	5/8 (62.5)	6/13 (46.0.3)	0.659
Third hepatectomy (redo-repeat), *n* (%)	2/5 (40)	0/6 (0)	0.182

Tomassini F, et al. Langenbechs Arch Surg 2015;400:683-91

- In patients with a positive CT response, CRLM can be detached from the hepatic veins, as the oncological outcome is similar to that of a larger resection.

Tomassini F, et al. Langenbechs Arch Surg 2015;400:683-91

Ann Surg Oncol (2016) 23:1352–1360
DOI 10.1245/s10434-015-5009-y

Annals of
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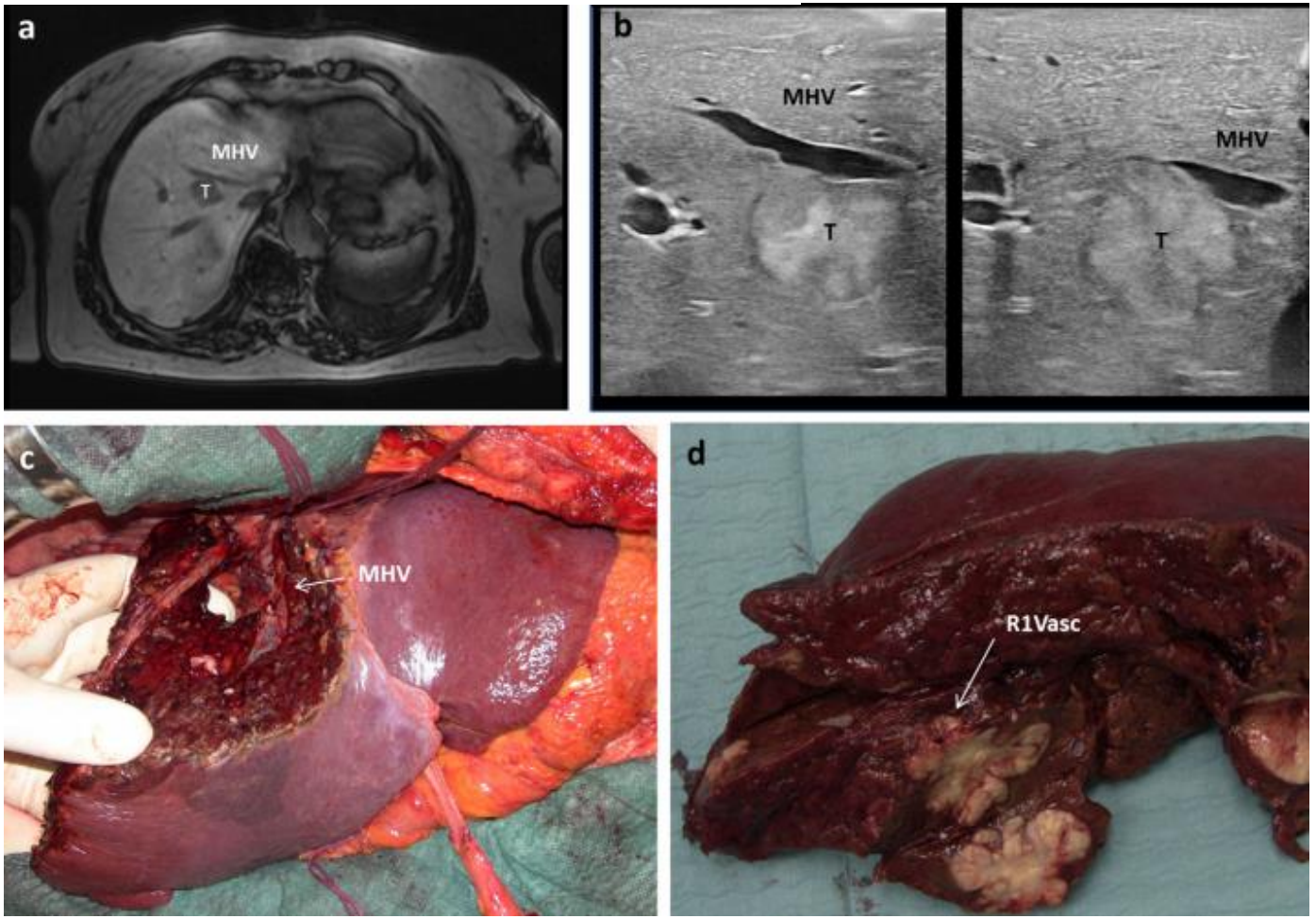
ORIGINAL ARTICLE – HEPATOBILIARY TUMORS

