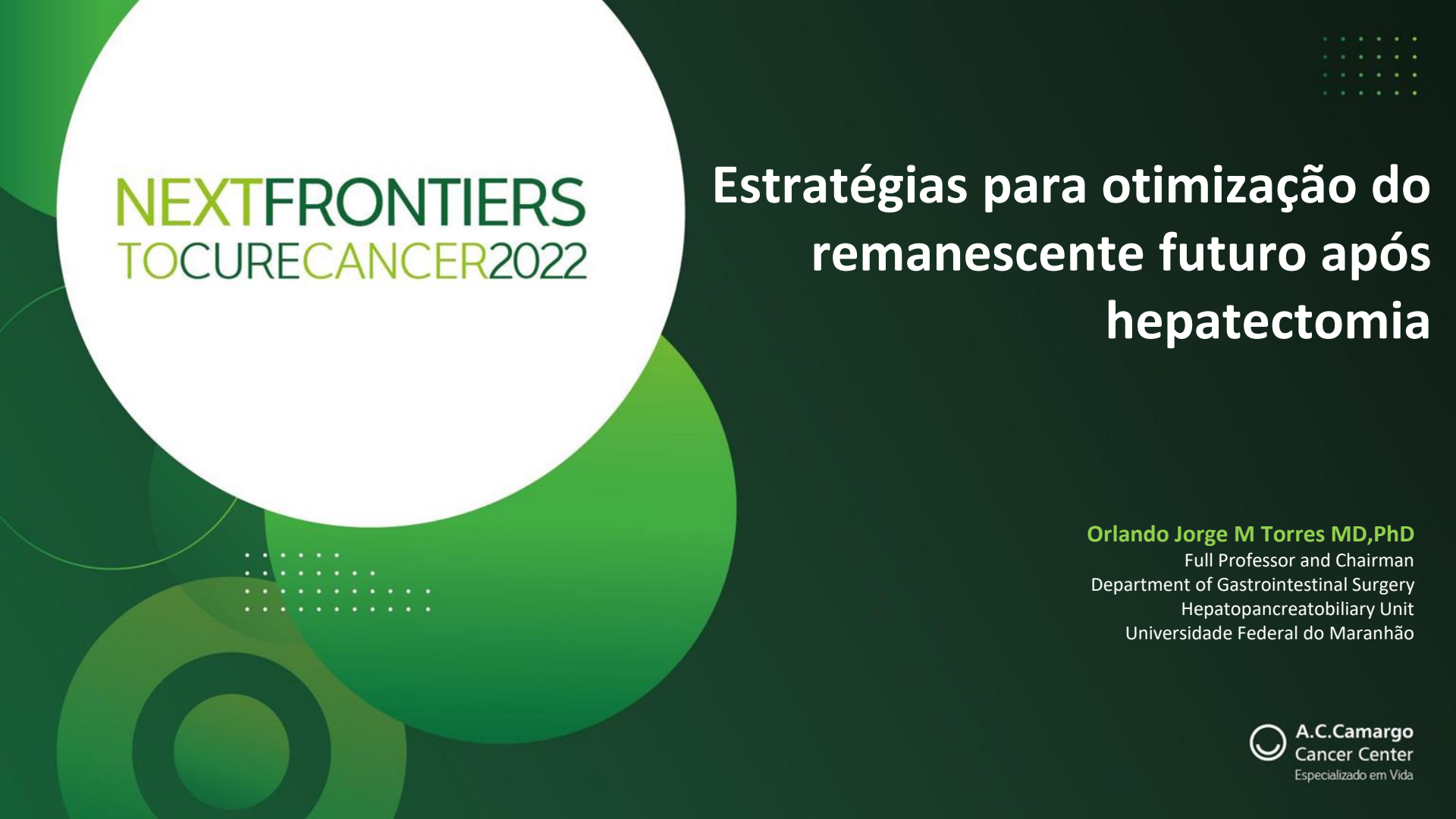


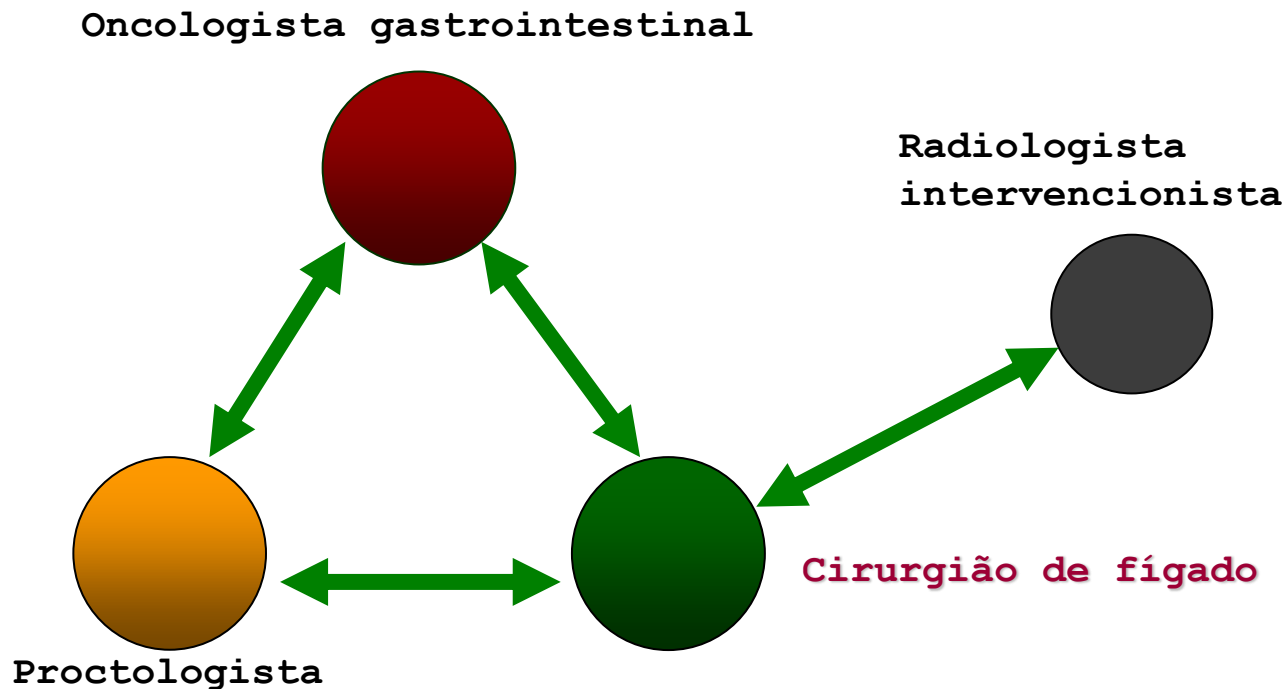


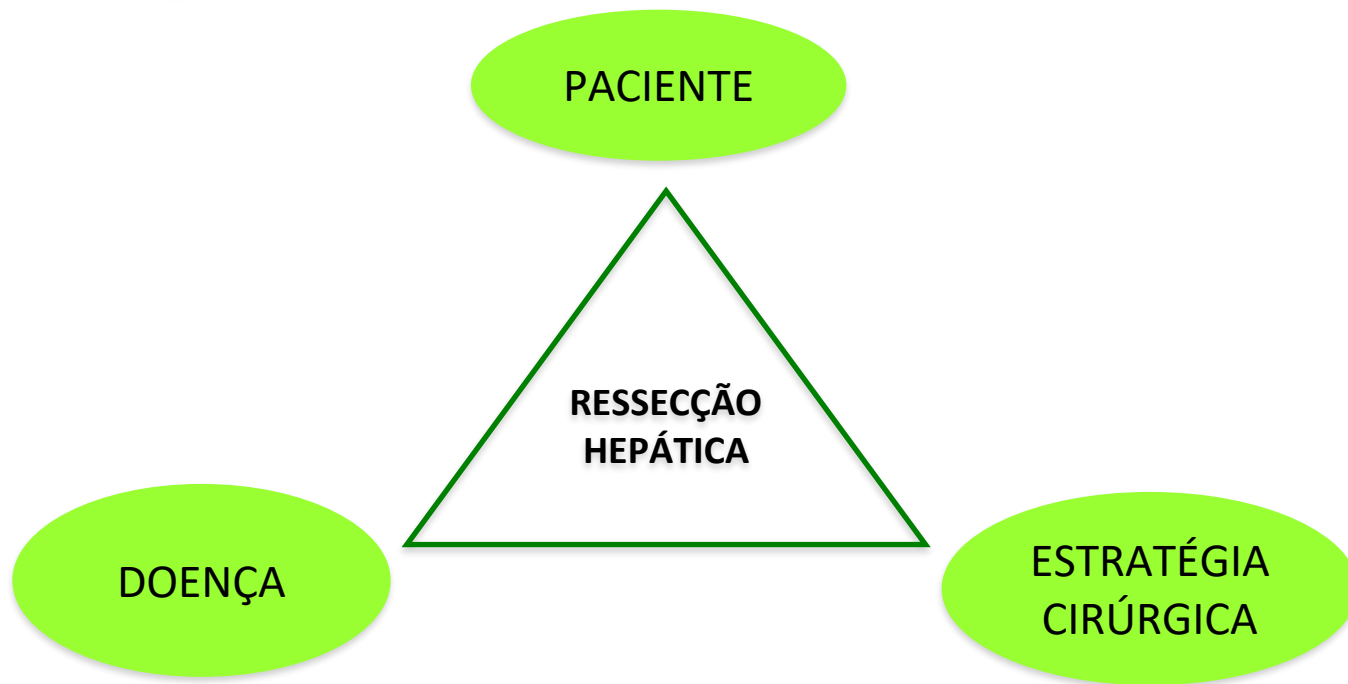
NEXTFRONTIERS
TOCURECANCER2022

Estratégias para otimização do remanescente futuro após hepatectomia

Orlando Jorge M Torres MD, PhD

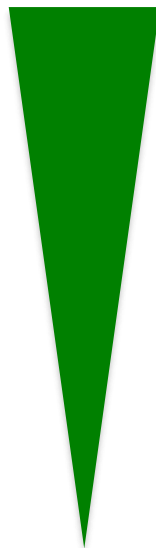
Full Professor and Chairman
Department of Gastrointestinal Surgery
Hepatopancreatobiliary Unit
Universidade Federal do Maranhão





ESTRUTURA INSTITUCIONAL

Qualidade

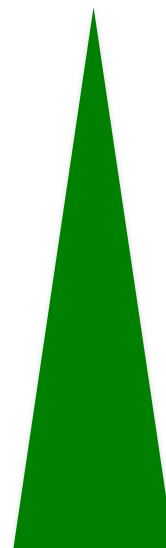


Normal

**Quimioterapia
Esteatose**

Cirrose

Volume



20-25%

>30%

>40%



$$\text{sFLR} = \frac{\text{Measured FLR volume}}{\text{TLV} = -794 + 1267 \times \text{BSA}} = \% \text{ of TLV}$$

❑ Técnica

Margem negativa

Remanescente hepático futuro

❑ Oncológica

Doença extra-hepática

Resposta à quimioterapia

ESA PAPER

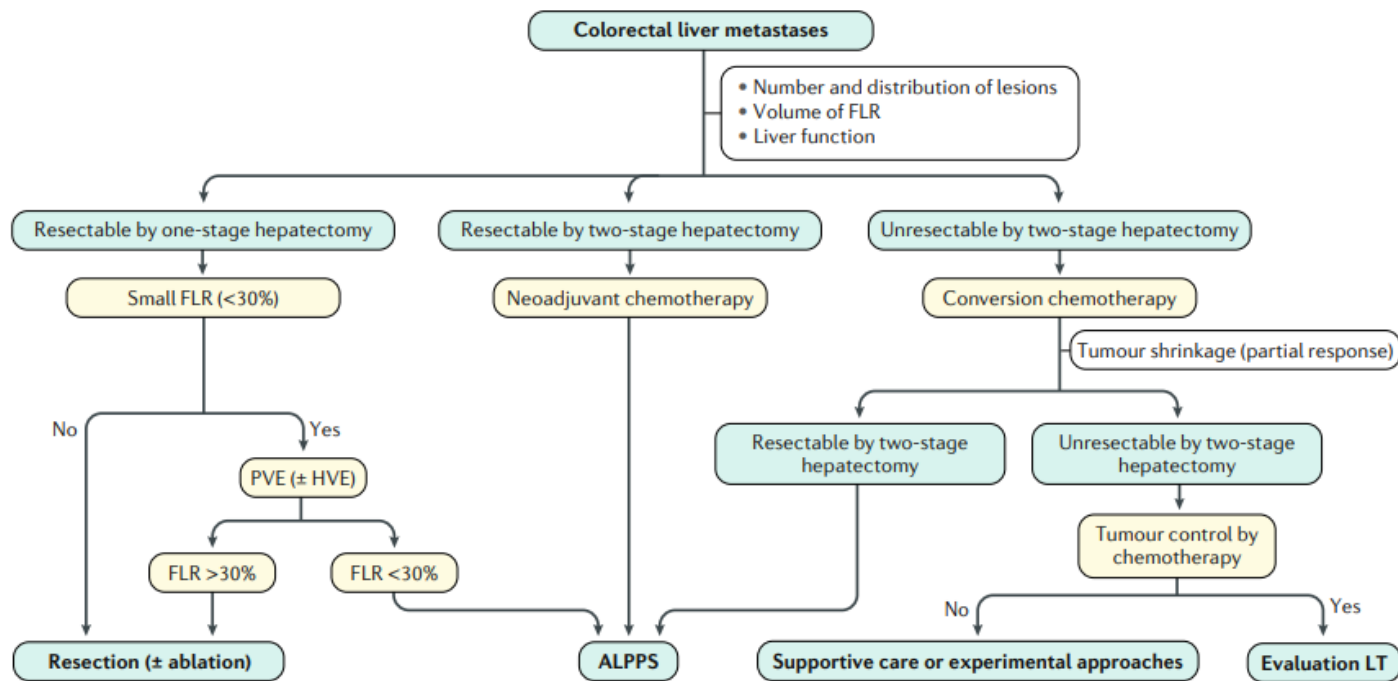
Choices of Therapeutic Strategies for Colorectal Liver Metastases Among Expert Liver Surgeons *A Throw of the Dice?*

Povilas Ignatavicius, MD, Christian E. Oberkofler, MD,* William C. Chapman, MD,†
Ronald P. DeMatteo, MD,‡ Bryan M. Clary, MD,§ Michael I. D'Angelica, MD,¶ Kenneth K. Tanabe, MD,||
Johnny C. Hong, MD,** Thomas A. Aloia, MD,†† Timothy M. Pawlik, MD, MPH, PhD,‡‡
Roberto Hernandez-Alejandro, MD,§§ Shimul A. Shah, MD,¶¶ Jean-Nicolas Vauthey, MD,††
Guido Torzilli, MD,|||| Hauke Lang, MD,*** Pål-Dag Line, MD, PhD,††† Olivier Soubrane, MD,†††
Hugo Pinto-Marques, MD,§§§ Ricardo Robles-Campos, MD,¶¶¶ Karim Boudjema, MD,|||||
Peter Lodge, MD,**** René Adam, MD,†††† Christian Toso, MD,†††† Alejandro Serrablo, MD, PhD,§§§§
Luca Aldrighetti, MD,¶¶¶¶ Michelle L. DeOliveira, MD,* Philipp Dutkowski, MD,* Henrik Petrowsky, MD,*
Michael Linecker, MD,* Cécilia S. Reiner, MD,||||||| Julia Braun, PhD,***** Ruslan Alikhanov, MD,†††††
Giedrius Barauskas, MD,††††† Albert C. Y. Chan, MS,§§§§§ Jiahong Dong, MD,¶¶¶¶¶
Norihiro Kokudo, MD,||||||| Masakazu Yamamoto, MD,***** Koo Jeong Kang, MD,†††††
Yuman Fong, MD,††††† Mohamed Rela, MD,§§§§§ Xabier De Aretxabala, MD,¶¶¶¶¶
Eduardo De Santibañes, MD, PhD,||||||| Miguel Ángel Mercado, MD,***** Oscar C. Andriani, MD,†††††
Orlando Jorge M. Torres, MD,††††† Antonio D. Pinna, MD,§§§§§ and Pierre-Alain Clavien, MD, PhD*✉*

TABLE 1. Agreement (Percentage) Among Experts for Each Clinical Case

	1*	2*	3*	4*	5	6	7	8	9	10
Resectability (Yes/No)	100	100	100	100	95	95	97	84	89	63
Initial treatment (surgery, chemotherapy)	53	84	97	97	82	86	58	83	86	68
Approach (open, minimally invasive)	71	63	58	46	92	89	95	94	100	96
Portal vein embolization (Yes/No)	92	100	79	100	89	68	95	75	57	52
Preoperative volumetry (Yes/No)	71	97	66	95	79	57	84	56	81	67
Type of surgery (2-stage, 1-stage)	100	100	95	100	89	62	92	62	44	44
Type of resection (anatomical, parenchyma sparing)	47	82	47	61	81	49	51	56	79	60
Ablation in combination with resection (Yes/No)	97	97	76	92	50	62	55	51	65	56

*Low complexity cases.



