TRATAMENTO CIRÚRGICO DO COLANGIOCARCINOMA

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Review

Adenocarcinoma of the Hepatic Duct at Its Bifurcation Within the Porta Hepatis*

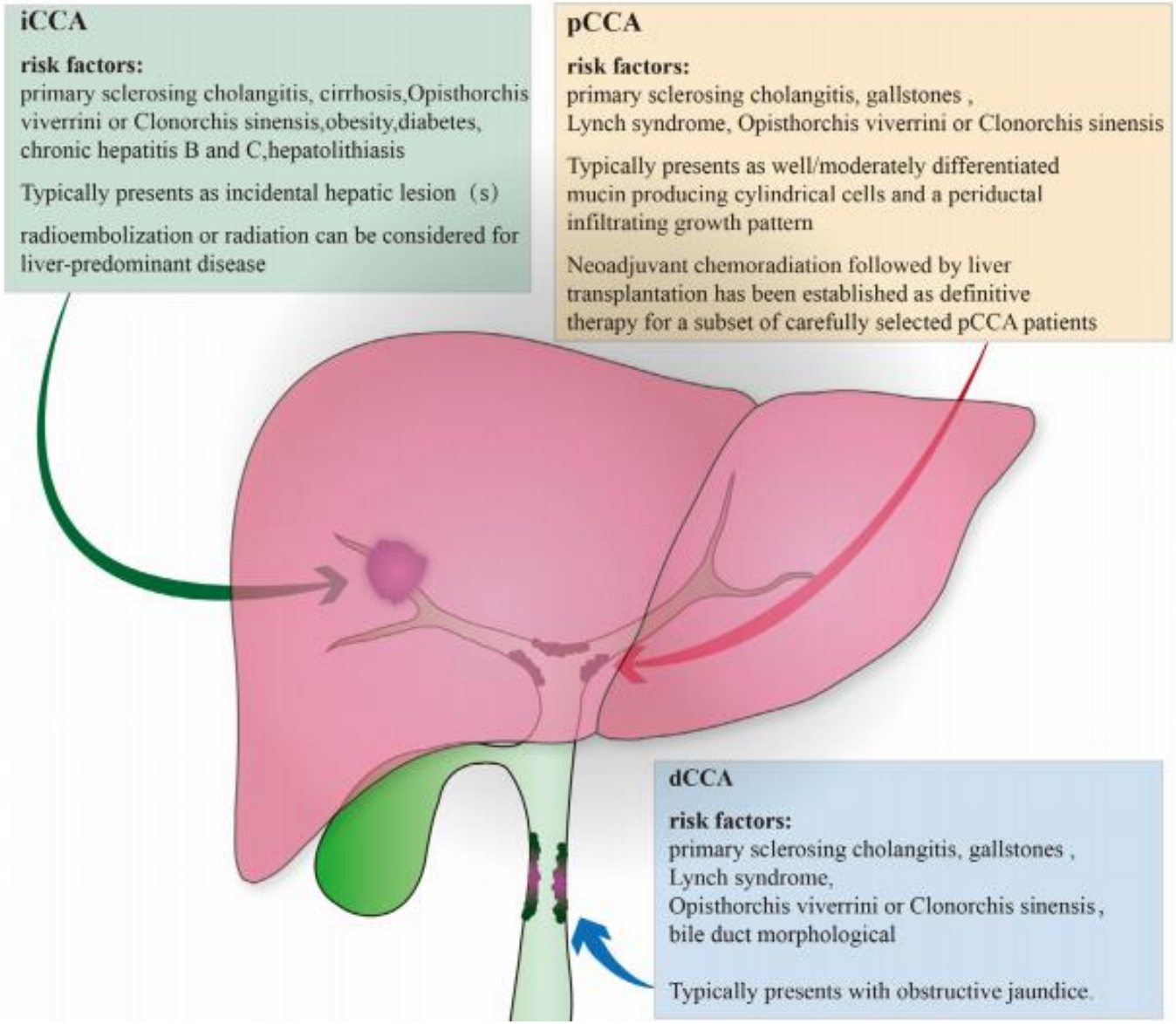
An Unusual Tumor with Distinctive Clinical and Pathological Features

GERALD KLATSKIN, M.D.
New Haven, Connecticut

TABLE I
PREOPERATIVE SYMPTOMS AND PHYSICAL FINDINGS

Data	Case No.													Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Age (yr.)	73	29	54	67	63	60	48	45	52	72	54	52	88	...
Sex	F	M	F	F	M	F	M	M	M	M	M	M	M	...
Symptoms														
Duration (wk.)	5	8	4	6	3	6	12	16	4	7	4	4	?	...
Jaundice	+*	+	+*	+	+	+	+	+	+	+	+	+	0	12
Dark urine	+*	+	+	+	+	+	+	+	+	+	+	+*	0	12
Clay-colored stools	+*	+	+	+	+*	+	+	+	+	+	+	+*	0	12

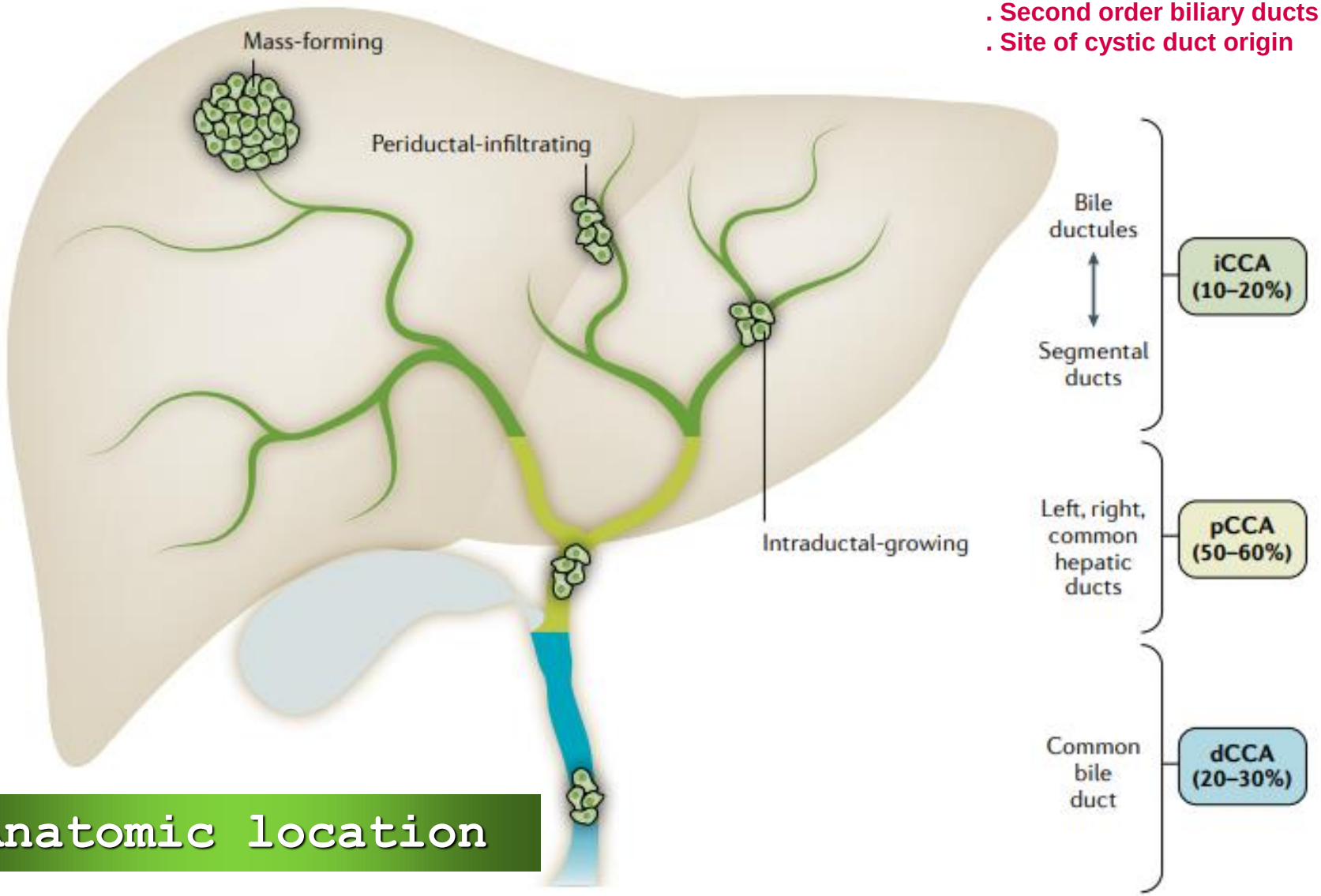
Klatskin G. Am J Med 1965;38:241-56



Wang M, et al. J Cell Mol Med. 2021;25:618–28.

CHOLANGIOCARCINOMA

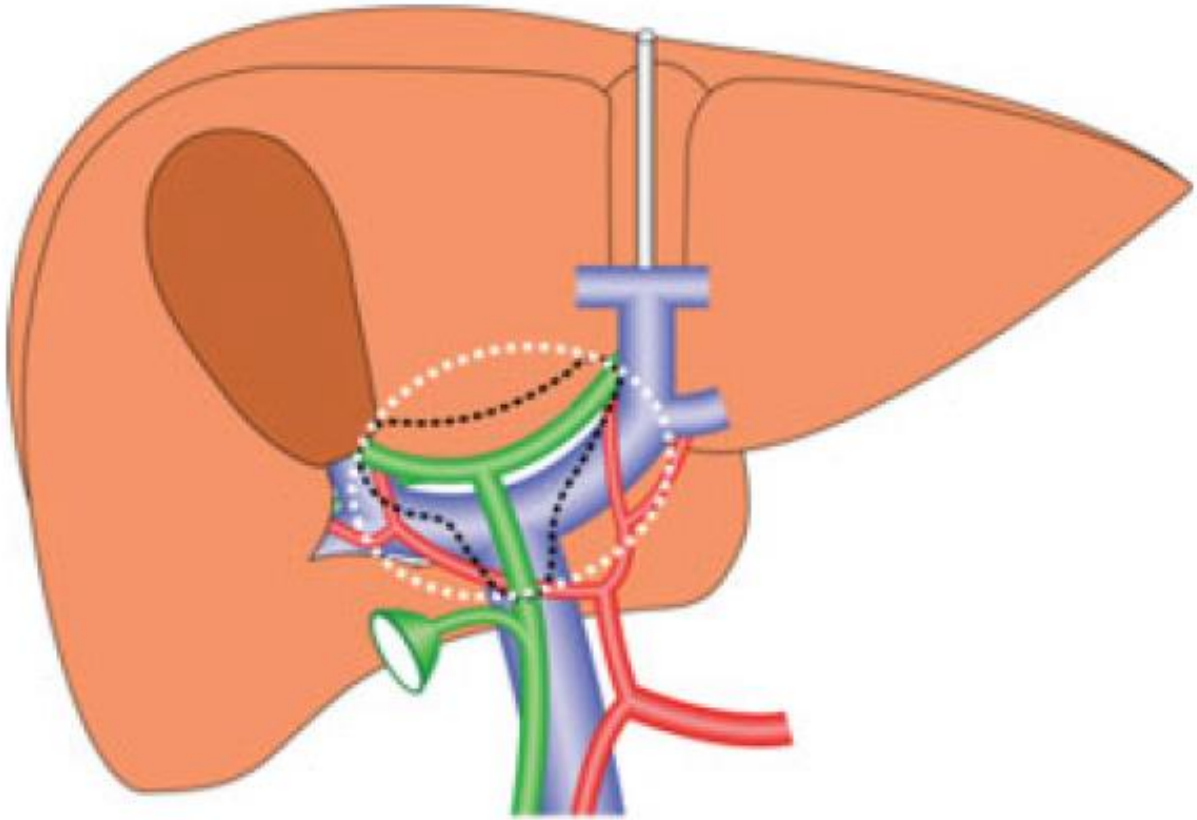
. Second order biliary ducts
. Site of cystic duct origin



Anatomic location

Bonales JM, et al. Nature Reviews. Gastroenterol Hepatol 2020

PERIHILAR CHOLANGIOCARCINOMA



- When the centre of the liver mass is located between the right side of the umbilical portion of the left portal vein and the left side of the right posterior portal (white dotted line).

Ebata T, et al. Br J Surg 2014; 101: 79–88

CLASSIFICATION

Bismuth and Corlette (1975)

Type I

Type II

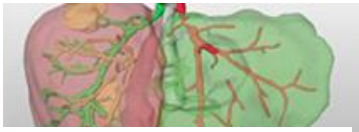
Type III a

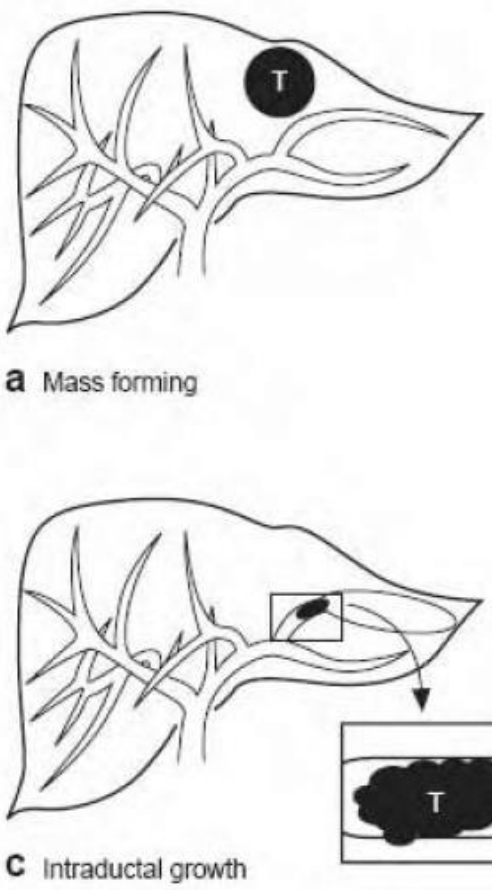
Type III b

Type IV

Bismuth H, Corlette MB. Surg Gynecol Obstet 1975;140:170–8.

CLASSIFICATION





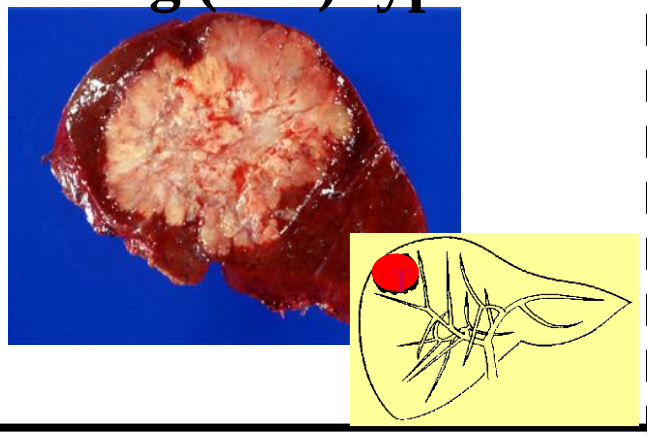
- A – Mass forming
- B – Periductal infiltrating
- C – Intraductal growth
- D – Mass forming + periductal infiltrating

Liver Cancer Study Group of Japan (1997)

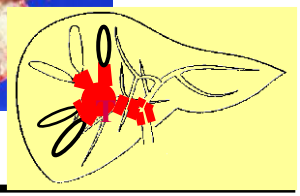
CLASSIFICATION

Mass-forming (MF) type

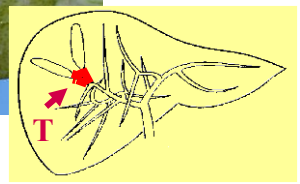
Mass-forming (MF) type



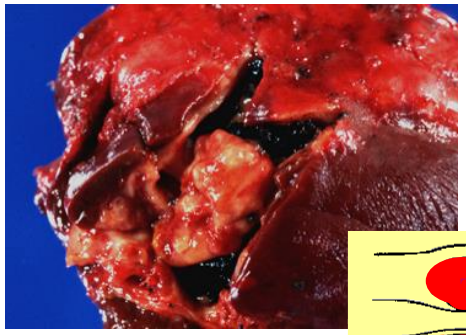
Mass-forming+periductal-infiltrating (MF+PI) type

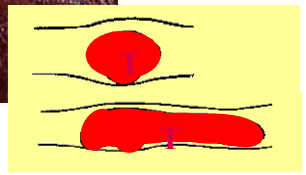


Periductal-infiltrating (PI) type

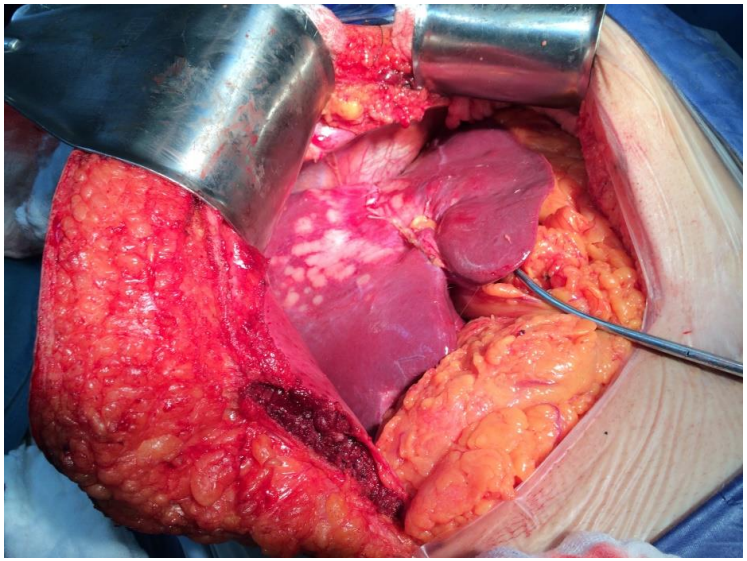


Intraductal growth (IG) type





INTRAHEPATIC



ALTERNATIVE DIAGNOSES

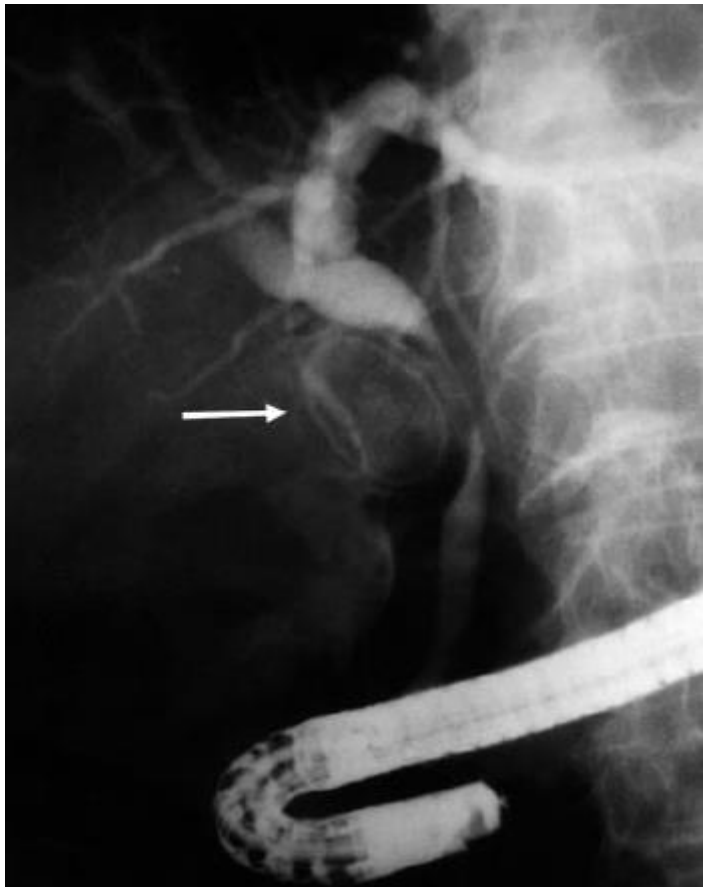
- Gallbladder carcinoma

- Distended gallbladder (GC)
- Shrunken gallbladder (CC)

Jarnagin W, Winston C. HPB (Oxford) 2005; 7(4):244–51.

ALTERNATIVE DIAGNOSES

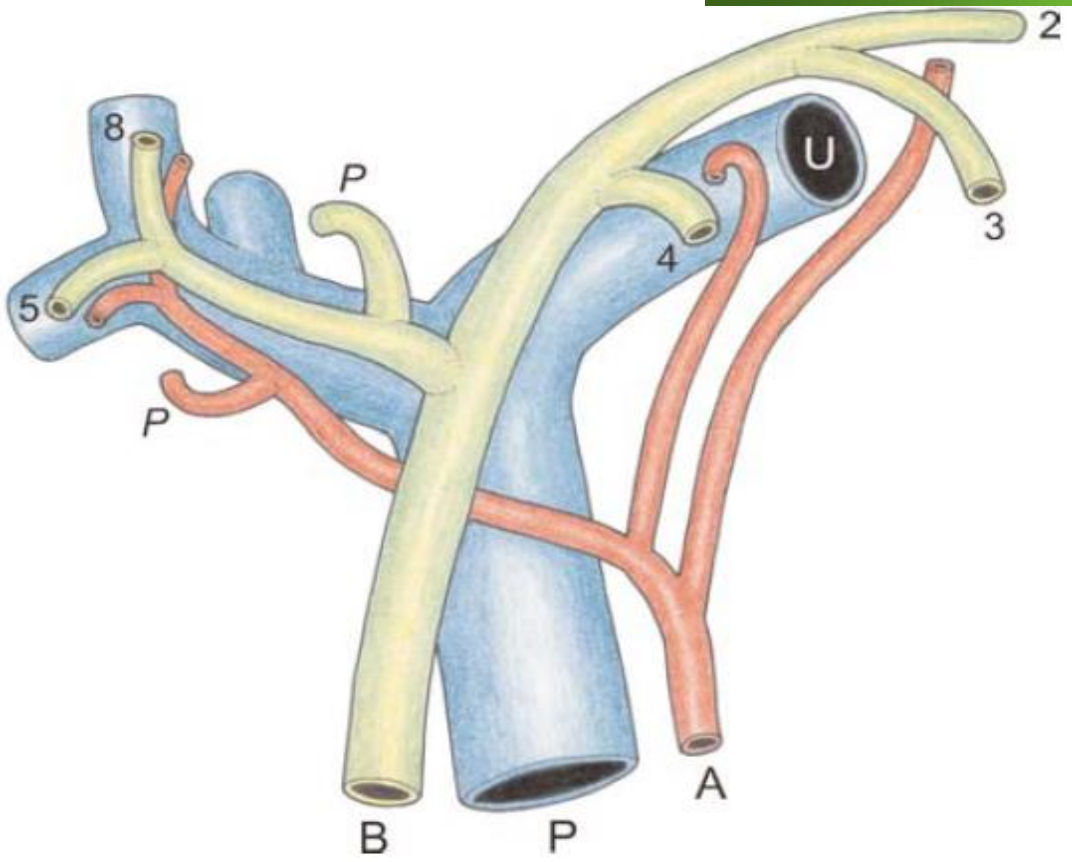
- Mirizzi syndrome



Jarnagin W, Winston C. HPB (Oxford) 2005; 7(4):244–51.

