

ircad

América Latina

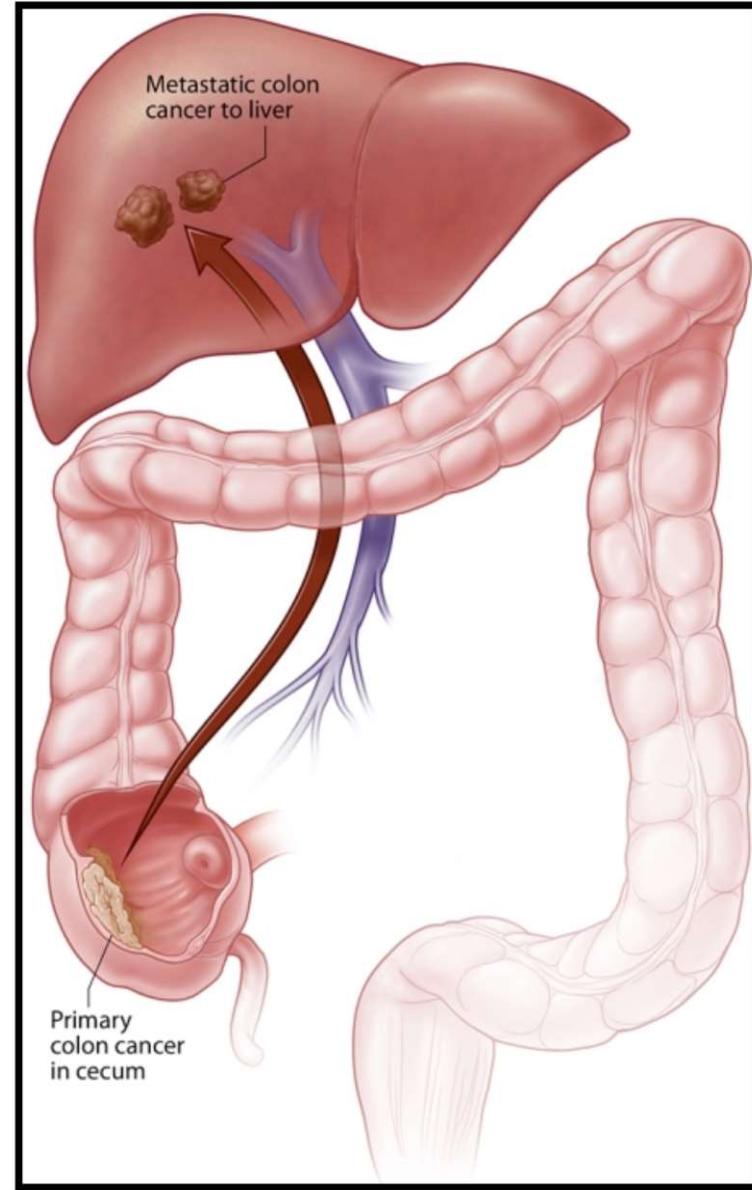
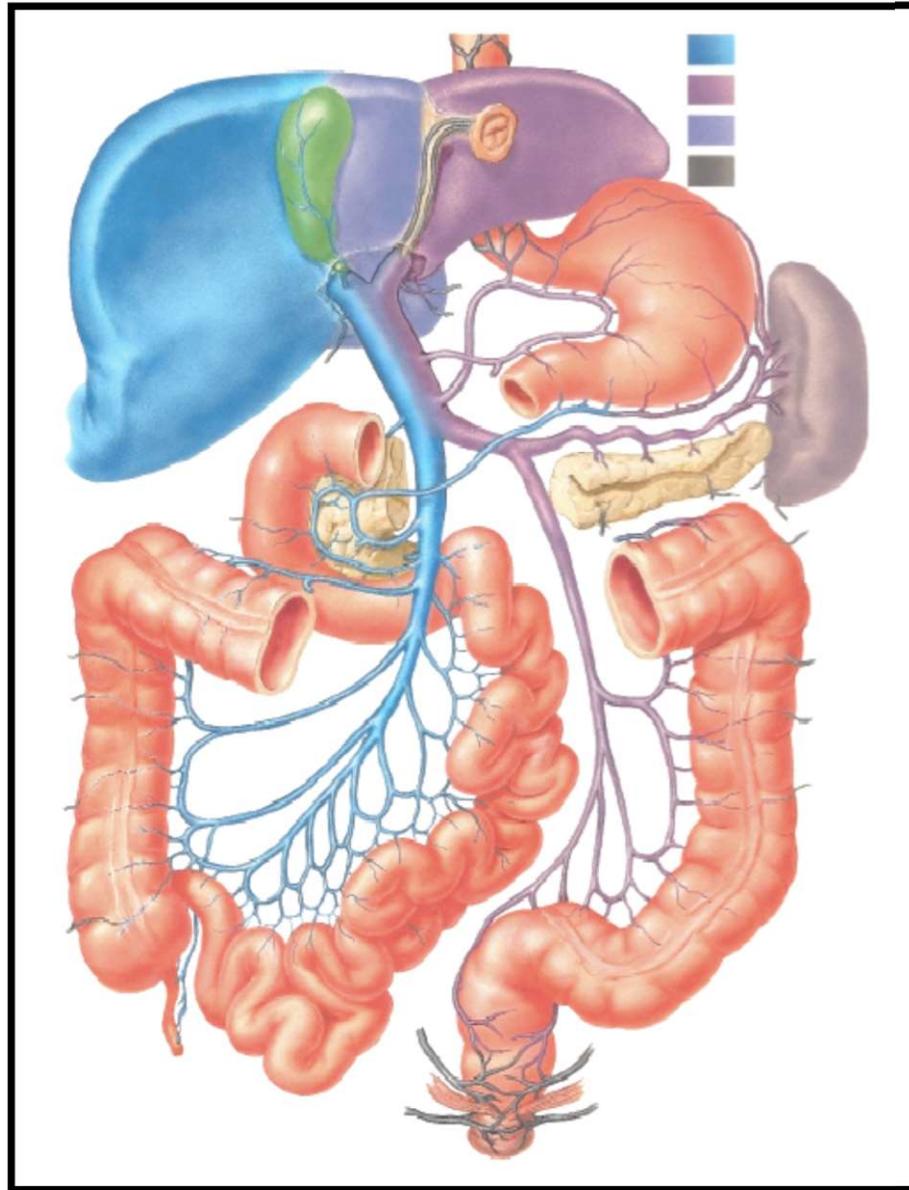
UNIDADE BARRETOS

"Hepatic metastasis surgery"

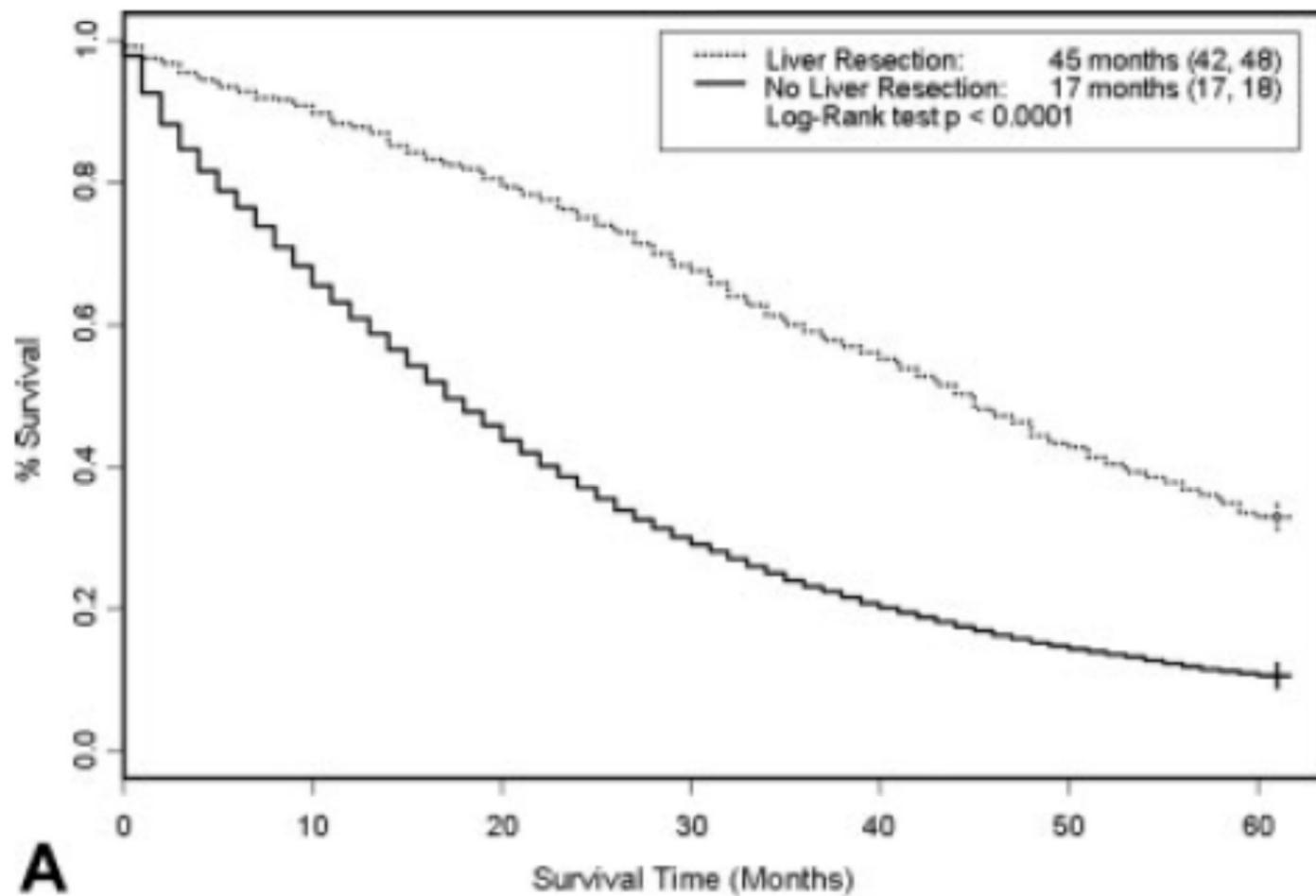


Orlando Jorge M. Torres MD, PhD
Full Professor and Chairman
Department of Gastrointestinal Surgery
Hepatopancreatobiliary Unit
Universidade Federal do Maranhão - Brazil

Liver metastasis



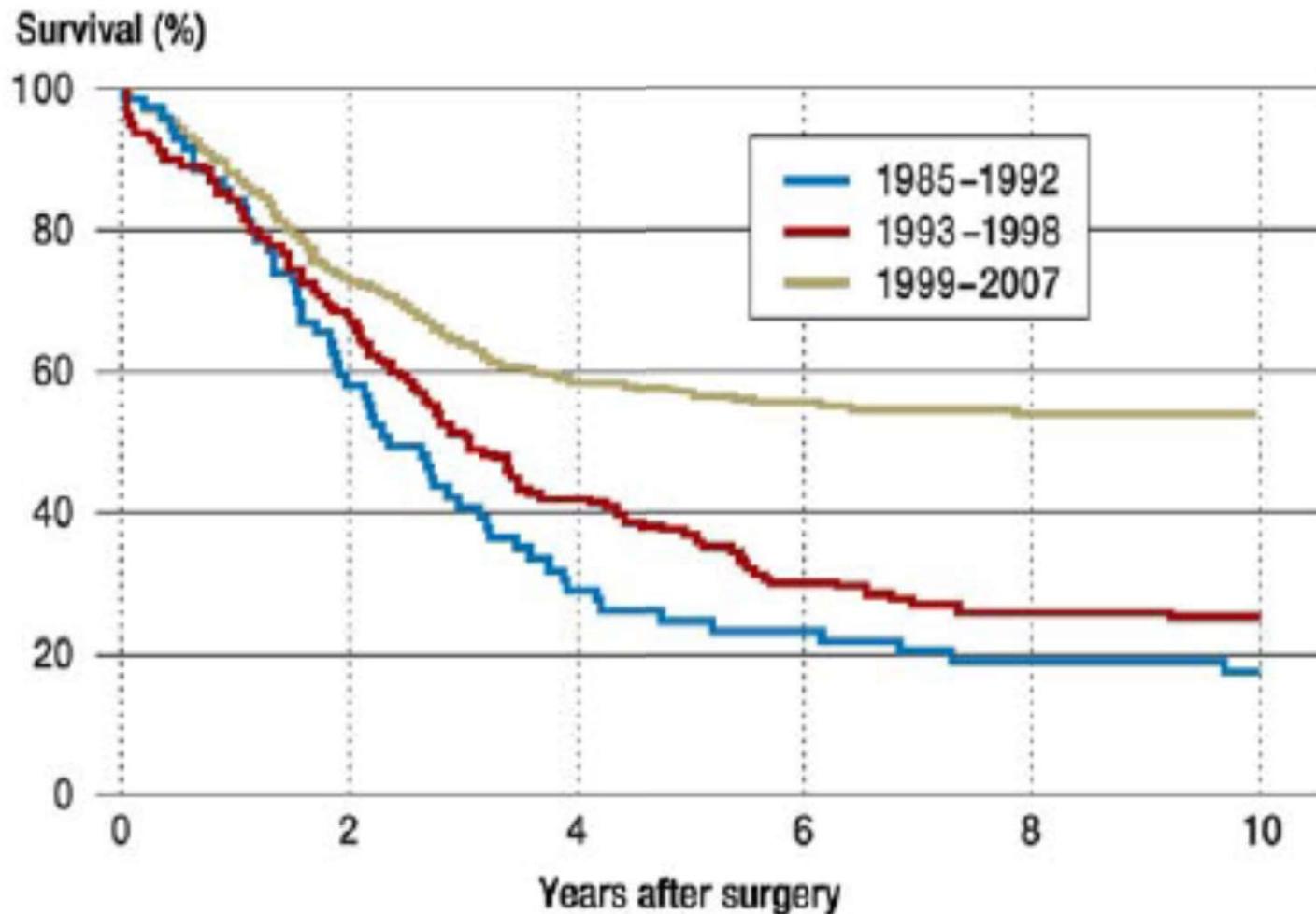
Liver resection



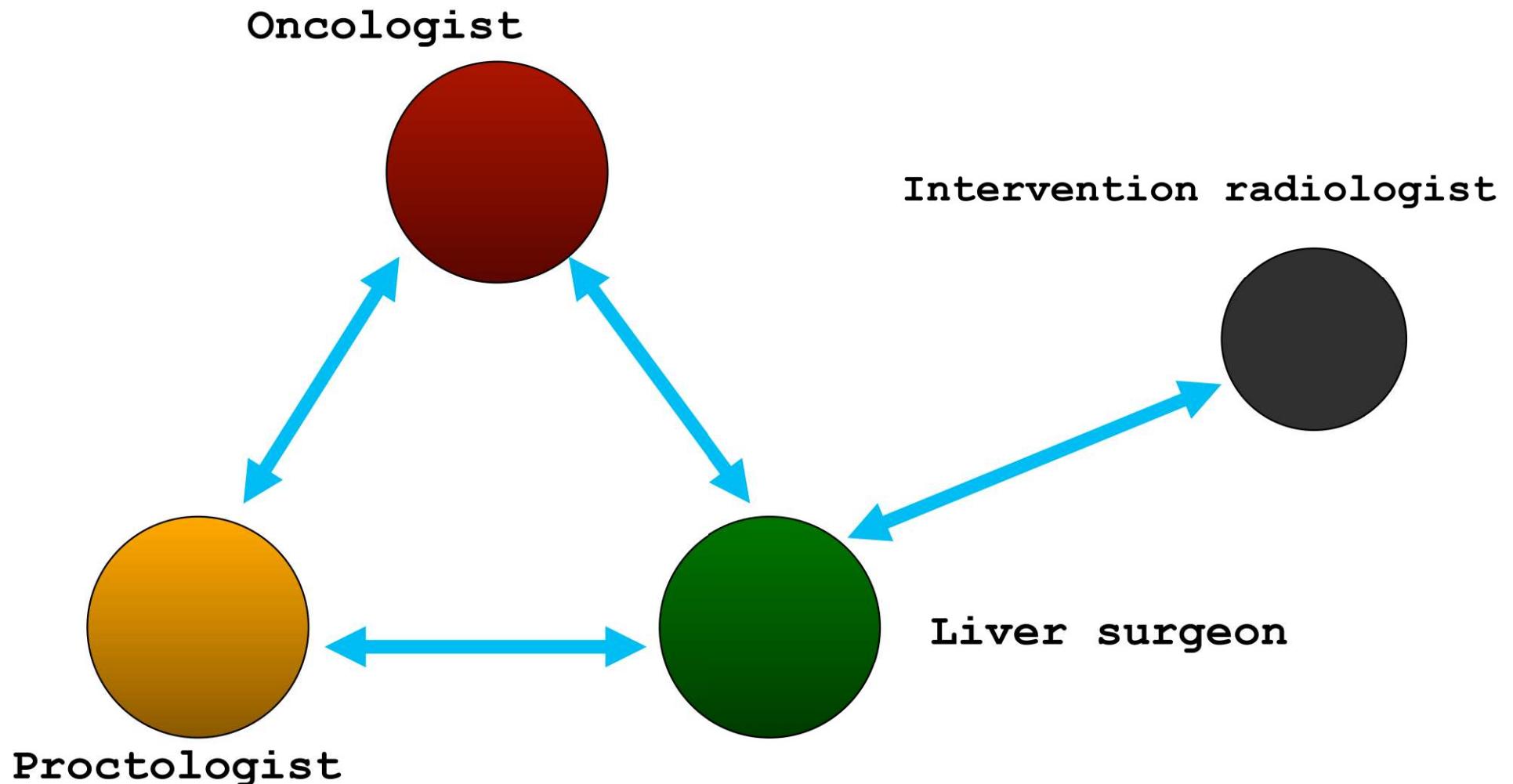
- Associated with better survival.

Colorectal liver metastasis

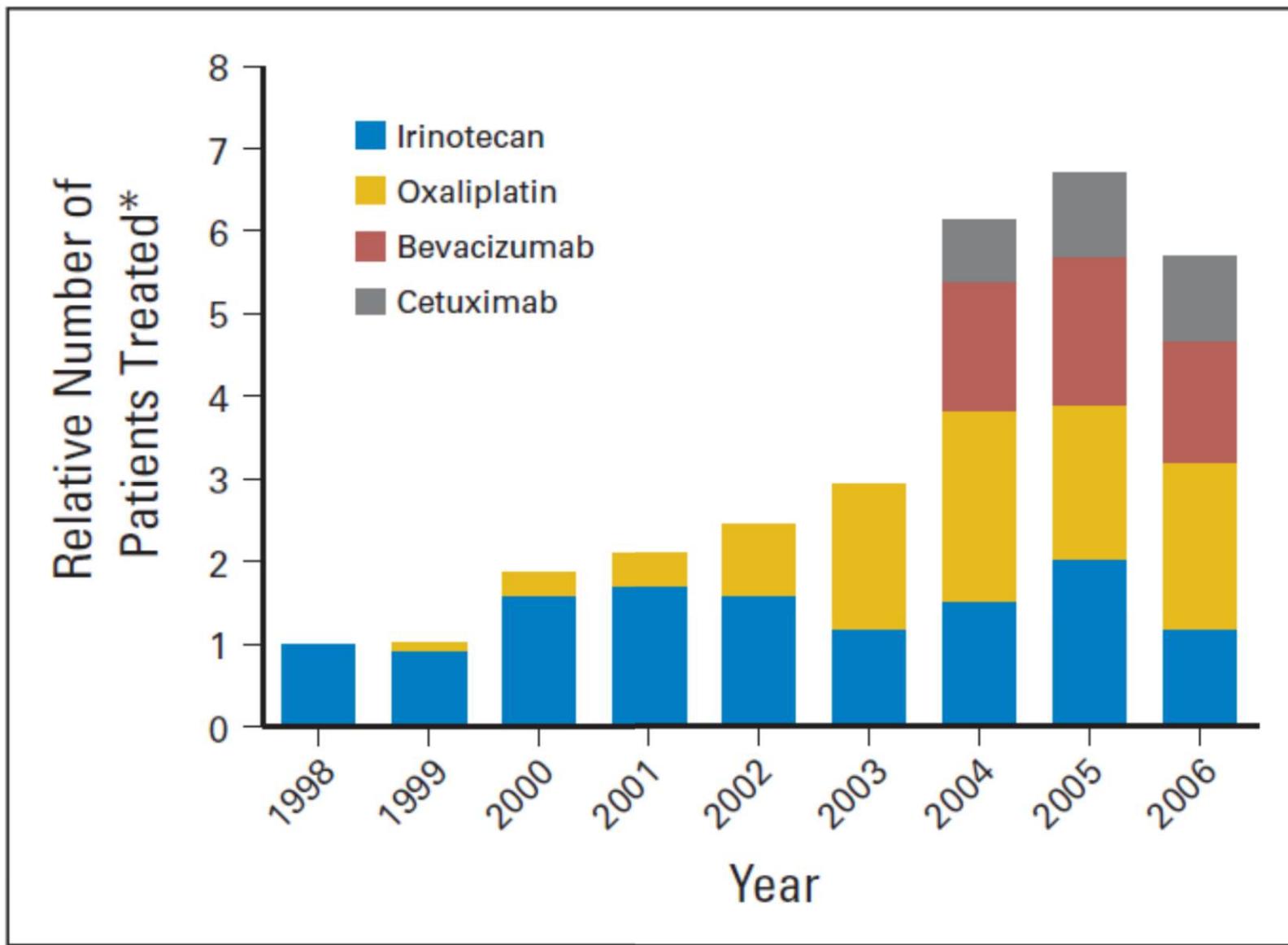
FIGURE 2

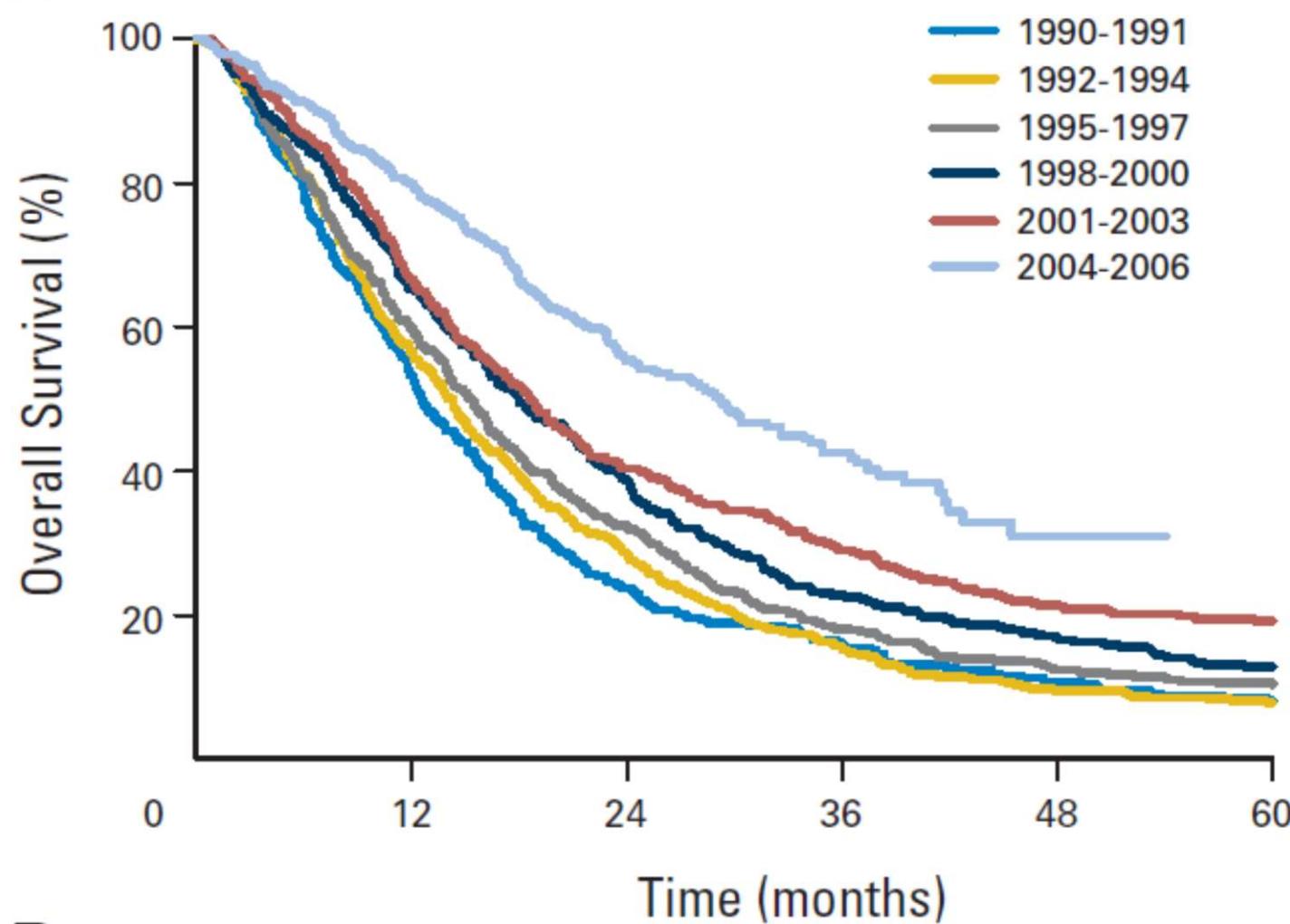


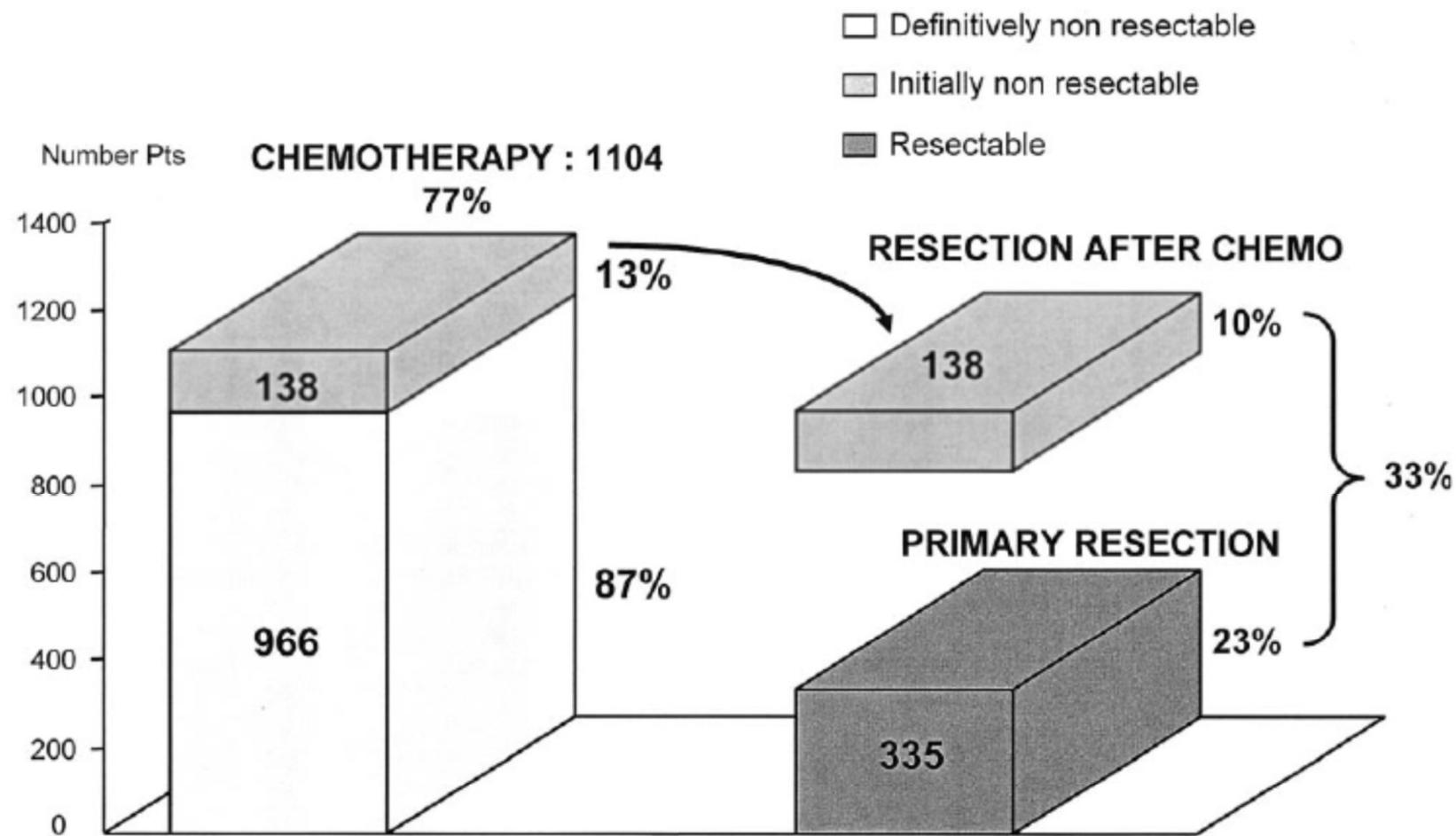
Multidisciplinary Team



Chemotherapy

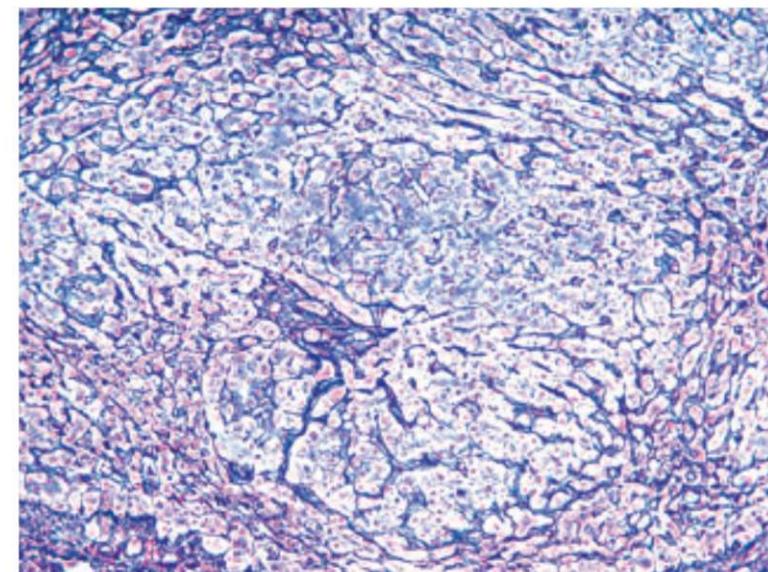
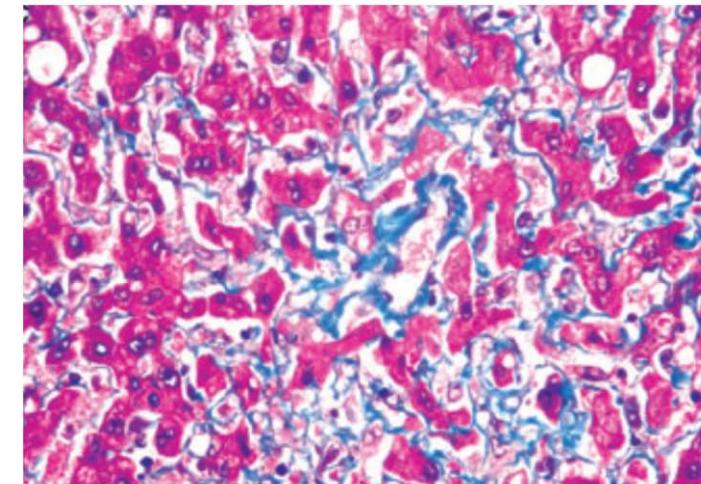
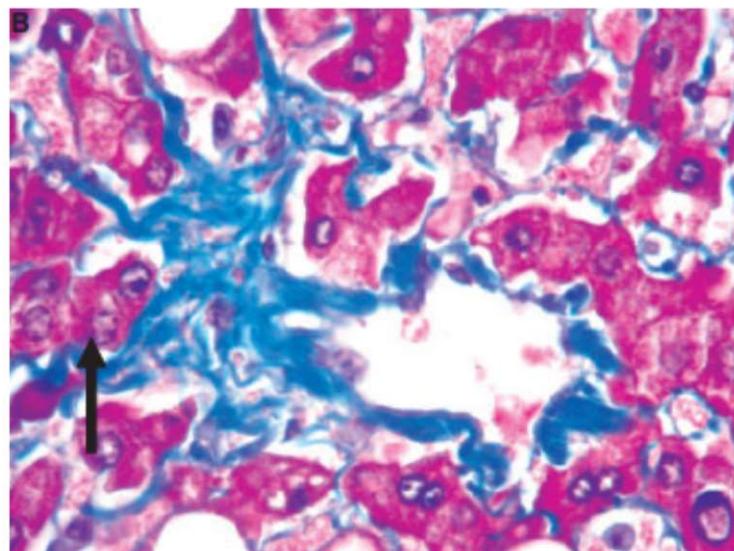
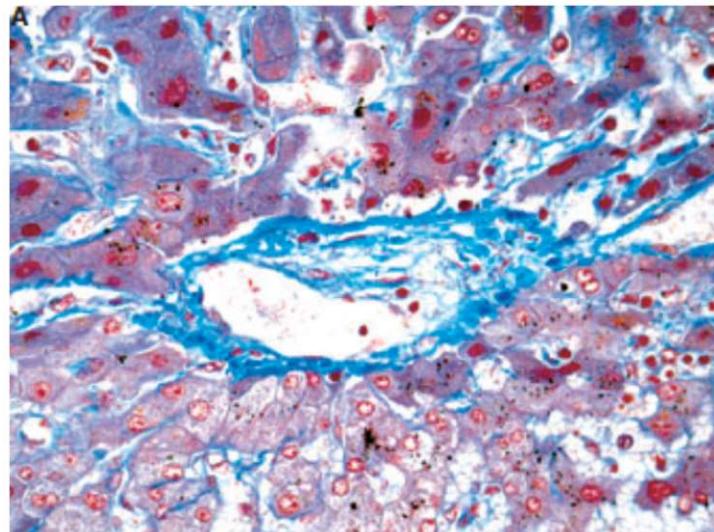


A

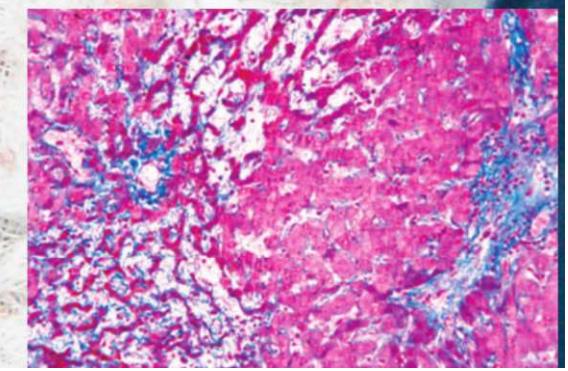
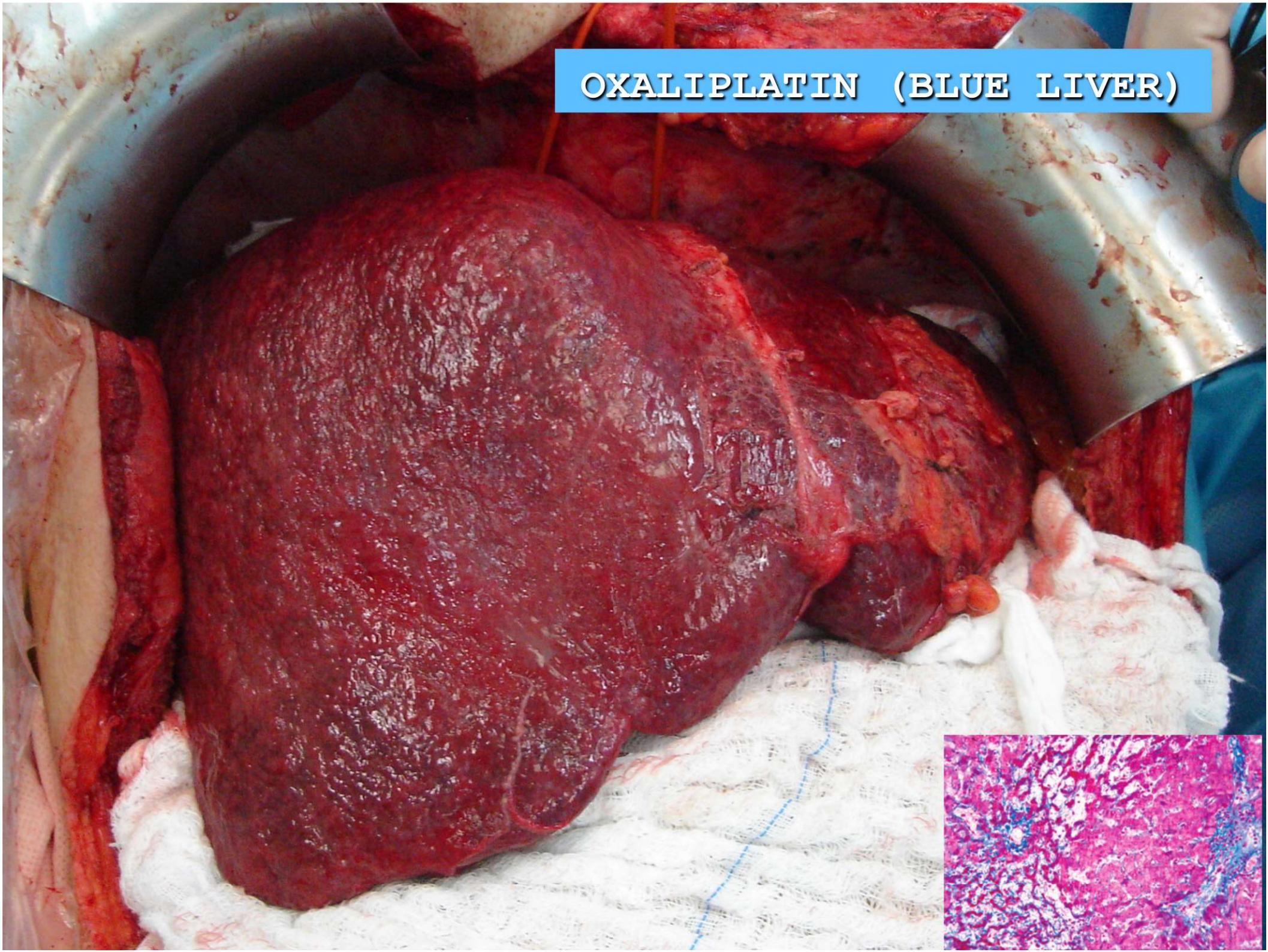


Chemotherapy

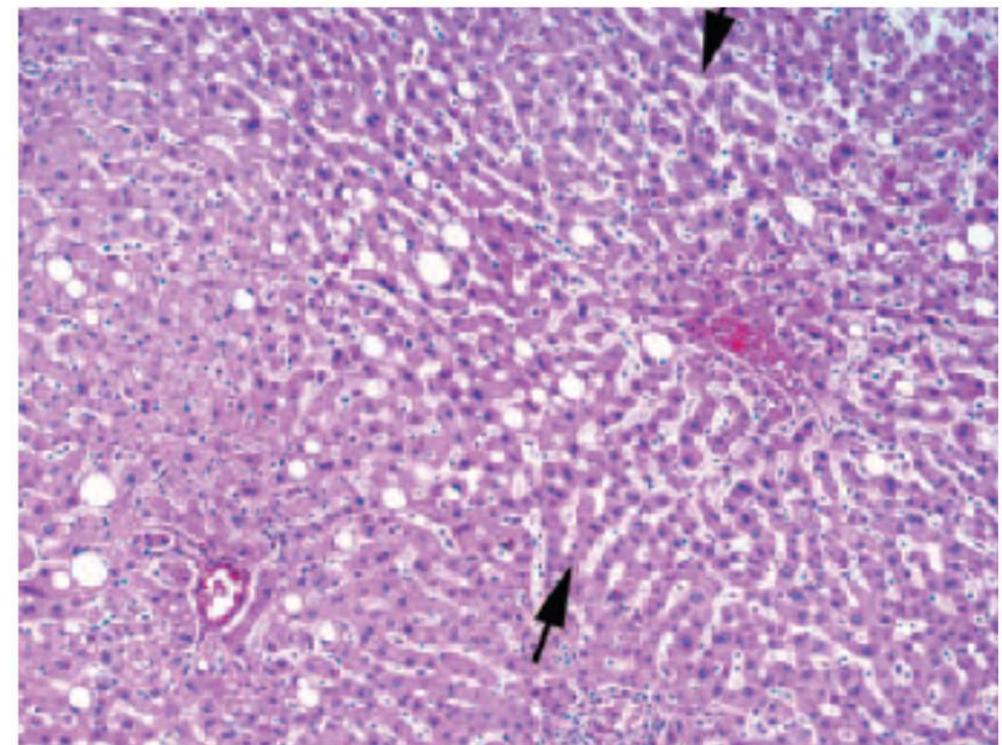
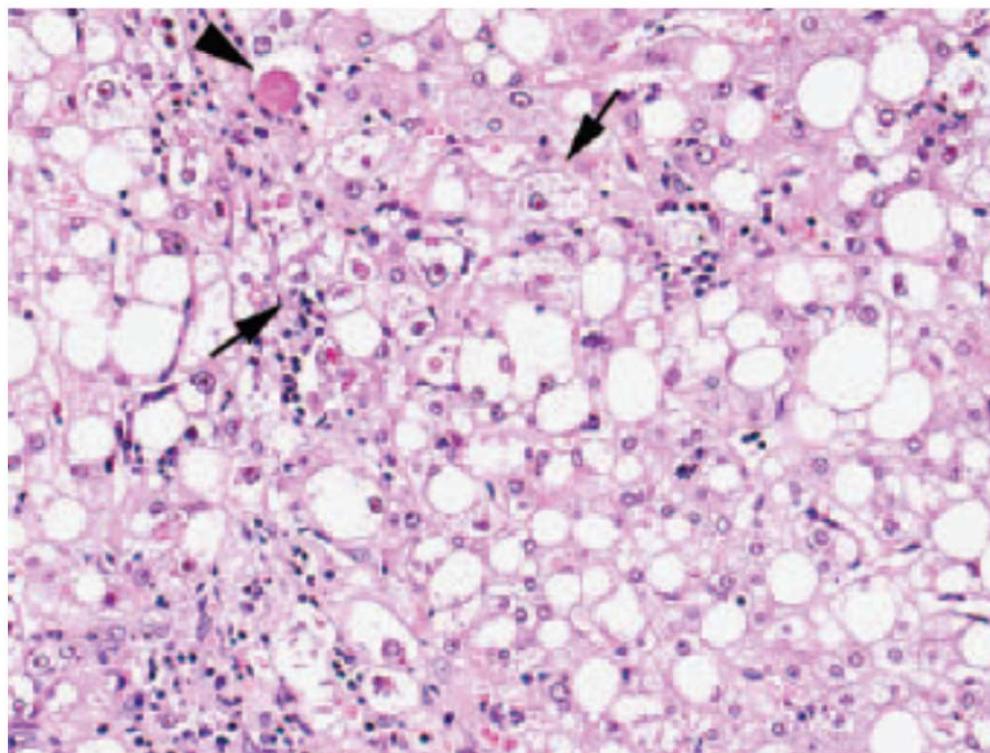
OXALIPLATIN AND SINUSOIDAL OBSTRUCTION

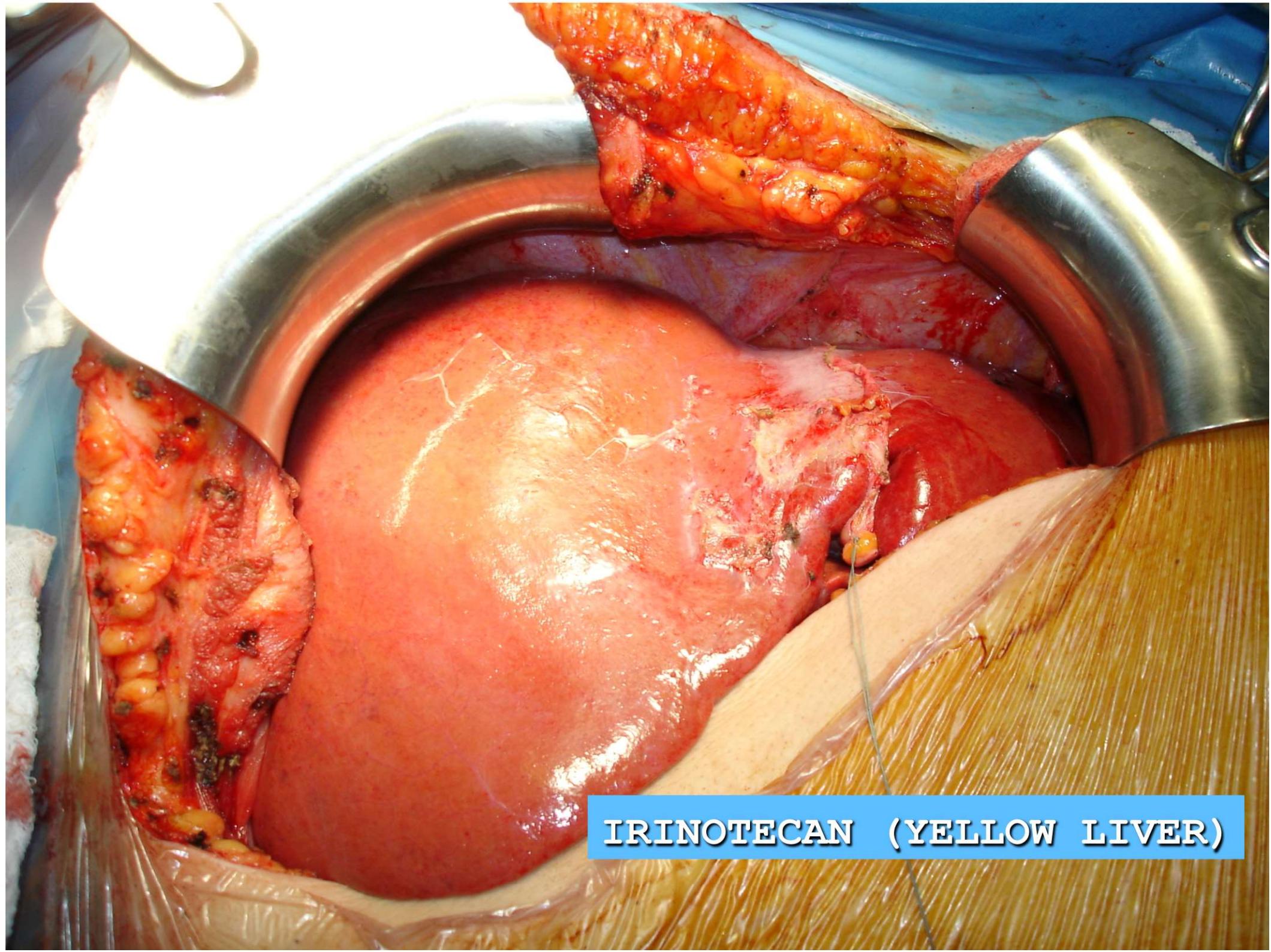


OXALIPLATIN (BLUE LIVER)



