XIV Semana Brasileira do Aparelho Digestivo

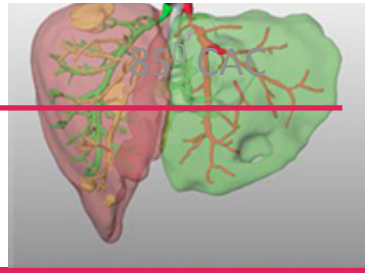
XIV SBAD

21 a 25 novembro | 2015 | ExpoCuritiba | Curitiba

ALPPS

Associating **L**iver **P**artition and **P**ortal Vein **L**igation for **S**taged Hepatectomy

Orlando Jorge M. Torres MD, PhD
Professor Titular e Chefe do Serviço de
Cirurgia do Aparelho Digestivo
Universidade Federal do Maranhão - Brazil



Indução de Hipertrofia

Embolização Portal (EP)

Makuuchi M, et al. *Surgery 1990*

Hepatectomia en 2 tempos

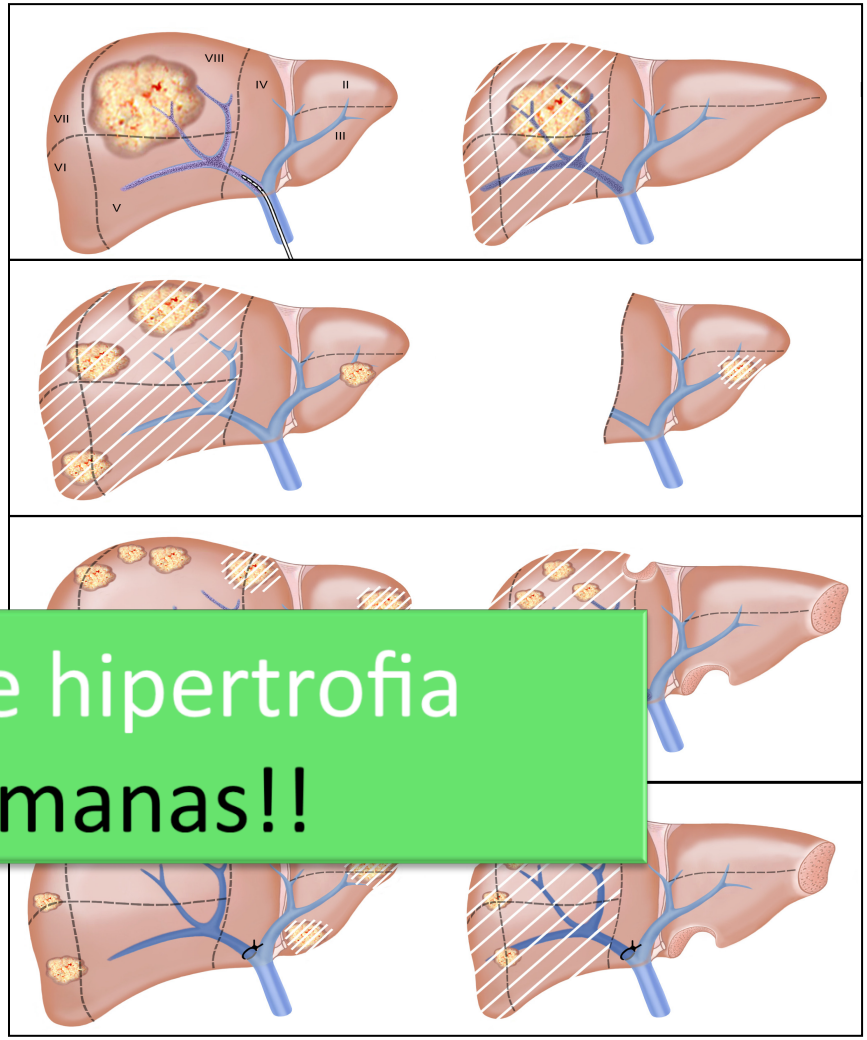
Adam R, et al. *Ann Surg. 2000*

Hepatecto

Jaeck D, et al.

Hepatectomia 2 tempos + LP

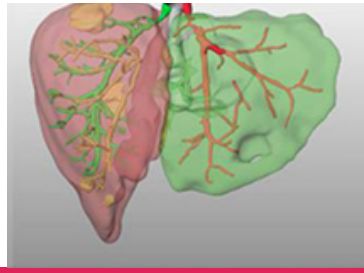
J Belghiti, Clavien AP, et al. *Hepatology 2008*



30-40% de hipertrofia

6-8 semanas!!

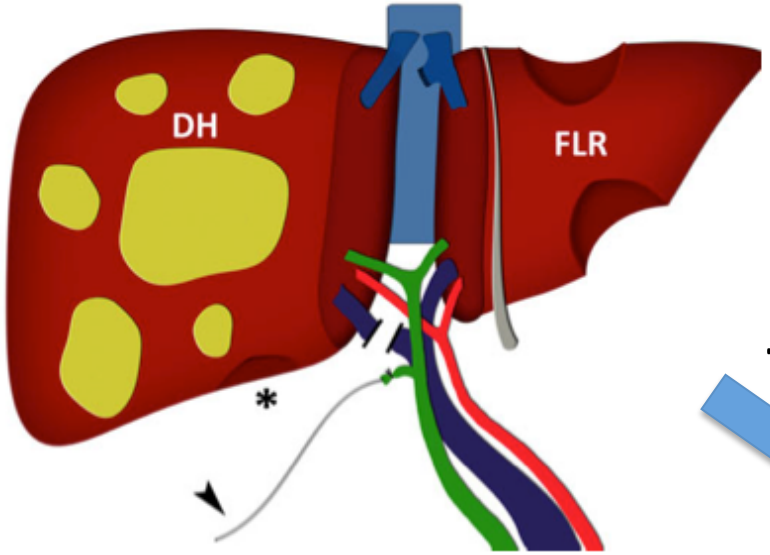
O Começo



Hans Jurgen Schlitt
Regensburg University
Germany - 2007

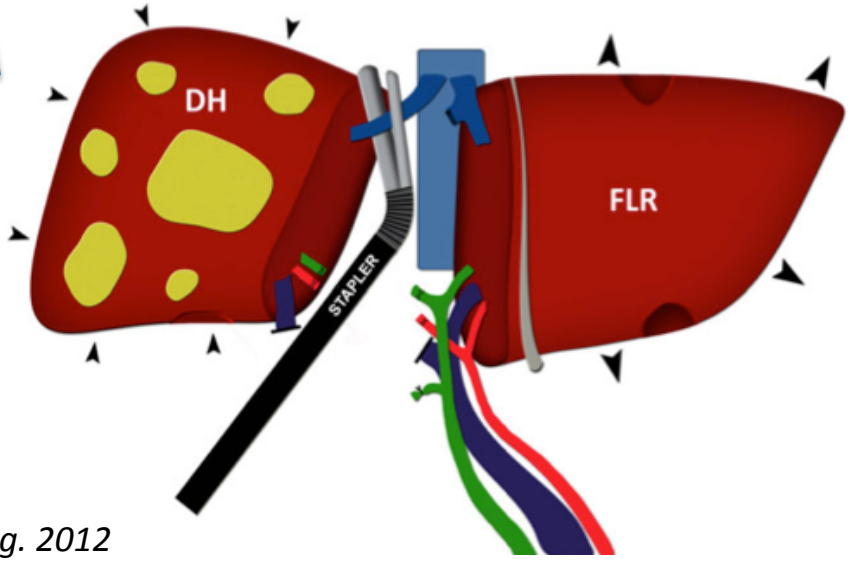
Aspectos técnicos

(hepatectomia em dois tempos com intervalo curto)



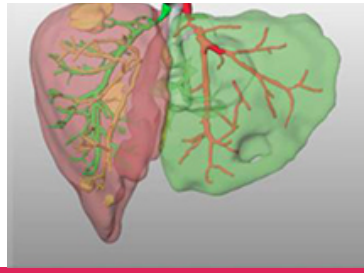
Limpeza do remanescente

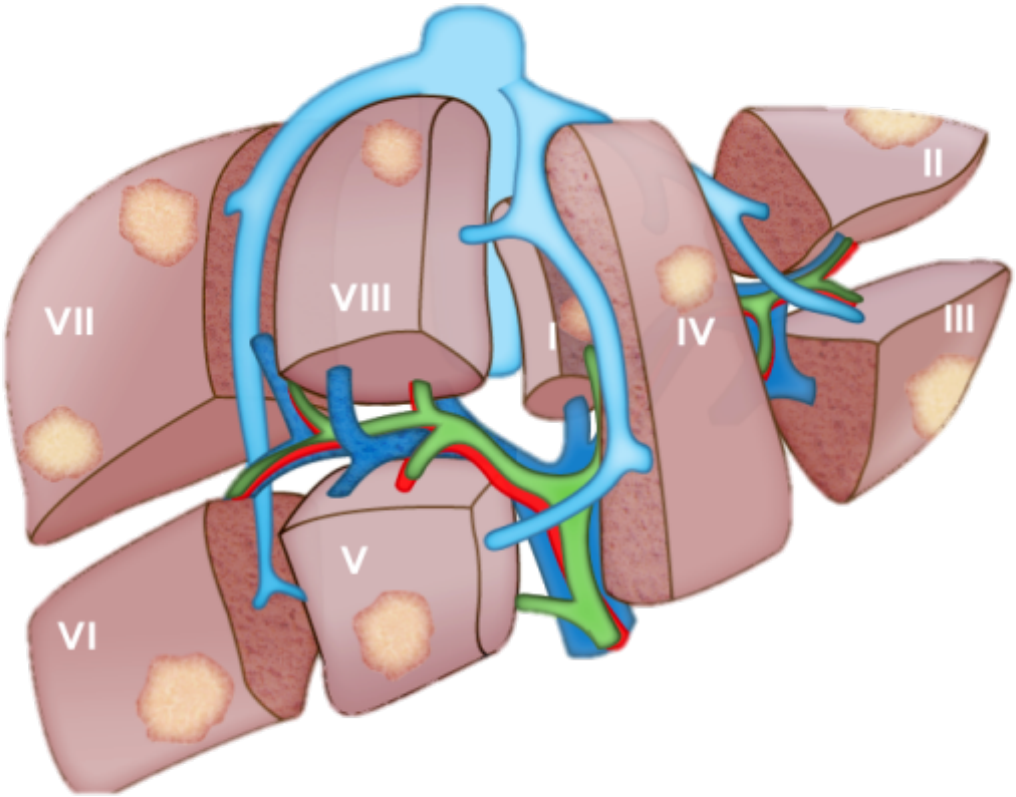
7-9 dias



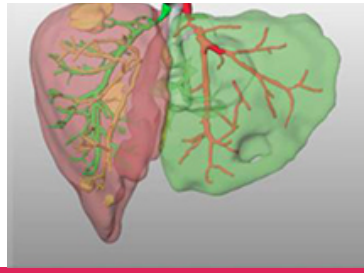
***Alvarez FA, et al**. ALPPS: Tips and Tricks. J Gastrointest Surg. 2012*