ANATOMIC CONSIDERATIONS

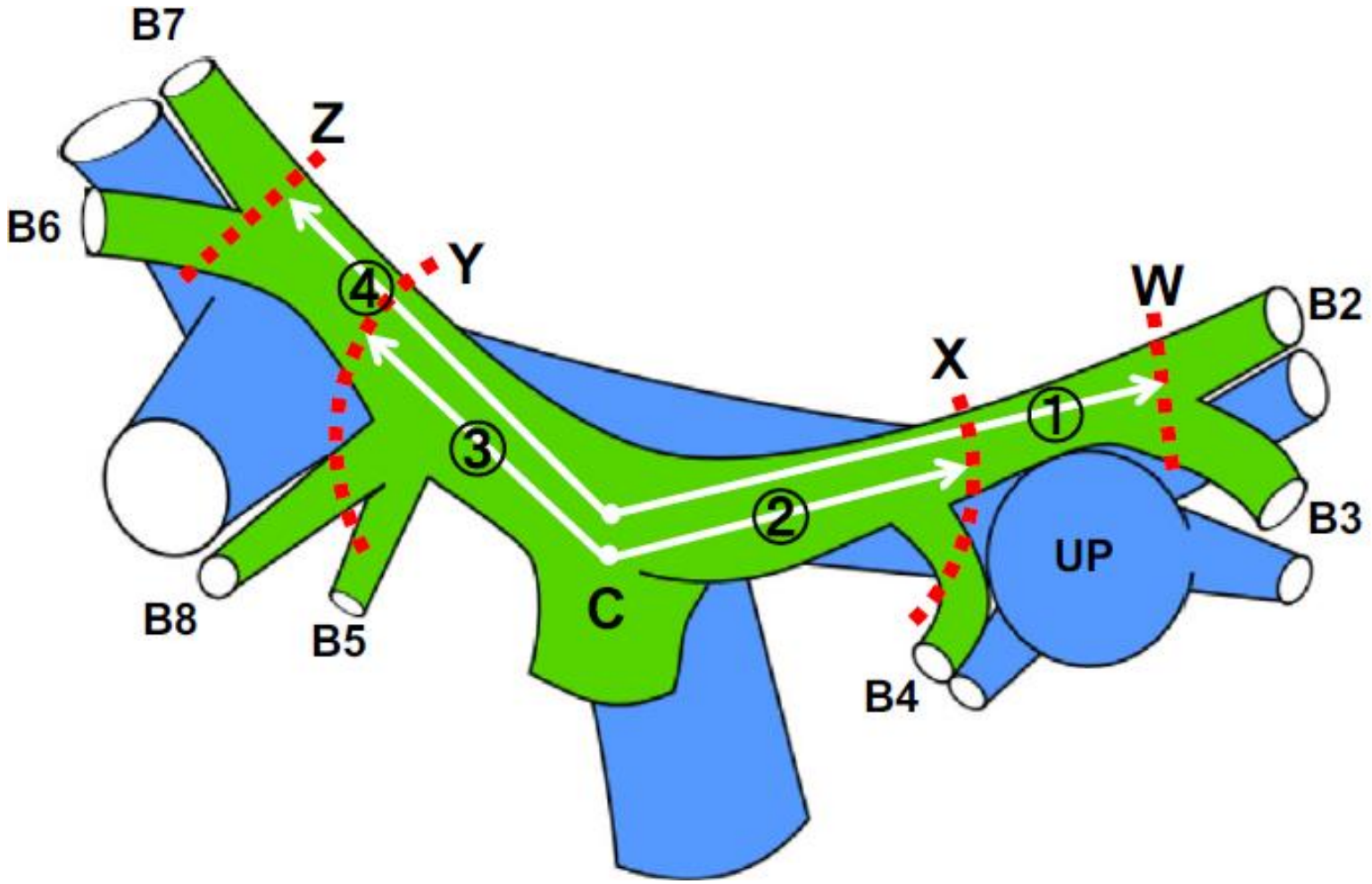
- Right hemihepatectomy
- Right hepatic trisectionectomy



U – umbilical portion
P – posterior branch

- The extrahepatic portion of the left hepatic duct is longer than that of the right hepatic duct.
- The right hepatic artery passes behind the common hepatic duct (often involved).
- Systematic caudate lobectomy can be performed more securely and easily.

ANATOMIC CONSIDERATIONS

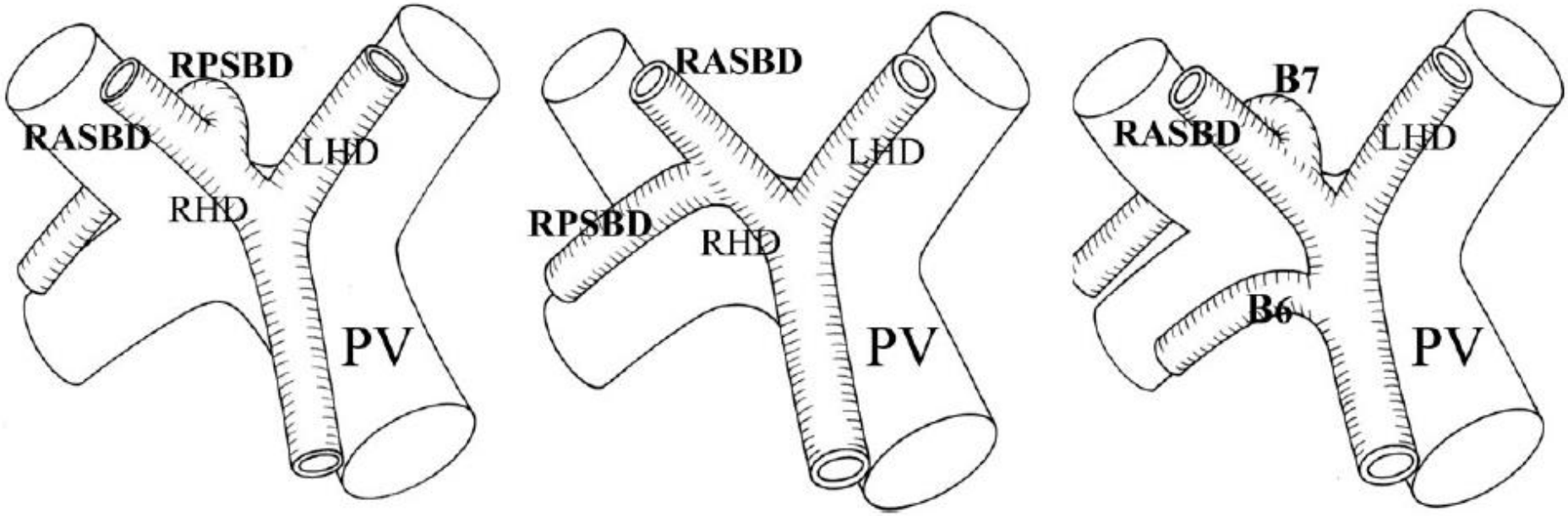


Hirose T, et al. World J Surg 2015; 39:2983–9

ANATOMIC CONSIDERATIONS

Clinical Significance of Biliary Vascular Anatomy of the Right Liver for Hilar Cholangiocarcinoma Applied to Left Hemihepatectomy

Hiroaki Shimizu, MD, PhD, Shigeaki Sawada, MD, PhD, Fumio Kimura, MD, PhD, Hiroyuki Yoshidome, MD, PhD, Masayuki Ohtsuka, MD, PhD, Atsushi Kato, MD, PhD, and Masaru Miyazaki, MD, PhD



A:Supraportal type B:Infraportal type C:Combined type

Shimizu H, et al. Ann Surg 2009;249: 435–439

ANATOMIC CONSIDERATIONS

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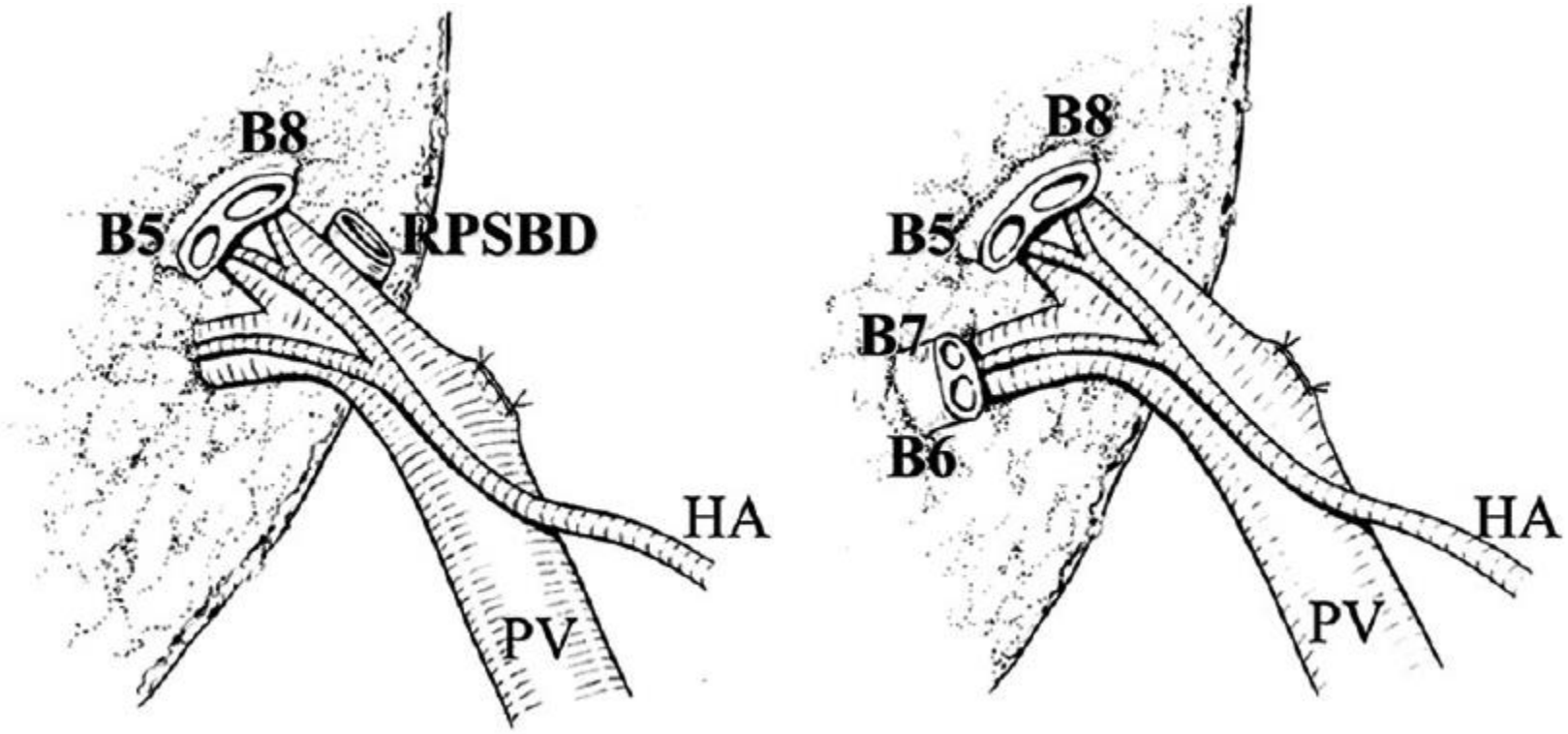
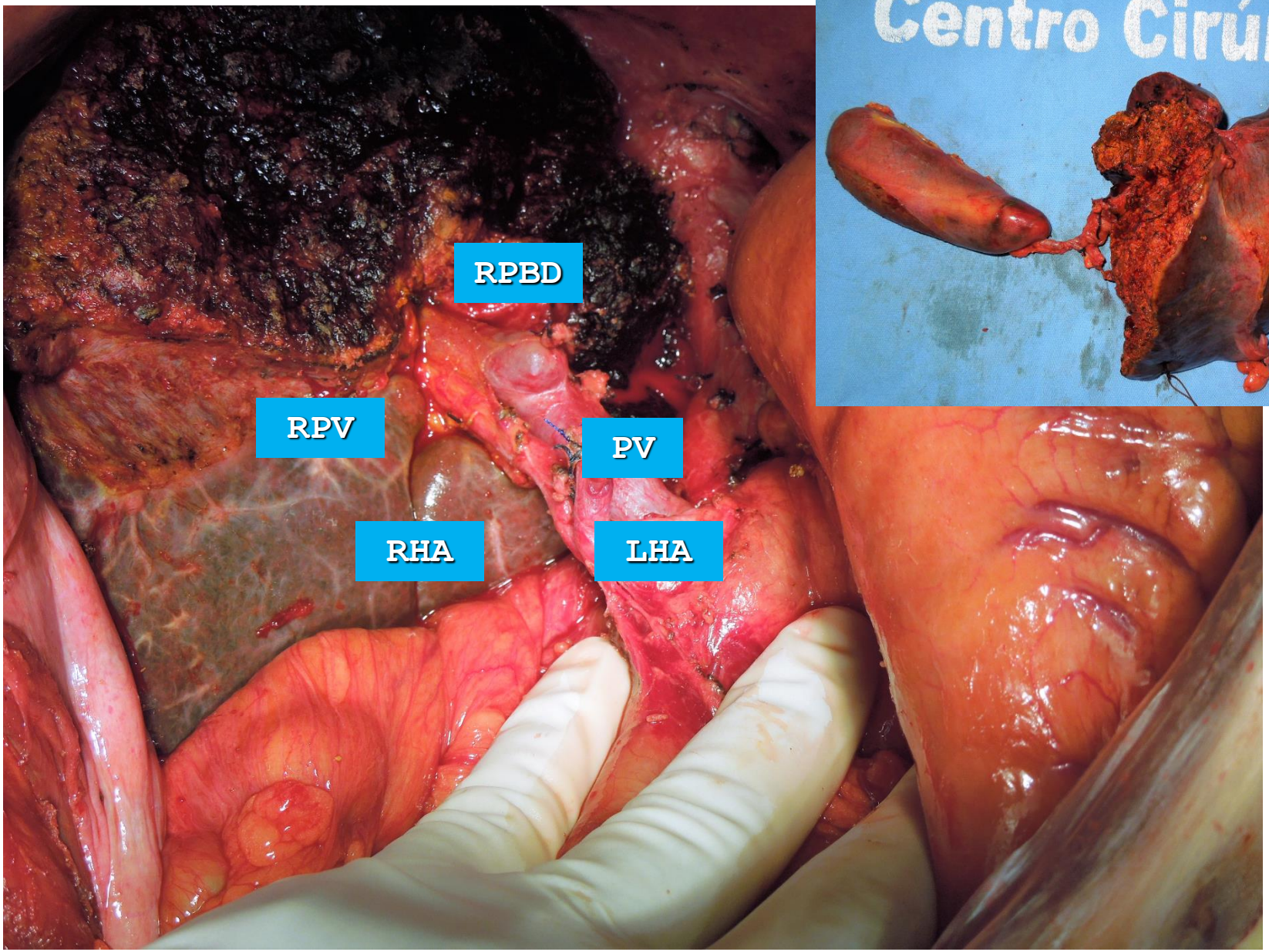


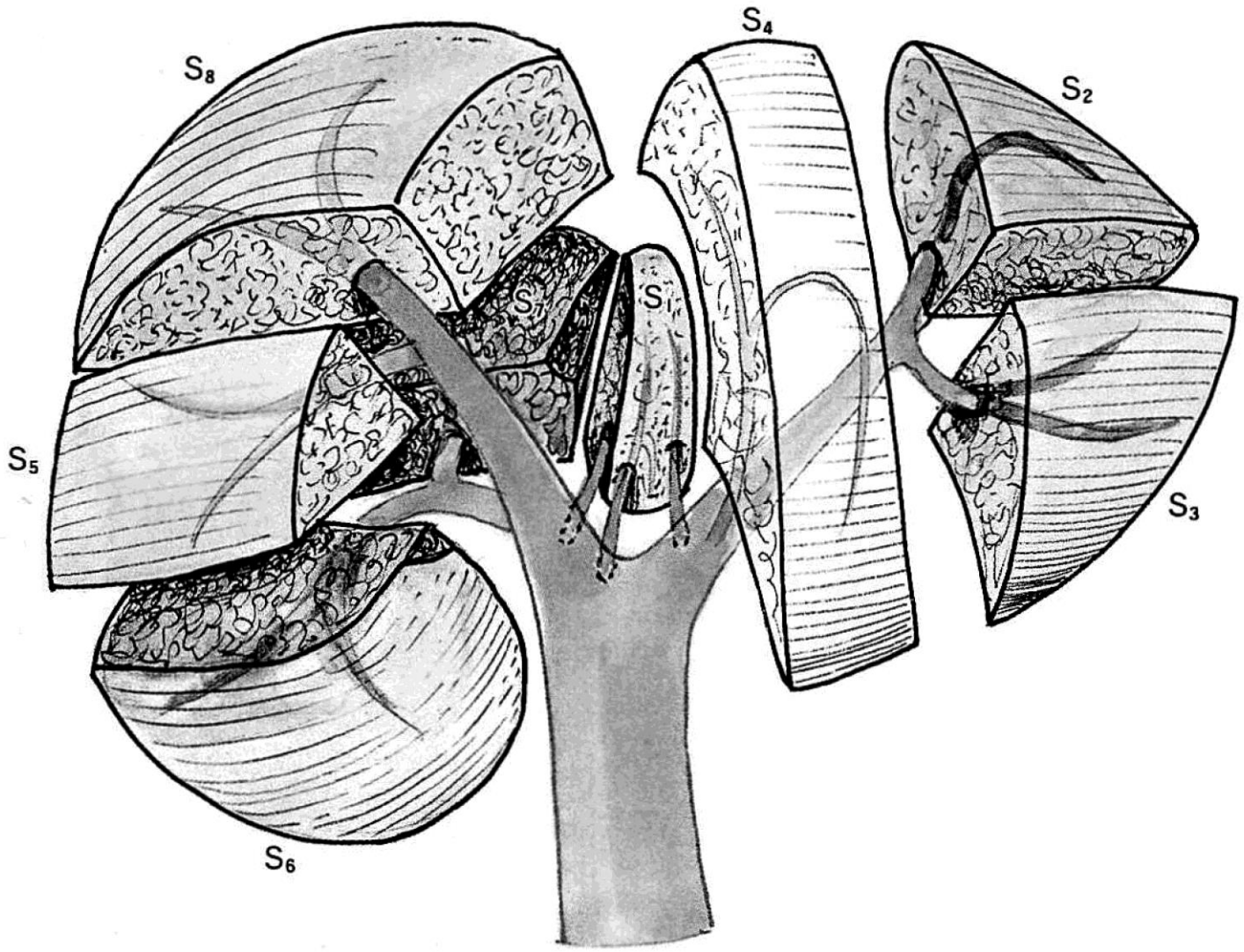
A:Supraportal type B:Infraportal type

Shimizu H, et al. Ann Surg 2009;249: 435–439


RPBD
RPV
PV
RHA
LHA


Centro Cirúrgico

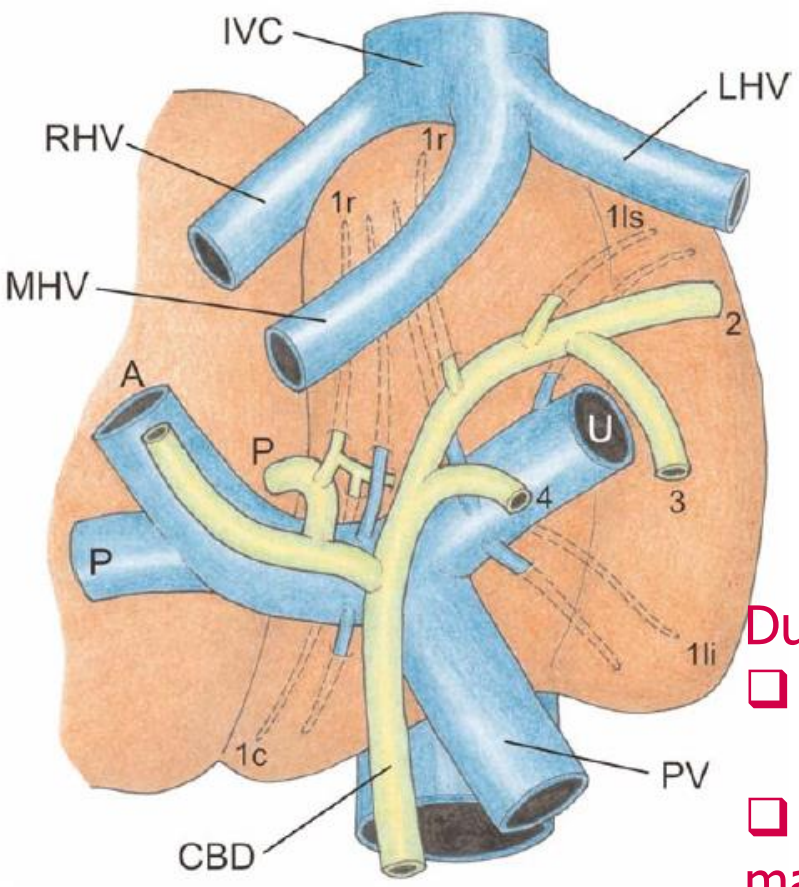
CAUDATE LOBE



Nimura Y. In Torres O. Cirurgia de Fígado, Pancreas e Vias Biliares – Ed Rubio 2019

CAUDATE LOBE

Vertical extension into the caudate duct



Due to:

- lack of a strong muscular layer to restrict the tumor extension
- Caudate biliary ducts usually enter the main bile duct at the confluence posteriorly

Systematic Review and Meta-Analysis

Medicine®

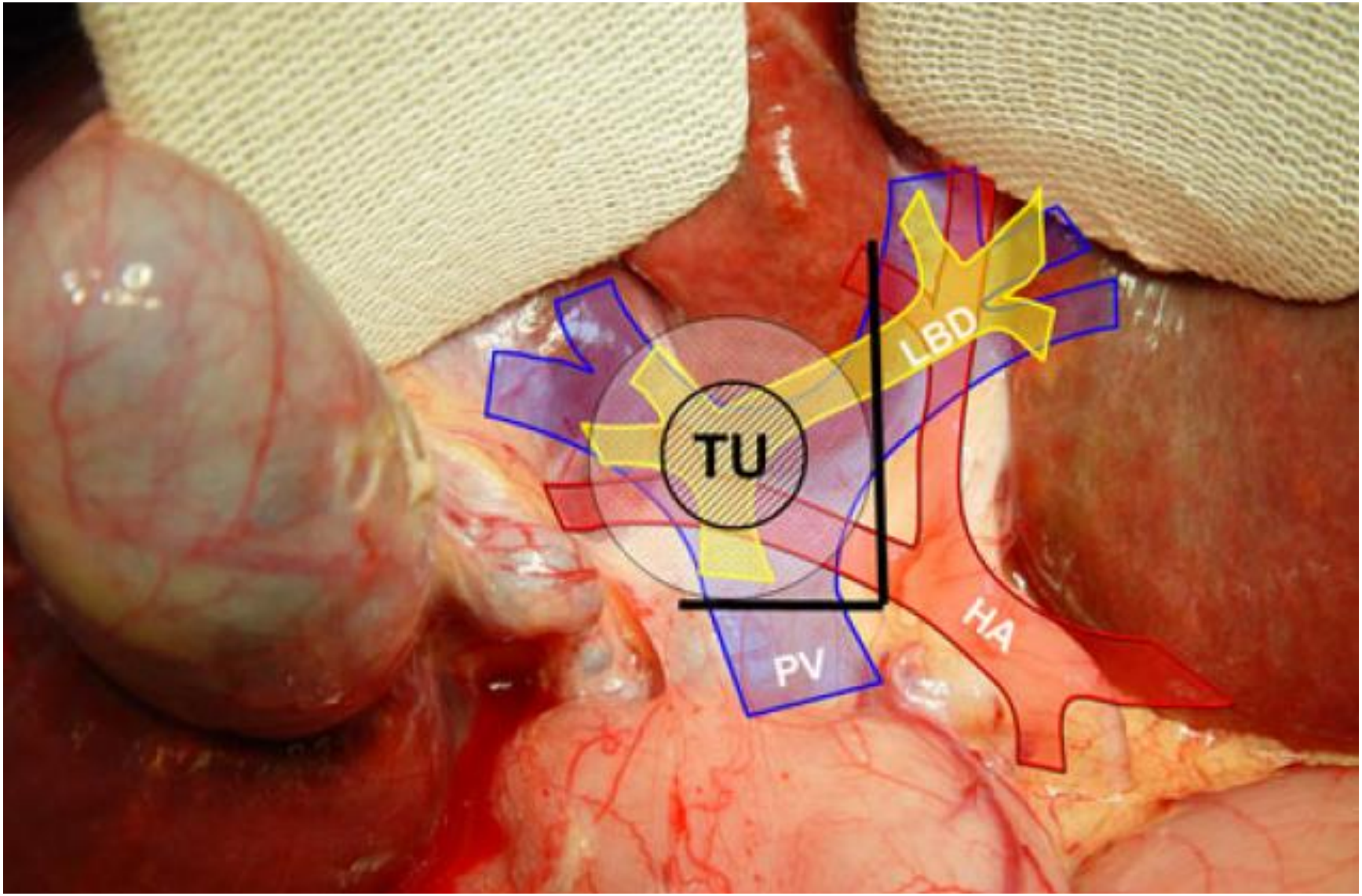
OPEN

The value of caudate lobectomy in hilar cholangiocarcinoma treatment

A meta-analysis

Ming Yang, MD[a], Wei Wei Li, MD[a], Jian Hua Chen, BS[b], Miao Hang Cui, BS[a], Jin Long Liu, MD[a,*]

Conclusion: Combining caudate lobectomy can significantly increase the incidence of radical resection of HCCA and the postoperative survival time. The morbidity and mortality were not increased after the operation. Thus, caudate lobectomy should be included when performing partial hepatectomy for HCCA.