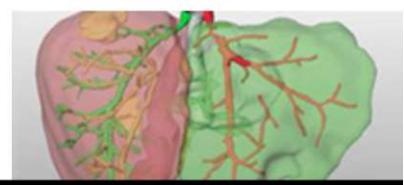
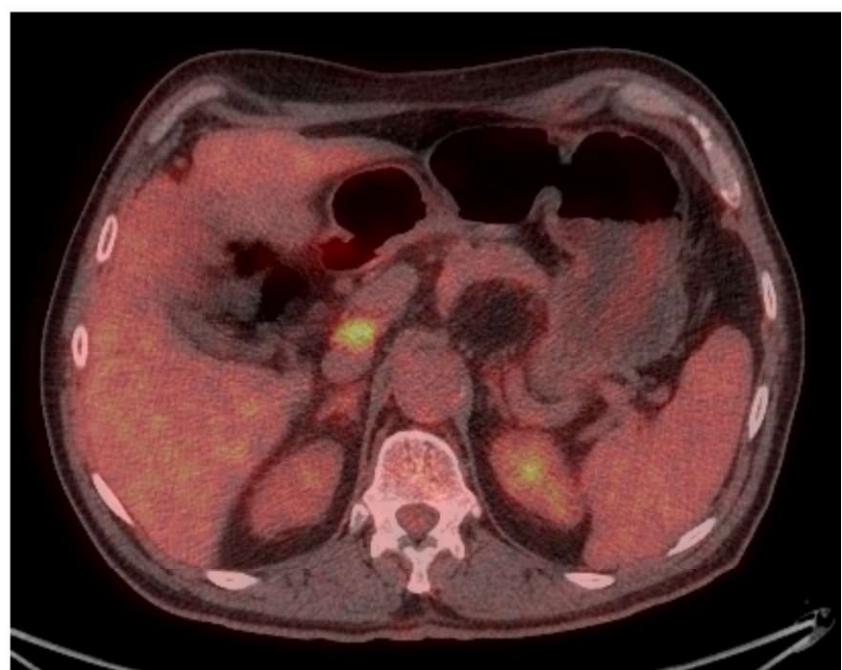
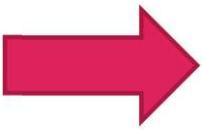
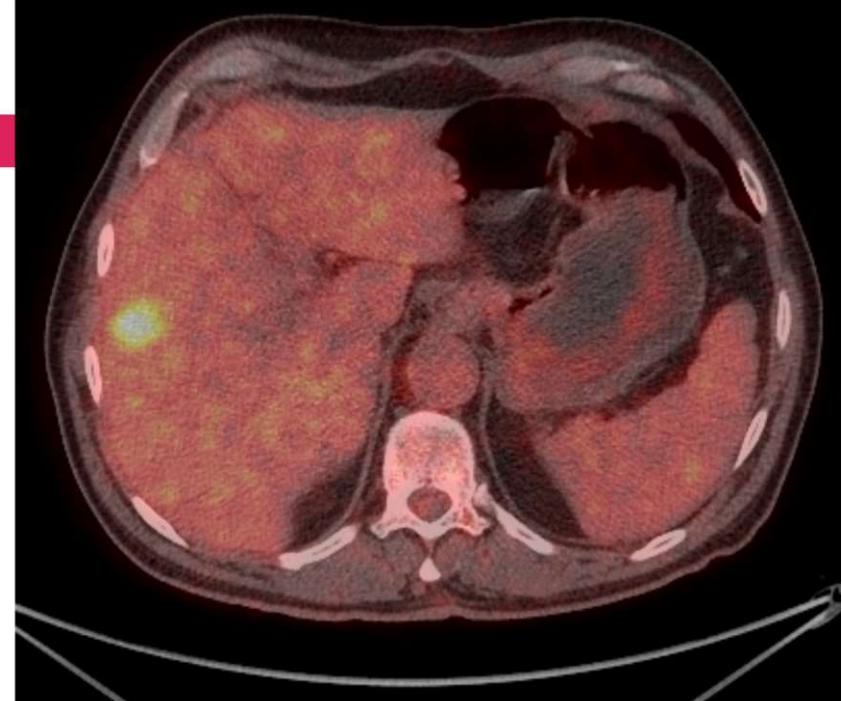
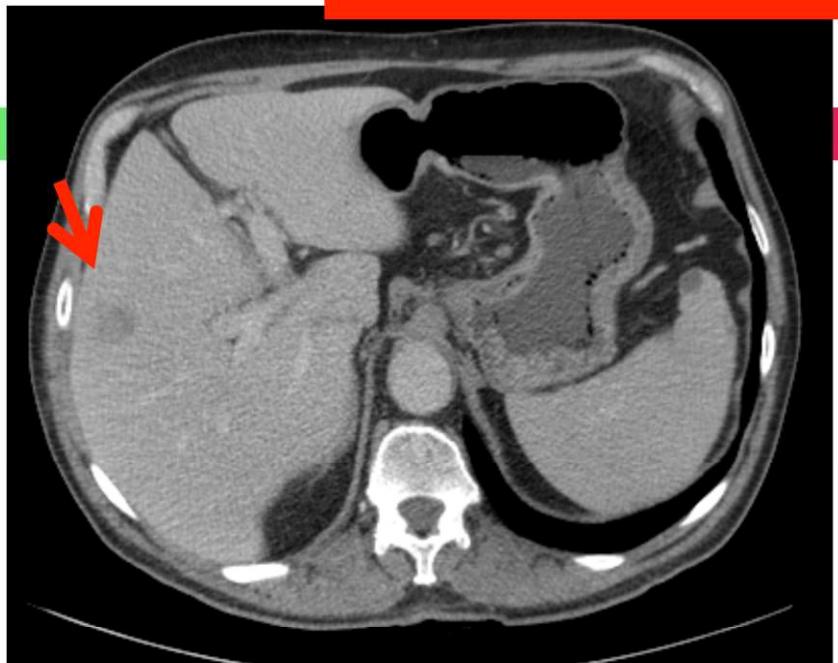
IRINOTECAN AND STEATOHEPATITIS





IRINOTECAN (YELLOW LIVER)

PET-CT



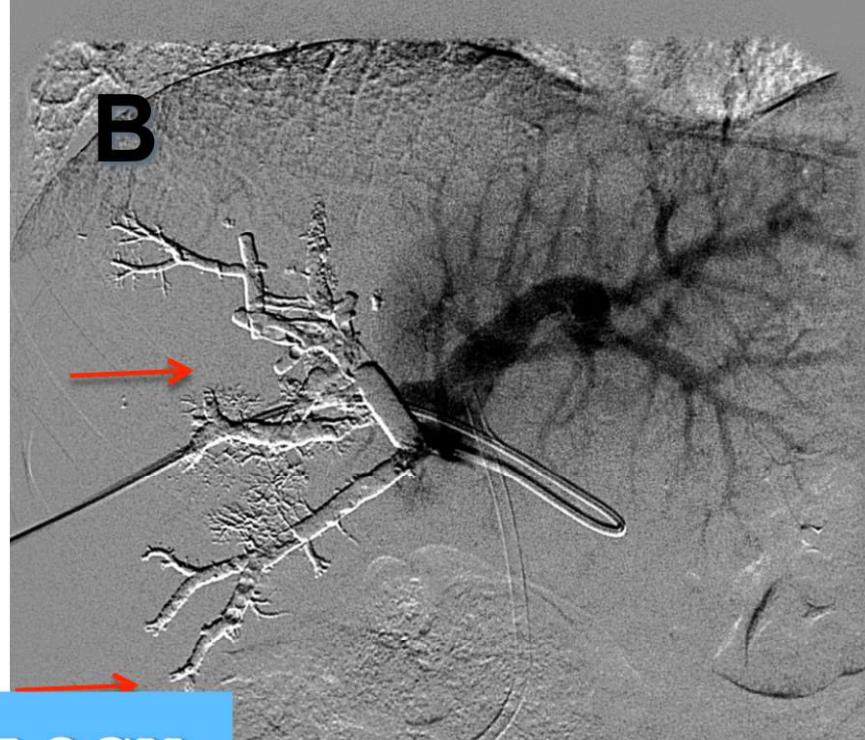
INTERVENTIONAL RADIOLOGY



A

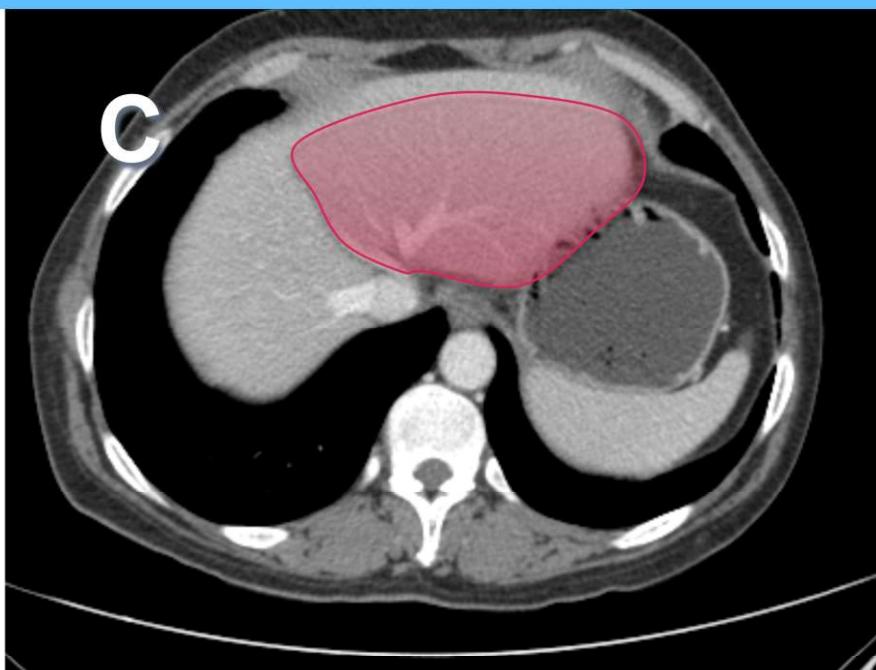


B



INTERVENTIONAL RADIOLOGY

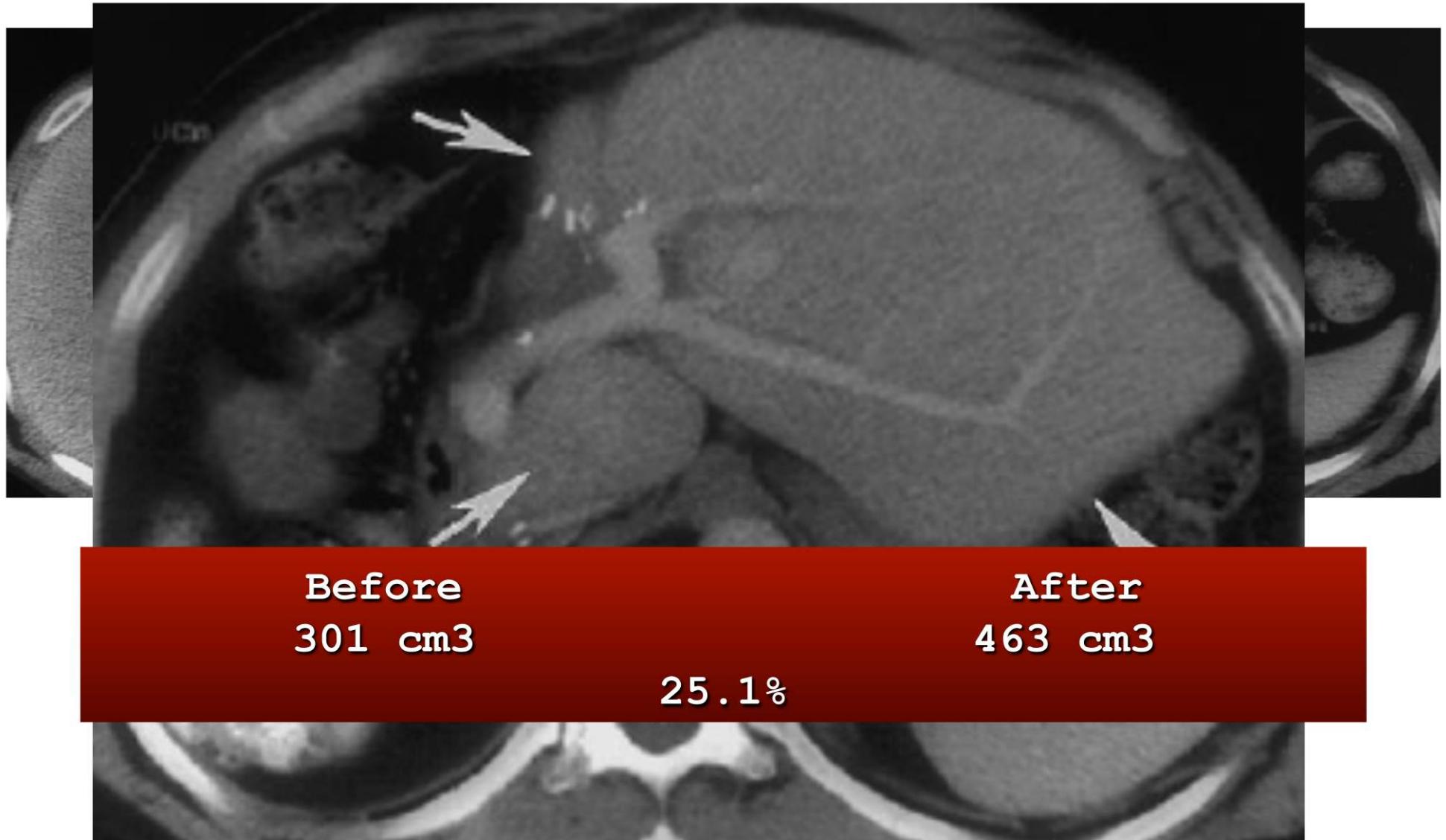
C



D



INTERVENTIONAL RADIOLOGY



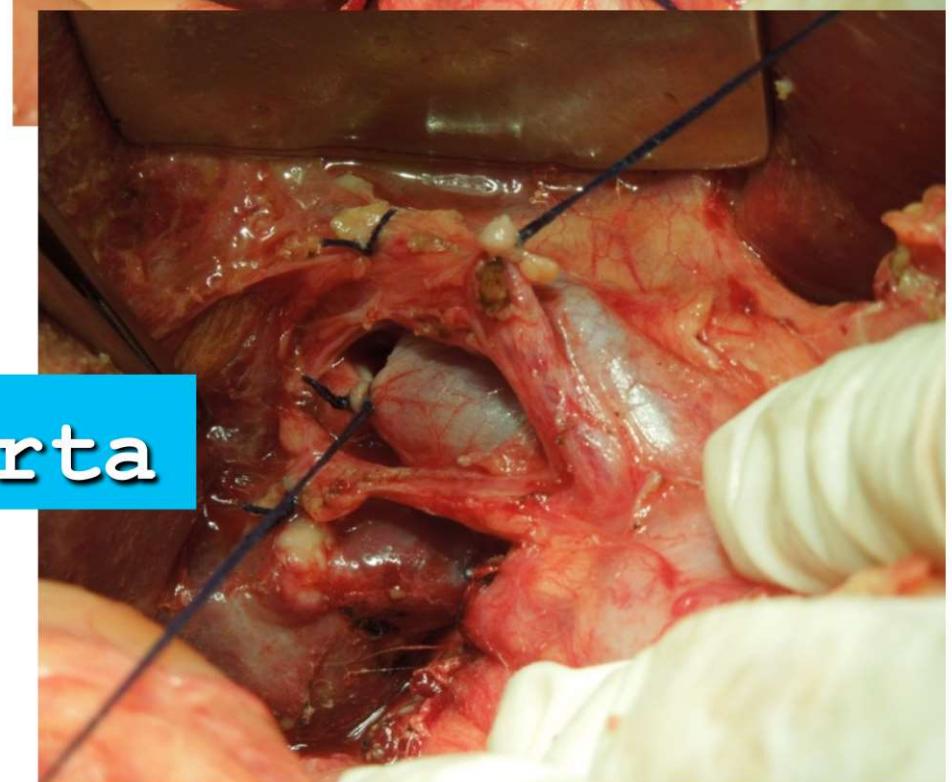
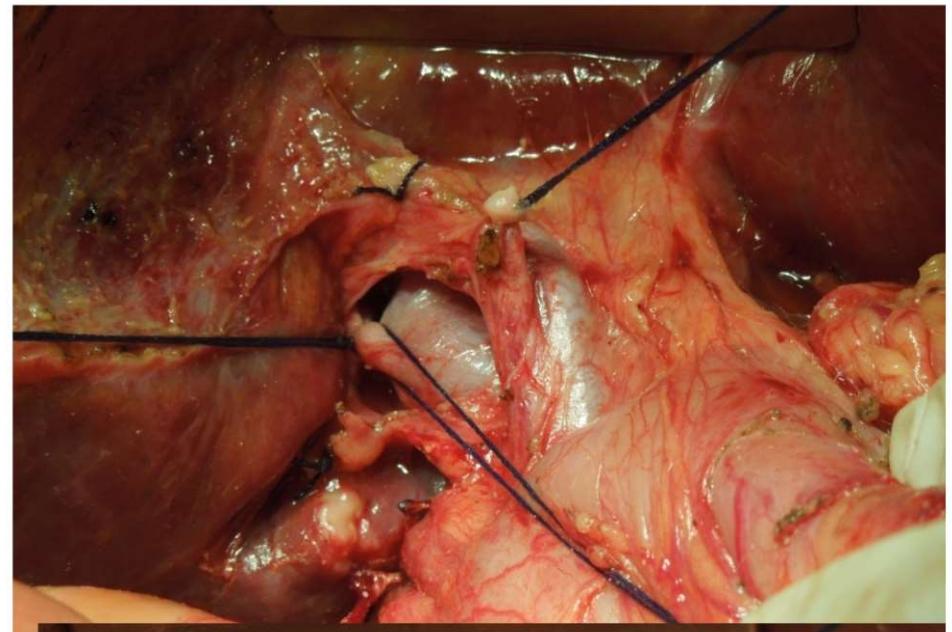
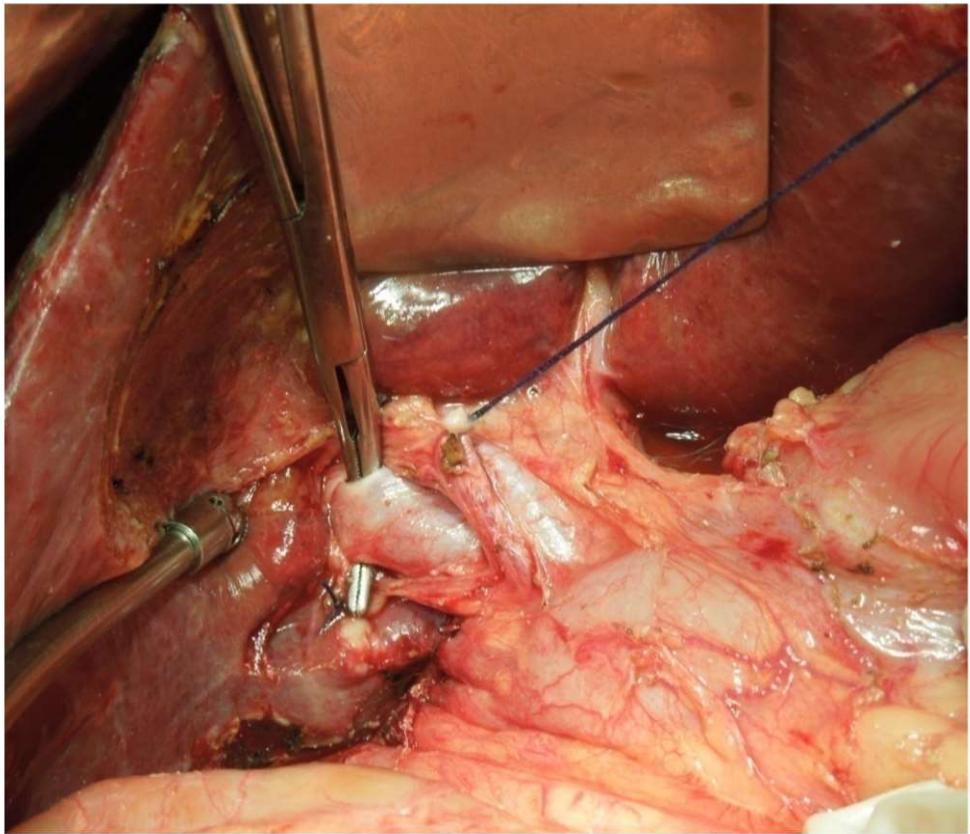
Before

301 cm³

25.1%

After

463 cm³



Ligadura da veia porta

Sequência de Tratamento

Primário Colon / Reto Alto

- Abordagem Clássica:
 - Ressecção do Tumor primário → QT → Ressecção das metástases hepáticas → QT
- Abordagem Simultânea:
 - (\pm QT Neoadjuvante) → Ressecção do Tumor primário e das metástases hepáticas ao mesmo tempo → (\pm QT adjuvante)
- Abordagem Reversa:
 - QT Neoadjuvante → Ressecção Hepática → (\pm QT de Intervalo) → Ressecção do Tumor primário → (\pm QT Adjuvante)

Primário Reto médio/baixo*

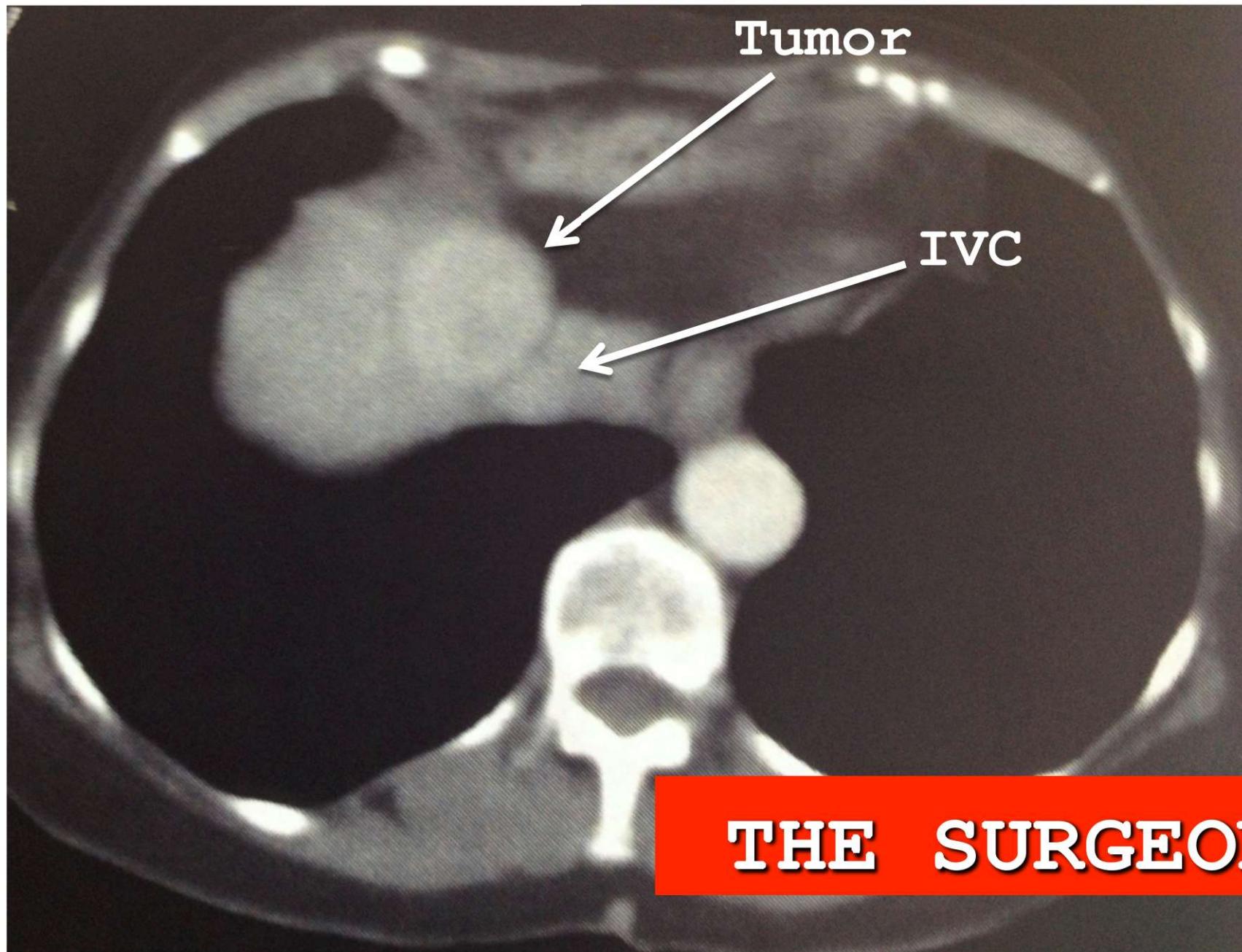
- Abordagem Clássica:
 - RDT/QT neoadjuvante → Ressecção do Tumor primário → QT → Ressecção das metástases hepáticas
- Abordagem Simultânea:
 - RDT/QT neoadjuvante → Ressecção do Tumor primário e das metástases hepáticas ao mesmo tempo → (\pm QT adjuvante)
- Abordagem Reversa:
 - QT Neoadjuvante → Ressecção Hepática → RDT/QT neoadjuvante → Ressecção do Tumor primário → (\pm QT Adjuvante)

* cT3/T4 e/ou N+



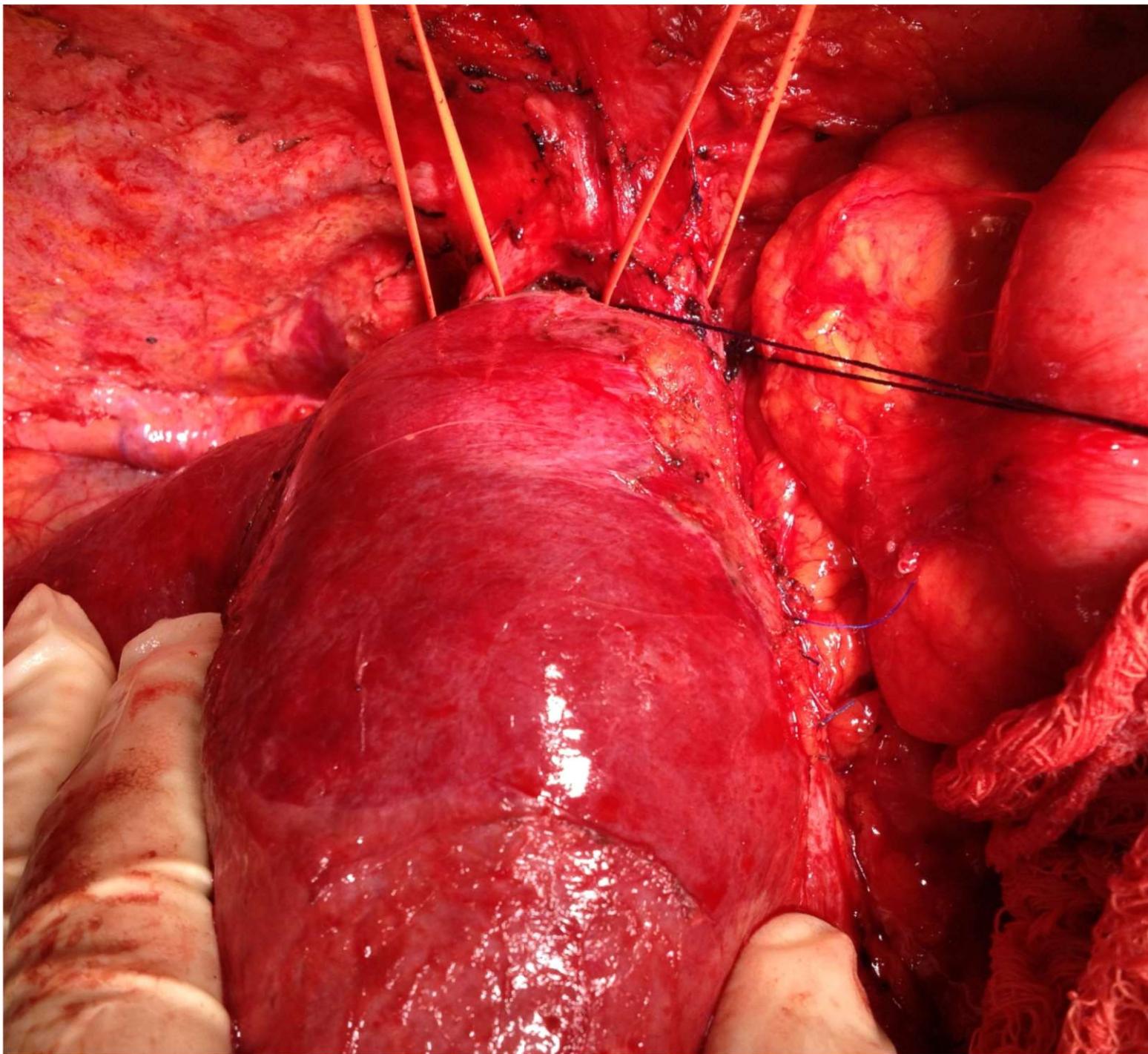
- CONVENTIONAL
- SIMULTANEOUS
- REVERSE (LIVER FIRST)

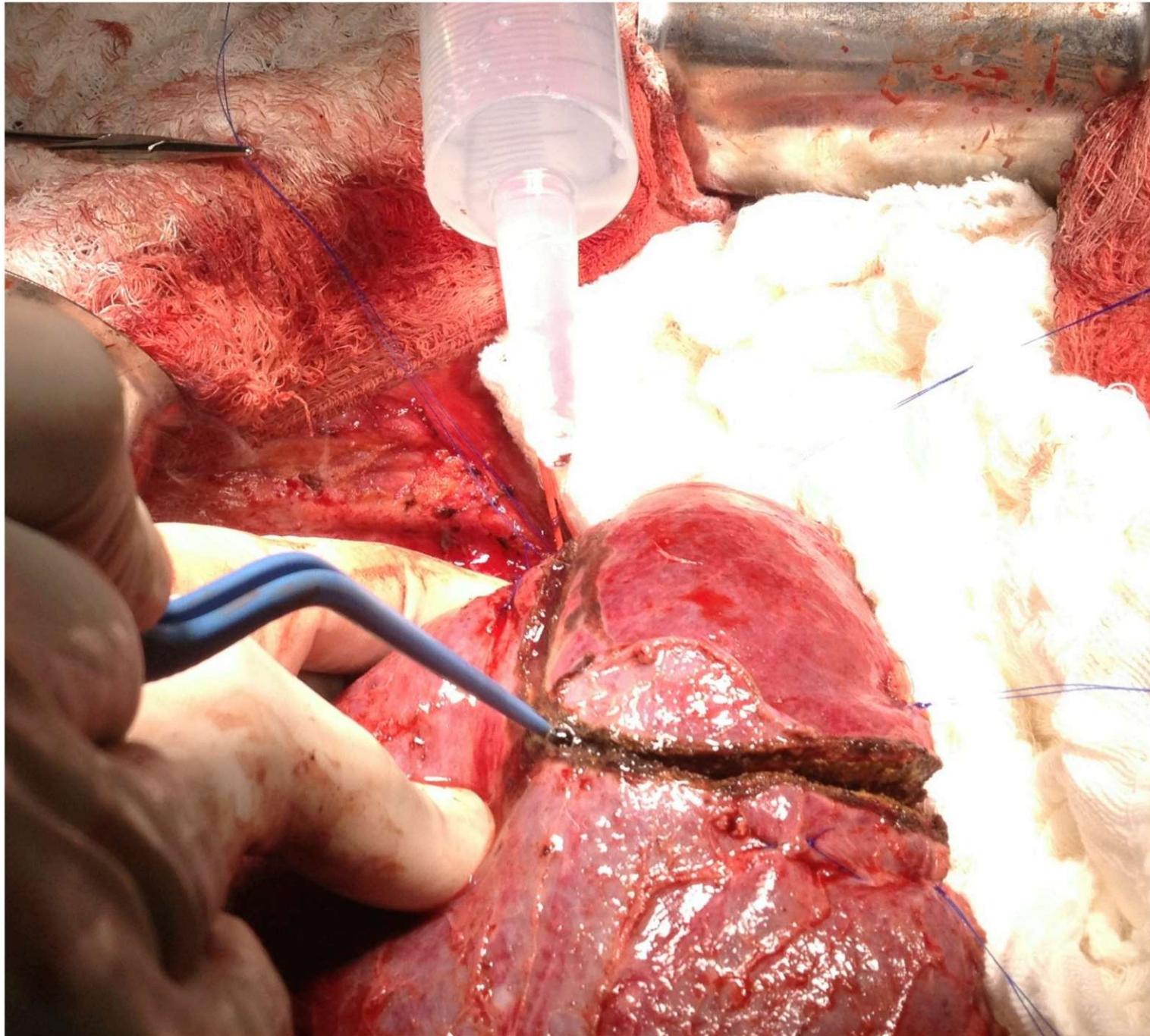
LIVER RESECTION

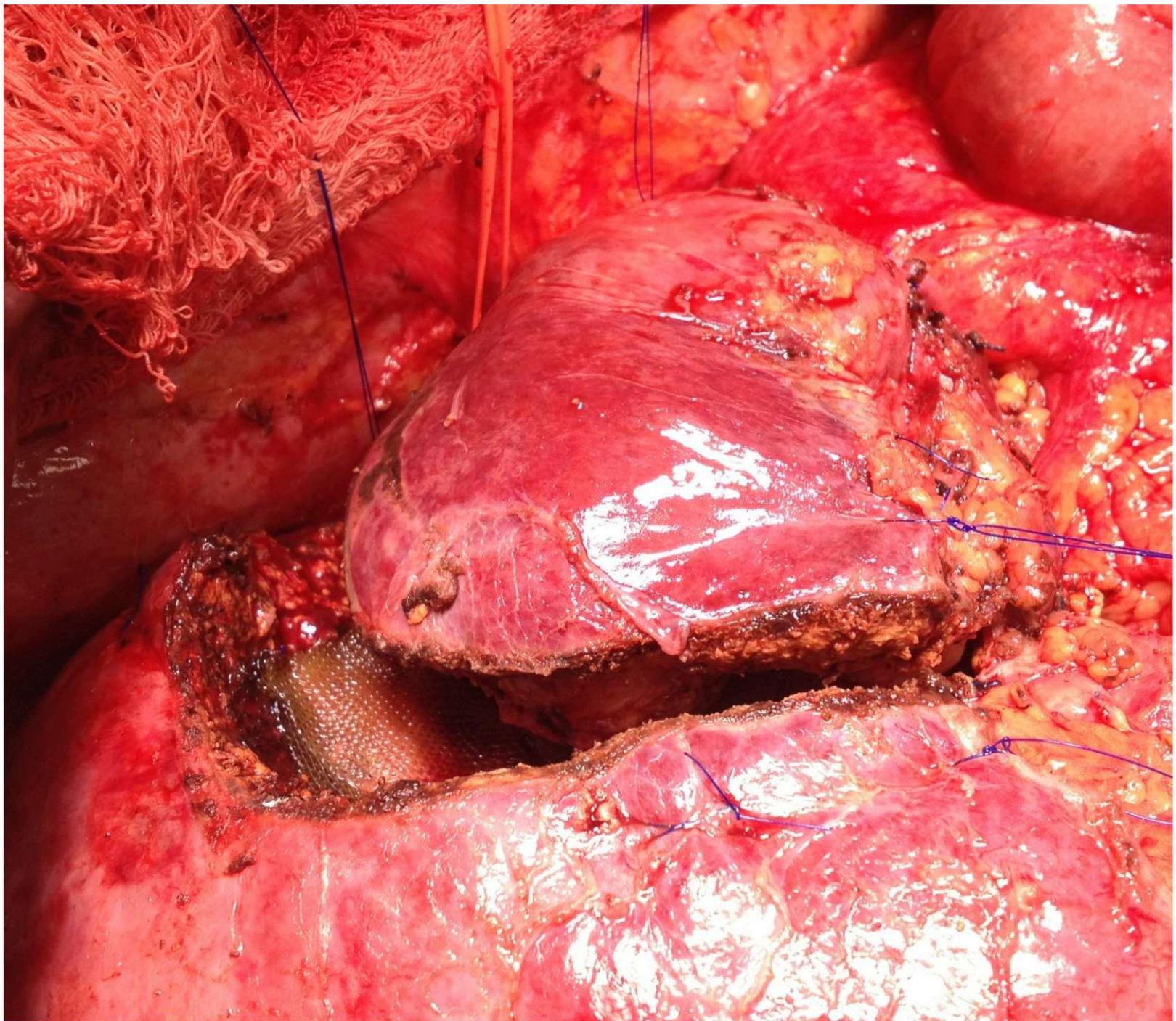


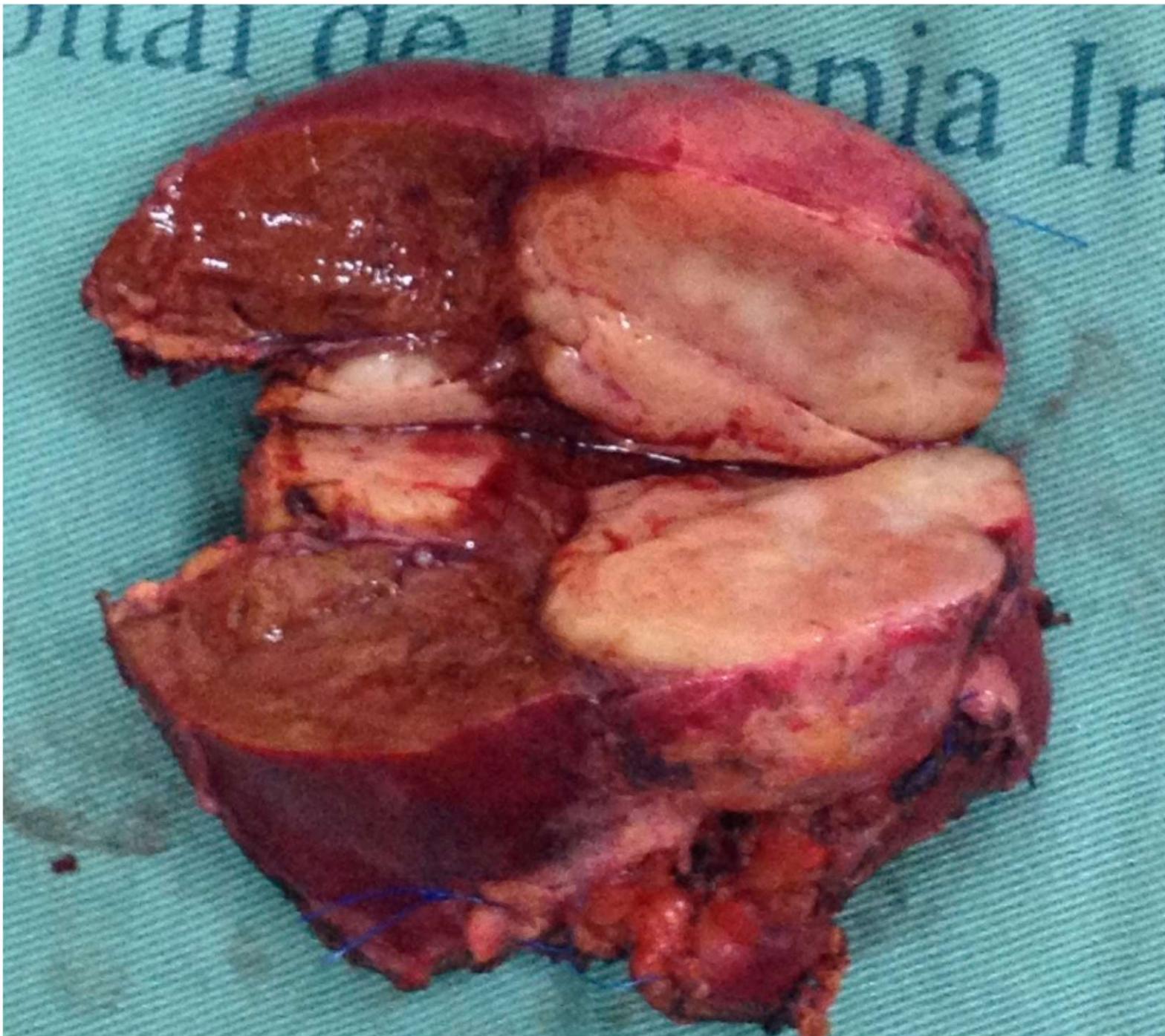
THE SURGEON

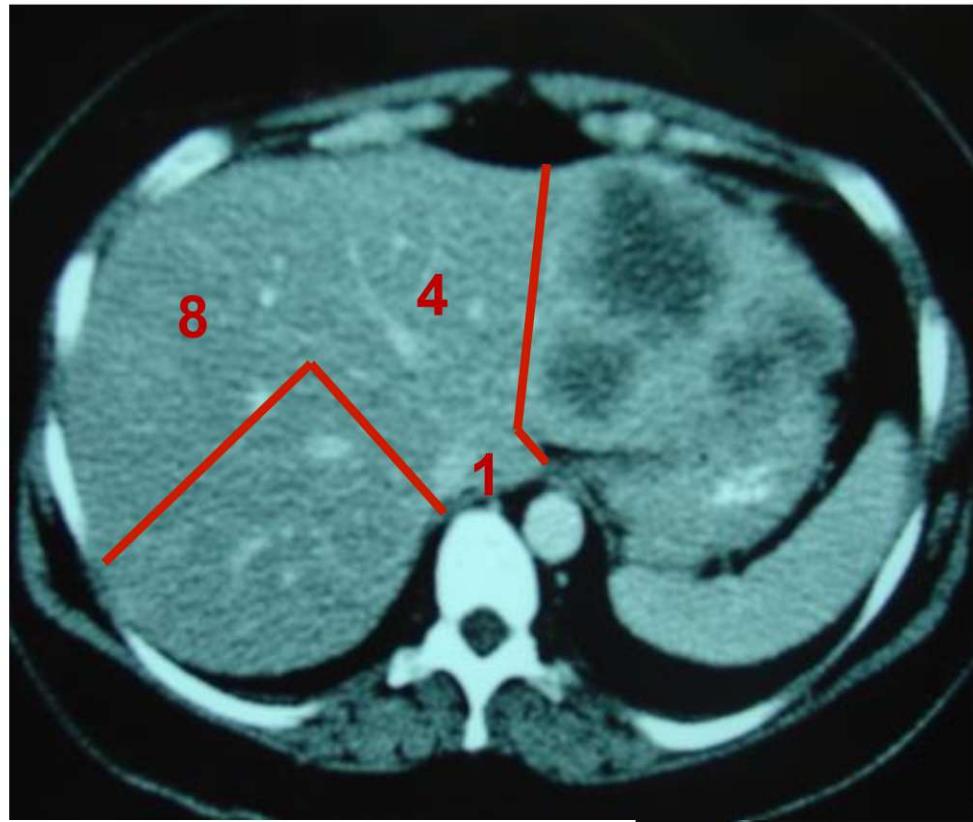




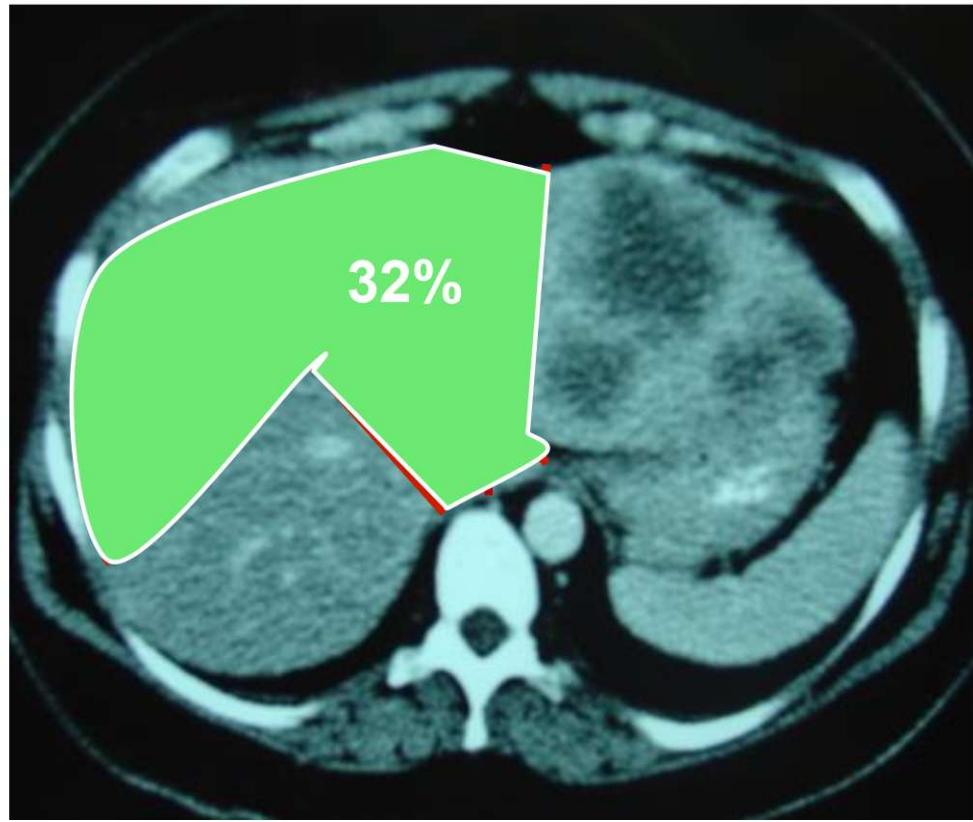




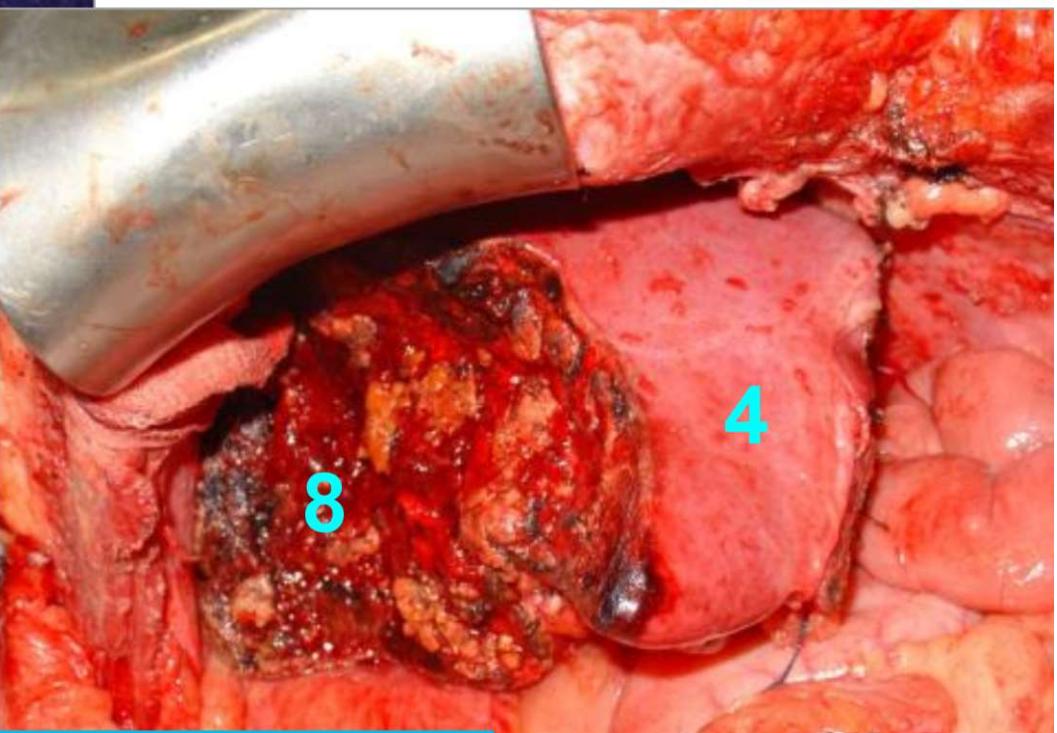
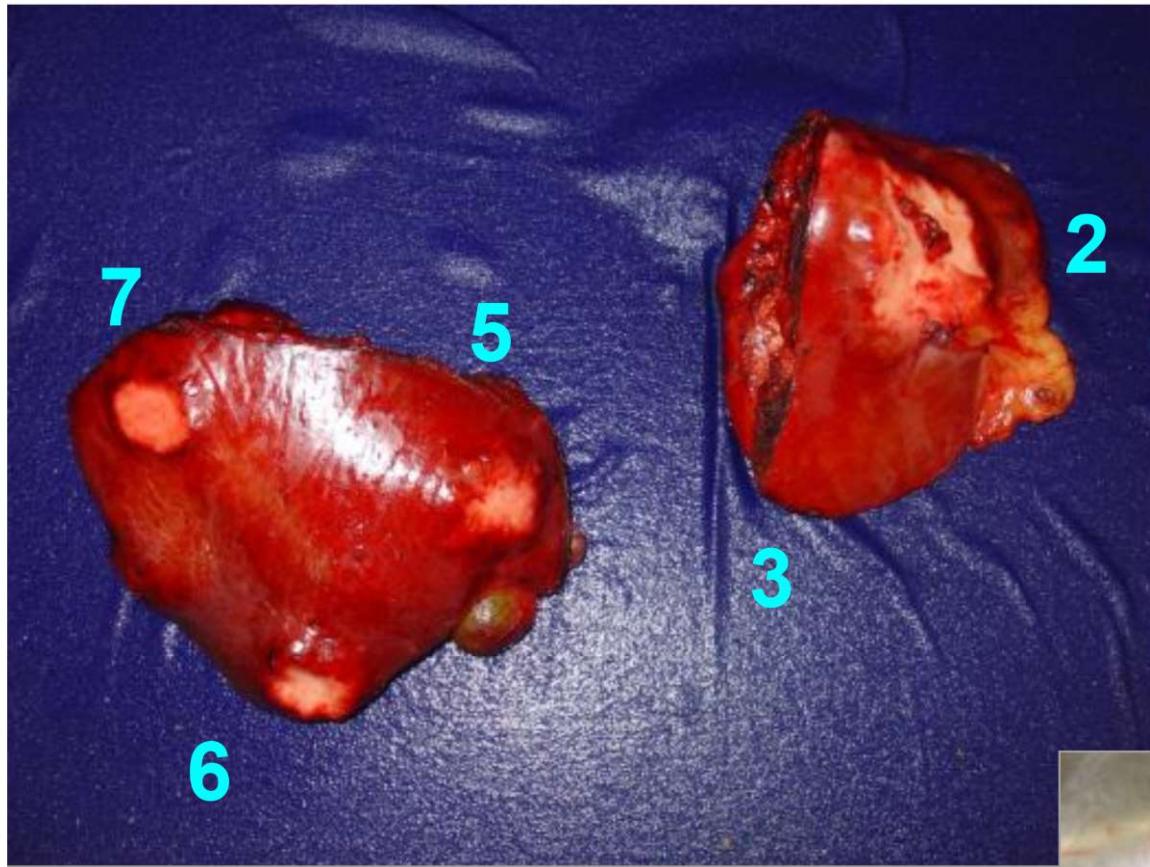