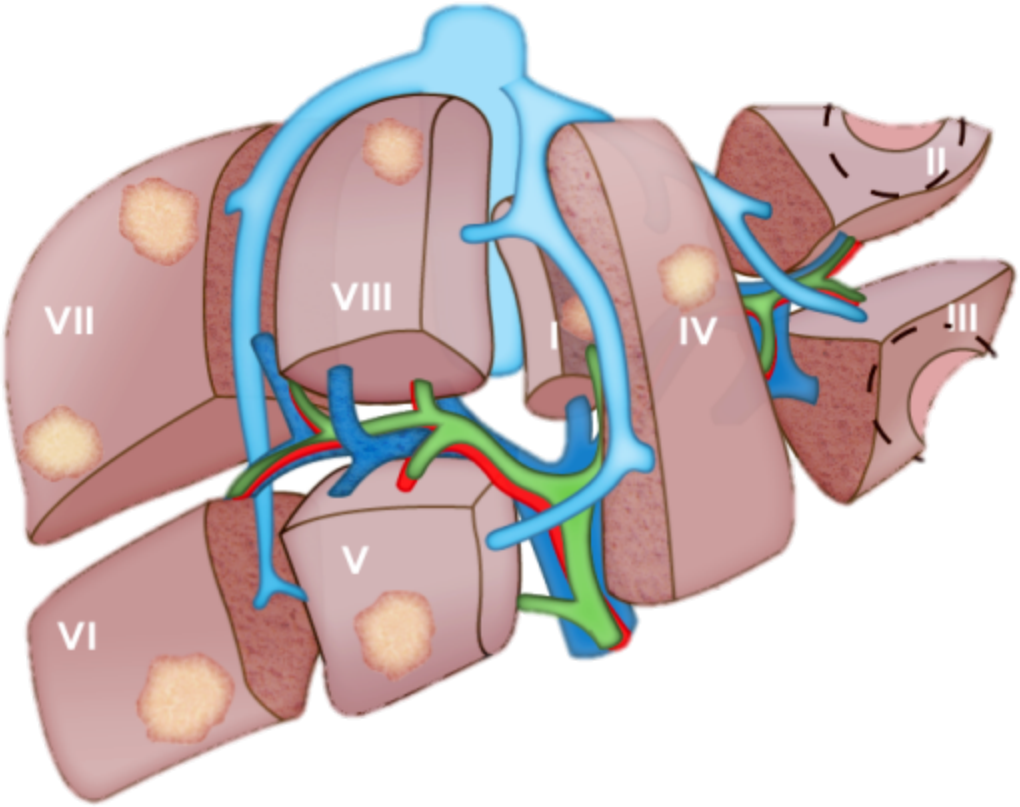
ALPPS



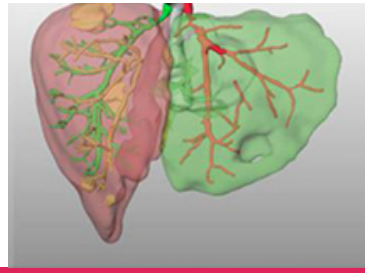


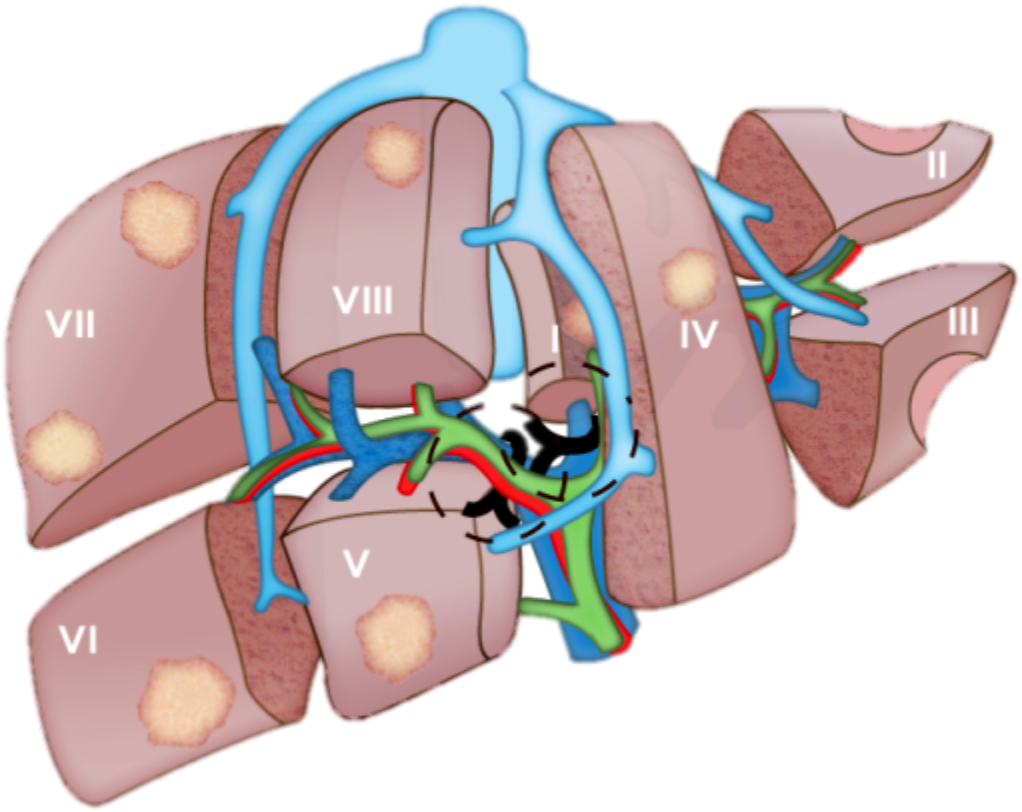
ALPPS



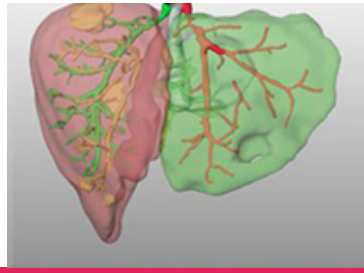


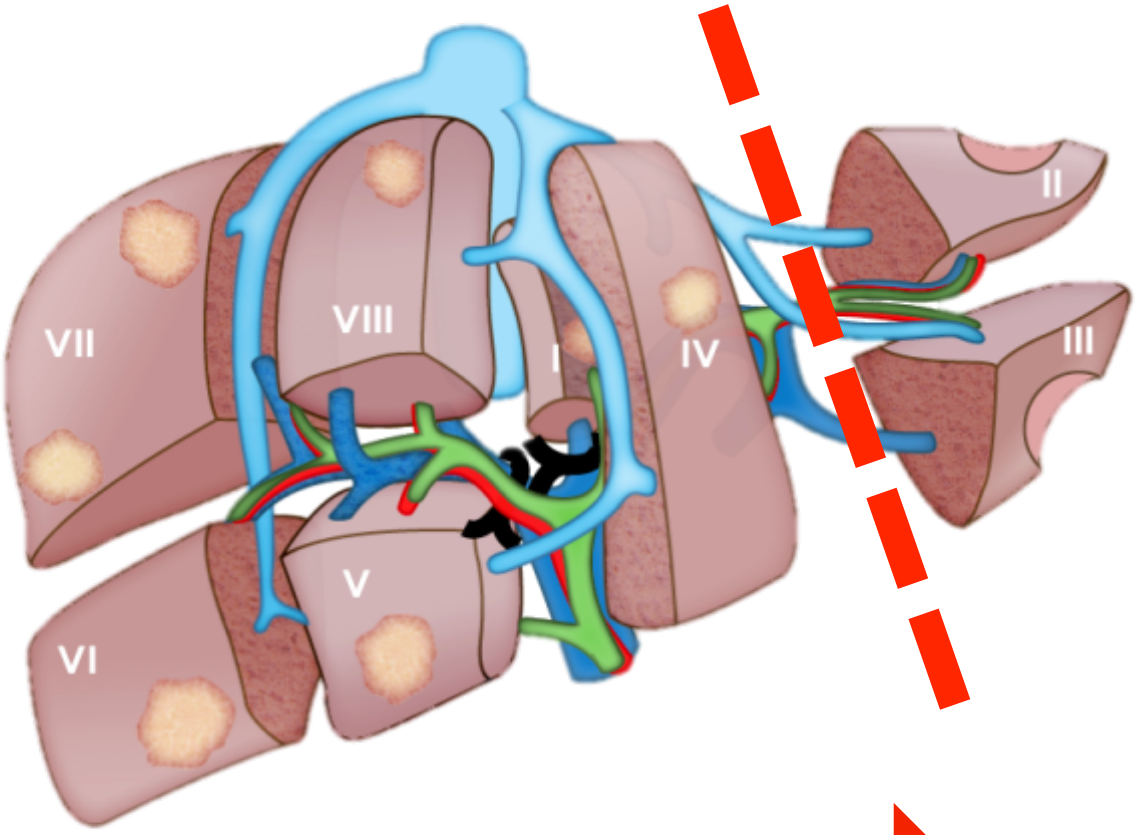
ALPPS





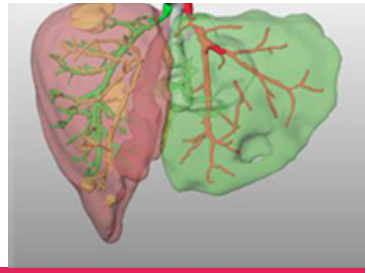
ALPPS

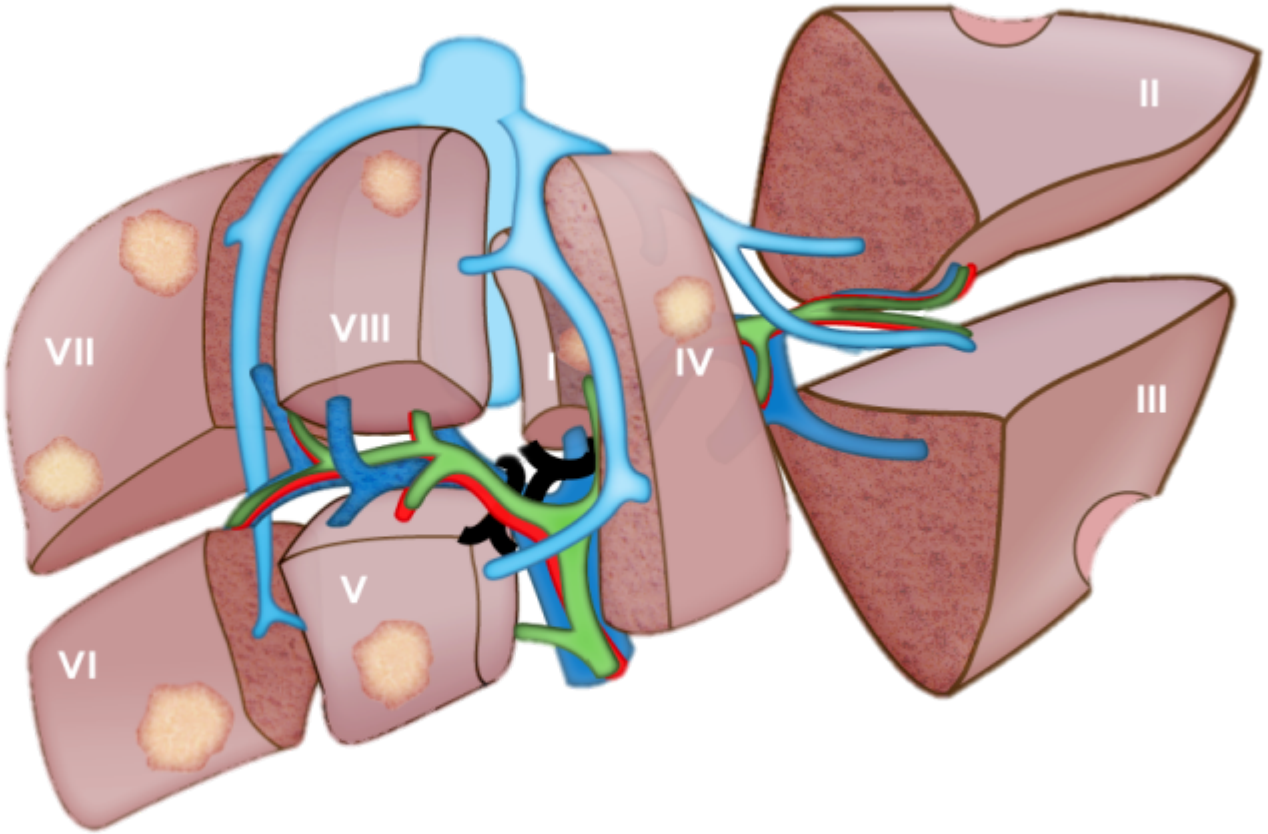




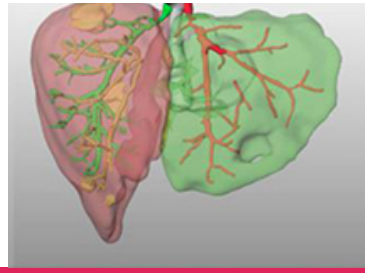
7 days

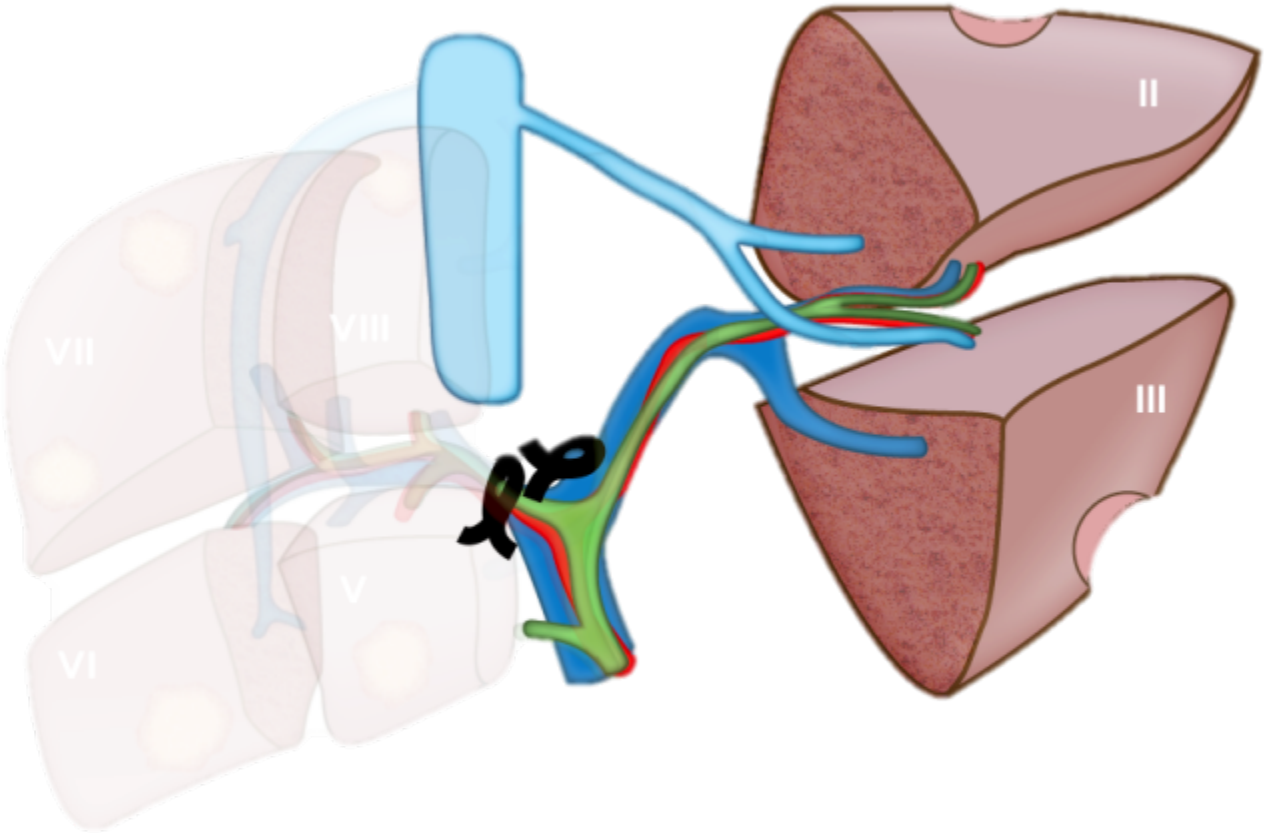
ALPPS



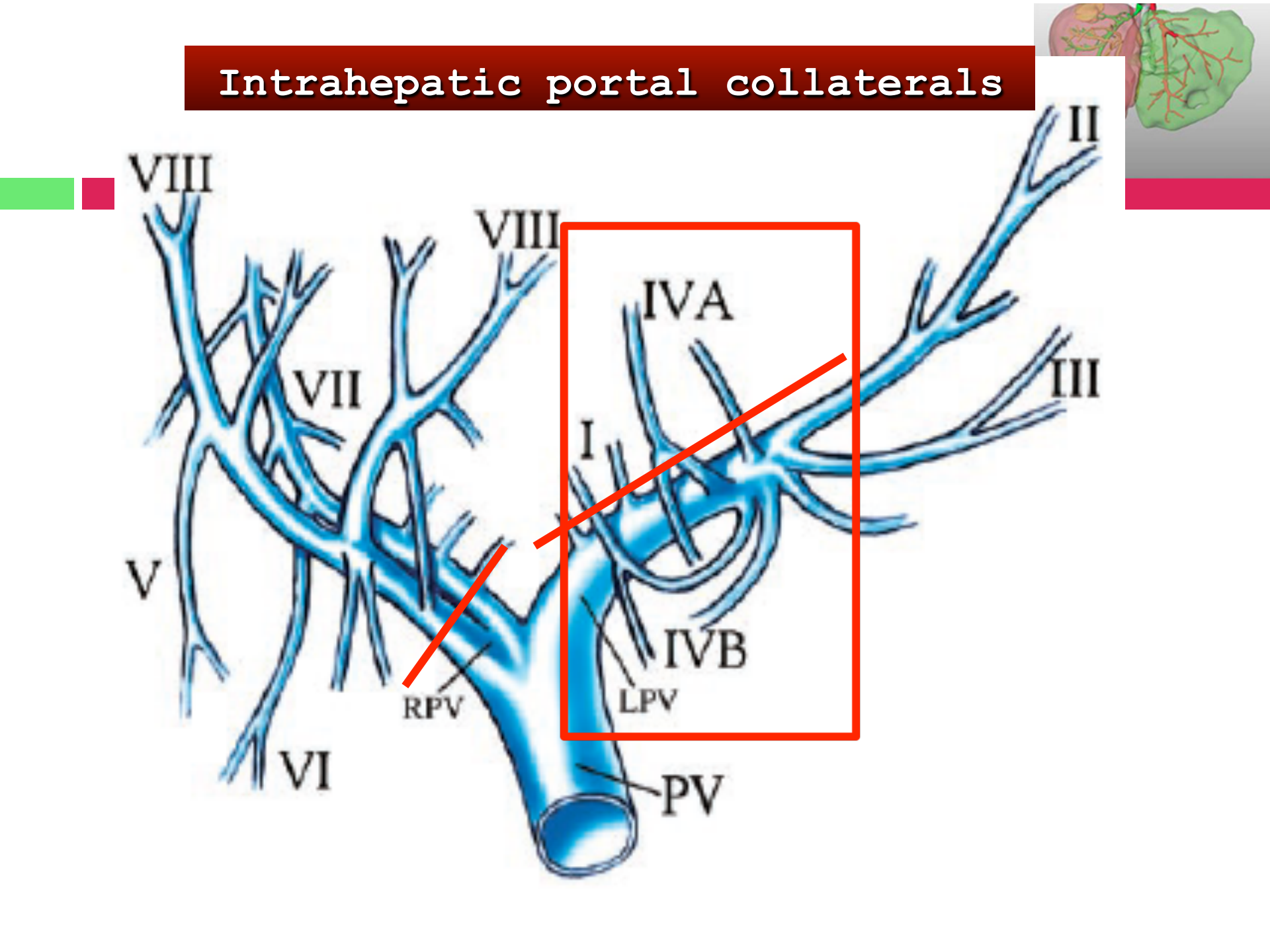


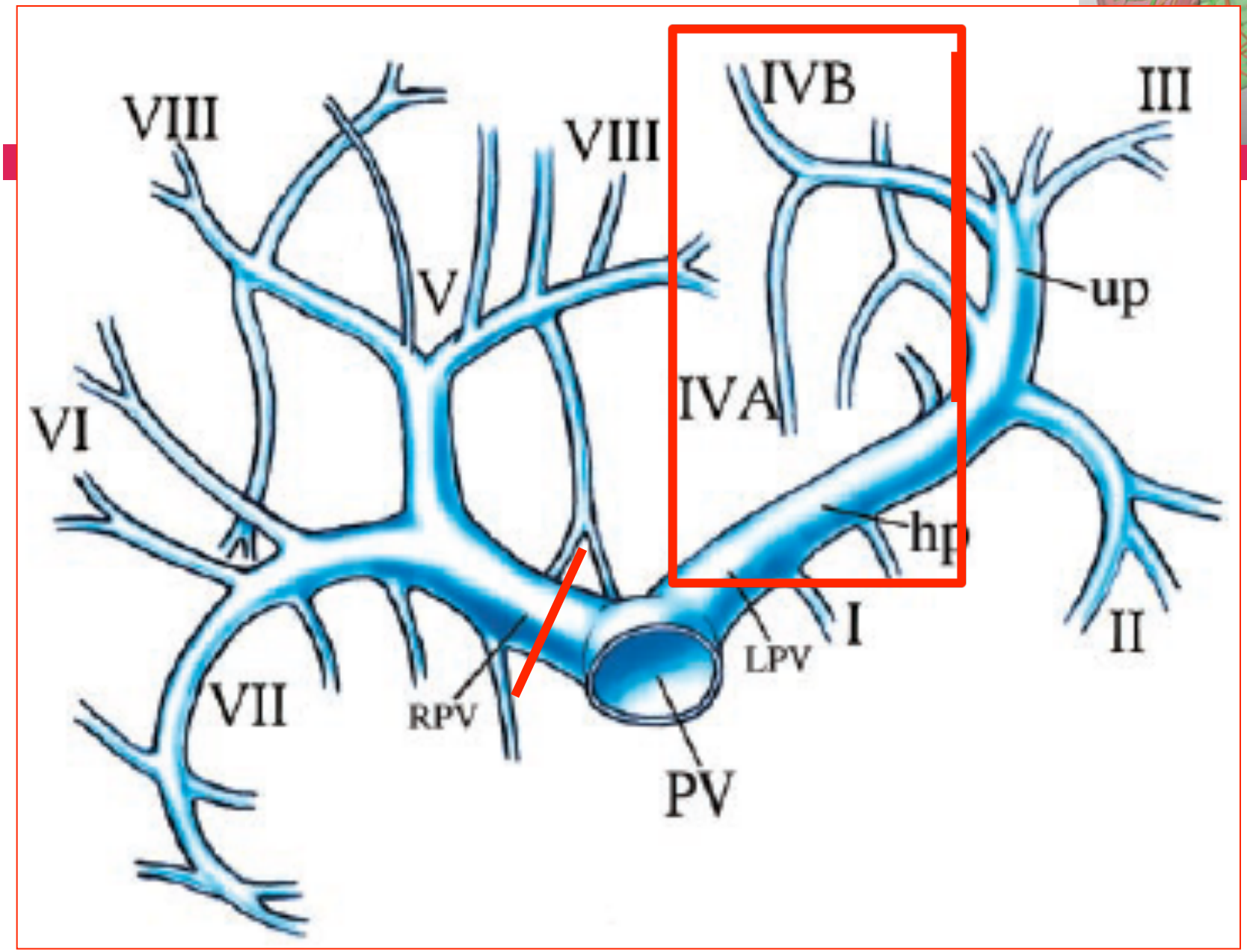
ALPPS

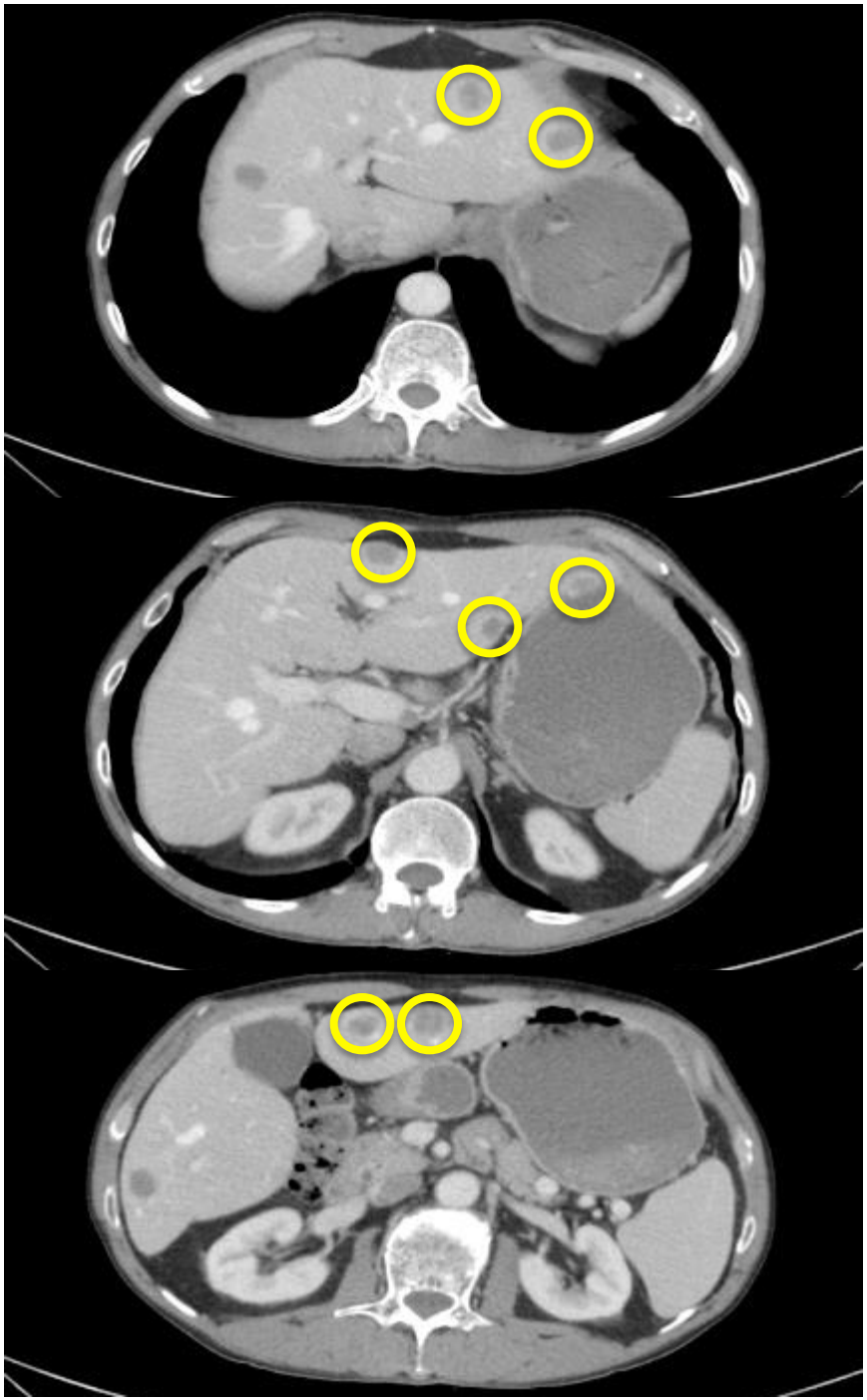




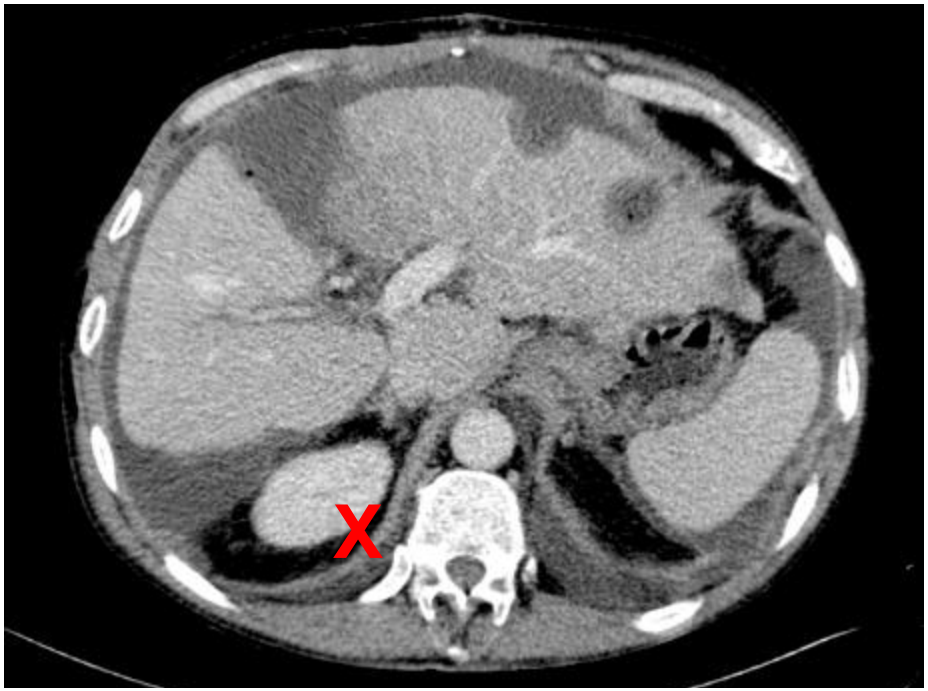
Intrahepatic portal collaterals




VIII
VIII
IVB
III
V
up
IVA
VI
hp
I
II
LPV
VII
RPV
PV

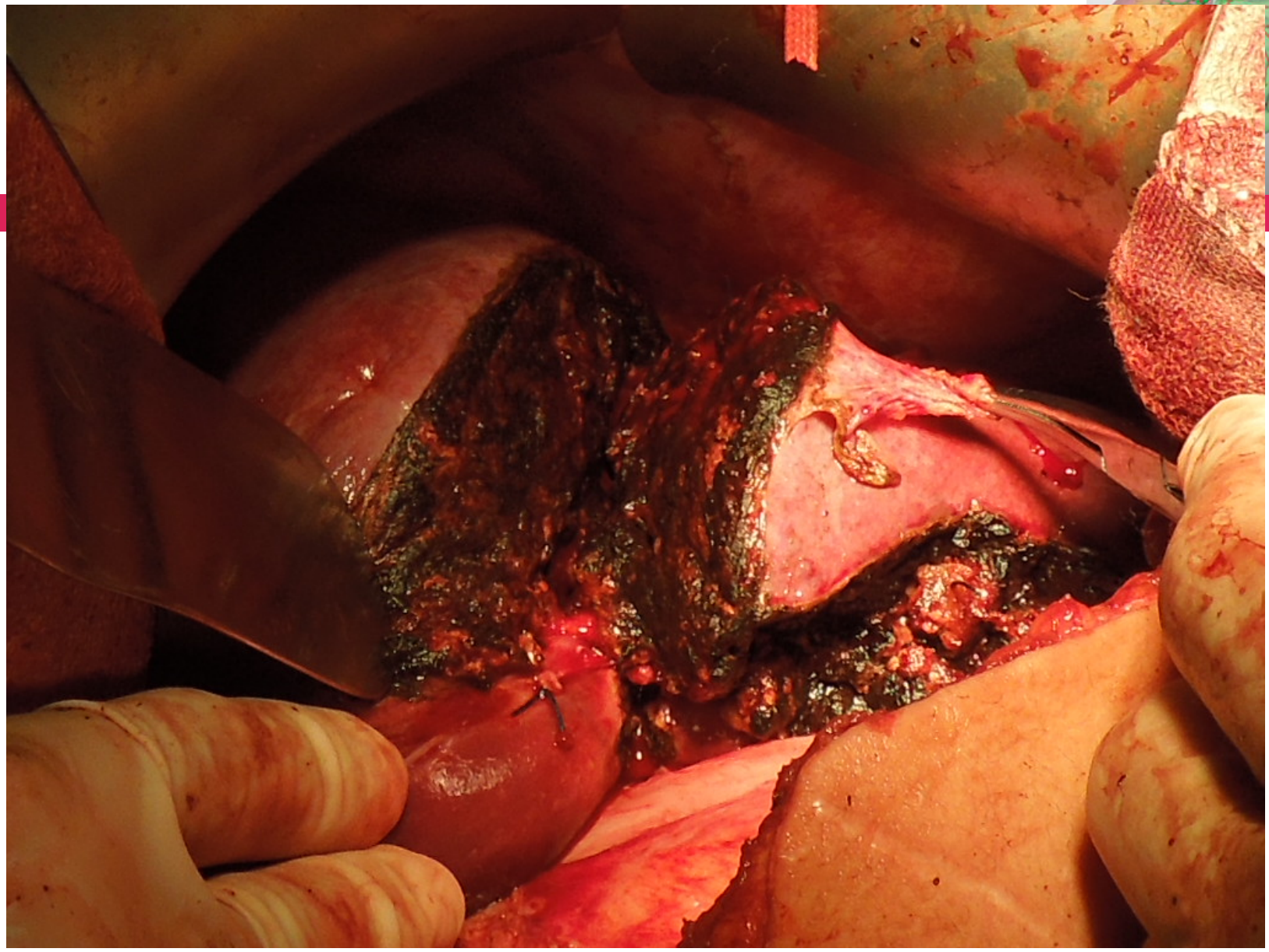


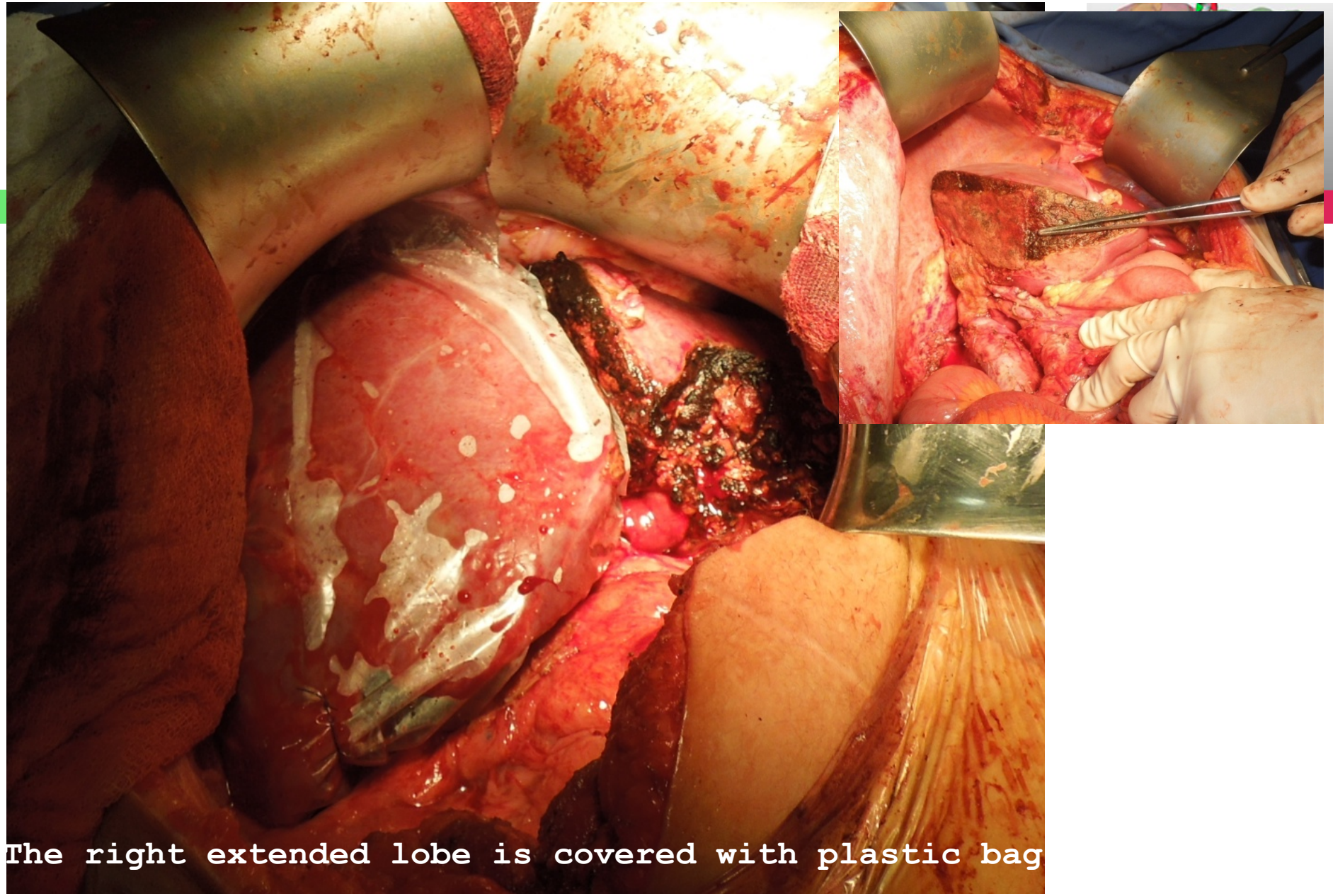
- **1º Tempo**
  - **Ressecção lesões à E**
  - **Ligadura da veia porta D**
  - **Transecção do parênquima**