Neuhaus P, et al. Ann Surg Oncol 2012; 19:1602-8

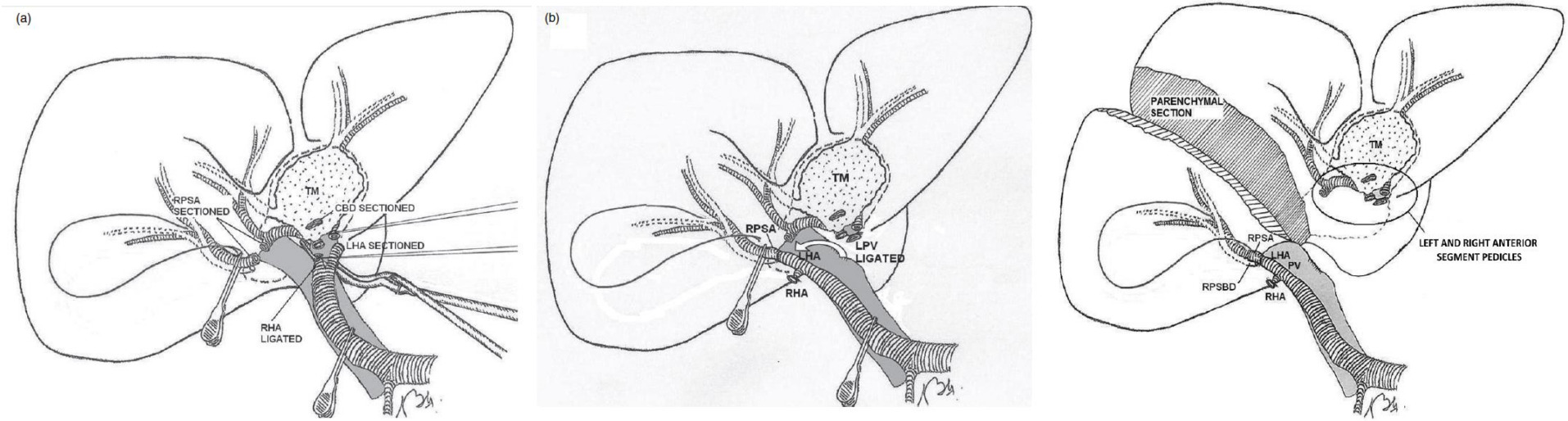
DOI:10.1111/j.1477-2574.2011.00404.x HPB

BISMUTH-CORLETTE IIIb

TECHNICAL REPORT

Hepatic artery reconstruction first for the treatment of hilar cholangiocarcinoma Bismuth type IIIB with contralateral arterial invasion: a novel technical strategy

Eduardo de Santibañes, Victoria Ardiles, Fernando A. Alvarez, Juan Pekolj, Claudio Brandi & Axel Beskow



Santibanes E, et al HPB (Oxford) 2012; 14:76-70

IMAGING STUDIES

- Level and extent of tumor within the biliary tree
- Vascular invasion (portal vein/arterial)
- Hepatic lobar atrophy
- Distant metastatic disease (and lymph nodes)

Jarnagin W, Winston C. HPB (Oxford) 2005; 7(4):244–51.

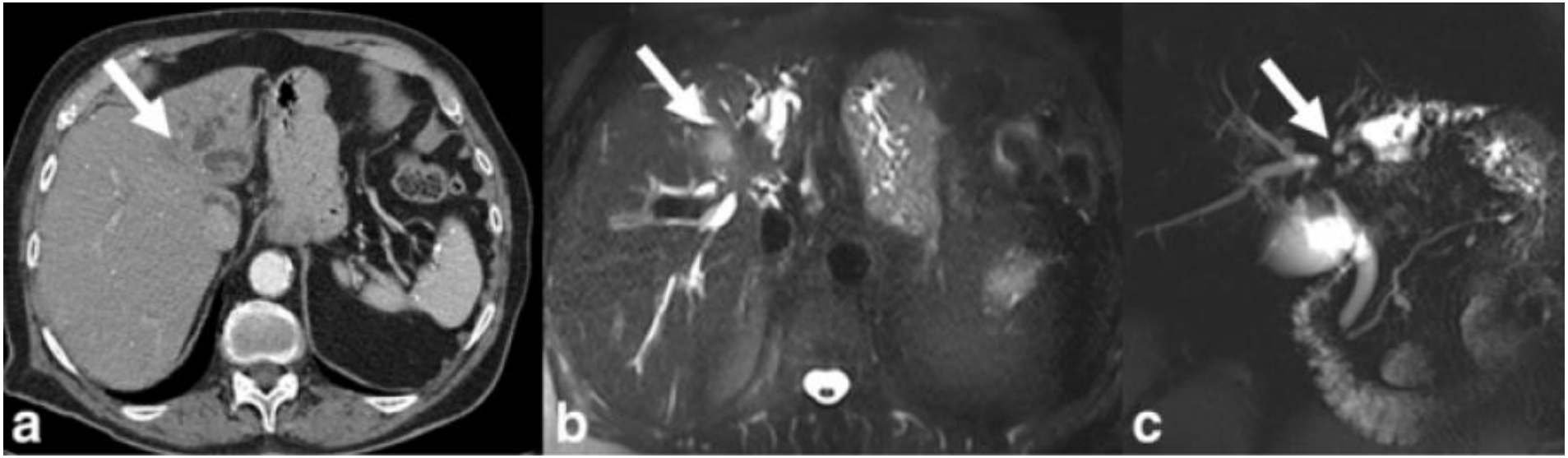
IMAGING STUDIES

- Magnetic resonance cholangiopancreatography(MRCP)
  - Tumor
  - Level of biliary obstruction
  - Obstructed and isolated ducts
  - Presence of metastases
  - Lobar atrophy
- MR angiography
  - Assess involvement of hilar vascular structures

Jarnagin W, Winston C. HPB (Oxford) 2005; 7(4):244–51.

IMAGING STUDIES

CT MRI MRCP

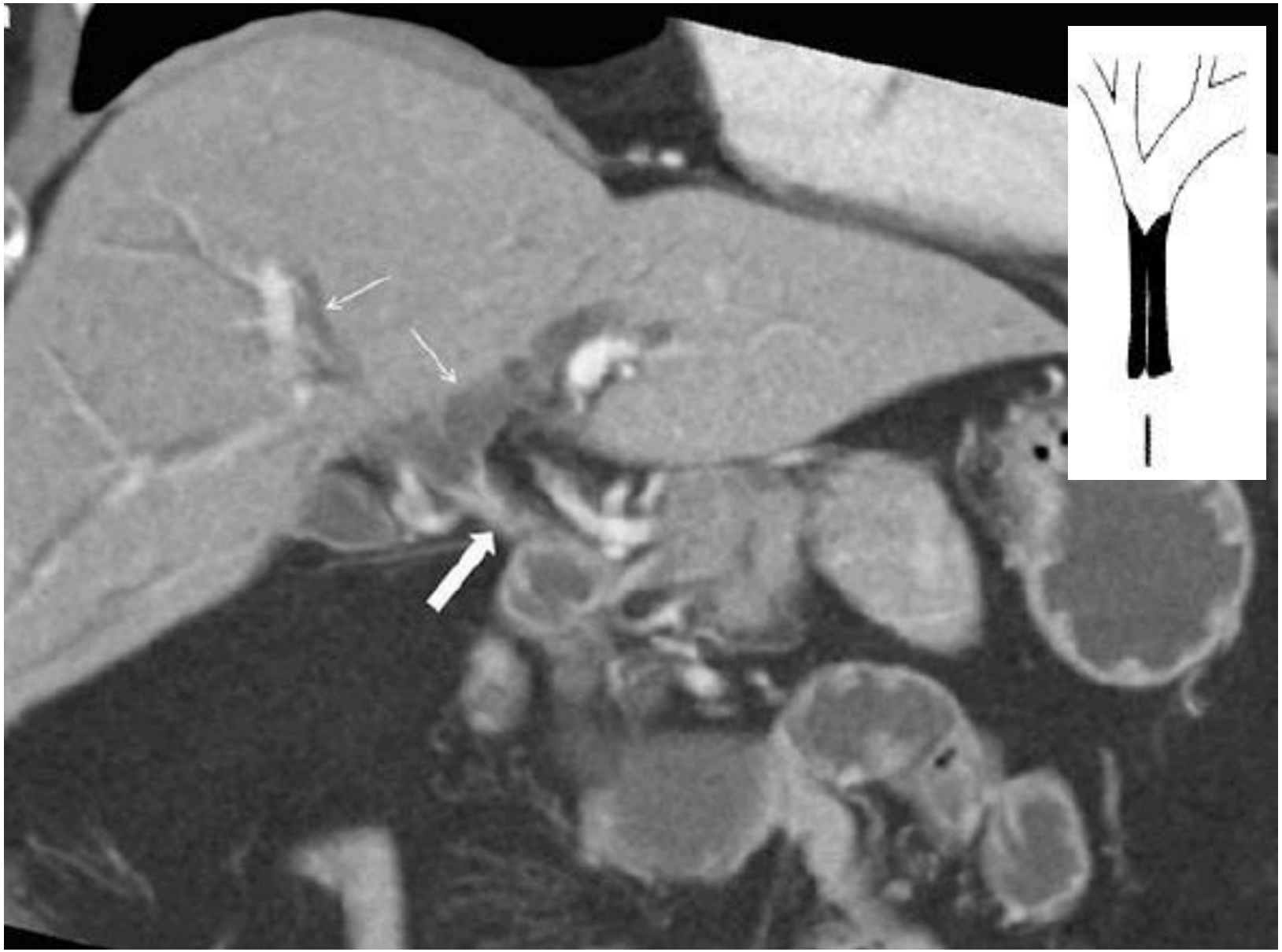


- Infiltrating pCCA of the left hepatic duct
- Dilation of the left hepatic ducts
- Extension to the confluence
- Mild dilatation of the right hepatic ducts

Hennedige TP, et al. Cancer Imaging 2014, 14:1-21

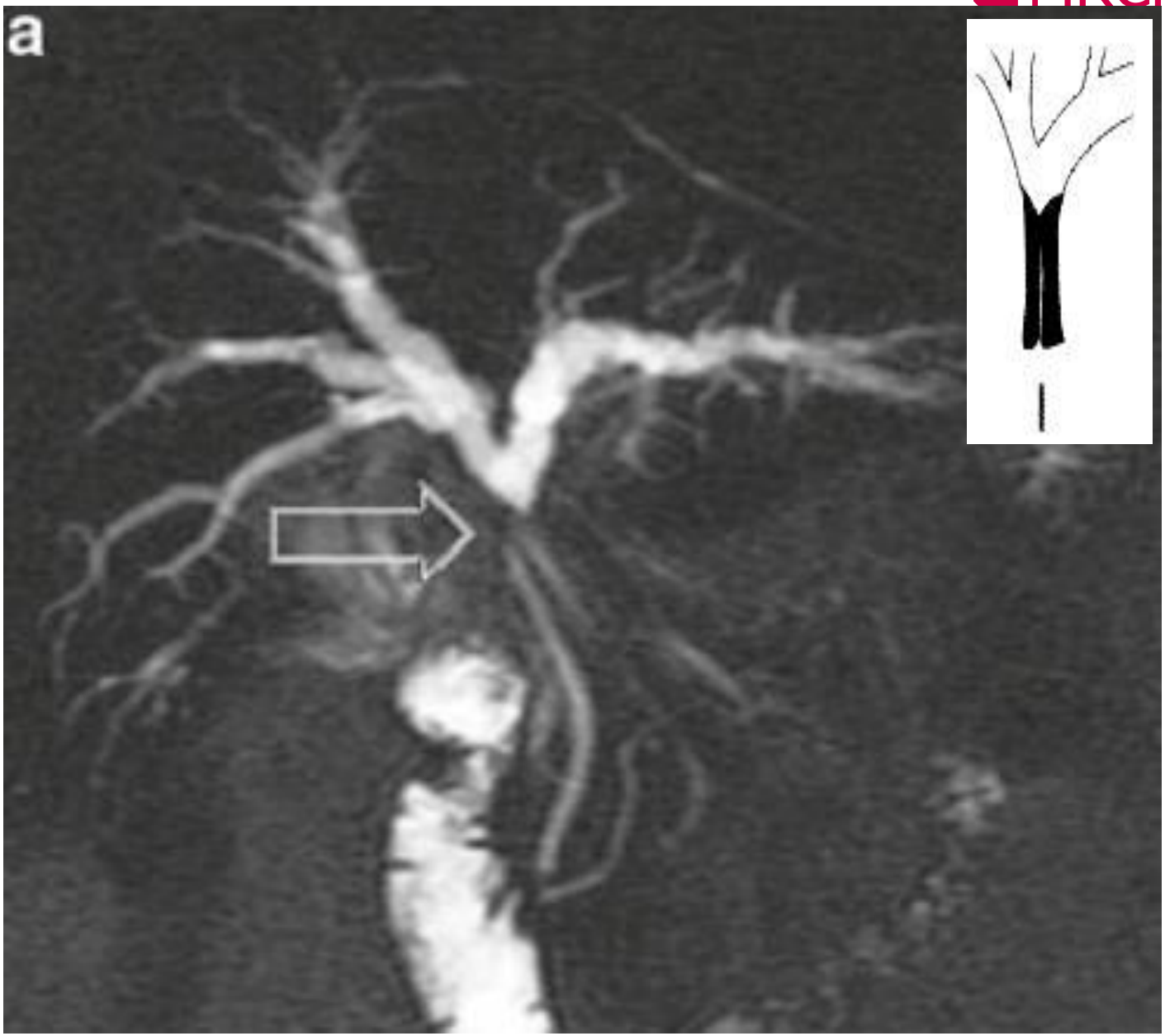
IMAGING STUDIES

- MRI

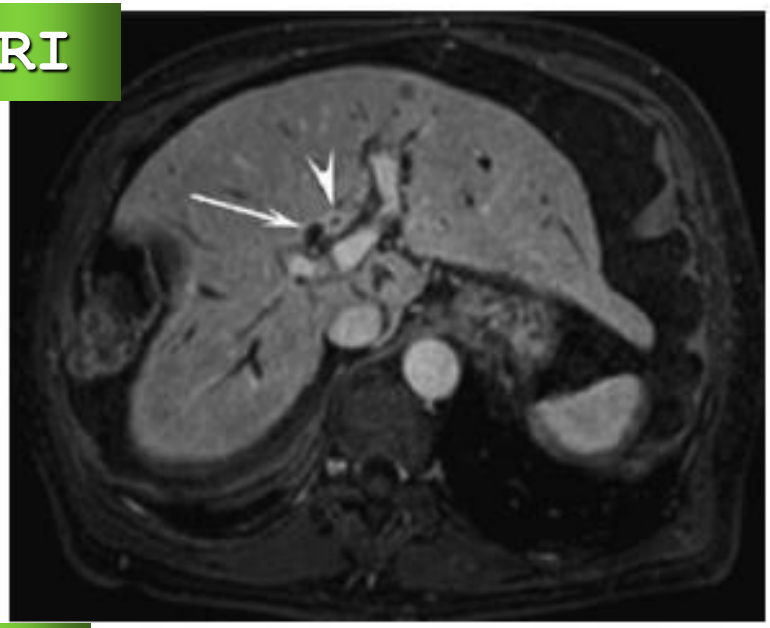


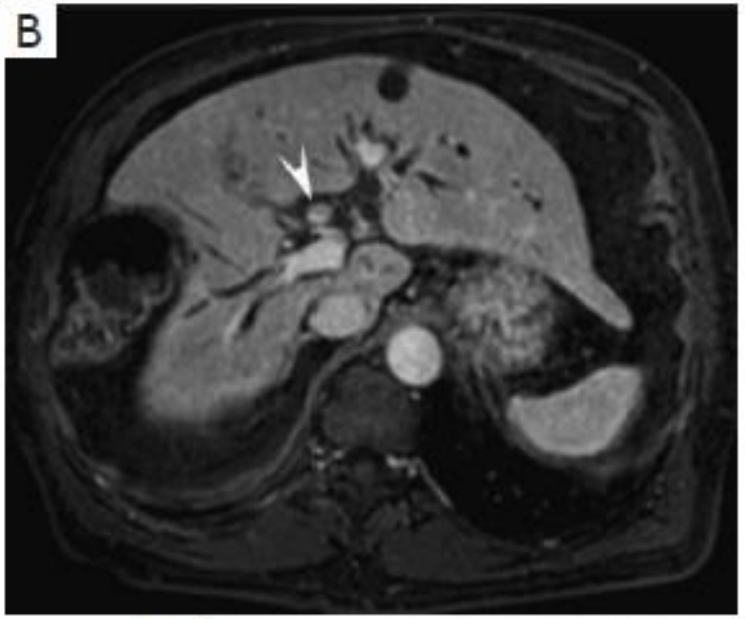
IMAGING STUDIES

- MRCP

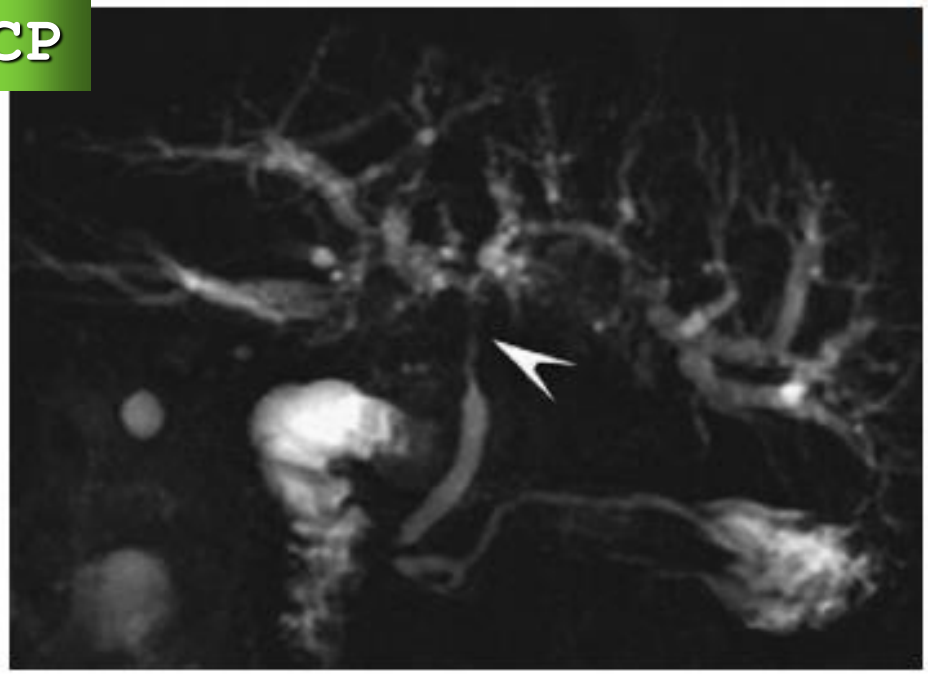


MRI





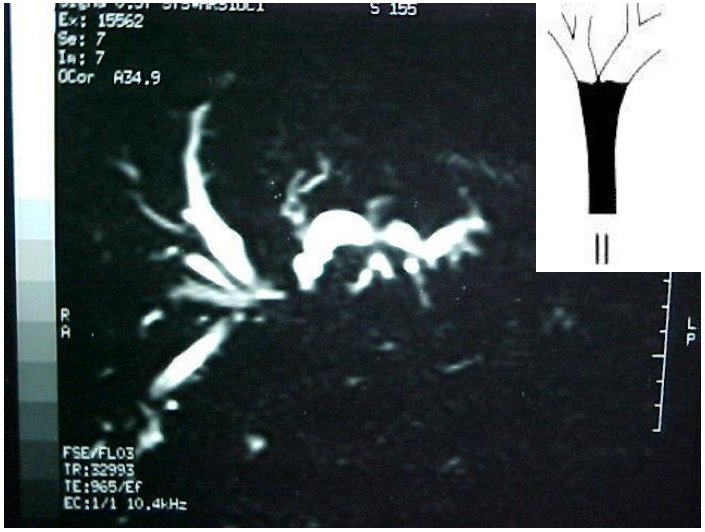
MRCP



ERCP

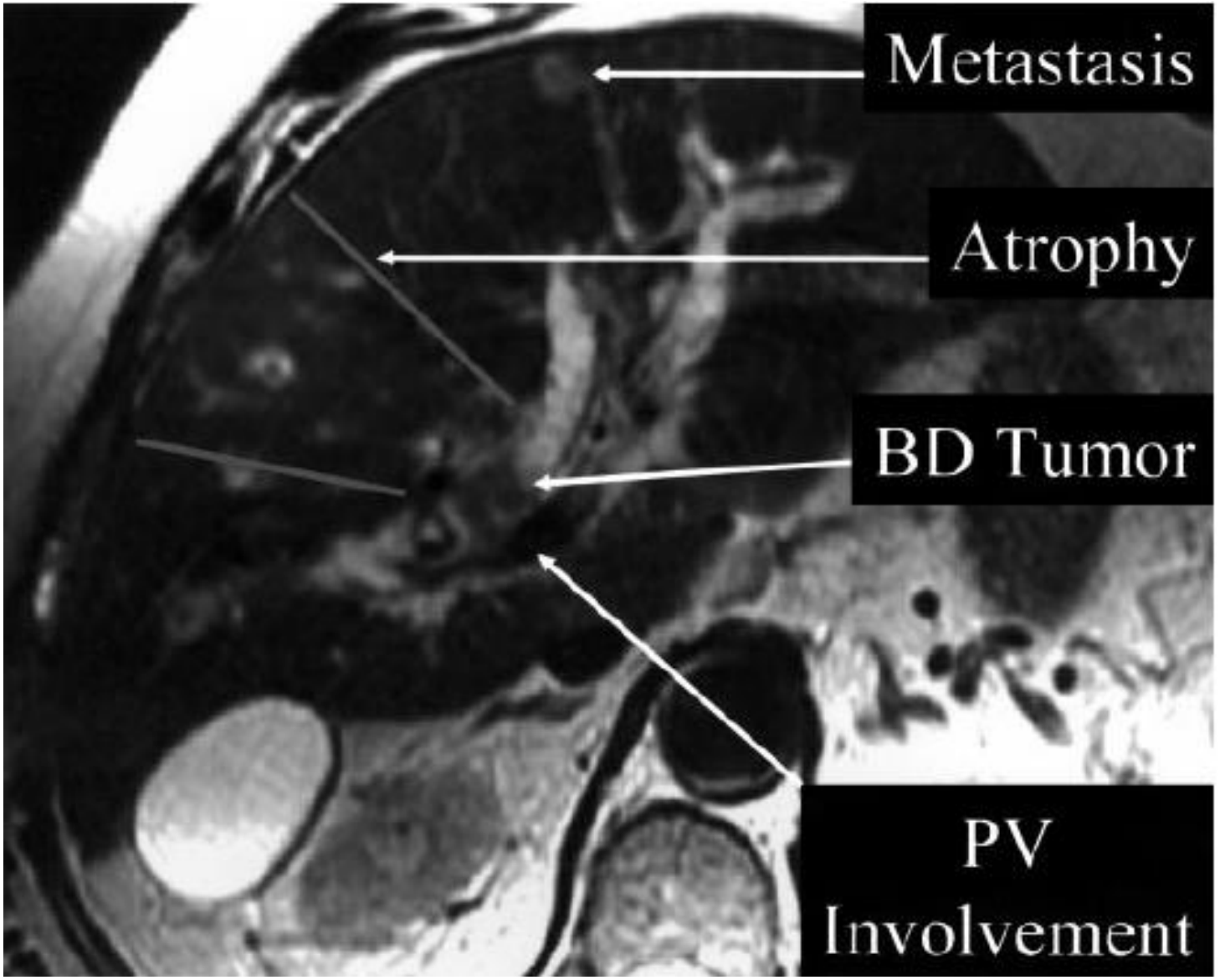
IMAGING STUDIES

❑ MRI and MRCP



IMAGING STUDIES

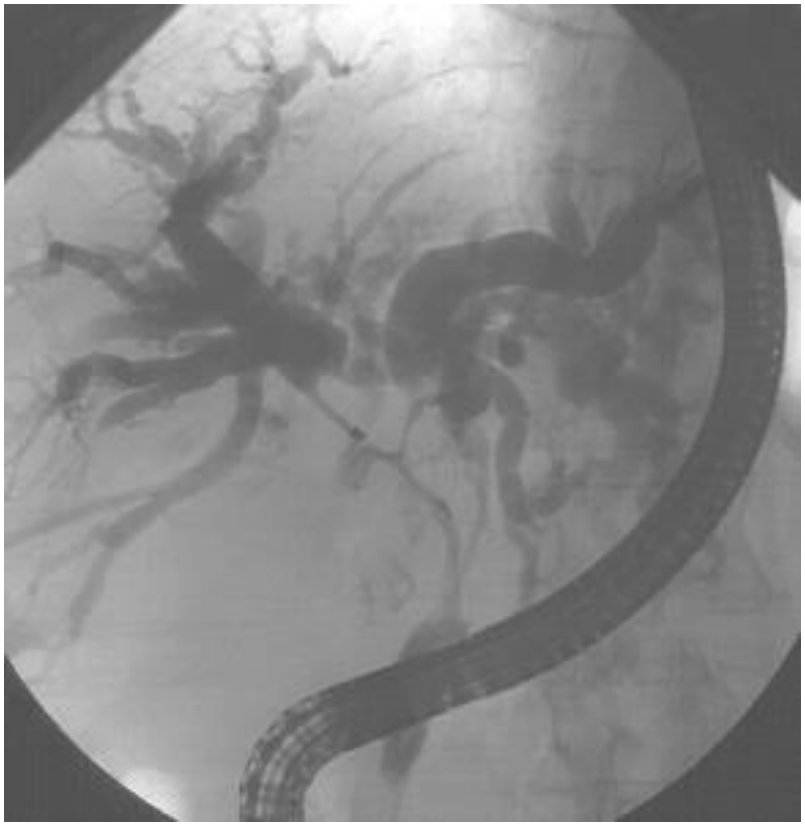
- MRI

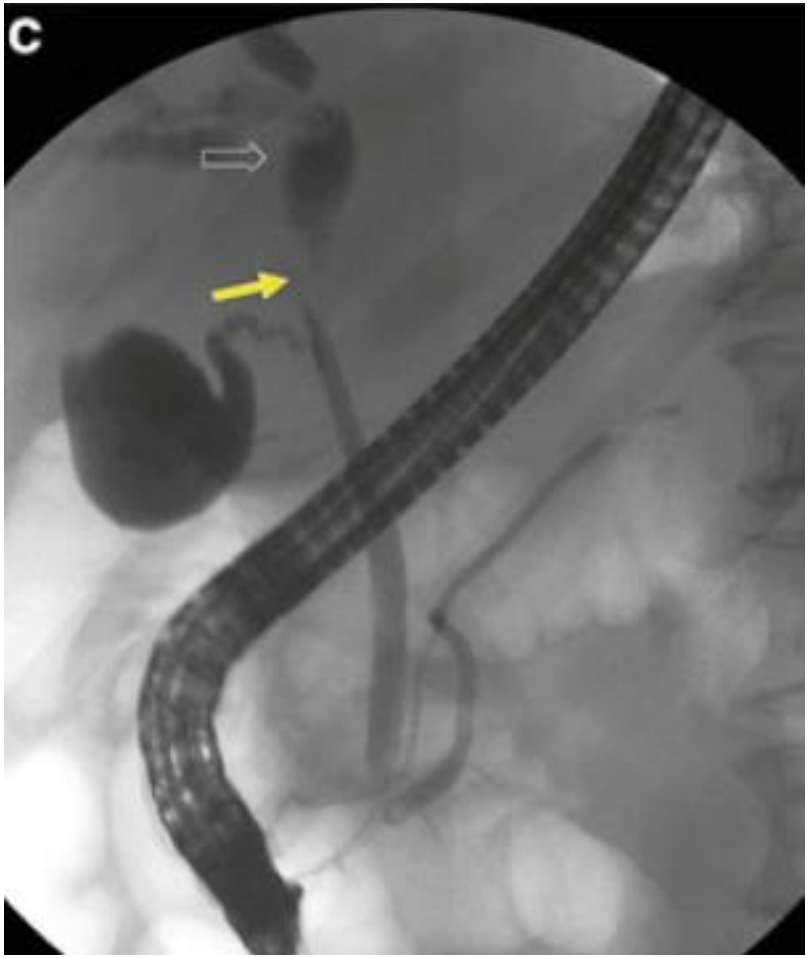


Jarnagin W, Winston C. HPB (Oxford) 2005; 7(4):244–51.