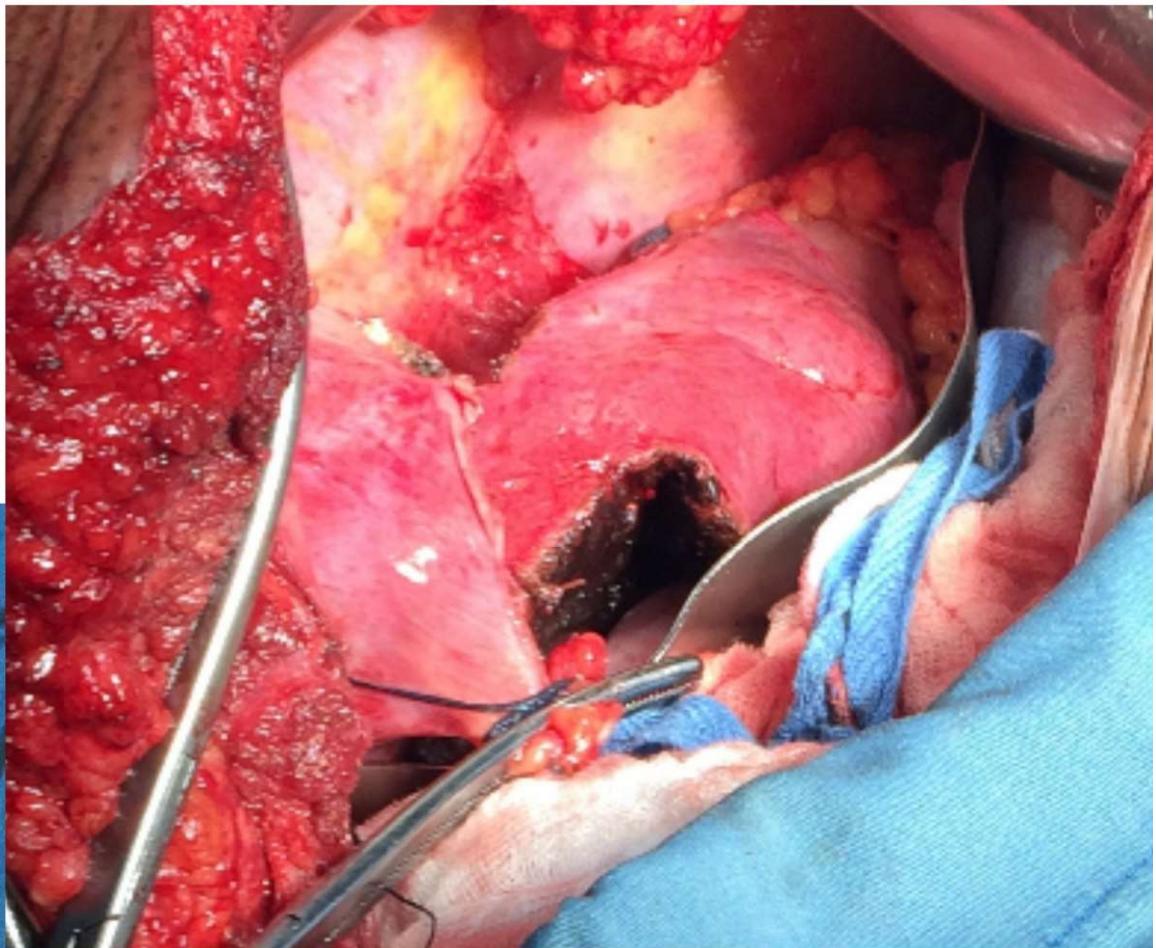
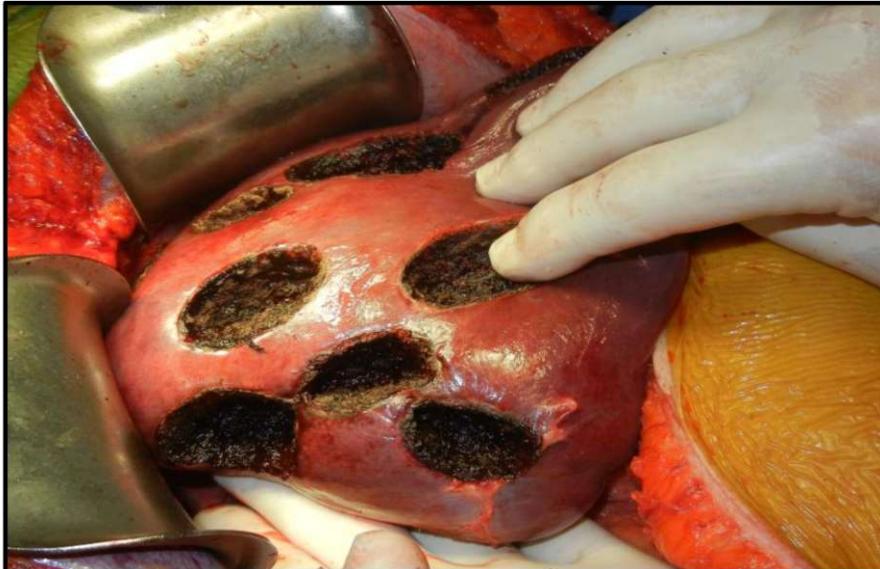
Courtesy: Prof. Paulo Herman (USP)



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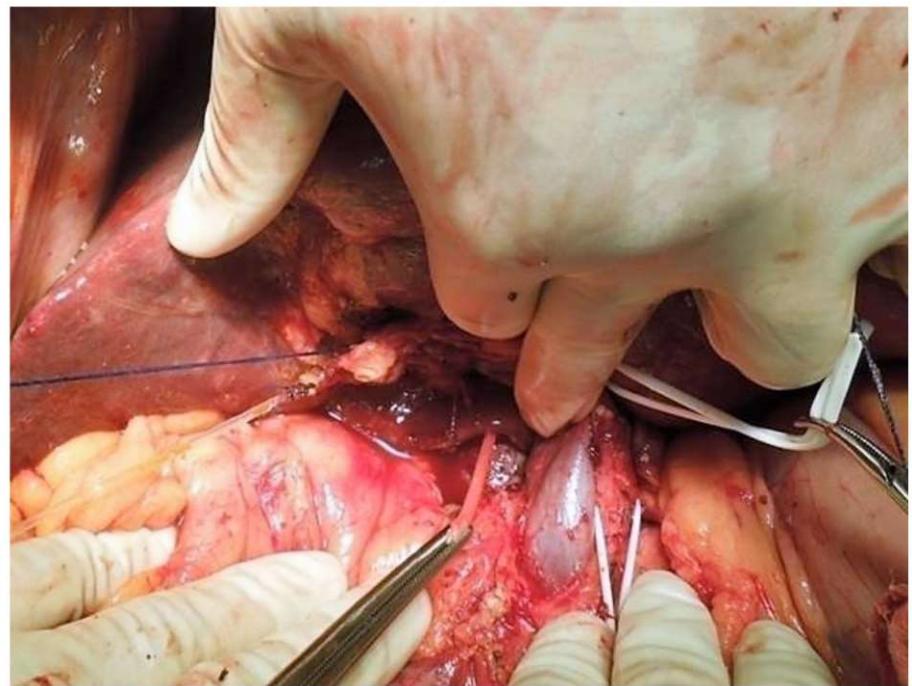
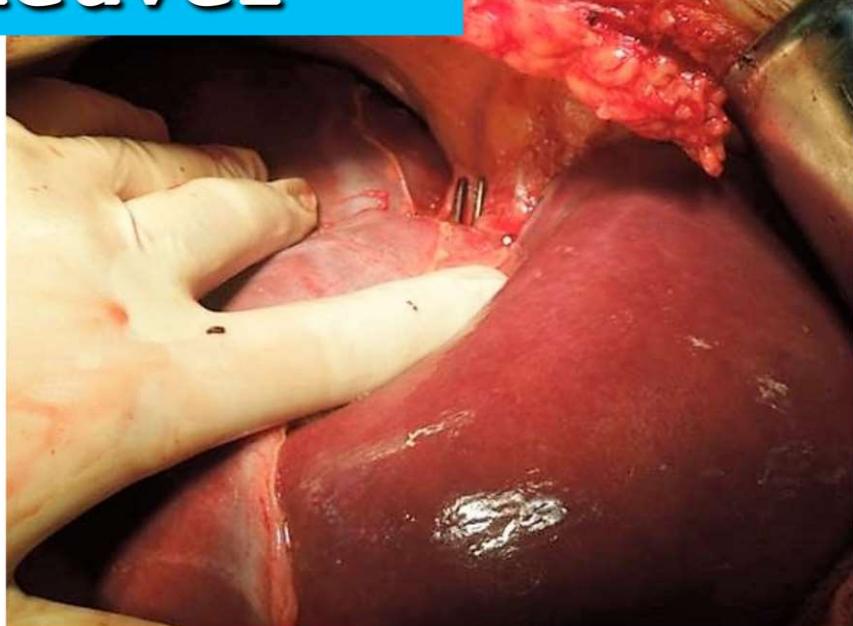
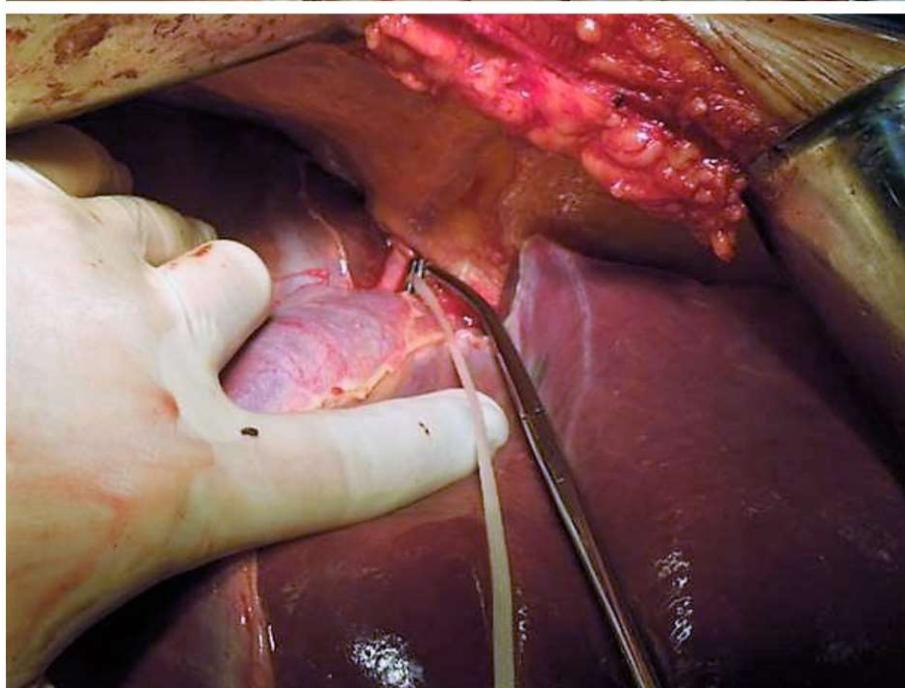
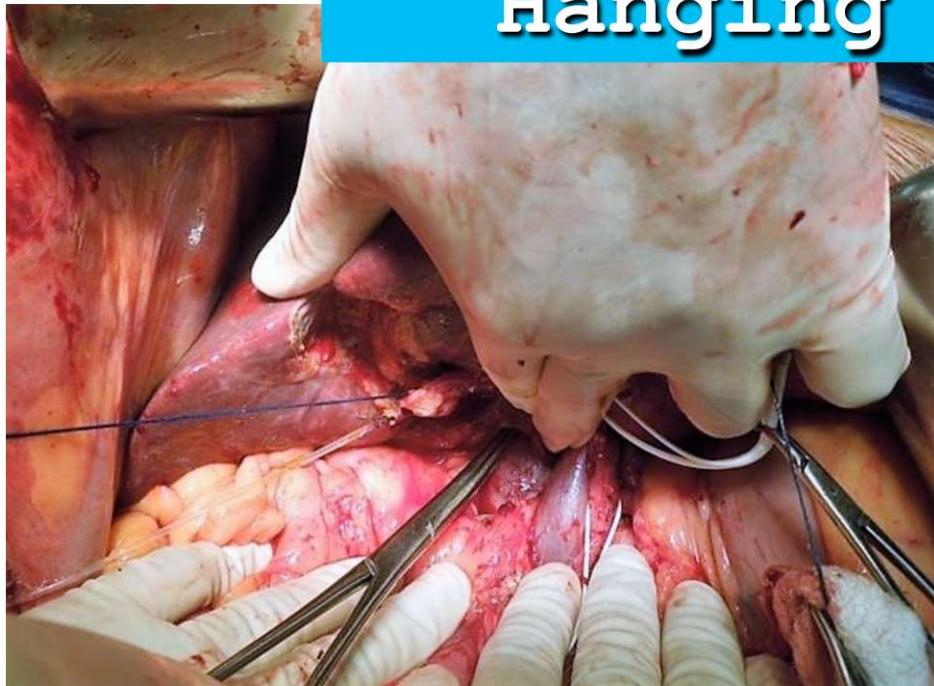


Courtesy: Prof. Paulo Herman (USP)

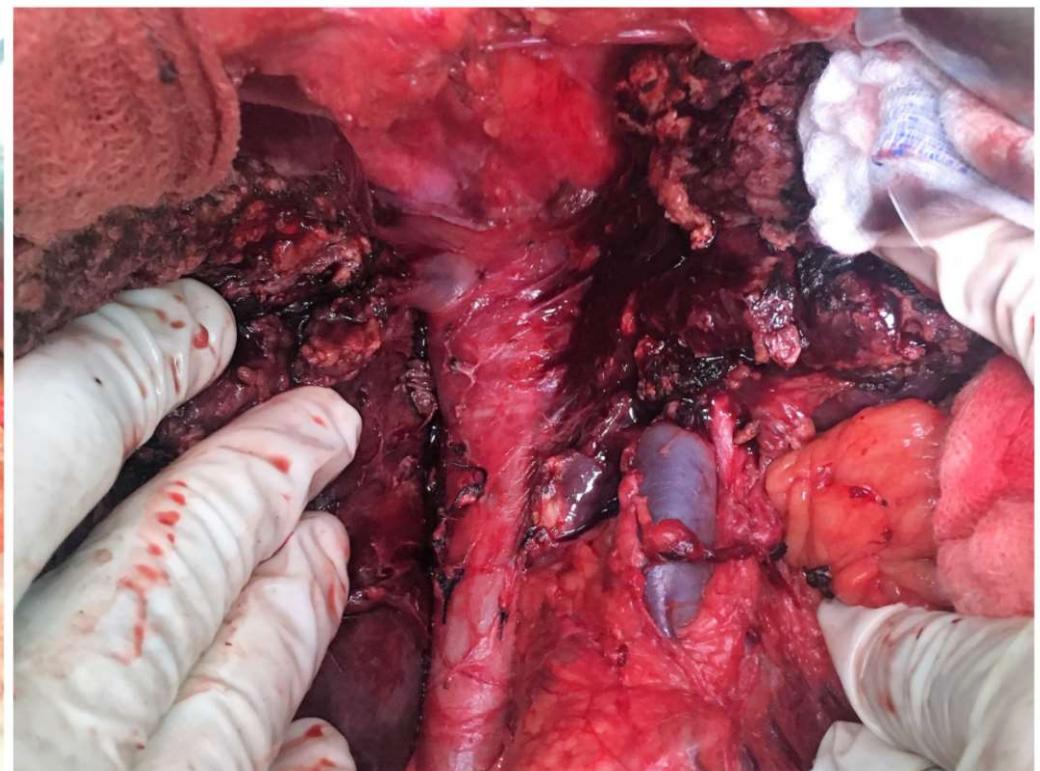
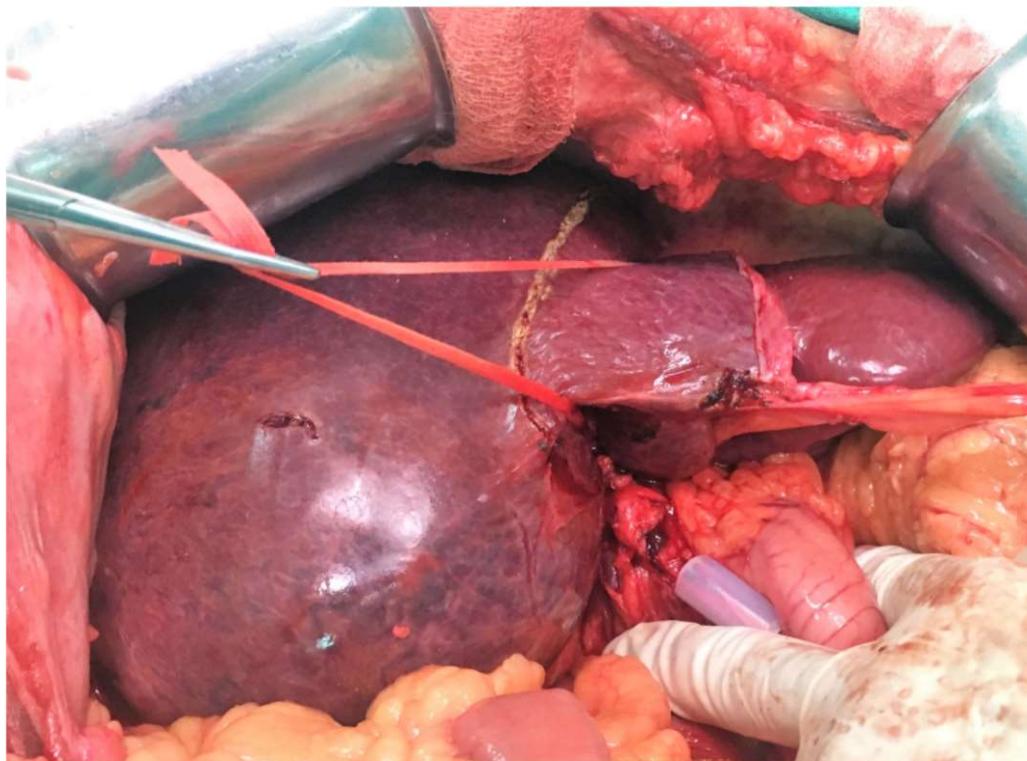


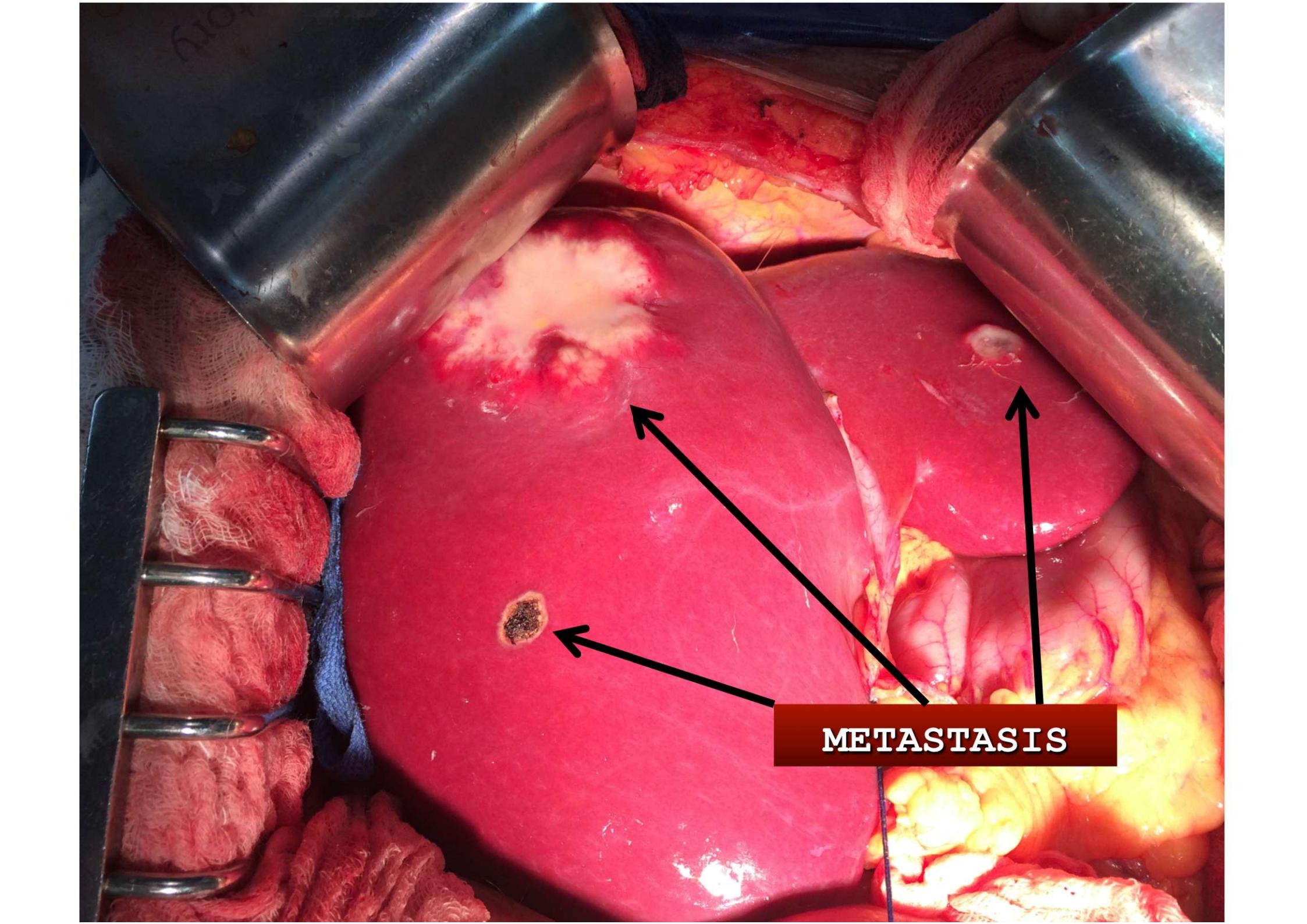
Suisse cheese

Hanging maneuver



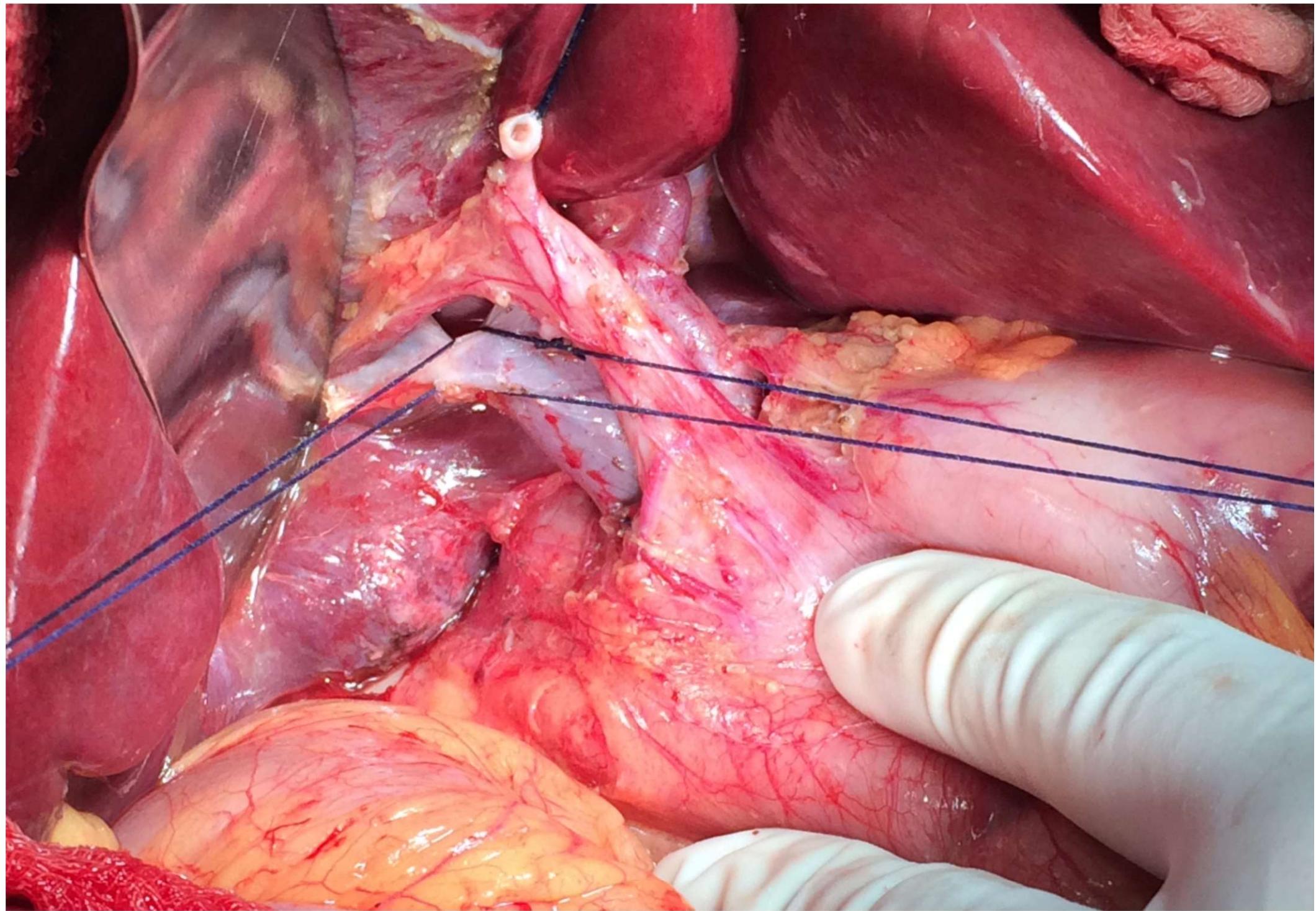
Anterior approach

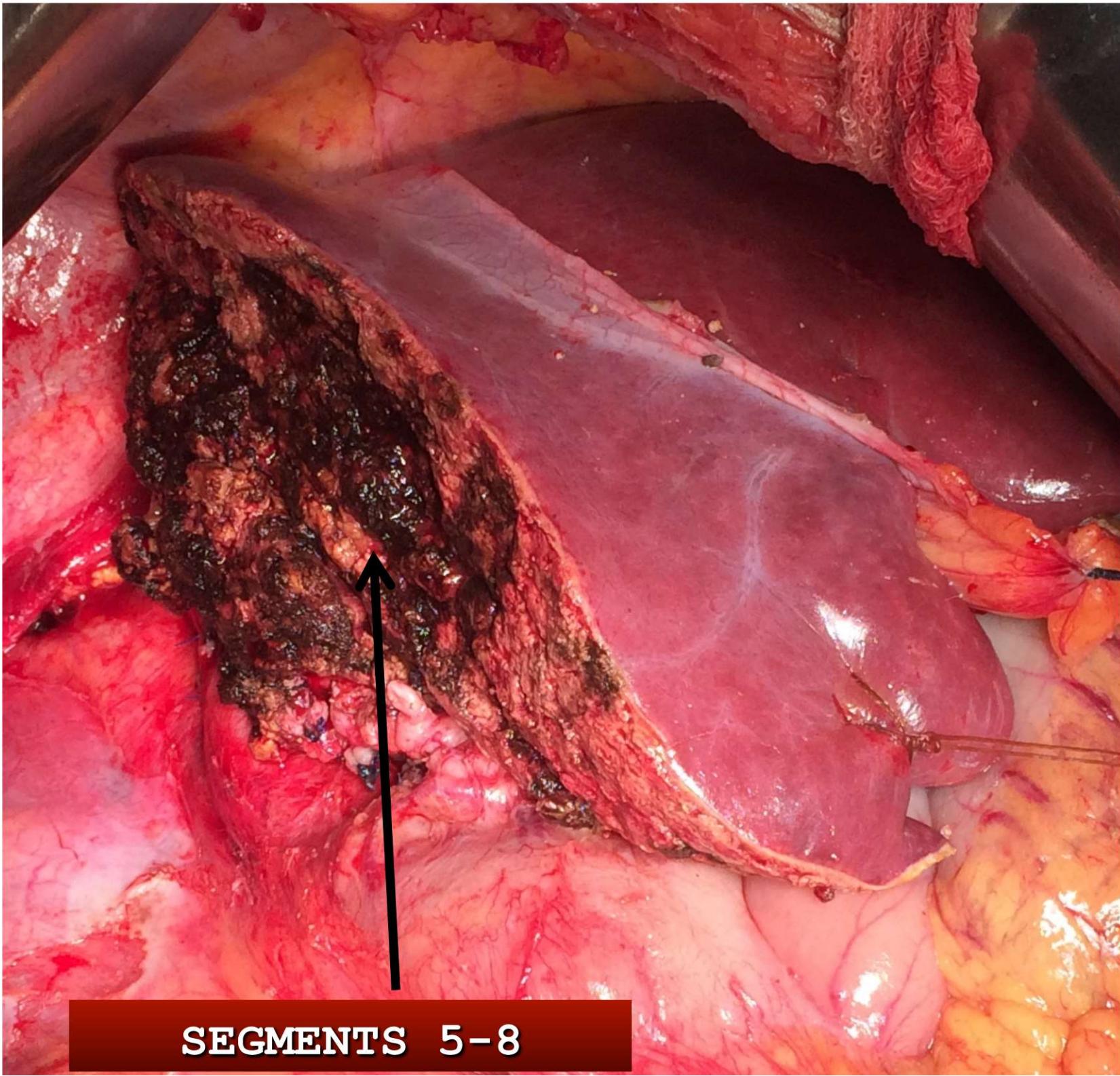




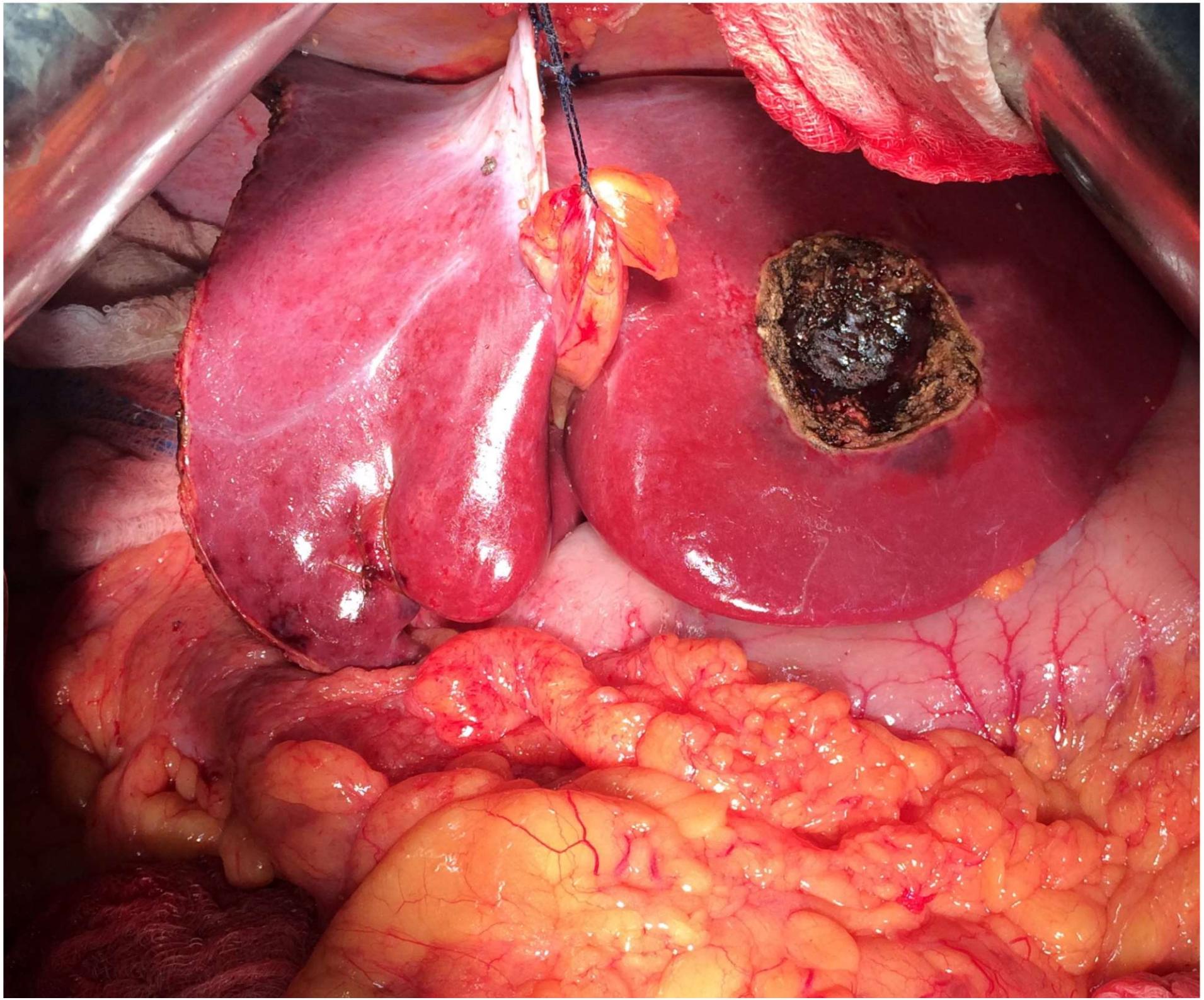
An intraoperative photograph showing a large, reddish-pink liver. Several dark, irregular spots, characteristic of metastatic lesions, are visible on its surface. Two black arrows point from a red rectangular label containing the word "METASTASIS" to two distinct metastatic nodules. The liver is surrounded by surgical instruments and tissue. The word "Tumor" is faintly visible in the top left corner of the image.

METASTASIS



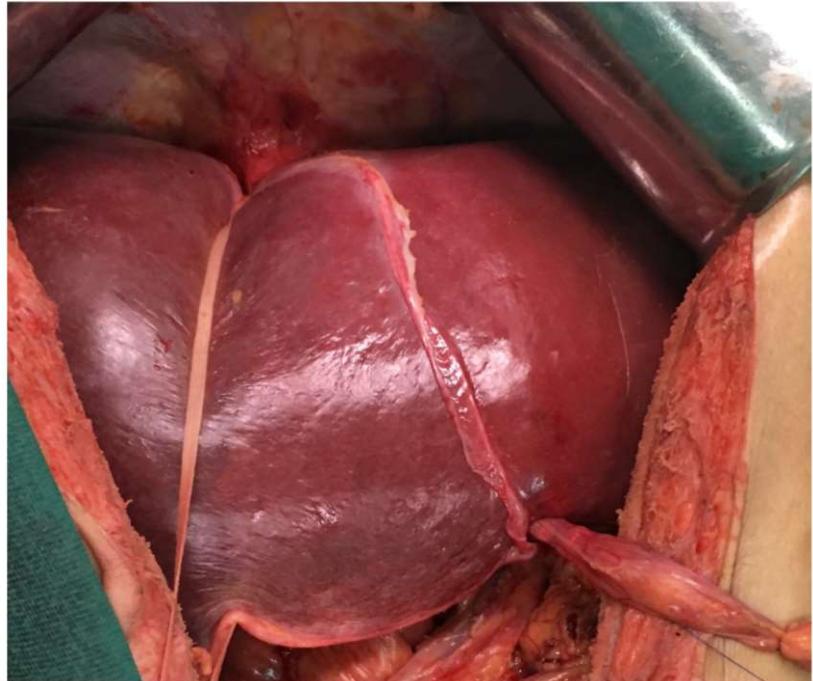


SEGMENTS 5-8

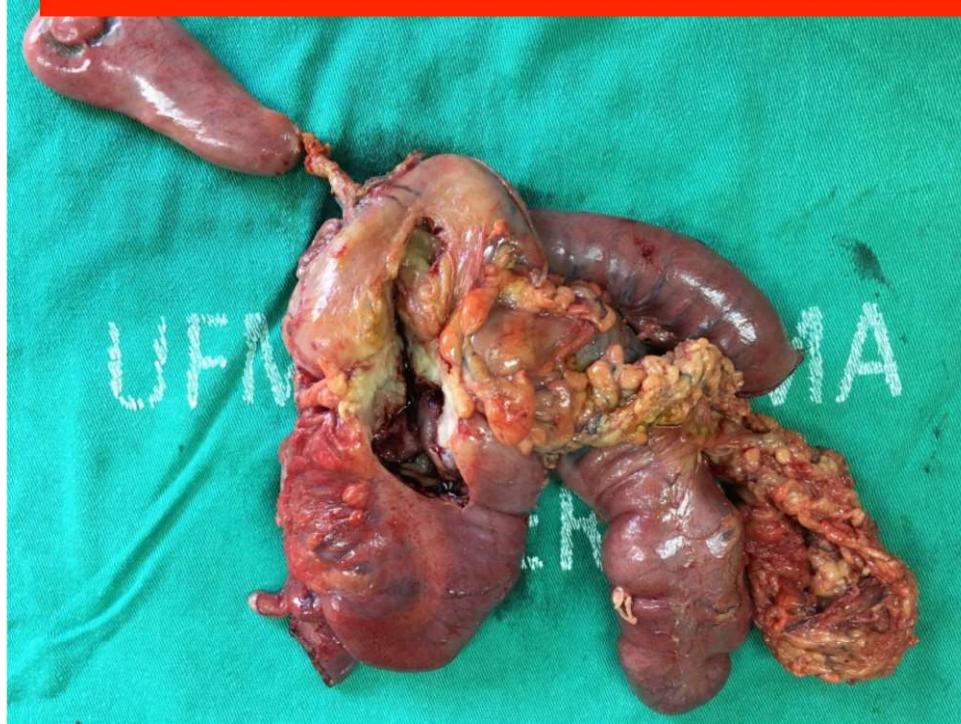




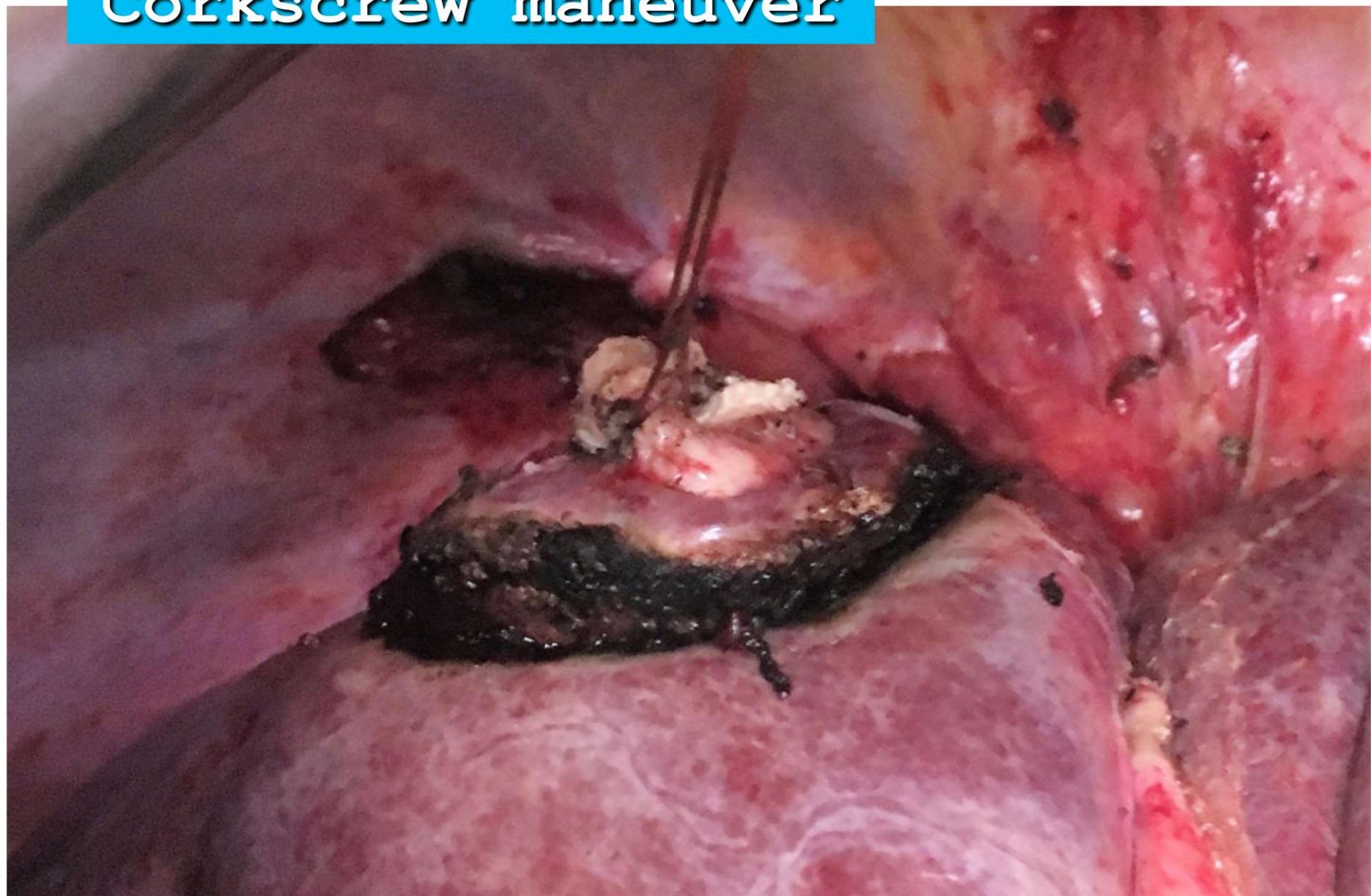
SIMULTANEOUS

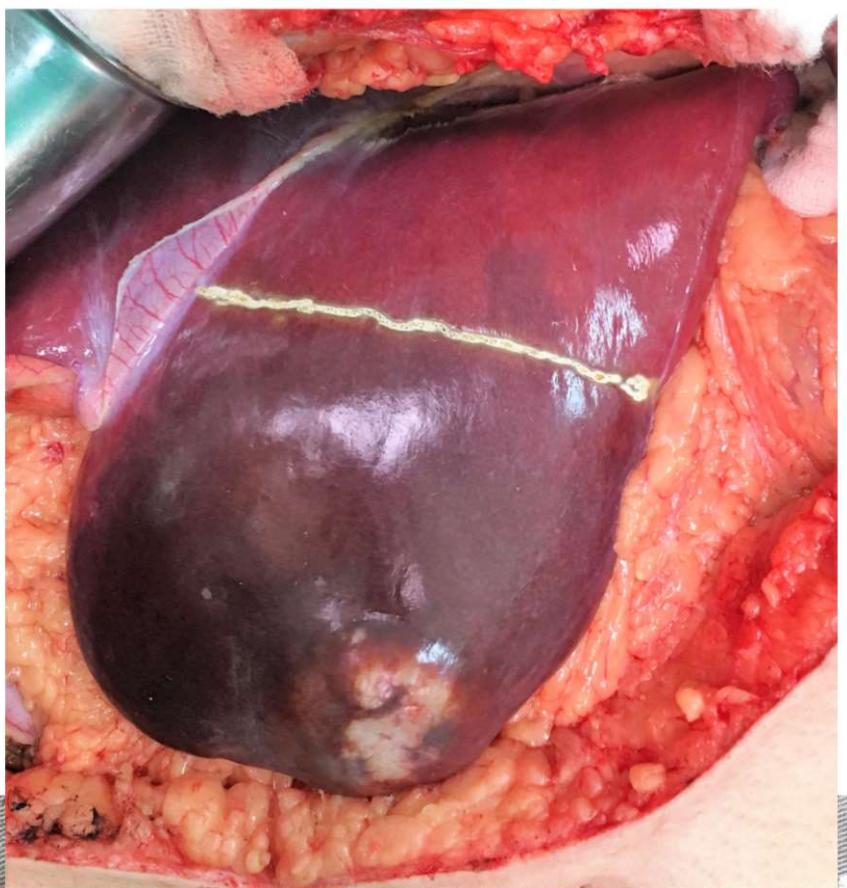
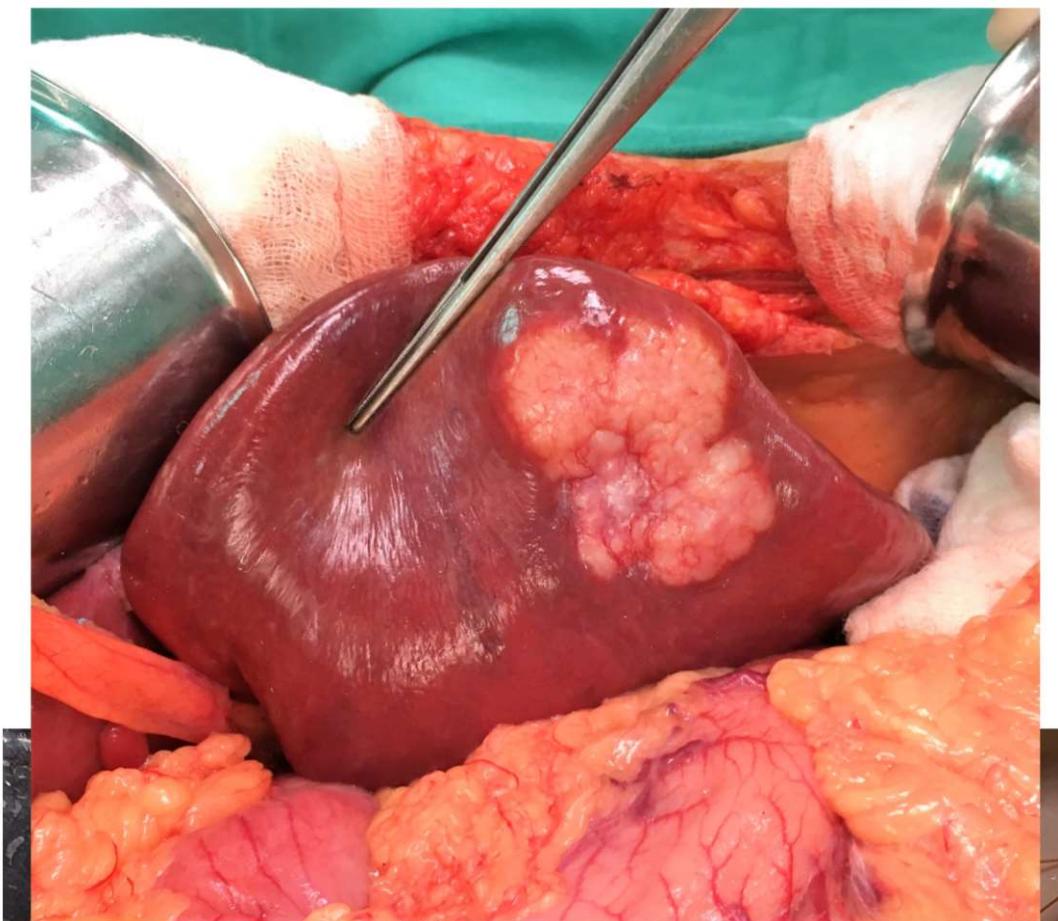