Vascular margin

Is Tumor Detachment from Vascular Structures Equivalent to R0 Resection in Surgery for Colorectal Liver Metastases? An Observational Cohort

Luca Viganò, MD, PhD, Fabio Procopio, MD, Matteo Maria Cimino, MD, Matteo Donadon, MD, PhD, Andrea Gatti, MD, Guido Costa, MD, Daniele Del Fabbro, MD, and Guido Torzilli, MD, PhD, FACS

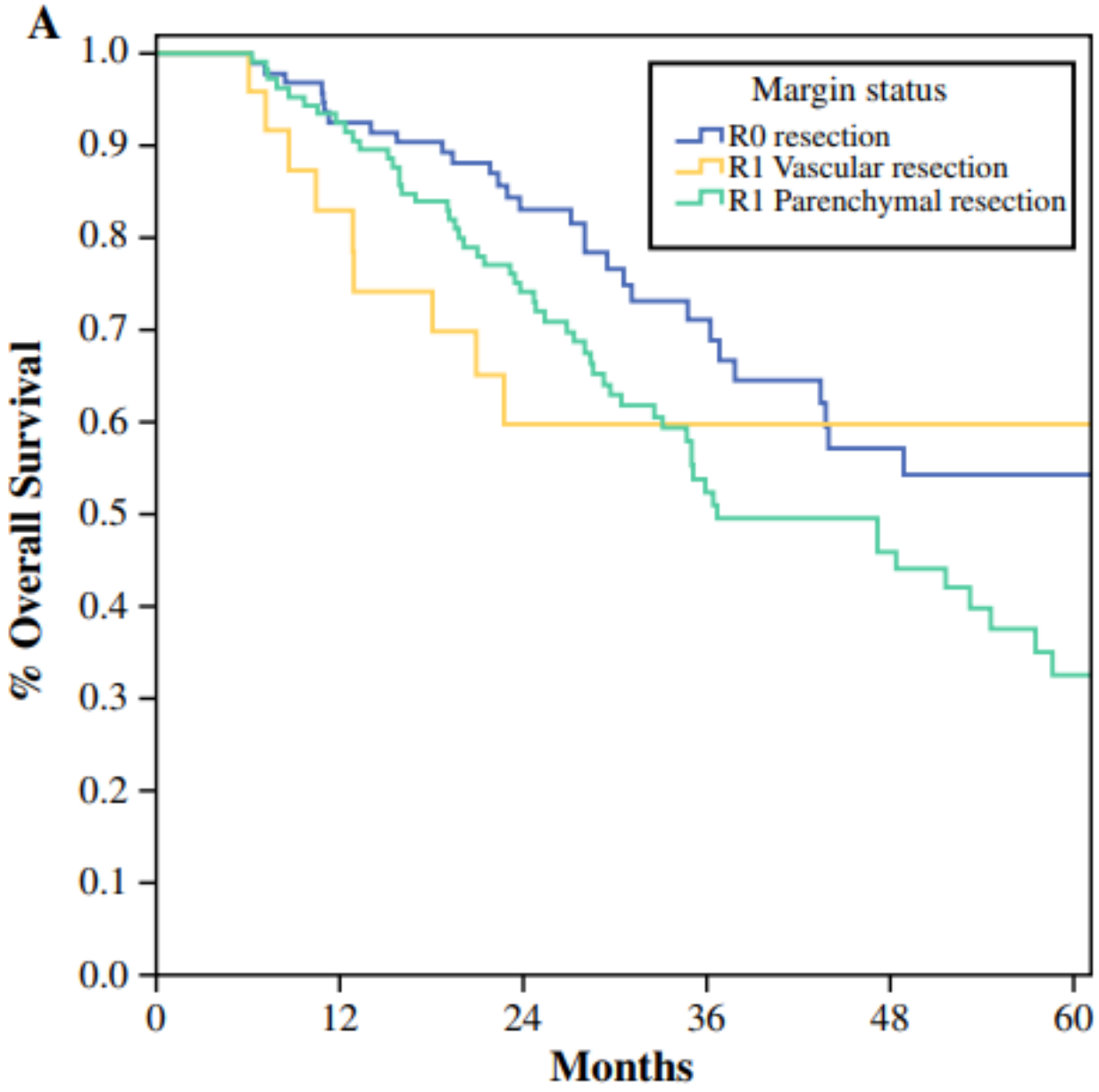


Vigano L, et al. Ann Surg Oncol 2016;23:1352-60

TABLE 3 Univariate and multivariate analysis of prognostic factors of OS after LR