☐ **Clínica:**

☐ Quimioterapia

☐ **Radiointervenção**

☐ Embolização da veia porta

☐ Deprivação venosa hepática

☐ Ablação

☐ Radiofrequência

☐ Microondas

☐ **Cirúrgica**

☐ Hepatectomia com preservação de parênquima

☐ Hepatectomia em dois tempos

☐ Hepatectomias repetidas

☐ ALPPS

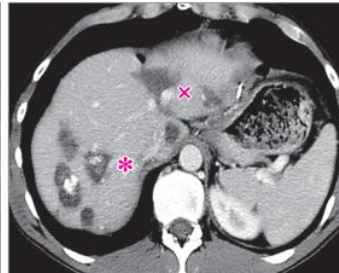
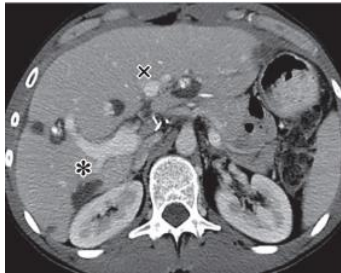
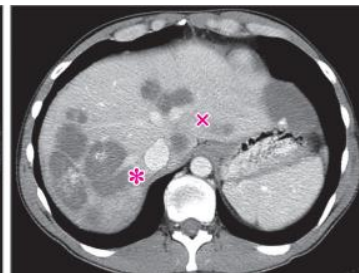
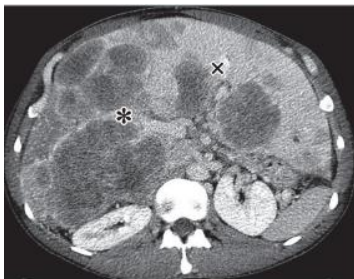
☐ **Transplante**

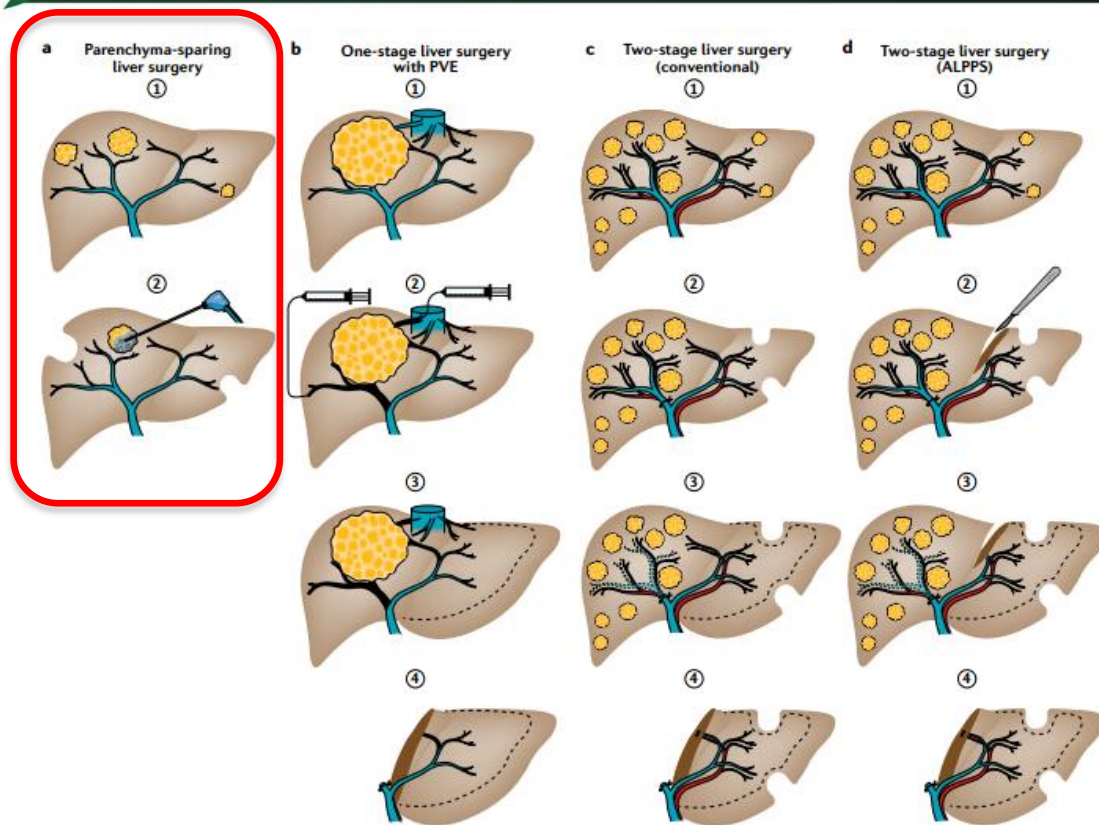
JAMA Surgery | Review

Role of Hepatic Artery Infusion Chemotherapy in Treatment of Initially Unresectable Colorectal Liver Metastases A Review

Table. Select Trials of Initially Unresectable Colorectal Liver Metastases Treated With Combination Hepatic Artery Infusion and Systemic Chemotherapy

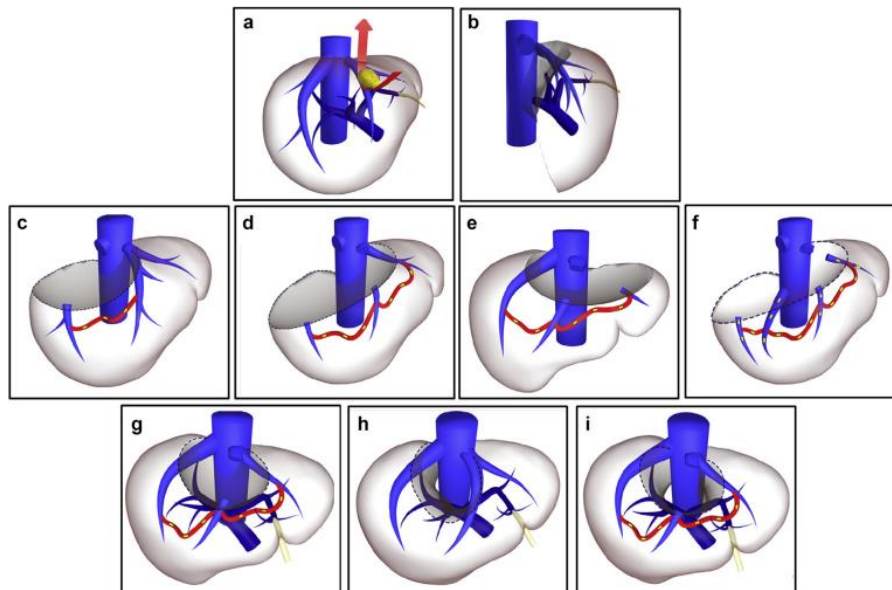
Source	No. of Patients	Treatment	RR, %	Conversion to Resection, %	Overall Survival, Median, mo
Kemeny et al, ⁵⁶ 2009	49	HAI-FUDR and DEX and systemic IRI + OX	92 ^b	47	51 (Chemotherapy naive) 35 (prior chemotherapy)
Goéré et al, ⁵⁷ 2010	87	HAI-OX and systemic FU and LV	55	26	NR ^c
D'Angelica et al, ⁵⁸ 2015	49	HAI-FUDR and DEX and best systemic therapy	76	47	38
Pak et al, ⁵⁹ 2018	64	HAI-FUDR and DEX and best systemic therapy ^d	73	52	81





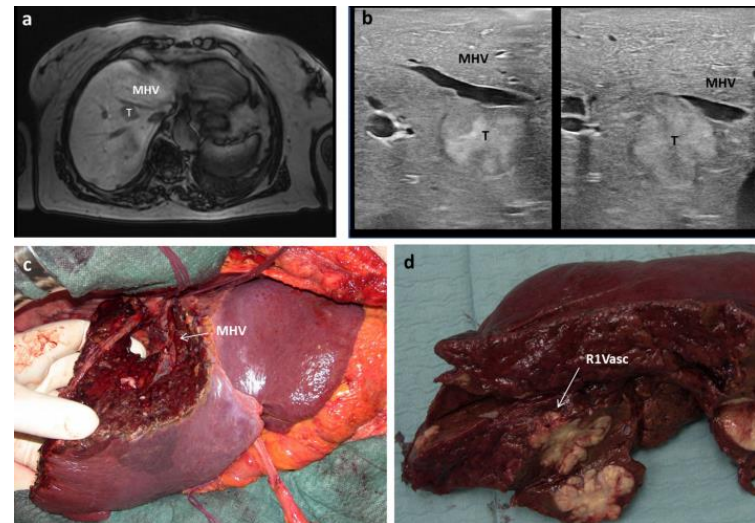
ORIGINAL ARTICLE

Twelve-year experience of “radical but conservative” liver surgery for colorectal metastases: impact on surgical practice and oncologic efficacy

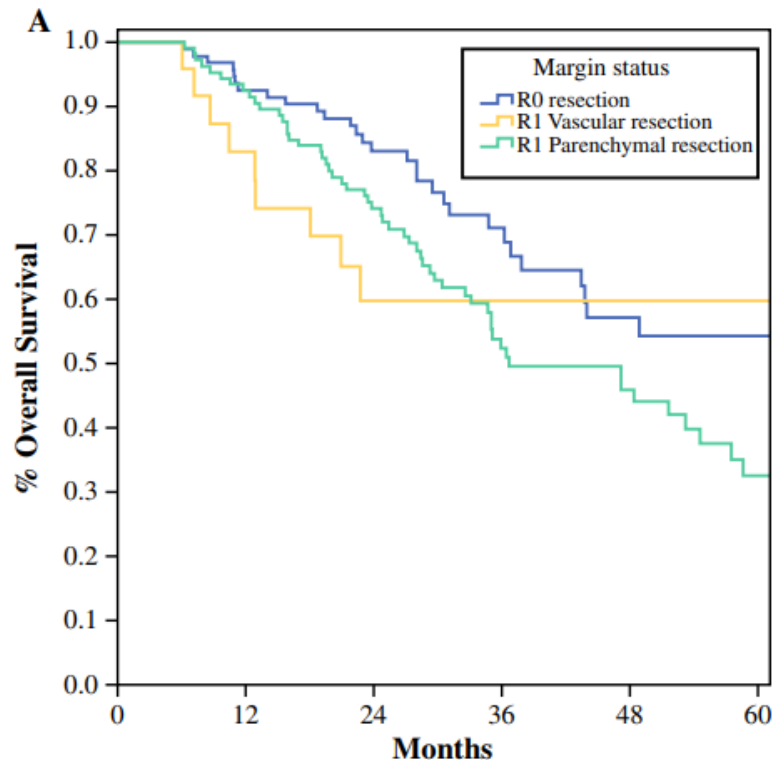


Is Tumor Detachment from Vascular Structures Equivalent to R0 Resection in Surgery for Colorectal Liver Metastases? An Observational Cohort

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



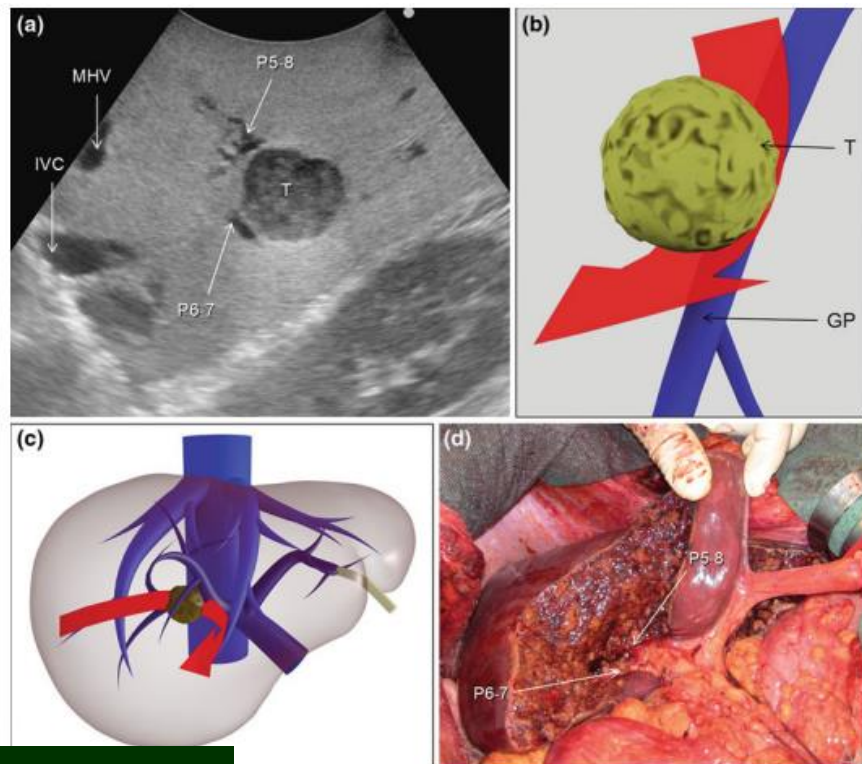
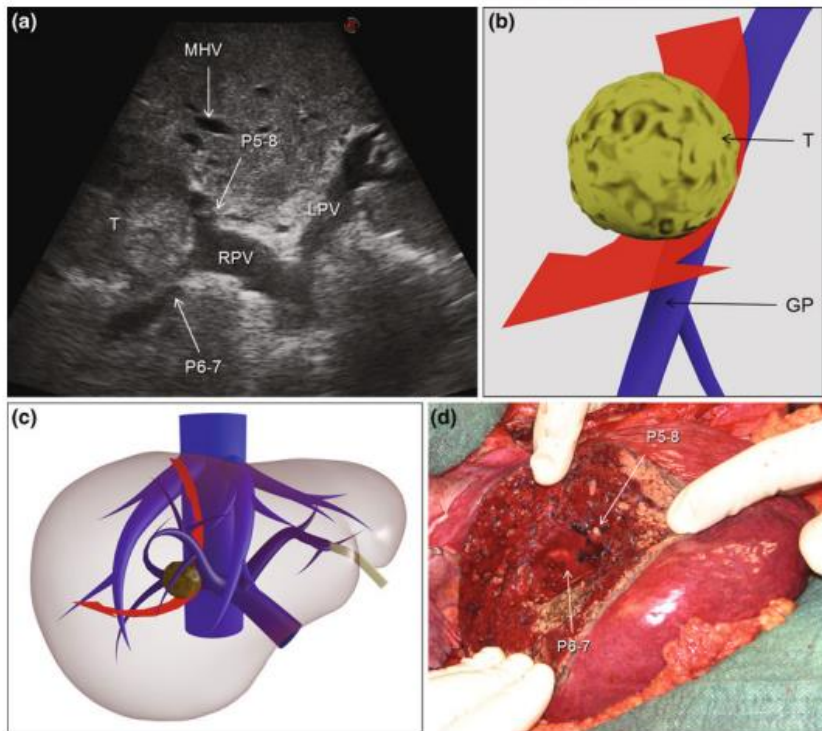
VASCULAR MARGIN