HEPATOPANCREATODUODENECTOMY + COLECTOMY

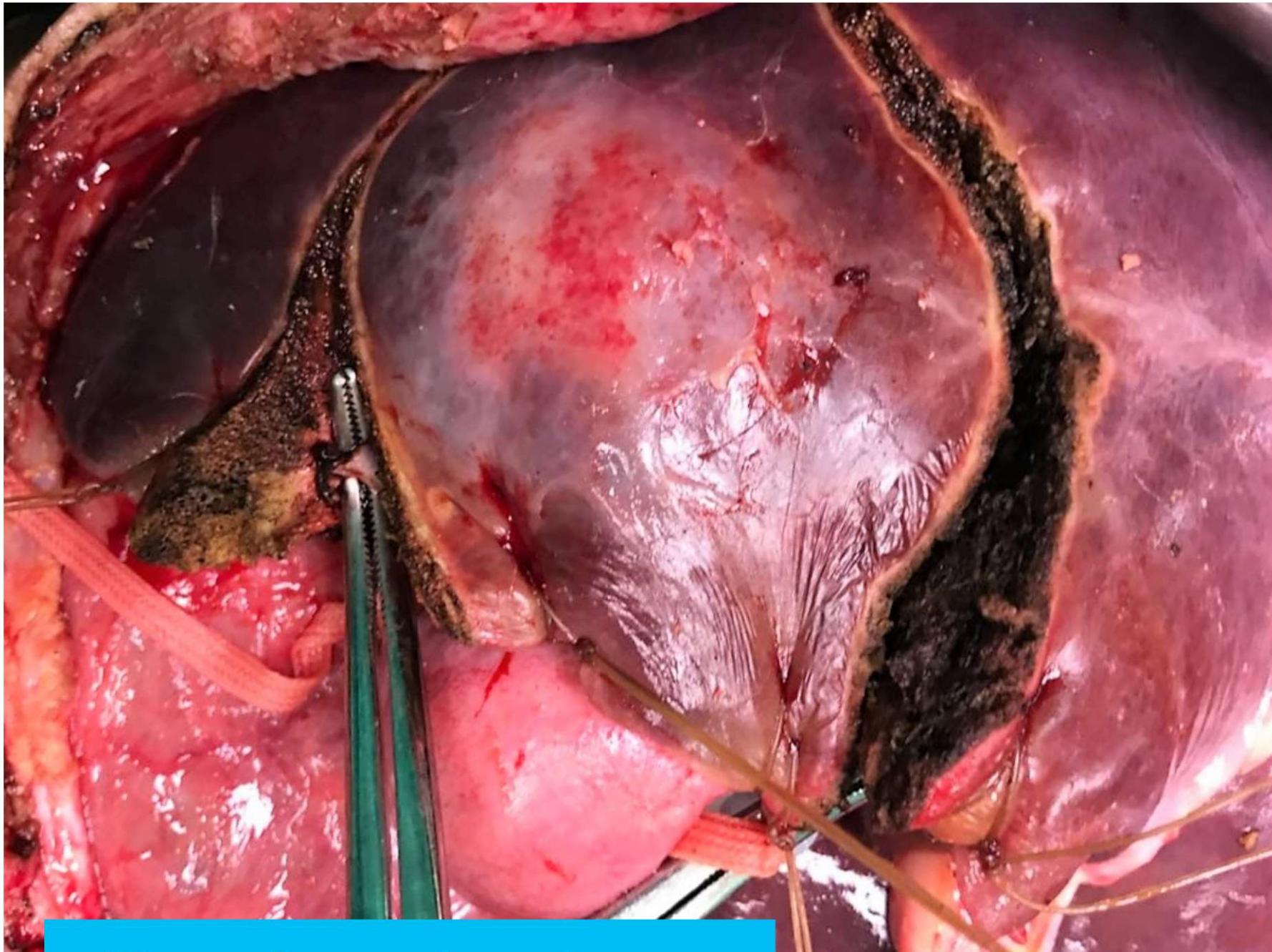


Corkscrew maneuver



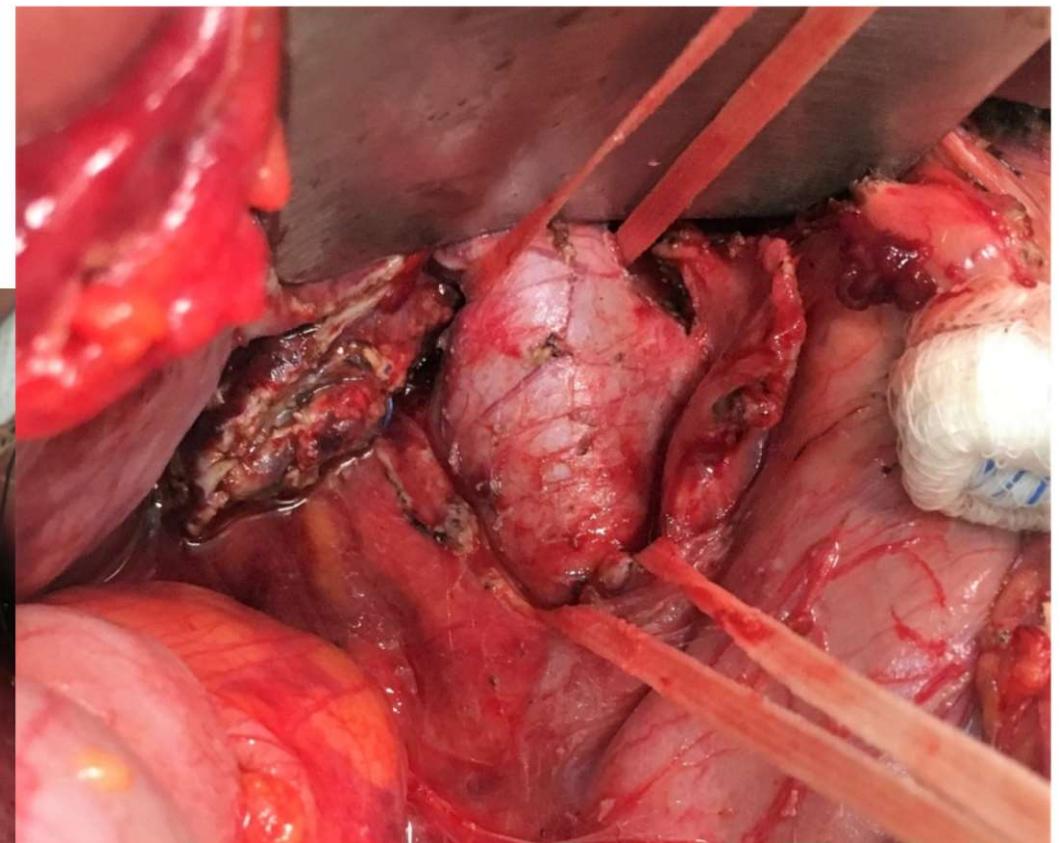
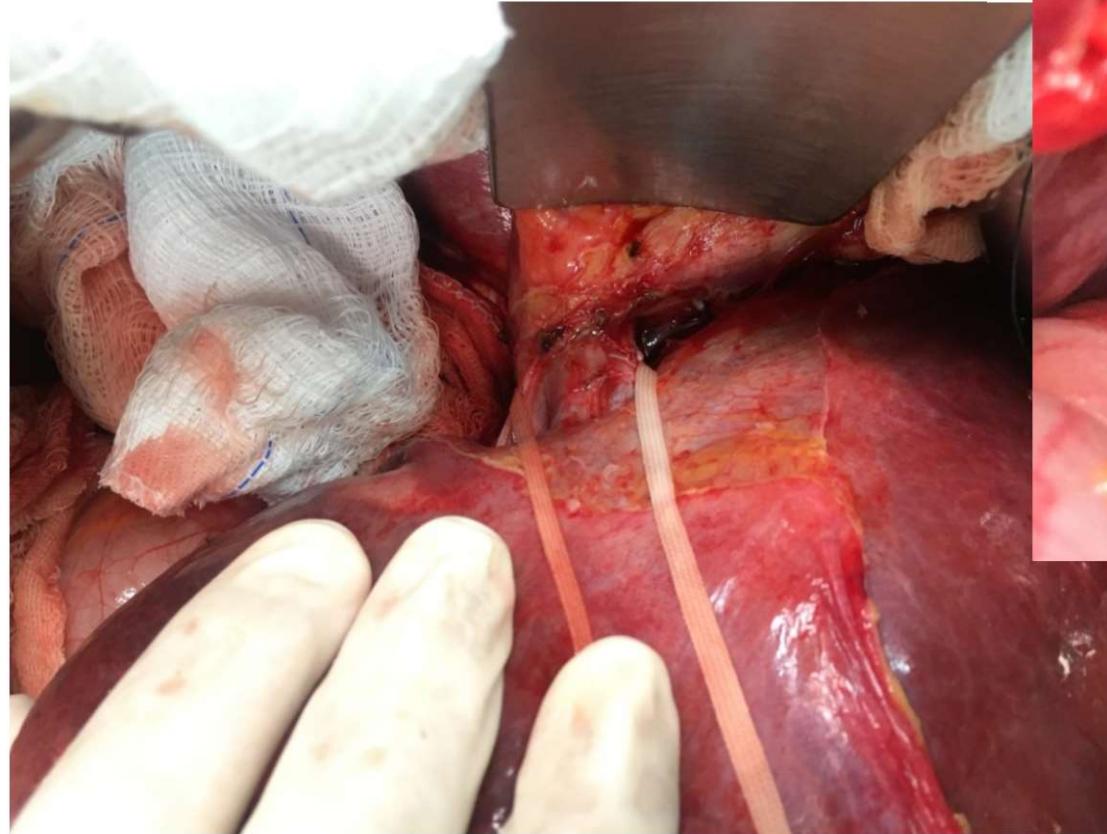


Glissonian pedicle

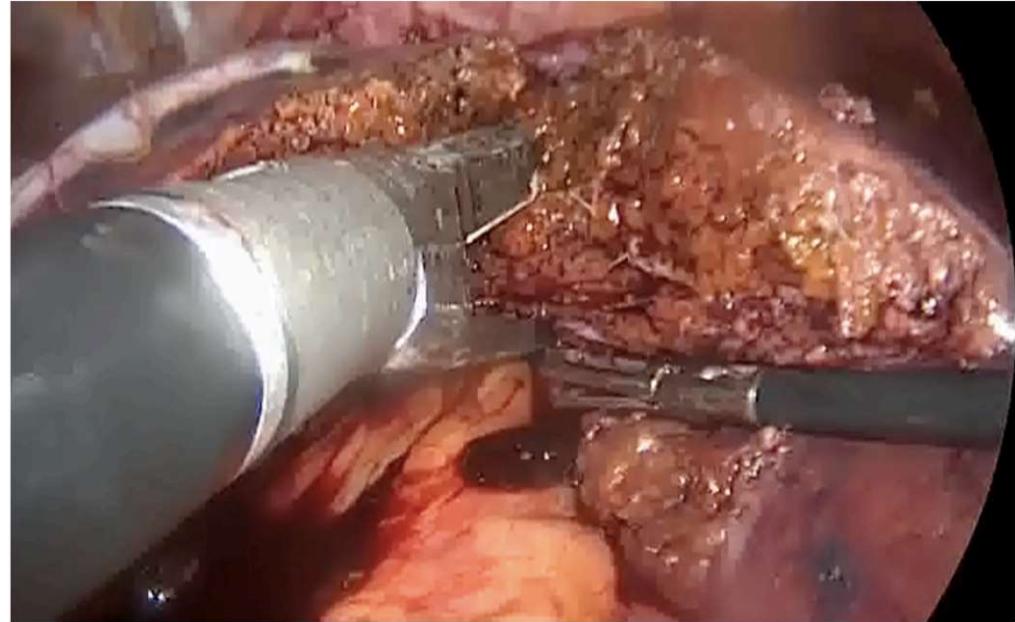
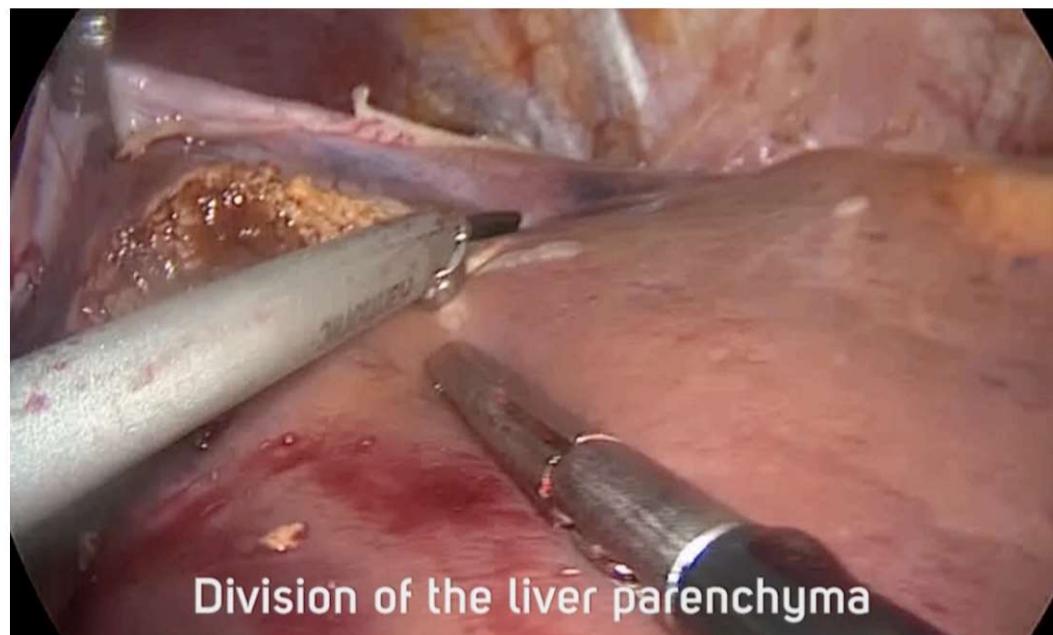


Mesohepatectomy

Total vascular exclusion

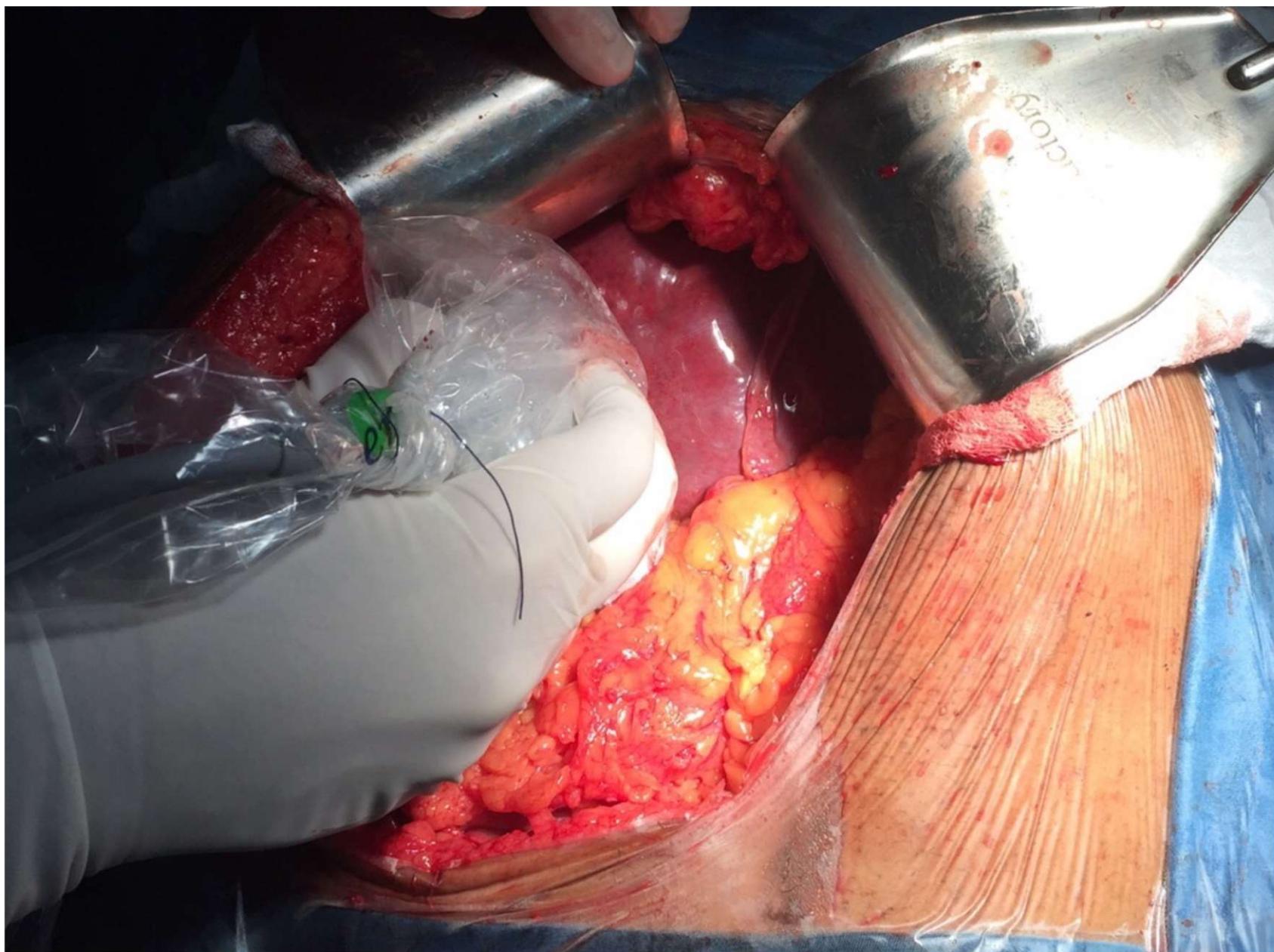


VIDEOLAPAROSCOPIA E ROBÓTICA



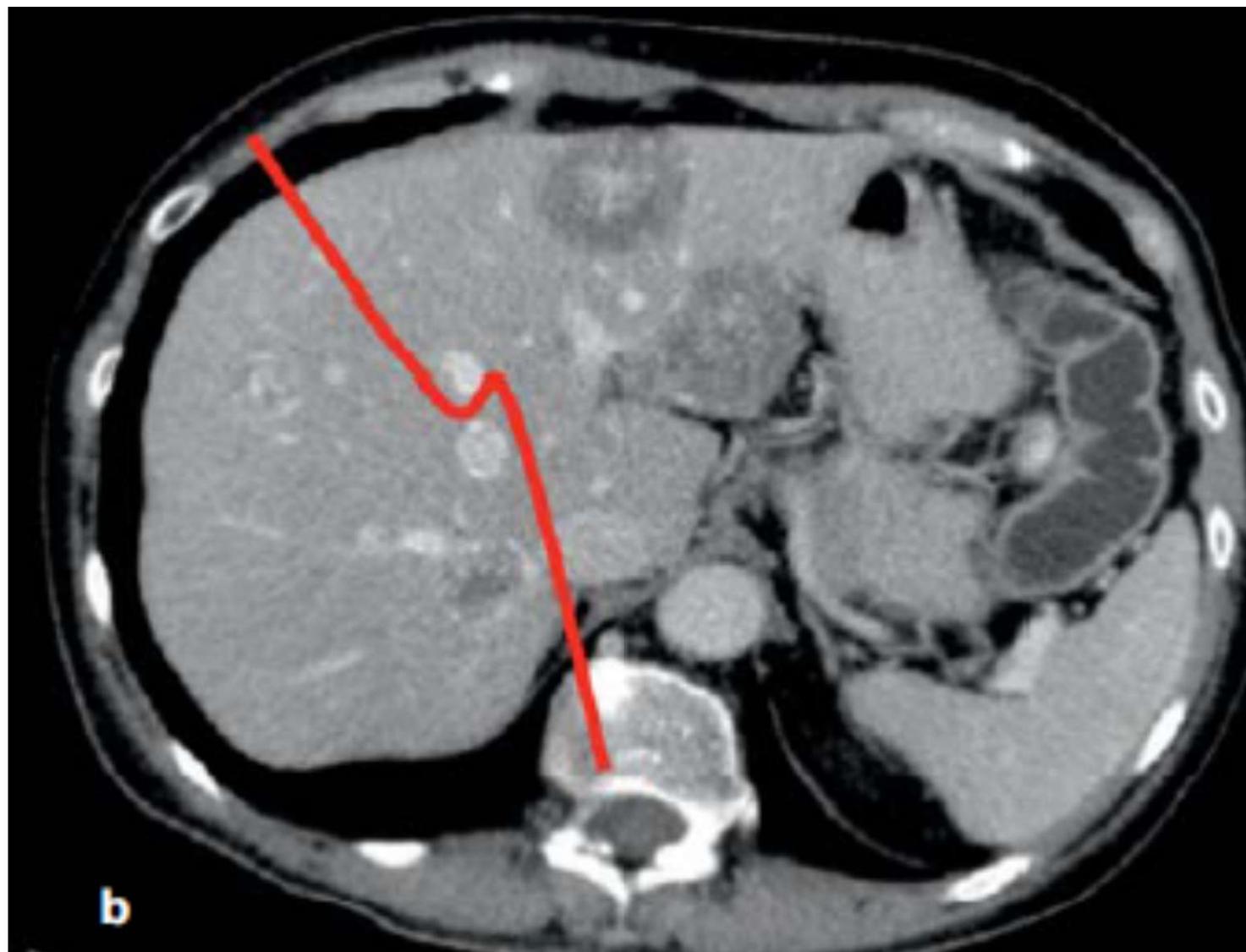
INTRAOPERATIVE US





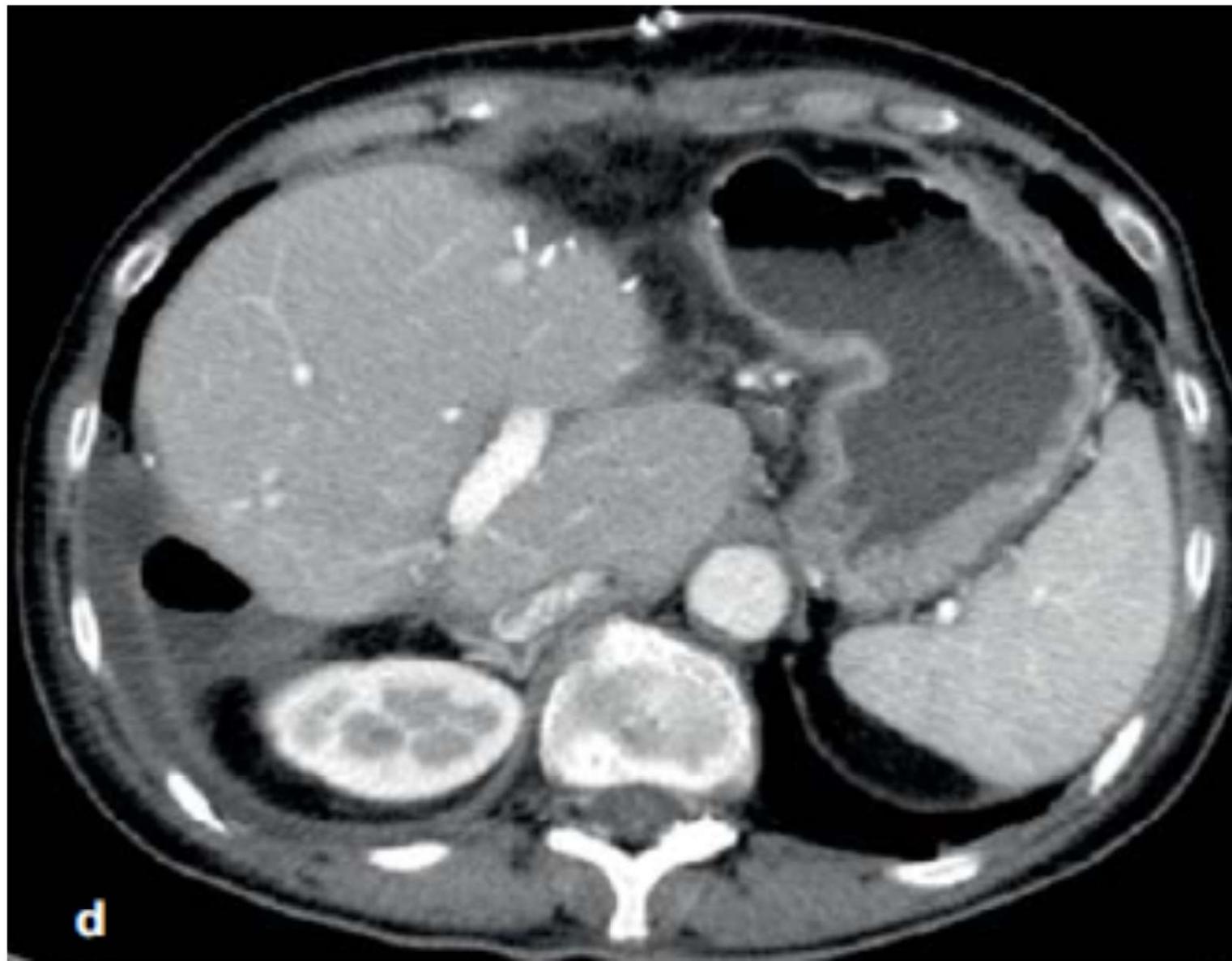


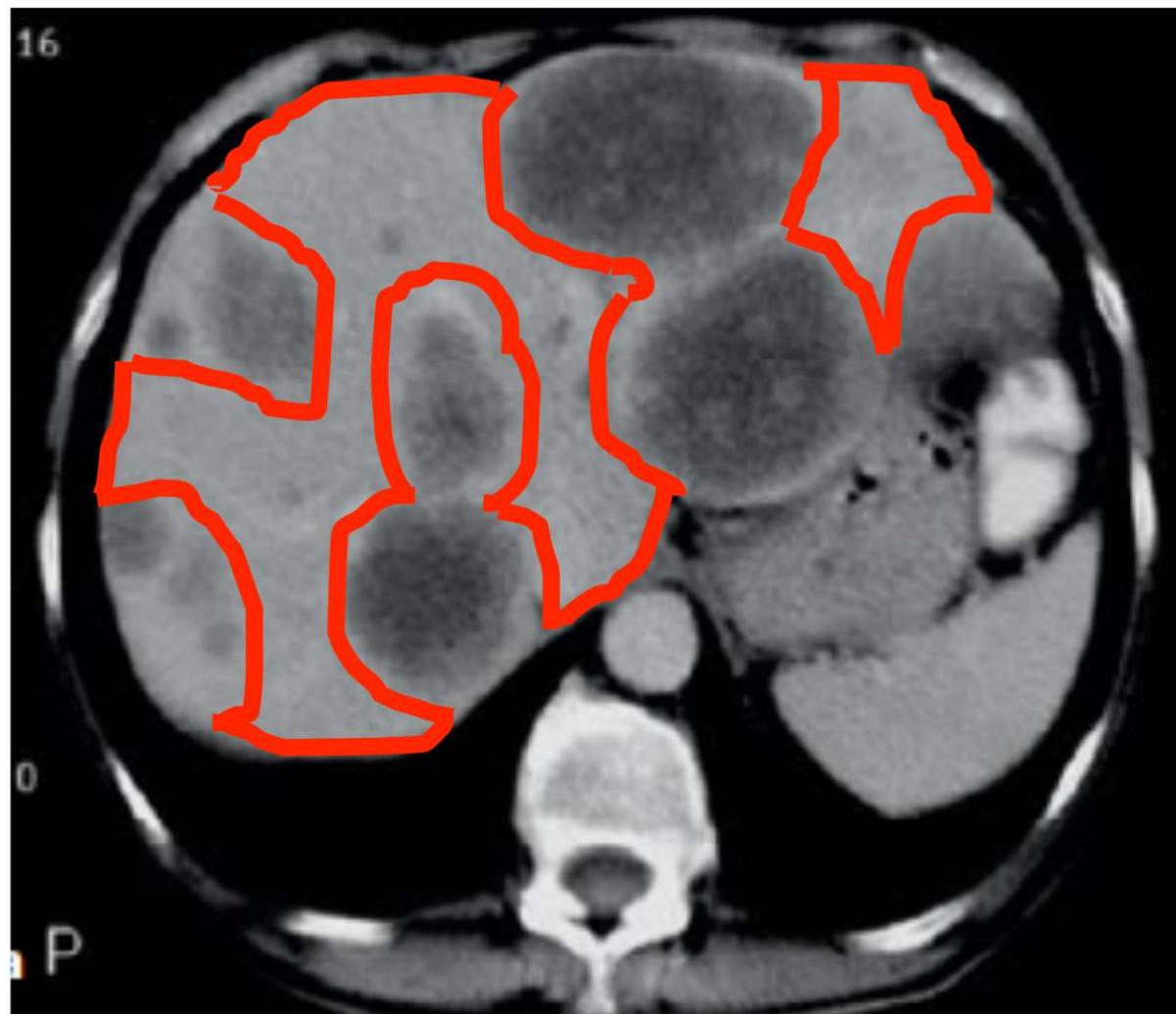
1. Chemotherapy
2. Portal vein embolization
3. Two-stage hepatectomy



b







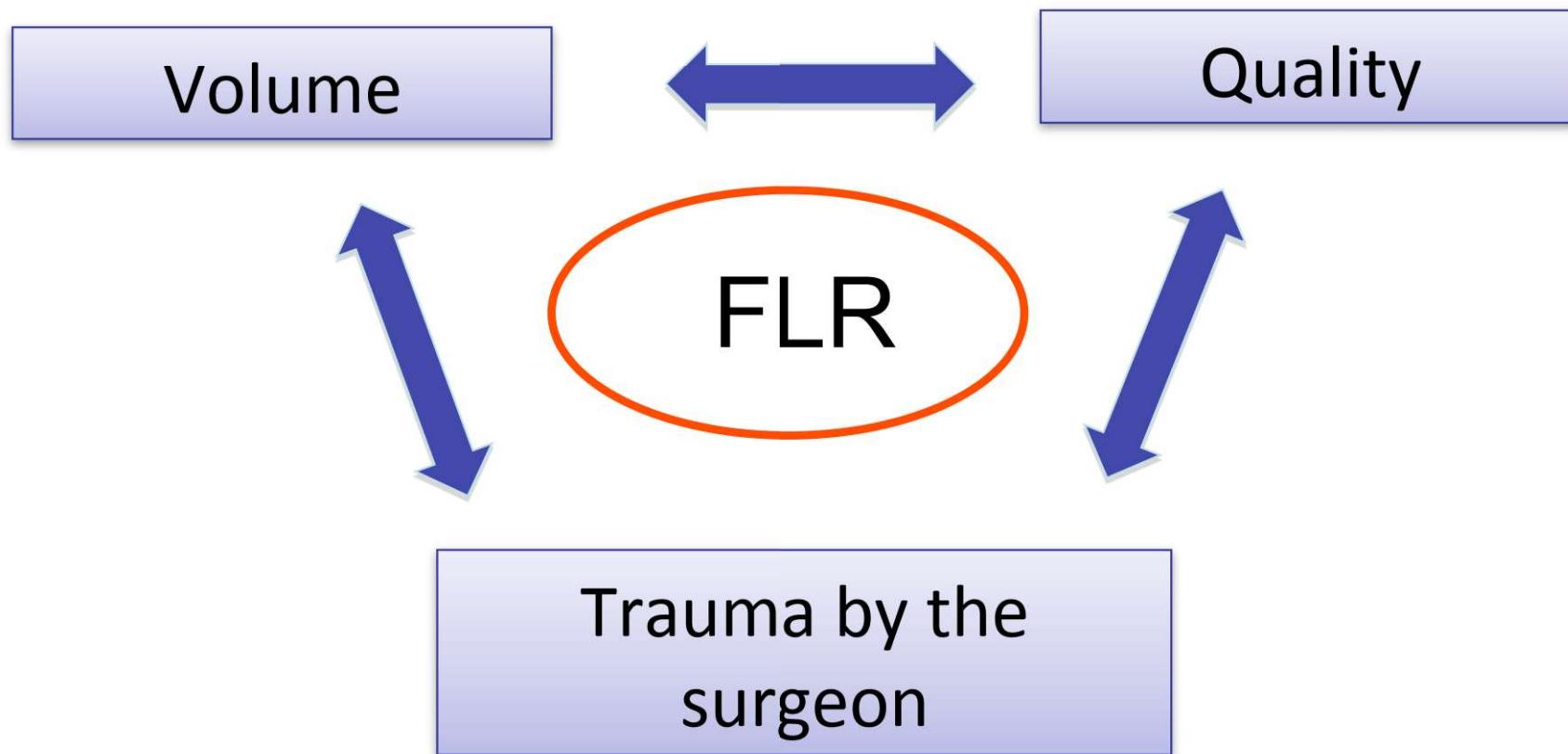
BRAZILIAN CONSENSUS FOR MULTIMODAL TREATMENT OF COLORECTAL LIVER METASTASES. MODULE 3: CONTROVERSIES AND UNRESECTABLE METASTASES

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

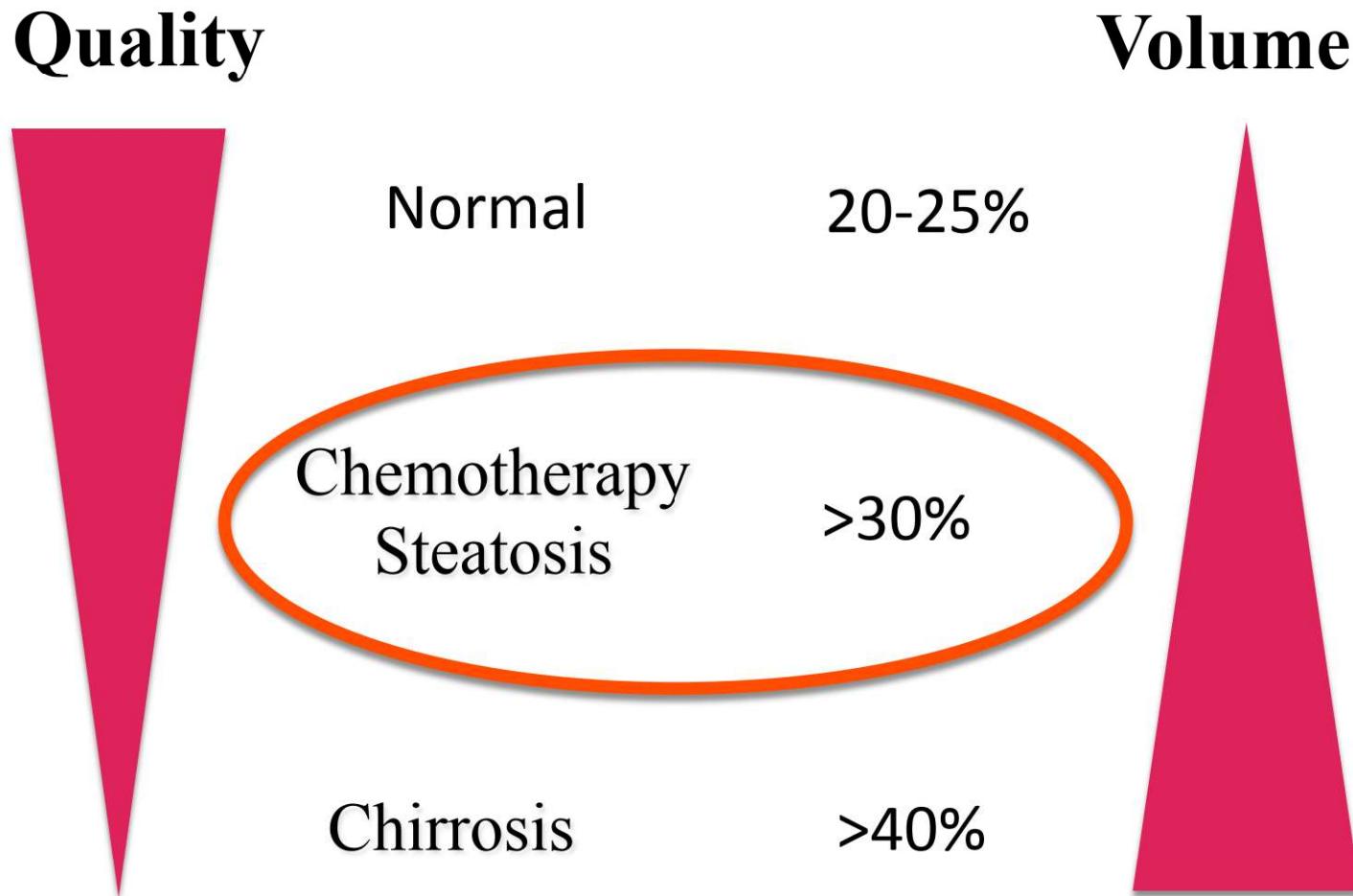
Orlando Jorge Martins **TORRES**^{1,2,6}, Márcio Carmona **MARQUES**^{2,6}, Fabio Nasser **SANTOS**¹, Igor Correia de **FARIAS**^{2,6},
Anelisa Kruschewsky **COUTINHO**³, Cássio Virgílio Cavalcante de **OLIVEIRA**^{1,4,5}, Antonio Nocchi **KALIL**^{1,2,4,6},
Celso Abdon Lopes de **MELLO**³, Jaime Arthur 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**¹, 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}

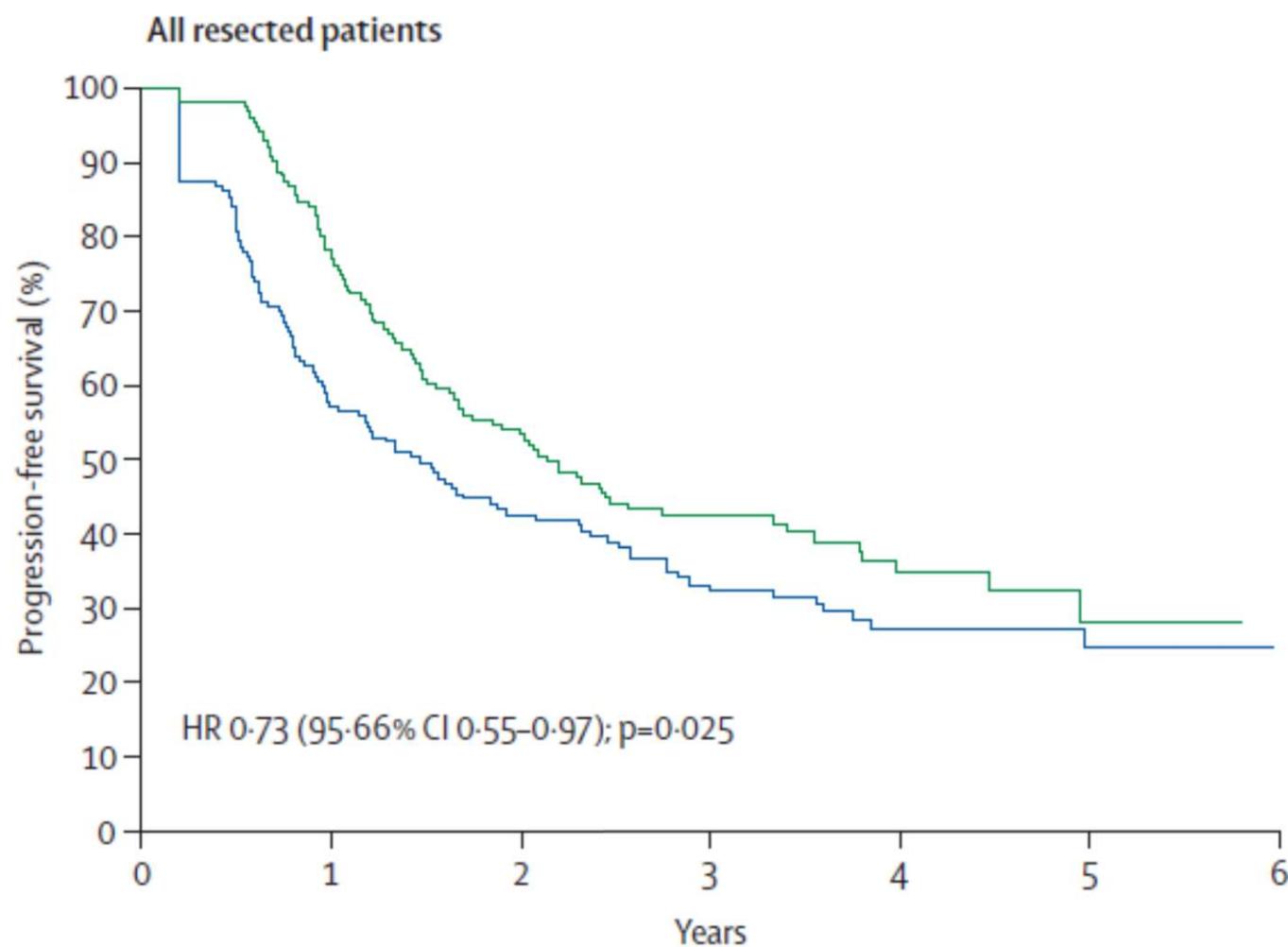


FUTURE LIVER REMNANT EVALUATION



FUTURE LIVER REMNANT







LIVER METASTASIS: LIMITS FOR RESECTION

PORTAL VEIN EMBOLIZATION

Makuuchi M, et al. Surgery 1990

TWO-STAGE HEPATECTOMY

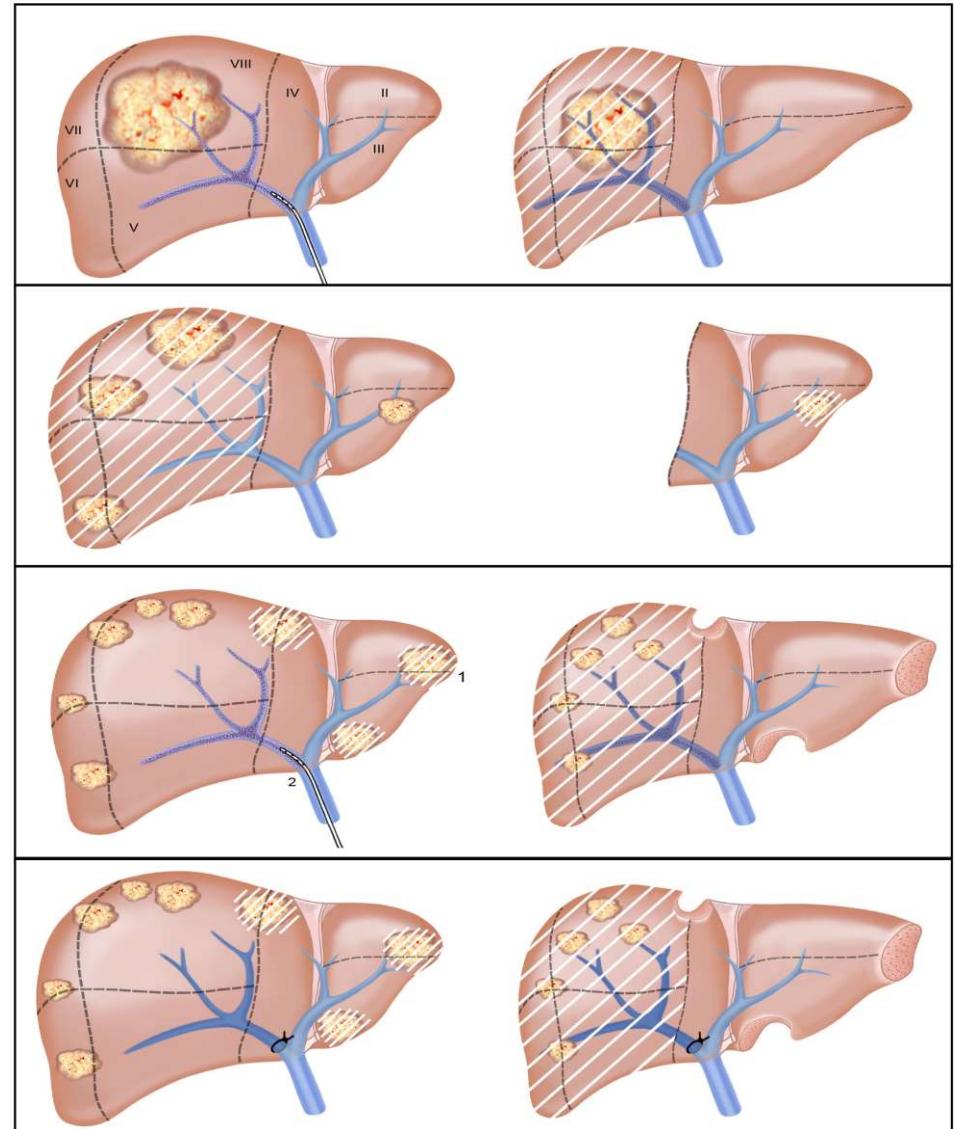
Adam R, et al. Ann Surg 2000

TWO-STAGE HEPATECTOMY + PVE

Jaeck D, et al. Ann Surg 2004

TWO-STAGE HEPATECTOMY + PVL

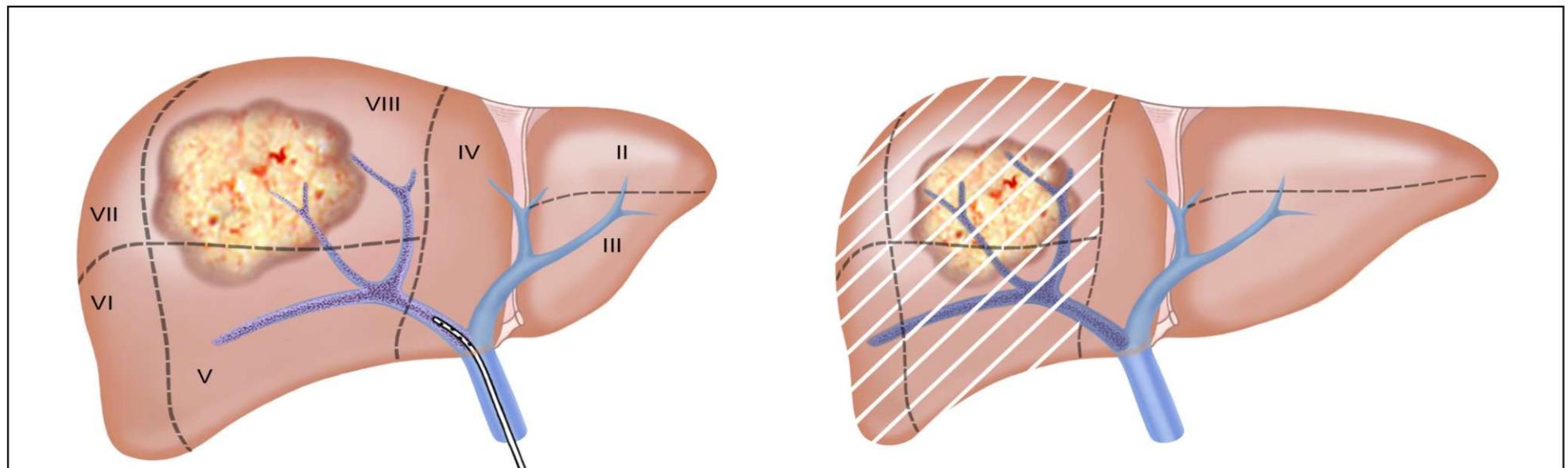
Belghiti J, et al. Hepatology 2008



PORTAL VEIN EMBOLIZATION

PORTAL VEIN EMBOLIZATION

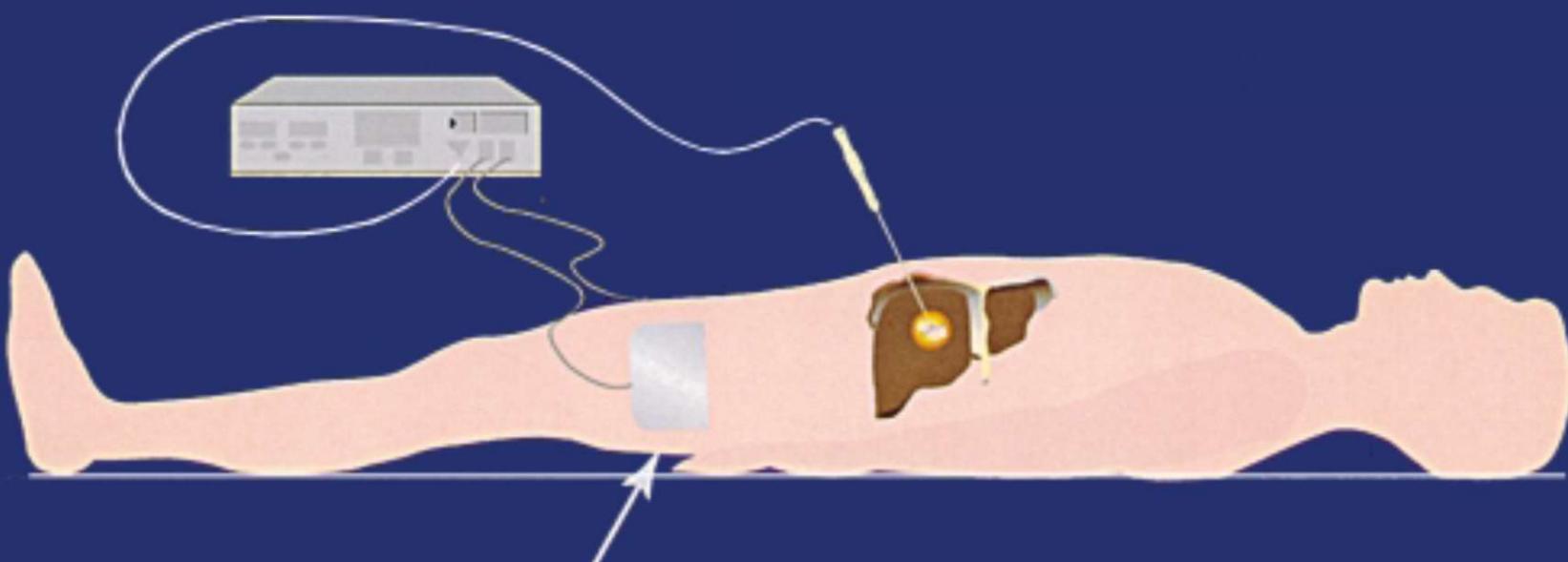
Makuuchi M, et al. Surgery 1990



Liver ablation

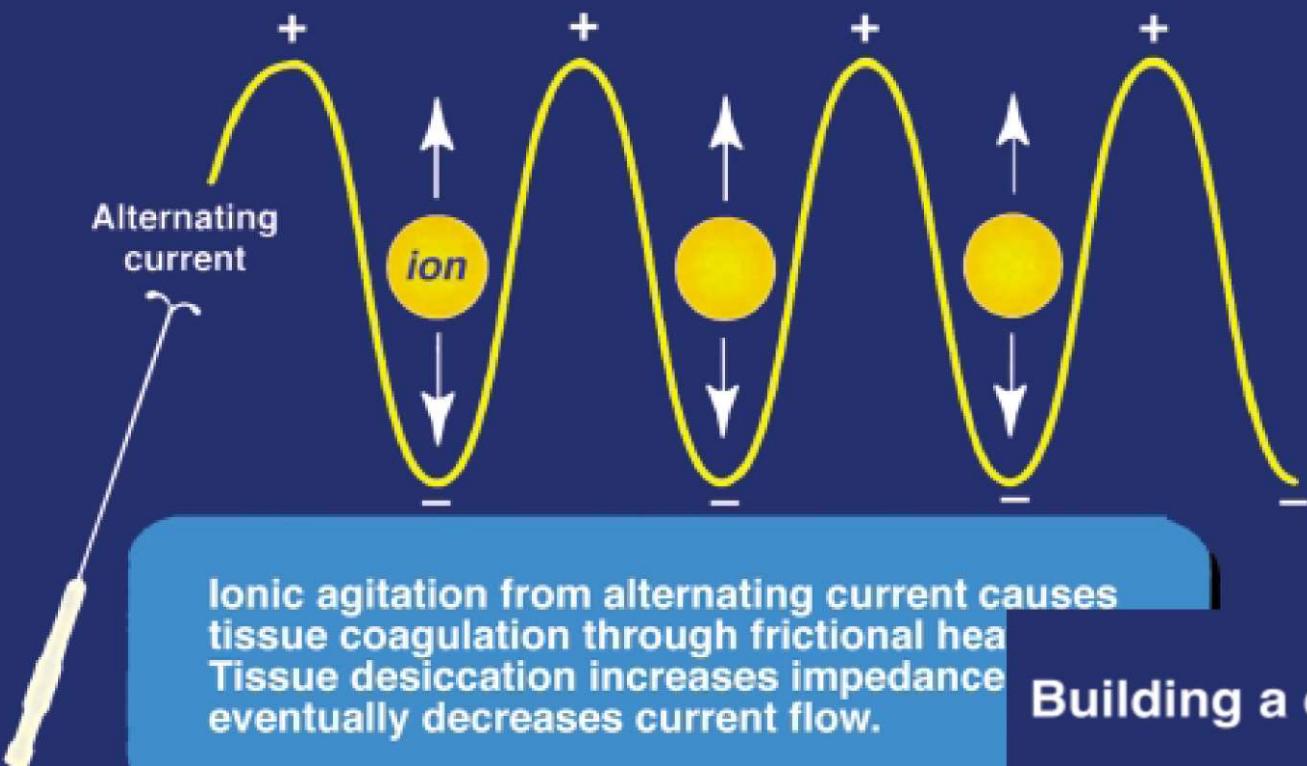
Radiofrequency

Radiofrequency generator

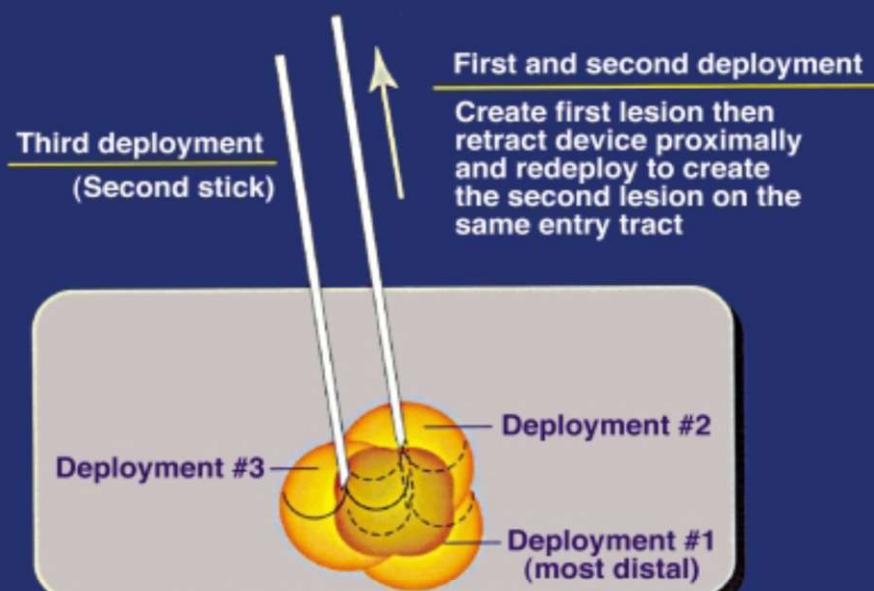


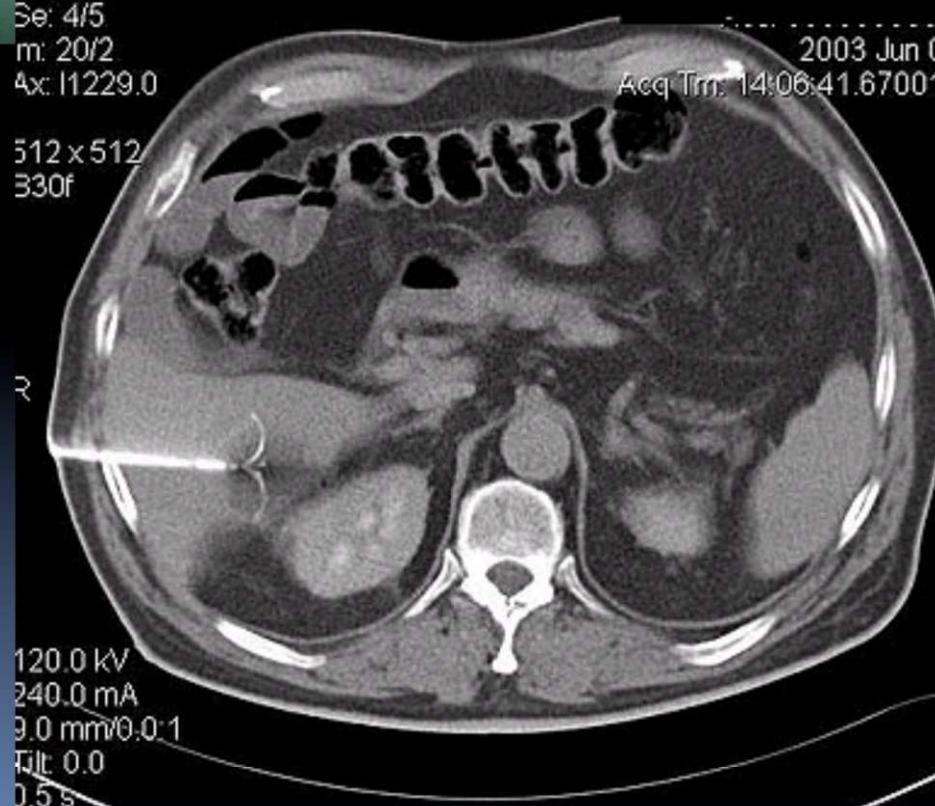
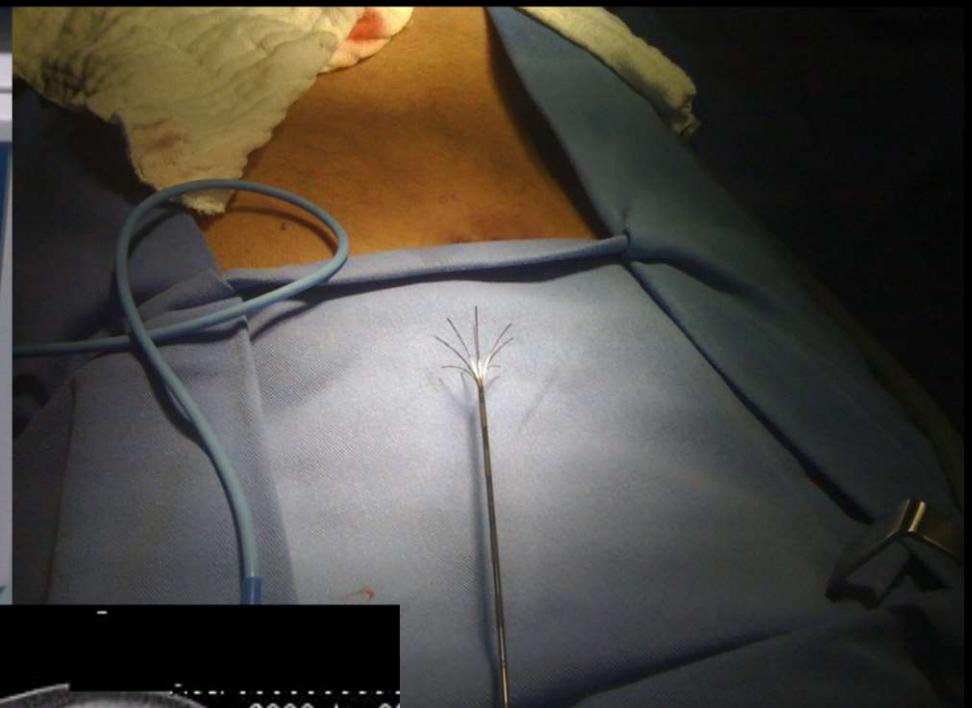
2 Grounding pads
(one on each thigh)