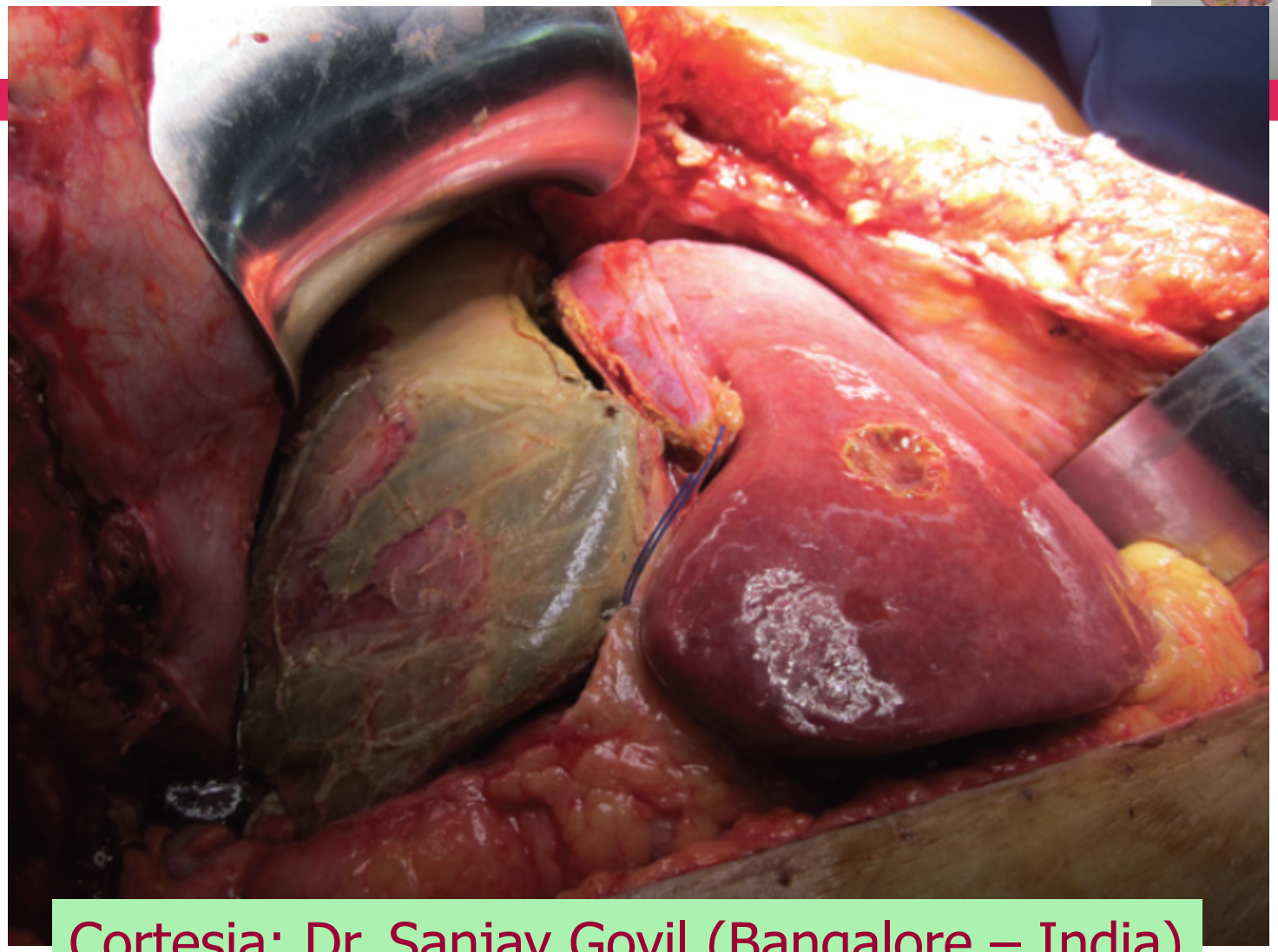
Serviço de Cirurgia do Fígado HC/FMUSP

***Cortesia Prof. Paulo Herman**

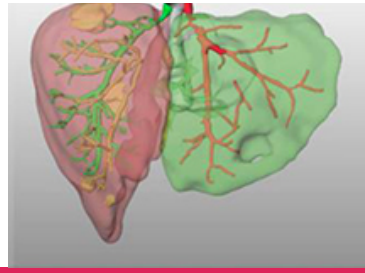




The right extended lobe is covered with plastic bag



Cortesia: Dr. Sanjay Govil (Bangalore – India)



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**

ABCDDV/898

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

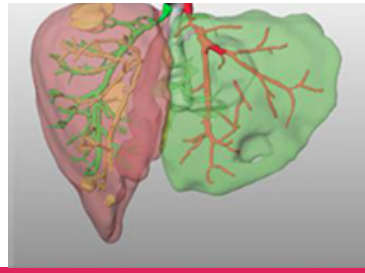
Original Article

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 **OLIV**
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 **MACHAD**

59 e 64% Complicação
12 e 12,8% Mortalidade



EDITORIAL

Playing Play-Doh to Prevent Postoperative Liver Failure

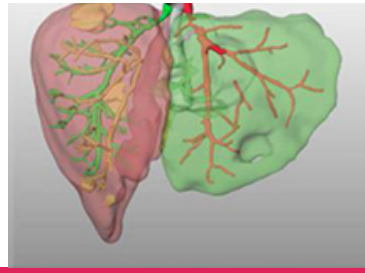
The "ALPPS" approach

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

ALPPS

Santibanes E, Clavien P. Ann Surg 2012;255:415-7



ORIGINAL ARTICLE

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

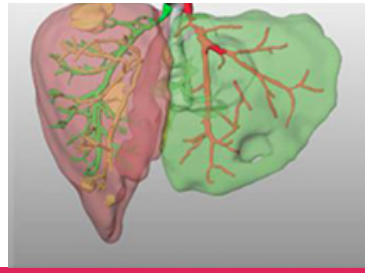
A Prospective Study at a Single Center

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

53% Morbidade
6,6% Mortalidade

Alvarez FA, et al. Ann Surg 2014

ALPPS Registry



PAPER OF THE 21ST ANNUAL ESA MEETING

Early Survival and Safety of ALPPS

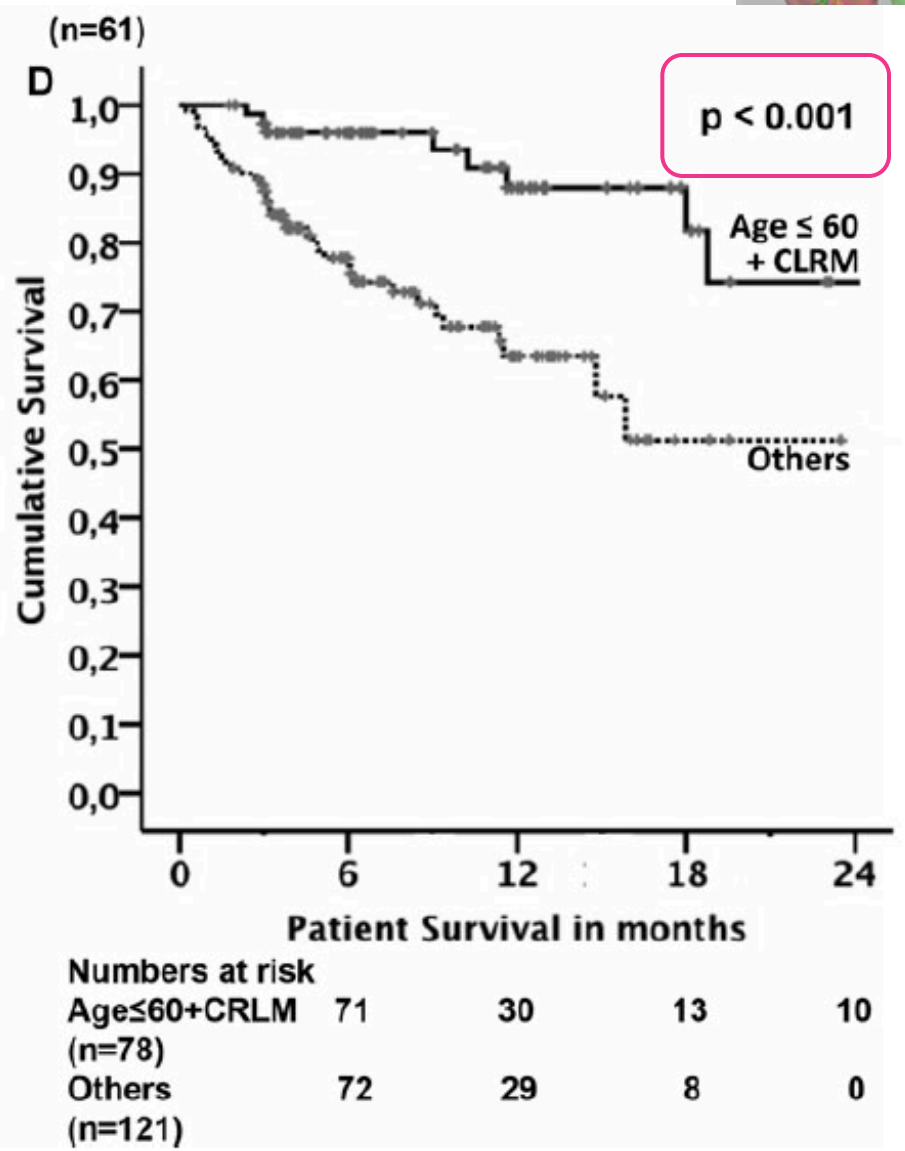
First Report of the International ALPPS Registry

Erik Schadde, MD, FACS, Victoria Ardiles, MD,† Ricardo Robles-Campos, MD,‡ Massimo Malago, MD, FACS,§ Marcel Machado, MD,¶ Roberto Hernandez-Alejandro, MD,‖ Olivier Soubrane, 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*

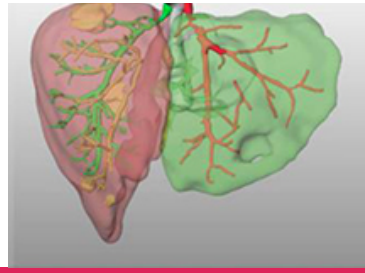
40 % Morbidade
9 % Mortalidade

Schadde E, et al. Ann Surg 2014;260:829-38

ALPPS Registry



Schadde E, et al. Ann Surg 2014;260:829-38

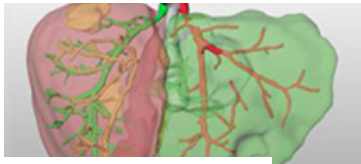


Can we improve the morbidity and mortality associated with the associating liver partition with portal vein ligation for staged hepatectomy (ALPPS) procedure in the management of colorectal liver metastases?

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 % Morbidade
0 % Mortalidade

Hernandez-Alejandro R, et al. Surgery 2014



ABCDDV/1112

ABCD Arq Bras Cir Dig
2015;28(3):155-156
DOI: /10.1590/S0102-67202015000300001

Editorial

ALPPS: PAST, PRESENT AND FUTURE

ALPPS: passado, presente e futuro

Orlando Jorge M **TORRES**[1], Eduardo S M **FERNANDES**[2], Paulo **HERMAN**[3]

[1]Universidade Federal do Maranhão (Federal University of Maranhão), São Luís, MA; [2] Hospital Adventista Silvestre, Rio de Janeiro, RJ, Brazil; [3]Universidade de São Paulo (University of São Paulo), São Paulo, SP, Brazil.

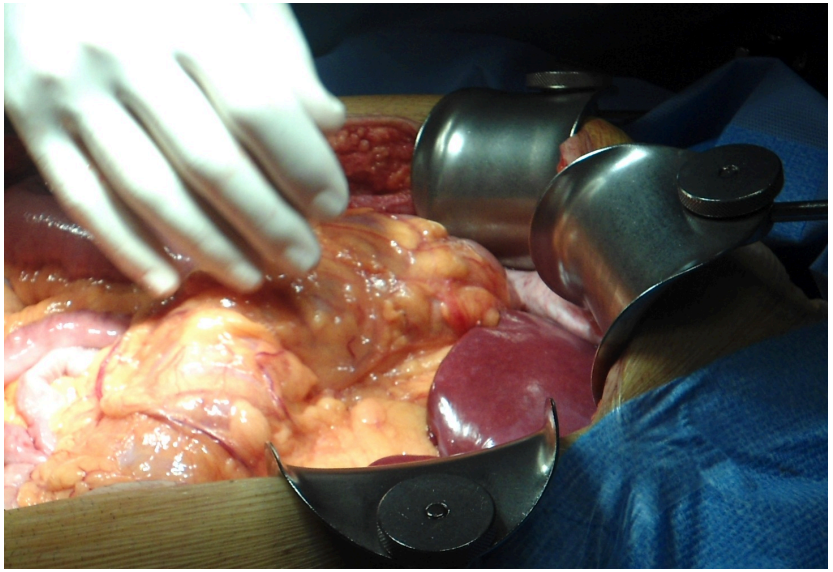
Complete tumor resection in the liver is the only chance to obtain long-term survival in patients with hepatic tumor or metastasis from other primary cancers. In patients with a large load of tumor within the liver, multiple strategies have been employed to improve resection, especially when a small liver remnant is expected. Staged hepatectomies, in which the surgeon perform partial resection in one side of the liver, and after four to six weeks proceed with the resection of the other side, and strategies to induce hypertrophy of the future liver remnant that include percutaneous portal vein embolization or intraoperative portal vein ligation, have also been largely employed by specialized liver surgery teams.

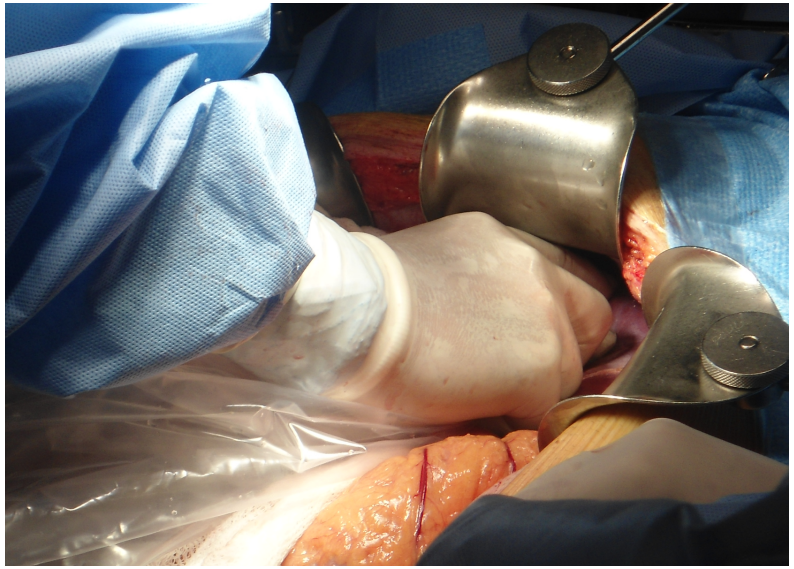
Hans Schlitt from Regensburg, Germany developed a new procedure, called liver bi-partition, for the first time by chance, in 2007. Planning to perform an extended right hepatectomy in a patient with hilar cholangiocarcinoma - being the future cholestatic liver remnant too small to sustain the patient postoperatively - he decided to perform intraoperatively only a selective hepatico-jejunostomy on the left biliary system, dividing the liver parenchyma along the falciform ligament, thereby completely devascularizing segment 4. Finally, the right portal vein was ligated to induce hypertrophy on segments 2 and 3. On the 8th

1. Estratificação adequada

- A exploração durante a primeira cirugia permite excluir enfermidade adicional que pode não ter sido detectada na avaliação pre-operatória.

Schnitzbauer A, H. J. Schlitt HJ, et al. *Annals of Surgery 2012*
Alvarez FA, Ardiles V, de Santibañes E et al*. J Gastrointest Surg 2012*

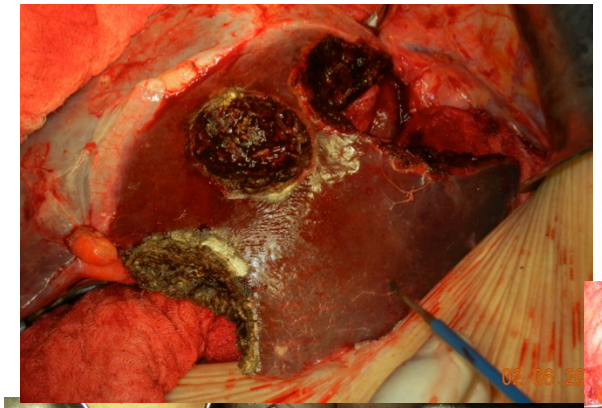


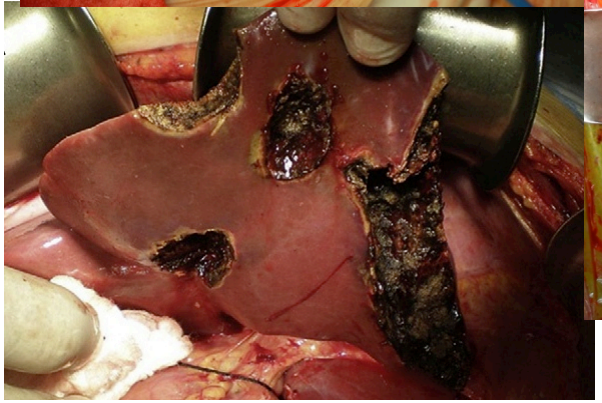


*Cortesia Prof. Eduardo de Santibanes

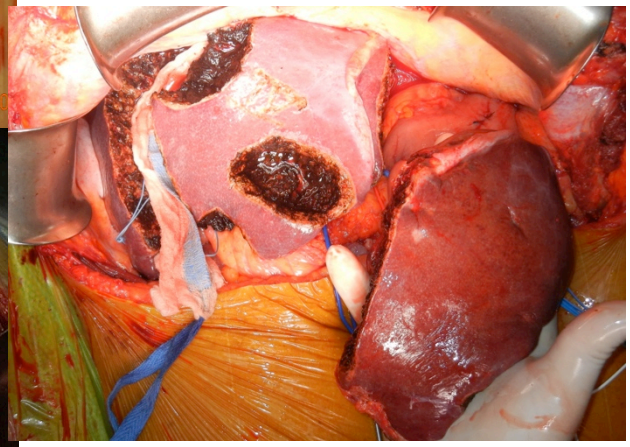
2. Limpeza agressiva do remanescente

ALPPS direito

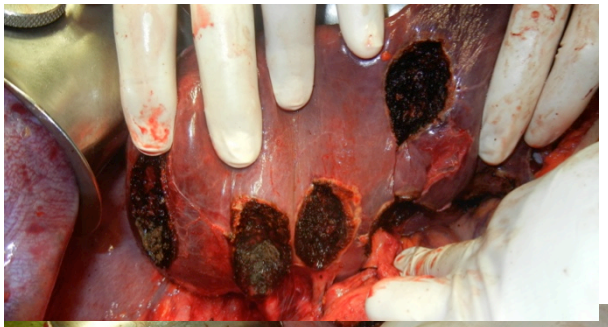




Central



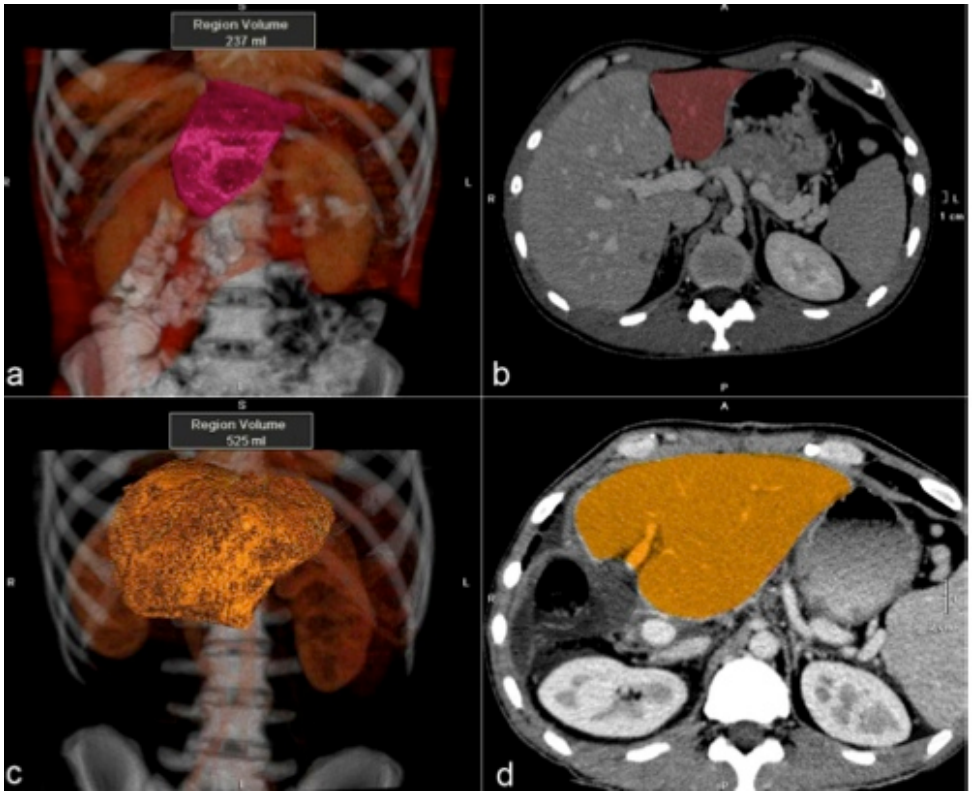
ALPPS esquerdo



de Santibañes E, Clavien PA. *Ann Surg 2012.*
de Santibañes E, Alvarez FA, Ardiles V. *World J Surg 2012*
Alvarez FA, Ardiles V, de Santibañes E et al. JOGS 2012