$p = \text{n.s.}$

$p = 0.023$

Parenchyma-sparing

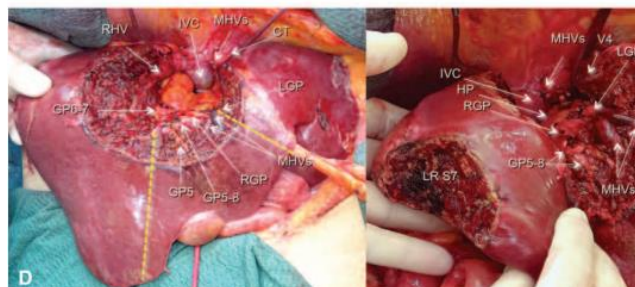
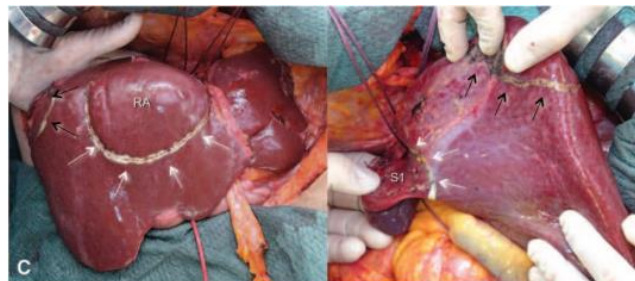
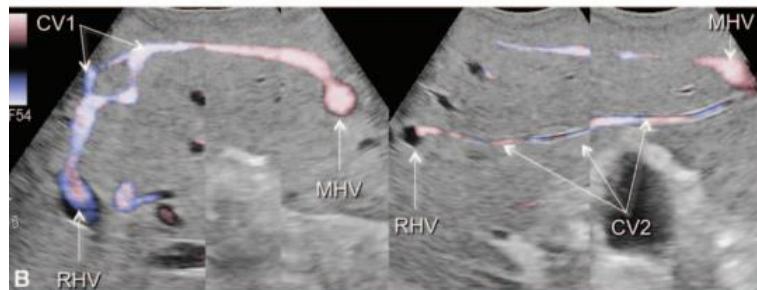
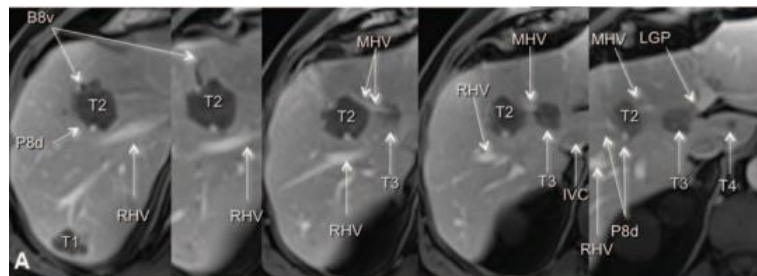


Courtesy: Prof. Guido Torzilli (Milan - Italy)

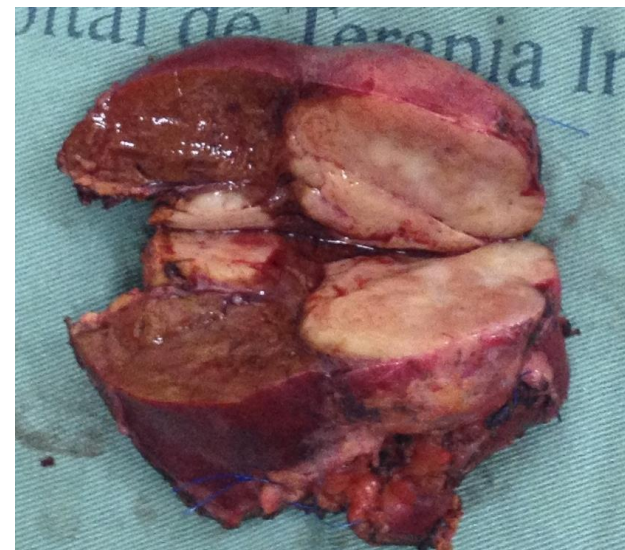
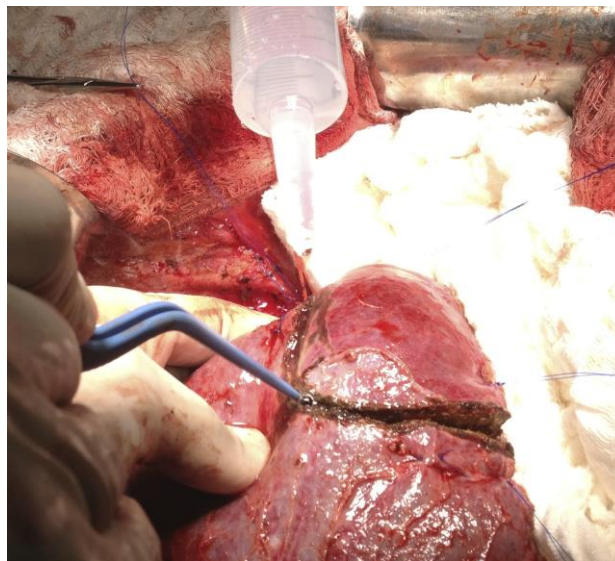
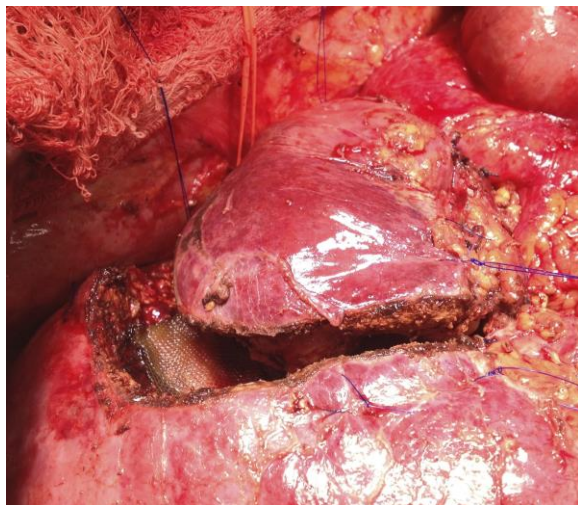
SURGICAL TECHNIQUE

The Liver Tunnel

Intention-to-treat Validation of a New Type of Hepatectomy

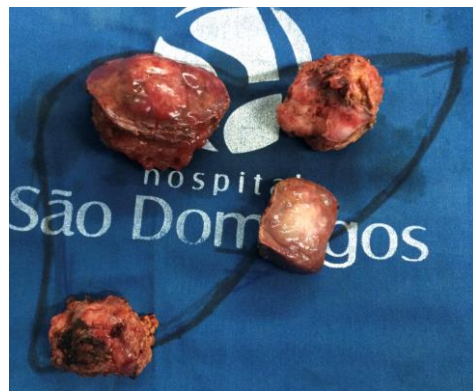
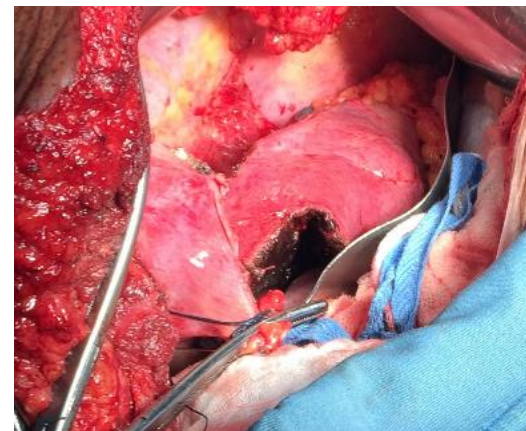
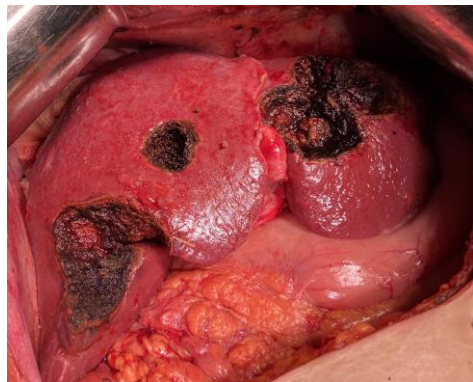


Parenchyma-sparing



NÃO ANATÔMICAS

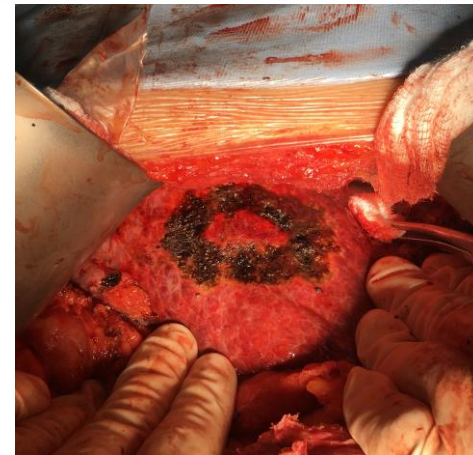
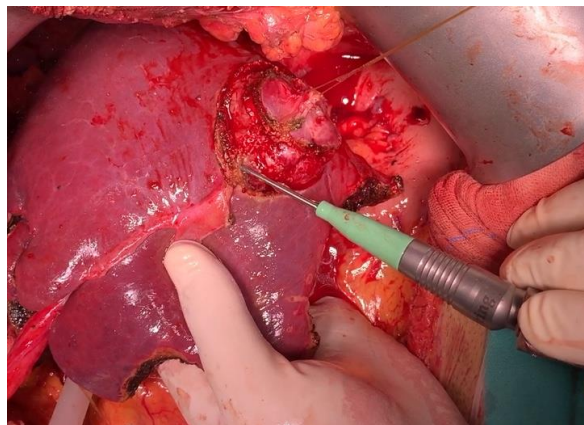
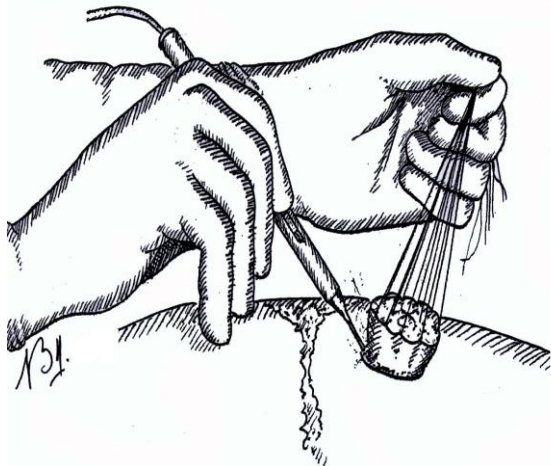
Parenchyma-sparing



QUEIJO SUIÇO

Liver Metastasis Resection: A Simple Technique That Makes It Easier

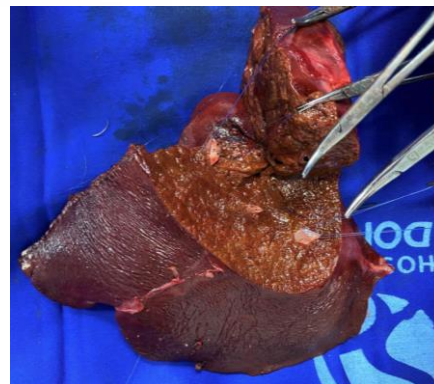
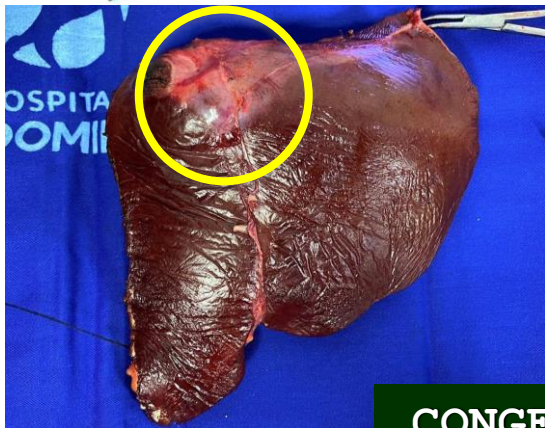
Eduardo de Santibañes • Rodrigo Sánchez Clariá •
Martín Palavecino • Axel Beskow • Juan Pekolj



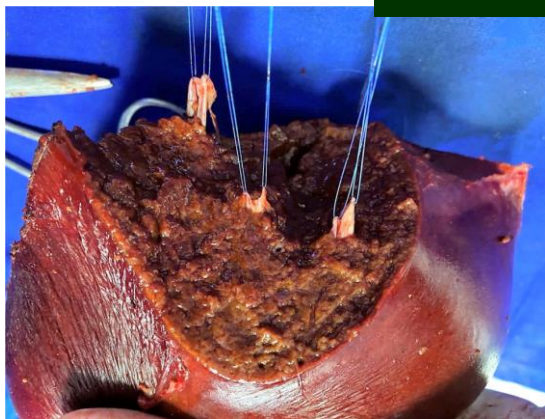
MANOBRA SACA-ROLHAS



Parenchyma-sparing

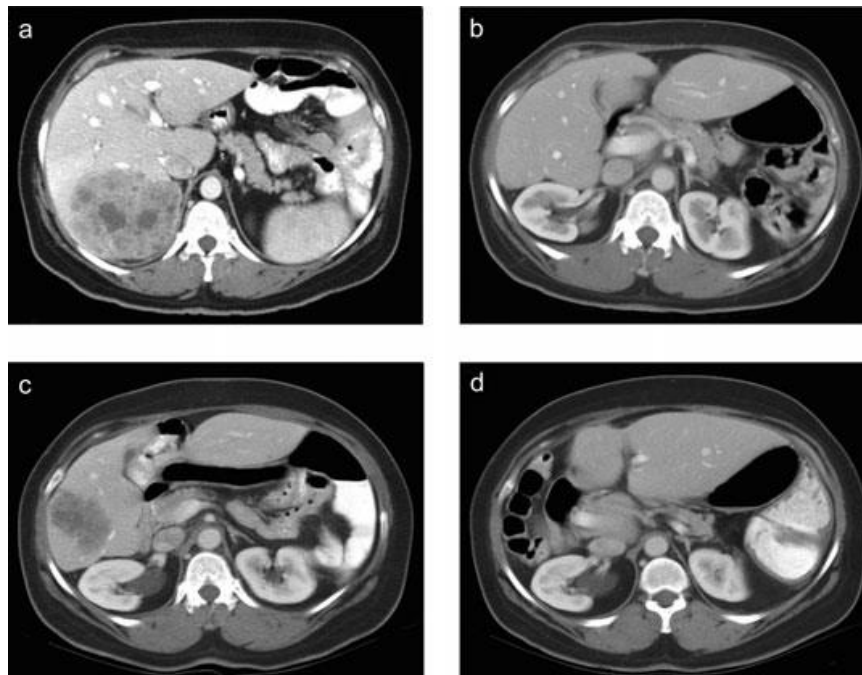


CONGESTÃO VENOSA



ORIGINAL ARTICLE

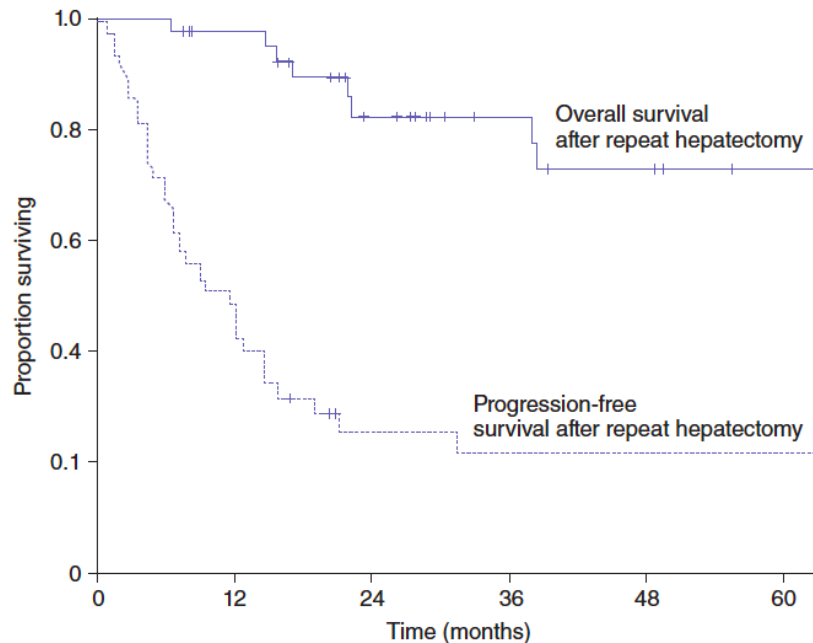
Repeat hepatectomy for recurrent colorectal liver metastases is associated with a high survival rate