Parameter	Overall survival			
	5-year OS (%)	Univariate analysis *p*	Multivariate analysis *p*	RR (95 % CI)
Surgical margin				
R0	54.3	0.068		1
R1Vasc	59.4		n.s.	1.372 (0.644–2.922)
R1Par	32.5		0.034	1.627 (1.037–2.552)
Adjuvant chemotherapy				
Y	53.5	0.008	0.023	0.605 (0.393–0.933)
N	34.6			1

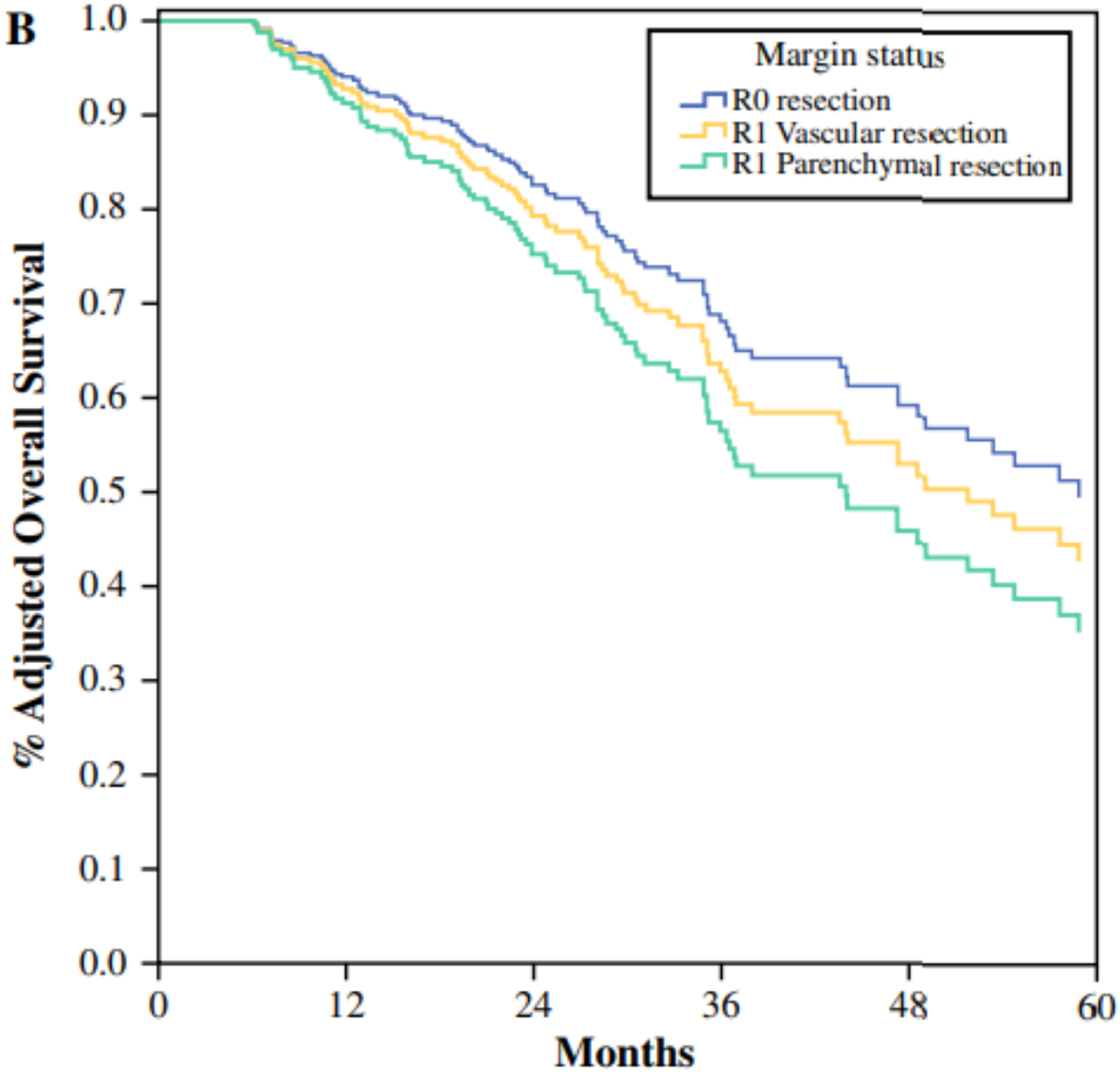
Vigano L, et al. Ann Surg Oncol 2016;23:1352-60



p = n.s.