3. Hipertrofia maciça e acelerada

Superior à E/LVP



- Homem 35 anos com CRLM.
- FOLFOX-Cetuximab **(14 ciclos)**

6 dias

135% hipertrofia

Até 200% de hipertrofia em uma semana

Donati M, et al. Ann Surg. 2012

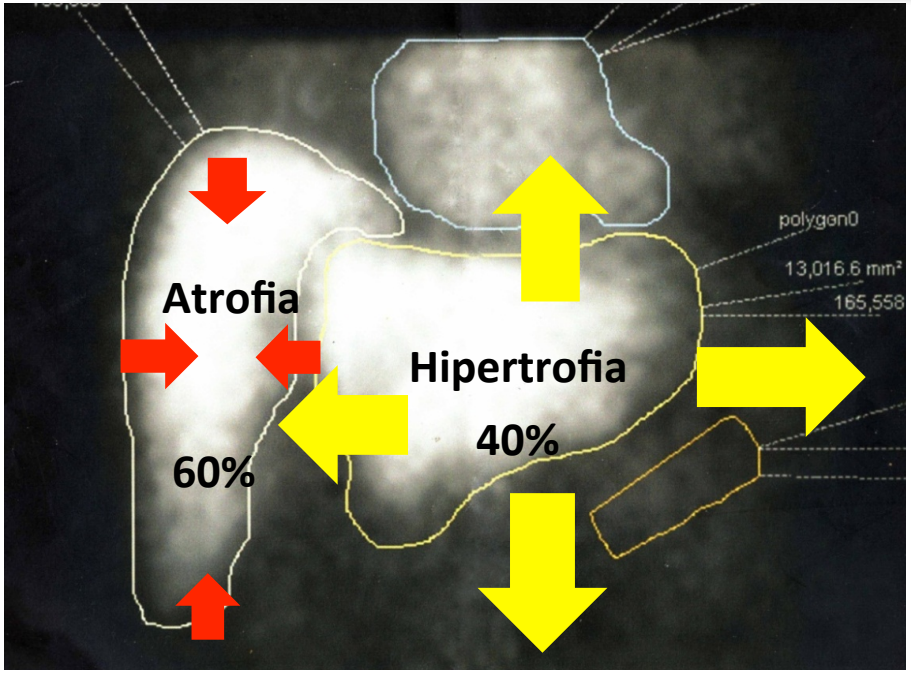
***Ulla M, Ardiles V, de Santibañes E et al**. Hepatogastroenterology 2012*
***Knoefel W T et al**. British Journal of Surgery 2013*

***Cortesia Prof. Eduardo de Santibanes**

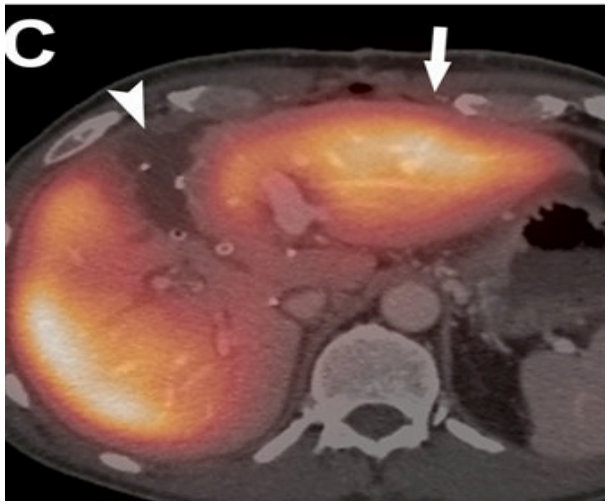
4. Fígado auxiliar temporário

How to Avoid Postoperative Liver Failure: A Novel Method

Eduardo de Santibañes · Fernando A. Alvarez · Victoria Ardiles



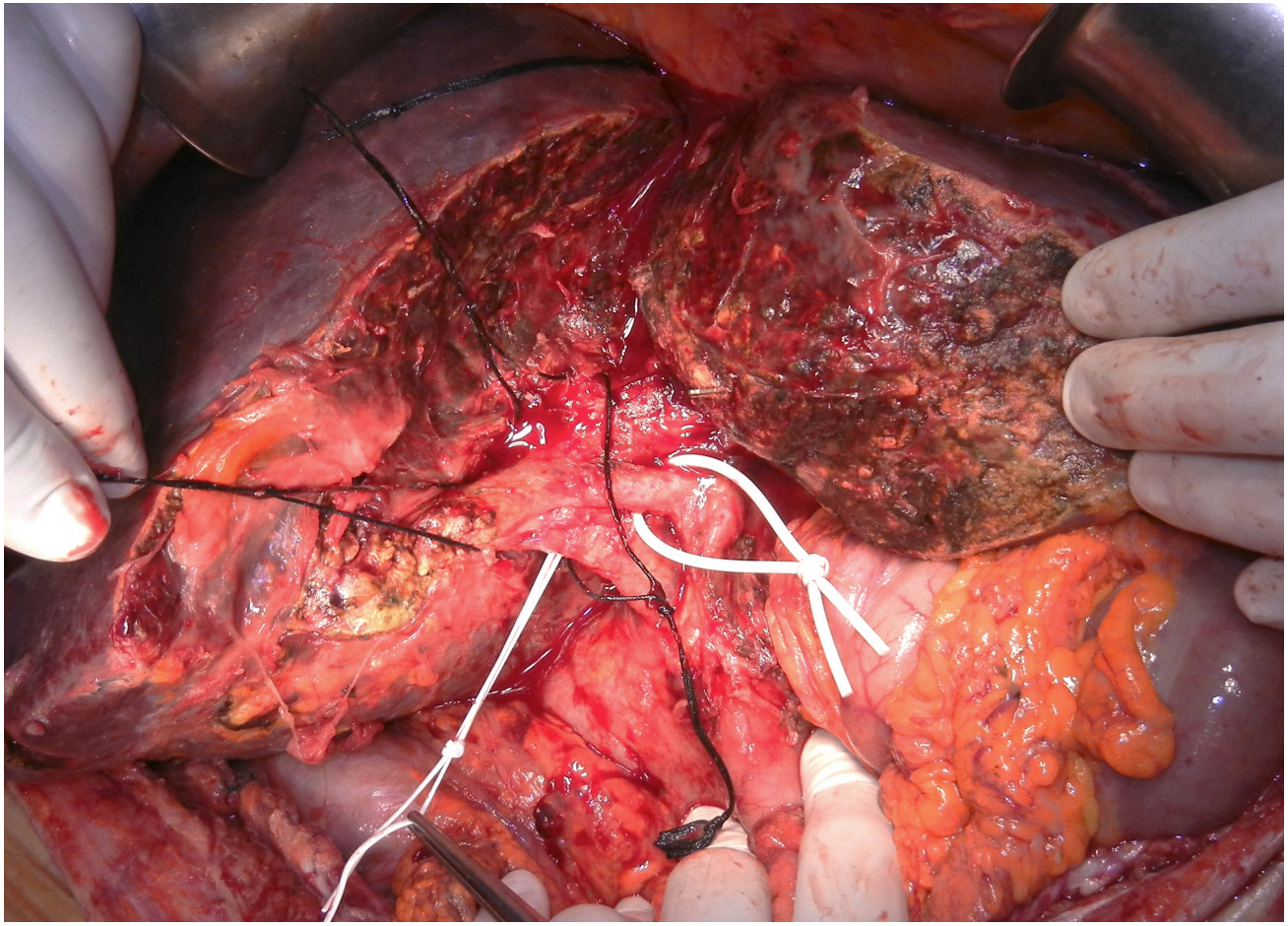
Fígado doente responsável por 60% da função total até o 6º dia



Dokmak S, Belghiti J. *Ann Surg 2012.*
de Santibañes E, Alvarez FA, Ardiles V. *World J Surg 2012.*

***Cortesia Prof. Eduardo de Santibanes**

5. Menos aderências



Em contraste com a hepatectomia em 2-tempos clássica,
o curto intervalo impede a formação de aderências.

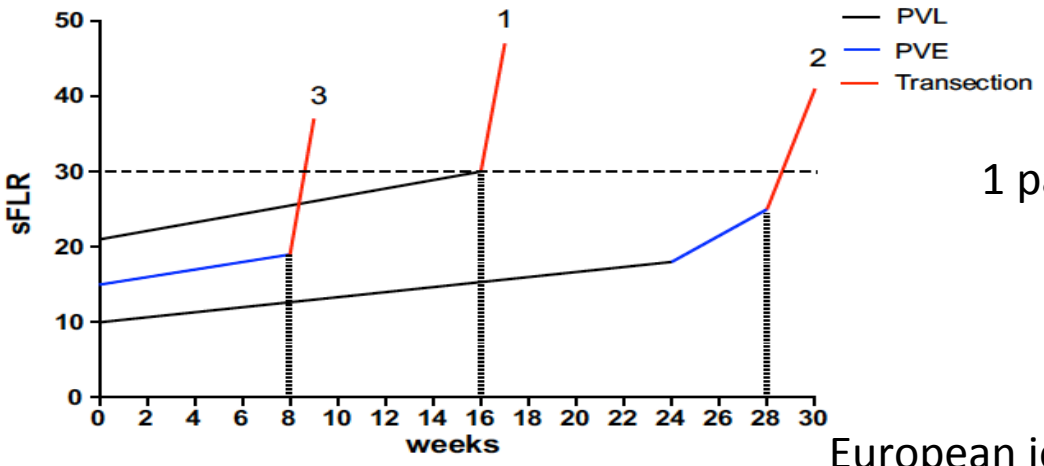
6. ALPPS no resgate da EVP/LVP

Salvage Parenchymal Liver Transection for patients with

Insufficient volume increase after Portal Vein occlusion

- An extension of the ALPPS approach -

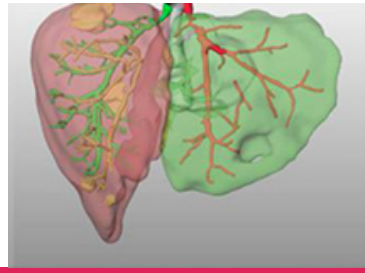
hristoph Tschuor*&, MD, Kris P. Croome#&, MD, Gregory Sergeant*, MD, PhD, Virginia Cano+, MD,
ik Schadde*, MD, Victoria Ardiles+, MD, Ksenija Slankamenac*, MD, Rodrigo Sanchez Clariá +, MD,
Eduardo de Santibañes +, MD, PhD, Roberto Hernandez-Alejandro #&, MD and
Pierre-Alain Clavien *&, MD, PhD



1 paciente com PVL- PVE (S4) e embolização veia suprahepática direita.

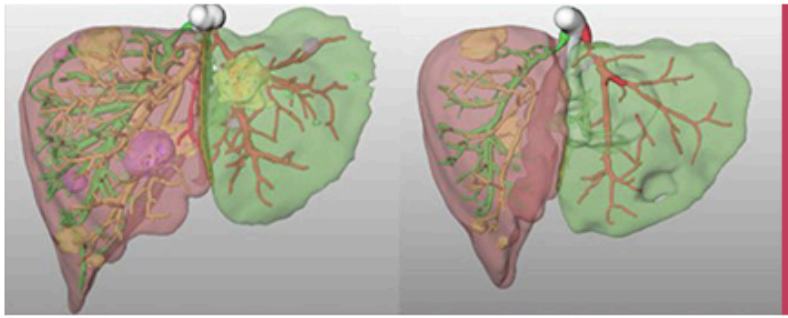
European journal of Surgical Oncology 2013

ALPPS



- Ressecção simultânea na primeira operação em doença sincrônica.
- O intervalo curto torna pouco provável a progressão tumoral.
- Na progressão tumoral no hemifígado doente, não há invasão por contiguidade.

Ardiles V, et al. In Torres 2015. In press



1 st International Consensus Meeting on ALPPS

February 27th and 28th 2015, Hamburg, Germany

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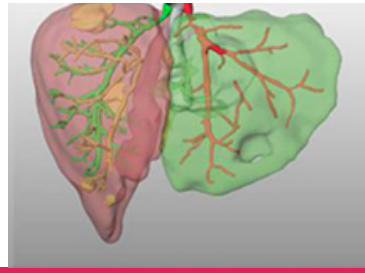
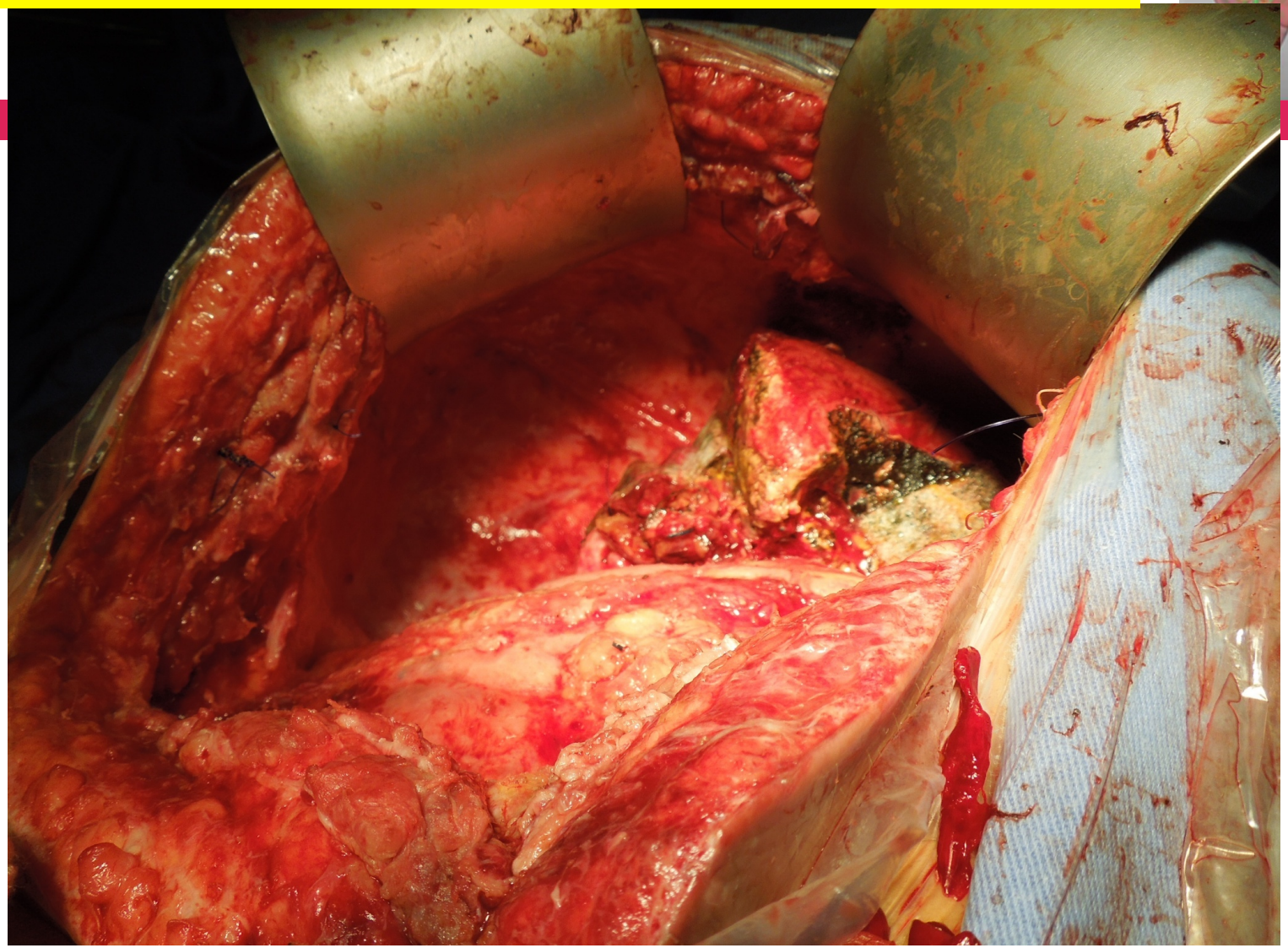
Brazil



HEPATECTOMIA DIREITA AMPLIADA



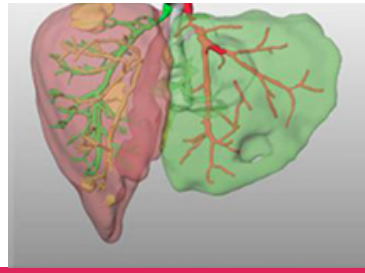


TABLE 2. Main Operative Characteristics of 202 Patients in the ALPPS Registry

Variable	All Patients (n = 202)
Laparoscopic/robotic ALPPS, n (%)	5 (3)
Type of ALPPS*	
Right hepatectomy ALPPS, n (%)	106 (52)
Right trisectionectomy ALPPS + Sg 1, n (%)	69 (34)
Right trisectionectomy ALPPS − Sg 1, n (%)	17 (8)
Other types†, n (%)	10 (5)

Schadde E, et al. Ann Surg 2014;260:829-38

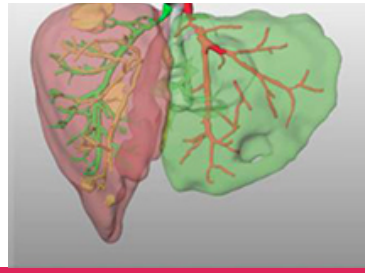


TABLE 2. Intraoperative Data in 30 Patients Treated

Characteristic	1st Stage	2nd Stage
Type of major liver resection, n (%)		
Right hepatectomy	—	8 (28)
Right trisectionectomy	—	20 (69)
Left trisectionectomy	—	1 (3)

Alvarez FA, et al. Ann Surg 2014

METÁSTASE HEPÁTICA COLO-RETAL EXTENSA

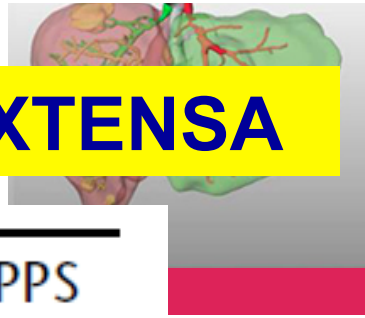
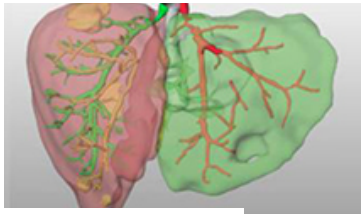
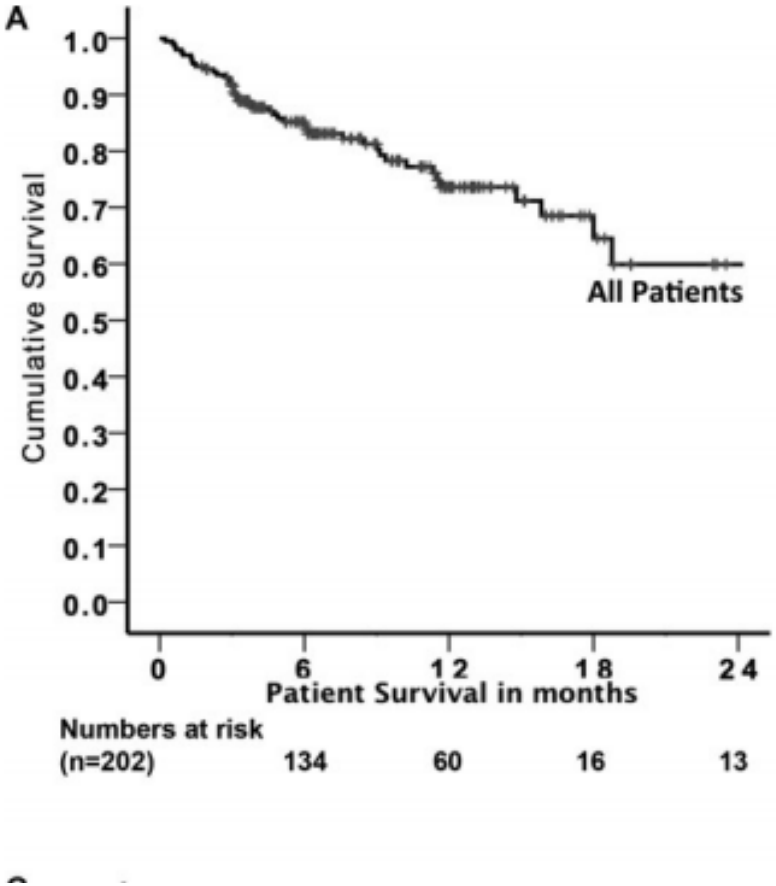