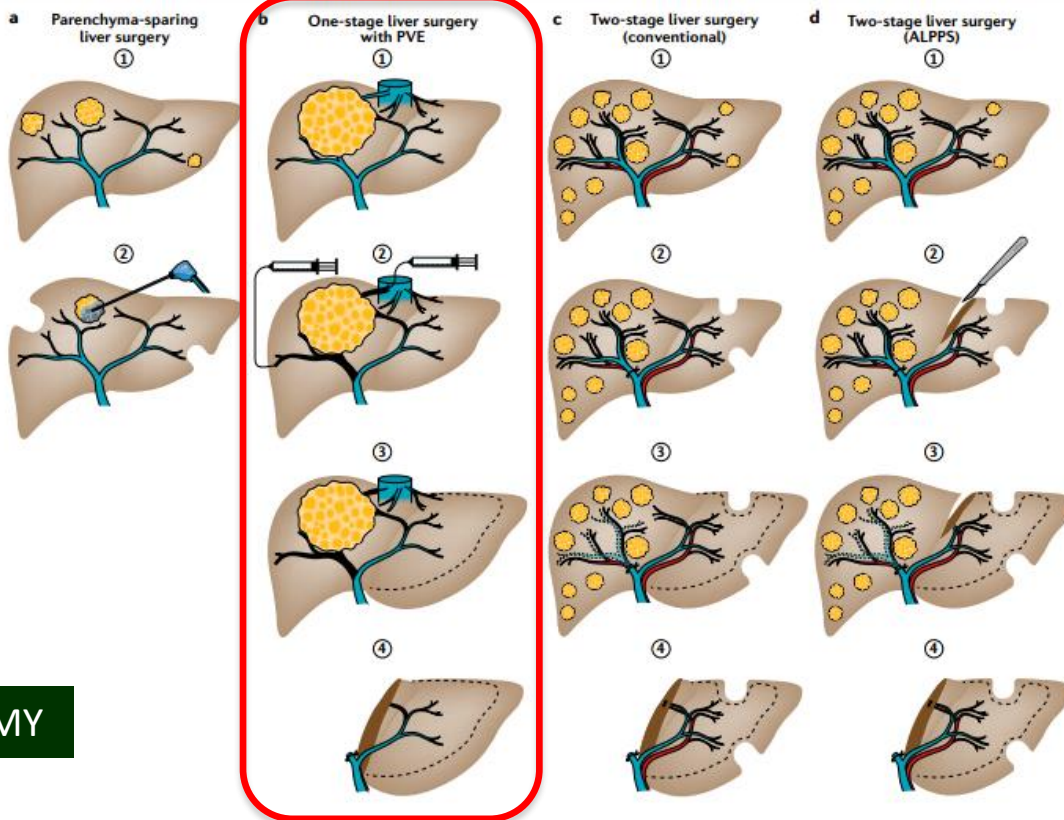


ORIGINAL ARTICLE

Repeat hepatectomy for recurrent colorectal liver metastases is associated with a high survival rate

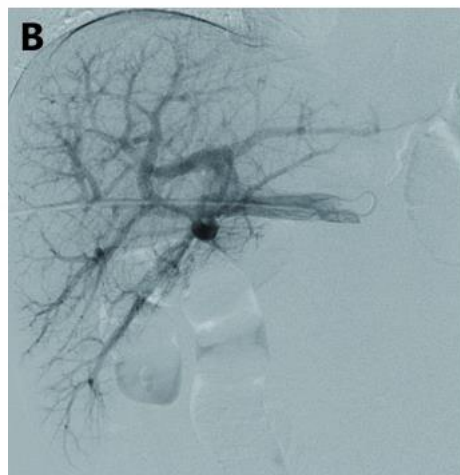
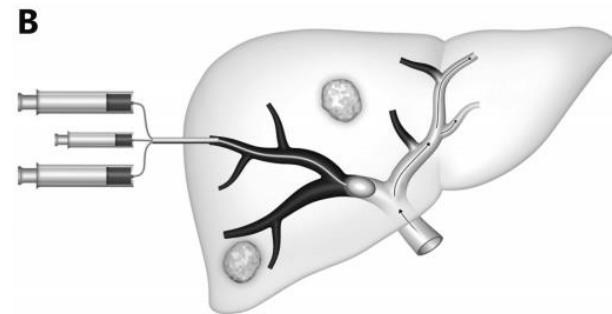
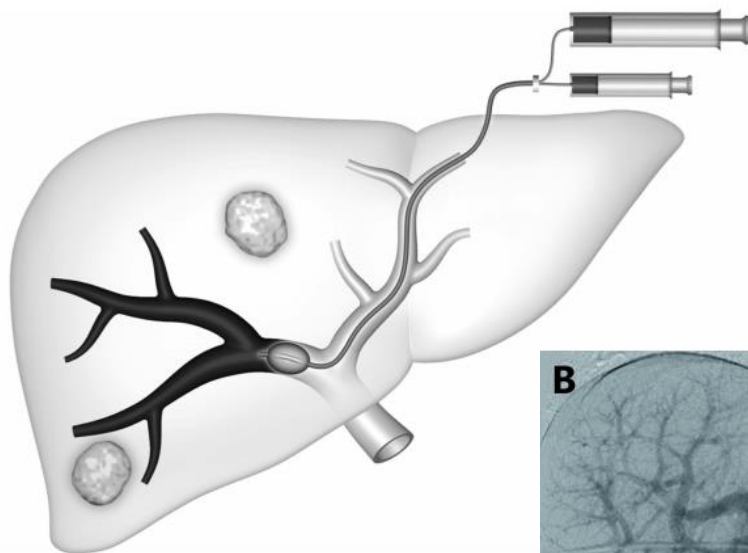
NÃO HÁ LIMITE

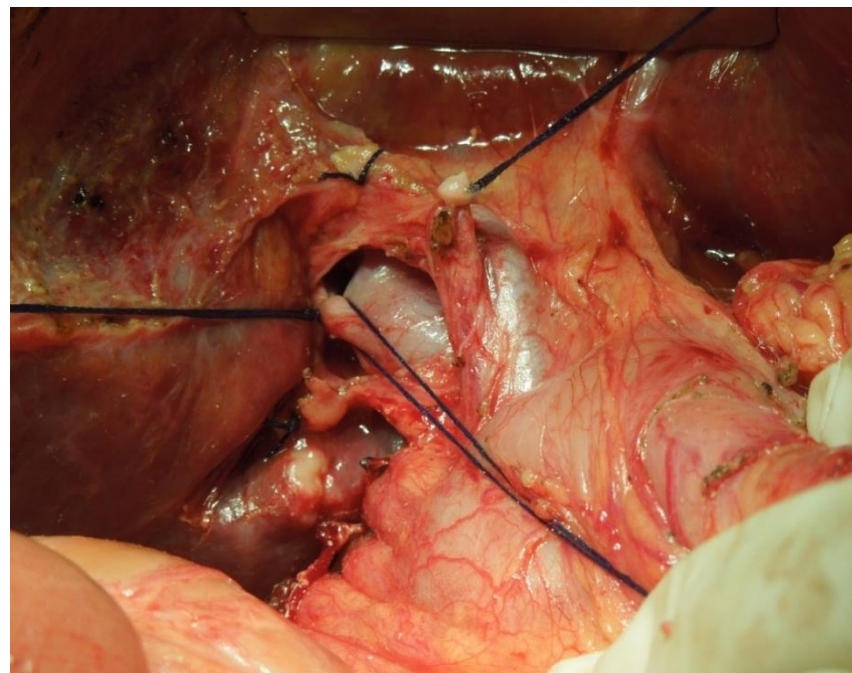
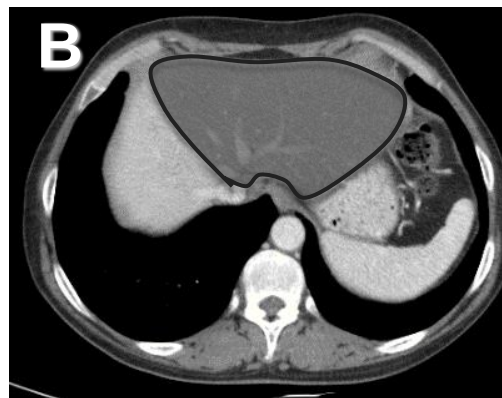
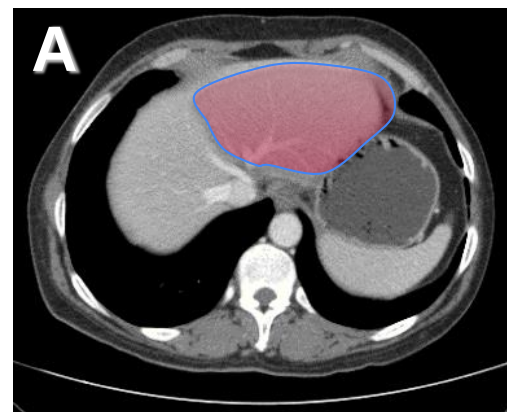
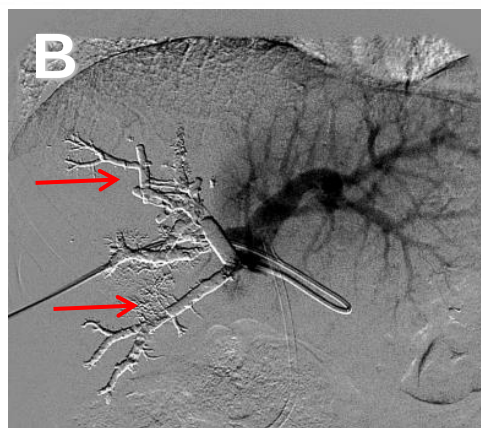
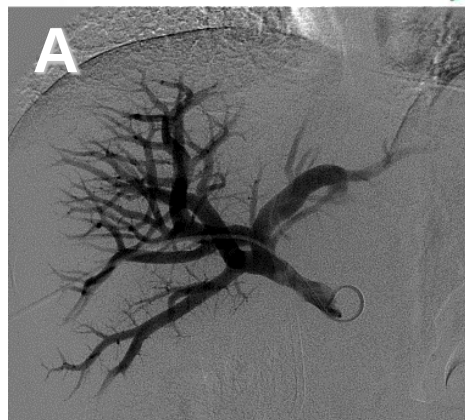




ONE-STAGE HEPATECTOMY

Embolização da veia porta







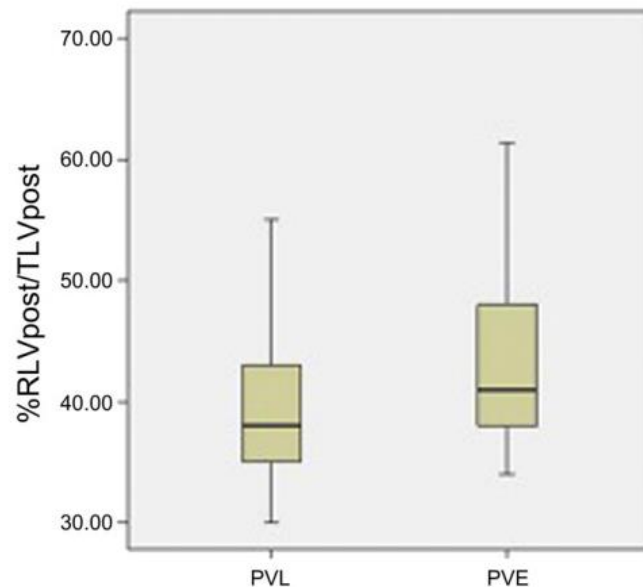
Comparative study of right portal vein ligation versus embolisation for induction of hypertrophy in two-stage hepatectomy for multiple bilateral colorectal liver metastases

□ Hypertrophy

□ PVE 31% a 44% (38 dias 21–60d)

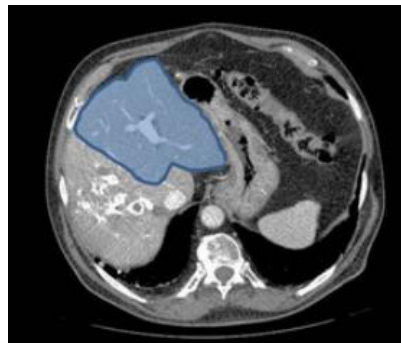
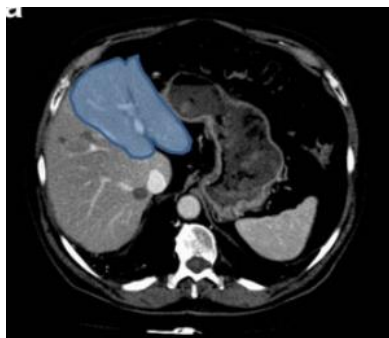
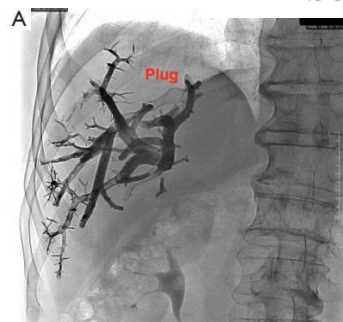
□ PVL 30% a 39% (35 dias 28–60d)

□ Drop out (até 30%)



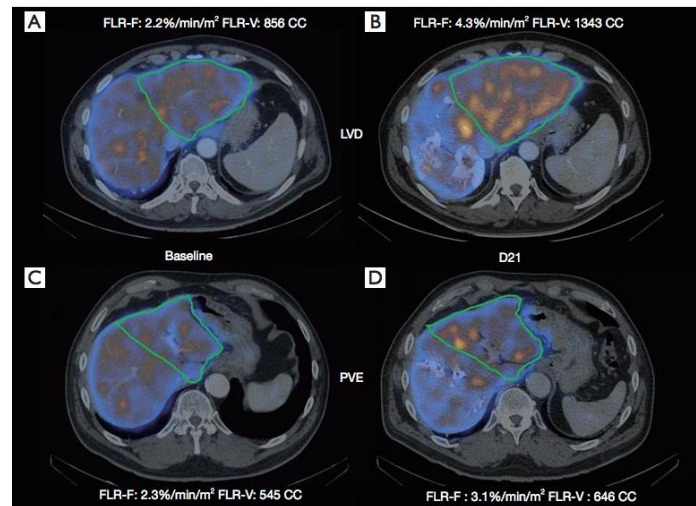
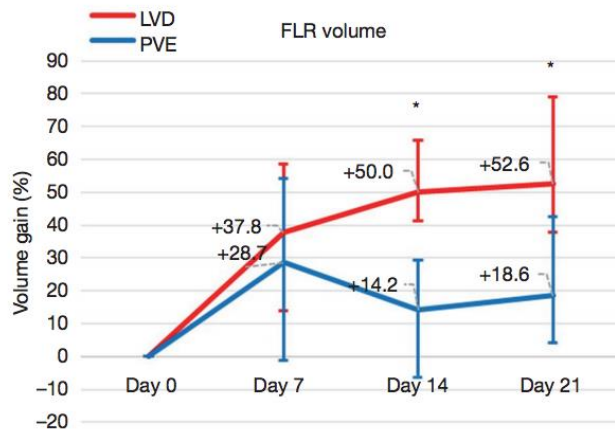
INTERVENTIONAL

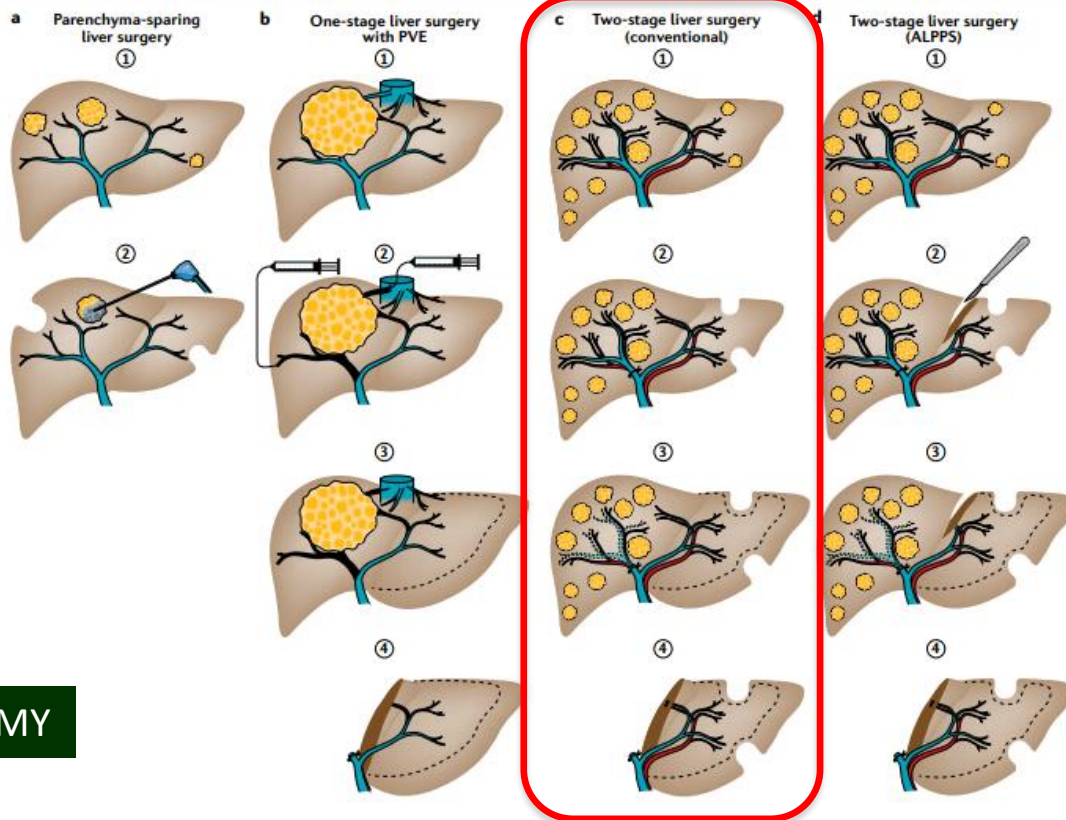
Simultaneous trans-hepatic portal and hepatic vein embolization before major hepatectomy: the liver venous deprivation technique