$p = 0.023$

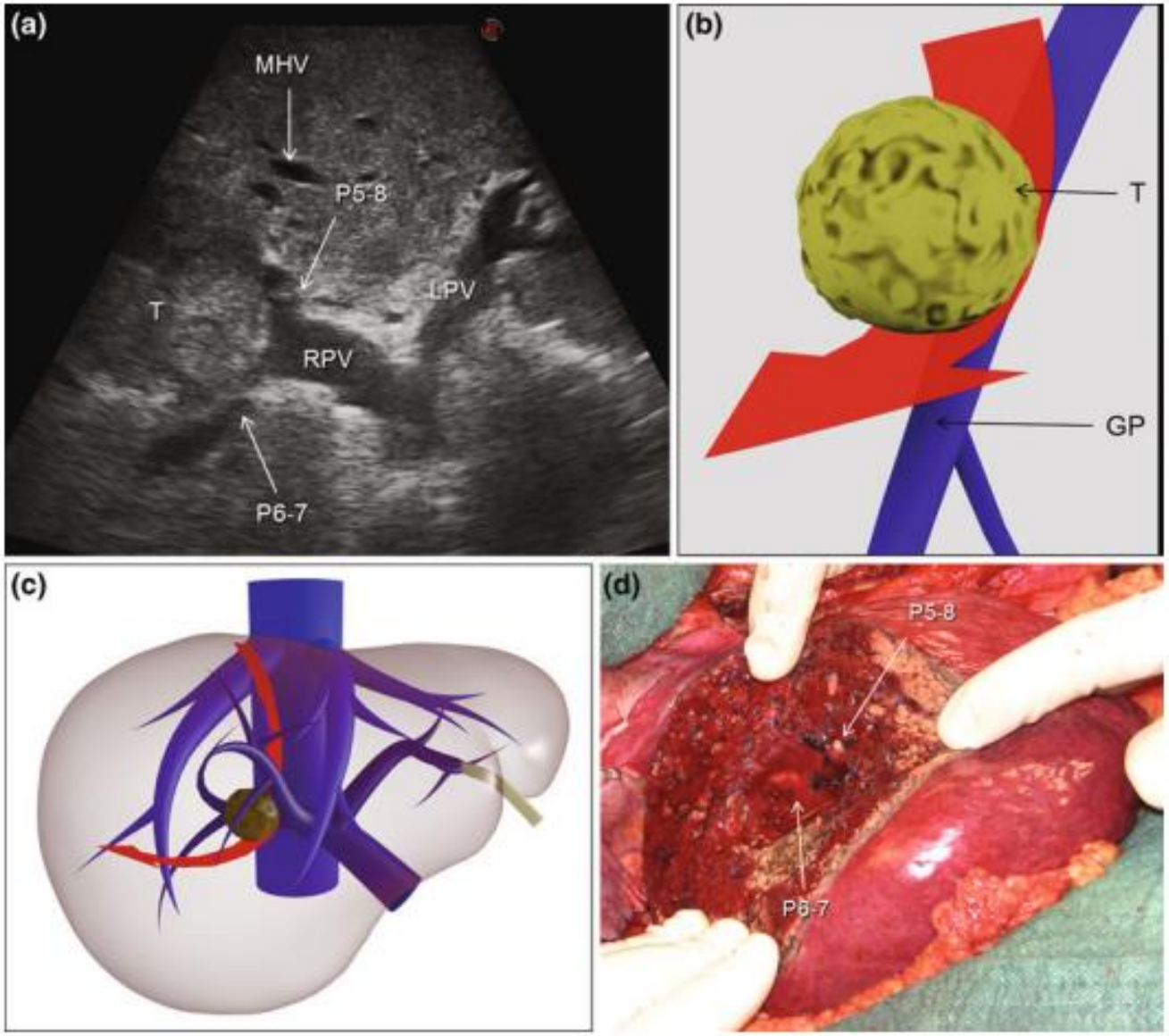
Vigano L, et al. Ann Surg Oncol 2016;23:1352-60