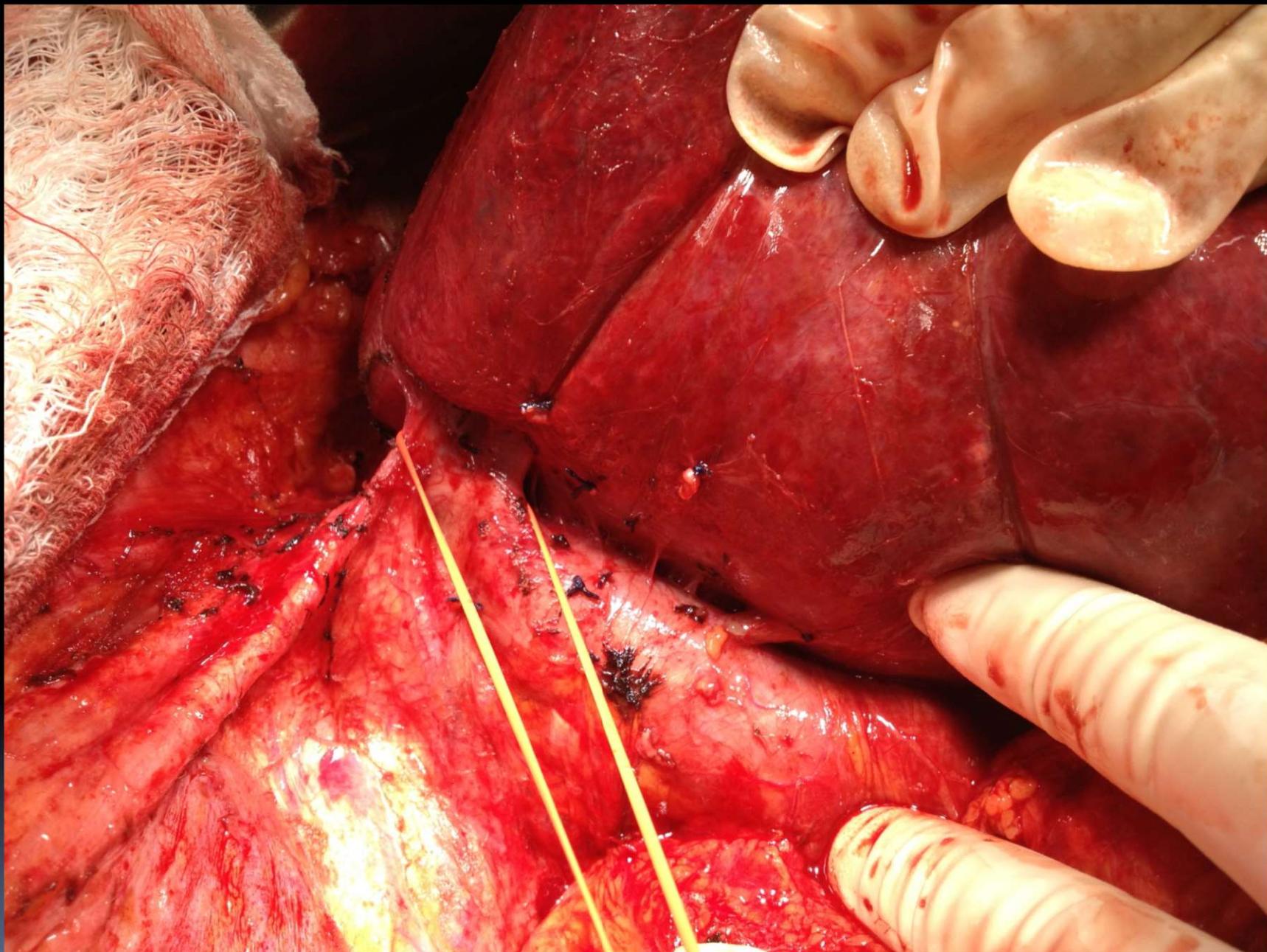
Radiofrequency ablation

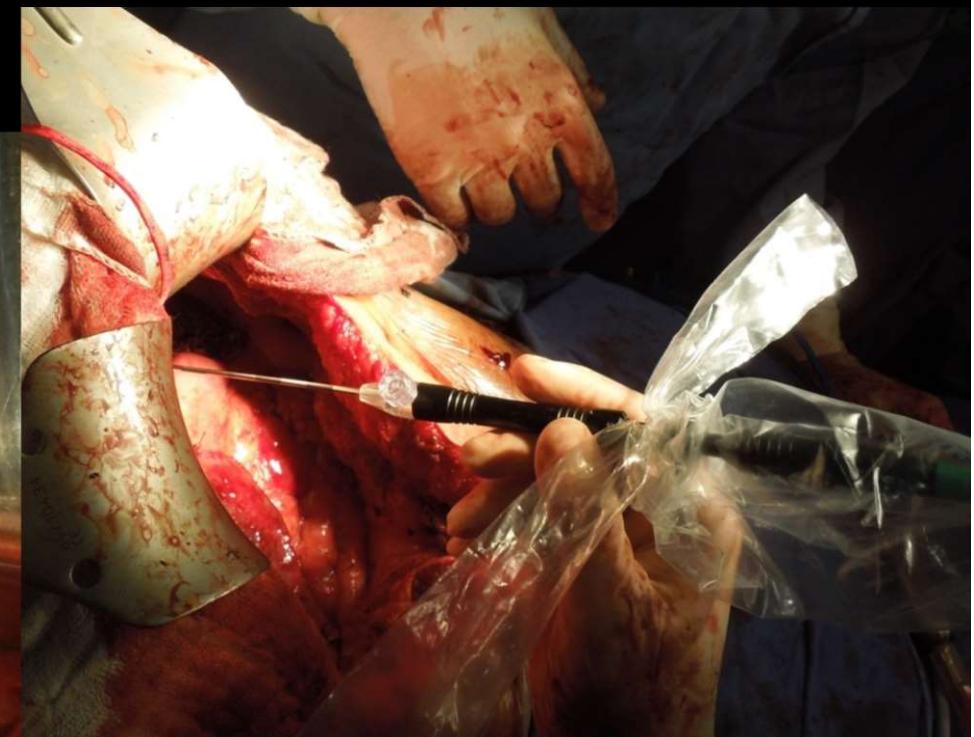
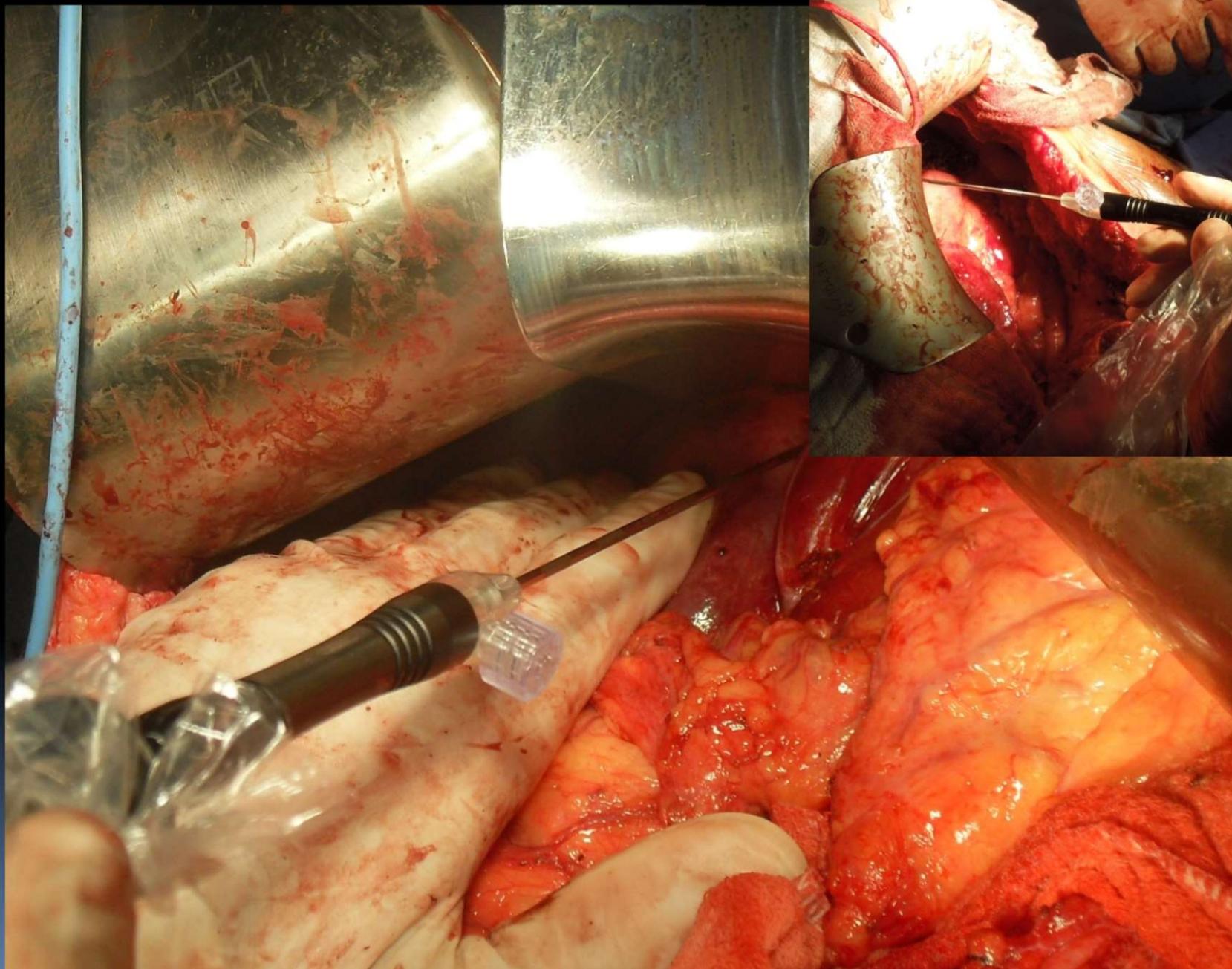


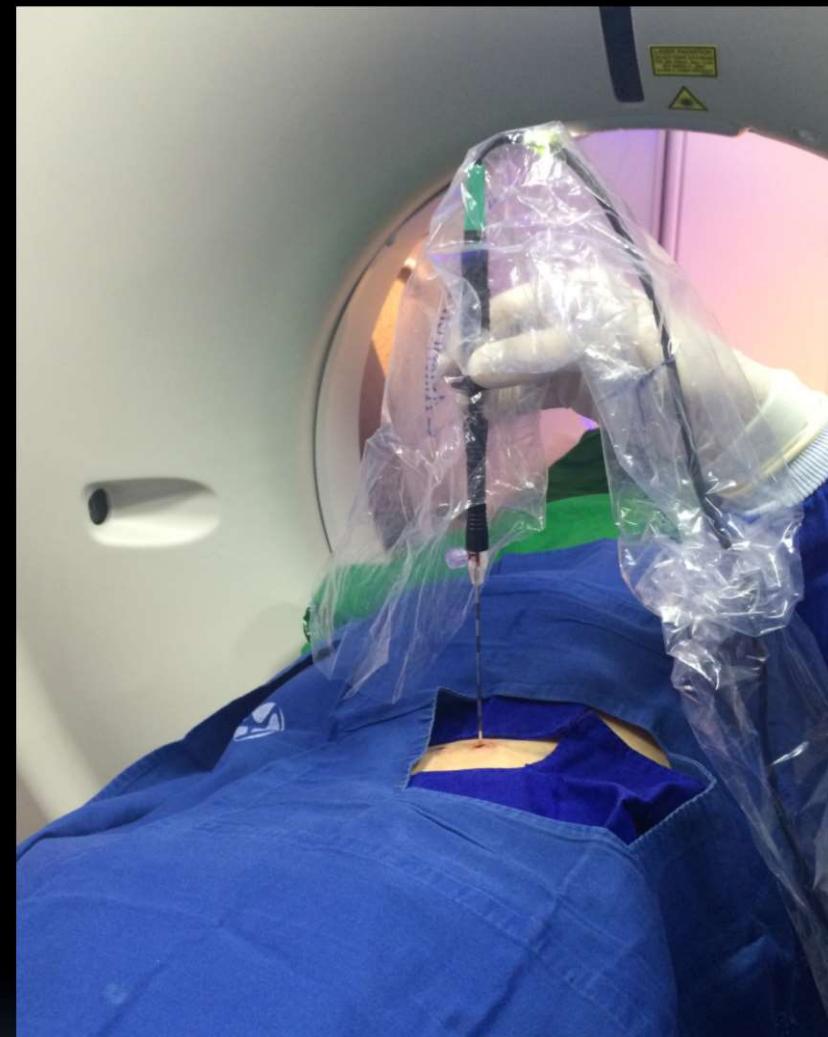
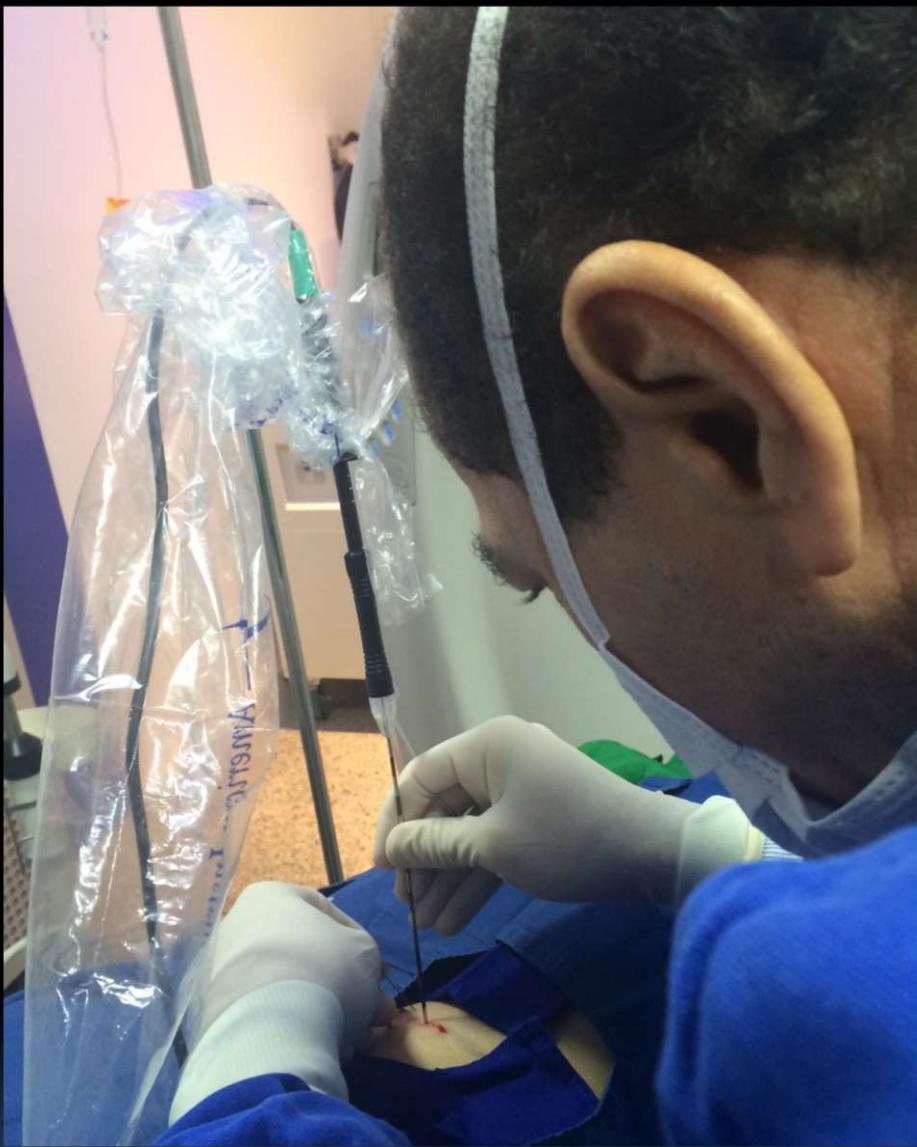
Building a compound thermal lesion













92:22: 9
14.00mm
0.0D

2015.07.13 11:51:05.723
120kV/51mAs/EC
0.6s/3.0mm/0.5x80
HP65.0



JUL 14 10:34 2015

100 / Img. 467

→ 0

0

3D Clinical

→ Filming Raw-Data

Utility

Layout

auto View 1st ▾

Auto Load

A

SILVA
LL: (294.77)
492: 22: 10
317.00mm
+0.0D

MARIA DA CONCEICAO P SILVA

2015.07.13 11:51:05.778

120kV/51mAs/EC

0.6s/3.0mm/0.5x80

HP65.0



TWO-STAGE HEPATECTOMY



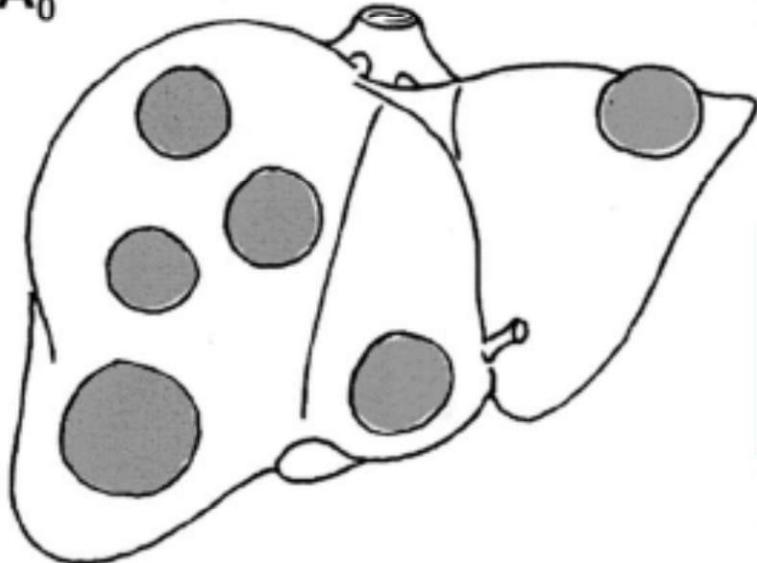
Two-stage hepatectomy + PVE

ORIGINAL ARTICLES

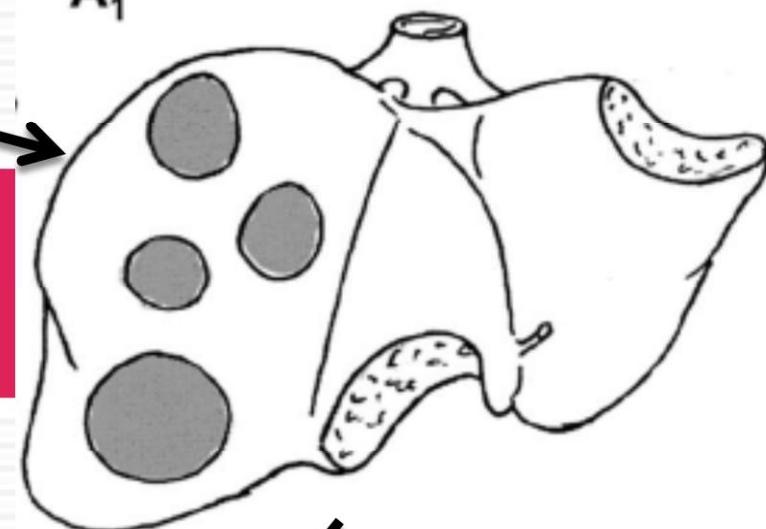
A Two-Stage Hepatectomy Procedure Combined With Portal Vein Embolization to Achieve Curative Resection for Initially Unresectable Multiple and Bilobar Colorectal Liver Metastases

Daniel Jaeck, MD, PhD, FRCS, Elie Oussoultzoglou, MD,* Edoardo Rosso, MD,* Michel Greget, MD,† Jean-Christophe Weber, MD, PhD,* and Philippe Bachellier, MD**

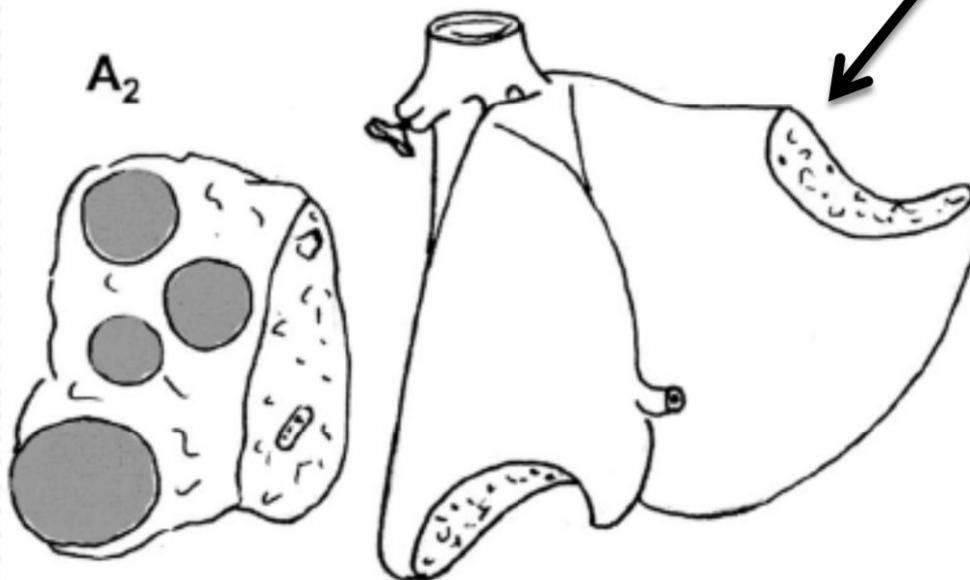
A₀

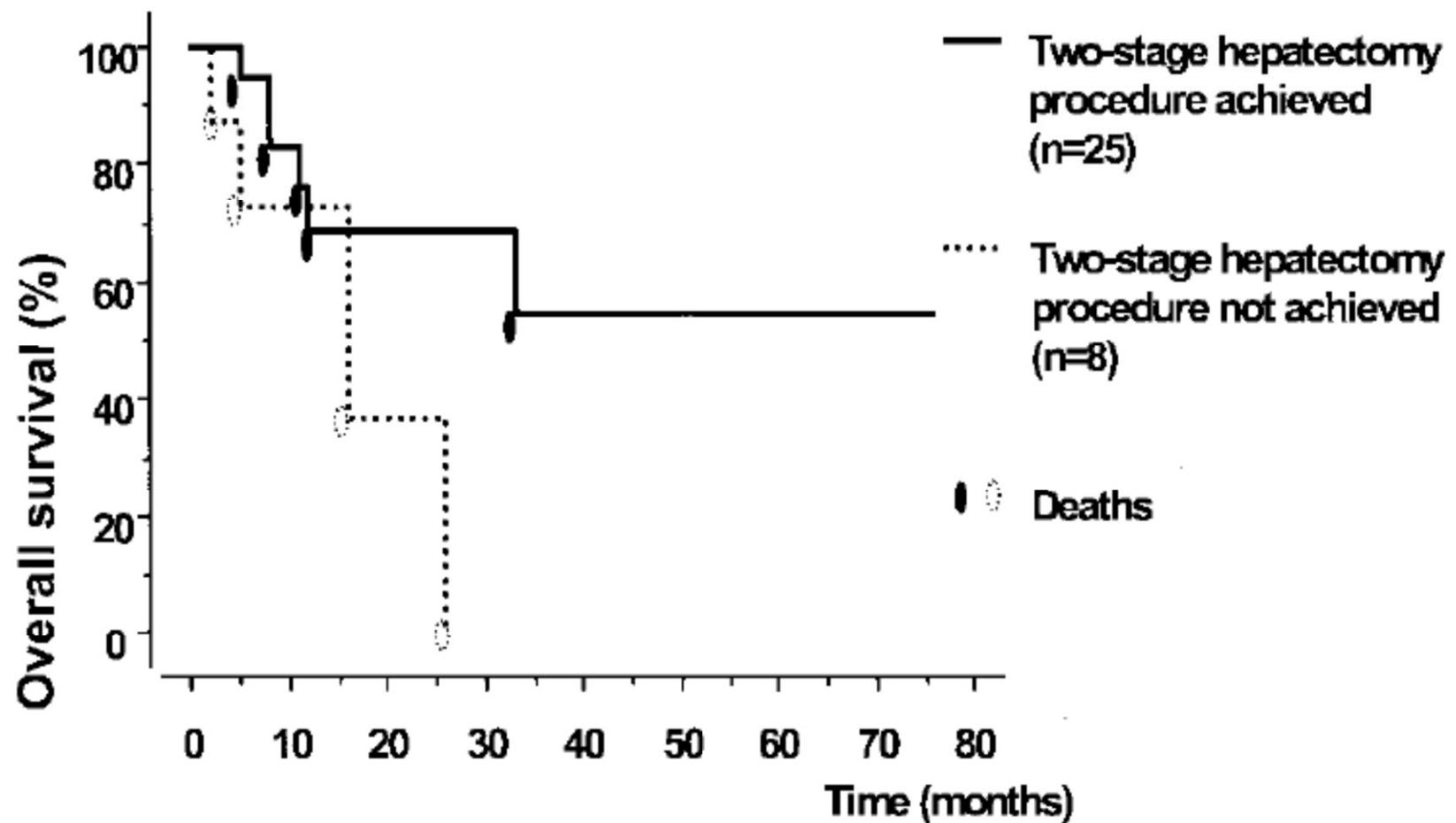
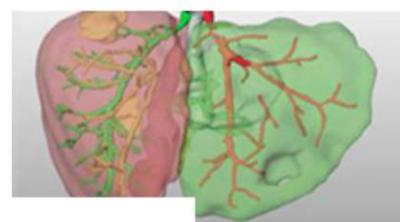


A₁



A₂





No. at risk

—	25	17	9	6	3	3	2	2	1
.....	8	3	1						

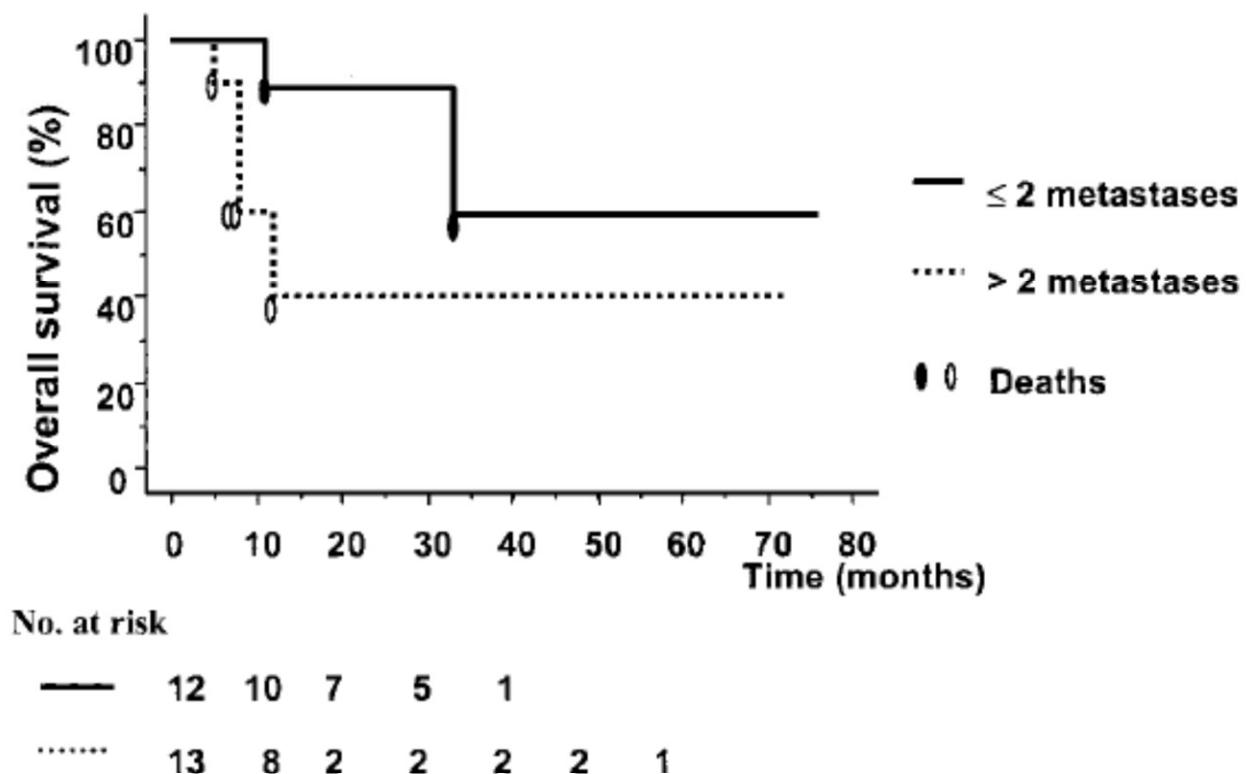
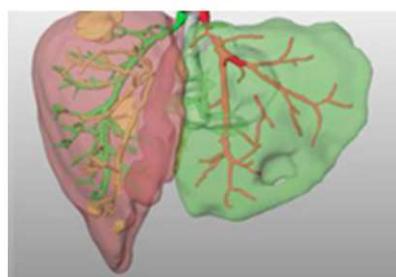


FIGURE 5. Kaplan-Meier survival of 25 patients in whom the strategy has been achieved according to the number of metastases in the future left remnant liver.

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 irresecáveis*

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**¹, 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

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



Av

Positive (R1) resection margin

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

REVIEW

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

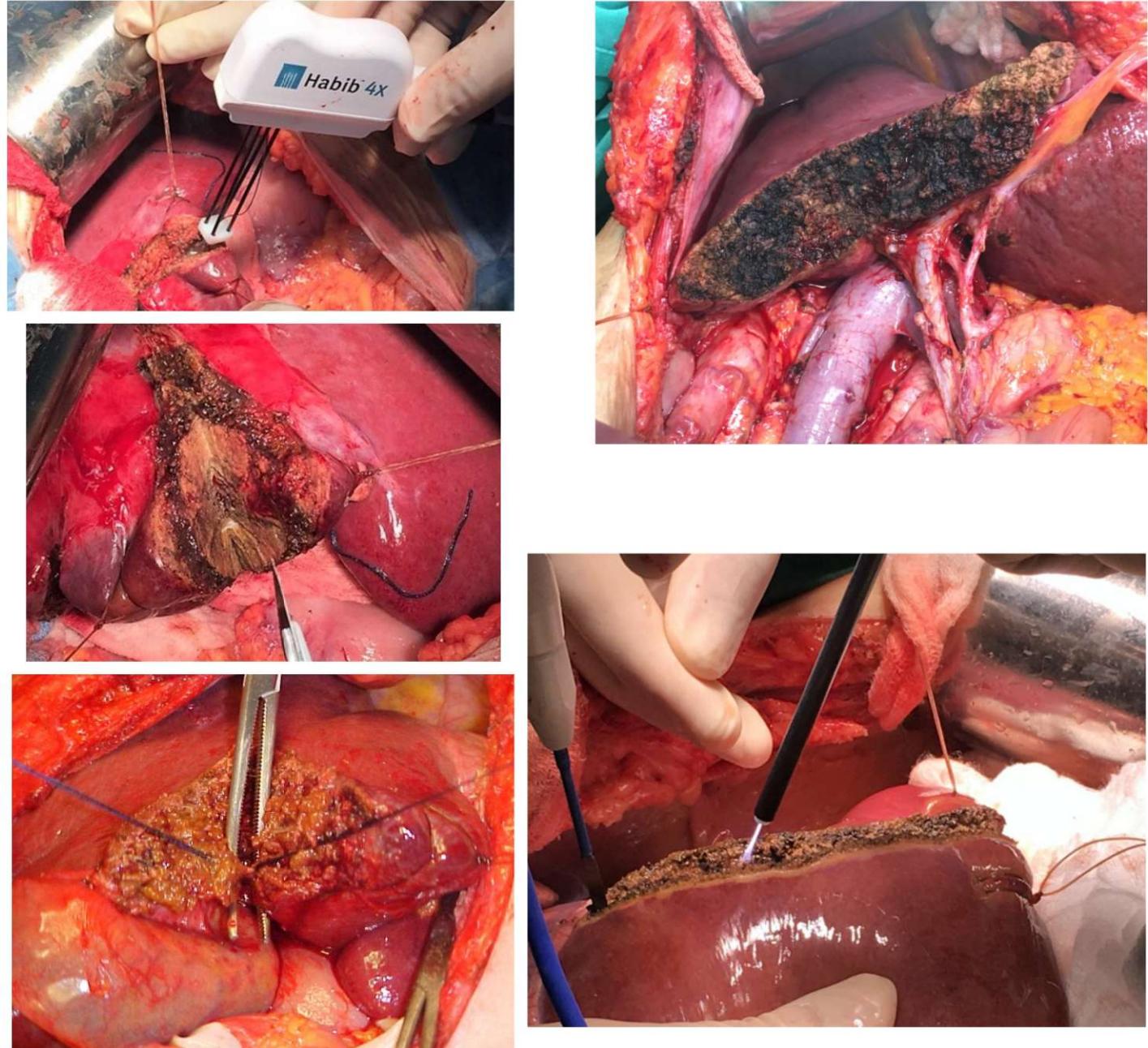
Fenella K.S. Welsh^{a,*}, Paris P. Tekkis^b, Tom O'Rourke^a,
Timothy G. John^a, Myrddin Rees^a

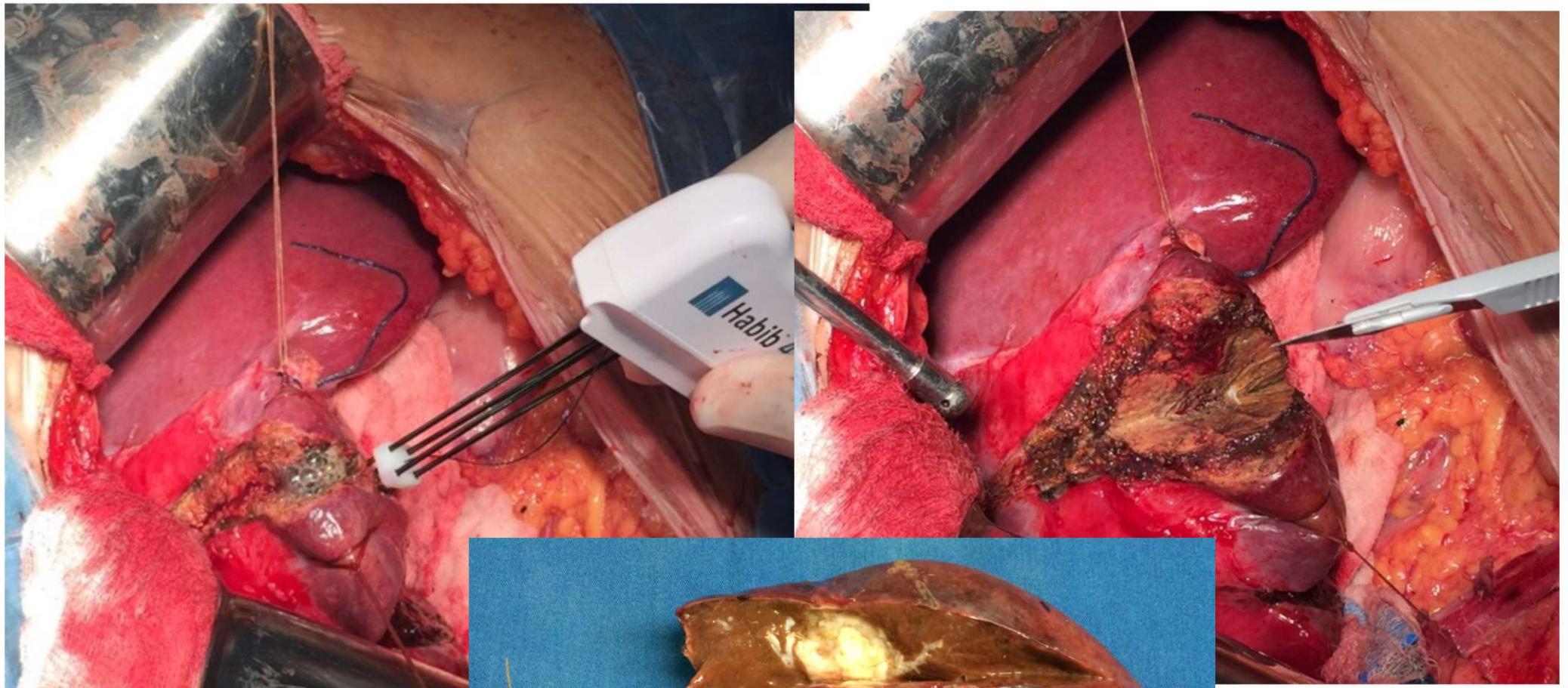
- Non-anatomical resection**
- Extended resection**
- >3 hepatic metastases involving >50% of the liver**
- Repeat hepatic resection**
- Bilobar disease**
- Abnormal pre-operative LFTs**

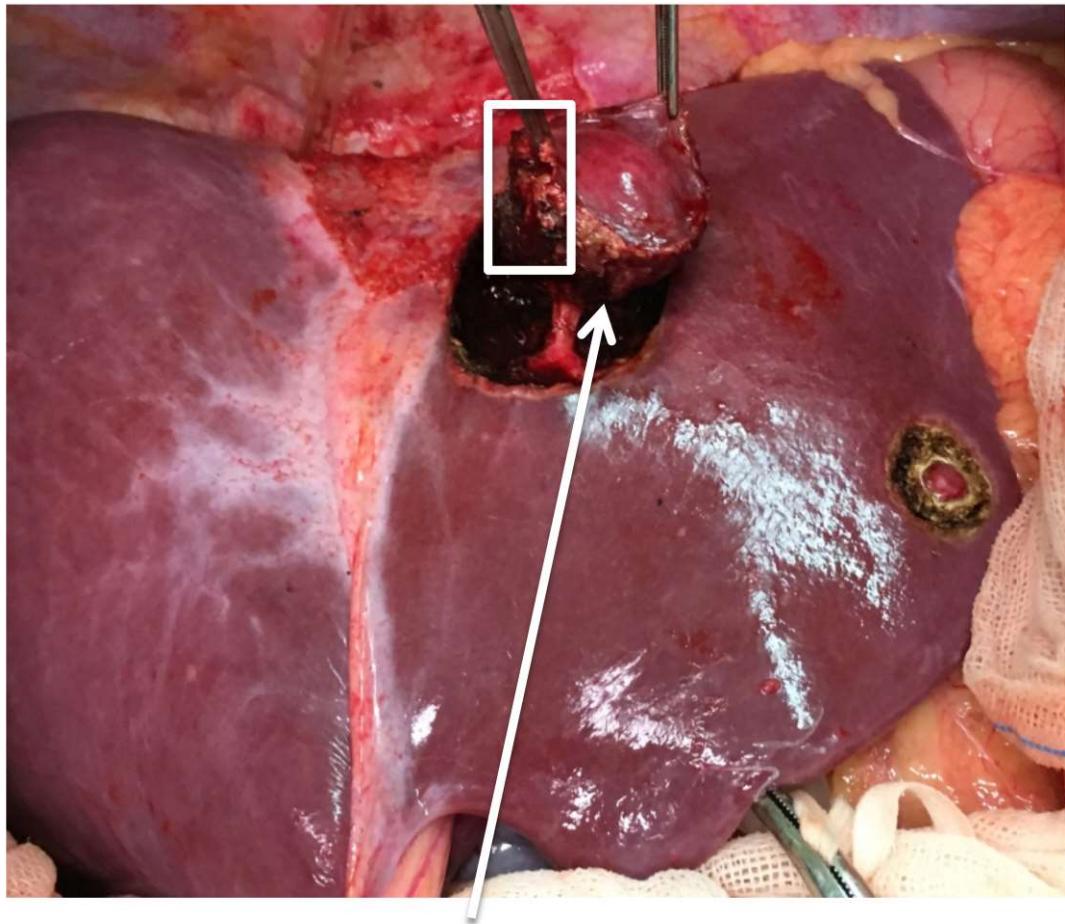
Risk

ACCURATE ASSESSMENT OF MARGINS STATUS

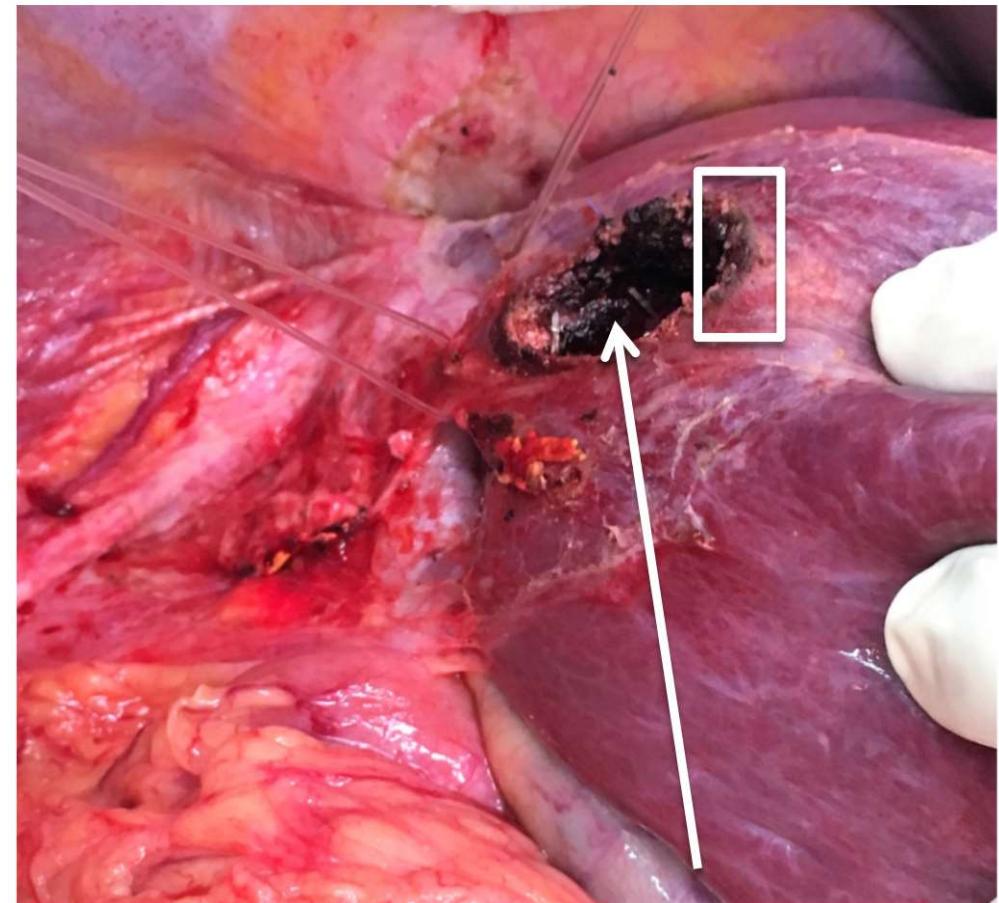
- Vaporize
- Aspirate
- Ablate
- Fracture
- Coagulate