Liver venous deprivation versus portal vein embolization before major hepatectomy: future liver remnant volumetric and functional changes

Boris Guiu¹, François Quenet², Fabrizio Panaro³, Lauranne Piron¹, Christophe Cassinotto¹, Astrid Herrero³, François-Régis Souche³, Margaux Hermida¹, Marie-Ange Pierredon-Foulongne¹, Ali Belgour¹, Serge Aho-Glele⁴, Emmanuel Deshayes⁵

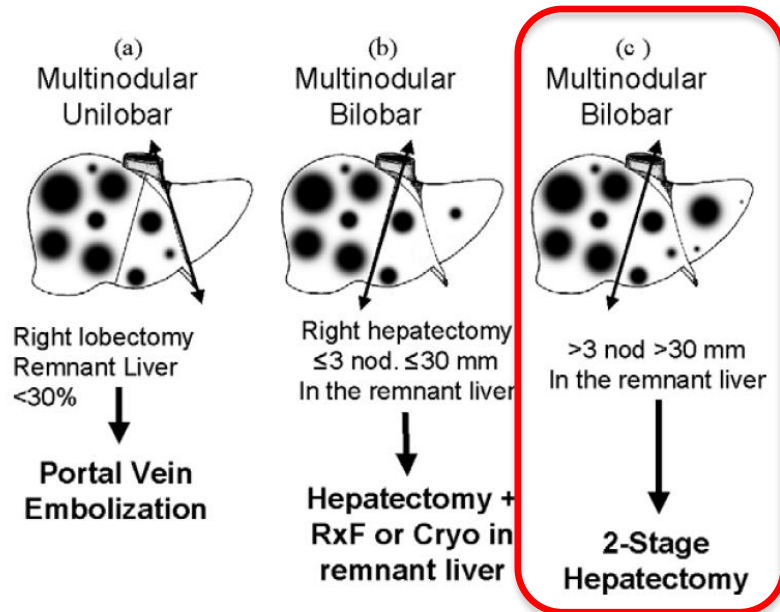




TWO-STAGE HEPATECTOMY

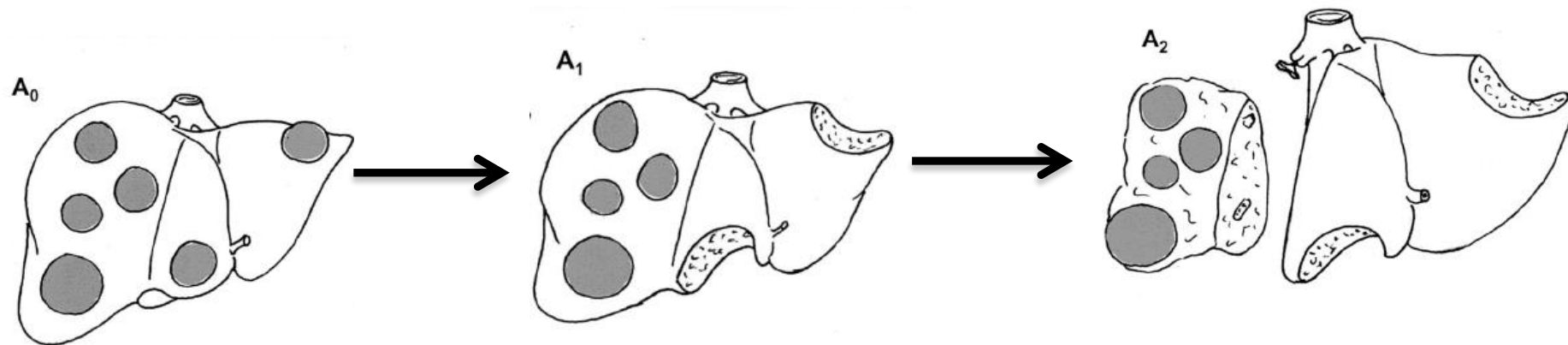
ANNALS OF SURGERY
Vol. 232, No. 6, 777-785
© 2000 Lippincott Williams & Wilkins, Inc.

Two-Stage Hepatectomy: A Planned Strategy to Treat Irresectable Liver Tumors



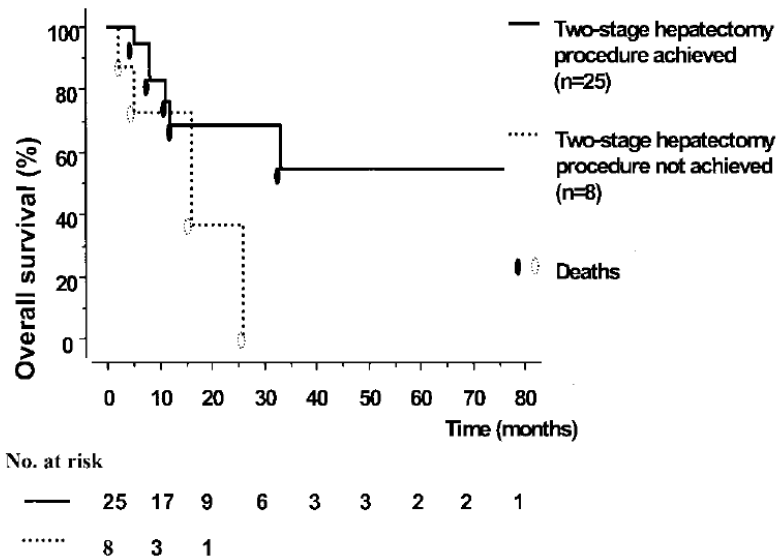
ORIGINAL ARTICLES

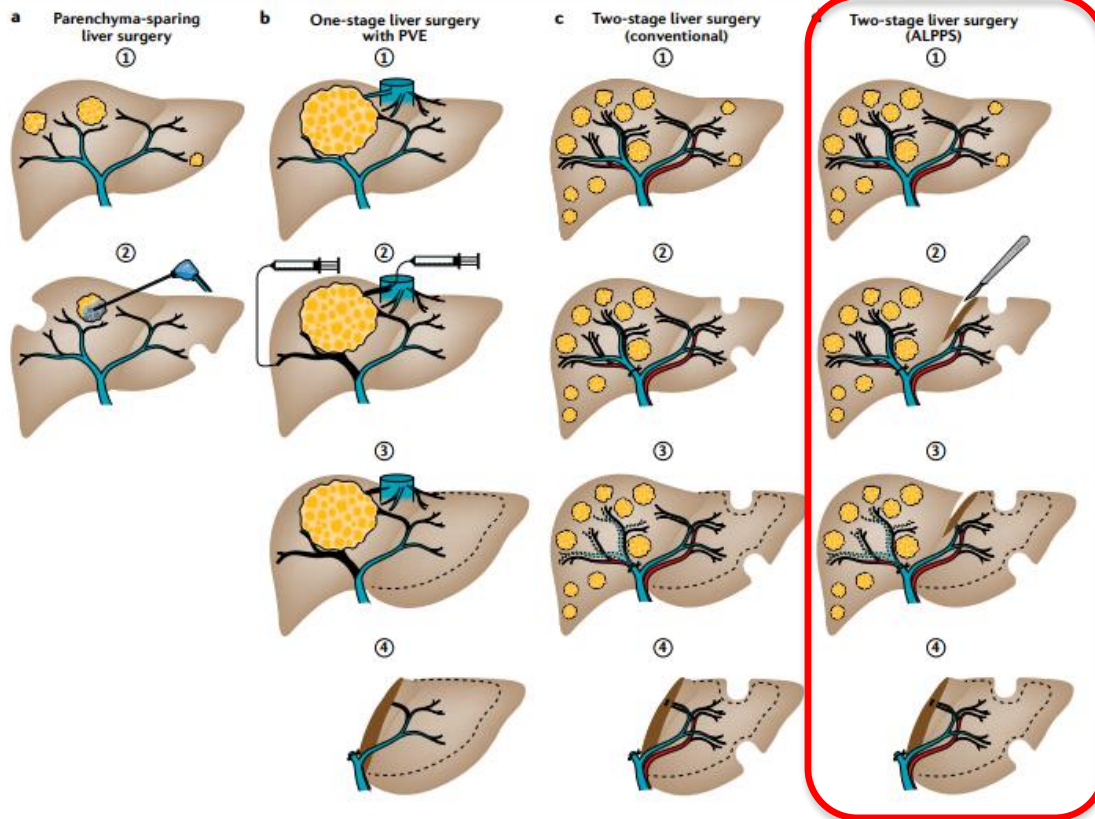
A Two-Stage Hepatectomy Procedure Combined With Portal Vein Embolization to Achieve Curative Resection for Initially Unresectable Multiple and Bilobar Colorectal Liver Metastases



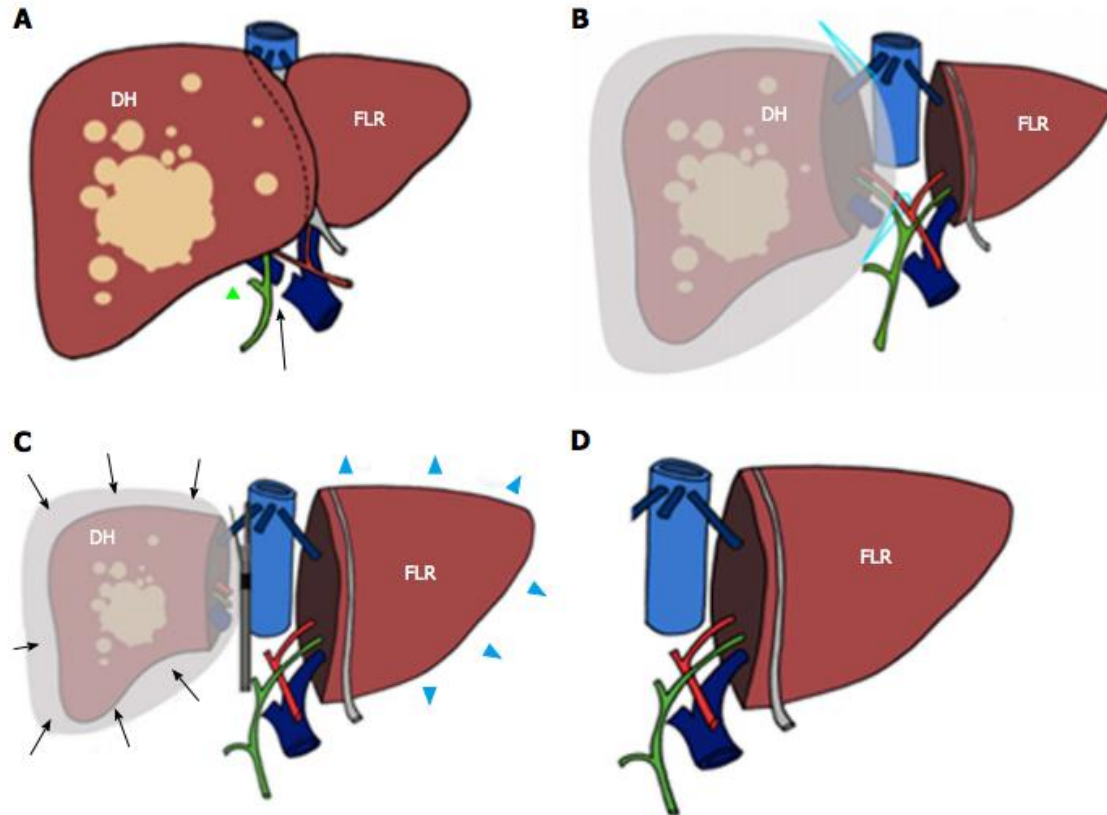
ORIGINAL ARTICLES

A Two-Stage Hepatectomy Procedure Combined With Portal Vein Embolization to Achieve Curative Resection for Initially Unresectable Multiple and Bilobar Colorectal Liver Metastases





ALPPS



ASSOCIATING LIVER PARTITION AND PORTAL VEIN LIGATION FOR STAGED HEPATECTOMY (ALPPS): A NEW APPROACH IN LIVER RESECTIONS

*Ligadura da veia porta associada à transecção para hepatectomia em dois estágios (ALPPS):
uma nova abordagem nas ressecções hepáticas*

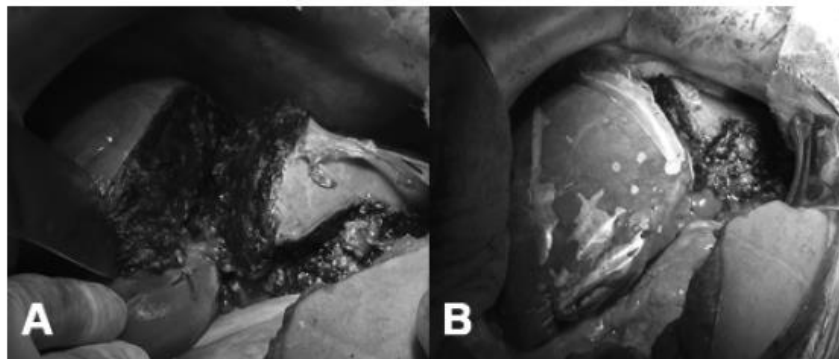
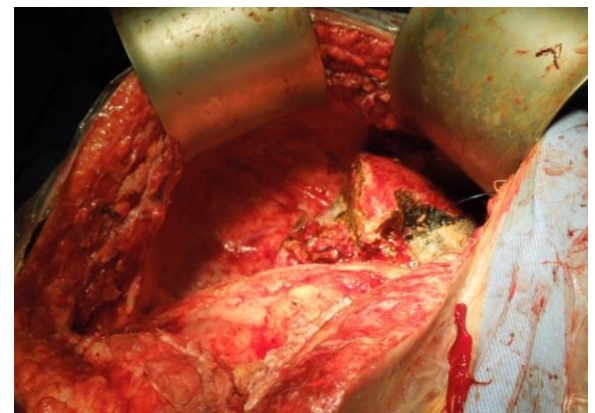
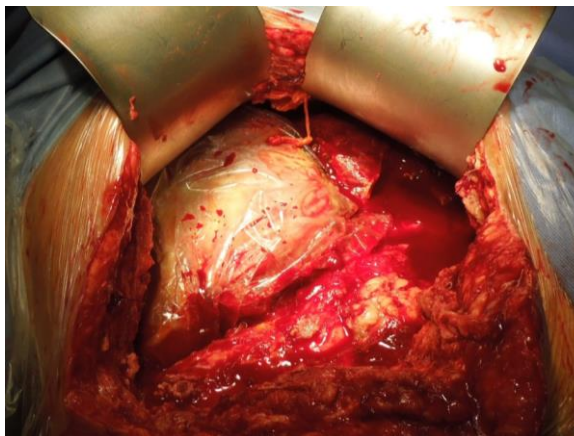
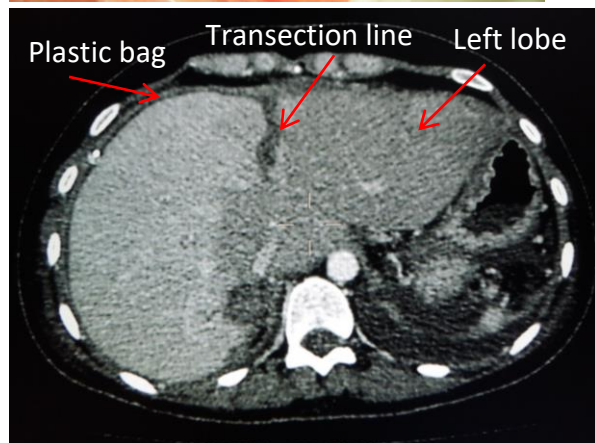
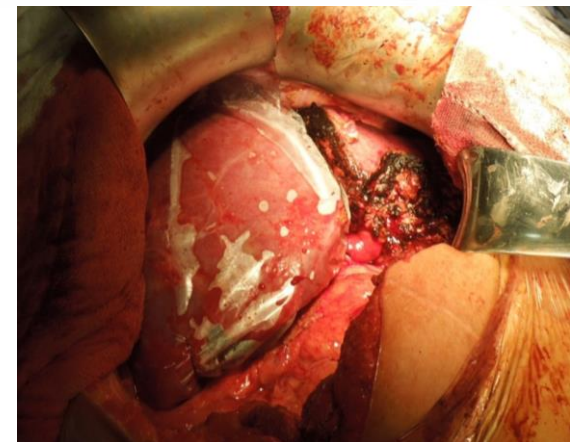
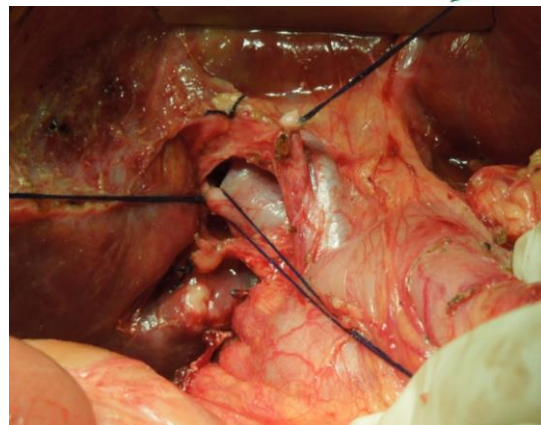