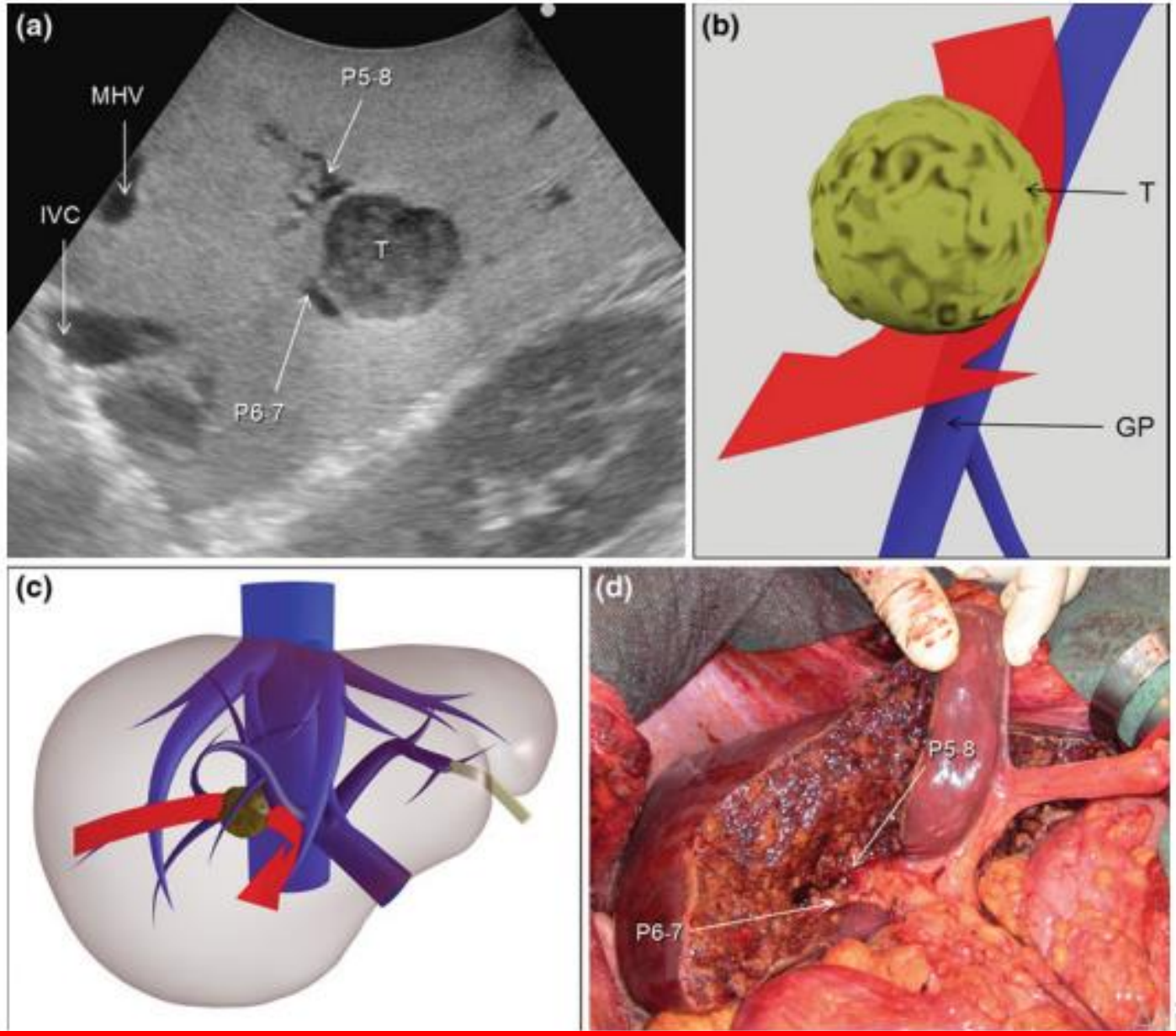
p = n.s.

$p = 0.034$

Vigano L, et al. Ann Surg Oncol 2016;23:1352-60



Courtesy from Prof. Guido Torzilli (Milan)



Courtesy from Prof. Guido Torzilli (Milan)

- R1 Vascular surgery achieves outcomes equivalent to R0 resection.
- CLM detachment from intrahepatic vessels can be pursued to increase patient resectability and resection safety (parenchymal sparing).

Conclusions

- Margin status remains the strongest independent prognostic factor.
- Postoperative chemotherapy reduces recurrence rates after R1 resection of CRLM, in patients with optimal morphologic response.
- Preoperative bevacizumab seems to have impact on resection margin status.
- R1 Vascular surgery achieves outcomes equivalent to R0 resection.

Conclusions

- RAS mutations are associated with positive margins in patients undergoing resection of CLM.
- Laparoscopic parenchymal-sparing surgery of CRLM does not compromise the oncological outcome.
- Radiofrequency assisted transection could be useful when R0 resection is difficult to obtain in order to enhance the margin.


Núcleo do Fígado
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Thanks!