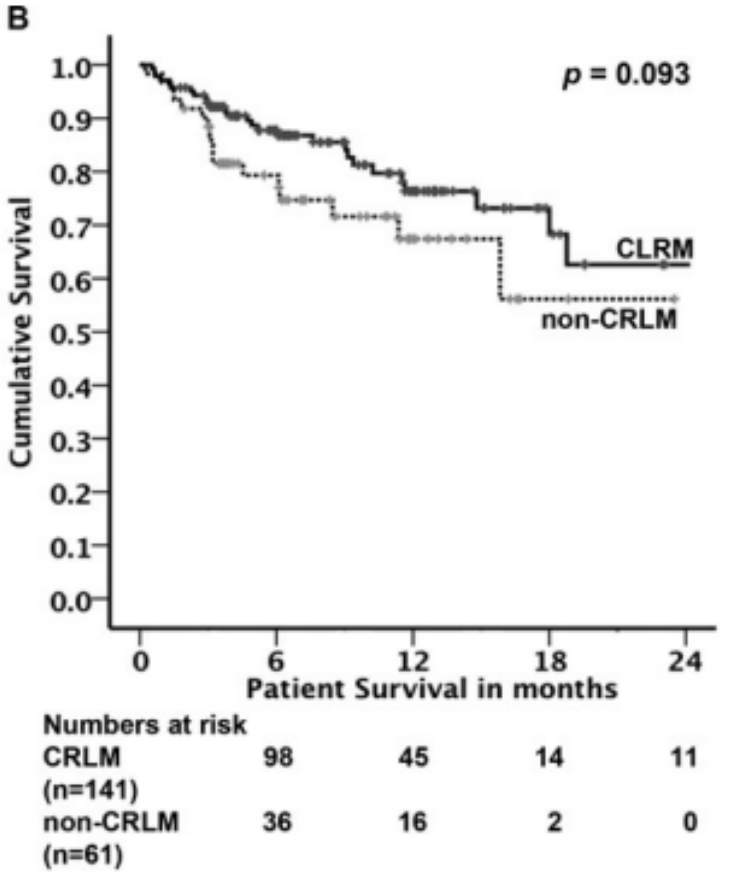
TABLE 1. Main Characteristics of 202 Patients in the ALPPS Registry

Variable of Interest	All Patients (n = 202)
Age, median (IQR), yr	60 (53–68)
Sex, male/female, number (%)	121/81(60%/40%)
Ethnic origin	
White, n (%)	188 (93)
Asian, n (%)	10 (5)
Other*, n (%)	4 (2)
Tumor type	
CRLM, n (%)	141 (70)
HCC, n (%)	17 (8)
PHCC, n (%)	11 (5)
IHCC, n (%)	8 (4)
NET, n (%)	8 (4)
Gallbladder cancer, n (%)	6 (3)
Others, n (%)	11 (5)

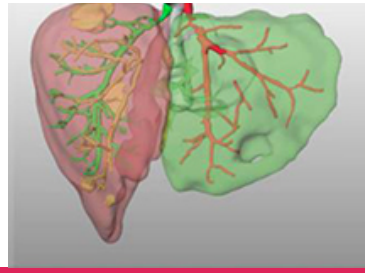
Schadde E, et al. Ann Surg 2014;260:829-38

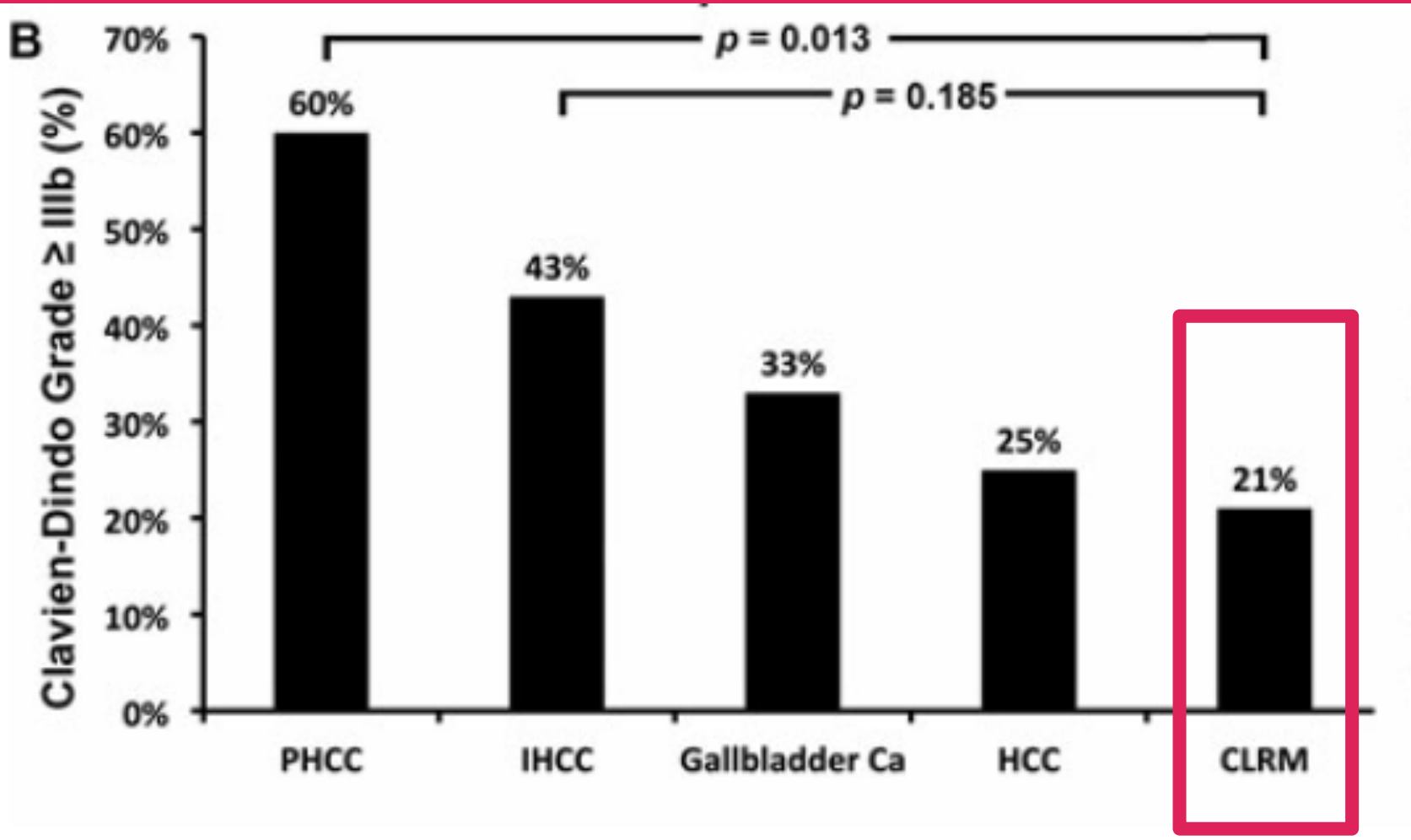






Schadde E, et al. Ann Surg 2014;260:829-38





Schadde E, et al. Ann Surg 2014;260:829-38

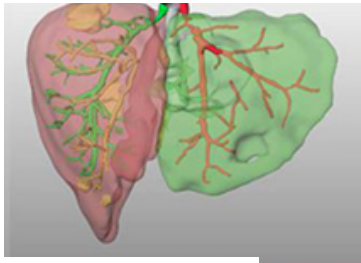
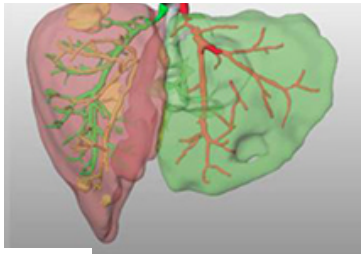


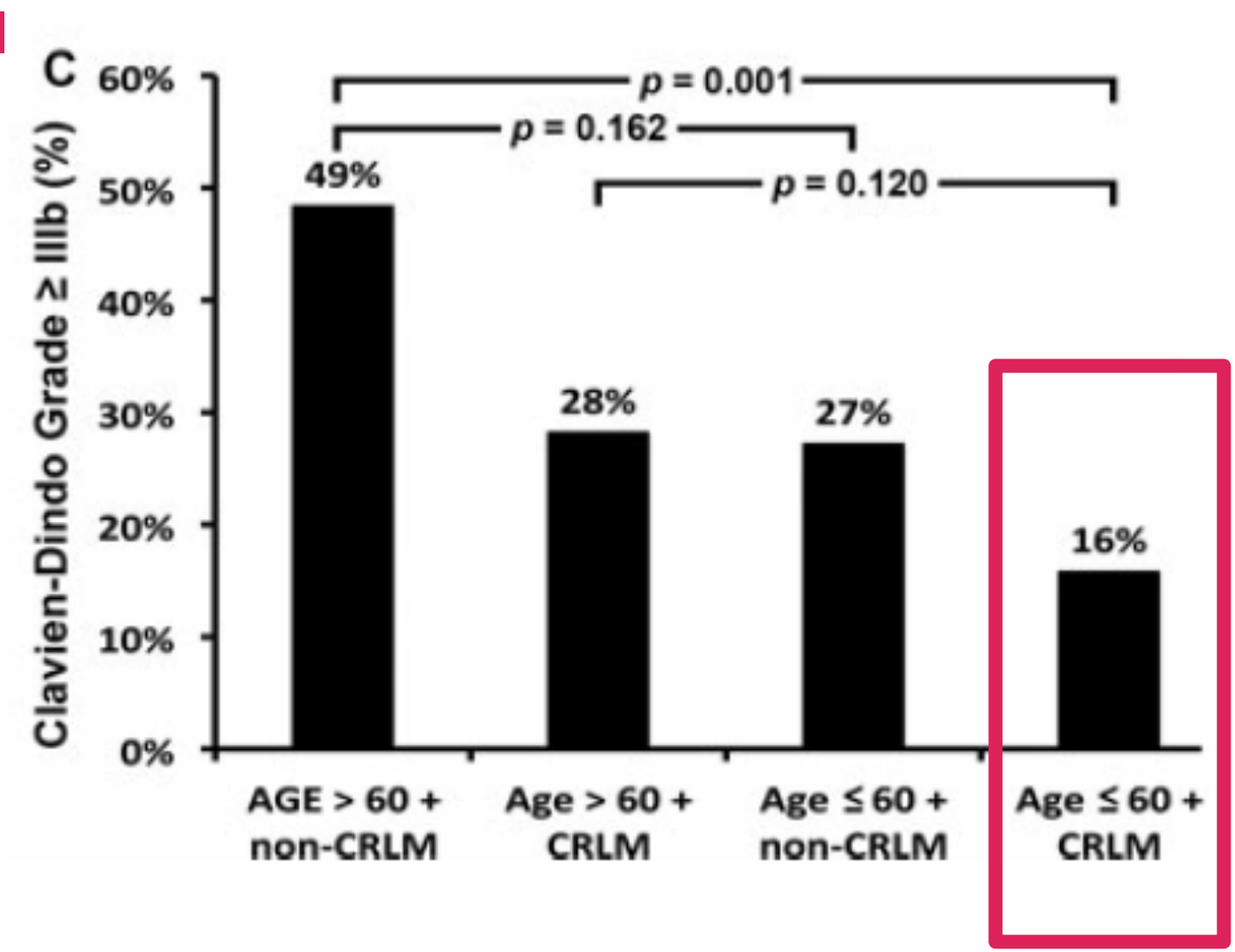
TABLE 3. Main Postoperative Outcomes of 202 Patients in the ALPPS Registry

Variable	All Patients (n = 202)
Failure to reach stage II, n (%)	5 (2)
30-d mortality, n (%)	5 (2)
In-hospital mortality, n (%)	18 (9)
90-d mortality	
In all patients n (%)	19 (9)
In CRLM, n (%) (no. total CRLM)	11 (8%) (n = 141)
In HCC, n (%) (no. total HCC)	2 (12%) (n = 17)
In PHCC, n (%) (no. total PHCC)	3 (27%) (n = 11)
In IHCC, n (%) (no. total IHCC)	1 (13%) (n = 8)
In NET, n (%) (no. total NET)	0 (0%) (n = 8)
In gallbladder cancer (%) (no. total gallbladder cancer)	2 (33%) (n = 6)

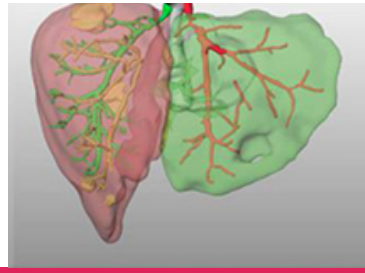
Schadde E, et al. Ann Surg 2014;260:829-38

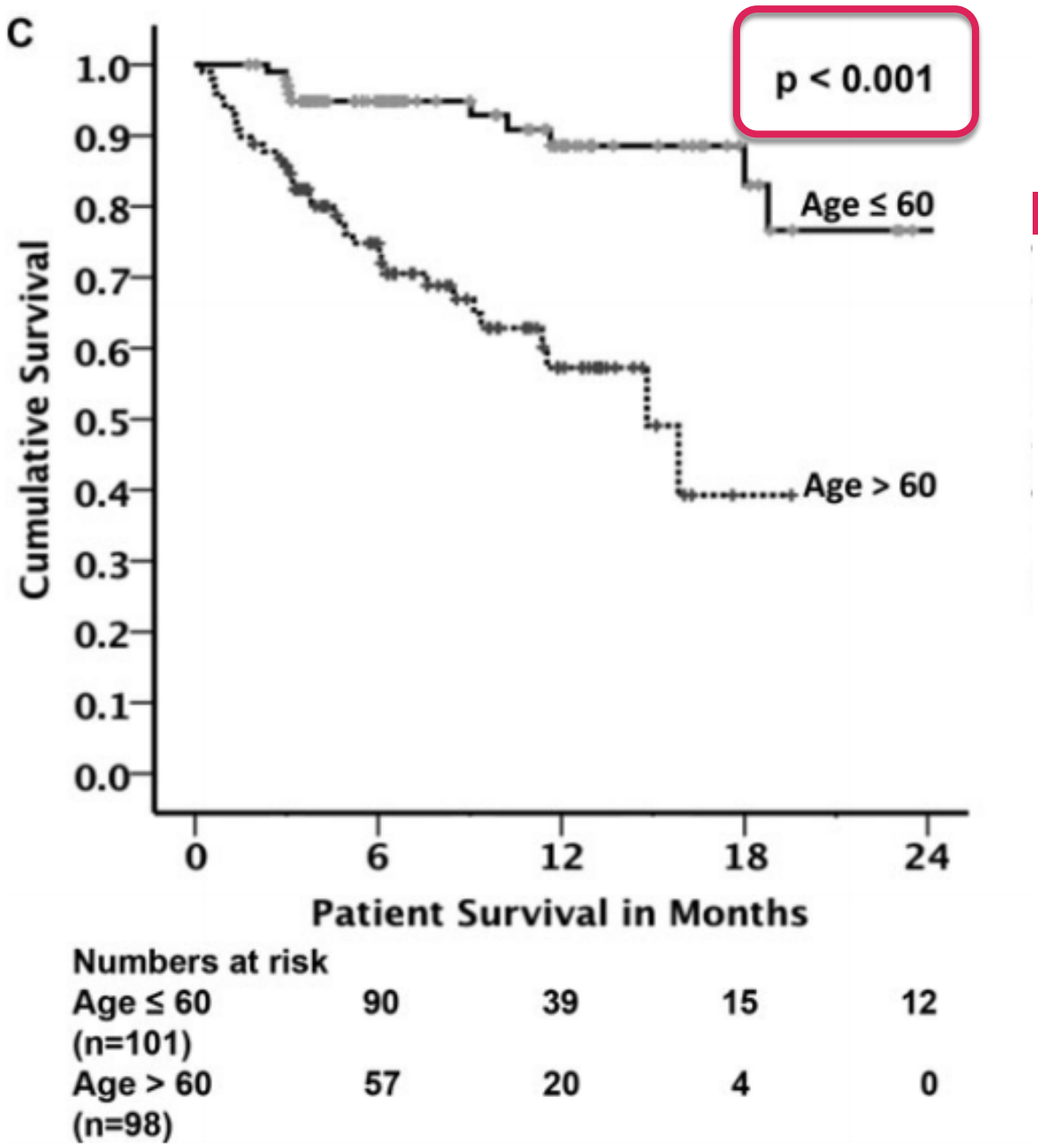
IDADE < 60 ANOS



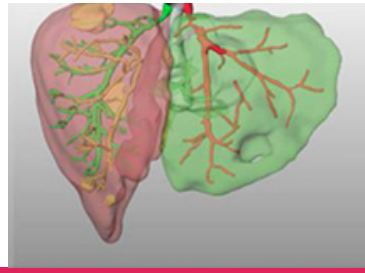


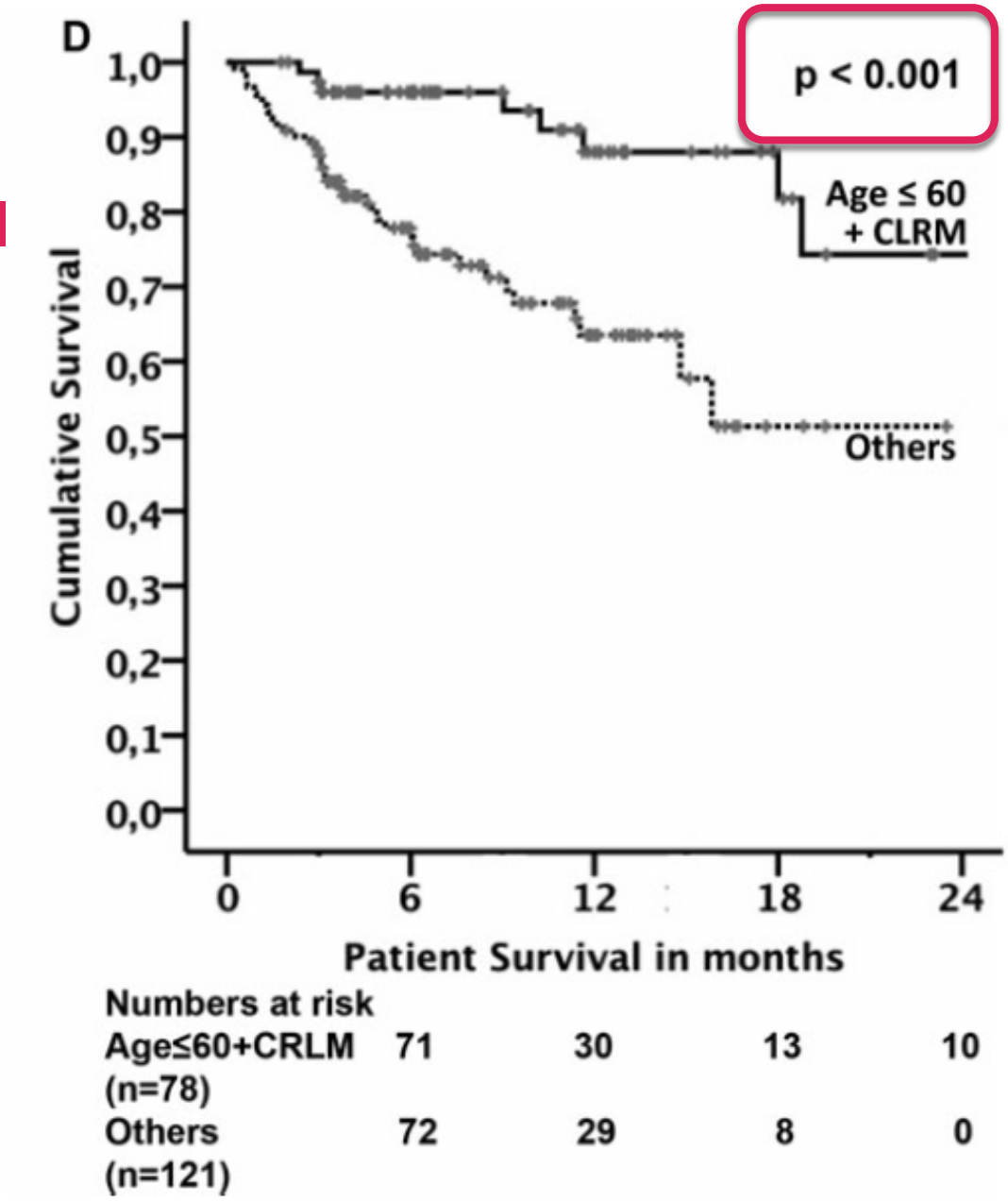
Schadde E, et al. Ann Surg 2014;260:829-38





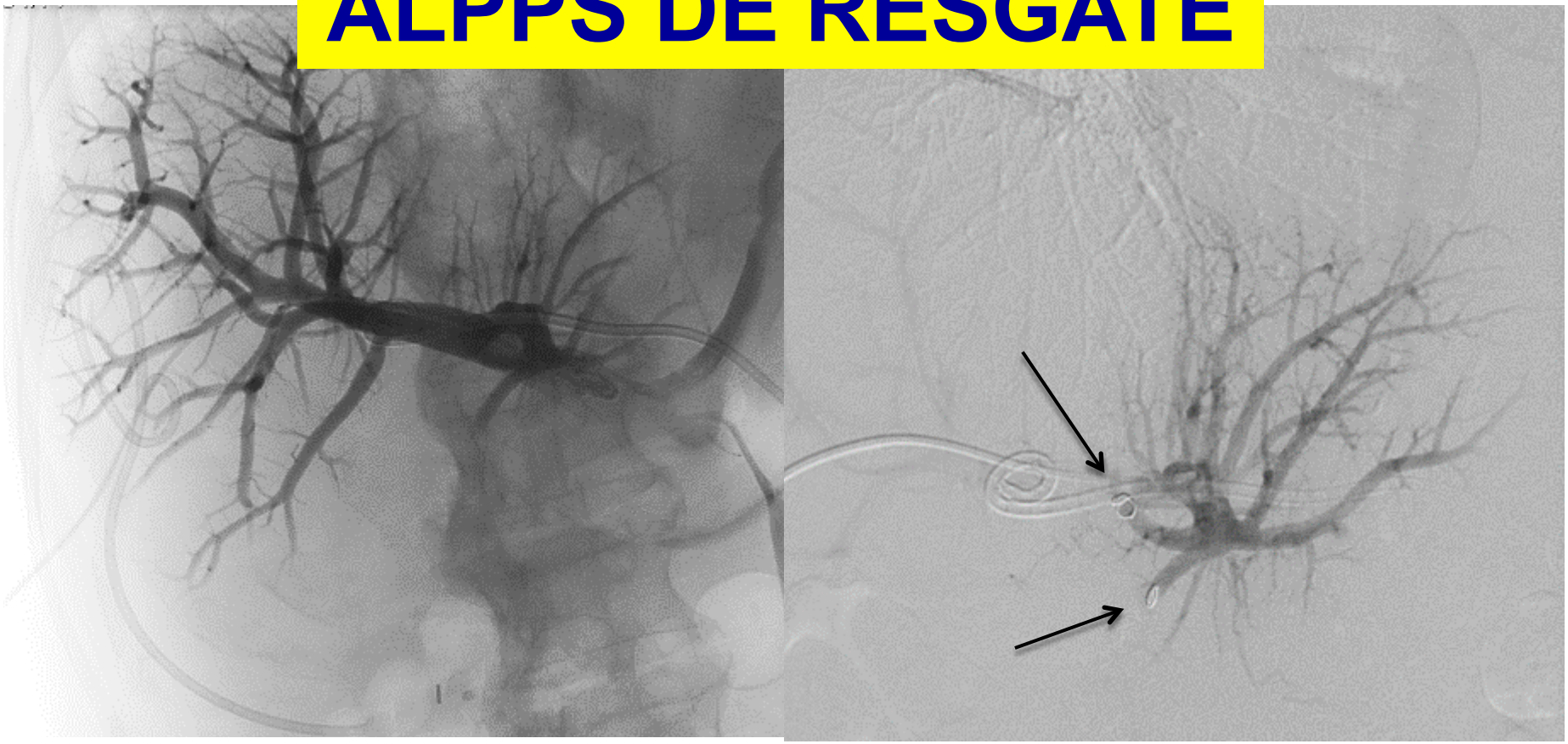
Schadde E, et al. Ann Surg 2014;260:829-38