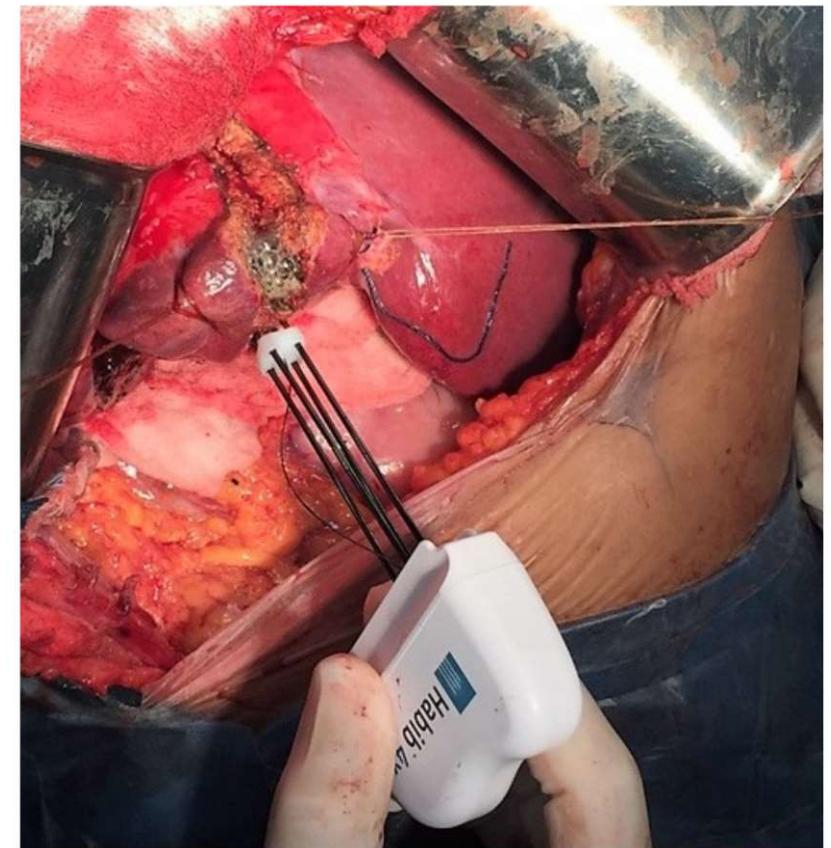
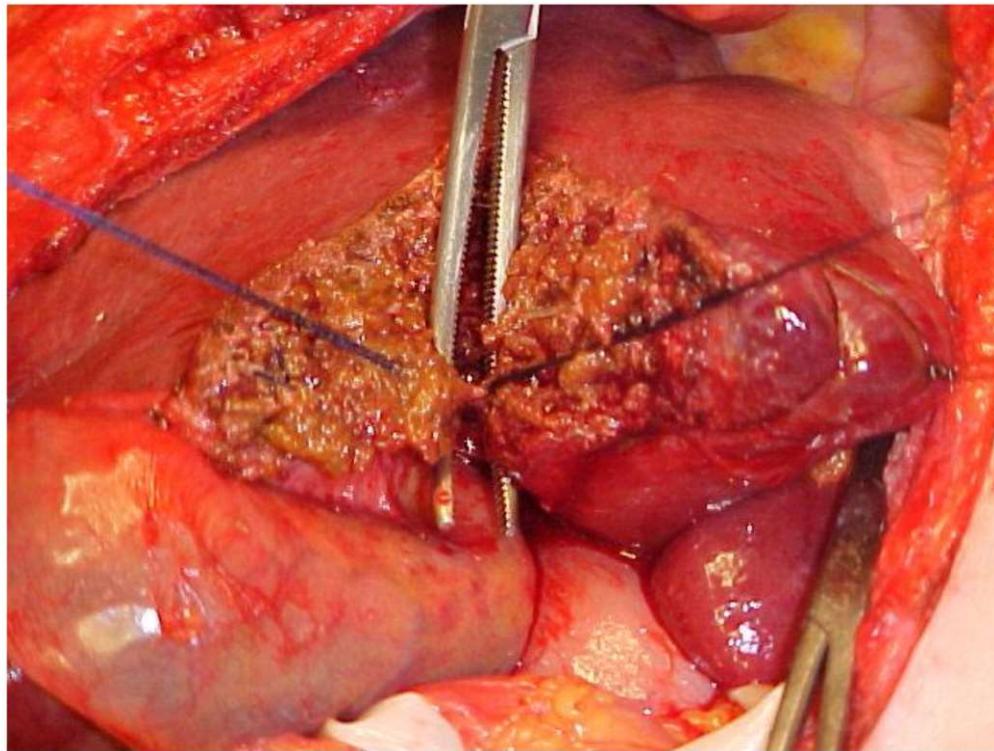


Pathology



Surgical



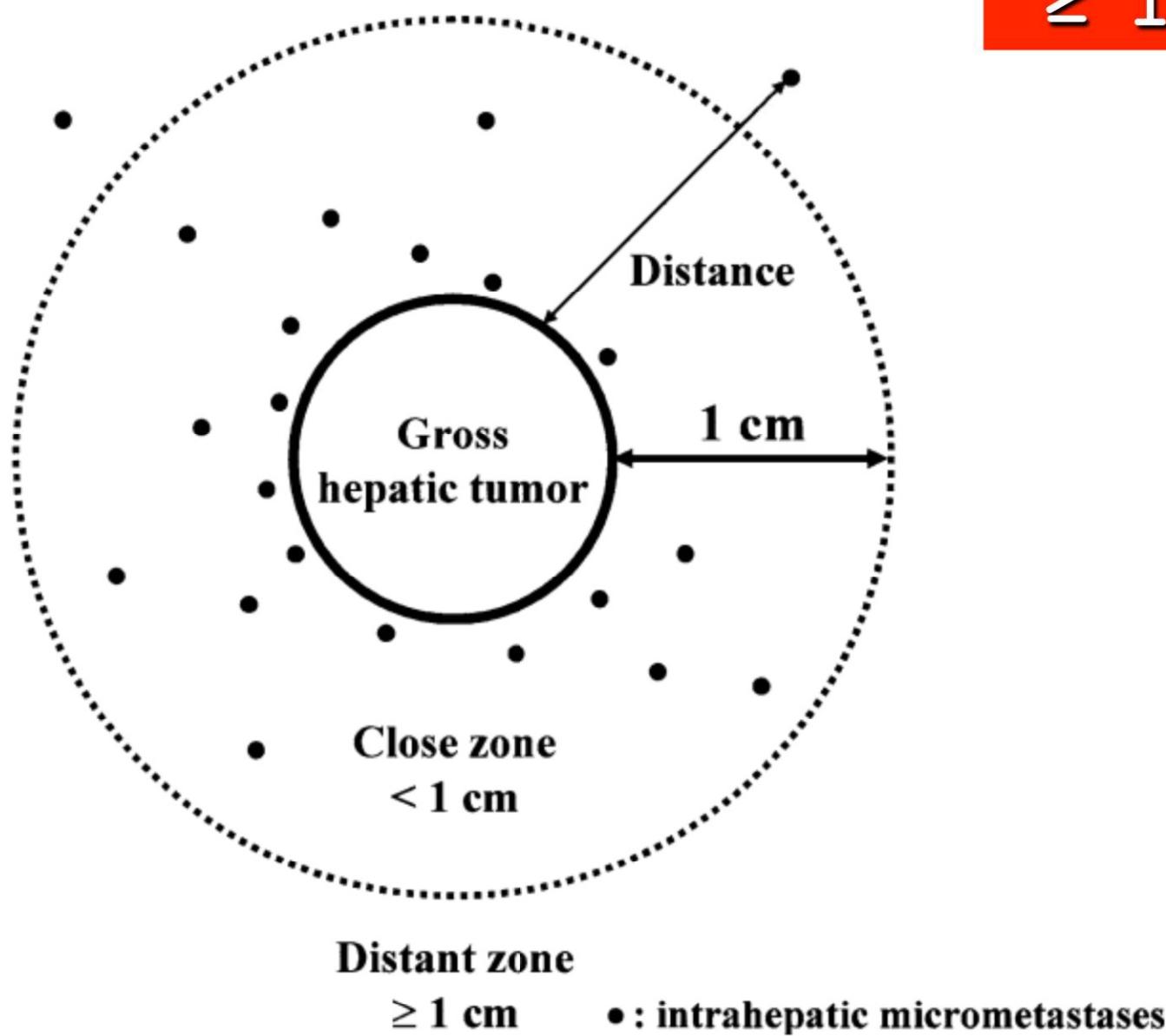


Kelly

Radiofrequency

Technique

$\geq 10\text{mm}$



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				Univariate Analysis		Multivariate Analysis	
			1-Yr	3-Yr	5-Yr	10-Yr	P	HR (95% CI)	P	
<1 mm	663	19.8 (17.4–22)	69	34	25	21	Ref	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***

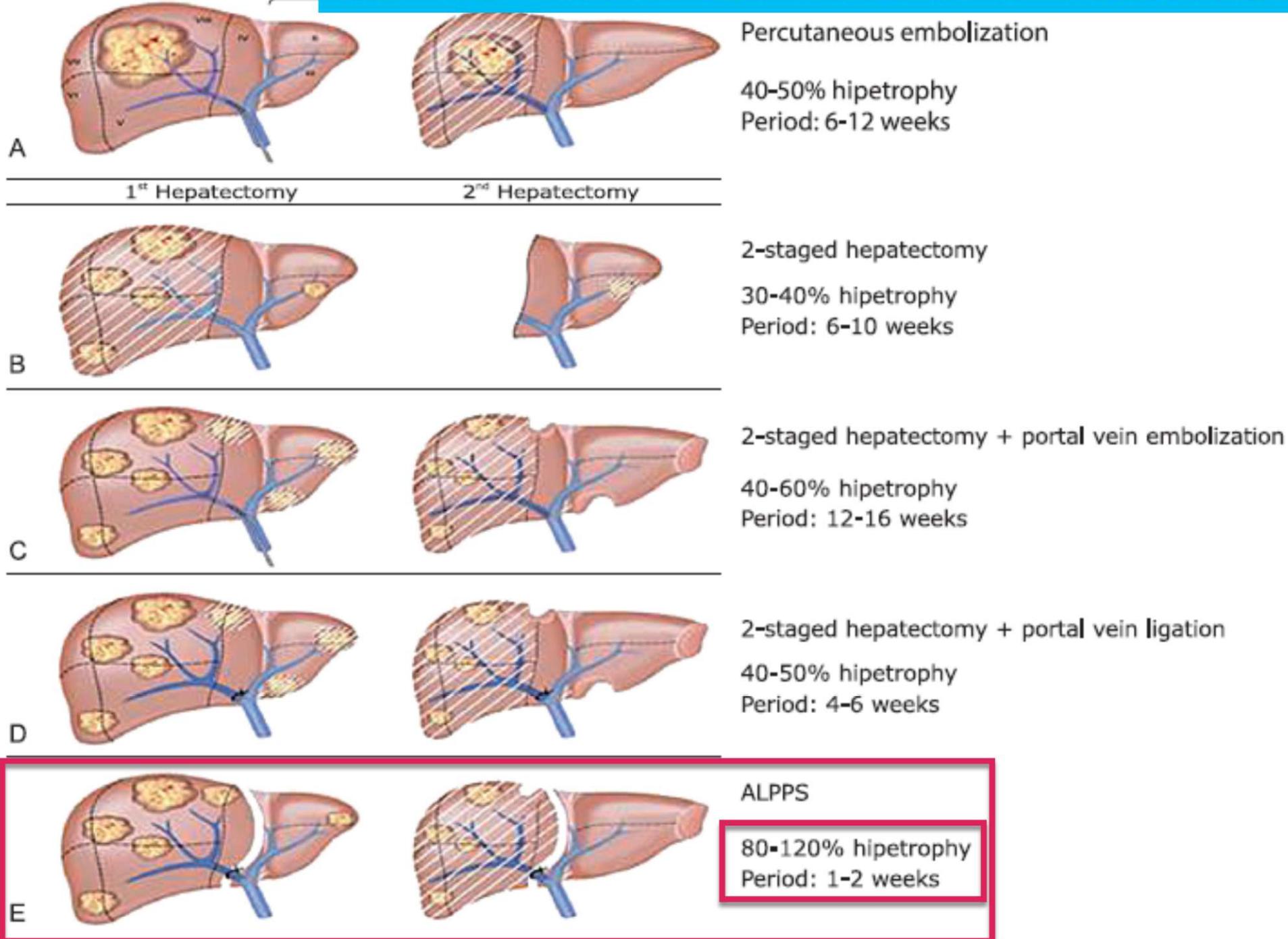
*Compared with <1 mm, **compared with 1–4.9 mm, ***compared with 5–9.9 mm.

≥ 1mm

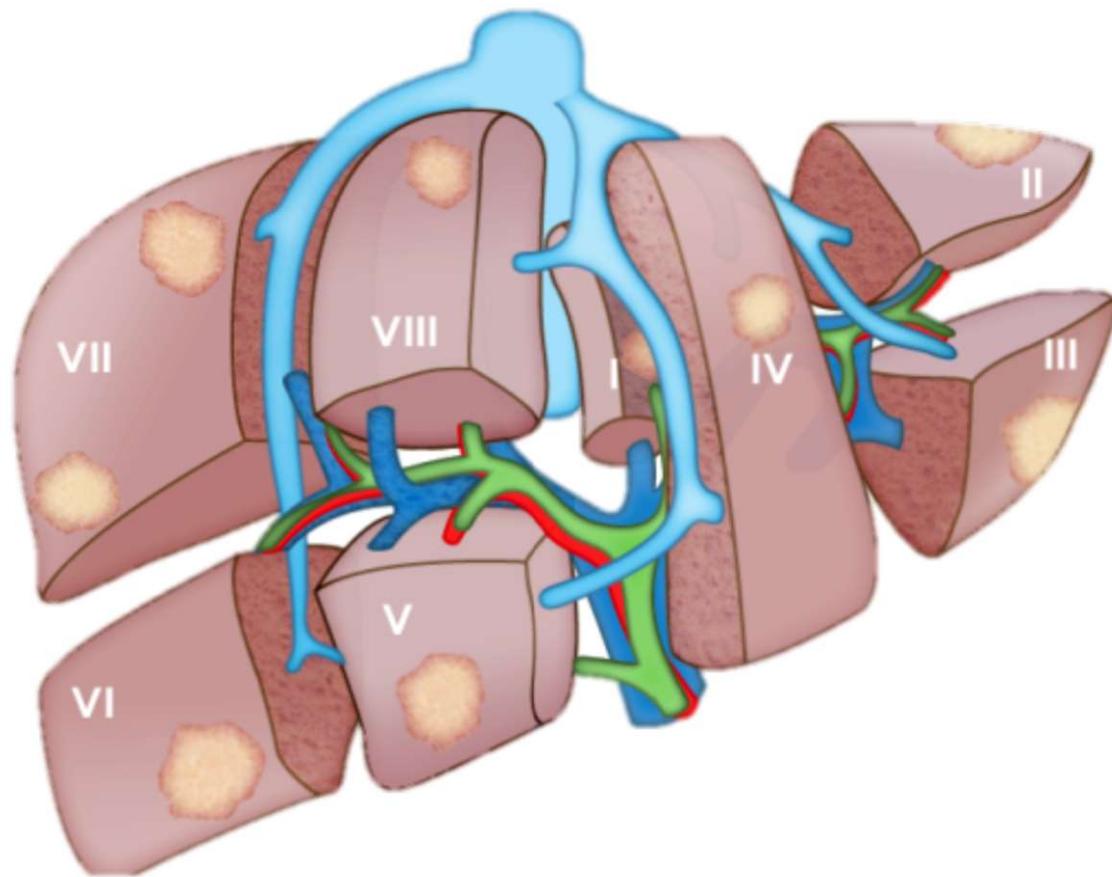
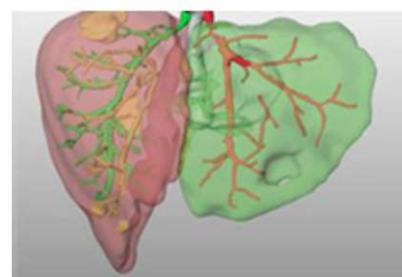
EXTRAHEPATIC DISEASE

- Lung**
- Ovary**
- Bone**
- Lymph node**
- Peritoneum**

UP TO DATE IN LIVER METASTASIS

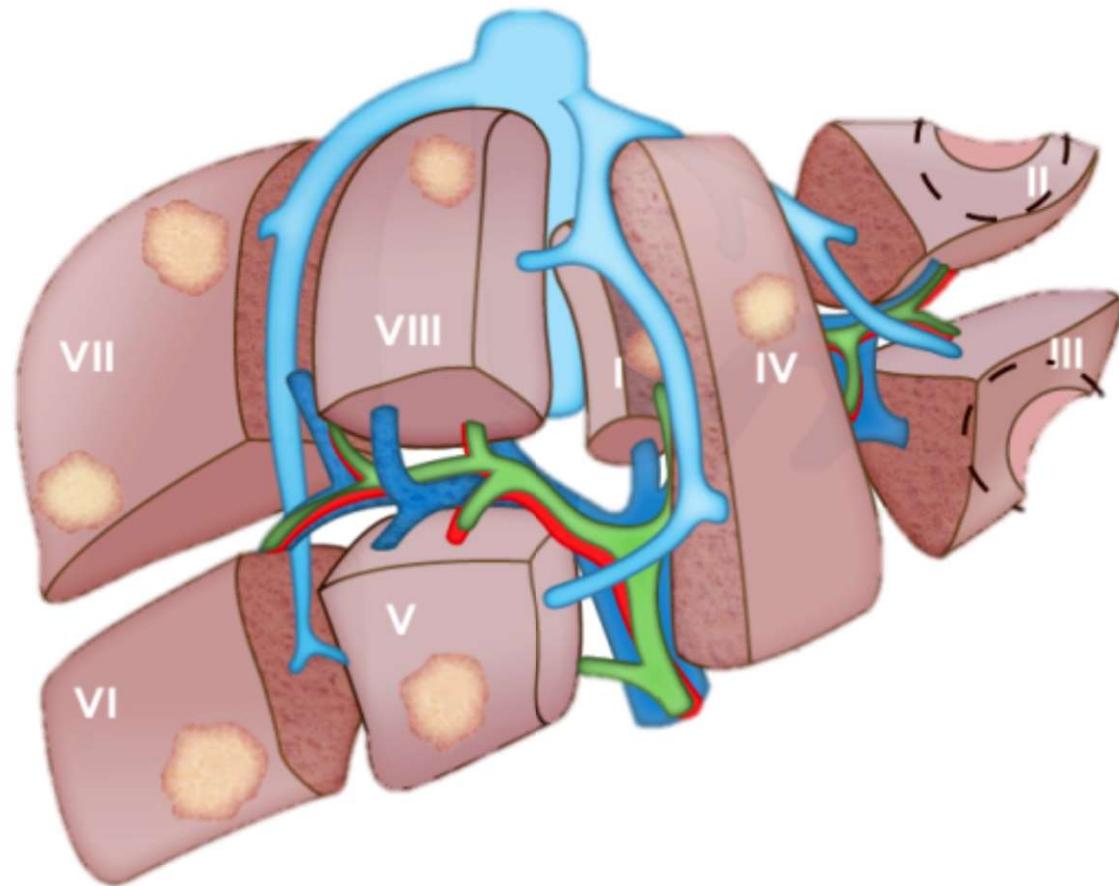
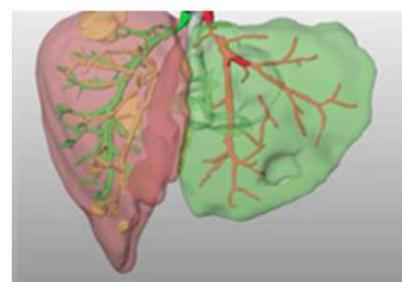


ALPPS

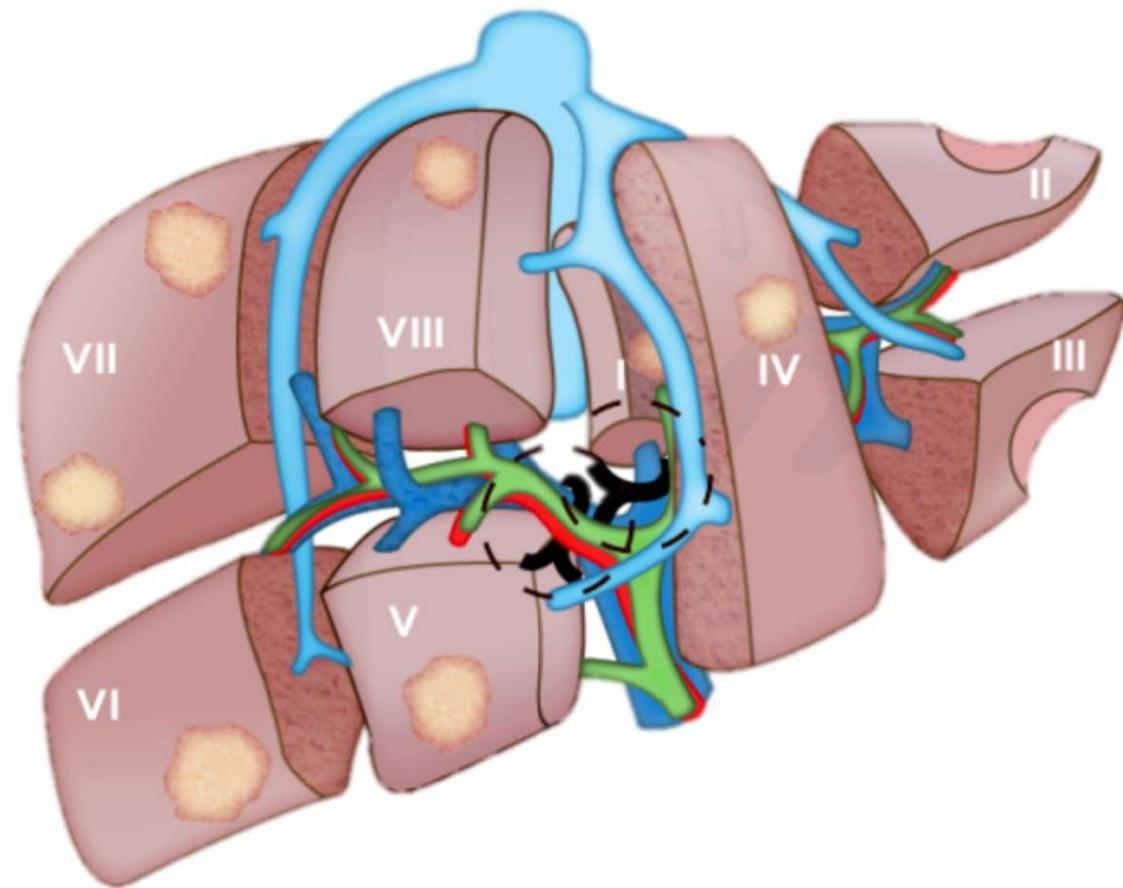
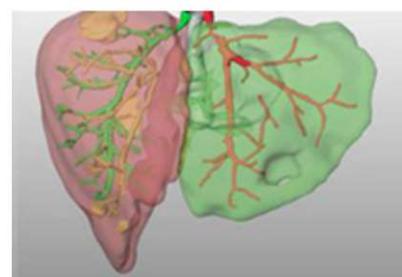


ALPPS, p-ALPPS, and Mini-ALPPS

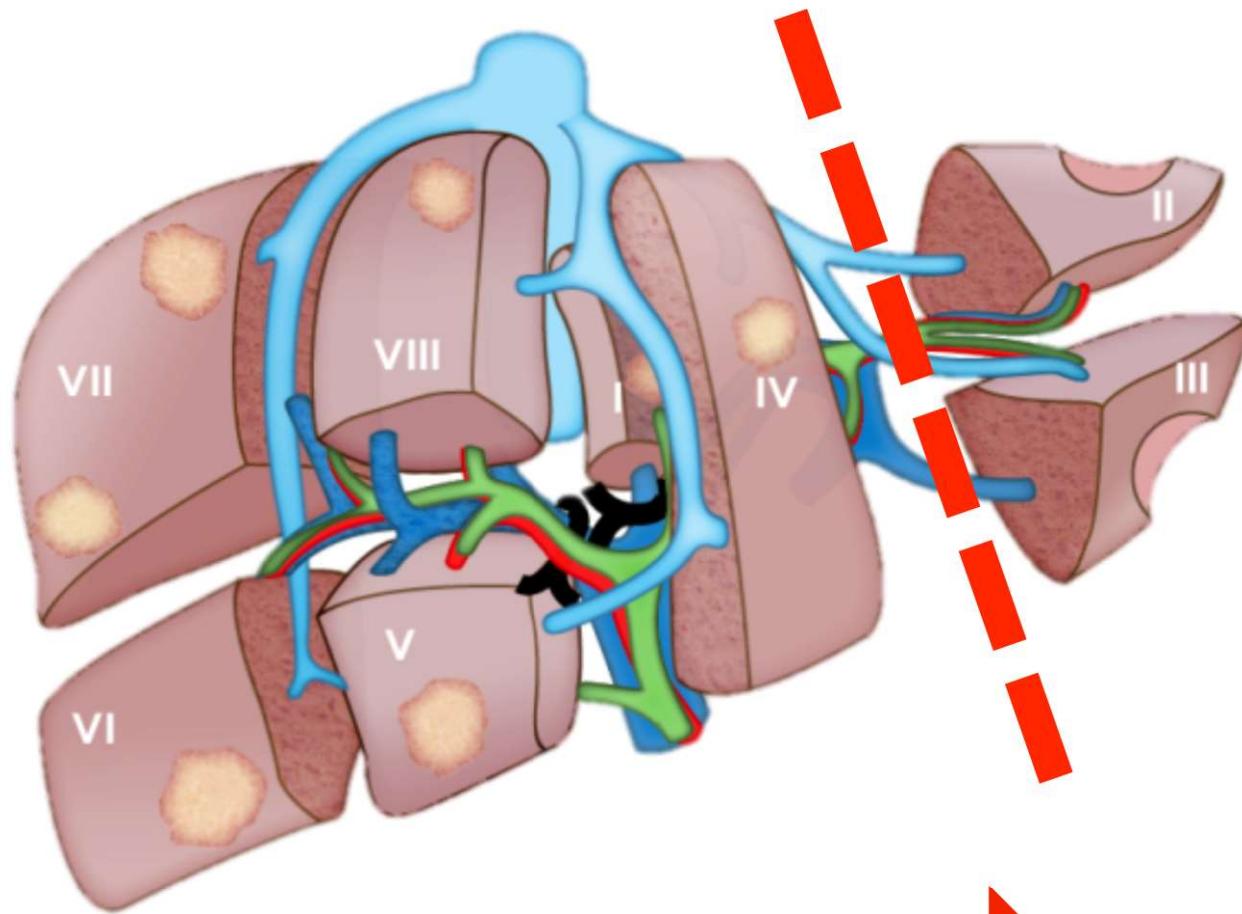
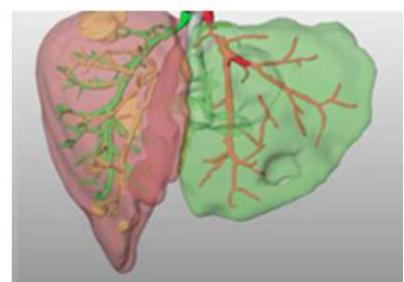
ALPPS



ALPPS

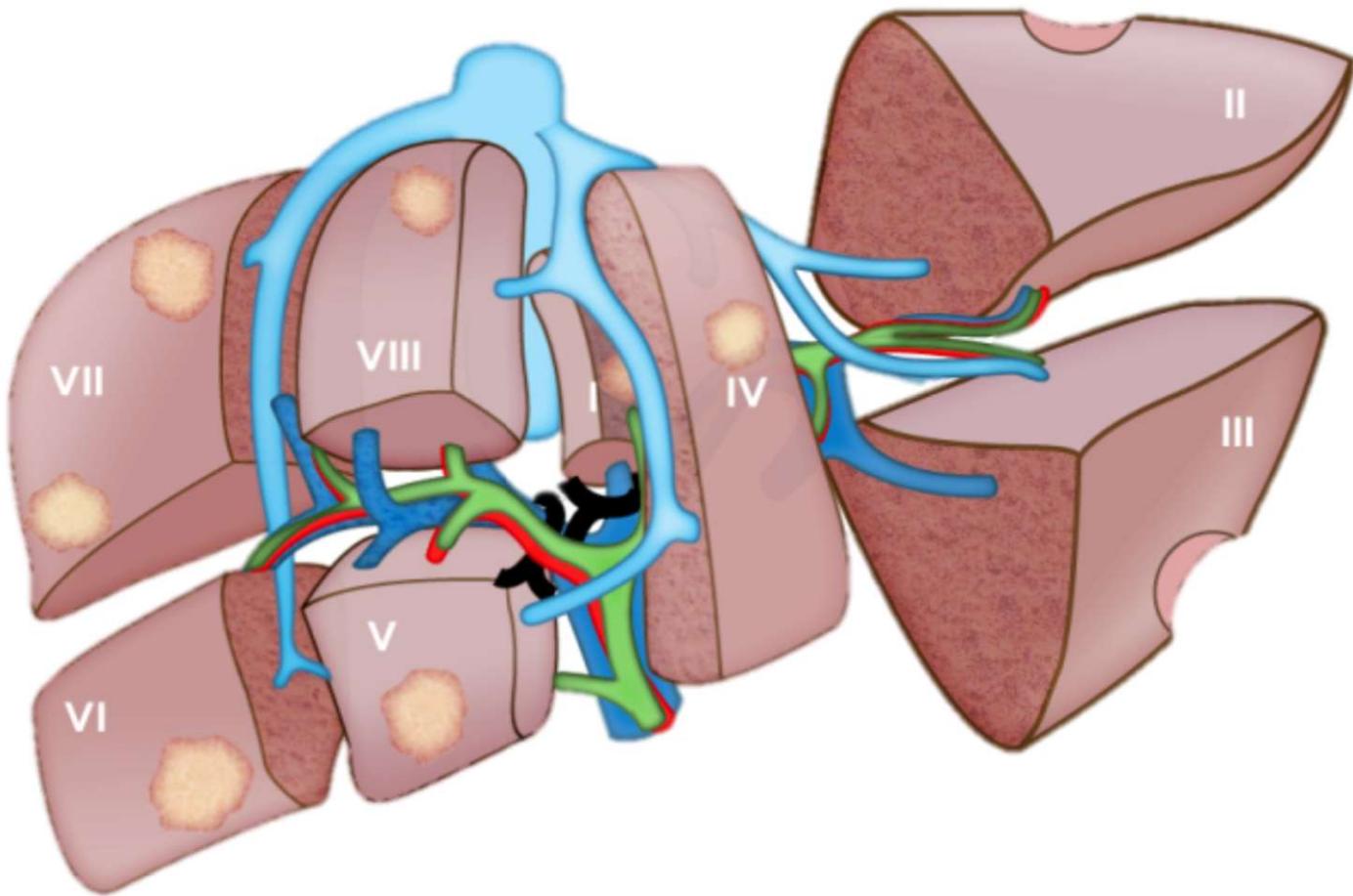
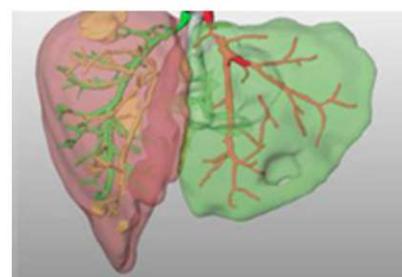


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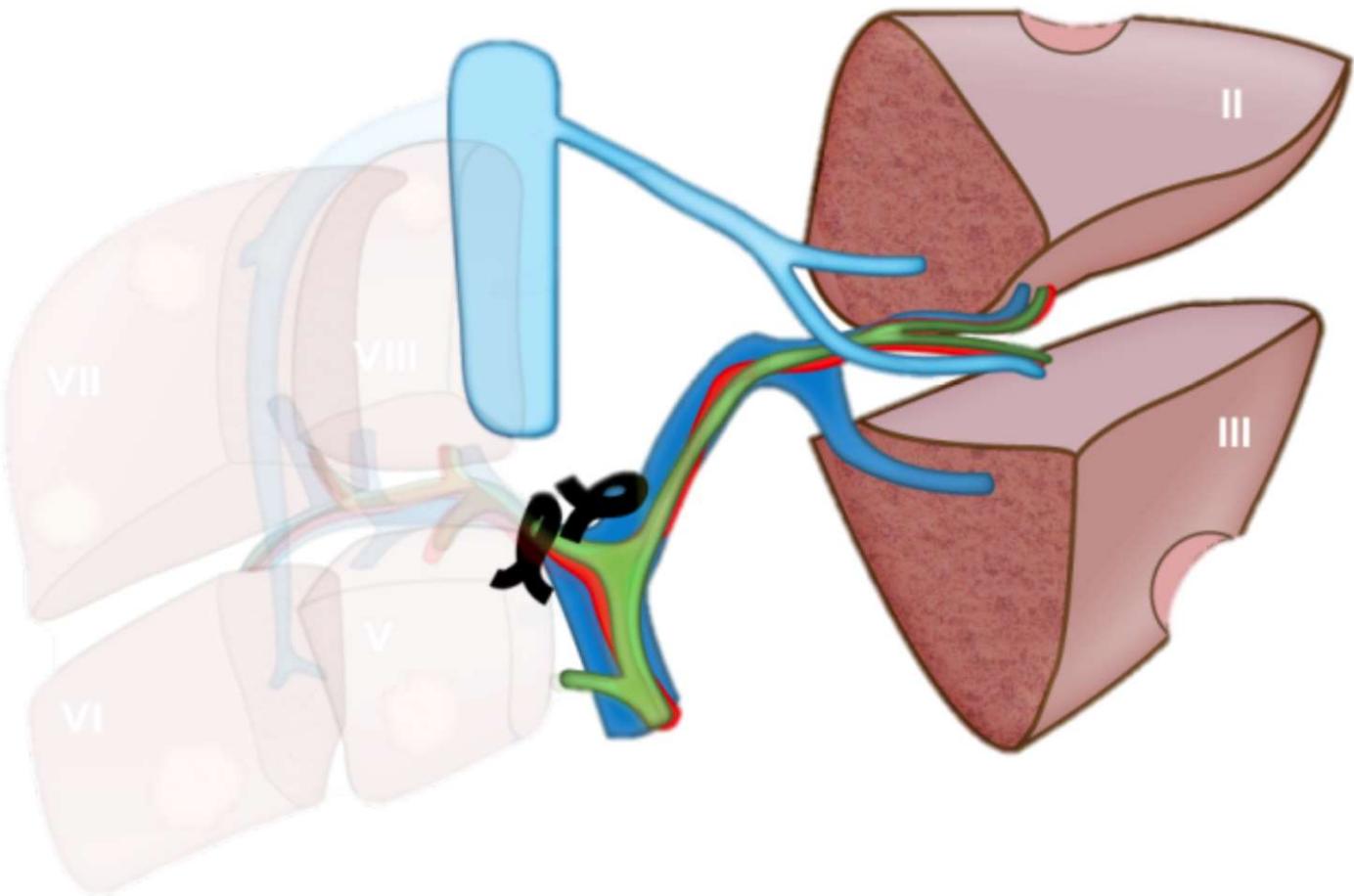
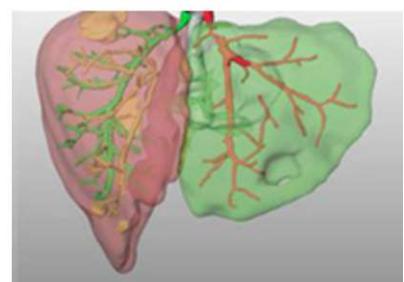


7 days

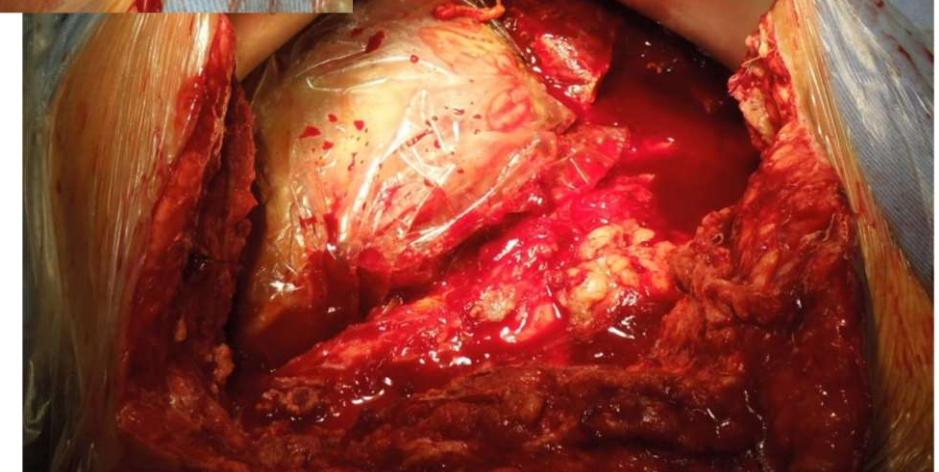
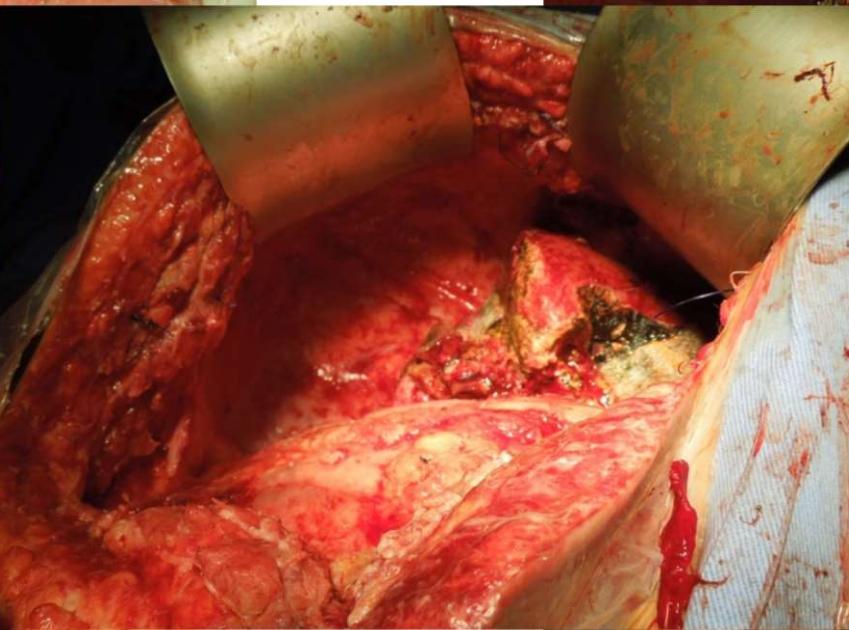
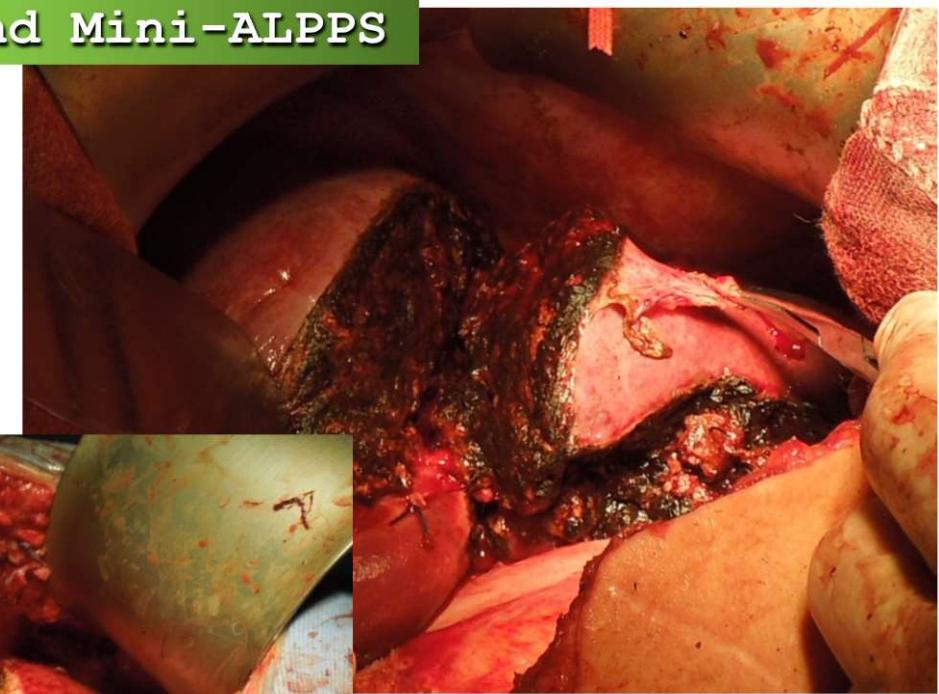
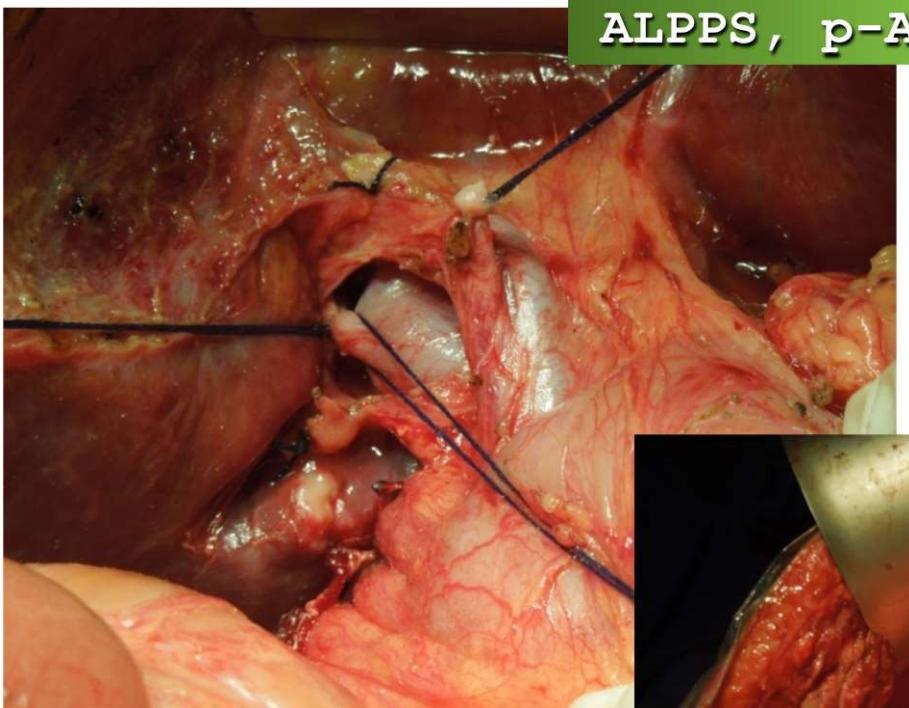
ALPPS

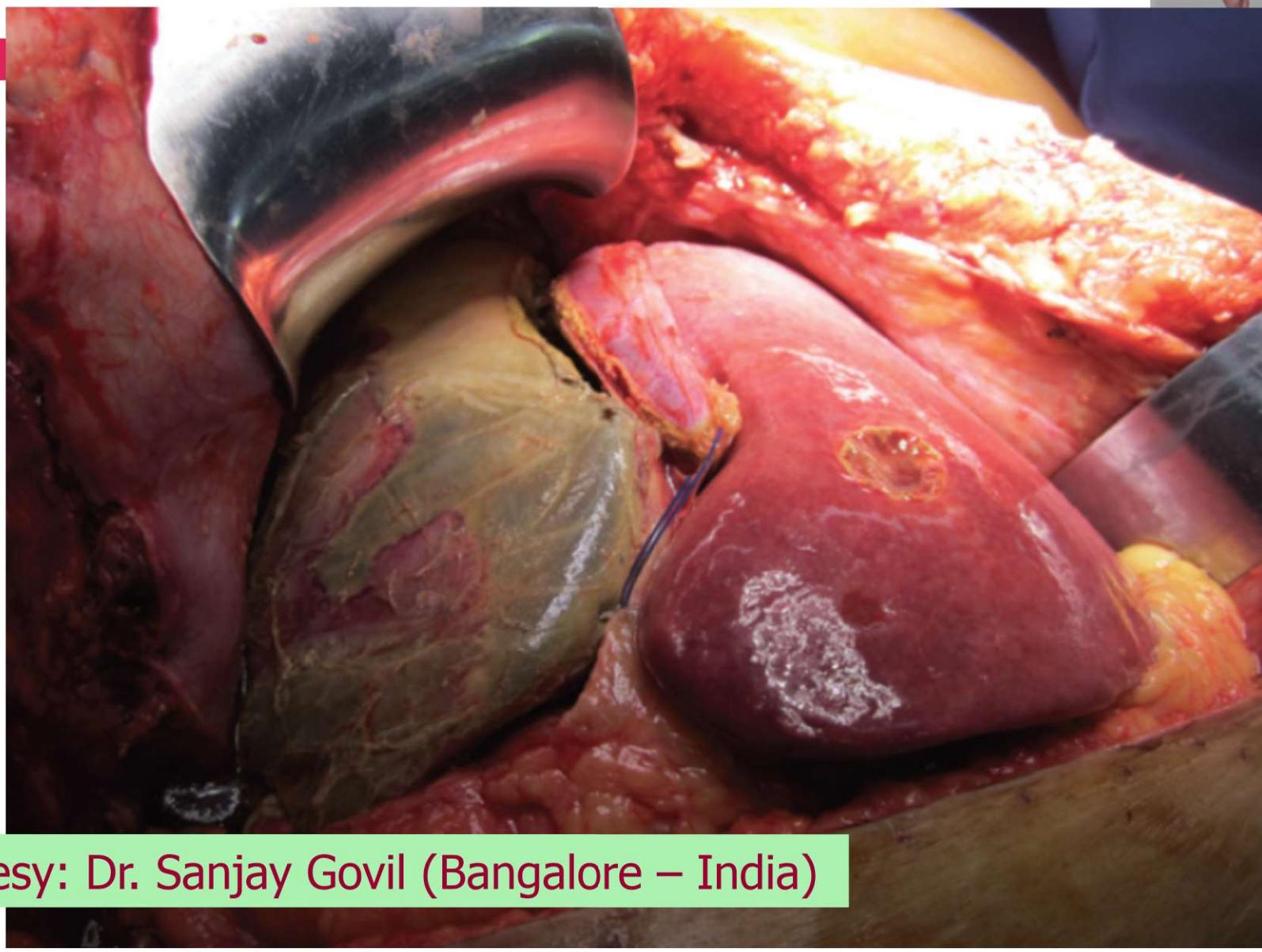
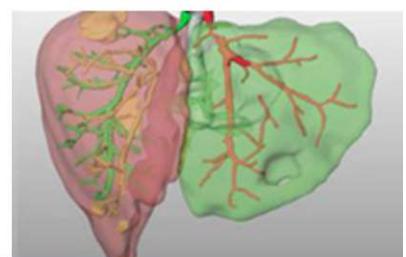


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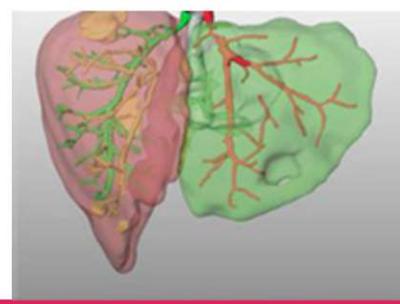


ALPPS, p-ALPPS, and Mini-ALPPS





Courtesy: Dr. Sanjay Govil (Bangalore – India)



EDITORIAL

Playing Play-Doh to Prevent Postoperative Liver Failure

The “ALPPS” approach

Eduardo de Santibañes, MD, PhD, and Pierre-Alain Clavien, MD, PhD†*

The safe removal of extensive tumor load in the liver has been one of the main focuses of laboratory and clinical research for hepato-biliary surgeons over the past 3 decades.¹ The first breakthrough is credited to Masatoshi Makuuchi, who in 1980s, introduced the concept of the portal vein embolization (PVE) of the right portal branch to induce hypertrophy of the left side of the liver, enabling a safer removal of large or multiple tumors, mostly located in the right hemiliver and segment IV/2. This technique was rapidly adopted by many to prevent liver failure after a variety of extensive

Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy

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

Orlando Jorge Martins **TORRES**, José Maria Assunção **MORAES-JUNIOR**, Nádia Caroline Lima e **LIMA**, Anmara Moura **MORAES**

From the Department of Digestive Surgery,
UDI Hospital, São Luis, MA, Brazil.