FIGURE 1 - A - Transection of the liver; B - protection with sterile bag



FIGURE 2 - Final aspect of the surgical procedure



Right Portal Vein Ligation Combined With In Situ Splitting Induces Rapid Left Lateral Liver Lobe Hypertrophy Enabling 2-Staged Extended Right Hepatic Resection in Small-for-Size Settings

Andreas A. Schnitzbauer, MD,* Sven A. Lang, MD,* Holger Goessmann, MD,† Silvio Nadalin, MD,§ Janine Baumgart, MD,|| Stefan A. Farkas, MD,* Stefan Fichtner-Feigl, MD,* Thomas Lorf, MD,¶ Armin Goralcyk, MD,¶ Rüdiger Hörbelt, MD,# Alexander Kroemer, MD,* Martin Loss, MD,* Petra Rümmele, MD,‡ Marcus N. Scherer, MD,* Winfried Padberg, MD,# Alfred Königsrainer, MD,§ Hauke Lang, MD,|| Aiman Obed, MD,¶ and Hans J. Schlitt, MD*



ABCDV/898

ABCD Arq Bras Cir Dig
2013;26(1):40-43

Original Article

ASSOCIATING LIVER PARTITION AND PORTAL VEIN LIGATION FOR STAGED HEPATECTOMY (ALPPS): THE BRAZILIAN EXPERIENCE

Ligadura da veia porta associada à bipartição do fígado para hepatectomia em dois estágios (ALPPS): experiência Brasileira

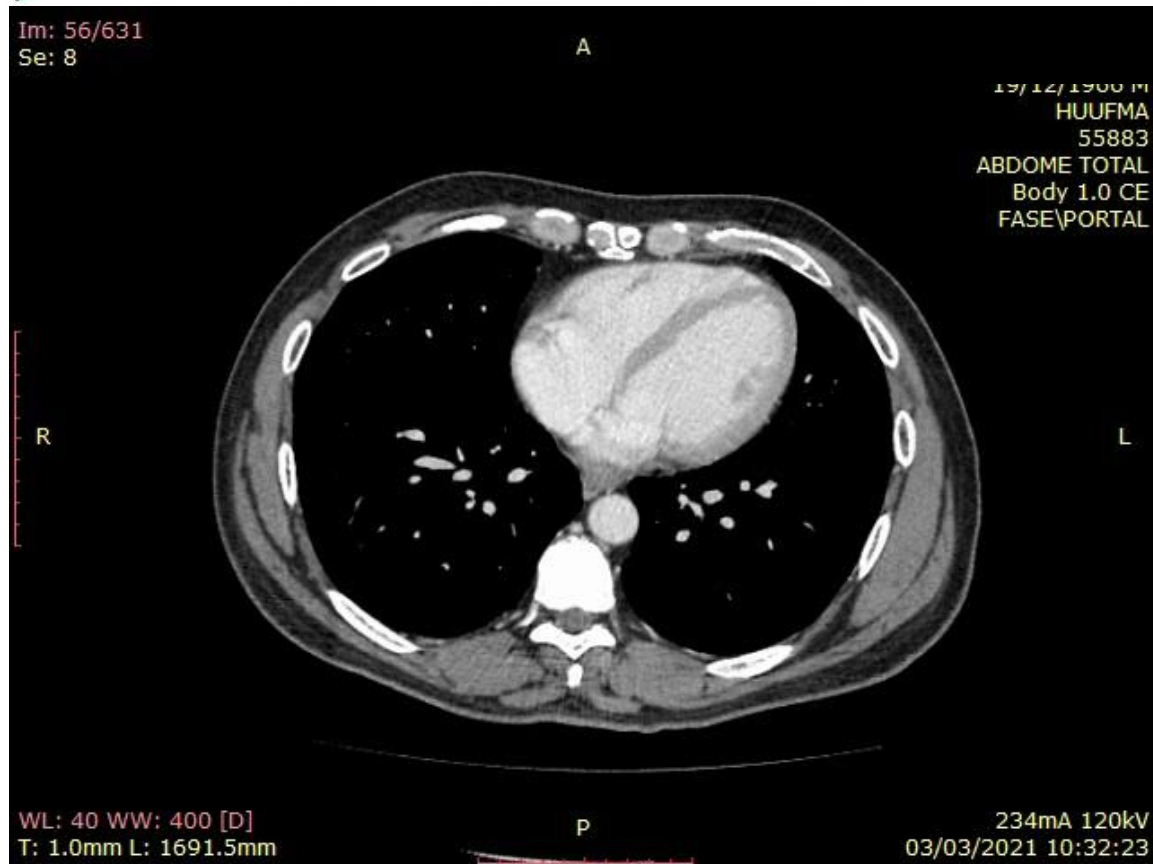
Orlando Jorge Martins **TORRES**¹, Eduardo de Souza Martins **FERNANDES**² Cassio Virgilio Cavalcante **OLIVEIRA**³, Cristiano Xavier **LIMA**⁴, Fabio Luiz **WAECHTER**⁵, Jose Maria Assunção **MORAES-JUNIOR**¹, Marcelo Moura **LINHARES**⁶, Rinaldo Danese **PINTO**⁷, Paulo **HERMAN**⁸, Marcel Autran Cesar **MACHADO**⁹

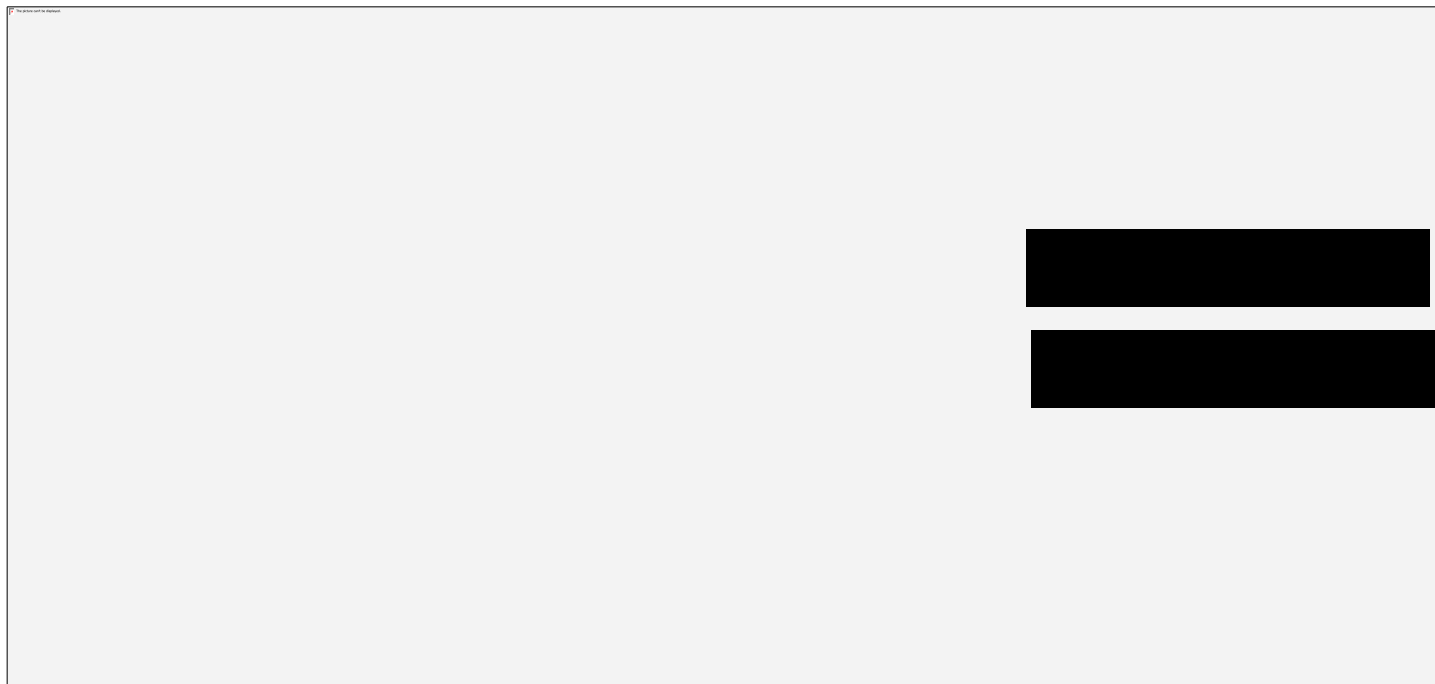
□ 59 and 64% - Morbidity
□ 12 and 12.8% - Mortality

CASE

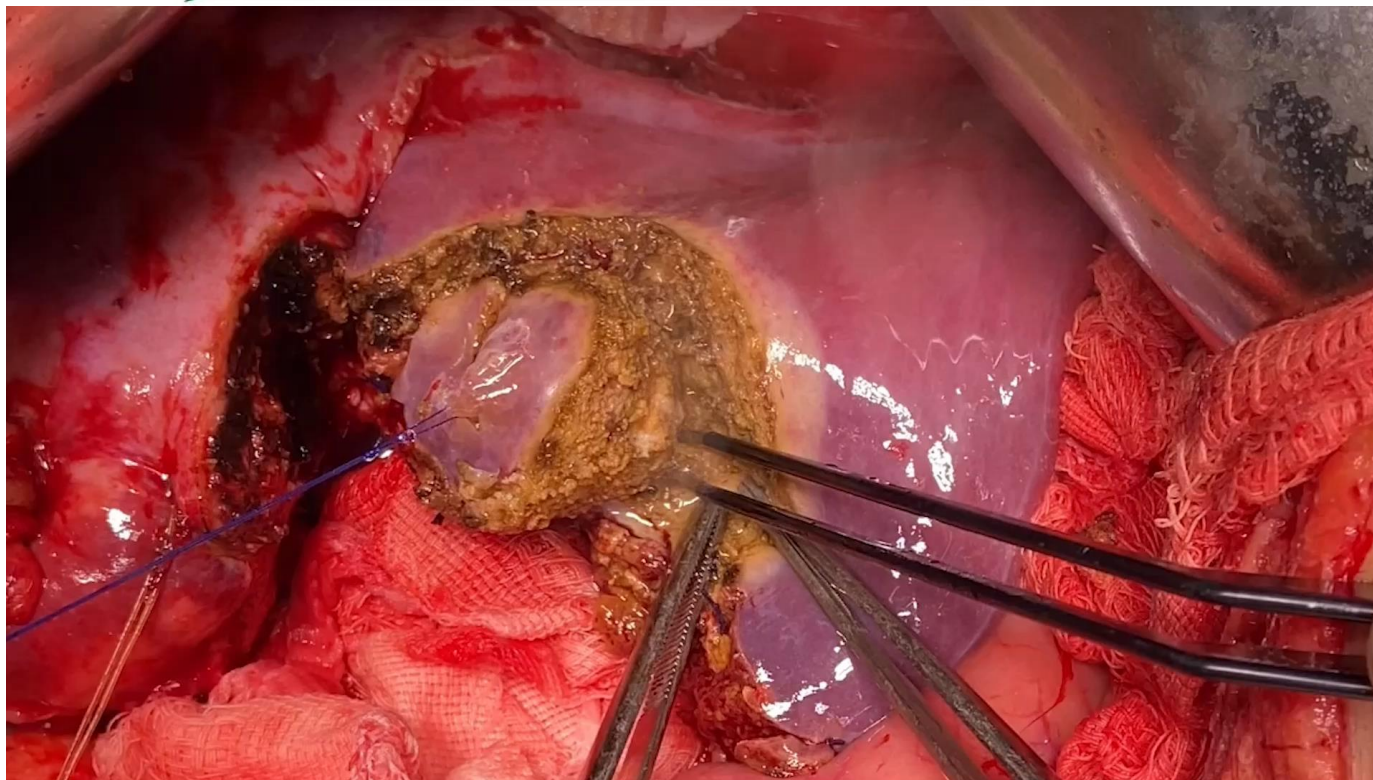
- ❑ 54-year-old male patient
 - ❑ Synchronous liver metastases
 - ❑ Left sided colon tumor
- ❑ Primary resected previously
 - ❑ Colostomy
- ❑ Chemotherapy
 - ❑ FOLFOX 12 cycles