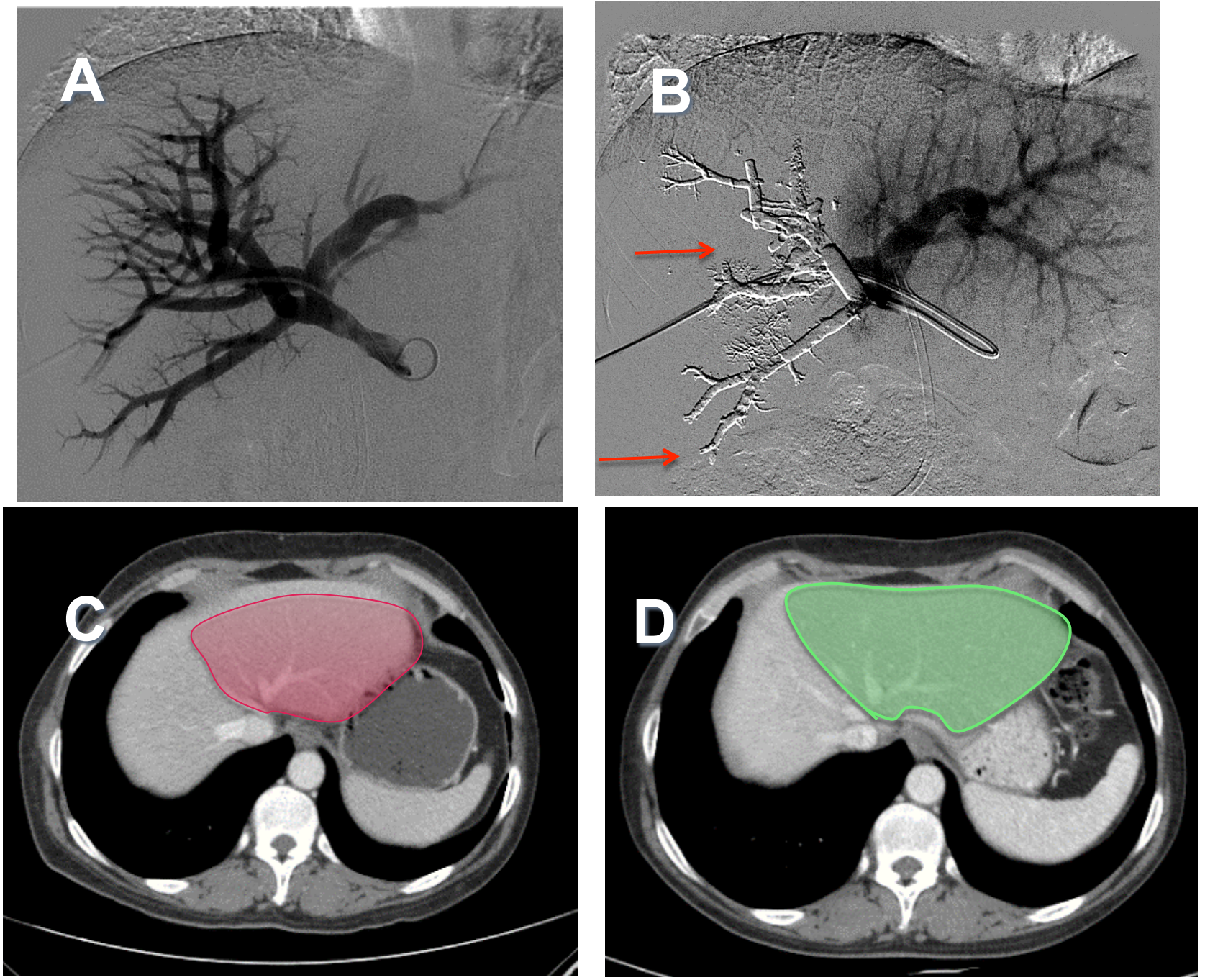
Schadde E, et al. Ann Surg 2014;260:829-38

ALPPS DE RESGATE

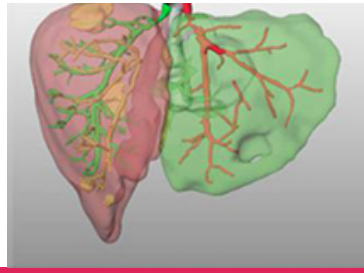


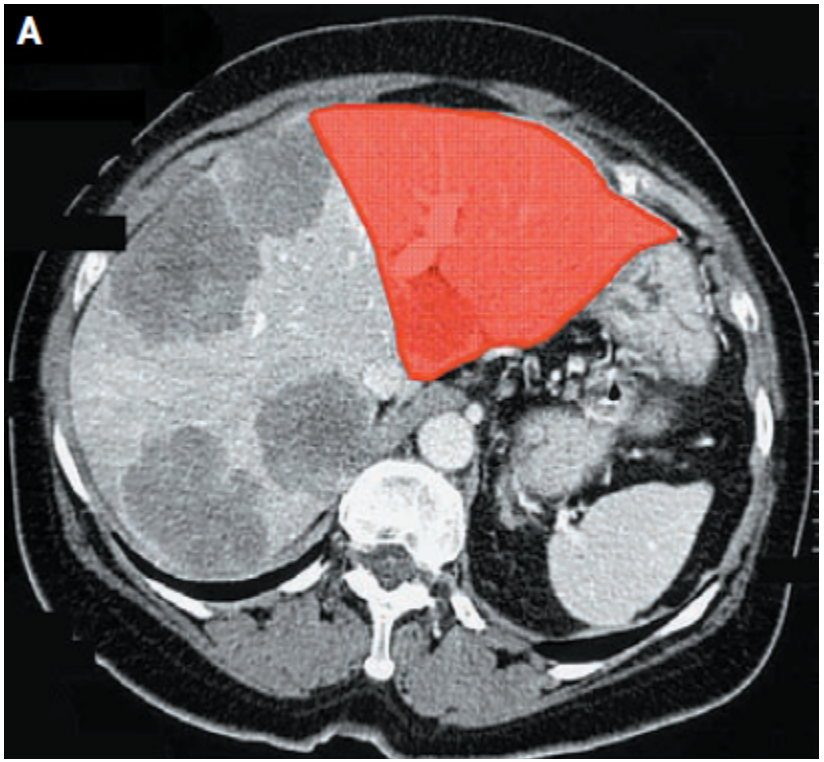
(A) Portografia direita com catéter pigtail através de acesso ipsilaterial. (B) Após microcateterização seletiva dos principais ramos do segmento 4 (setas), realizada embolização com micropartículas e micromolas. Notar a preservação do fluxo portal normal nos demais ramos do lobo esquerdo. O procedimento prosseguiu com embolização dos ramos portais direitos com NBCA.

Carnevale F, et al, In Torres OJM – Ed Rubio. In press



Carnevale F, et al, In Torres OJM – Ed Rubio. In press

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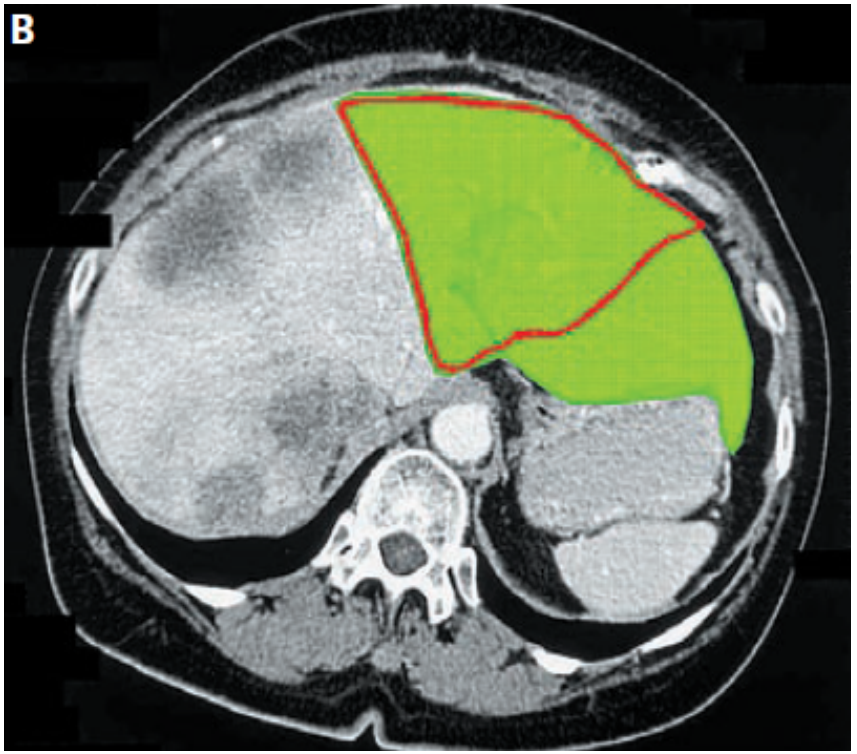
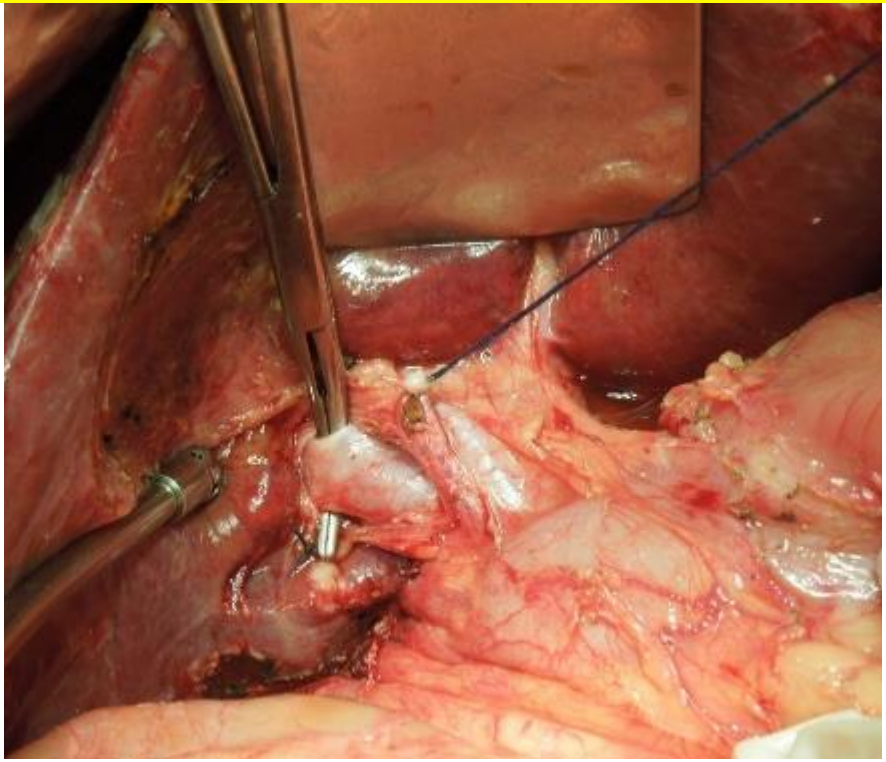
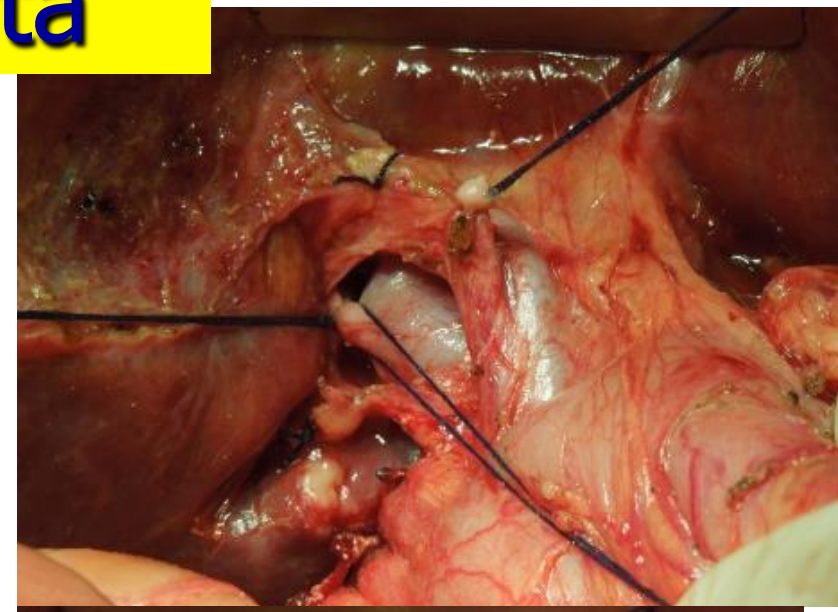
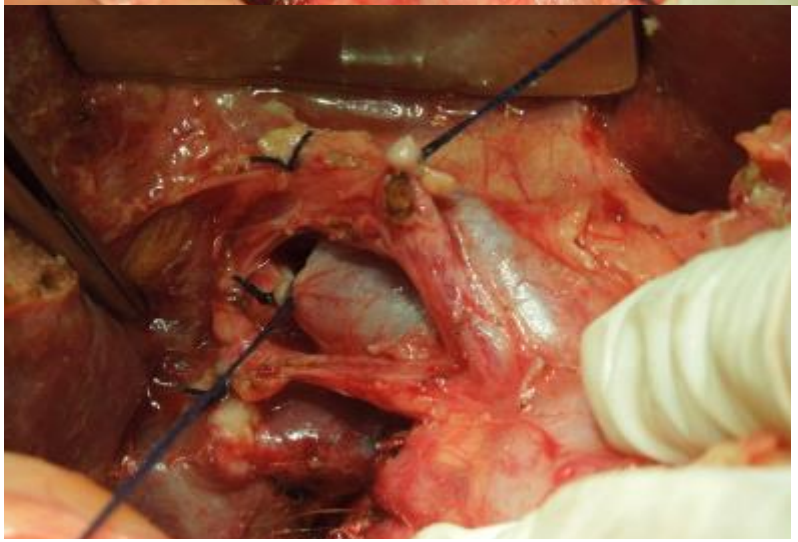
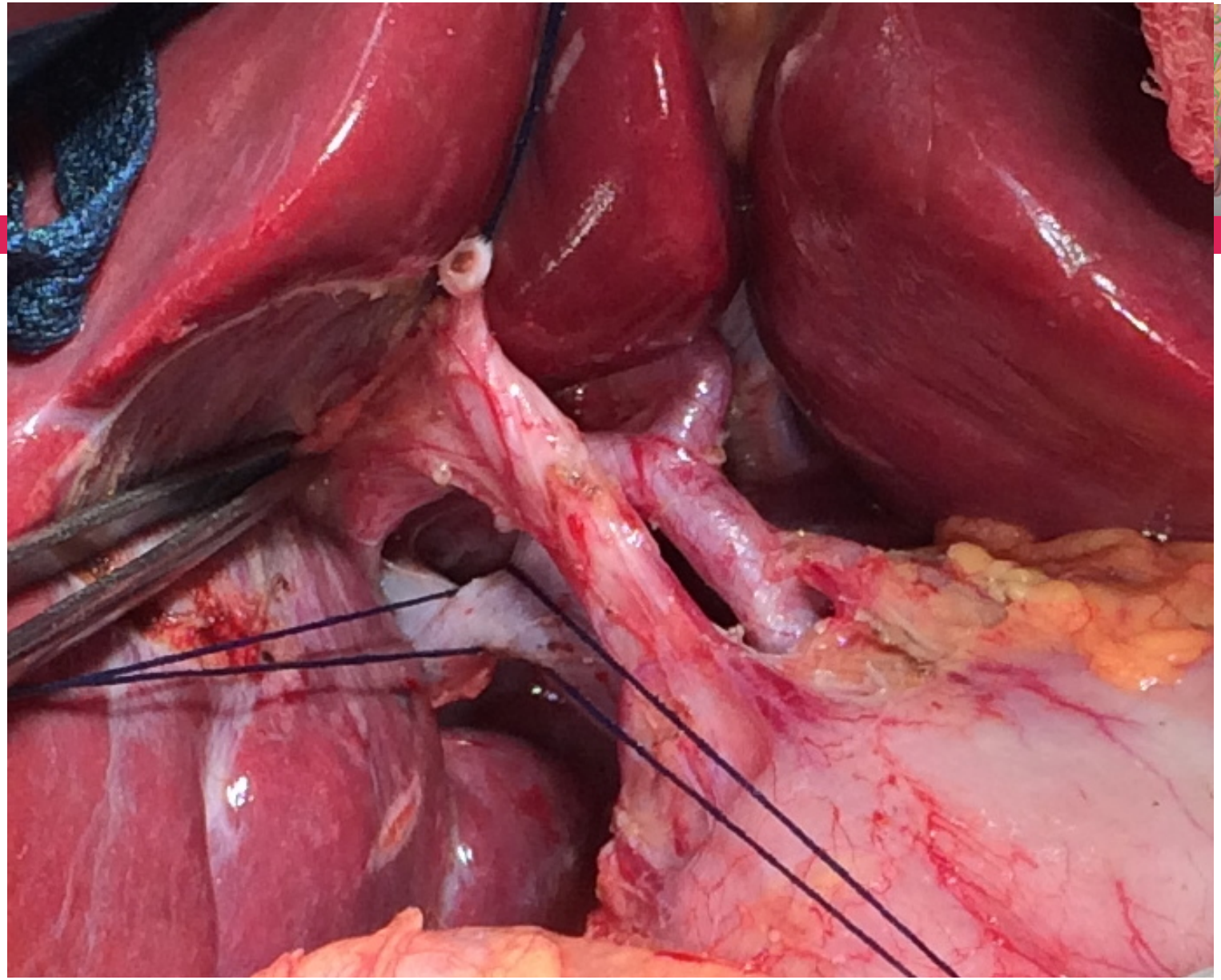

B

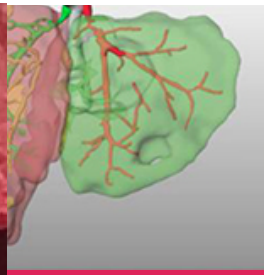
Ligadura da veia porta











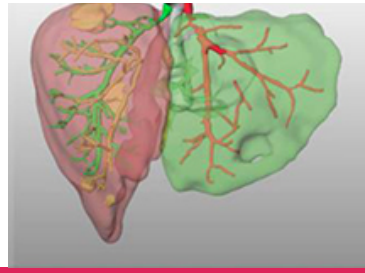
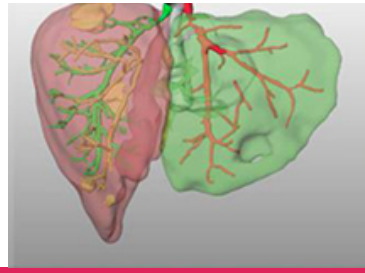


Table 2 Comparison of liver volume in patients undergoing extended right hepatectomy

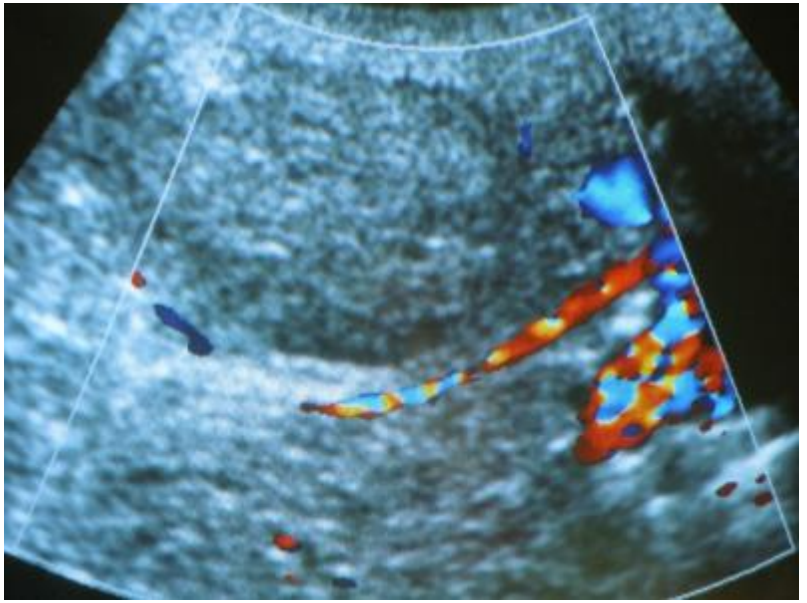
	RPVE (n = 6)	RPVE + IV (n = 12)
FLR volume pre-PVE, mL, median (IQR)	532.1 (410.7–614.2)	441.0 (256.9–513.0)
FLR volume post-PVE, mL, median (IQR)	739.4 (694.9–813.2)	579.6 (420.0–703.3)
Change in volume, mL, median (IQR)	139.9 (125.3–299.7)	140.9 (119.3–243.8)
sFLR pre-PVE, %, median (IQR)	26.5 (20.7–37.2)	23.8 (18.9–29.9)
sFLR post-PVE, %, median (IQR)	27.5 (23.2–57.2)	25.7 (24.8–42.5)
Degree of hypertrophy, %, median (IQR)	23.8 (20.7–62.3)	38.3 (26.0–87.2)