ABSTRACT – Background - Postoperative liver failure consequent to insufficiency of remnant liver is a feared complication in patients who underwent extensive liver

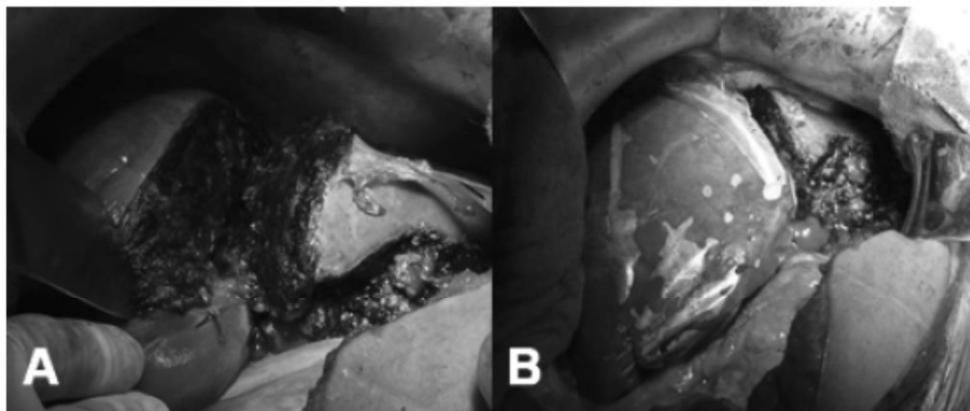
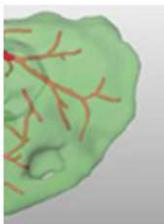


FIGURE 1 - A - Transection of the liver; B - protection with sterile bag



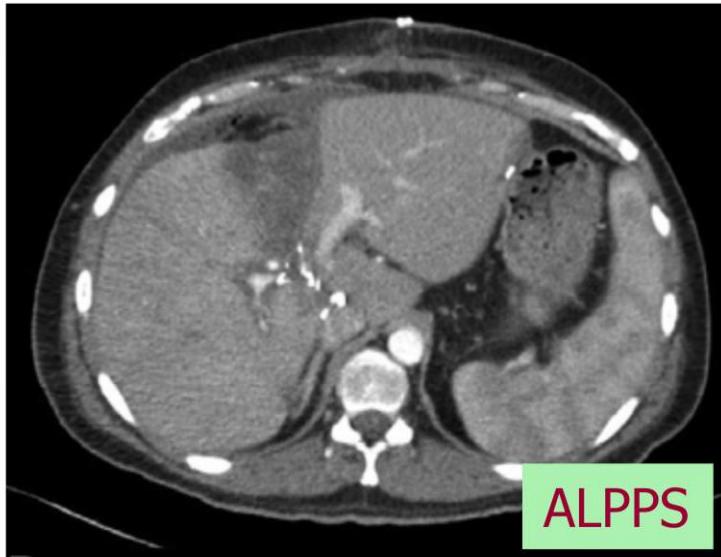
FIGURE 2 - Final aspect of the surgical procedure



Is Partial-ALPPS Safer Than ALPPS?

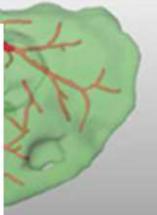
A Single-Center Experience

Henrik Petrowsky, MD, FACS,* Georg Györi, MD,* Michelle de Oliveira, MD, FACS,* Mickaël Lesurtel, MD, PhD,* and Pierre-Alain Clavien, MD, PhD, FACS†



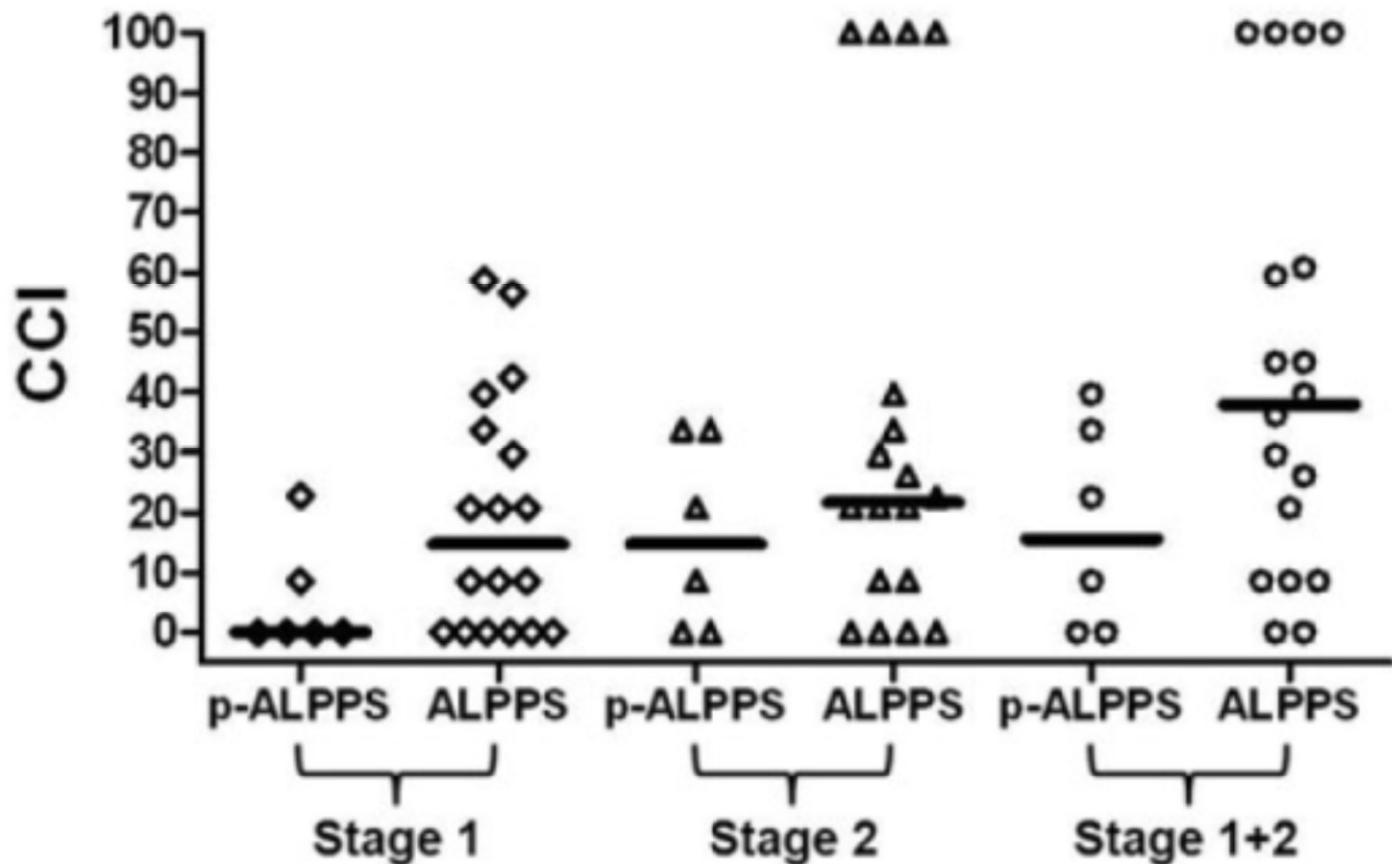
- 50- 80% of transection
- Middle hepatic vein
- Anterior approach
- Tumor near the transection line

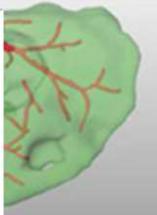
ALPPS, p-ALPPS, and Mini-ALPPS



Is Partial-ALPPS Safer Than ALPPS? A Single-Center Experience

Henrik Petrowsky, MD, FACS,* Georg Györi, MD,* Michelle de Oliveira, MD, FACS,* Mickaël Lesurte, MD, PhD,* and Pierre-Alain Clavien, MD, PhD, FACS†





Is Partial-ALPPS Safer Than ALPPS? *A Single-Center Experience*

Henrik Petrowsky, MD, FACS,* Georg Györi, MD,* Michelle de Oliveira, MD, FACS,* Mickaël Lesurte, MD, PhD,* and Pierre-Alain Clavien, MD, PhD, FACS†

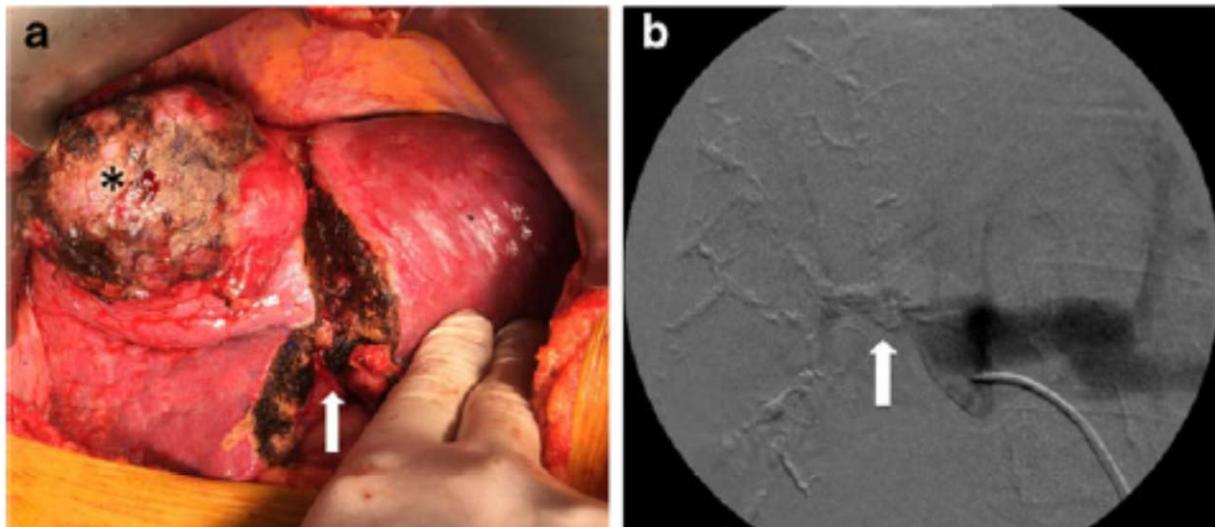
	p-ALPPS (%)	ALPPS (%)
Hipertrophy	60	61
Severe complications	0	33
Mortality	0	22

Risk

HOW-I-DO-IT ARTICLES

Inverting the ALPPS paradigm by minimizing first stage impact: the Mini-ALPPS technique

Eduardo de Santibañes^{1,2} · Fernando A. Alvarez¹ · Victoria Ardiles¹ · Juan Pekolj¹ ·
Martin de Santibañes¹



ALPPS, p-ALPPS, and Mini-ALPPS

HOW-I-DO-IT ARTICLES

Inverting the ALPPS paradigm by minimizing first stage impact: the Mini-ALPPS technique

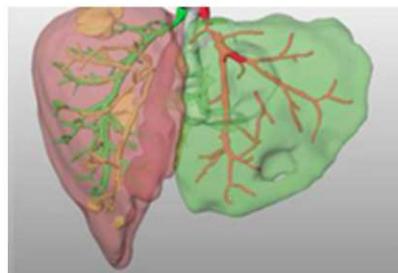
Eduardo de Santibañes^{1,2} • Fernando A. Alvarez¹ • Victoria Ardiles¹ • Juan Pekolj¹ •
Martin de Santibañes¹

Table 1 Patients characteristics and volumetric data

Patient	Sex	Age	Diagnosis	Preop chemotherapy (cycles)	Hepatectomy type	FLR/TLV (%) pre	FLR pre (cc)	FLR post (cc)	Hypertrophy (%)	KGR (cc/day)	Interval (days) ^a
1	Female	66	HCC	–	RTS	40	510	778	52.5	26.8	10
2	Female	71	CRLM	FOLFOX (6)	RTS + FLR clean-up	23	235	420	78.7	12.3	15
3	Female	44	CRLM	FOLFOX + BEV (6)	RTS + FLR clean-up	27	300	427	70	9.8	13
4	Male	61	CRLM	FOLFOX (4)/FOLFIRI + BEV (3)	RH + FLR clean-up	28	530	792	49.4	43.6	6

HCC hepatocellular carcinoma, CRLM colorectal liver metastases, BEV bevacizumab, RTS right trisectionectomy, RH right hepatectomy, FLR future liver remnant, KGR Kinetic growth rate

^a Interval between the first stage and the last volumetric evaluation before the second stage



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 TORRES¹, Eduardo de Souza Martins FERNANDES² Cassio Virgilio Cavalcante OLIV

Cristiano Xavier LIMA⁴, Fabio Luiz WAECHTER⁵, Jose Maria Assunção MORAES-JUNIOR¹,

Marcelo Moura LINHARES⁶, Rinaldo Danese PINTO⁷, Paulo HERMAN⁸, Marcel Autran Cesar MACHAD

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



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.

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 irreessecáveis*

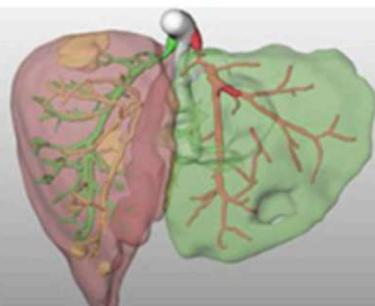
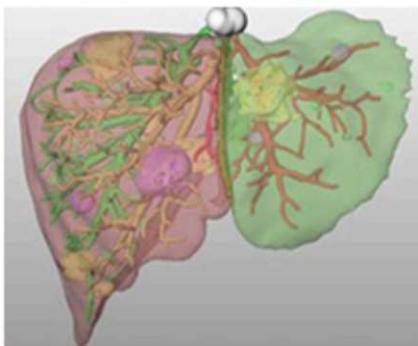
Orlando Jorge Martins **TORRES**^{1,2,6}, Márcio Carmona **MARQUES**^{2,6}, Fabio Nasser **SANTOS**¹, Igor Correia de **FARIAS**^{2,6},
Anelisa Kruschewsky **COUTINHO**³, Cássio Virgílio Cavalcante de **OLIVEIRA**^{1,4,5}, Antonio Nocchi **KALIL**^{1,2,4,6},
Celso Abdón Lopes de **MELLO**³, Jaime Arthur 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}

ALPPS

□ Alternative for two-stage hepatectomy

□ Rescue surgery – after PVE

ALPPS, p-ALPPS, and Mini-ALPPS



1 st International Consensus Meeting on ALPPS

February 27th and 28th 2015, Hamburg, Germany

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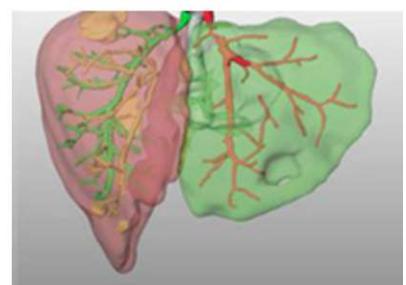


European-African Hepato-Pancreato-Biliary Association

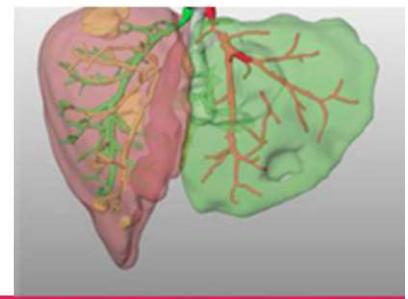
Supported with a grant of DFG

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Brazilians in Hamburg



INDICAÇÕES / SELEÇÃO



- Colorectal liver metastasis
- Rescue ALPPS (failed PVE)
- Bilobar disease (not indicated PVE)
- Intraoperative decision (unexpected tumor)
- FLR < 30% (ou < 0.5% of body weight)
- Extended right hepatectomy
- Need for huge hypertrophy
- Age ≤ 60 years old
- Tumor margin near the remnant

ALPPS, p-ALPPS, and Mini-ALPPS

ORIGINAL ARTICLE

ALPPS as a salvage procedure after insufficient future liver remnant hypertrophy following portal vein occlusion

Marcelo Enne¹, Erik Schadde^{2,3}, Berghór Björnsson⁴, Roberto Hernandez Alejandro⁵, Klaus Steinbrück⁶, Eduardo Viana¹, Ricardo Robles Campos⁷, Massimo Malago⁸, Pierre-Alain Clavien⁹, Eduardo De Santibanes¹⁰, Brice Gayet¹¹ & On Behalf of ALPPS Registry Group

¹Ipanema Federal Hospital, Brazil, ²Cantonal Hospital Winterthur, Canton of Zürich, Switzerland, ³Linköping University, Sweden, ⁴Department of Surgery, University of Roskilde Hospital, Denmark, ⁵Virgen de la Arrixaca University Hospital, Spain, ⁶Royal Free Hospital, London, UK, ⁷Hospital Italiano, Argentina, ⁸Royal Free Hospital, London, UK, ⁹Hospital Mutualiste Montsouris, France, ¹⁰Hospital Italiano, Argentina, and ¹¹Institut Mutualiste Montsouris, Paris, France

Table 3 Volumetric findings after PVO and Salvage ALPPS

FLR before PVO, ml, median (range) n = 15	339 (158–637)
FLR/SLV ratio before PVO, %, median (range) n = 15	20 (10–37)
Growth of FLR after PVO, %, median (range) n = 15	15 (−2–107)
Days from PVO to CT, median (range) n = 15	30 (15–56)
FLR before ALPPS, ml, median (range) n = 20	400 (183–707)
FLR/SLV ratio before ALPPS, %, median (range) n = 20	23 (10–41)
FLR before stage 2, ml, median (range) n = 20	786 (380–1008)
FLR/SLV ratio before stage 2, %, median (range) n = 20	41 (24–67)
Growth of FLR between stage 1 and 2, %, median (range) n = 20	88 (23–115)

ALPPS, p-ALPPS, and Mini-ALPPS

During liver regeneration following right portal embolization the growth rate of liver metastases is more rapid than that of the liver parenchyma

D. Elias, T. de Baere, A. Roche, M. Ducreux, J. Leclerc and P. Lasser

Departments of Surgical Oncology and Interventional Radiology, Institut Gustave Roussy, Rue Camille Desmoulins, 94805 Villejuif Cedex, France
Correspondence to: Dr D. Elias

- Liver volume – 59-127%
- Tumor volume – 60-970%

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 **TORRES¹**, Eduardo de Souza Martins **FERNANDES²** Cassio Virgilio Cavalcante **OLIVEIRA³**,
Cristiano Xavier **LIMA⁴**, Fabio Luiz **WAECHTER⁵**, Jose Maria Assunção **MORAES-JUNIOR¹**,
Marcelo Moura **LINHARES⁶**, Rinaldo Danese **PINTO⁷**, Paulo **HERMAN⁸**, Marcel Autran Cesar **MACHADO⁹**

- Morbidity – 59%
- Cholangiocarcinoma
- Other:
 - Colectomy
 - Pancreatoduodenectomy
- Risk score
- Mortality – 12.8%



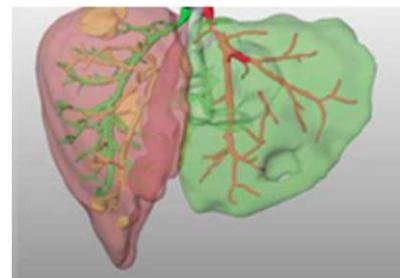
ORIGINAL ARTICLE

Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy Offers High Oncological Feasibility With Adequate Patient Safety

A Prospective Study at a Single Center

Fernando A. Alvarez, MD, Victoria Ardiles, MD, Martin de Santibañes, MD, Juan Pekolj, MD, PhD,
and Eduardo de Santibañes, MD, PhD

- 53% Morbidity
- 6.6% Mortality



PAPER OF THE 21ST ANNUAL ESA MEETING

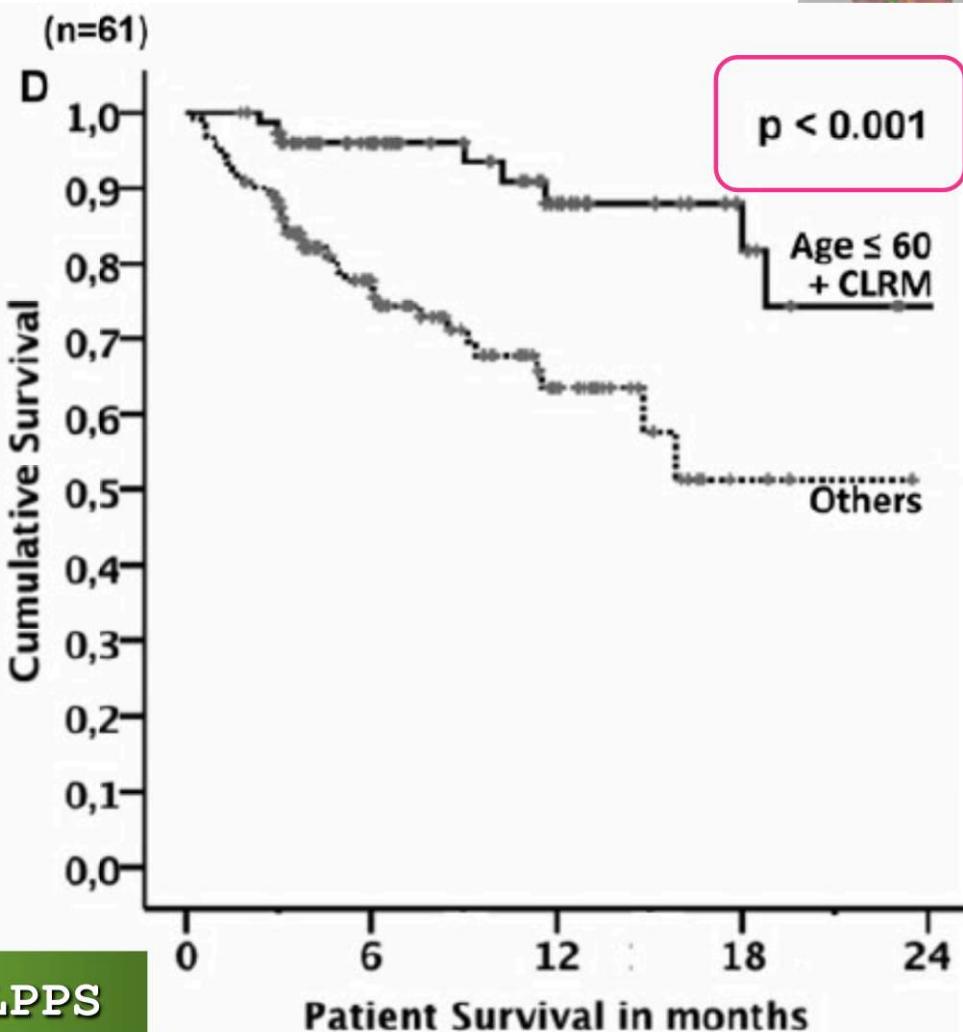
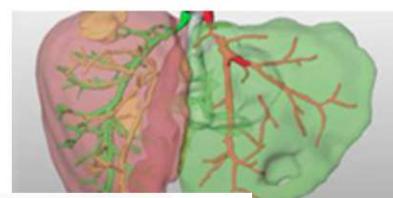
Early Survival and Safety of ALPPS

First Report of the International ALPPS Registry

Erik Schadde, MD, FACS,* Victoria Ardiles, MD,† Ricardo Robles-Campos, MD,‡ Massimo Malago, MD, FACS,§
Marcel Machado, MD,¶ Roberto Hernandez-Alejandro, MD,|| Olivier Soubbrane, MD,**
Andreas A. Schnitzbauer, MD,†† Dimitri Raptis, MD,* Christoph Tschuor, MD,* Henrik Petrowsky, MD, FACS,*
Eduardo De Santibanes, MD, PhD, FACS,† and Pierre-Alain Clavien, MD, PhD, FACS*§§; On behalf of the ALPPS
Registry Group

- 40 % Morbidity
- 9 % Mortality

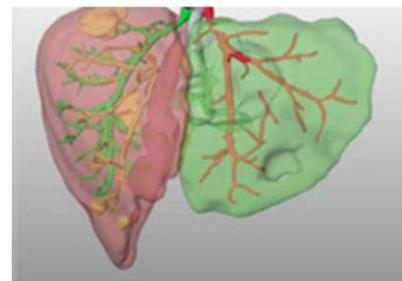
ALPPS Registry



ALPPS, p-ALPPS, and Mini-ALPPS

Numbers at risk

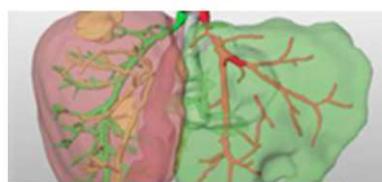
Age≤60+CRLM (n=78)	71	30	13	10
Others (n=121)	72	29	8	0



Can we improve the morbidity and mortality associated with the associating liver partition with portal vein ligation for staged hepatectomy (ALPPS) procedure in the management of colorectal liver metastases?

Roberto Hernandez-Alejandro, MD,^a Kimberly A. Bertens, MD, MPH,^a Karen Pineda-Solis, MD,^a and Kristopher P. Croome, MD, MS,^{a,b} London, Ontario, Canada, and Rochester, MN

- 36 % Morbidity
- 0 % Mortality



High Mortality Rates After ALPPS: the Devil Is the Indication

**Paulo Herman · Jaime Arthur Pirola Krüger ·
Marcos Vinícius Perini · Fabrício Ferreira Coelho ·
Ivan Cecconello**

0 % Mortality

Table 1 Operative results

	Gender, age, date	Diagnosis	Indication for ALPPS	Time between first and second OR (days)	Time from second OR to discharge (days)	Complications	FLR hypertrophy (%)
Case 1	M 48 17/11/11	MCRC	Multiple mets and small FLR	7	20	Liver failure Pulmonary sepsis	81
Case 2	M 58 16/02/12	MCRC	Multiple mets and intraoperative decision	7	6	None	78
Case 3	M 58 23/05/12	iCCC	Proximity to the hepatic vein and small FLR	7	8	None	82
Case 4	M 58 07/11/12	MCRC	Multiple mets and small FLR	7	7	None	75
Case 5	F 38 10/04/13	MCRC	Multiple mets and small FLR	7	7		67
Case 6	M 52 17/06/13	MCRC	Multiple mets and small FLR	8	30	Biliary fistula Hepatic insufficiency	37
Case 7	F 55 15/11/13	MCRC	Multiple mets and small FLR	14	8	None	61



ALPPS: PAST, PRESENT AND FUTURE

ALPPS: passado, presente e futuro

Orlando Jorge M TORRES¹, Eduardo S M FERNANDES², Paulo HERMAN³

¹Universidade Federal do Maranhão (Federal University of Maranhão), São Luís, MA; ² Hospital Adventista Silvestre, Rio de Janeiro, RJ, Brazil;

³Universidade de São Paulo (University of São Paulo), São Paulo, SP, Brazil.

Complete tumor resection in the liver is the only chance to obtain long-term survival in patients with hepatic tumor or metastasis from other primary cancers. In patients with a large load of tumor within the liver, multiple strategies have been employed to improve resection, especially when a small liver remnant is expected. Staged hepatectomies, in

- Decided at MDT
- FLR < 30%
- Rescue ALPPS (failed PVE)
- Avoid cholangiocarcinoma
- Minimize morbidity and mortality



The ALPPS procedure for hepatocellular carcinoma larger than 10 centimeters



Orlando Jorge M. Torres*, Rodrigo Rodrigues Vasques, Thiago Henrique S. Silva,
Miguel Eugenio L. Castelo-Branco, Camila Cristina S. Torres

Department of Digestive Surgery, Federal University of Maranhão, São Luiz, MA, Brazil

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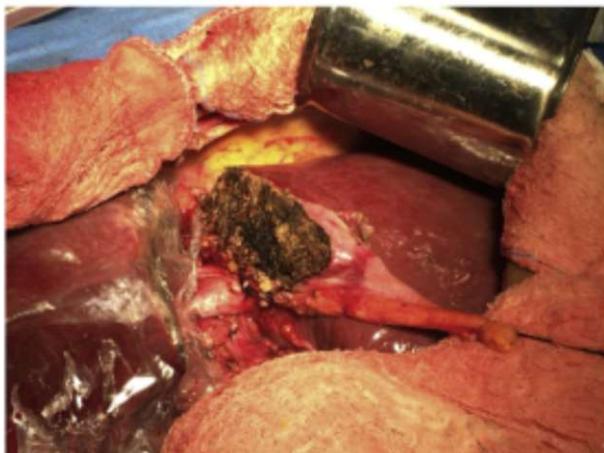


Fig. 2. ALPPS first procedure with plastic bag.

ABSTRACT

INTRODUCTION: The only means of achieving long-term survival in hepatocellular carcinoma is complete tumor resection or liver transplantation. Patients with large hepatocellular carcinomas are currently

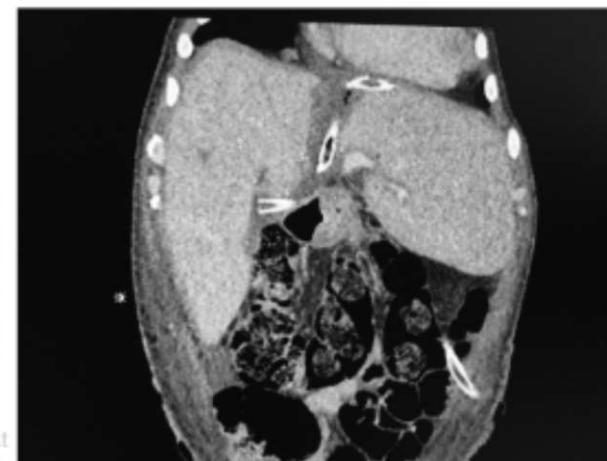


Fig. 3. CT 15 days after the first procedure.

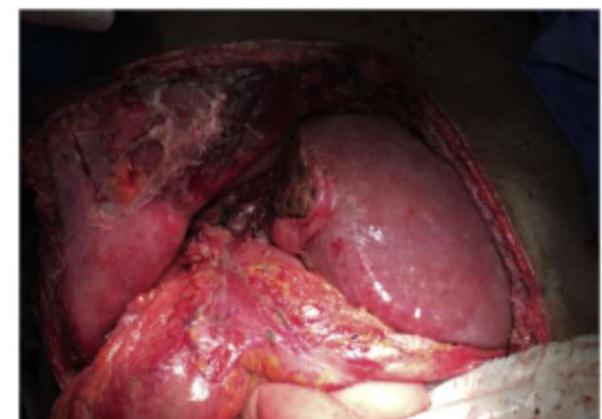
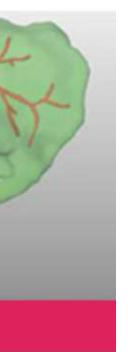


Fig. 4. Final aspect of the liver remnant.



The ALPPS Risk Score *Avoiding Futile Use of ALPPS*

Michael Linecker, MD,* Gregor A. Stavrou, MD,†‡ Karl J. Oldhafer, MD,†‡ Robert M. Jenner, MD,†
Burkhardt Seifert, PhD,§ Georg Lurje, MD,¶ Jan Bednarsch, MD,¶ Ulf Neumann, MD,¶
Ivan Capobianco, MD,|| Silvio Nadalin, MD,|| Ricardo Robles-Campos, MD,||
Eduardo de Santibañes, MD, PhD, FACS,†† Massimo Malagó, MD,†‡ Mickael Lesurtel, MD, PhD,*
Pierre-Alain Clavien, MD, PhD, FACS,* and Henrik Petrowsky, MD, FACS*

Objectives: To create a prediction model identifying futile outcome in

Conclusions: Both models have an excellent prediction to assess the individual risk of futile outcome after ALPPS surgery and can be used to avoid

TABLE 3. Risk Modeling

	Risk Points	Regression Coefficient	Odds Ratio (95% CI)	P
Pre-stage 1 variables*				
Tumor type†				
CRLM (reference)	0	0.000	1.000	
Non-CRLM/nonbiliary	1	0.655	1.925 (0.808–4.585)	0.139
Biliary	2	1.326	3.767 (1.800–7.882)	<0.001
Age ≥67 yr	3	1.735	5.668 (2.843–11.30)	<0.001
Intercept pre-stage 1		-5.3		
Pre-stage 2 variables‡				
Pre-stage 1 score, per point	0.66	0.665	1.925 (1.527–2.426)	<0.001
Interstage complications ≥3b	1.2	1.209	3.350 (1.280–8.769)	0.014
Pre-stage 2 bilirubin§	1.5	1.496	4.439 (1.699–11.60)	0.002
Pre-stage 2 creatinine	1.7	1.696	5.454 (1.606–18.52)	0.007
Intercept pre-stage 2		-6.8		

□ Pre-stage I Ponto

Não colorectal/biliar 1

Biliary surgery (Cholangiocarcinoma) 2

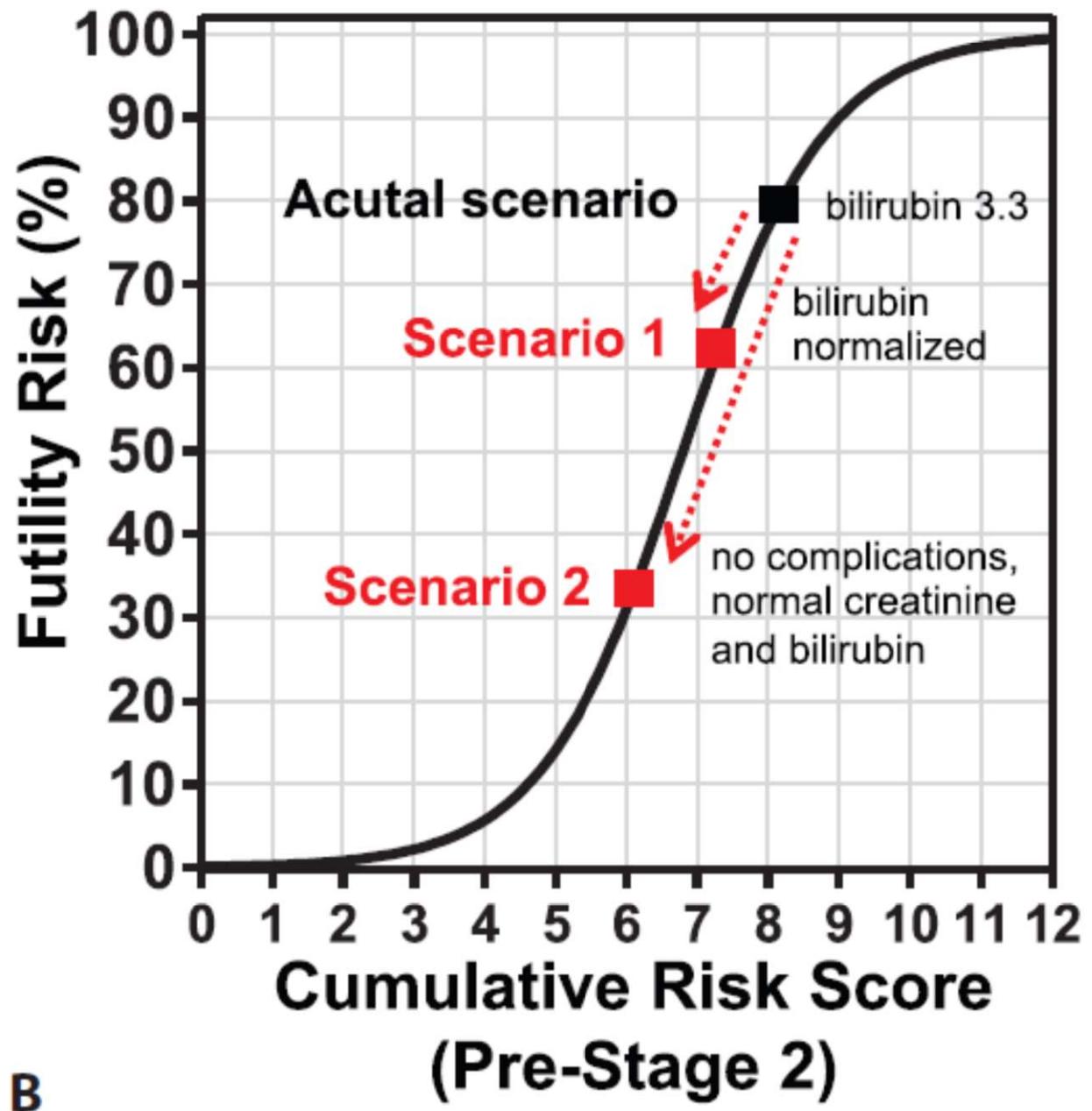
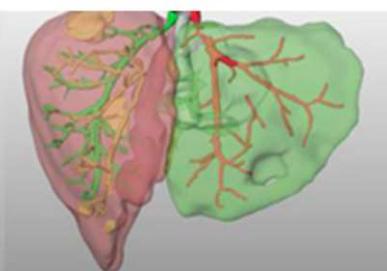
Age ≥ 67 yr 3

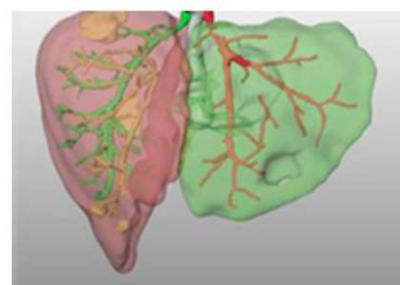
□ Pre-stage II

Complications ≥ 3b

Bilirubin

Creatinine





Risk	Score
5%	3.9
10%	4.7
20%	5.5
50%	6.9

ALPPS, p-ALPPS, and Mini-ALPPS

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

¹Swiss HPB and Transplantation Center, Department of Surgery, University Hospital Zurich, Switzerland, ²Liver Unit, Queen Elizabeth Hospital Birmingham, University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK, ³Department of General, Visceral and Transplant Surgery, University Hospital Tübingen, Tübingen, Germany, ⁴Department of Surgery, Universidade Federal do Maranhão, São Luis, MA, Brazil, ⁵Department of General, Visceral, and Transplantation Surgery, University of Heidelberg, Heidelberg, ⁶Department of Abdominal, Thoracic and Pediatric Surgery, Saarbruecken General Hospital, Saarbruecken, ⁷Semmelweis University, Budapest, Campus Hamburg, ⁸Department of General and Abdominal Surgery, Asklepios Hospital Barmbek, Hamburg, ⁹Department of Surgery and Transplantation, University Hospital RWTH Aachen, Aachen, Germany, ¹⁰Department of Surgery, Ankara University, Ankara, Turkey, ¹¹Department of General, Visceral, and Transplant Surgery, Universitätsmedizin Mainz, Mainz, Germany, ¹²Department of Surgery and Liver and Pancreas Transplantation, Virgen de la Arrixaca Clinic and University Hospital, Murcia, Spain, ¹³Department of Surgery, Division of HPB Surgery and Liver Transplantation, London Health Sciences Centre, London, Ontario, Canada, ¹⁴Division of Transplantation, Hepatobiliary Surgery, University of Rochester, Rochester, USA, ¹⁵Department of HPB- and Liver Transplantation Surgery, University College London, Royal Free Hospitals, London, UK, and ¹⁶Department of Surgery, Division of HPB Surgery, Liver Transplant Unit, Italian Hospital Buenos Aires, Argentina

Table 1 ALPPS pre-stage 1 and pre-stage 2 risk score¹⁰

	Risk points
Pre-stage 1 variables	
Tumor type	
CRLM (reference)	0
Non-CRLM, non-biliary	1
Biliary	2
Age \geq 67 years	3
Pre-stage 2 variables	
Pre-stage 1 score, per point	0.66
Inter-stage complications \geq 3b	1.2
Serum bilirubin pre-stage 2	1.5
Serum creatinine pre-stage 2	1.7

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 **TORRES¹**, Eduardo de Souza Martins **FERNANDES²** Cassio Virgilio Cavalcante **OLIVEIRA³**,
Cristiano Xavier **LIMA⁴**, Fabio Luiz **WAECHTER⁵**, Jose Maria Assunção **MORAES-JUNIOR¹**,
Marcelo Moura **LINHARES⁶**, Rinaldo Danese **PINTO⁷**, Paulo **HERMAN⁸**, Marcel Autran Cesar **MACHADO⁹**

- 83 yr
- 12.8 % Mortality
- Sarcoma
- Additional surgery:
 - Colectomy
 - Pancreatoduodenectomy

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 **TORRES¹**, Eduardo de Souza Martins **FERNANDES²** Cassio Virgilio Cavalcante **OLIVEIRA³**,
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Marcelo Moura **LINHARES⁶**, Rinaldo Danese **PINTO⁷**, Paulo **HERMAN⁸**, Marcel Autran Cesar **MACHADO⁹**

TABLE 1 - Complications after ALPPS approach

Complications	n	%
Surgical site infection	8	20.5
Ascites	5	12.8
Biliary fistula	4	10.2
Pneumonia	4	10.2
Abdominal hernia	4	10.2
Sepsis	3	7.7
Acute renal failure	2	5.1
Bile duct injury	1	2.5
Hepatic artery thrombosis	1	2.5
Acute liver failure	1	2.5
Others	9	23.0

Ativar o Windows

- High risk score
- 4 patients
- 35 patients
- 1 death
- Mortal 2.86%

UP TO DATE IN LIVER METASTASIS

LIVER TRANSPLANT

Review Article

Transplantation for colorectal metastases: on the edge of a revolution

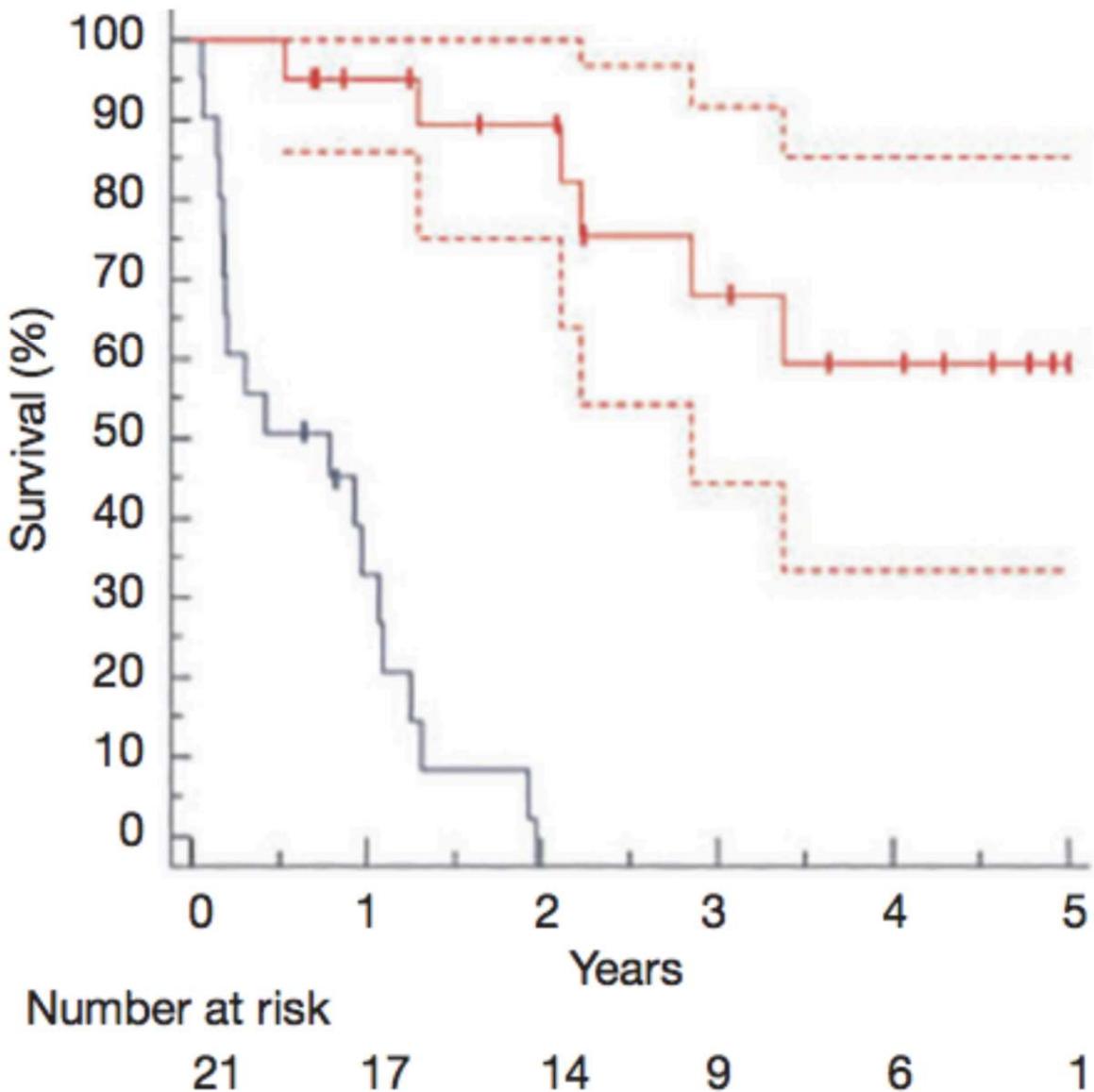
Axel Andres¹, Graziano Oldani¹, Thierry Berney¹, Philippe Compagnon¹, Pål-Dag Line^{2,3}, Christian Toso¹

¹Transplantation Division, Department of Surgery, Geneva University Hospital, Geneva, Switzerland; ²Department of Transplantation Medicine, Oslo University Hospital, Oslo, Norway; ³Institute of Clinical Medicine, University of Oslo, Oslo, Norway

Contributions: (I) Conception and design: A Andres, C Toso, PD Line; (II) Administrative support: All authors; (III) Provision of study materials or patients: None; (IV) Collection and assembly of data: None; (V) Data analysis and interpretation: None; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Axel Andres. Transplantation and Visceral Surgery, Department of Surgery, Geneva University Hospital, Rue Gabrielle-Perret-Gentil 4, 1211 Geneva, Switzerland. Email: axel.andres@hcuge.ch.