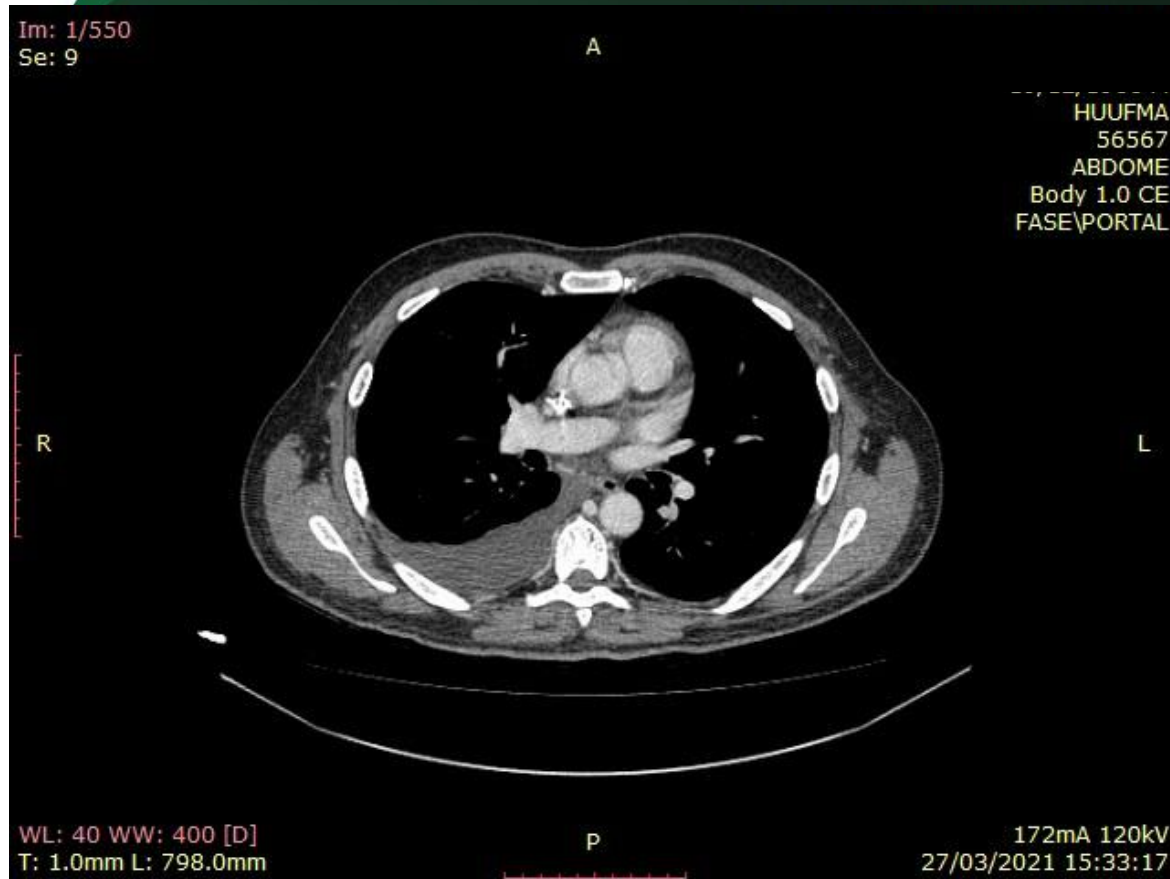
❑ KRAS Wild-type

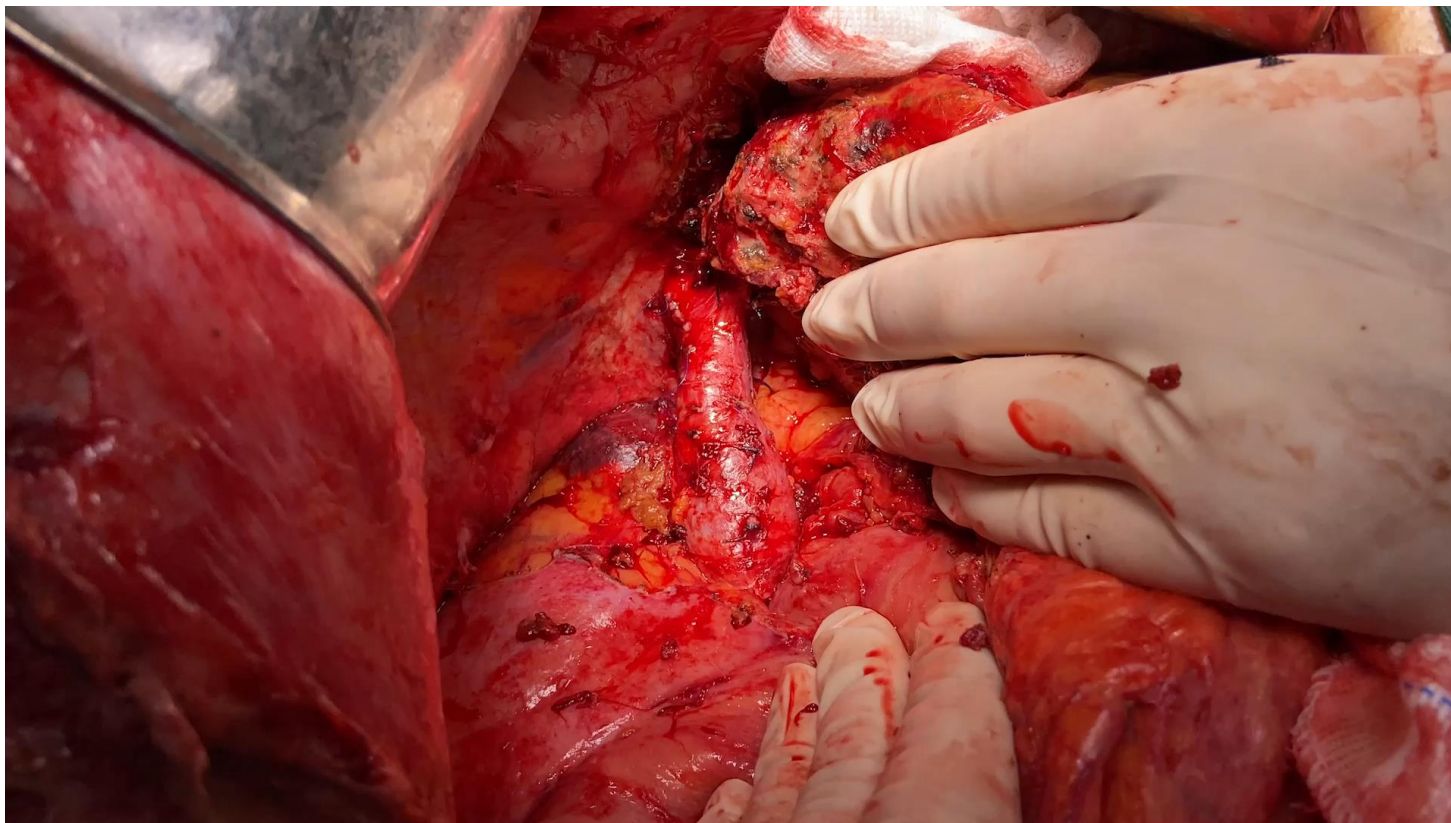




Courtesy: Prof. Deniz Balci (Ankara - Turkey)











SPECIMEN



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Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy (ALPPS) procedure for colorectal liver metastasis

Roberto Hernandez-Alejandro^{a,*}, Luis I. Ruffolo^{a,1}, Ruslan Alikhanov^b, Bergthor Björnsson^c,
Orlando Jorge M. Torres^d, Alejandro Serrablo^e

..

Perioperative Outcome	ALPPS (n=48)	TSH (n=49)
Resection Rate	98%	57%
R0 Resection	77%	57%
90-day mortality	8%	6%
Liver-first approach	40%	37%
Clavien-Dindo Grade 3a or greater complication	43%	43%
1 year recurrence-free-survival	46%	45%

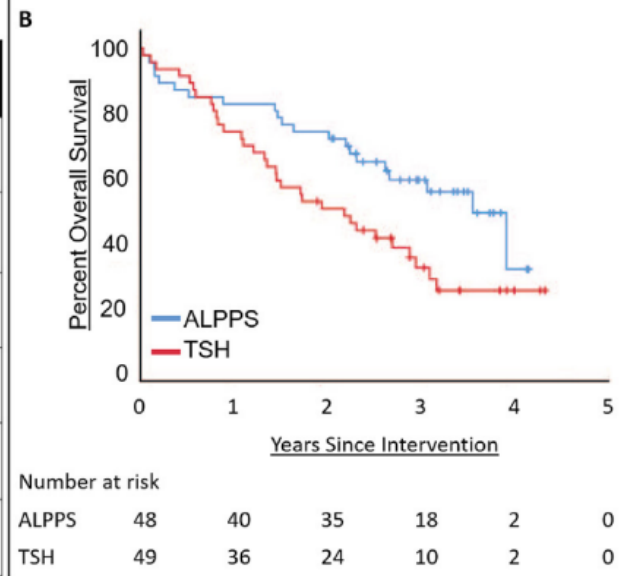


TABLE 108D.1 Degree of Hypertrophy After Stage 1 of ALPPS Procedure

Series	No. Patients	Interval Stage (mean days)	Degree of Hypertrophy (%)
Schnitzbauer et al, 2012	25	9	74
Knoefel et al, 2013	7	6	63
Li et al, 2013	9	13	87.20
Nadalin et al, 2014	15	10	87.2
Torres et al, 2013	39	14.1	83
Robles Campos et al, 2014	22*	7	61
Alvarez et al, 2015	30	6	89.7
Hernandez-Alejandro et al, 2015	14	8	93

*Associating liver tourniquet and portal ligation for staged hepatectomy (ALTPS).

ALPPS, Associating liver partition and portal vein ligation for staged hepatectomy.

ORIGINAL ARTICLE

Performance validation of the ALPPS risk model

Michael Linecker¹, Christoph Kuemmerli¹, Patryk Kambakamba¹, Andrea Schlegel², Paolo Muiesan², Ivan Capobianco³, Silvio Nadalin³, Orlando J. Torres⁴, Arianeb Mehrabi⁵, Gregor A. Stavrou^{6,7}, Karl J. Oldhafer^{7,8}, Georg Lurje⁹, Deniz Balci¹⁰, Hauke Lang¹¹, Ricardo Robles-Campos¹², Roberto Hernandez-Alejandro^{13,14}, Massimo Malago¹⁵, Eduardo De Santibanes¹⁶, Pierre-Alain Clavien¹ & Henrik Petrowsky¹

Table 4 Specific characteristics of risk categories

Variable	Development cohort (n = 528)				Validation cohort (n = 258)			
	Low*	Intermediate*	High*	P	Low**	Intermediate**	High**	P
Pre-stage 1 model								
No. of patients, n (%)	308 (63)	127 (26)	52 (11)		146 (64)	58 (25)	24 (11)	
Age, years	57 (48–62)	69 (65–73)	73 (69–76)	<0.001	55 (47–61)	68 (60–72)	72 (69–74)	<0.001
Tumor entity								
CRLM, n (%)	255 (76)	82 (24)	0 (0)	<0.001	121 (80)	31 (20)	0 (0)	<0.001
Biliary tumors, n (%)	0 (0)	45 (59)	31 (41)	<0.001	0 (0)	27 (63)	16 (37)	<0.001
Non-CRLM/non-biliary, n (%)	53 (72)	0 (0)	21 (28)	<0.001	25 (74)	1 (3)	8 (24)	0.001
Pre-stage 2 model								
No. of patients, n (%)	224 (60)	124 (33)	28 (7)		133 (64)	63 (30)	12 (6)	
Complications ≥3b, n (%)	7 (18)	22 (58)	9 (24)	<0.001	4 (29)	9 (64)	1 (7)	0.013
Bilirubin pre-stage-2, mg/dl	0.68 (0.40–1.10)	0.71 (0.50–1.45)	1.55 (0.89–4.34)	<0.001	0.53 (0.34–0.80)	0.80 (0.53–1.60)	3.05 (1.15–9.30)	<0.001
Creatinine pre-stage 2, mg/dl	0.70 (0.60–0.80)	0.79 (0.65–1.00)	0.97 (0.70–1.30)	<0.001	0.69 (0.55–0.80)	0.78 (0.60–0.95)	1.12 (0.76–1.51)	<0.001

SECA-I

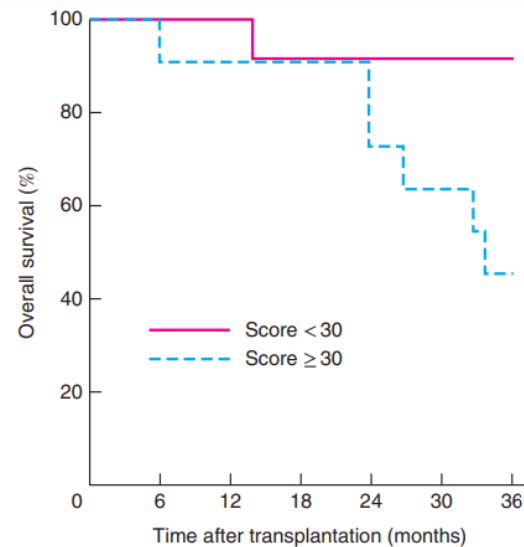
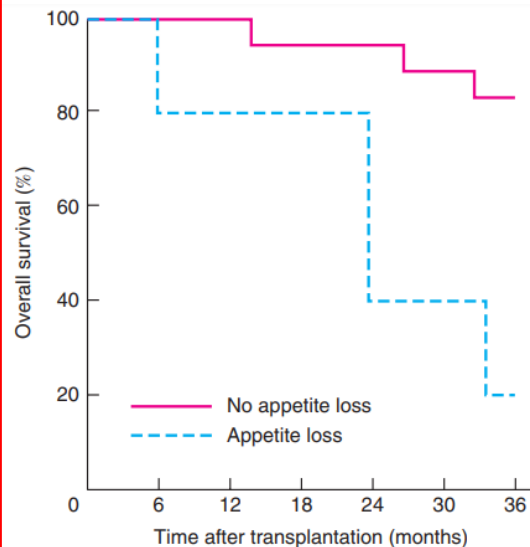
Original article

Long-term quality of life after liver transplantation for non-resectable colorectal metastases confined to the liver

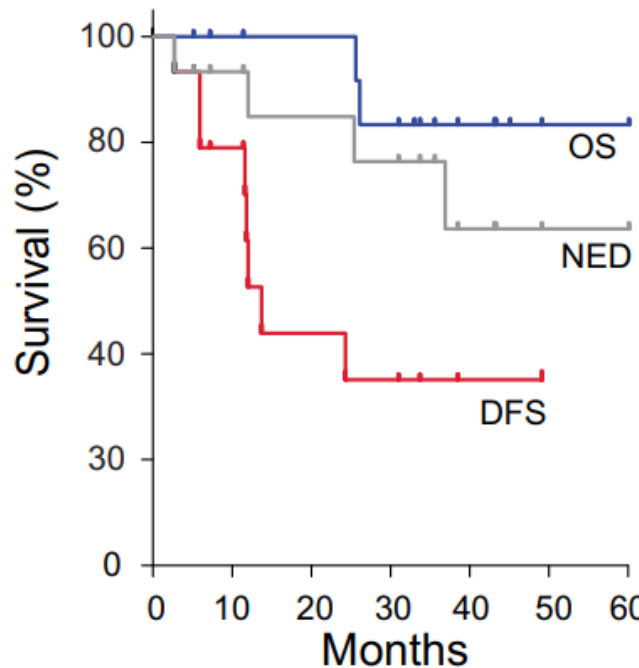
Table 1 Baseline characteristics of patients in SECA-1 trial

	No. of patients* (n = 23)
Age (years)†	54.7 (44.5–64.7)
Sex ratio (F : M)	10 : 13
Tumour site	
Colon	13
Rectum	10
Timing of metastasis	
Synchronous	19
Metachronous	4
Liver resection before LT	4
Chemotherapy before LT (no. of lines)	
1	10
2	9
3	4
> 10 liver metastases	8
Largest lesion > 5 cm	10
CEA > 5 µg/l	14

*Unless indicated otherwise. †Values are median (range). LT, liver transplantation; CEA, carcinoembryonic antigen.



SECA-II



Survival Following Liver Transplantation for Patients With Nonresectable Liver-only Colorectal Metastases

Svein Dueland, MD,*✉ Trygve Syversveen, MD,† Jon Magnus Solheim, MD,‡ Steinar Solberg, MD,§ Harald Grut, MD,† Bjørn Atle Bjørnbeth, MD,¶ Morten Hagness, MD,‡ and Pål-Dag Line, MD‡||

TABLE 1. Inclusion-exclusion Criteria SECA-II Study

Inclusion Criteria

- Histologically verified adenocarcinoma in colon or rectum
- No signs of extra hepatic metastatic disease or local recurrence according to PET/CT scan
- No signs of extra hepatic metastatic disease or local recurrence according to CT or MR (thorax/abdomen/pelvis) scan within 4 wks before the faculty meeting at the transplant unit
- No signs of local recurrence judged by colonoscopy/CT colography within 12 mo before the faculty meeting at the transplant unit
- Good performance status, ECOG 0 or 1
- Satisfactory blood tests Hb >10 g/dL, neutrophils >1.0 (after any G-CSF), TRC >75, Bilirubin <2 x upper normal level, ASAT, ALAT <5 x upper normal level, Creatinine <1.25 x upper normal level. Albumin above lower normal level.
- Standard surgical resection procedure of primary tumor with adequate resection margins, including circumferential resection margins (CRM) of at least ≥2 mm for rectal cancer patients
- Signed informed consent and expected cooperation of the patients for the treatment and follow-up must be obtained and documented according to GCP, and national/local regulations.
- Relapse of liver metastases after second liver resection or liver metastases not eligible for curative liver resection
- Received first-line treatment
- Before start of chemotherapy, no lesion should be larger than 10 cm, if more than 30 lesions all should be less than 5 cm and the patients should have at least 30% response by RECIST-criteria.
- At least 10% response (RECIST-criteria) on chemotherapy. Patients must be accepted for transplantation before progressive disease on ongoing chemotherapy.
- Patients with less than 10% response on chemotherapy may be included if they obtain at least 20% response after TACE (DEB-IRI) or by ⁹⁰Y-spheres.
- At least 1-year time span from CRC diagnosis and date of being listed on the transplantation list.

Exclusion Criteria

OSLO



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Perspective

Liver transplantation for colorectal liver metastases: What do we need to know?