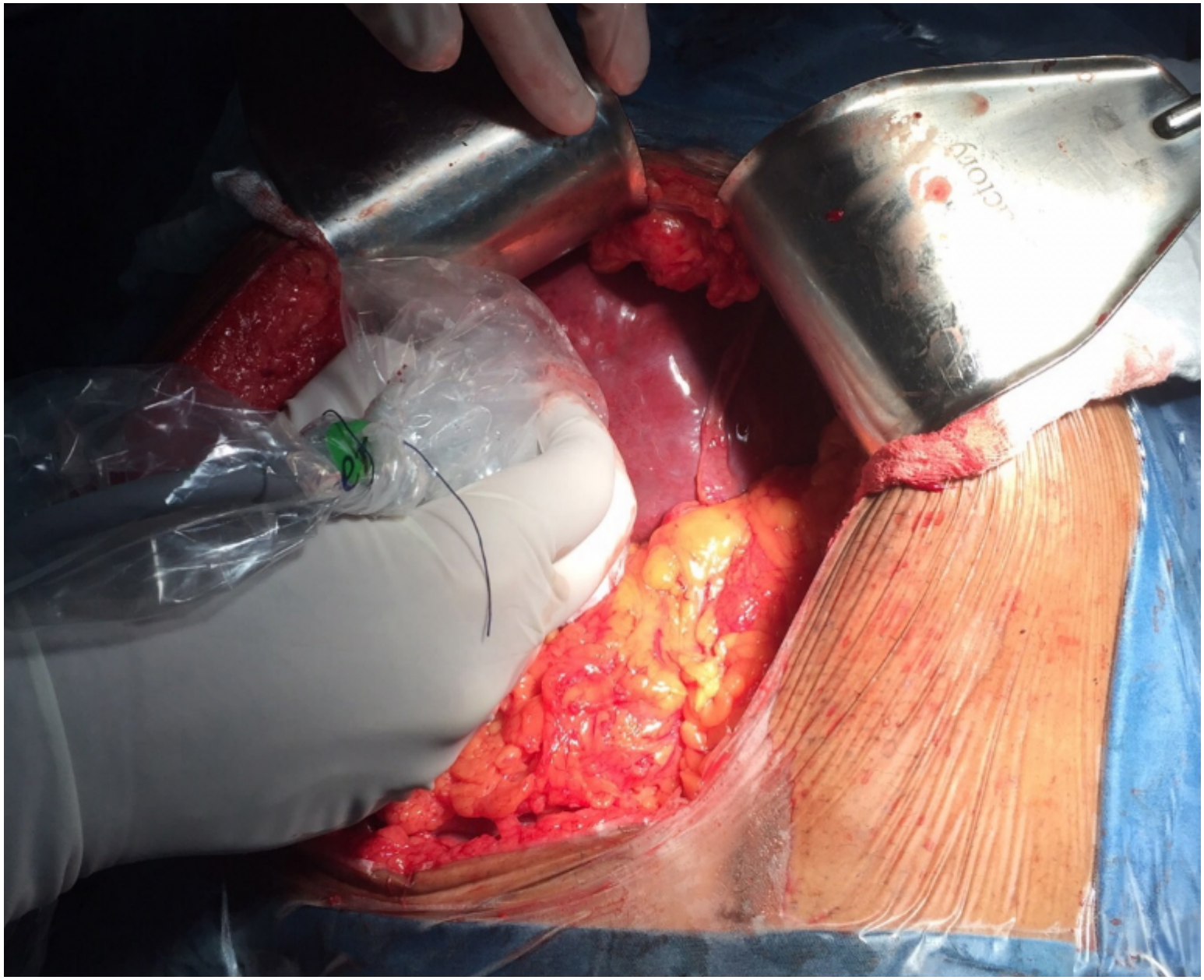
Massimino KP, et al. HPB 2012;14:14-9

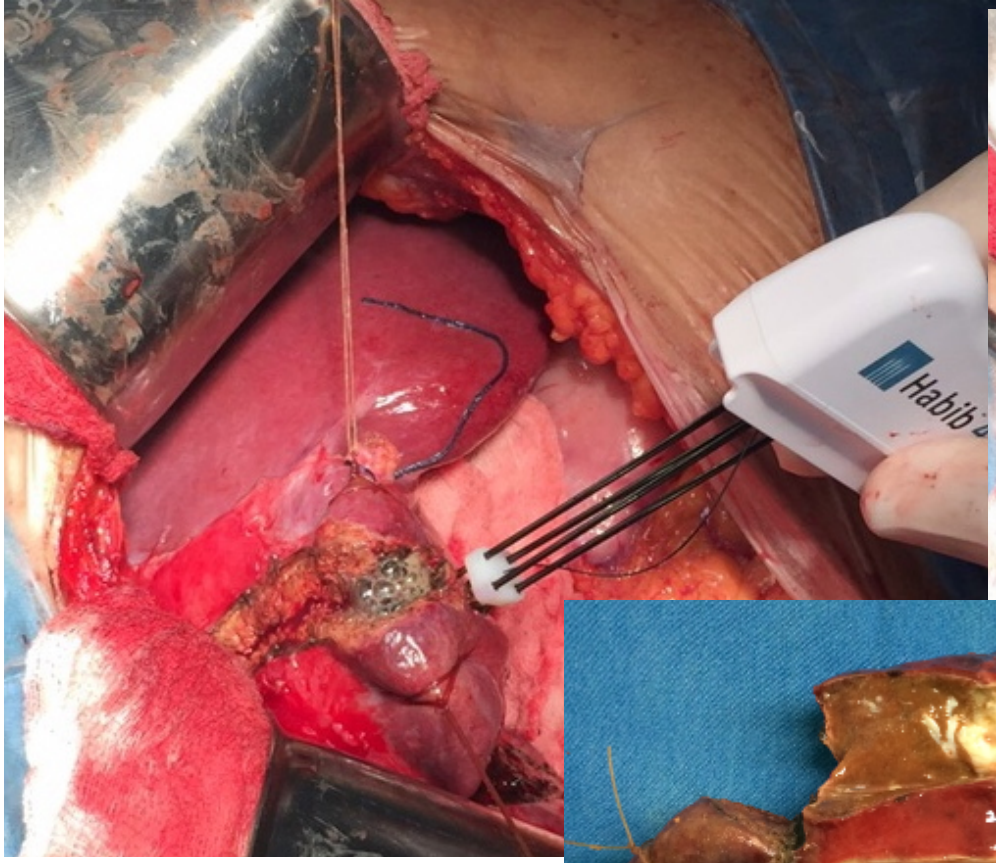


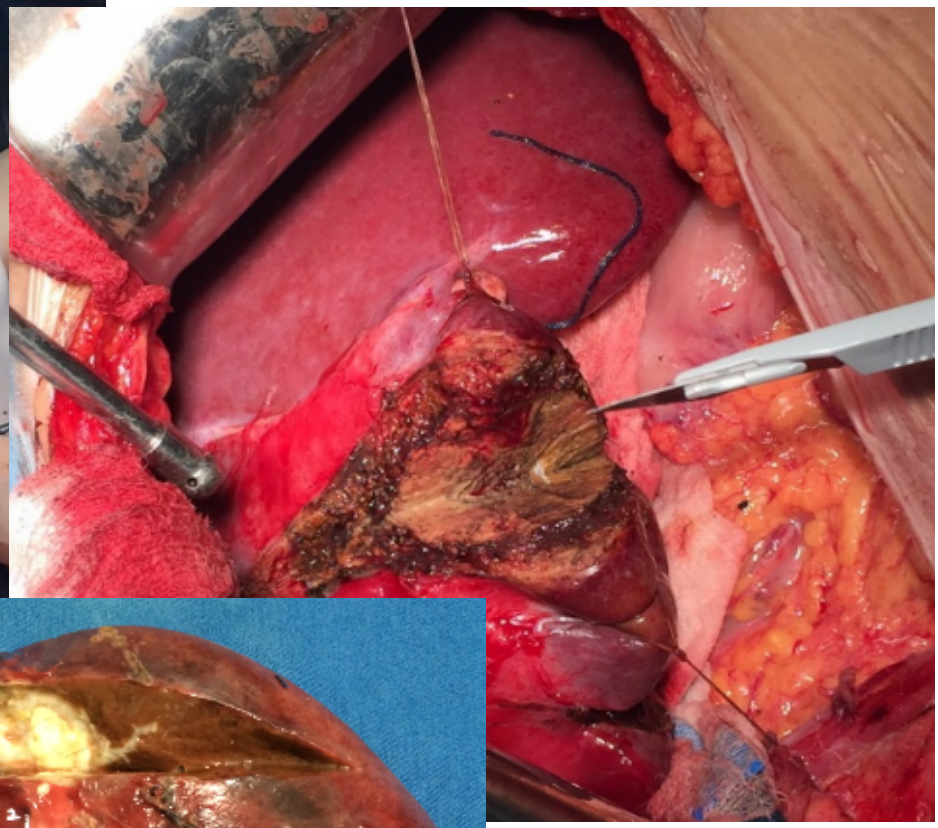
Margem do tumor próximo ao remanescente hepático

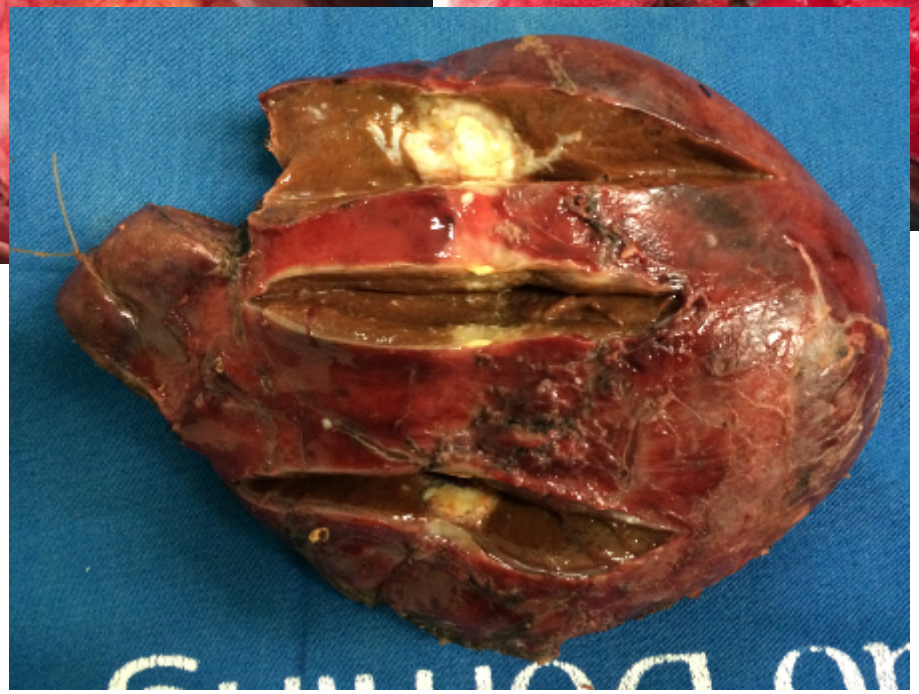
(ou seu pedículo vascular)



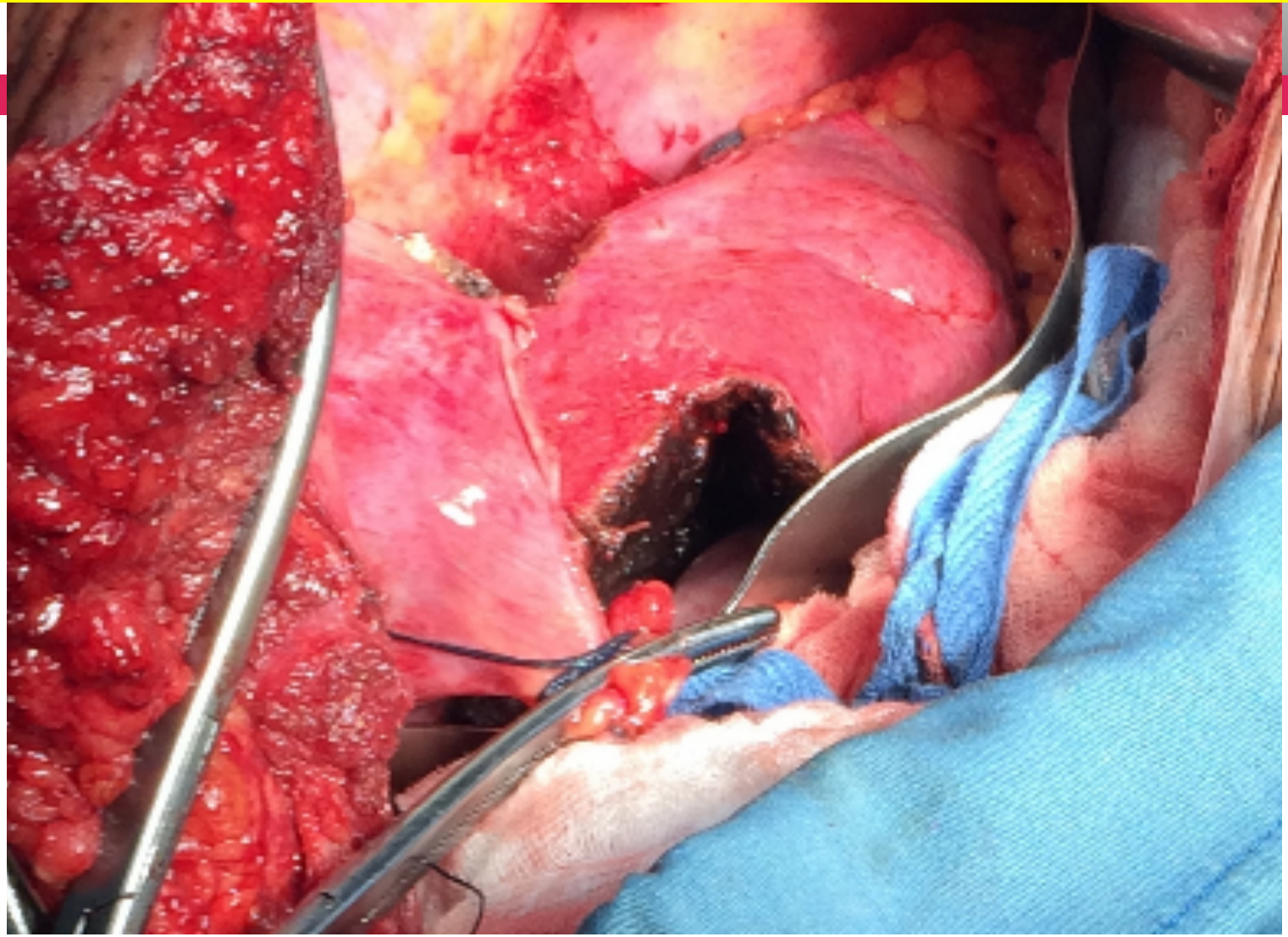


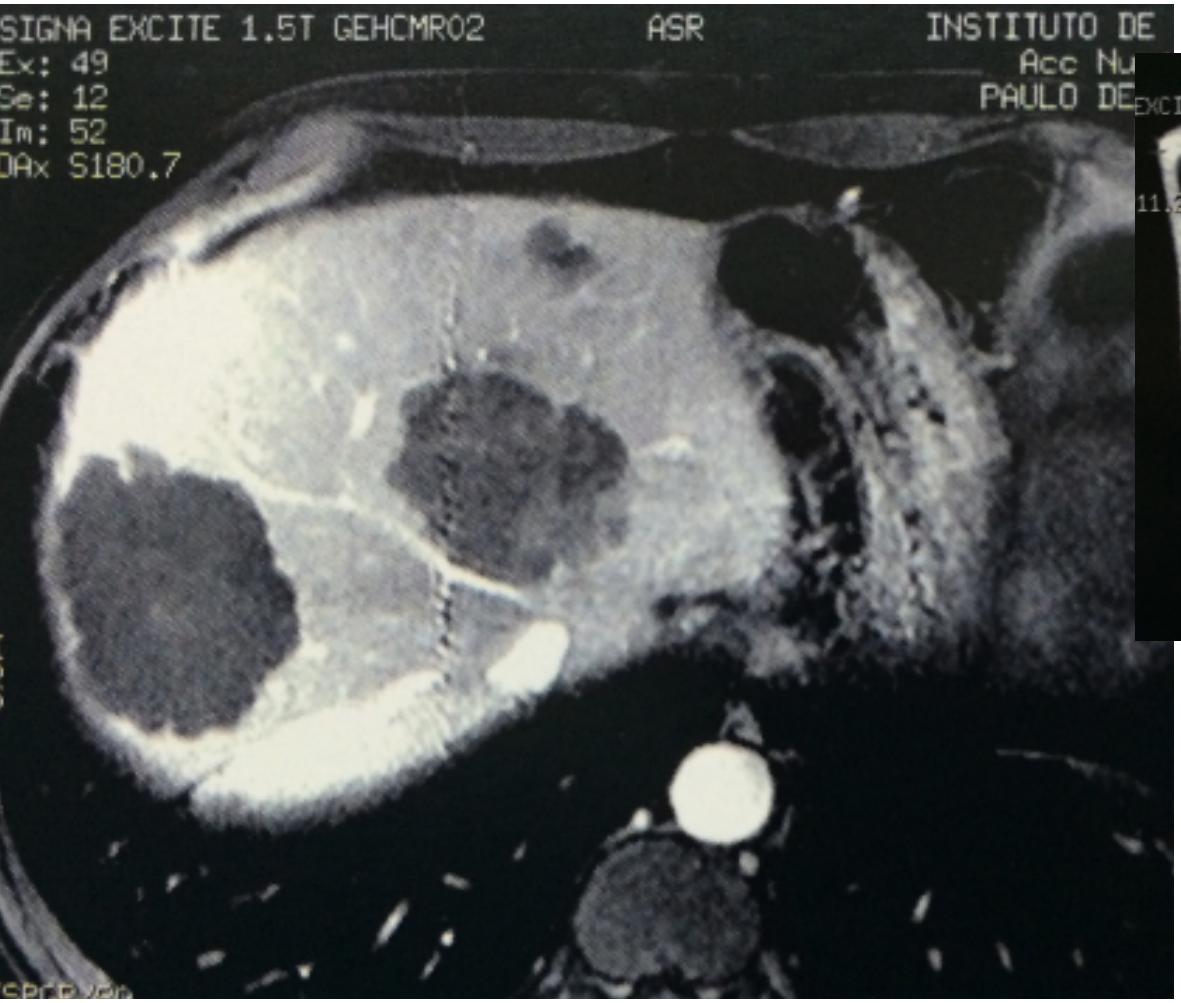

Habib





EXTENSÃO TUMORAL INESPERADA

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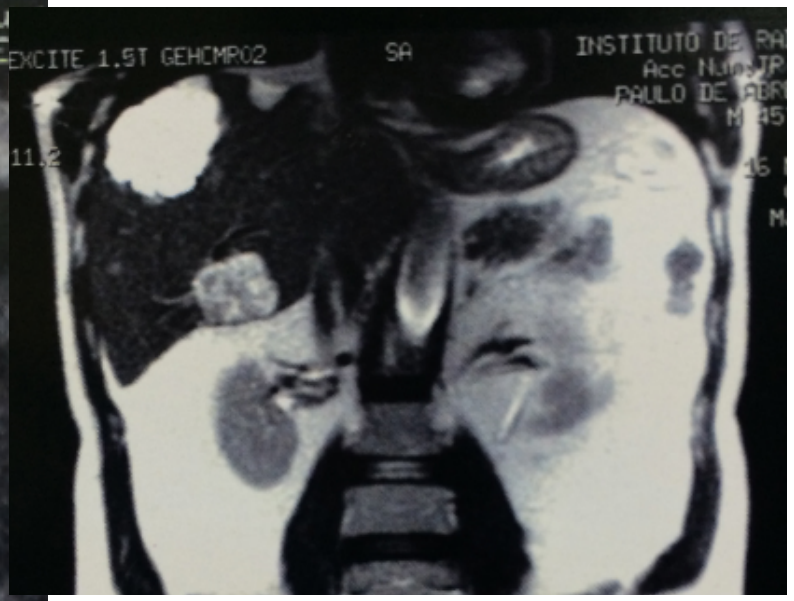
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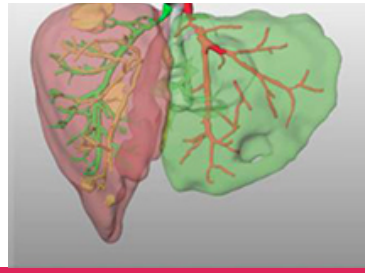
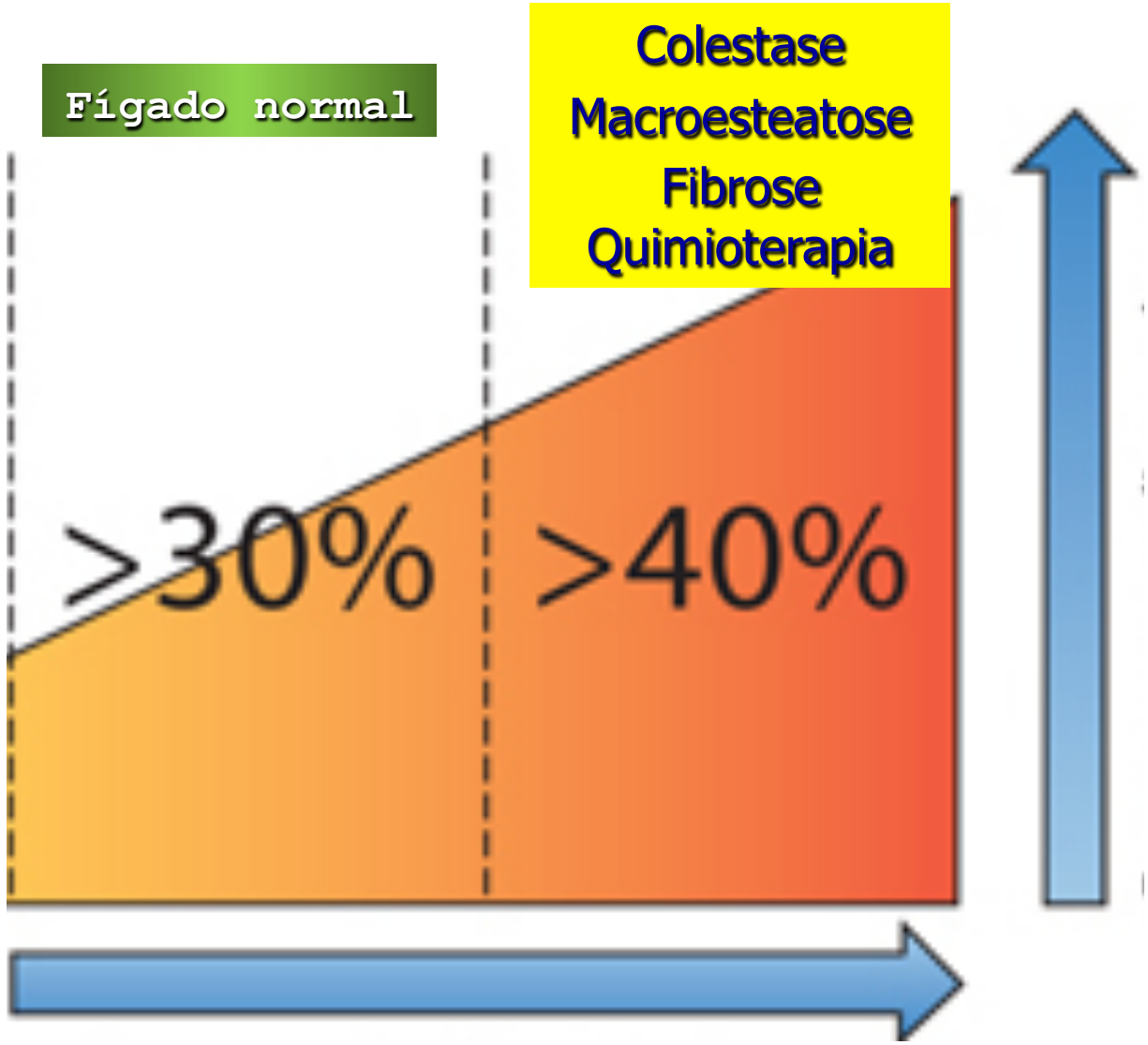