IMAGING STUDIES

- ERCP





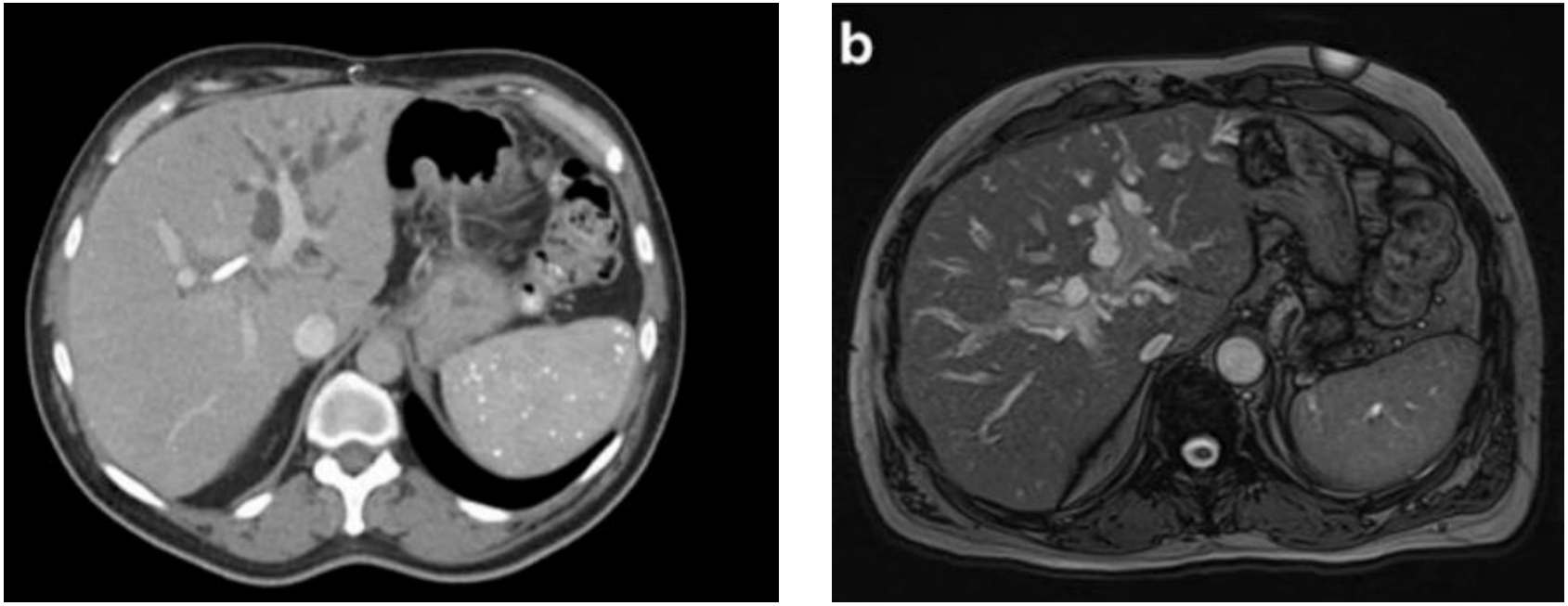
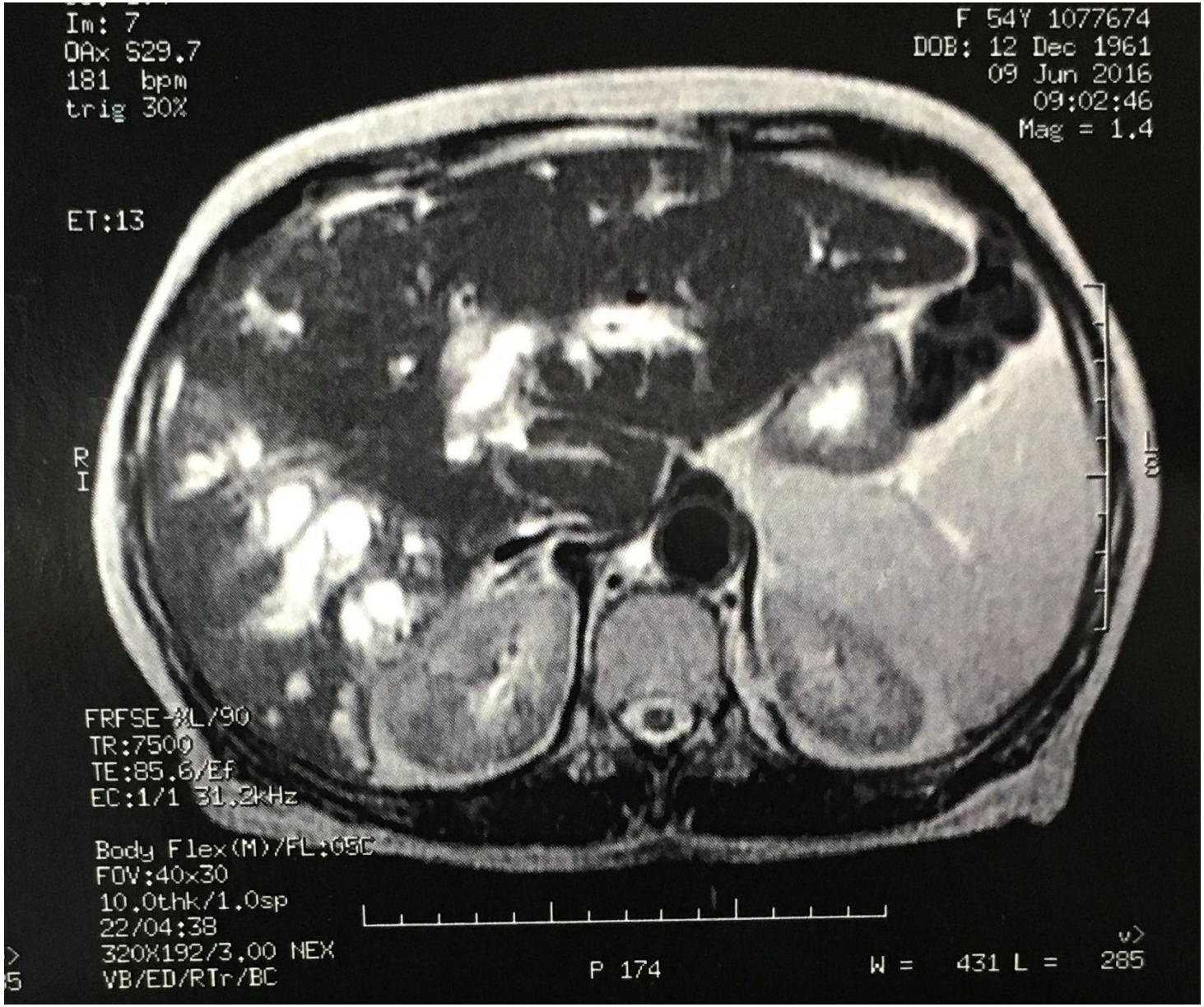


Fig. 1. Abdominal CT scan (a) and MRI (b) demonstrating left biliary tree dilatation in a 63-year-old male with hilar cholangiocarcinoma

Poruk KE, et al. J gastrointest Surg 2015


Im: 7
OAx S29.7
181 bpm
trig 30%
ET:13
F 54Y 1077674
DOB: 12 Dec 1961
09 Jun 2016
09:02:46
Mag = 1.4
R
I
FRFSE-XL/90
TR:7500
TE:85.6/Ef
EC:1/1 31.2kHz
Body Flex(M)/FL:05C
FOV:40x30
10.0thk/1.0sp
22/04:38
320X192/3.00 NEX
VB/ED/RTr/BC
P 174
W = 431 L = 285

UNRESECTABILITY

Patient factors

- Medically unfit or otherwise unable to tolerate a major operation
- Hepatic cirrhosis

Jarnagin W, Winston C. HPB (Oxford) 2005; 7(4):244–51.

UNRESECTABILITY

Local tumor-related factors

- Tumor extension to secondary biliary radicles bilaterally
- Encasement or occlusion of the main portal vein proximal to its bifurcation
- Atrophy of one hepatic lobe with contralateral portal vein branch encasement or occlusion
- Atrophy of one hepatic lobe with contralateral tumor extension to secondary biliary radicles
- Unilateral tumor extension to secondary biliary radicles with contralateral portal vein branch encasement or occlusion

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Jarnagin W, Winston C. HPB (Oxford) 2005; 7(4):244–51.

UNRESECTABILITY

Metastatic disease

- Histologically proven metastases to lymph nodes beyond the hepatoduodenal ligament*
- Lung, liver, or peritoneal metastases

* Peripancreatic, periduodenal, celiac, superior mesenteric or posterior pancreaticoduodenal lymph nodes are considered not amenable to a potentially curative resection. Cystic duct, pericholedochal, hilar or portal lymph nodes do not constitute unresectability.

Jarnagin W, Winston C. HPB (Oxford) 2005; 7(4):244–51.

JAUNDICE

PRE-OPERATIVE BILIARY DRAINAGE

- Biliary sepsis (Cholangitis)
- Severe/Long-lasting jaundice
- Patients undergoing preoperative anti-neoplastic therapy
- Patients with hyperbilirubinaemia-induced malnutrition
- Hepatic insufficiency
- Renal insufficiency
- Patients undergoing PVE
- Delayed schedule of surgery

Not to do:

- No duct dilatation in the future liver remnant

Mansour JC, et al. HPB (Oxford) 2015; 17:691-99

PRE-OPERATIVE BILIARY DRAINAGE

Potential benefit

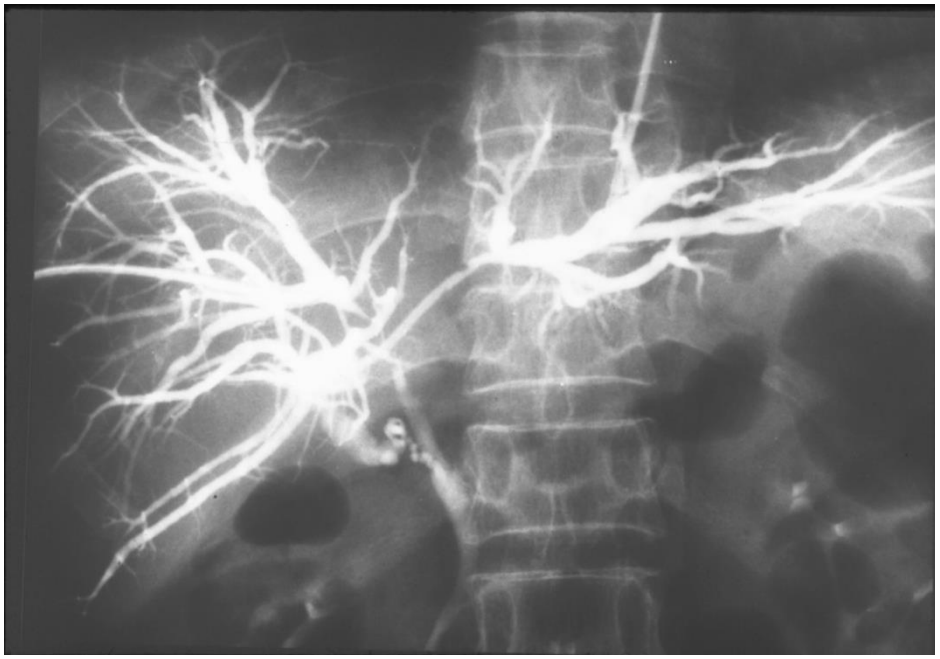
- Improve hepatic functional reserve
  - Regeneration of liver remnant
  - Postoperative liver failure
- Improve non-hepatic functions
  - Cell-mediated immunity
  - Nutrition and coagulation parameters
  - Renal function
- Apply for other purposes
  - Cholangiography
  - Endoscopy (PTCS,POCS)
  - Tissue biopsy
  - Bile sampling

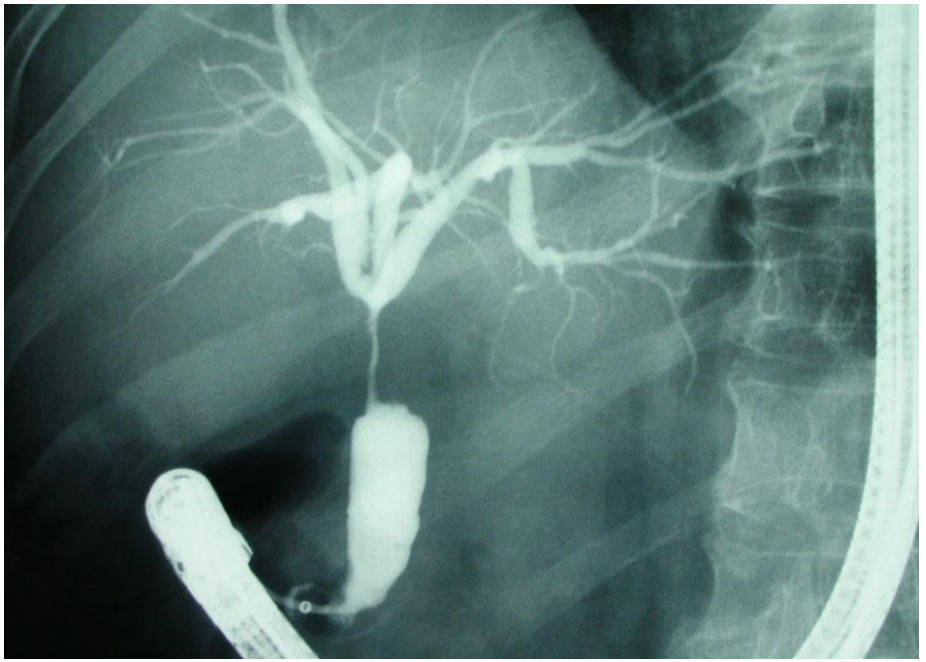
PRE-OPERATIVE BILIARY DRAINAGE

Drawbacks

- Its own complications
  - Failure
  - Pancreatitis
  - Vascular injury
  - Catheter obstruction/dislodgement
- Bile contamination
  - Cholangitis of the drained lobe
  - Cholangitis of the undrained lobe
- Postoperative complications
  - Surgical site infection
  - Organ/space infection

Percutaneous or Endoscopic?





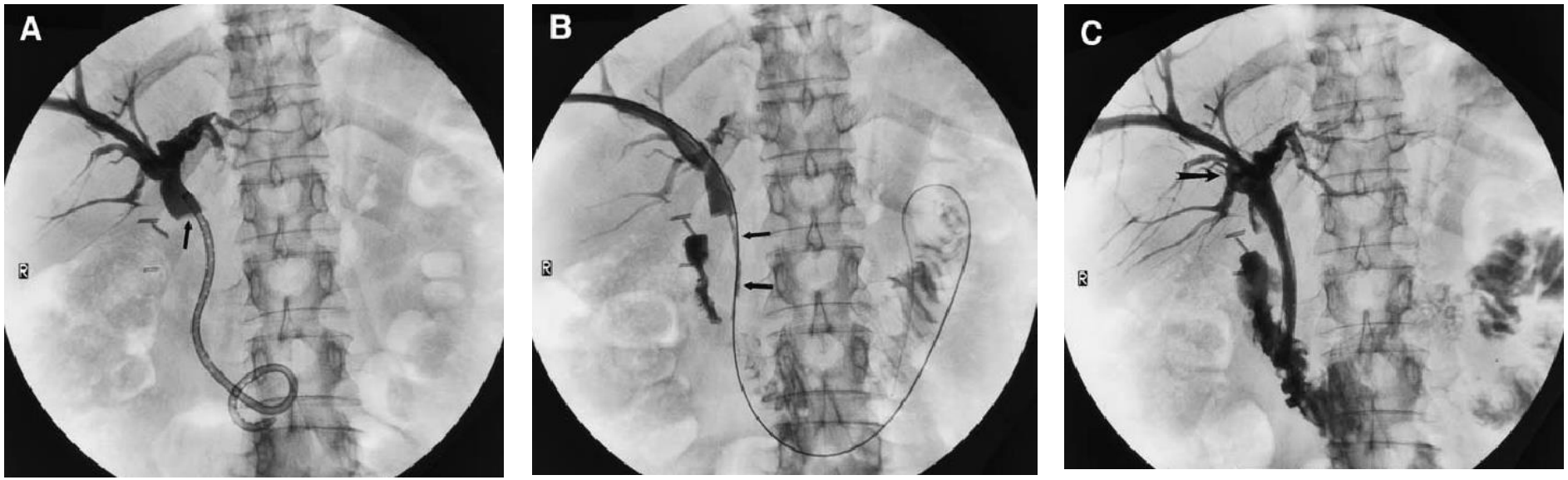
http://dx.doi.org/10.1016/j.hpb.2016.03.002 HPB

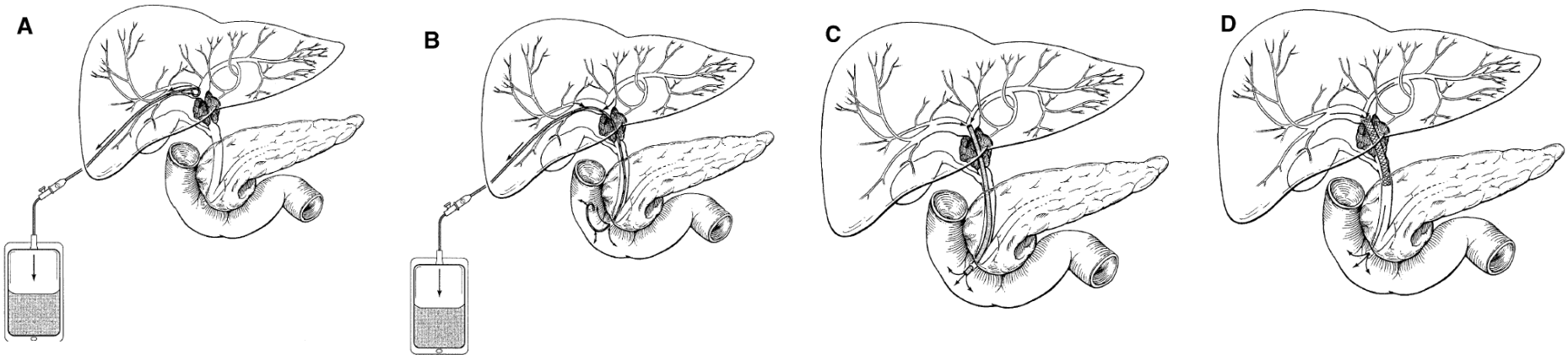
REVIEW ARTICLE

Percutaneous vs. endoscopic pre-operative biliary drainage in hilar cholangiocarcinoma – a systematic review and meta-analysis

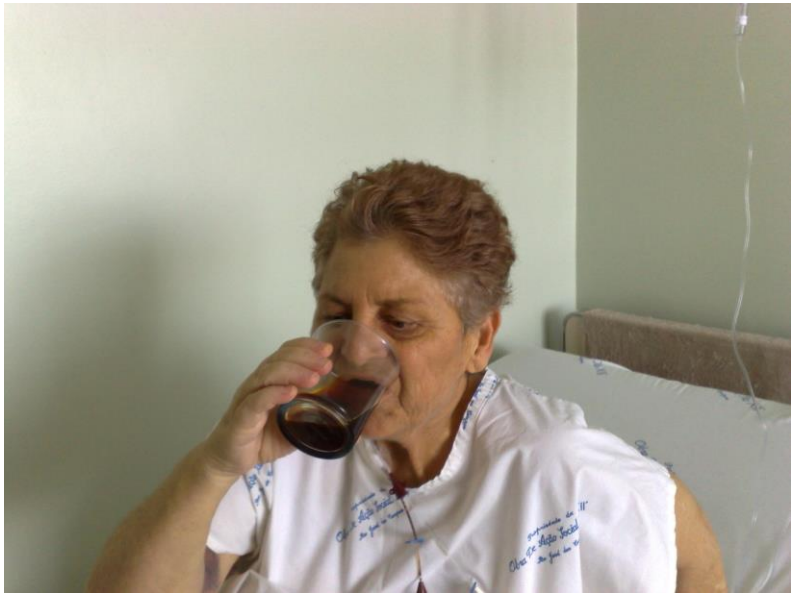
Hameed A, et al. HPB (Oxford) 2016;18:400-10

Percutaneous biliary drainage





Percutaneous biliary drainage



Courtesy: Dr. Eduardo Fernandes (RJ)

Evolution of Surgical Treatment for Perihilar Cholangiocarcinoma

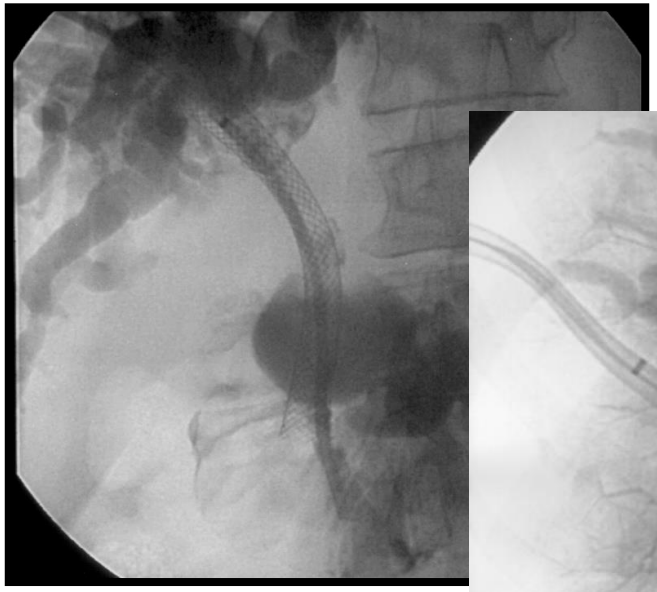
A Single-Center 34-Year Review of 574 Consecutive Resections