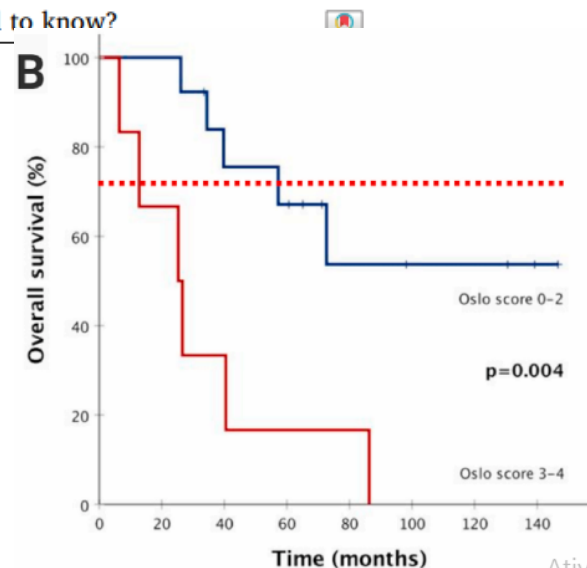
Oslo Score (0–4)

Tumor Diameter > 5.5 cm

CEA > 80 µg/L

Less than 2 year interval between
primary resection and LT

Progressive disease at time of LT



Received: 19 August 2019

Revised: 2 October 2019

Accepted: 19 October 2019

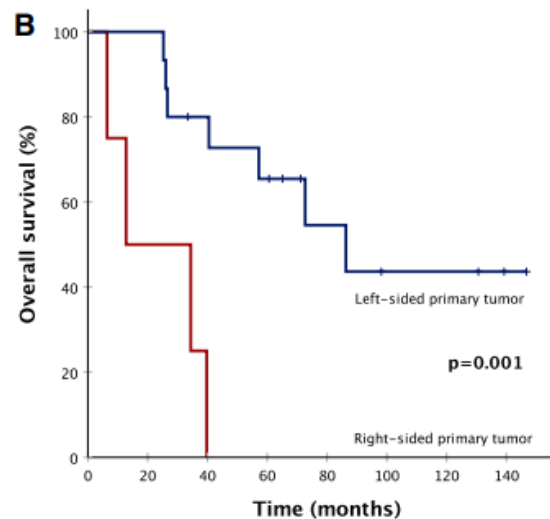
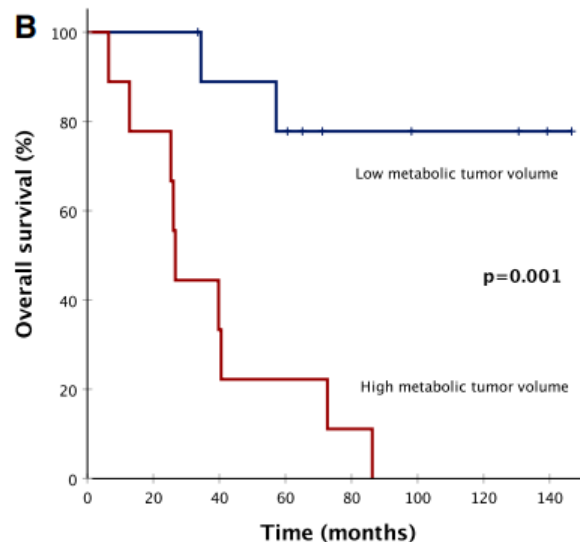
DOI: 10.1111/ajt.15682



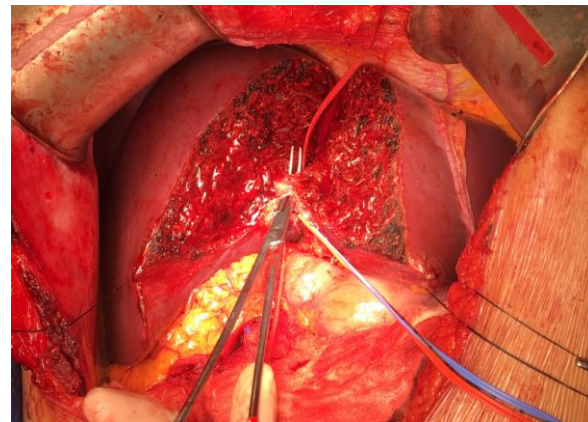
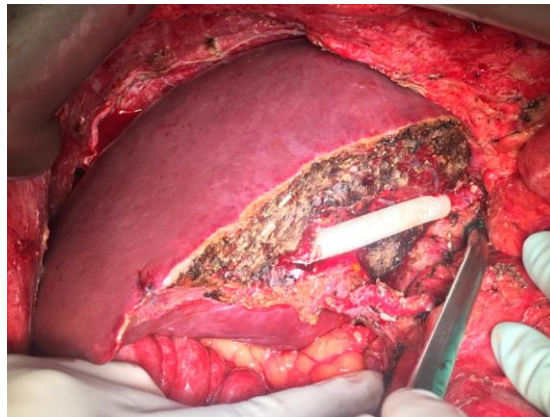
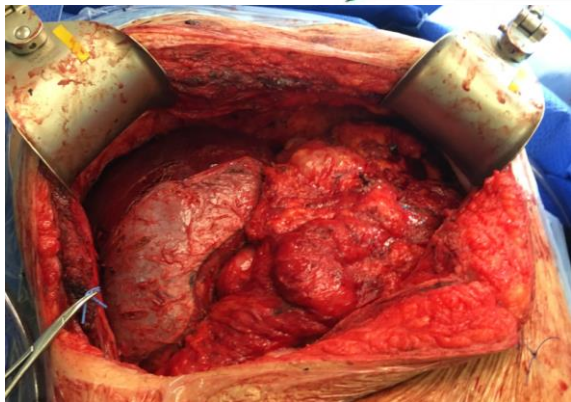
BRIEF COMMUNICATION

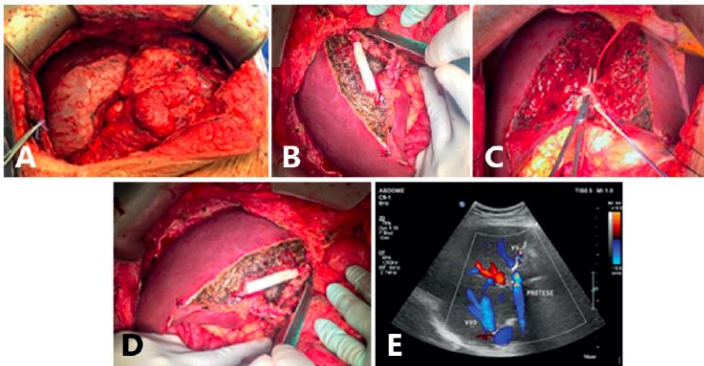
AJT

Selection criteria related to long-term survival following liver transplantation for colorectal liver metastasis



Transplante hepático





ABCD Arq Bras Cir Dig
2019;32(4):e1468
DOI: /10.1590/0102-672020180001e1468

Letter to the Editor

LIVING DONOR LIVER TRANSPLANT FOR COLORECTAL LIVER METASTASIS: THE FIRST CASE IN LATIN AMERICA

*Transplante hepático intervivos para metástase hepática de
origem colorretal: primeiro caso na América Latina*

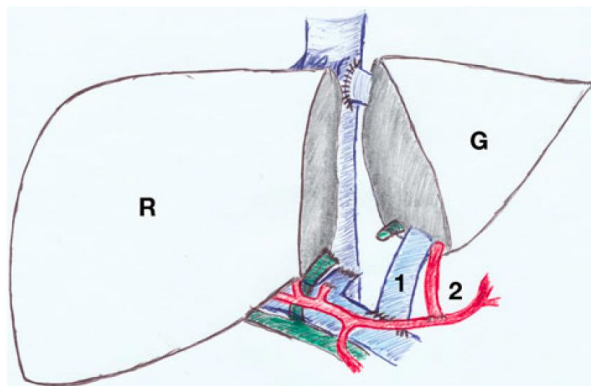
Eduardo de Souza M **FERNANDES**¹, Pal-Dag **LINE**², Felipe
Pedreira de **MELLO**¹, Ronaldo Oliveira **ANDRADE**¹, Camila
Liberato **GIRÃO**¹, Leandro Savatone **PIMENTEL**¹, Camilla
CÉSAR¹, Tarik Soares **SULEIMAN**¹, Fabio Luis **WAECHTER**³,
Antonio Talvane T **OLIVEIRA**⁴, Orlando Jorge M **TORRES**⁵

liver transplant for patients with colorectal liver metastases (SECA I study). The inclusion criteria were R0 primary colorectal resection, unresectable liver metastases, no extrahepatic disease, at least six weeks of chemotherapy and an Eastern Cooperative Oncology Group (ECOG) performance status 0–1^{2,3}. Twenty-one patients with unresectable colorectal liver metastases (u-CRLM) were included. The overall survival rate at five years was 60% with a median survival time of 27 months. Notwithstanding the disease free survival rate was 35% at one year and all patients got relapse if observed up to three years, mainly in the form of lung metastases which were slow growing and most often resectable. Some factors were identified as related to worse prognosis (the Oslo Criteria) and include: 1) time from primary cancer surgery <2 years; 2) progressive disease on chemotherapy; 3) maximum tumor diameter >5.5 cm; and 4) CEA levels >80 µg/l. Beside Norway, liver transplant for colorectal liver metastasis have been performed in Japan, France, Canada, Portugal, Turkey, and Germany^{2,4,5}. Very recently the Oslo group reported the preliminary results of SECA II trial, indicating that a five year overall survival of about 80% may be obtained if stricter selection criteria for liver transplant in this patient cohort are used⁶. Nowadays, the majority of liver

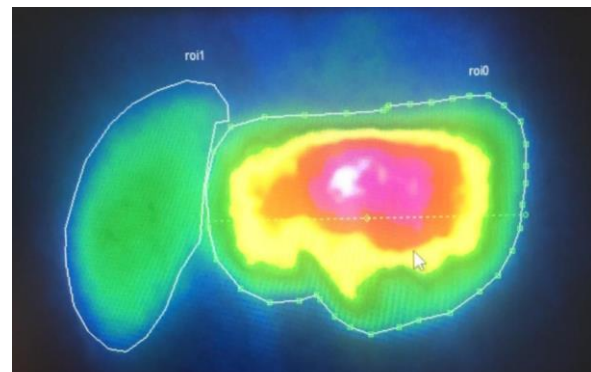
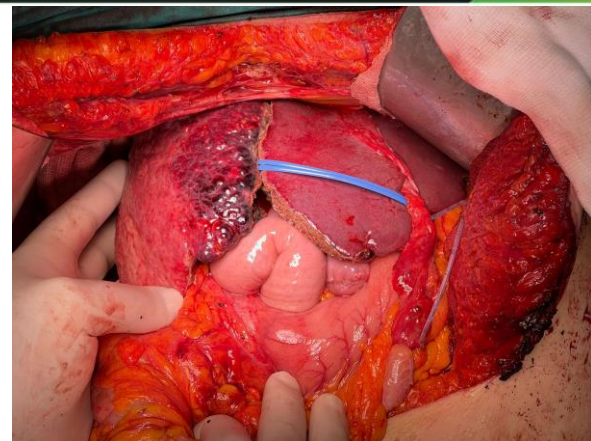
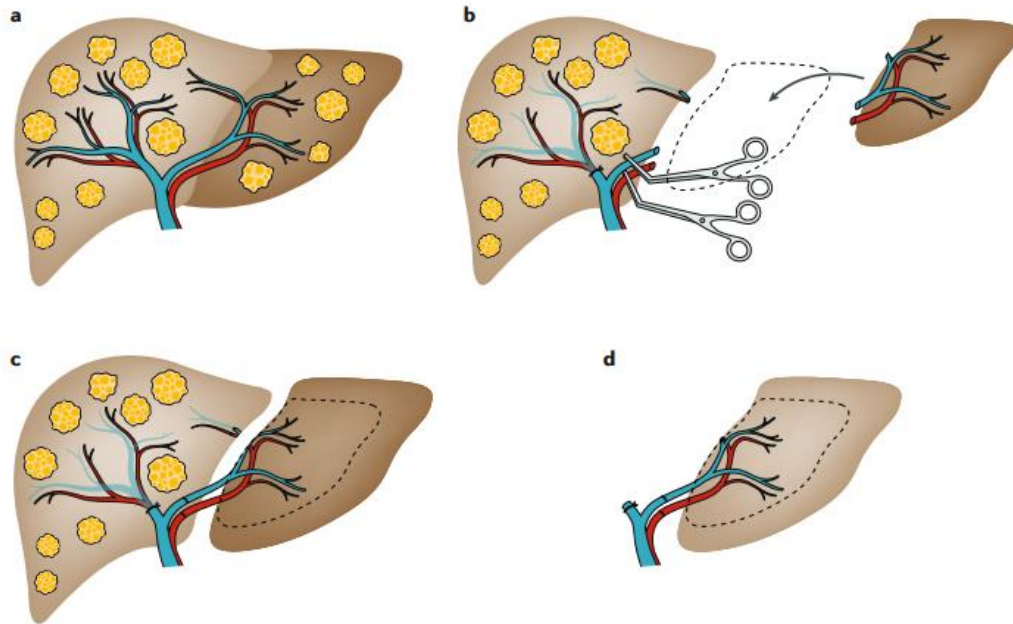
A Novel Concept for Partial Liver Transplantation in Nonresectable Colorectal Liver Metastases

The RAPID Concept

Pål-Dag Line, MD, PhD, Morten Hagness, MD, PhD,* Audun Elnaes Berstad, MD, PhD,† Aksel Foss, MD, PhD,*§
and Svein Dueland, MD, PhD‡*

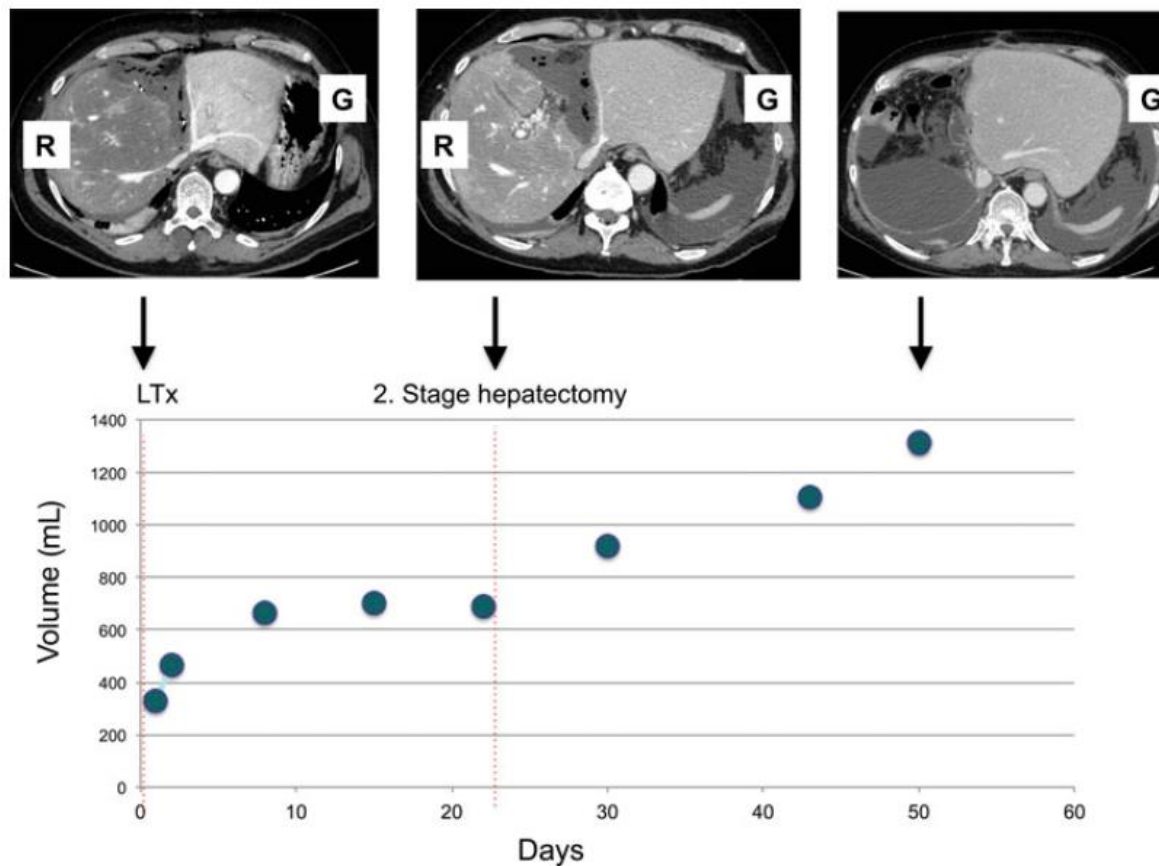


The RAPID concept



Courtesy: Prof. Deniz Balci (Ankara - Turkey)

The RAPID concept



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Present by: **Orlando J M Torres** – Universidade Federal do Maranhão