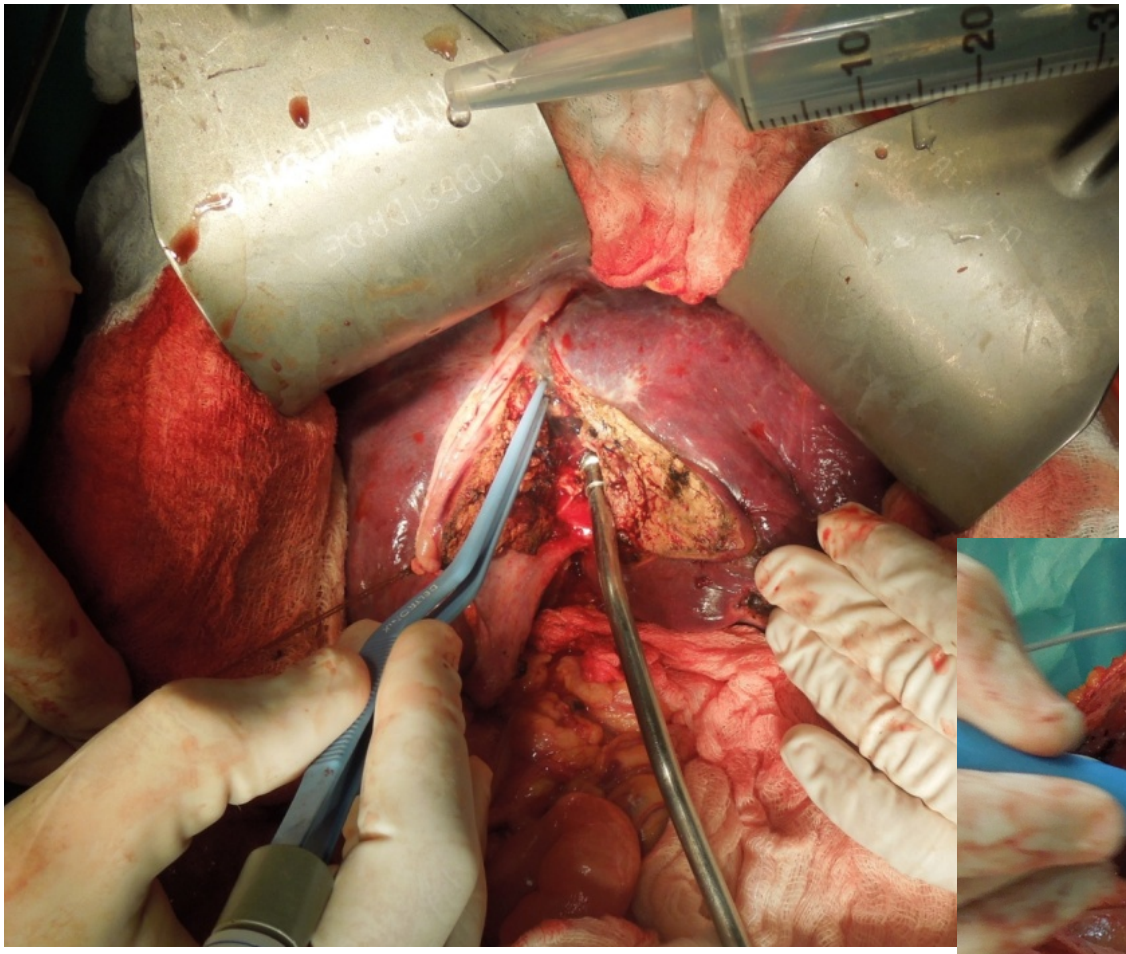
REMANESCENTE HEPÁTICO ≤ 30%

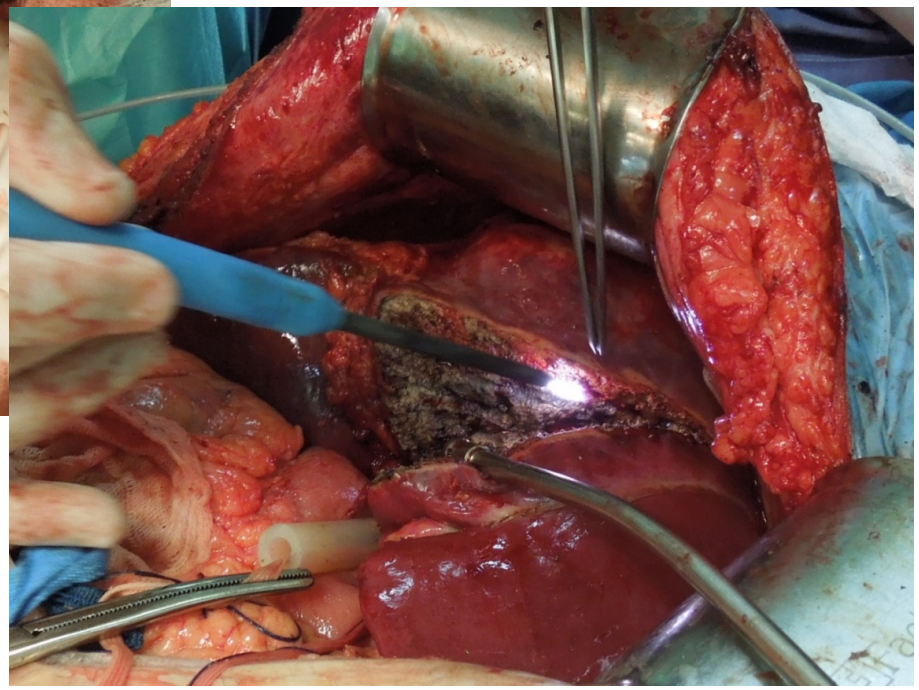
(≤ 0,5% do peso corporal)

Remanescente hepático

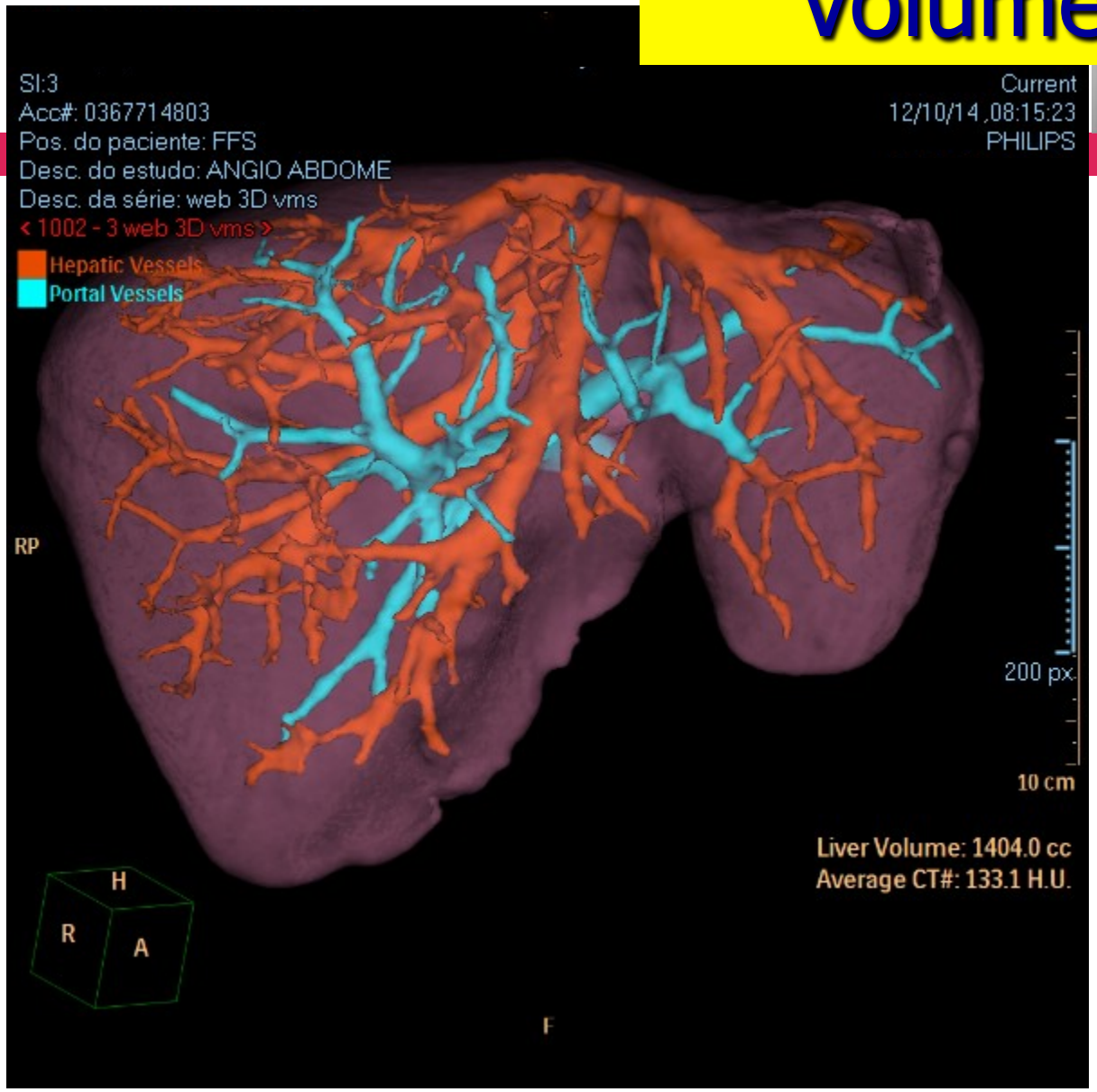


Abdalla EK, et al. Dig Surg 2008;25:421-9





Volumetria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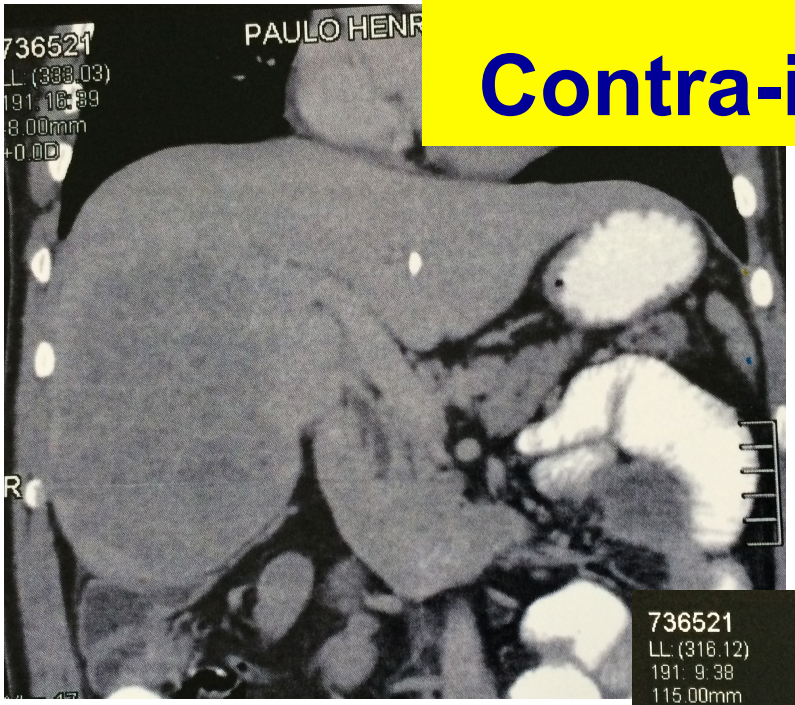
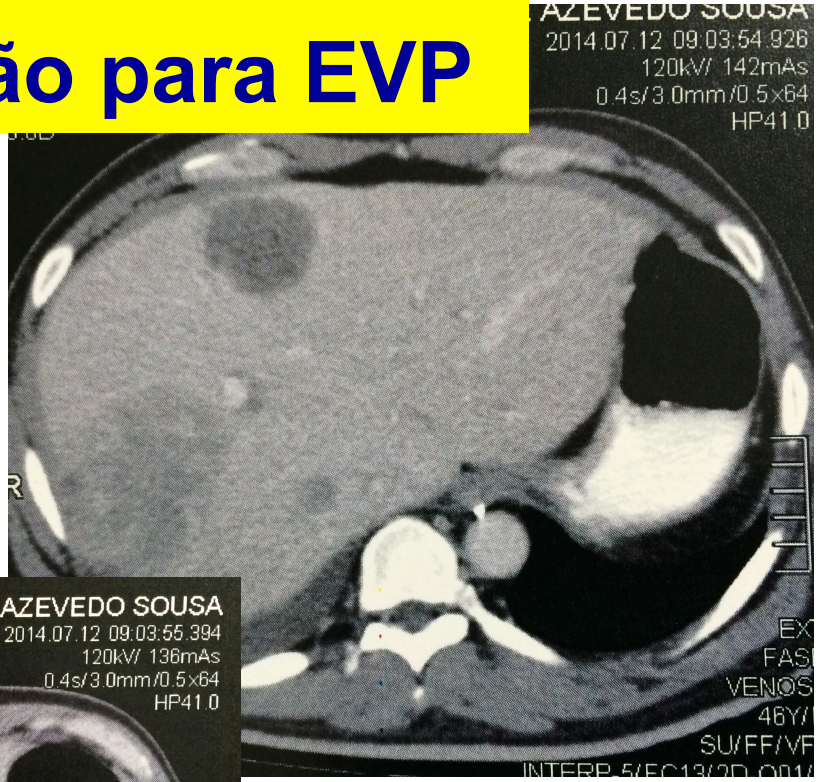
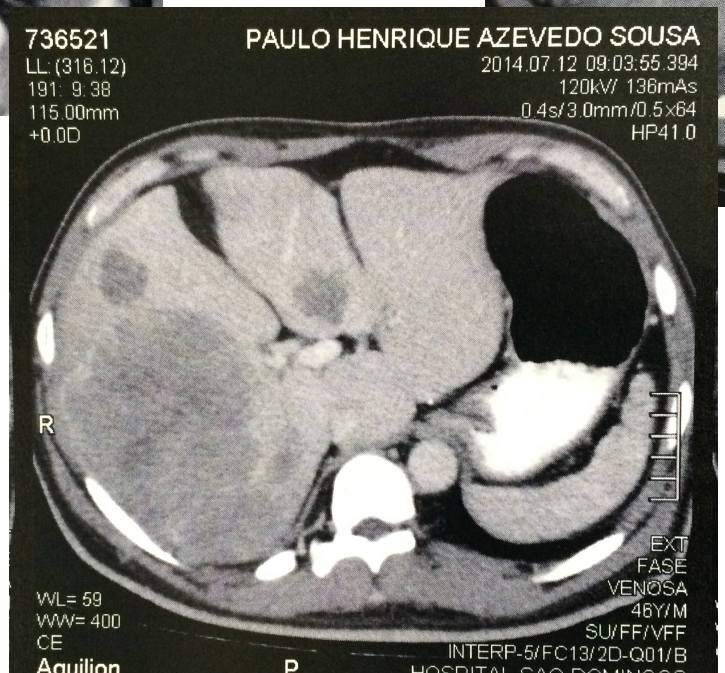
Pos. do paciente: FFS
Desc. do estudo: ANGIO ABDOME
Desc. da série: web 3D vms
< 1002 - 3 web 3D vms >
Hepatic Vessels
Portal Vessels
Current
12/10/14 ,08:15:23
PHILIPS
RP
200 px
10 cm
Liver Volume: 1404.0 cc
Average CT#: 133.1 H.U.
H
R
A
F

DOENÇA BILOBAR

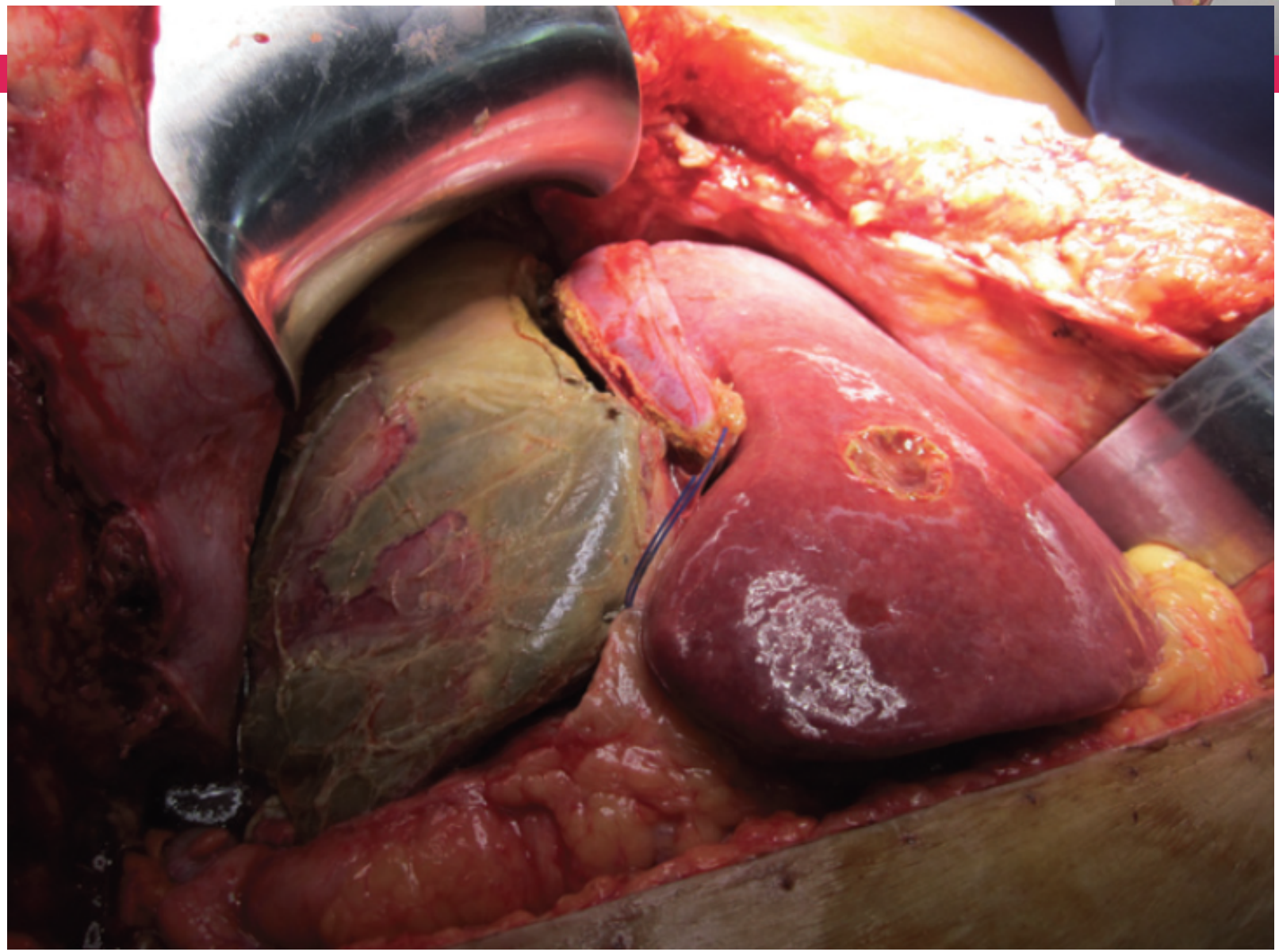
Contra-indicação para EVP



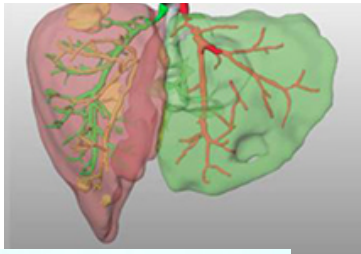




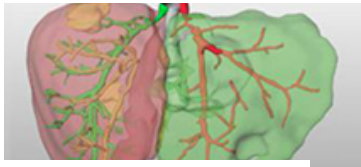
Necessidade de grande hipertrofia (> 65%)



Evitar em Klatskin e CHC



Serviço de referência em HPB



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MGMT. OF COMPLEX CASES IN GI ONCOLOGY

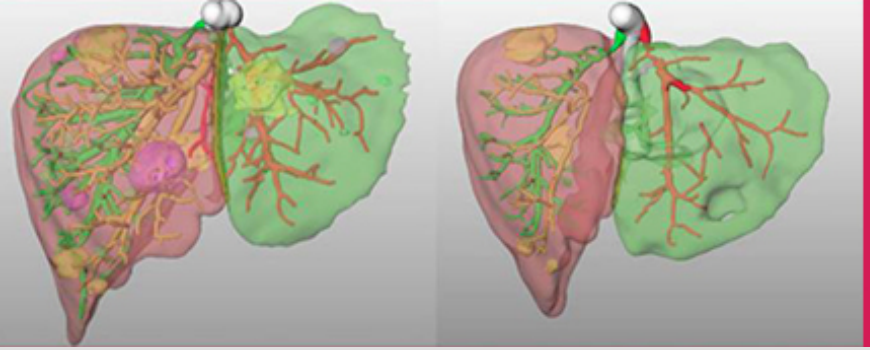
High Mortality Rates After ALPPS: the Devil Is the Indication

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

Table 1 Operative results

	Gender, age, date of first OR	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

Herman P, et al. J Gastrointest Cancer. 2015



1 st International
Consensus Meeting
on ALPPS

February 27th and 28th 2015, Hamburg, Germany

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Obrigado!