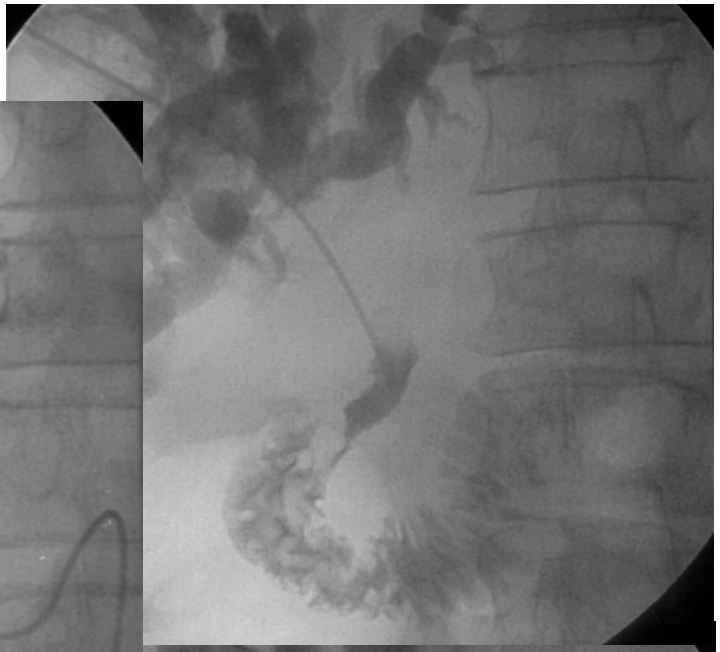
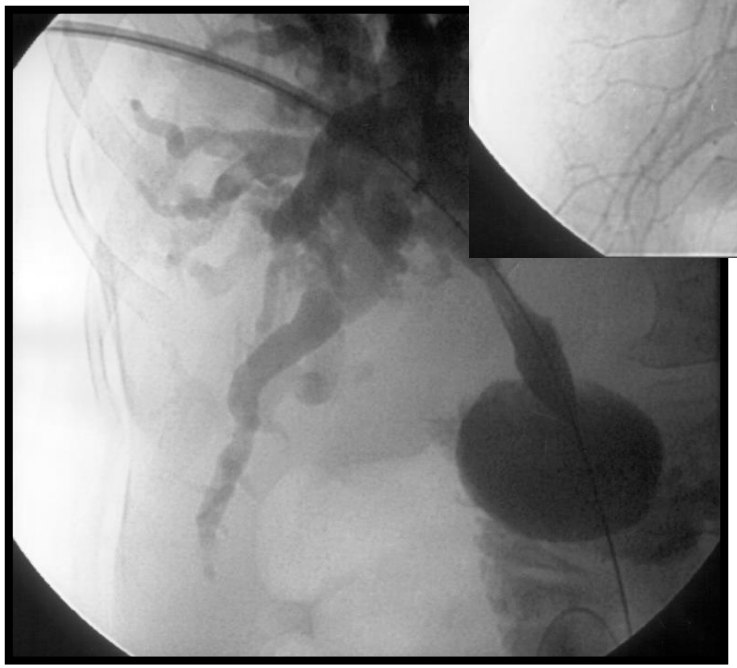
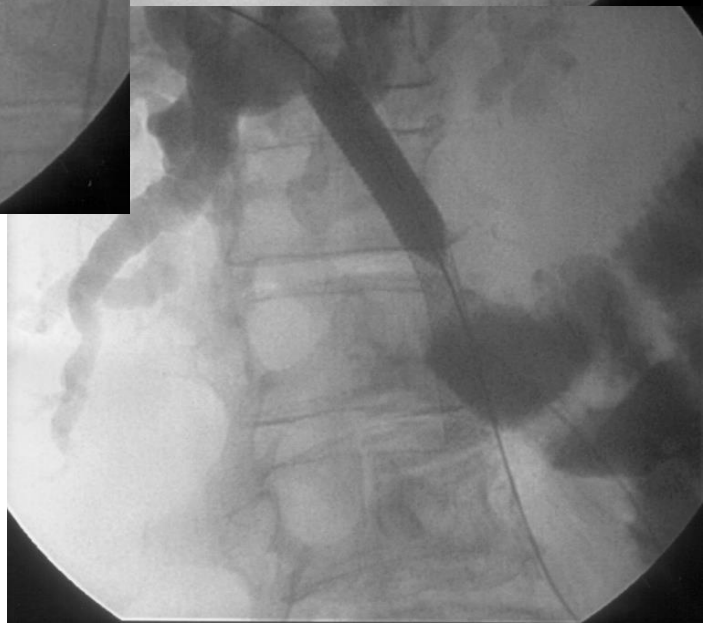
Masato Nagino, MD, PhD, Tomoki Ebata, MD, PhD,* Yukihiro Yokoyama, MD, PhD,* Tsuyoshi Igami, MD, PhD,* Gen Sugawara, MD, PhD,* Yu Takahashi, MD, PhD,* and Yuji Nimura, MD, PhD†*

PRE-OPERATIVE BILIARY DRAINAGE

- Before 2005 - PTBD
  - Possibility of seeding metastasis
- After 2005 - ENBD
  - PTBD when endoscopic drainage is not feasible

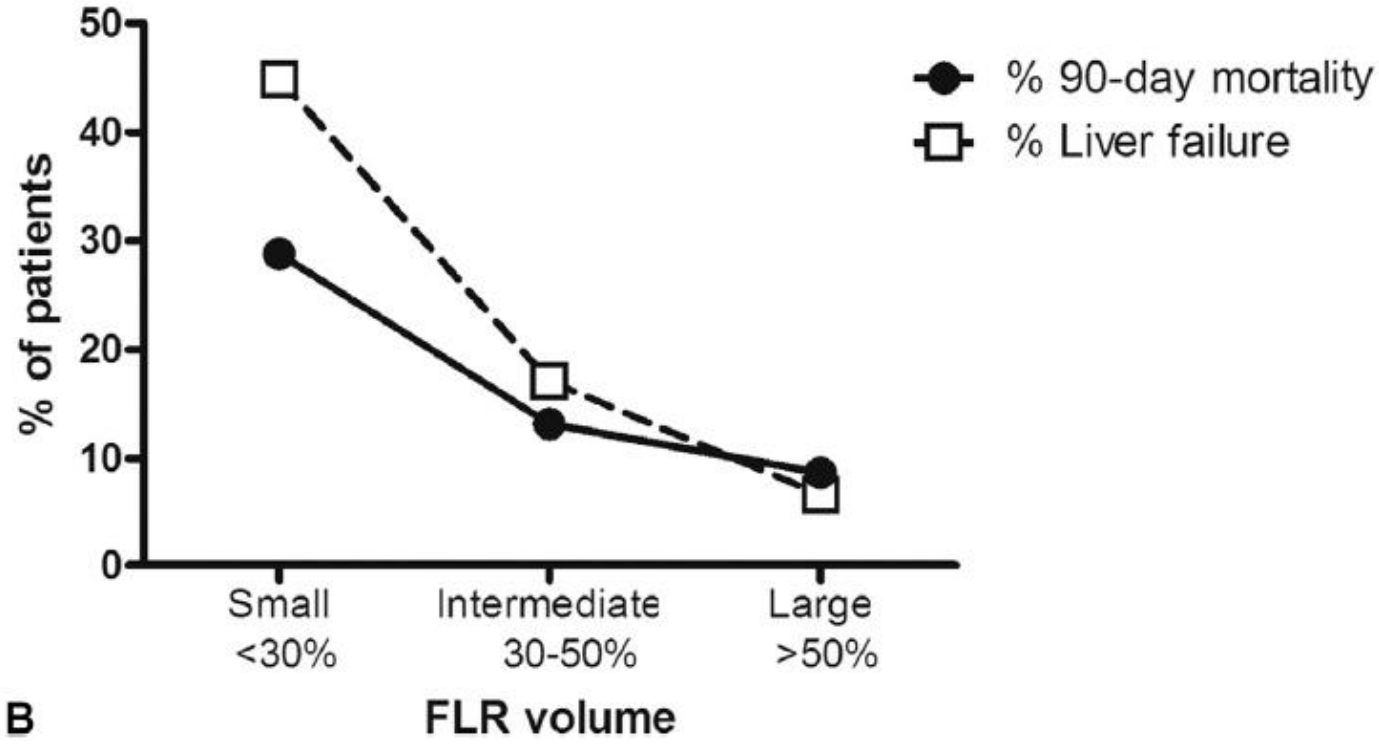
Nagino M, et al. Ann Surg 2013;258: 129–140



Postoperative Mortality after Liver Resection for Perihilar Cholangiocarcinoma: Development of a Risk Score and Importance of Biliary Drainage of the Future Liver Remnant

Jimme K Wiggers, MD, PhD, Bas Groot Koerkamp, MD, PhD, Kasia P Cieslak, MD, Alexandre Doussot, MD, David van Klaveren, PhD, Peter J Allen, MD, FACS, Marc G Besselink, MD, PhD, Olivier R Busch, MD, PhD, Michael I D'Angelica, MD, FACS, Ronald P DeMatteo, MD, FACS, Dirk J Gouma, MD, PhD, T Peter Kingham, MD, FACS, Thomas M van Gulik, MD, PhD, William R Jarnagin, MD, FACS



B

Wiggers JK, et al. J Am Coll Surg 2016; 223:321-31

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Table 3. Developed Mortality Risk Score to Predict 90-Day Postoperative Mortality after Liver Resection for Perihilar Cholangiocarcinoma

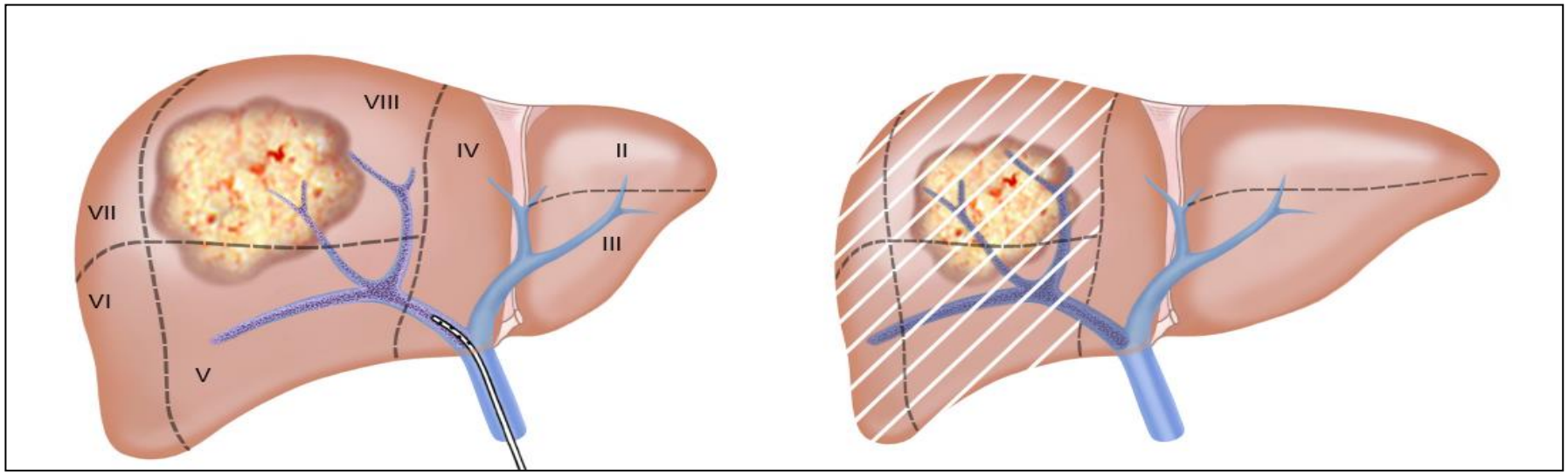
Risk factor	Points
Age	
Younger than 50 y	0
50–59 y	1
60–69 y	2
70–79 y	3
80 y and older	4
Preoperative cholangitis	2
FLR <30%	1
Incomplete drainage + FLR <50%	1
Portal vein reconstruction	1

Table 4. Risks Predicted by the Mortality Risk Score

Group	Point total	n*	Predicted risk of postoperative mortality, %
Low-risk	0	4	1
	1	23	1
	2	45	3
Intermediate-risk	3	60	6
	4	55	14
High-risk	5	34	28
	6	16	47
	7	5	67
	8	1	82
	9	0	NA

Wiggers JK, et al. J Am Coll Surg 2016; 223:321-31

PORTAL VEIN EMBOLIZATION



Makuuchi M, et al. J Jpn Surg Assoc 1984;45:1558-64
Makuuchi M, et al. Surgery 1990;107:521-7

PORTAL VEIN EMBOLIZATION

J Hepatobiliary Pancreat Sci (2014) 21:542–549
DOI: 10.1002/jhbp.77

TOPIC

Indications for portal vein embolization in perihilar cholangiocarcinoma

Ryota Higuchi · Masakazu Yamamoto

- FLR < 40%

Higuchi R, Yamamoto M. J Hepatobiliary Pancreat Sci 2014; 21:542-49

Postoperative Liver Failure Risk Score: Identifying Patients with Resectable Perihilar Cholangiocarcinoma Who Can Benefit from Portal Vein Embolization

Pim B Olthof, MD, PhD, Jimme K Wiggers, MD, PhD, Bas Groot Koerkamp, MD, PhD, Robert J Coelen, MD, PhD, Peter J Allen, MD, FACS, Marc G Besselink, MD, PhD, Olivier R Busch, MD, PhD, Michael I D'Angelica, MD, FACS, Ronald P DeMatteo, MD, FACS, T Peter Kingham, MD, FACS, Krijn P van Lienden, MD, PhD, William R Jarnagin, MD, FACS, Thomas M van Gulik, MD, PhD

Table 3. Preoperative Risk Score for Post-Hepatectomy Liver Failure

Risk factor	Points	Prevalence post-hepatectomy liver failure, %
Jaundice at presentation	2	30
Preoperative cholangitis	2	43
Future liver remnant volume		
≥45%	0	17
30% to 45%	1	23
<30%	2	44
Immediate preoperative bilirubin >50 μmol/L*	2	52

*>2.9 mg/dL.
FLRV, future liver remnant volume; PHLF, post-hepatectomy liver failure.

Olthof PB, et al. J Am Coll Surg 2017; 225:387-94

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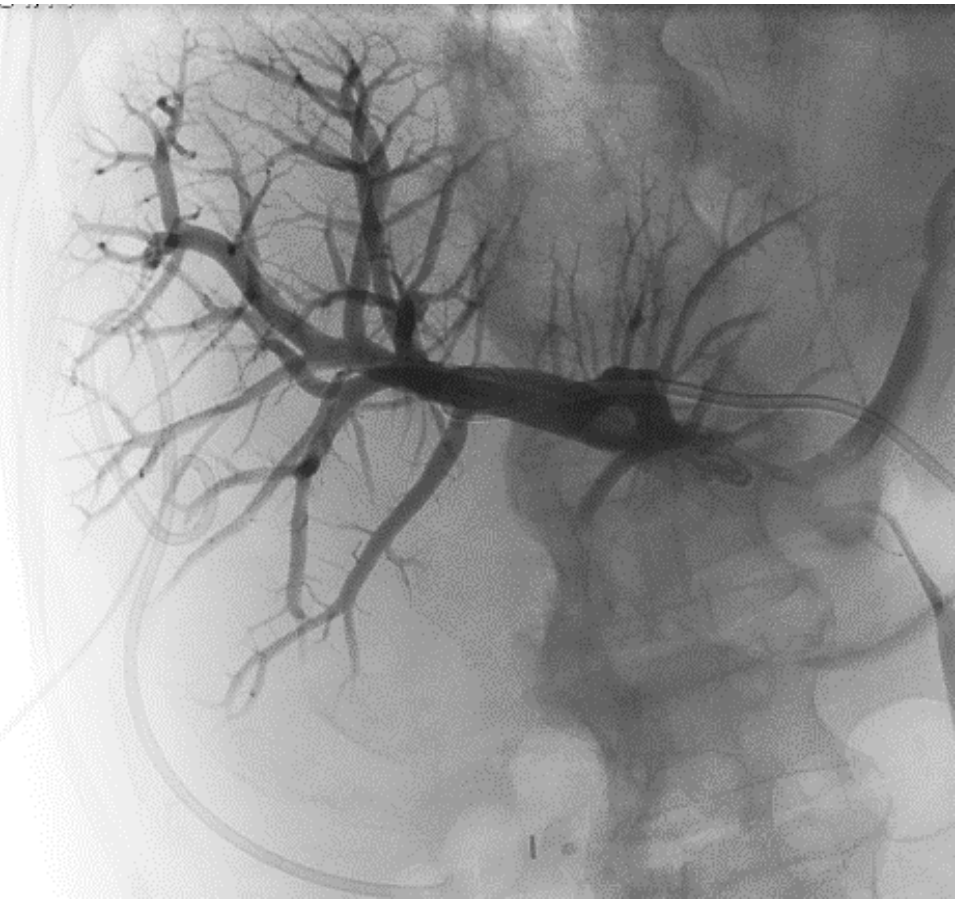
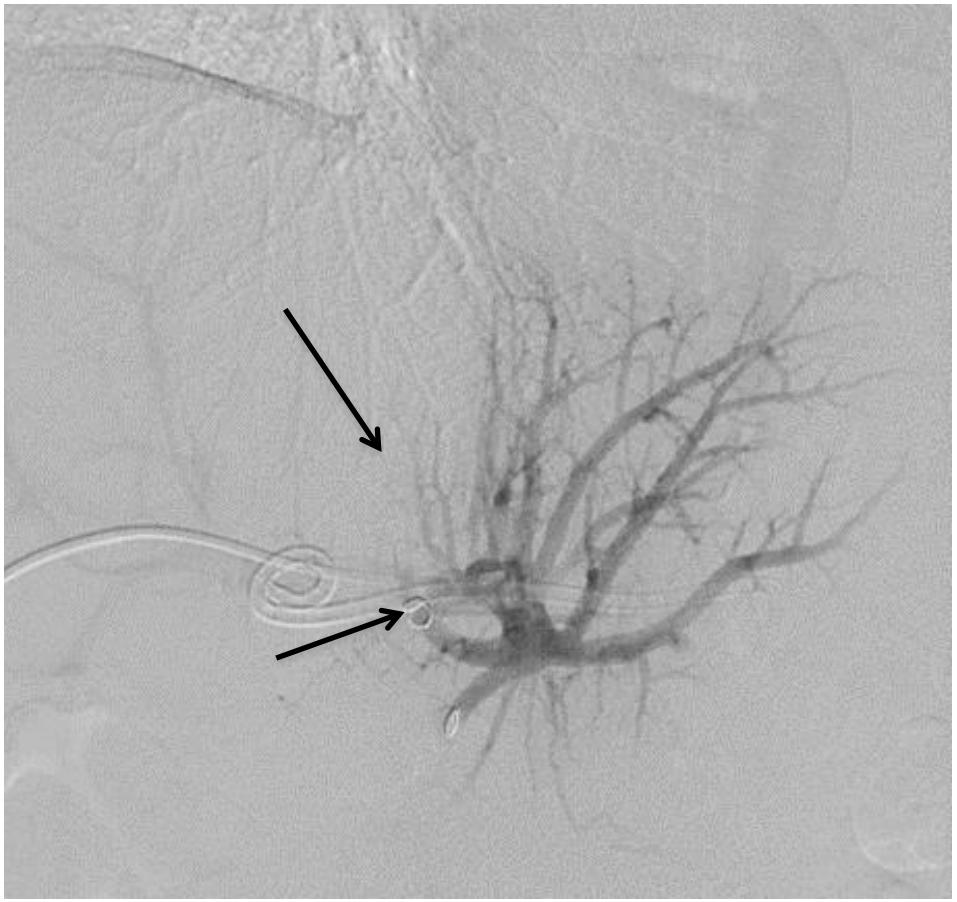
Table 4. Calculated Risk of Post-Hepatectomy Liver Failure According to the Developed Risk Score

Total risk score	n	Predicted risk, %	Group	Predicted risk, %	Observed risk, %
0	34	4	Low risk	4	5
1	10	7	Low risk		
2	44	12	Moderate risk	14	14
3	20	20	Moderate risk		
4	53	33	High risk	44	44
5	18	48	High risk		
6	11	64	High risk		
7	1	77	High risk		
8	7	87	High risk		

Olthof PB, et al. J Am Coll Surg 2017; 225:387-94

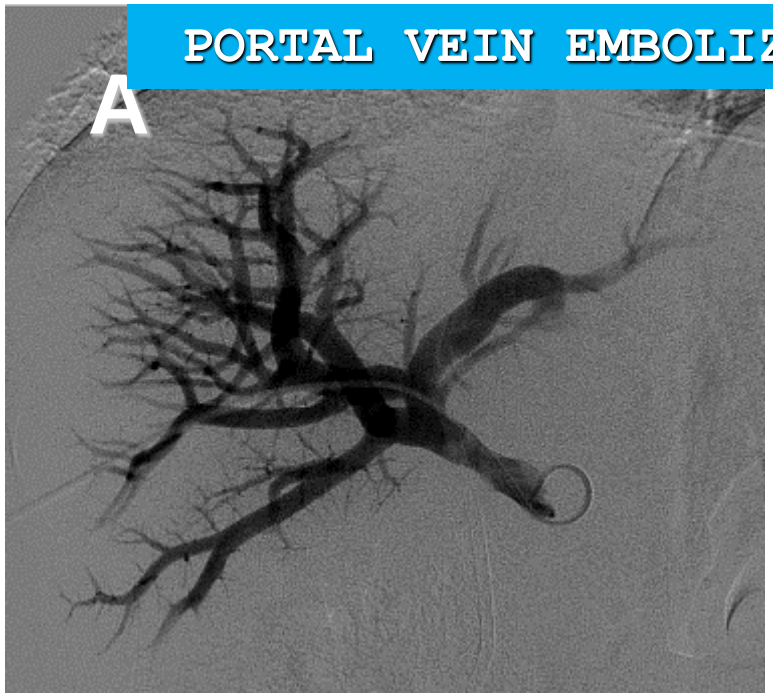
PORTAL VEIN EMBOLIZATION

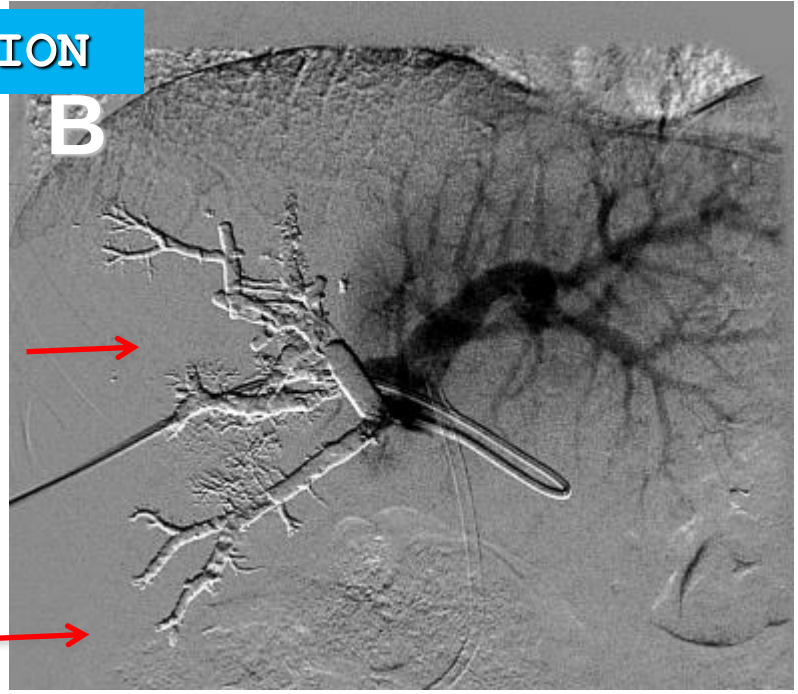


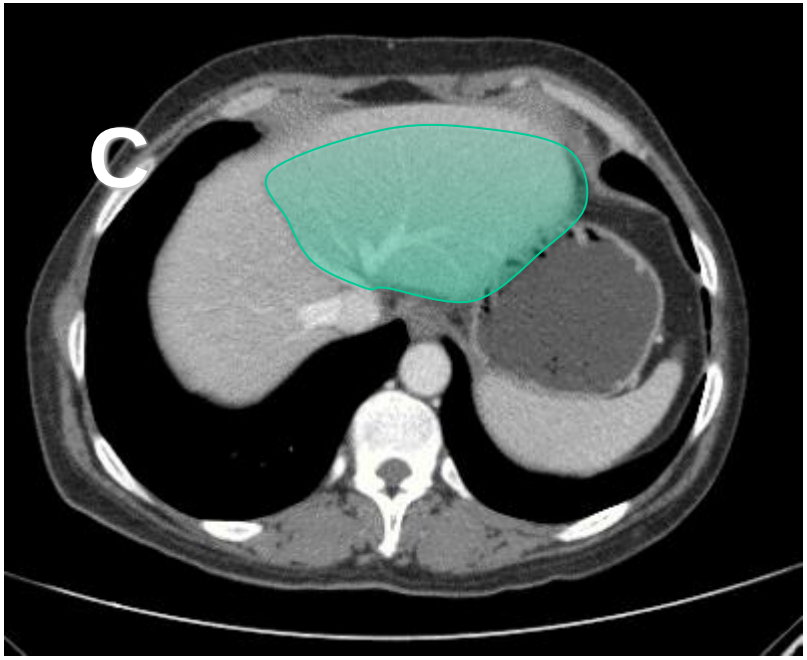


Carnevale F, et al. In Torres OJ. Cirurgia de Fígado, Pancreas e Vias Biliares – Ed Rubio 2019