LIVER TRANSPLANT



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

S. Dueland¹ , P.-D. Line^{2,3}, M. Hagness², A. Foss² and M. H. Andersen^{2,4}

Departments of ¹Oncology and ²Transplantation Medicine, Oslo University Hospital, and Institutes of ³Clinical Medicine and ⁴Health and Society, University of Oslo, Oslo, Norway

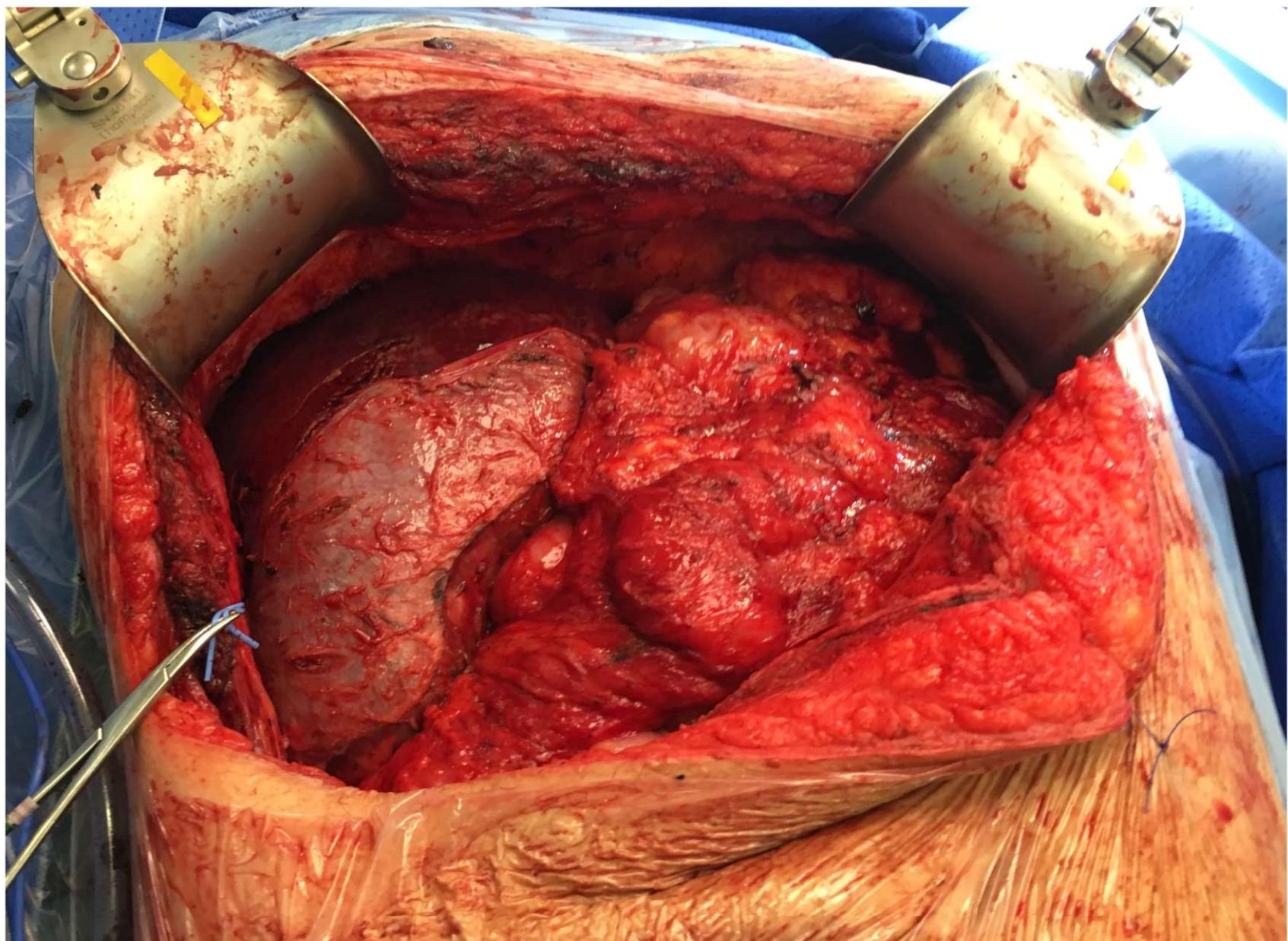
Correspondence to: Dr S. Dueland, Department of Oncology, Oslo University Hospital, Postbox 4950 Nydalen, N-0424 Oslo, Norway
(e-mail: svedue@ous-hf.no)



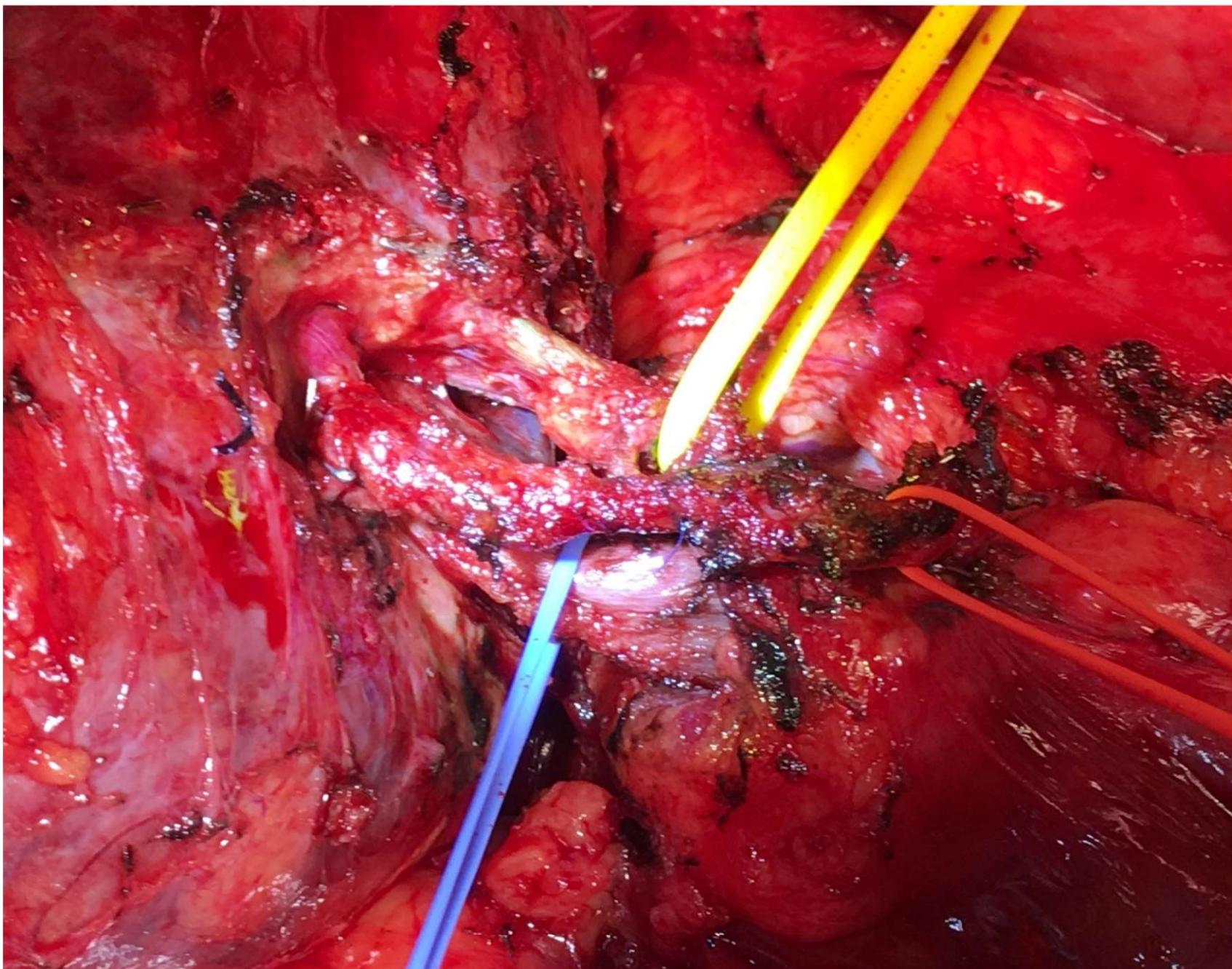
FIRST LDLT FOR LIVER METASTASIS IN SOUTH AMERICA

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- EQUIPE
- DR. TALVANE (RJ)
- DR. FABIO WAECHTER (RS)
- DR. ORLANDO (MA)

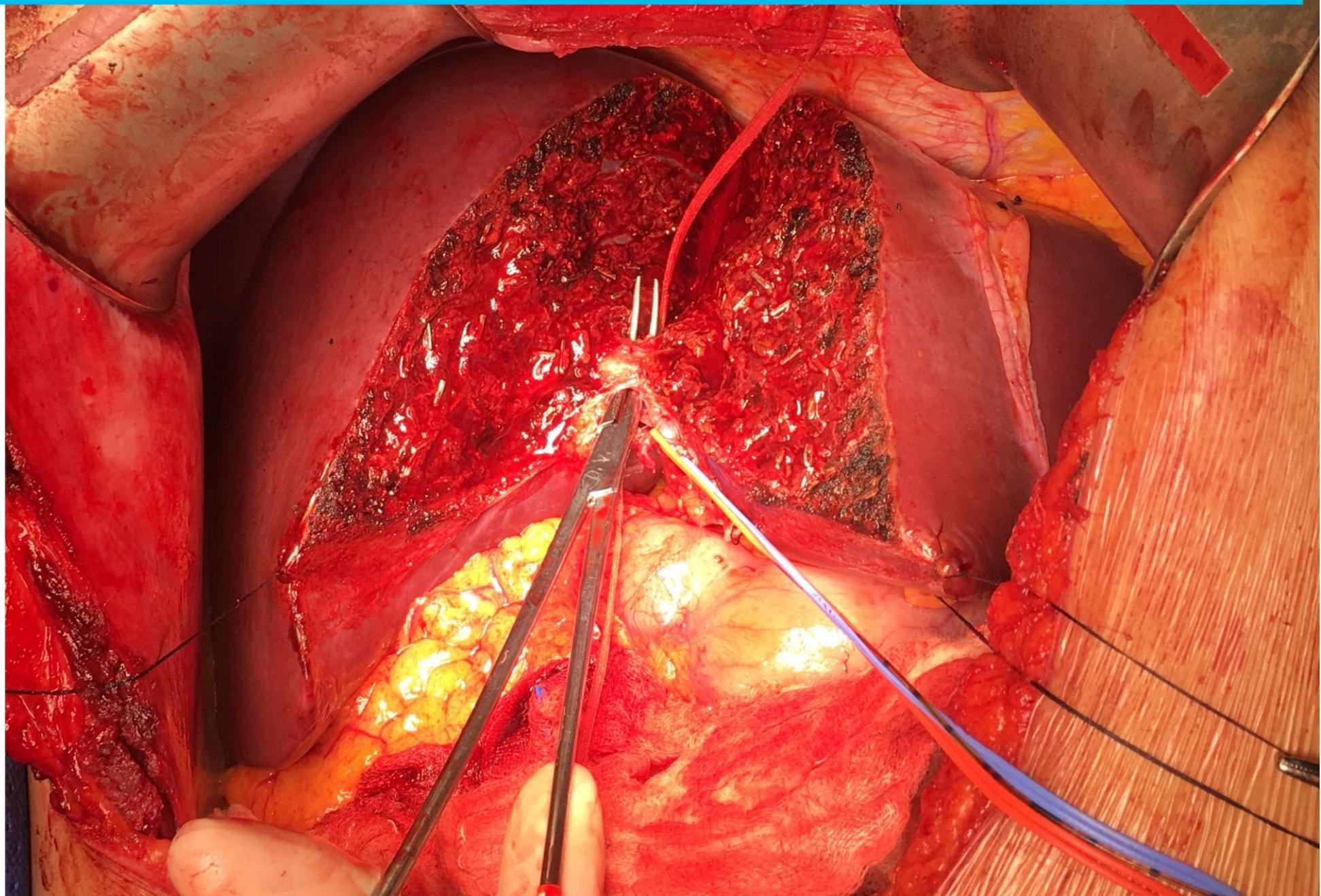
RECIPIENT: TOTAL HEPATECTOMY



RECIPIENT: TOTAL HEPATECTOMY



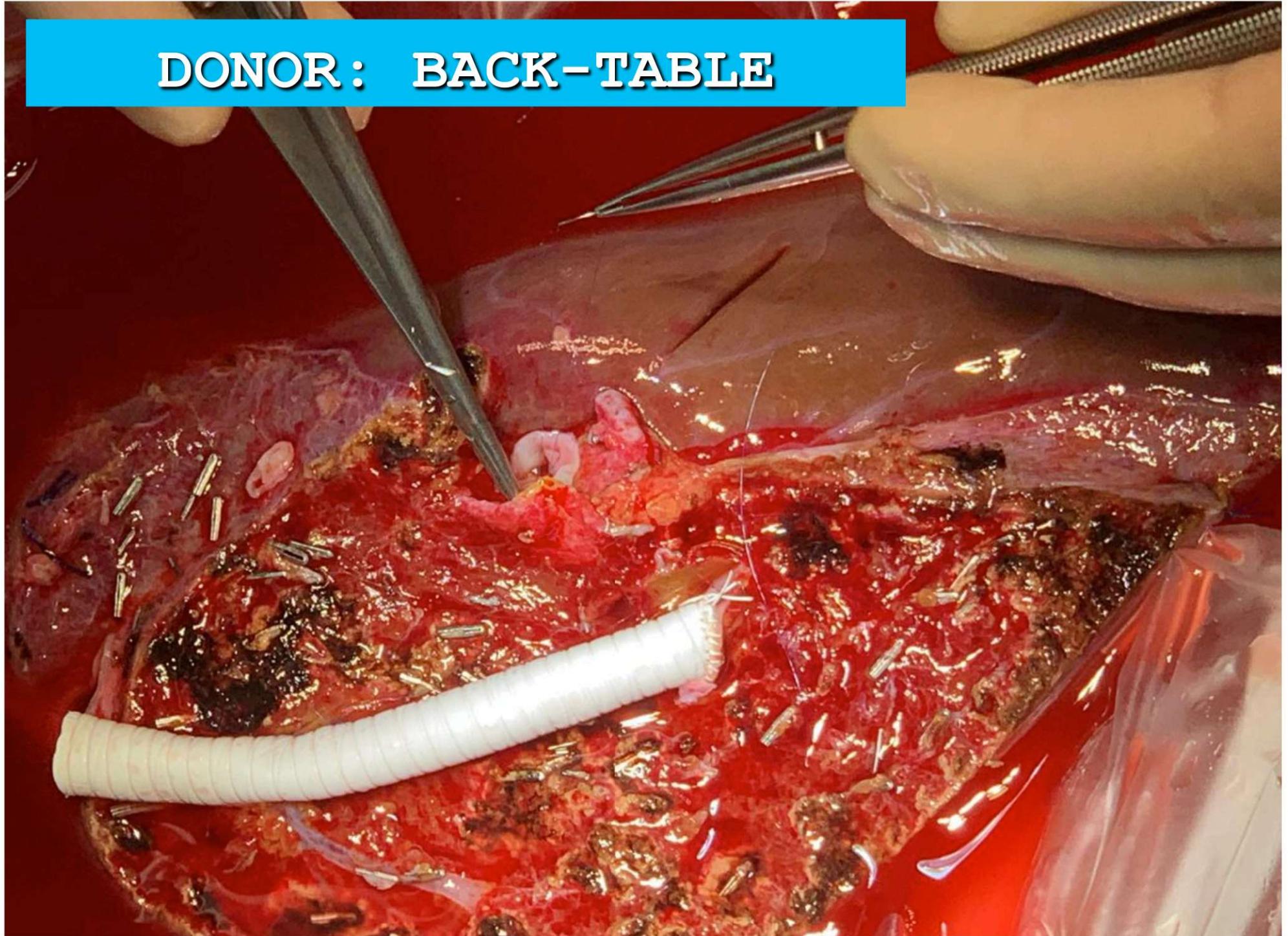
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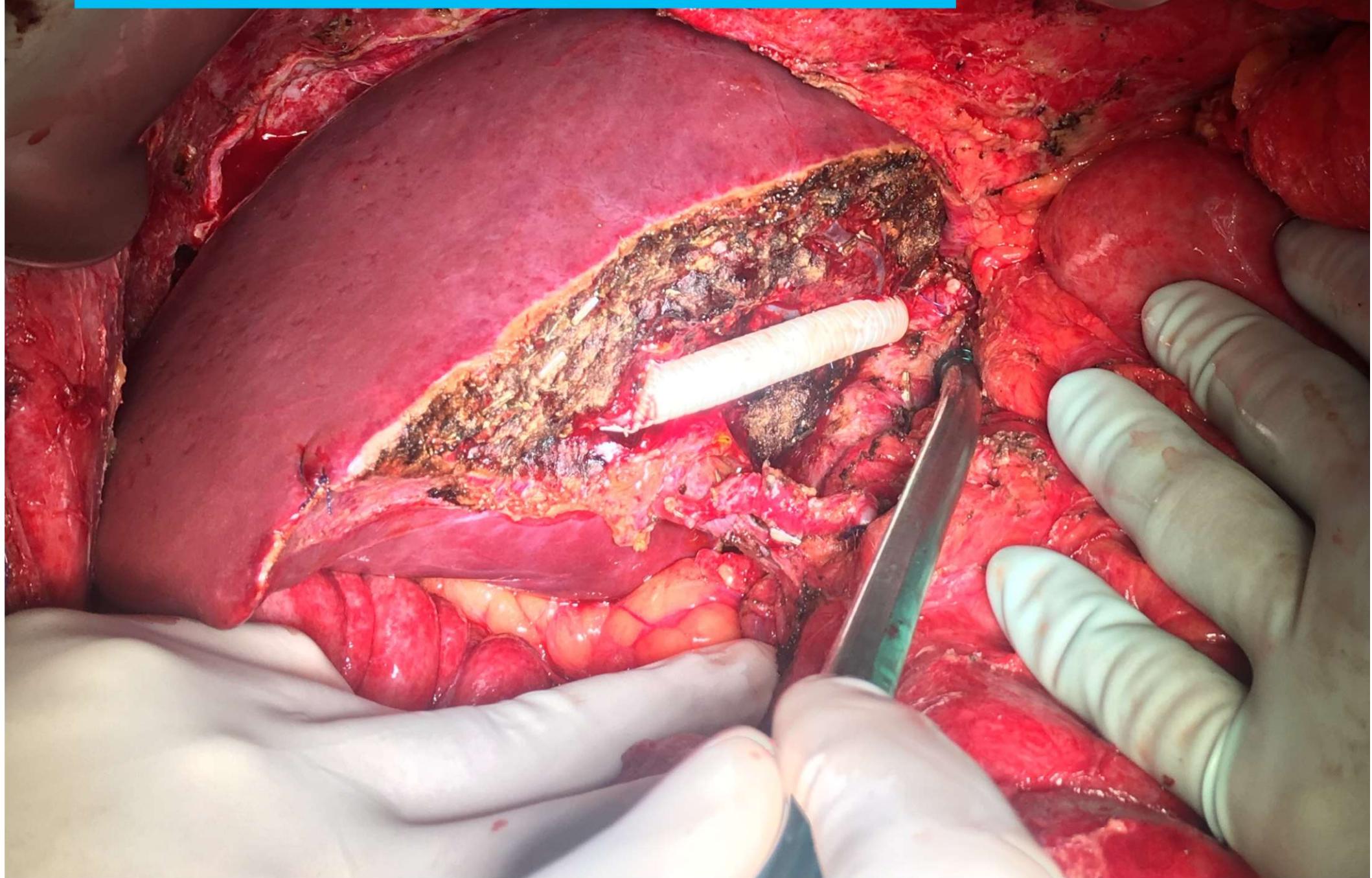
DONOR: BACK-TABLE



DONOR: BACK-TABLE



RECIPIENT : ANASTOMOSIS



LIVER TRANSPLANT: RAPID

LETTER-PRELIMINARY REPORT/TECHNIQUE

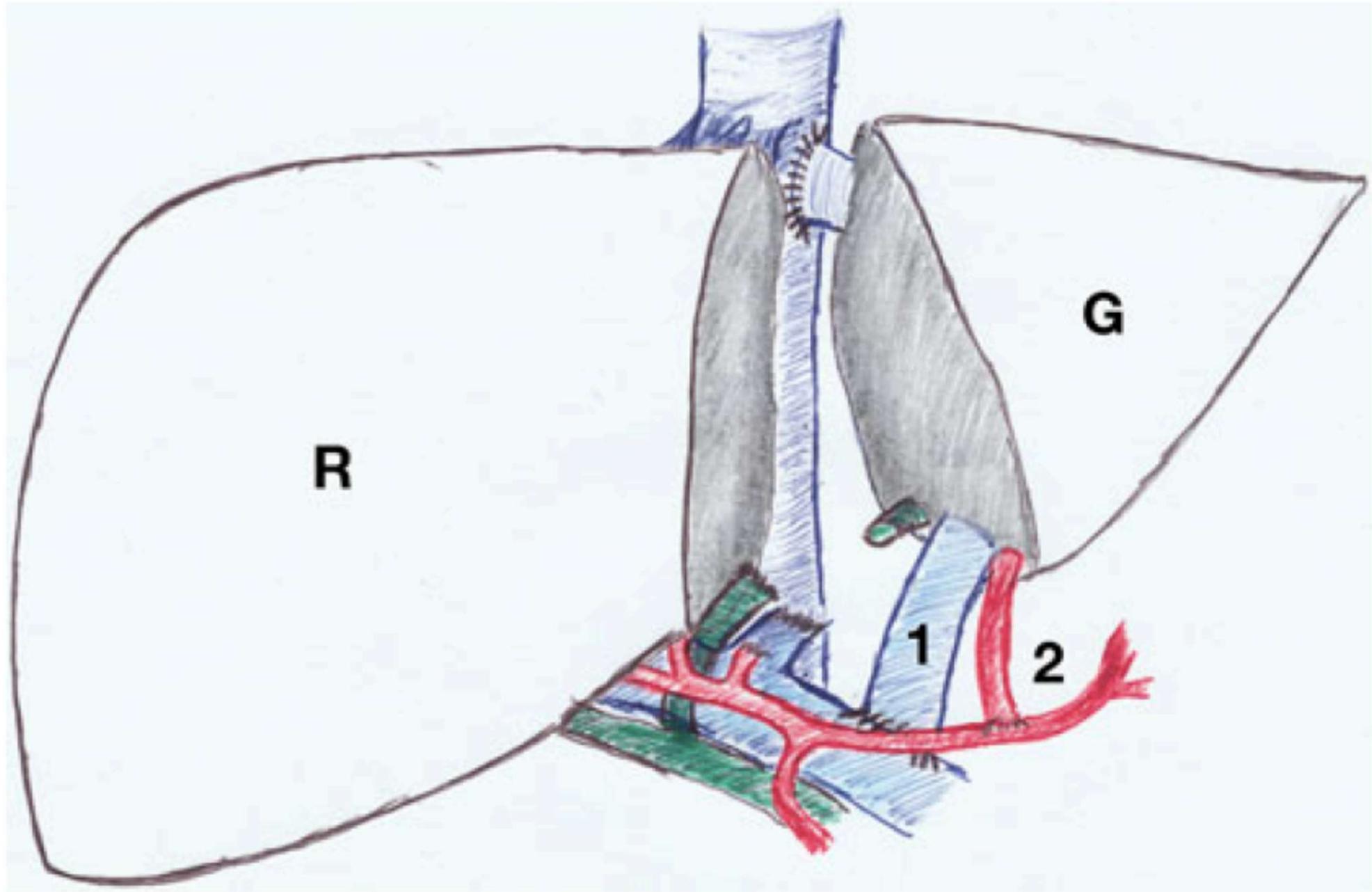
A Novel Concept for Partial Liver Transplantation in Nonresectable Colorectal Liver Metastases

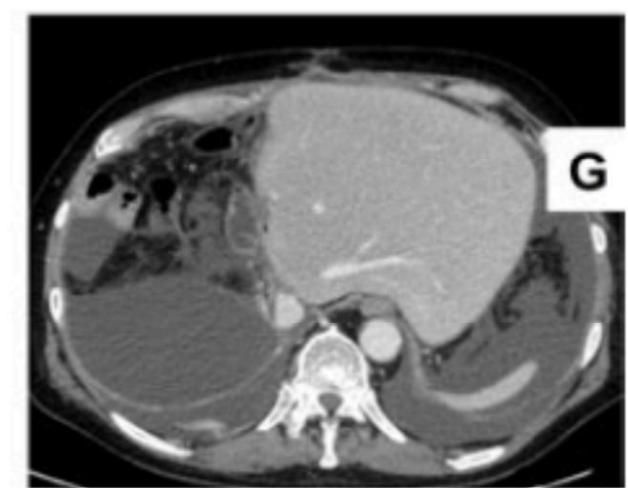
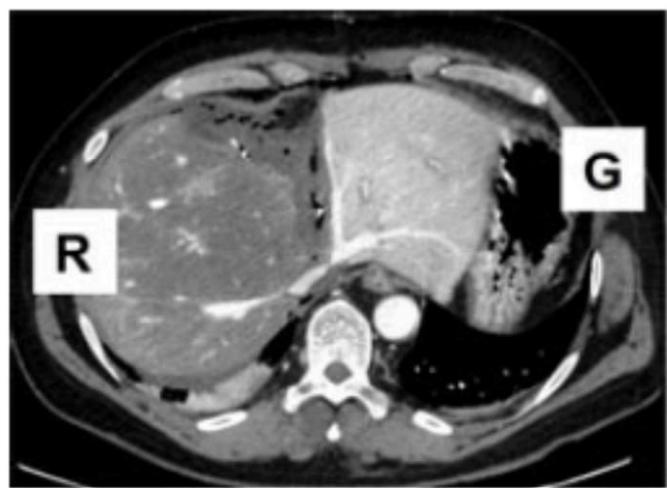
The RAPID Concept

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

Objective: Selected patients with nonresectable colorectal liver metastases

20% of the patients become surgically resectable. We have demon-





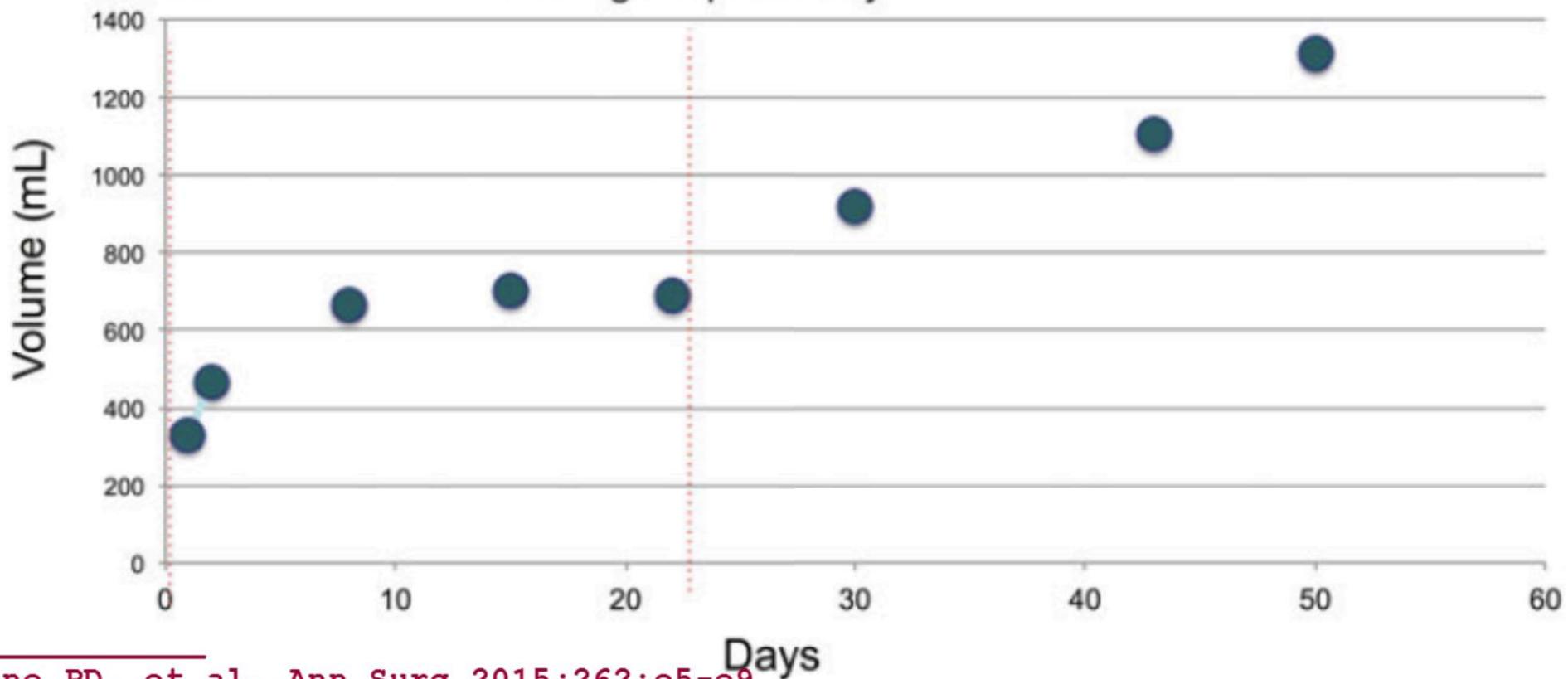
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LTx

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2. Stage hepatectomy

↓



VASCULAR MARGIN





ORIGINAL ARTICLE – HEPATOBILIARY TUMORS

**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

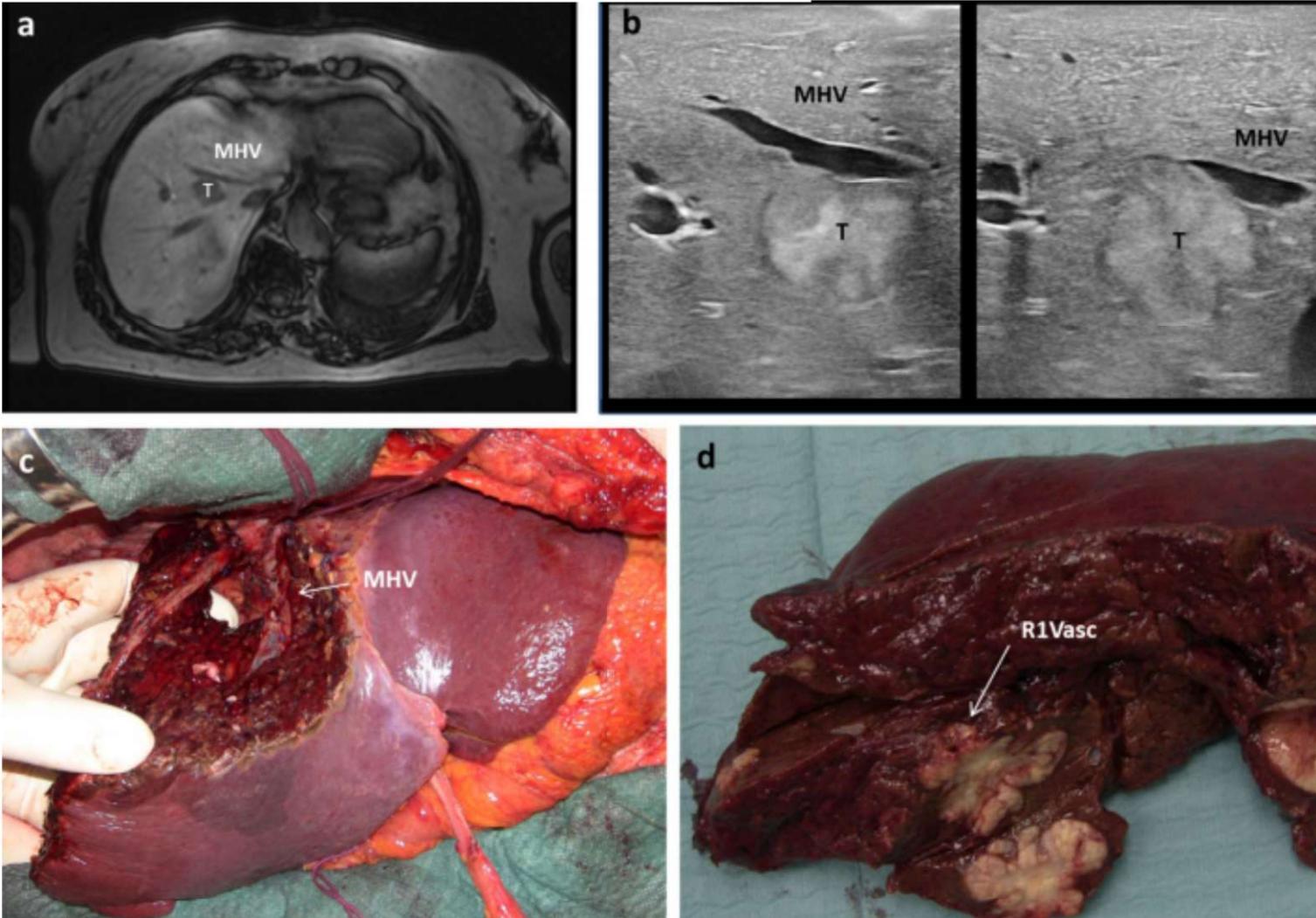
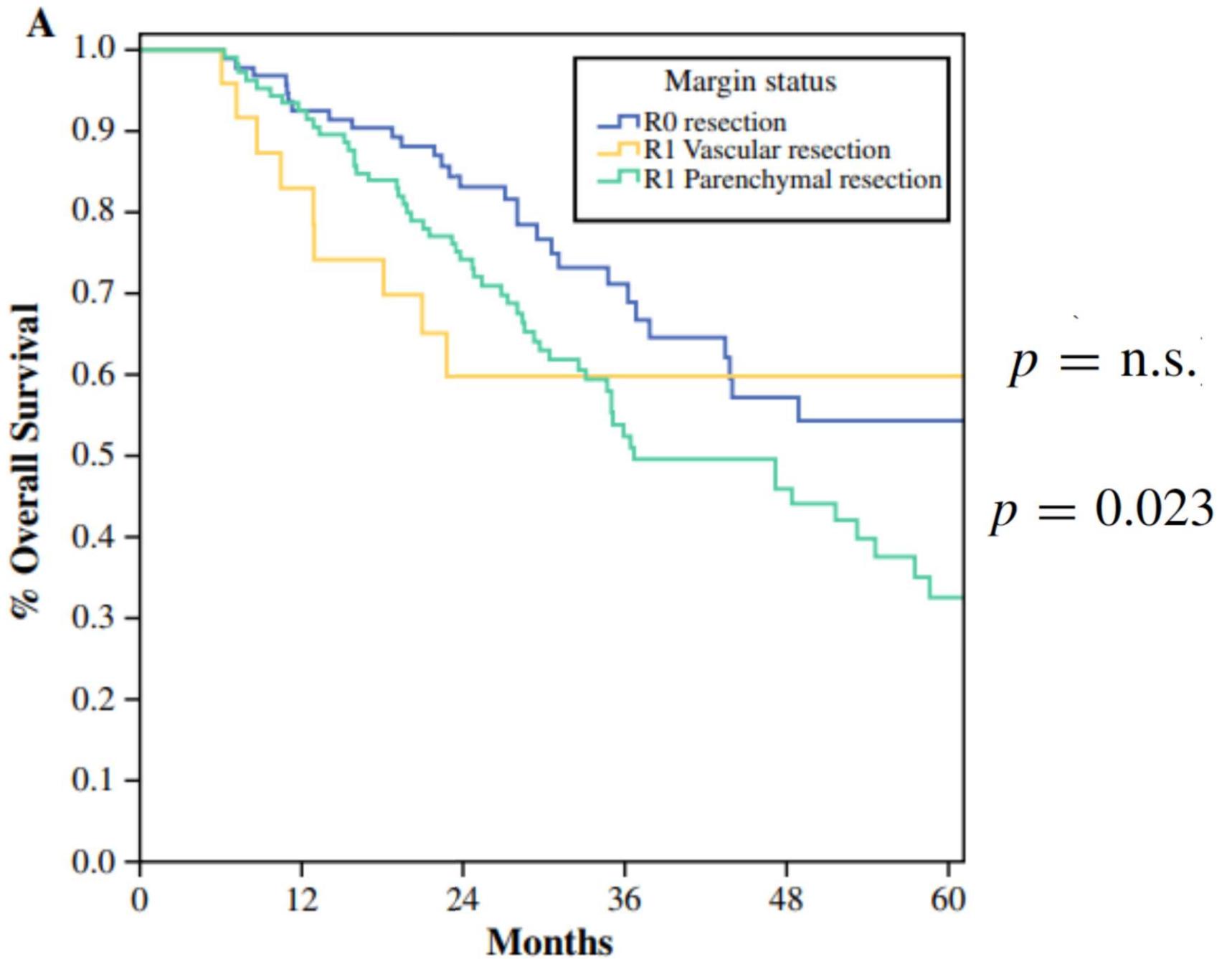
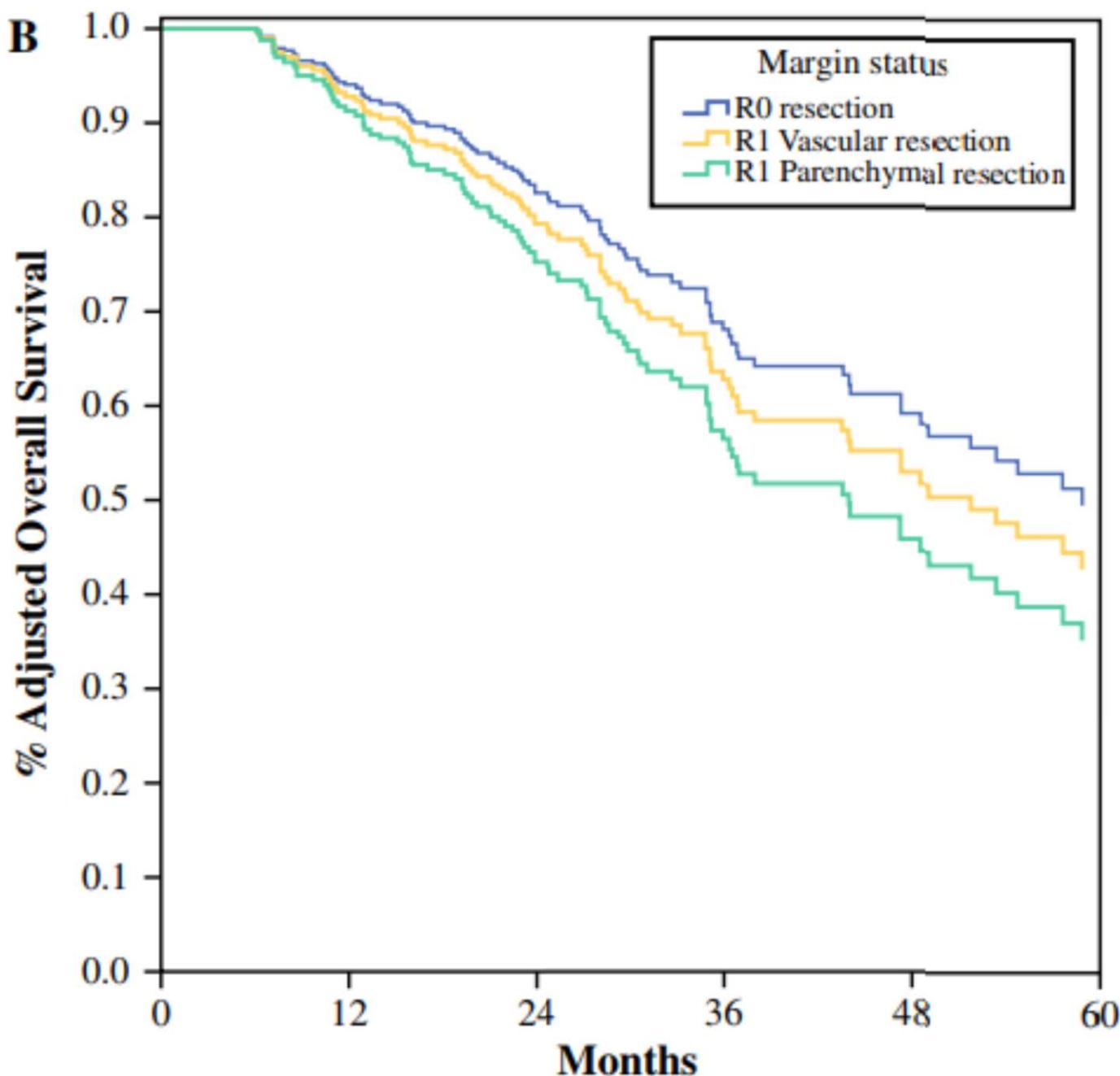


TABLE 3 Univariate and multivariate analysis of prognostic factors of OS after LR

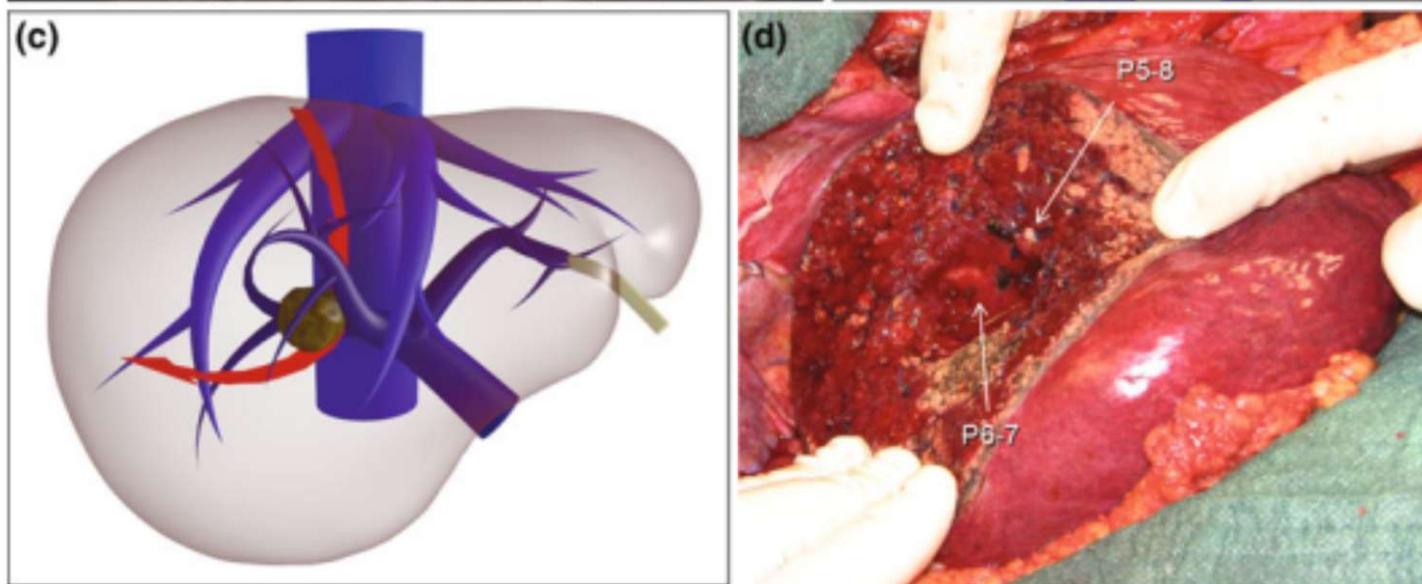
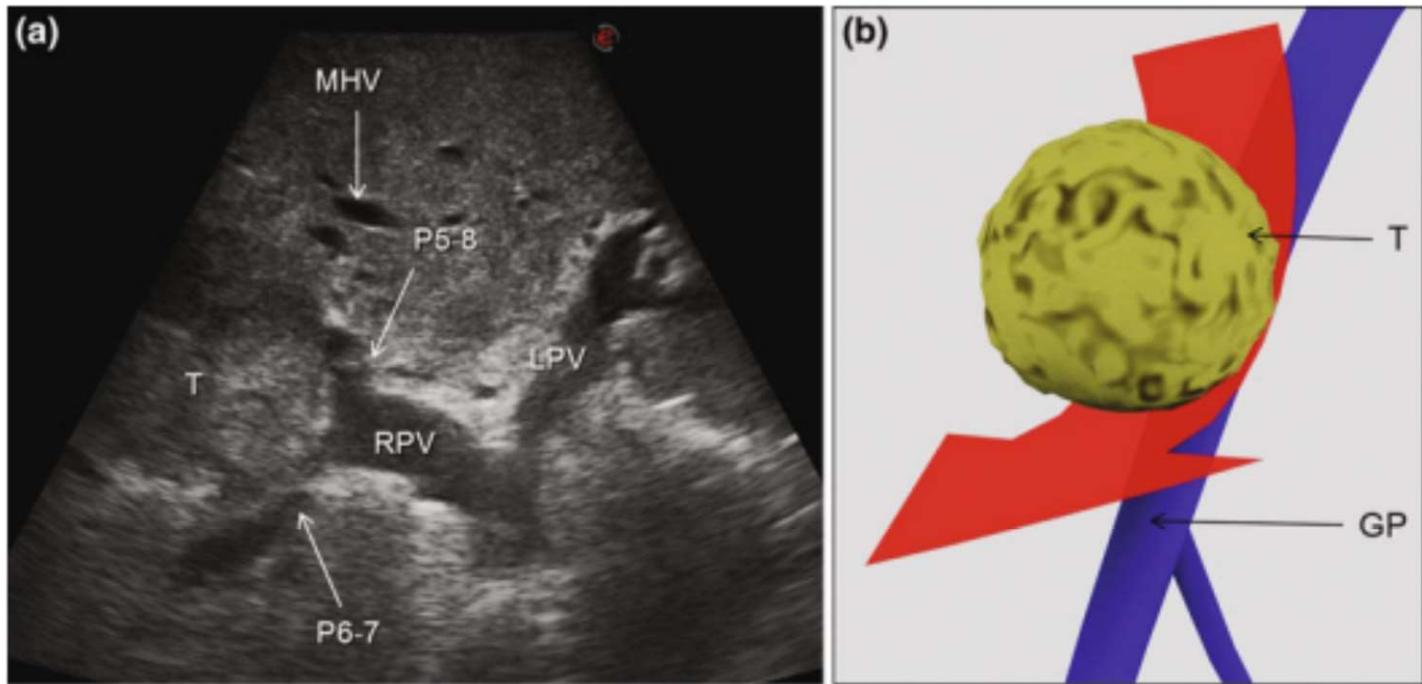
Parameter	Overall survival		
	5-year OS (%)	Univariate analysis <i>p</i>	Multivariate analysis <i>p</i>
Surgical margin			
R0	54.3	0.068	1
R1Vasc	59.4		n.s.
R1Par	32.5		0.034
Adjuvant chemotherapy			
Y	53.5	0.008	0.023
N	34.6		1



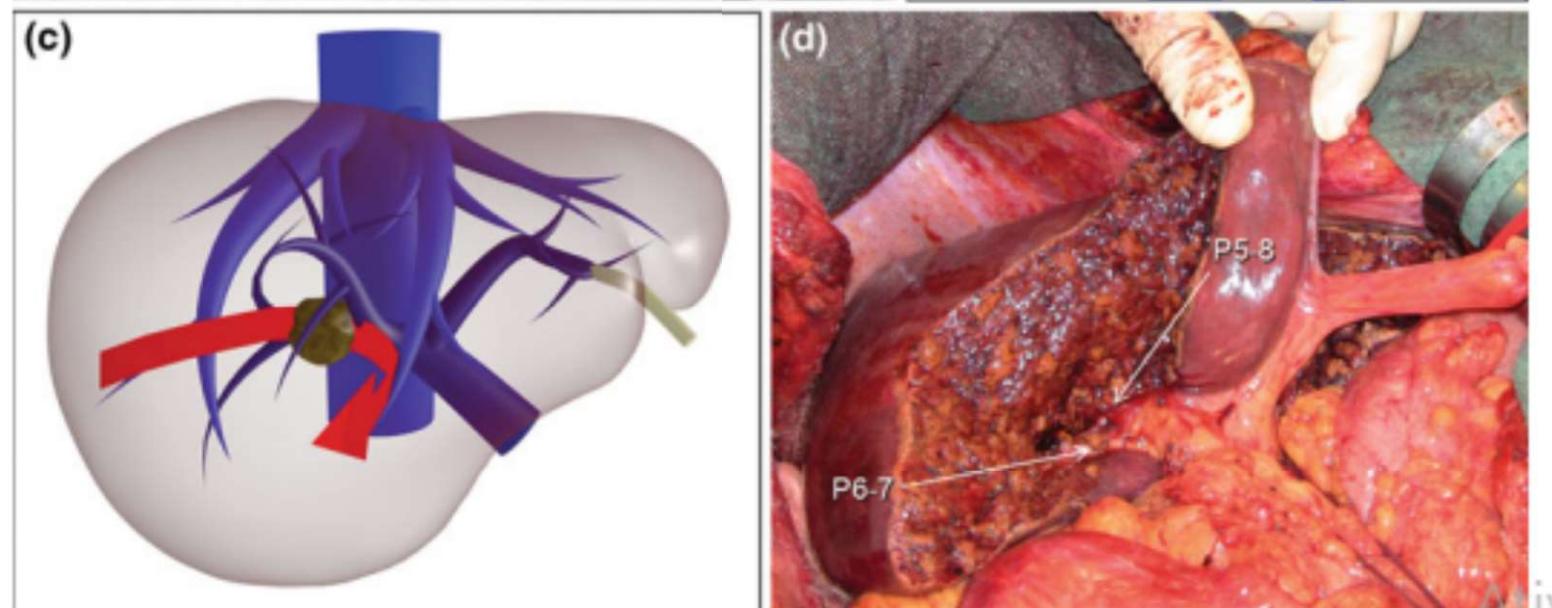
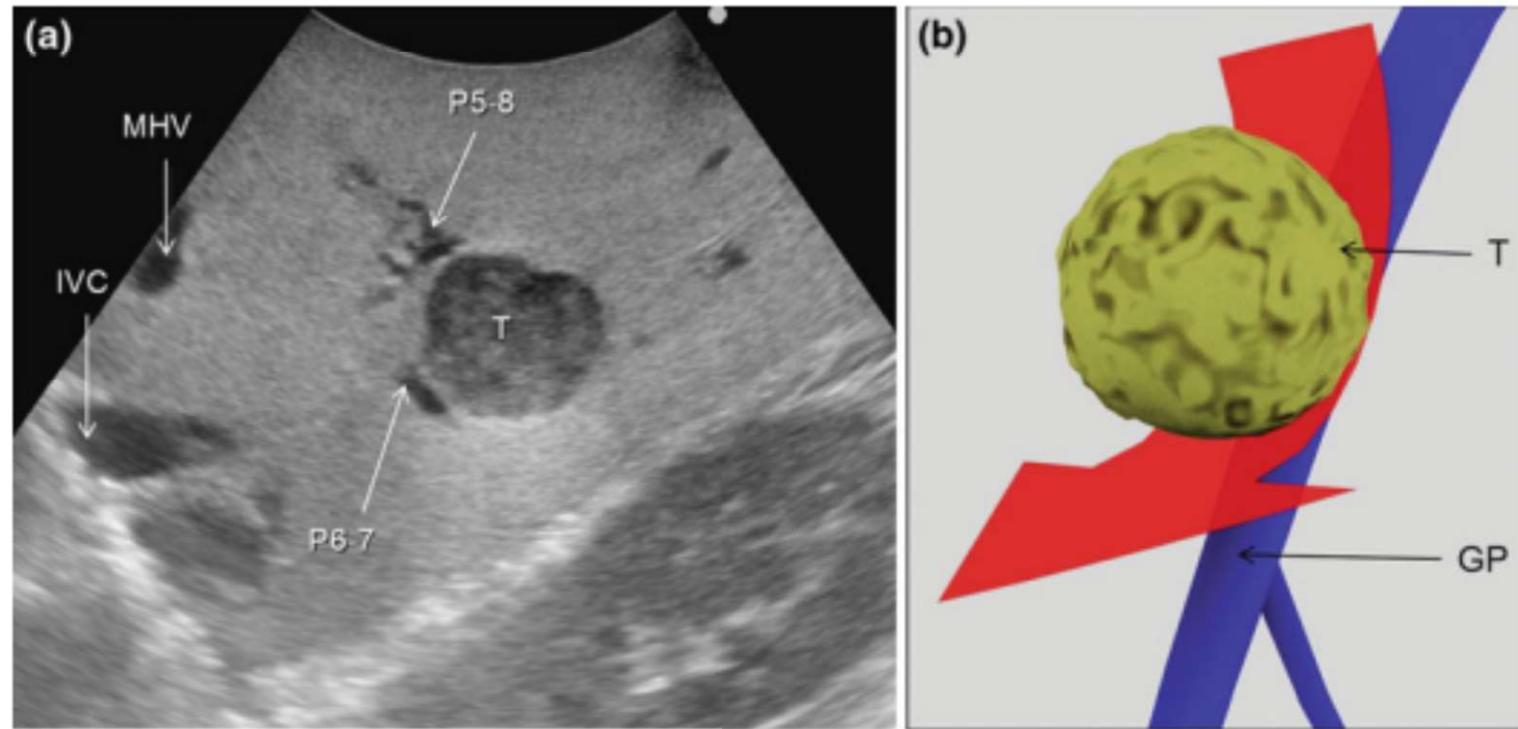


$p = \text{n.s.}$

$p = 0.034$



Courtesy from Prof. Guido Torzilli (Milan)



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Thanks !