PORTAL VEIN EMBOLIZATION

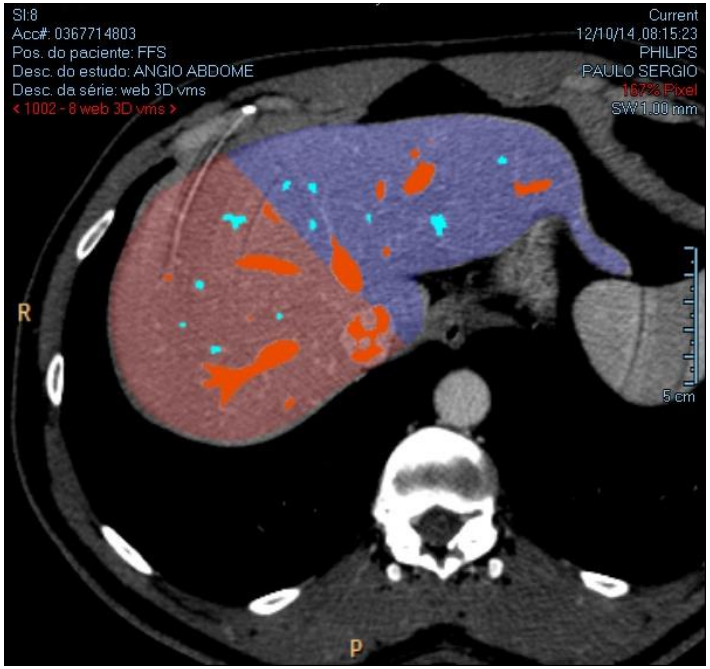


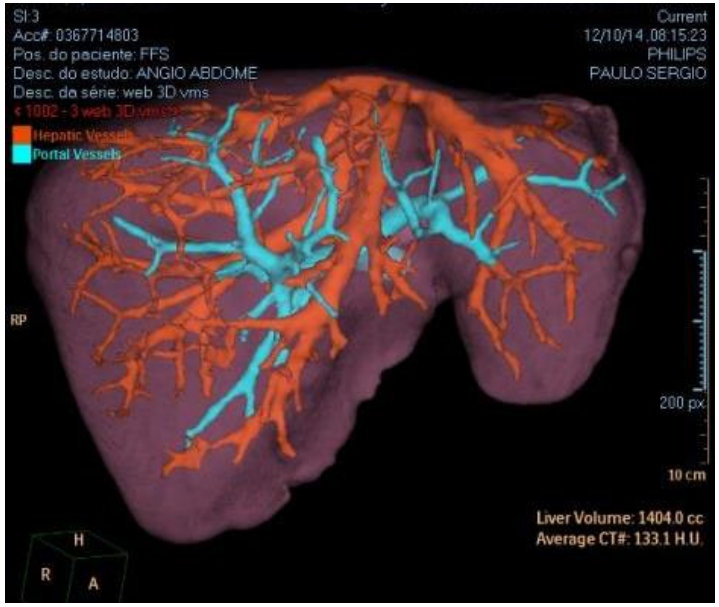




Carnevale F, et al. In Torres OJ. Cirurgia de Fígado, Pancreas e Vias Biliares – Ed Rubio 2019

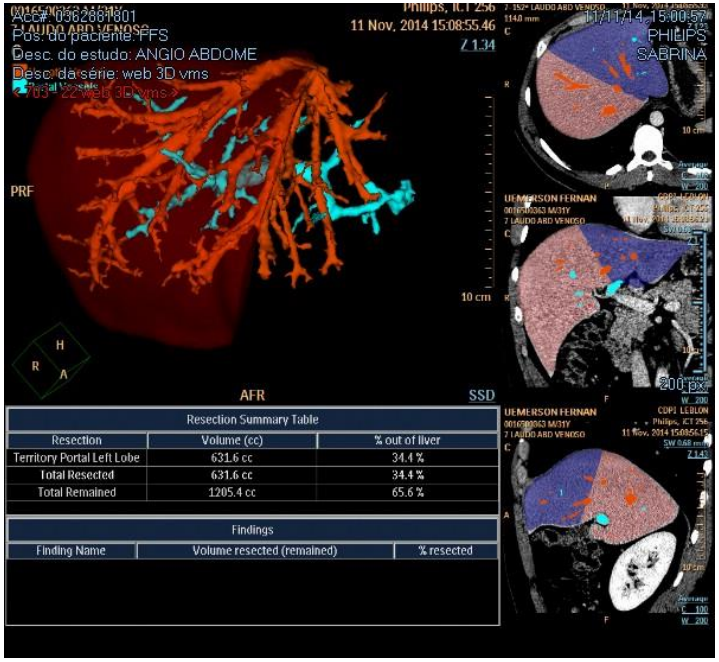
VOLUMETRY





Left hepatectomy + caudate

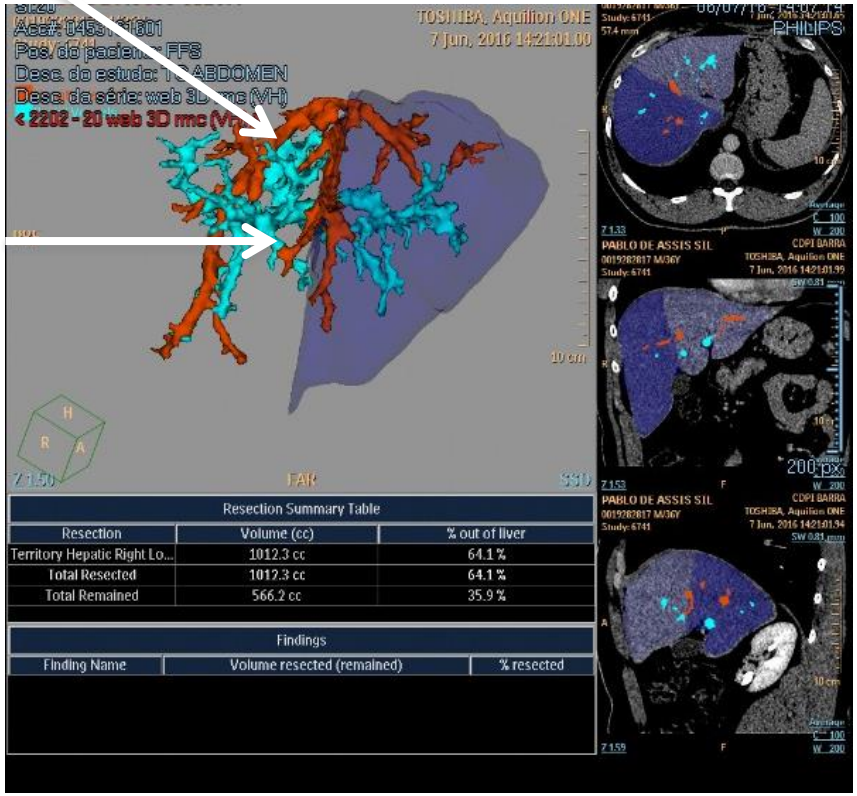
VIRTUAL HEPATECTOMY

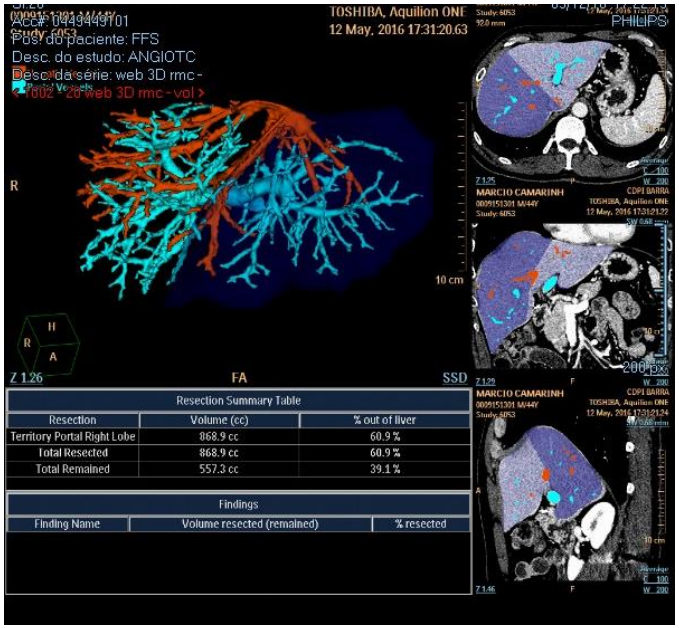


VOLUMETRY

V8

V5



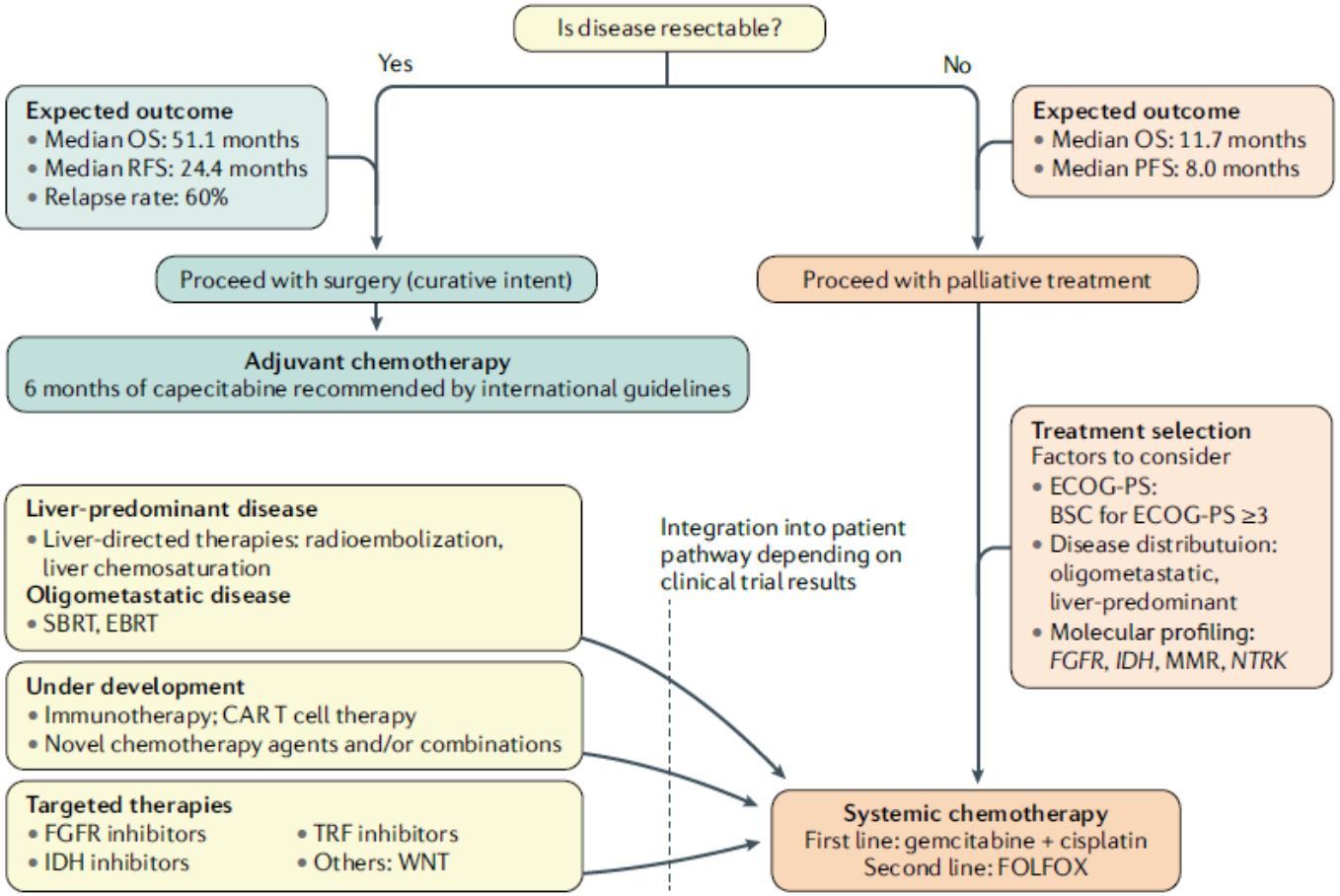


VIRTUAL HEPATECTOMY

Right hepatectomy + caudate

OPEN

Cholangiocarcinoma 2020: the next horizon in mechanisms and management



Bonales JM, et al. Nature Reviews. Gastroenterol Hepatol 2020

SURGICAL MANAGEMENT

- Local excision
- Hepatectomy
- Liver transplantation

STANDARD THERAPY

- Major hepatectomy
- Extrahepatic biliary tree resection
- Lymphadenectomy
- Caudate resection
- Biliary reconstrution
- Portal vein resection (?)
- R0 resection

ASTR

ORIGINAL ARTICLE
pISSN 2288-6575 • eISSN 2288-6796
https://doi.org/10.4174/astr.2020.98.1.15
Annals of Surgical Treatment and Research

Comparison study for surgical outcomes of right versus left side hemihepatectomy to treat hilar cholangiocellular carcinoma

[illegible][1,2]

https://doi.org/10.1016/j.hpb.2019.07.003 HPB

ORIGINAL ARTICLE

Left- versus right-sided hepatectomy with hilar en-bloc resection in perihilar cholangiocarcinoma

Ann Hepatobiliary Pancreat Surg 2018;22:350-358
https://doi.org/10.14701/ahbps.2018.22.4.350

Original Article

Comparison analysis of left-side versus right-side resection in bismuth type III hilar cholangiocarcinoma

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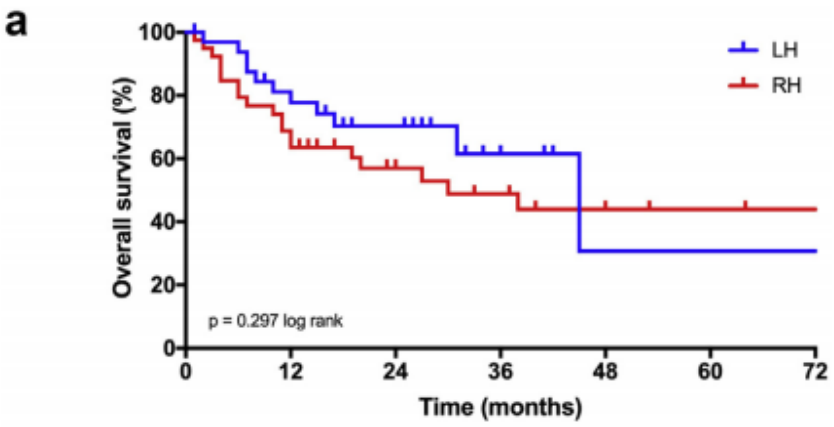
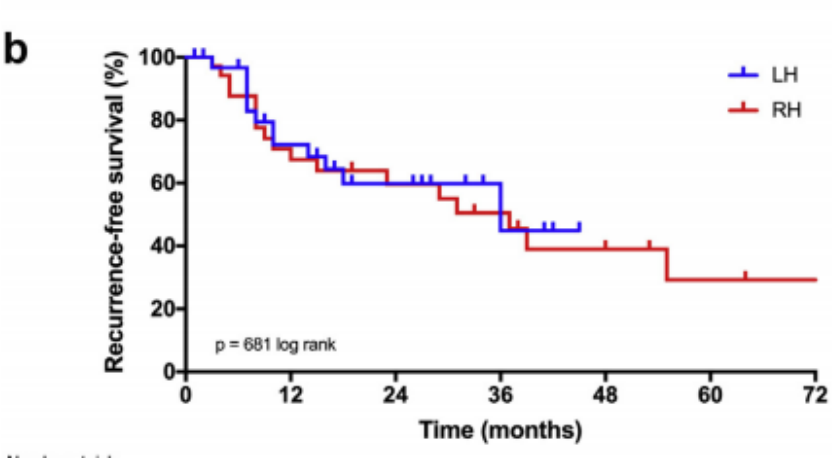
Hong SS, et al. Ann Surg Treat Res 2020
Bednarsch J, et al. HPB 2019
Li Y, et al. Ann Hepatobiliary Pancreat Surg 2018

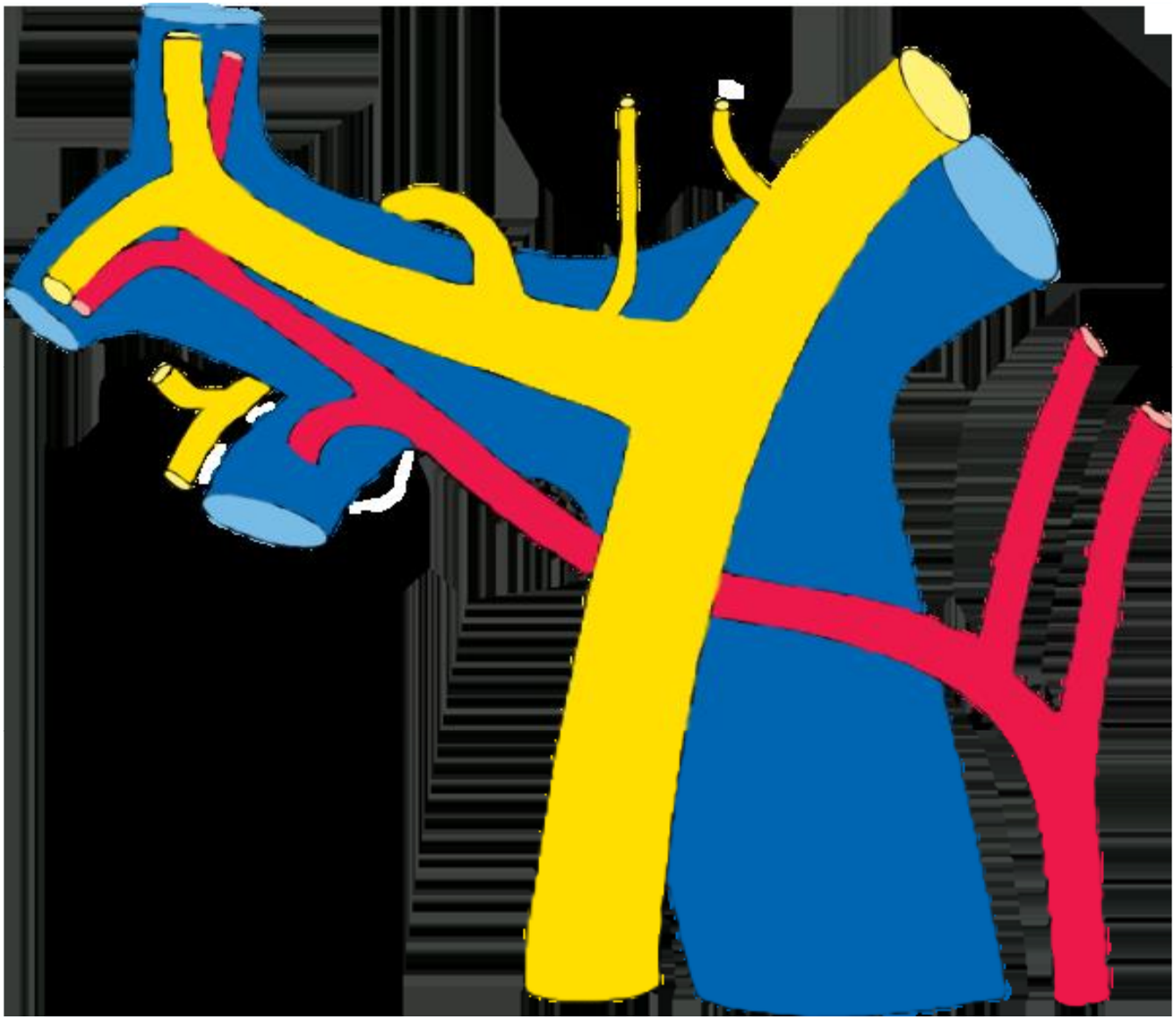
Right or Left?

Right or Left?



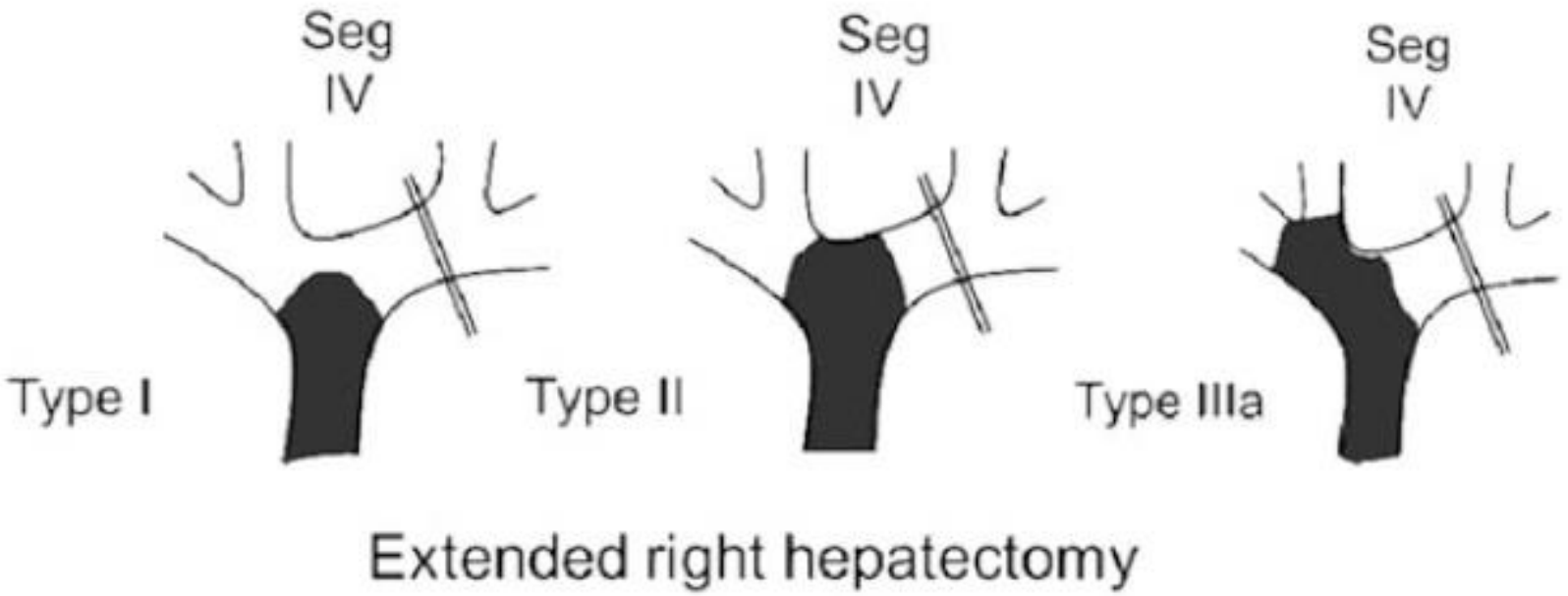


Bednarsch J, et al. HPB 2019

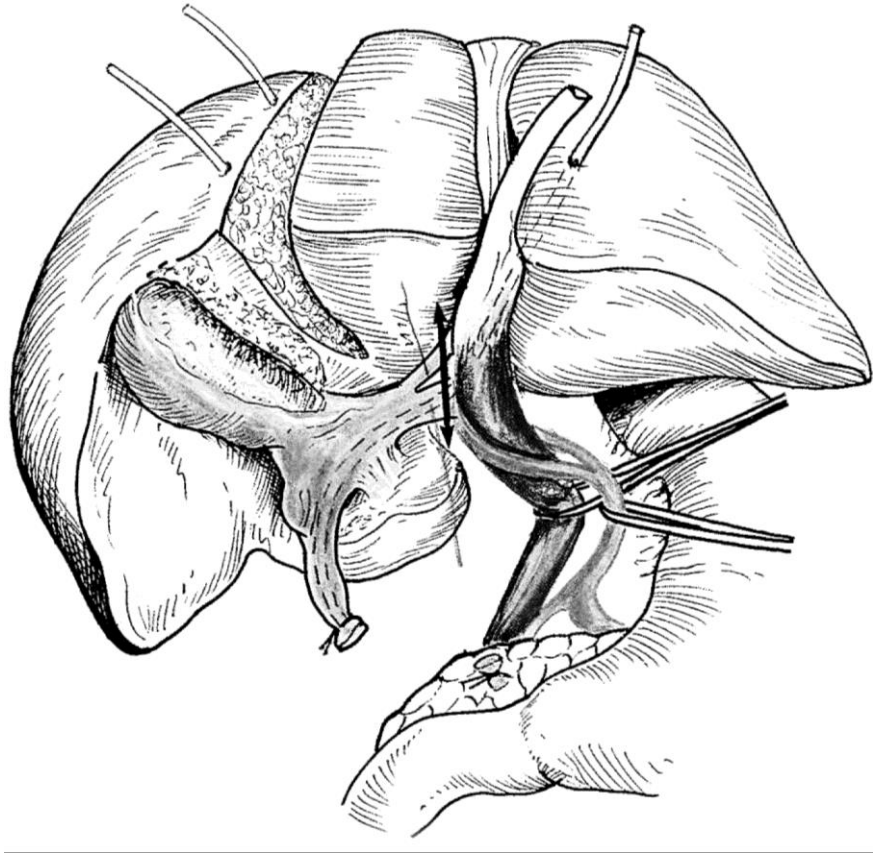


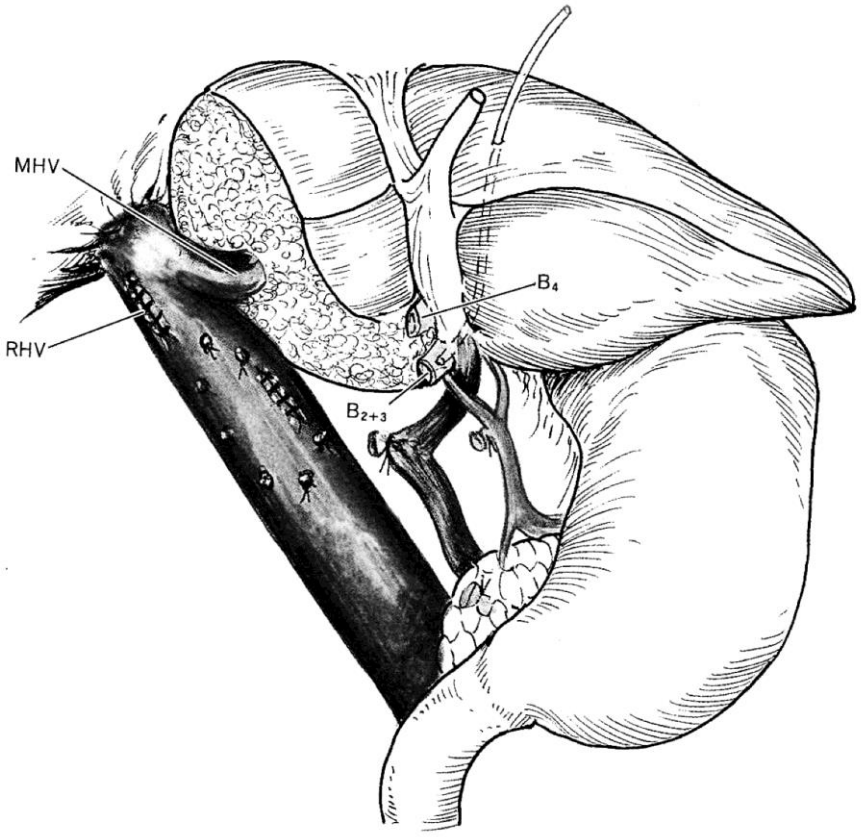
BISMUTH-CORLETTE I,II, and IIIa

- Right hepatectomy
- Extended right hepatectomy



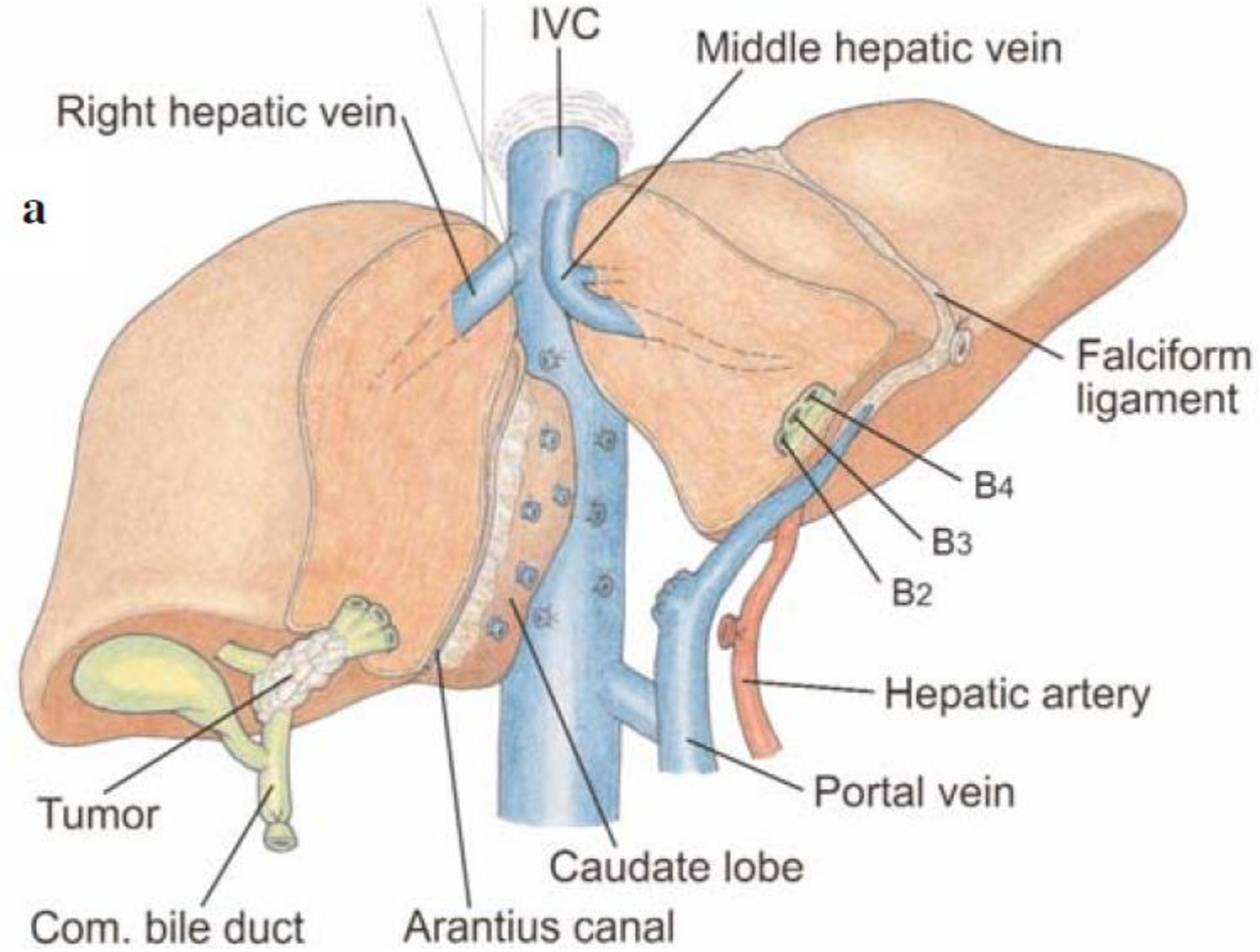
❑ Right hepatectomy + caudate



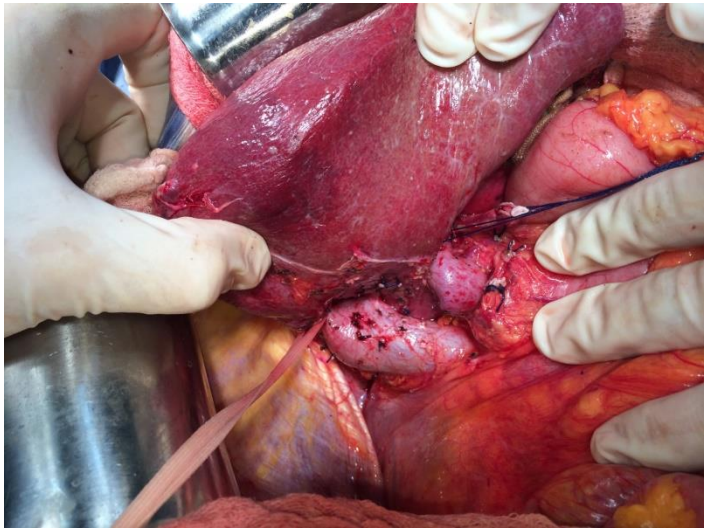


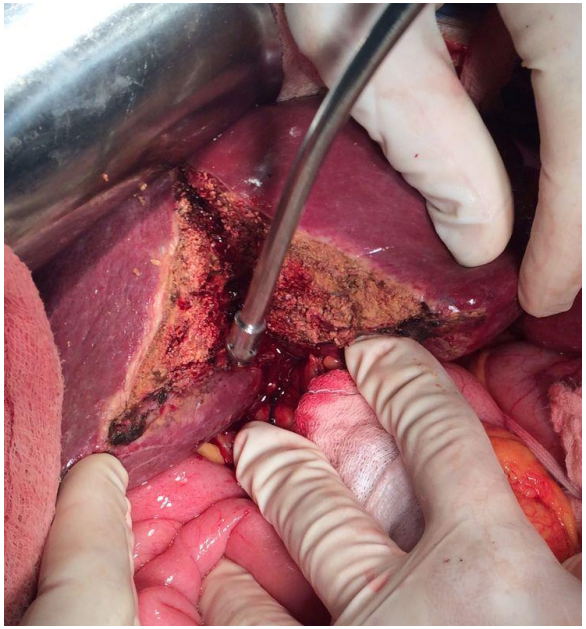
Nimura Y. In Torres O. Cirurgia de Fígado, Pancreas e Vias Biliares – Ed Rubio 2019

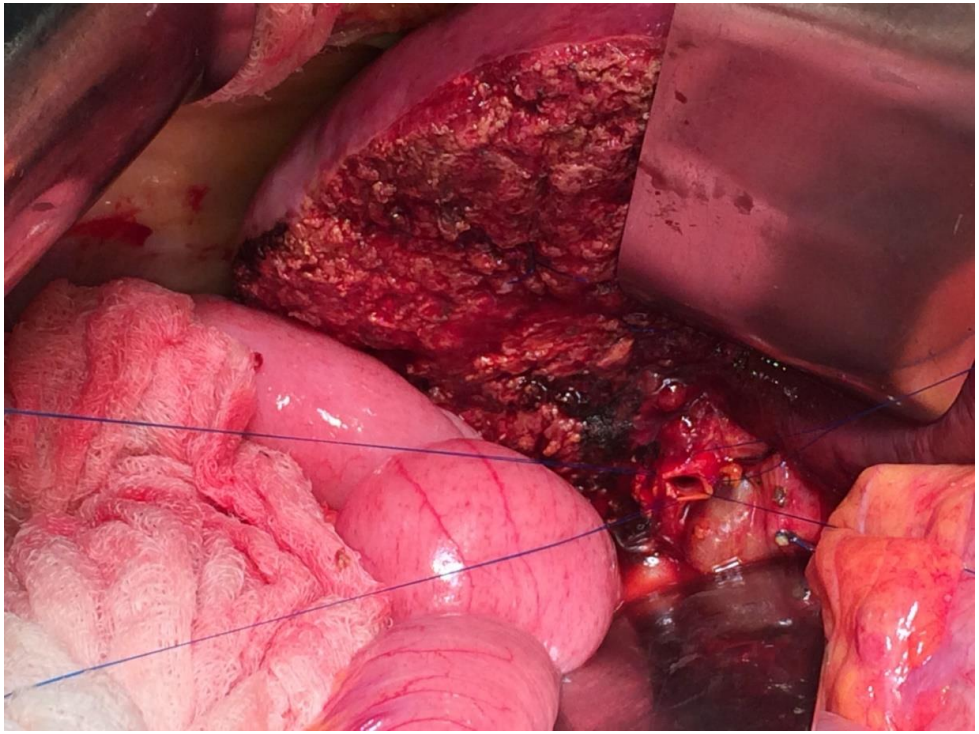
❑ Right hepatectomy + caudate



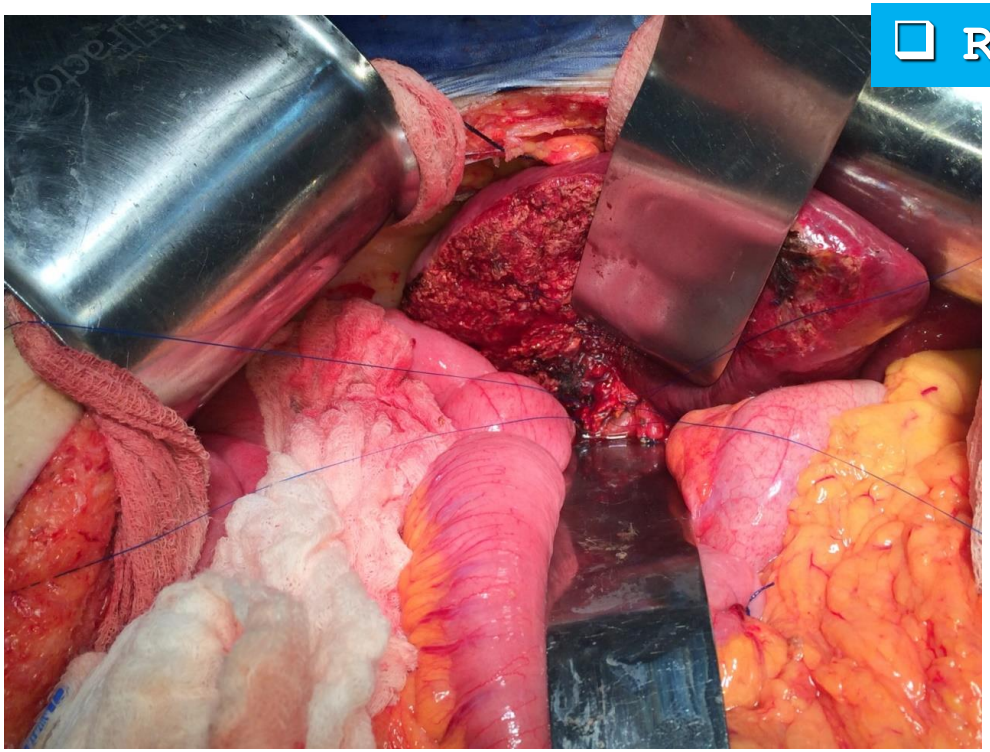
❑ Right hepatectomy + caudate

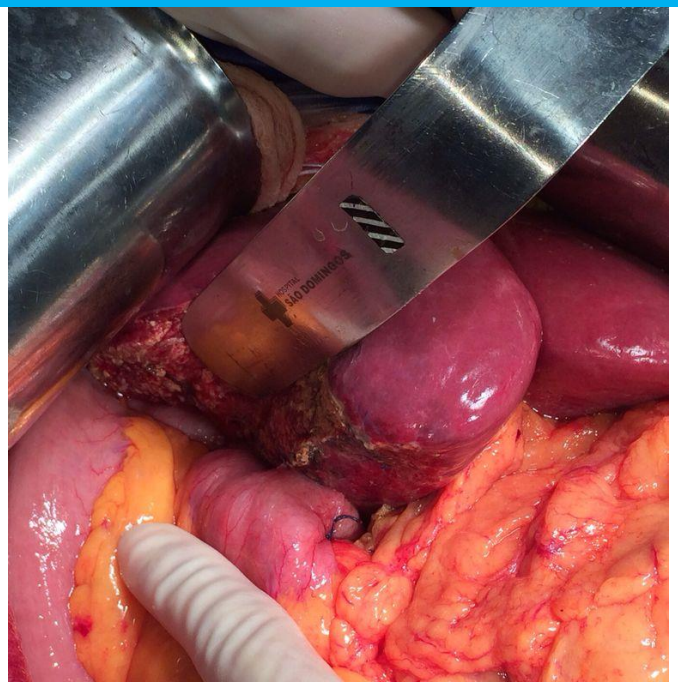




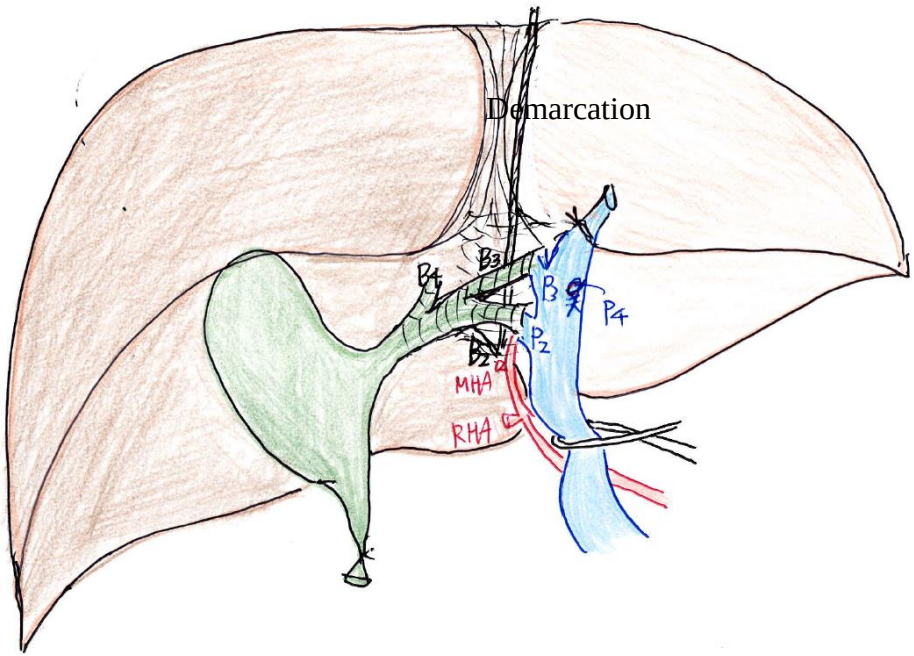


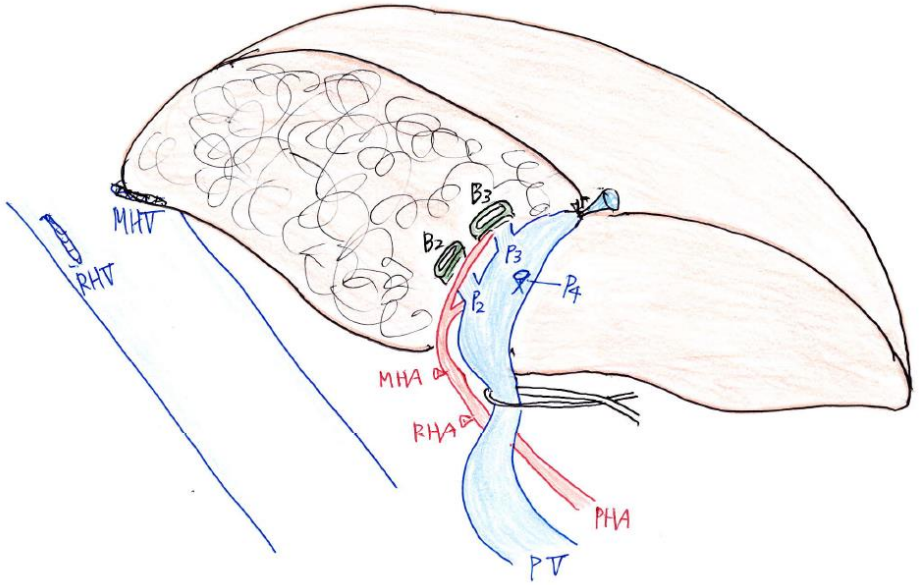
❑ Right hepatectomy + caudate





❑ Extended right hepatectomy





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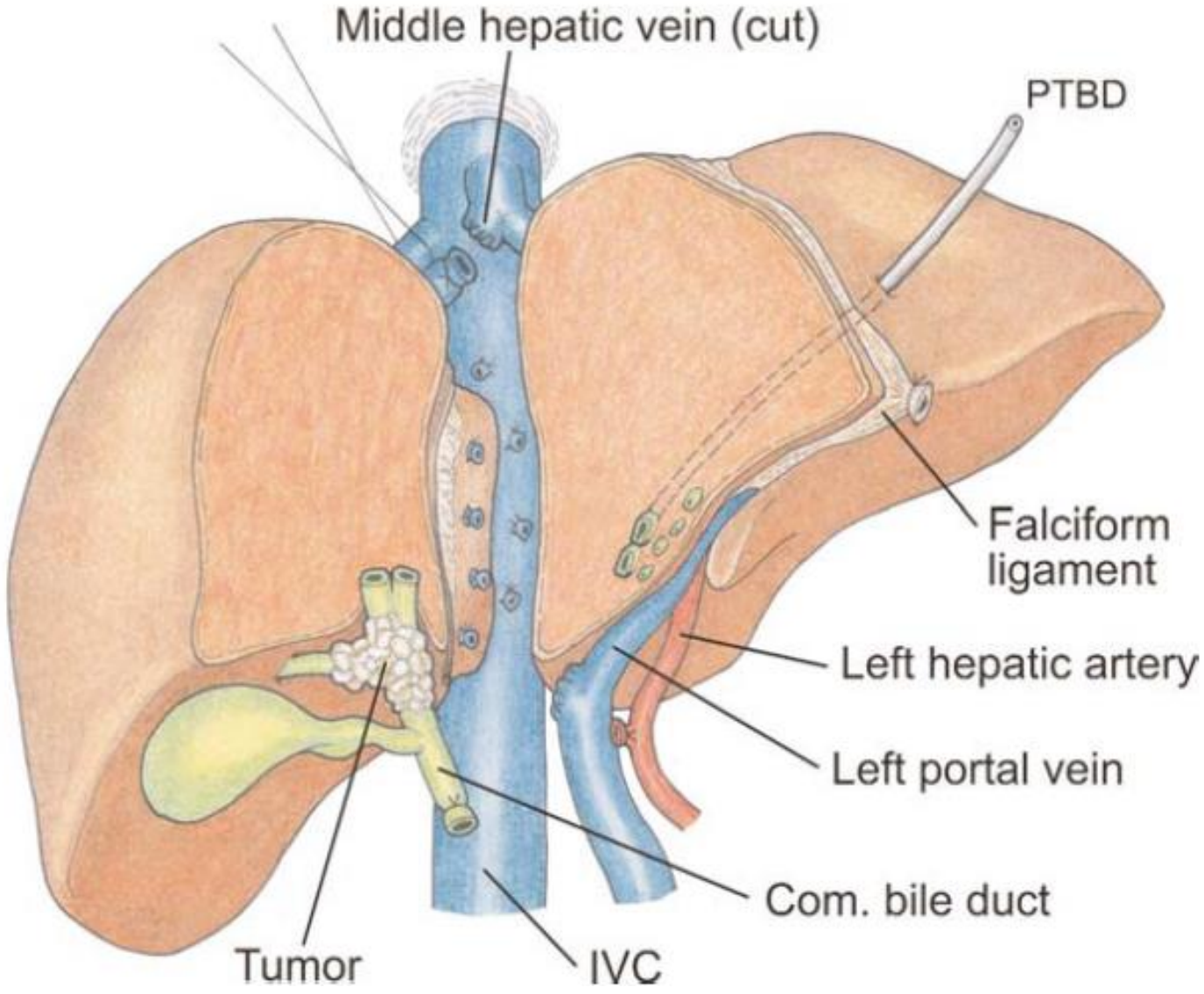
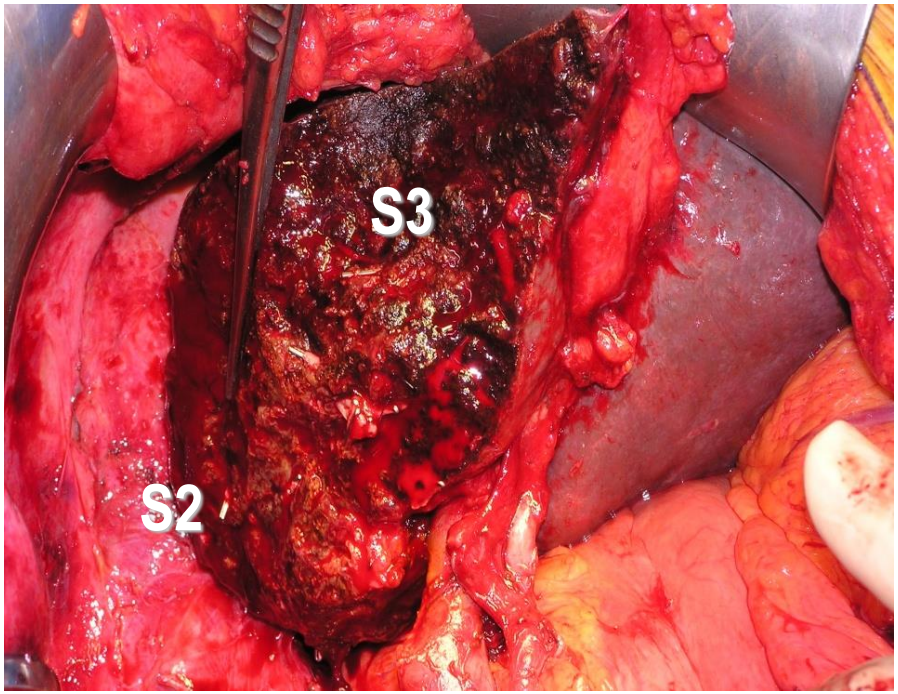
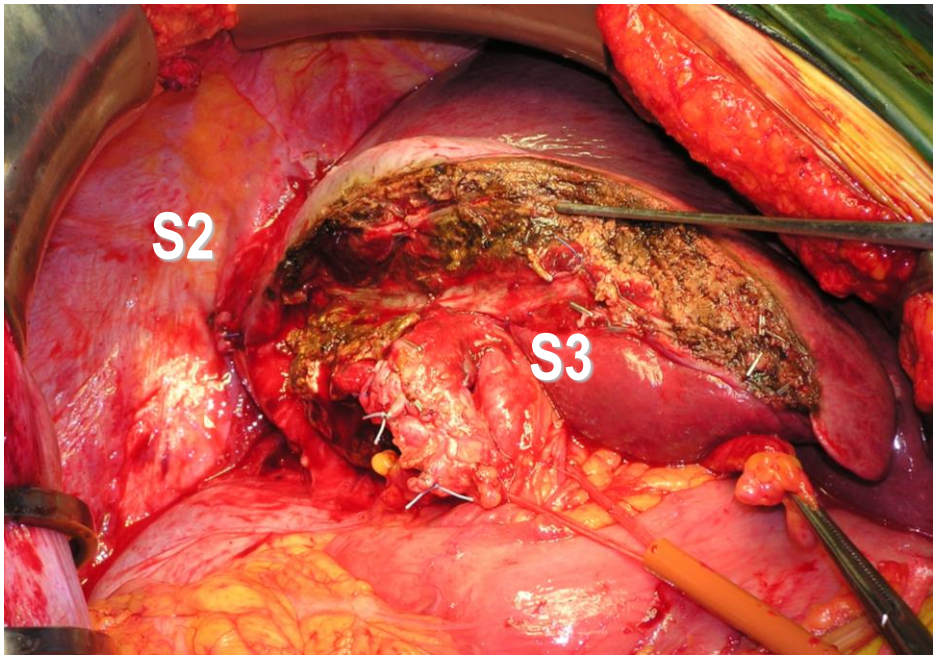
❑ Extended right hepatectomy

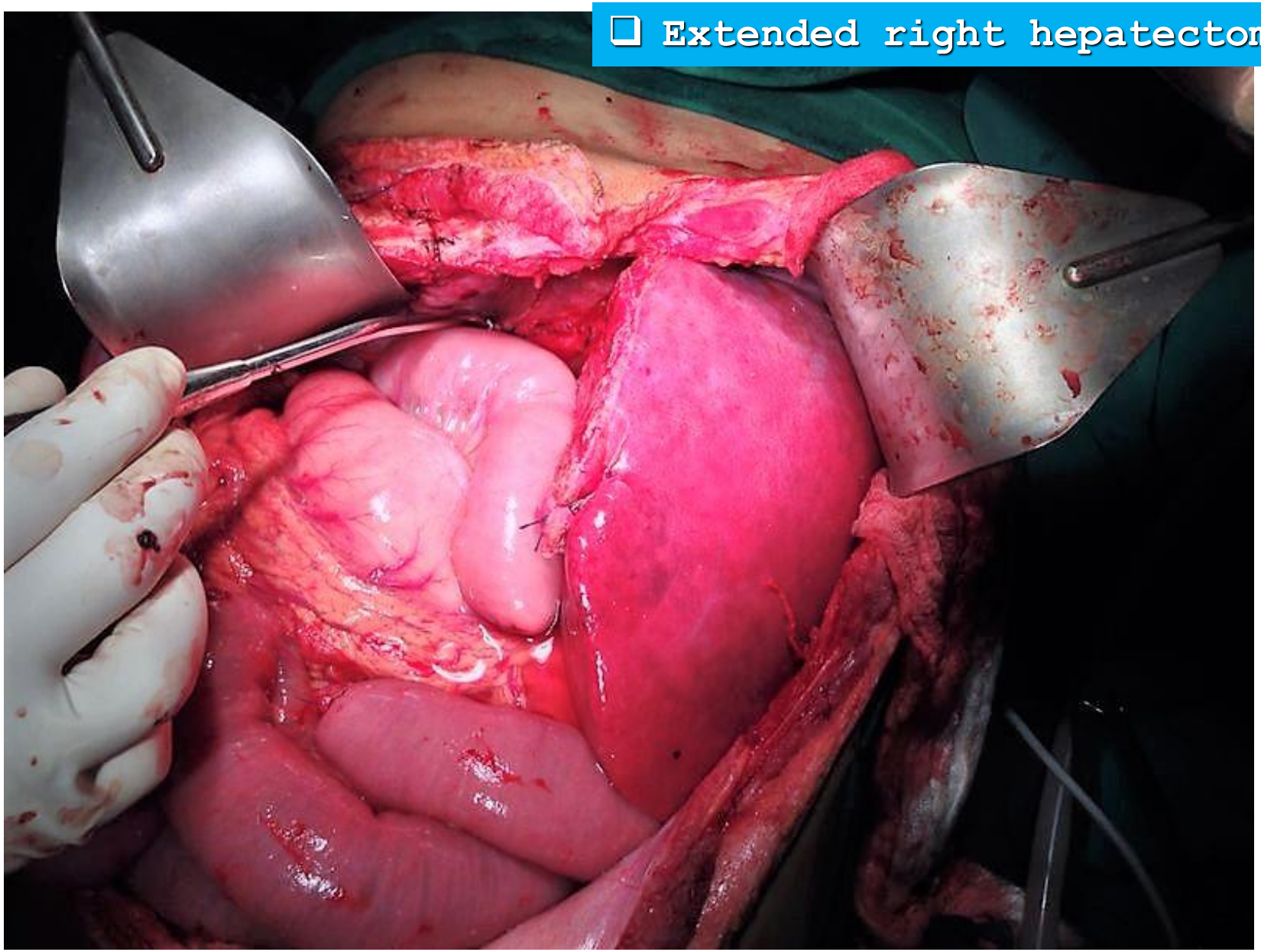


❑ Extended right hepatectomy



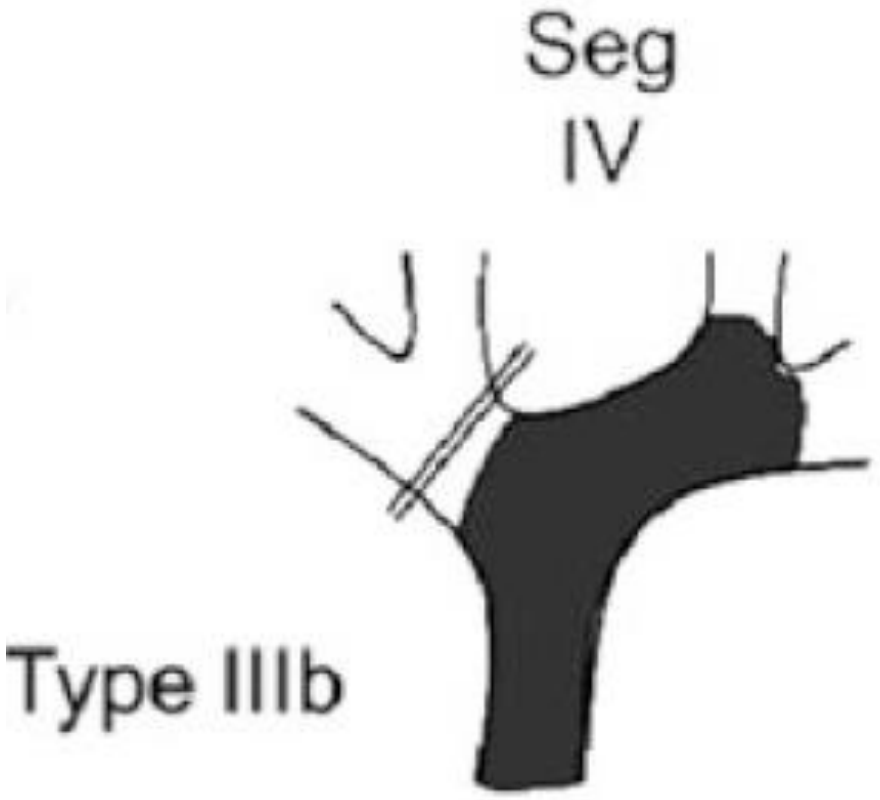


❑ Extended right hepatectomy

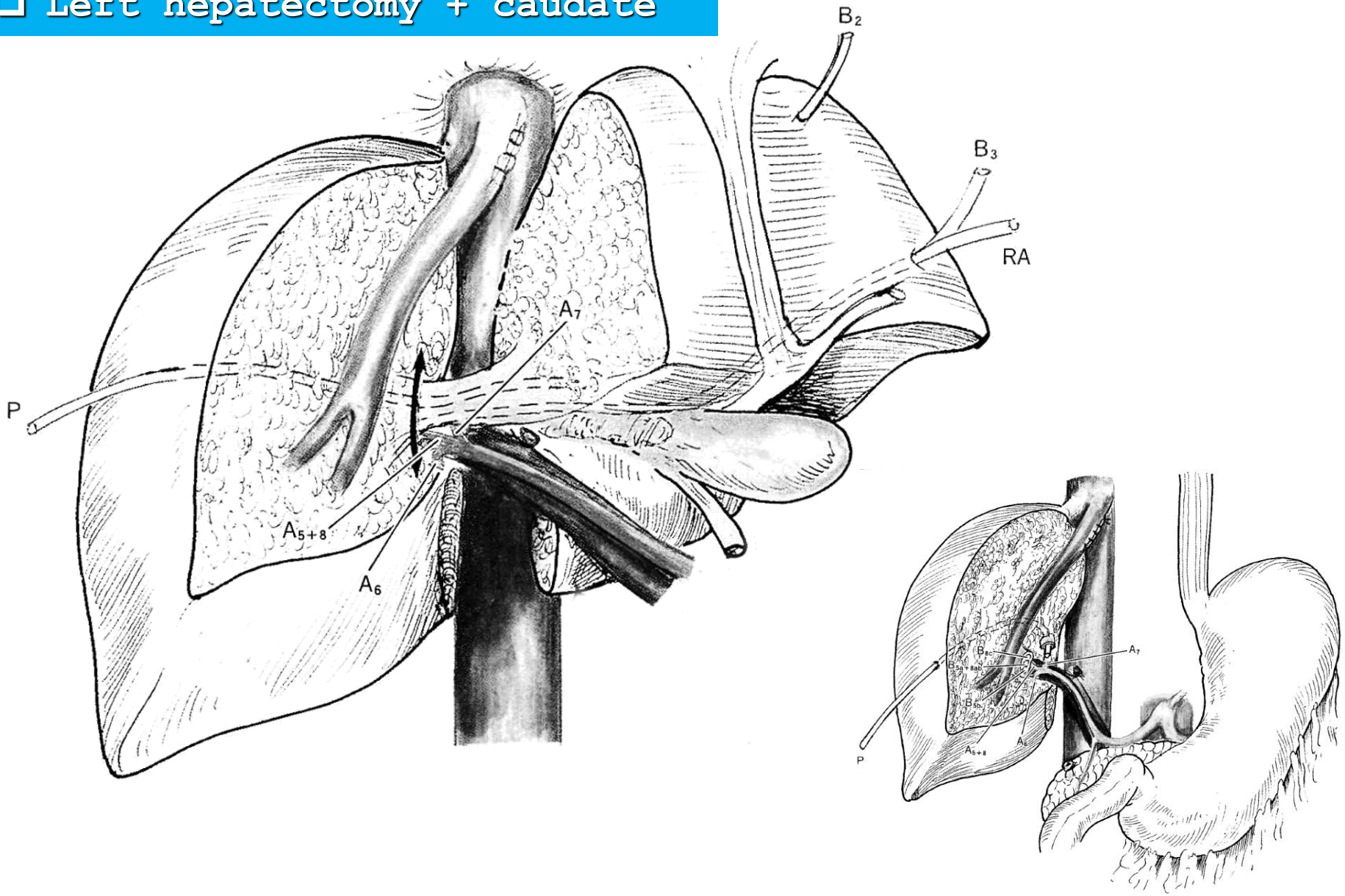


BISMUTH-CORLETTE IIIb

- Left hepatectomy
- Extended left hepatectomy

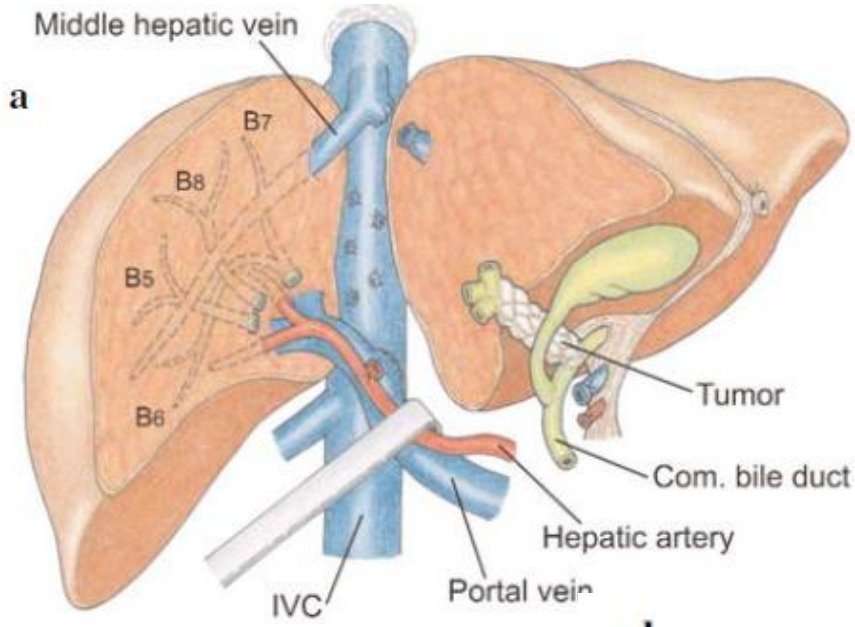


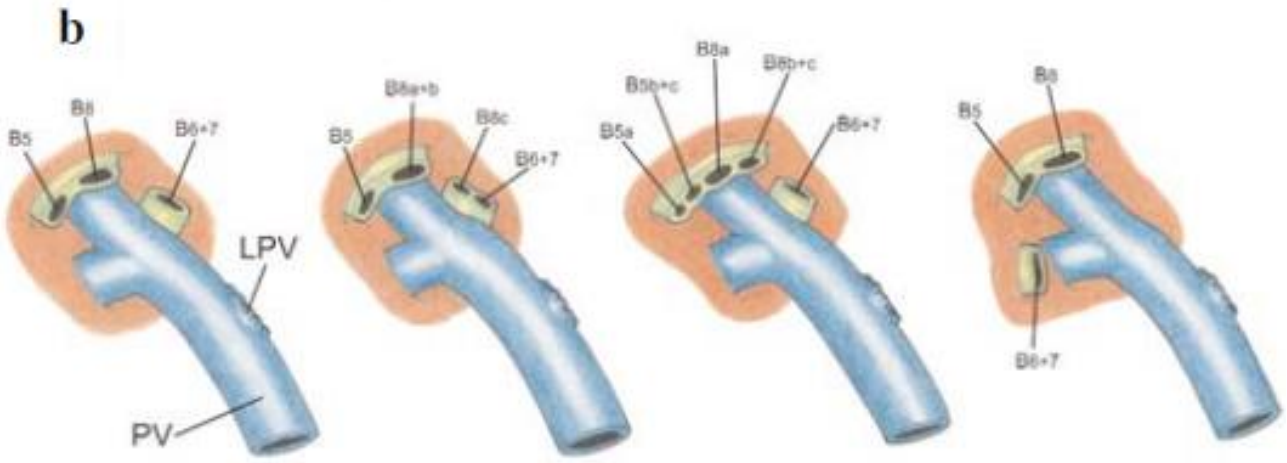
❑ Left hepatectomy + caudate



Nimura Y. In Torres O. Cirurgia de Fígado, Pancreas e Vias Biliares – Ed Rubio 2019

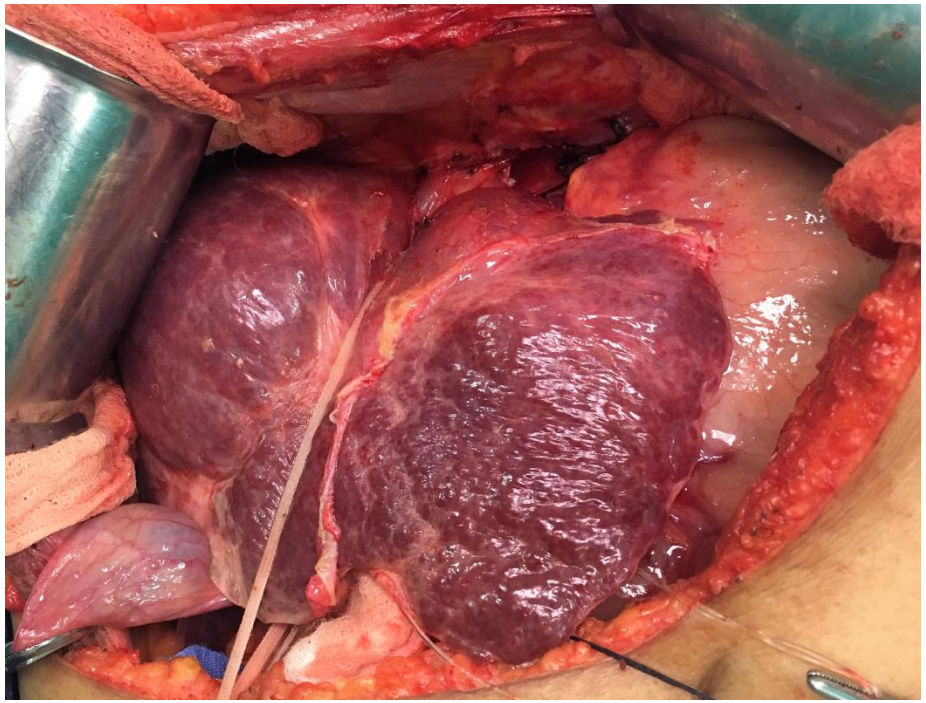
❑ Left hepatectomy + caudate

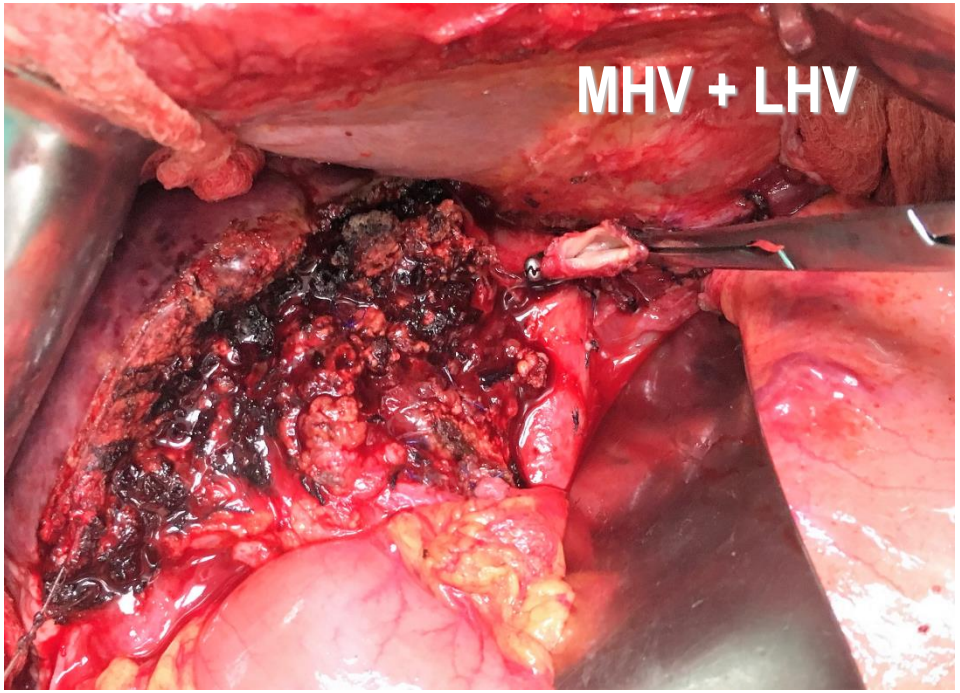




❑The right anterior and posterior bile duct (B5,B8/B6,B7) and different possibilities

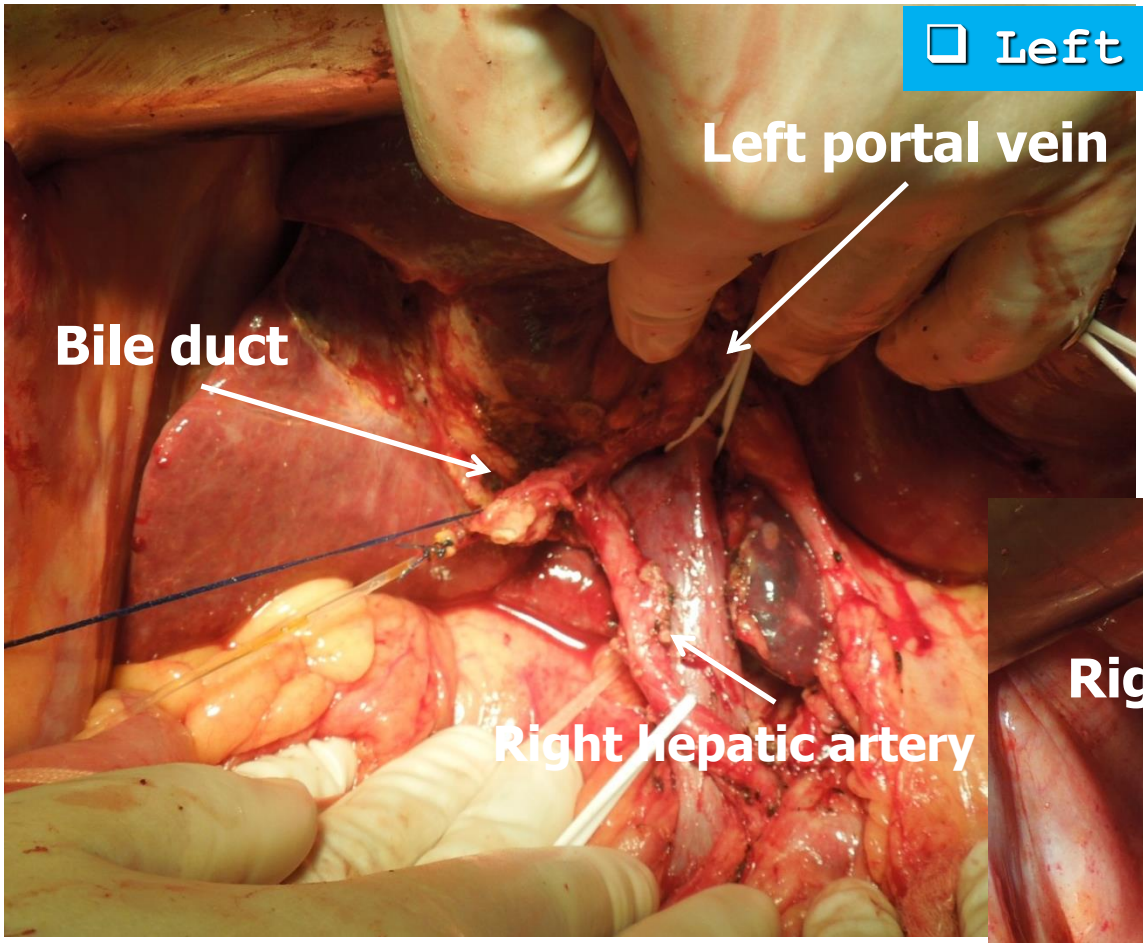
❑ Left hepatectomy + caudate

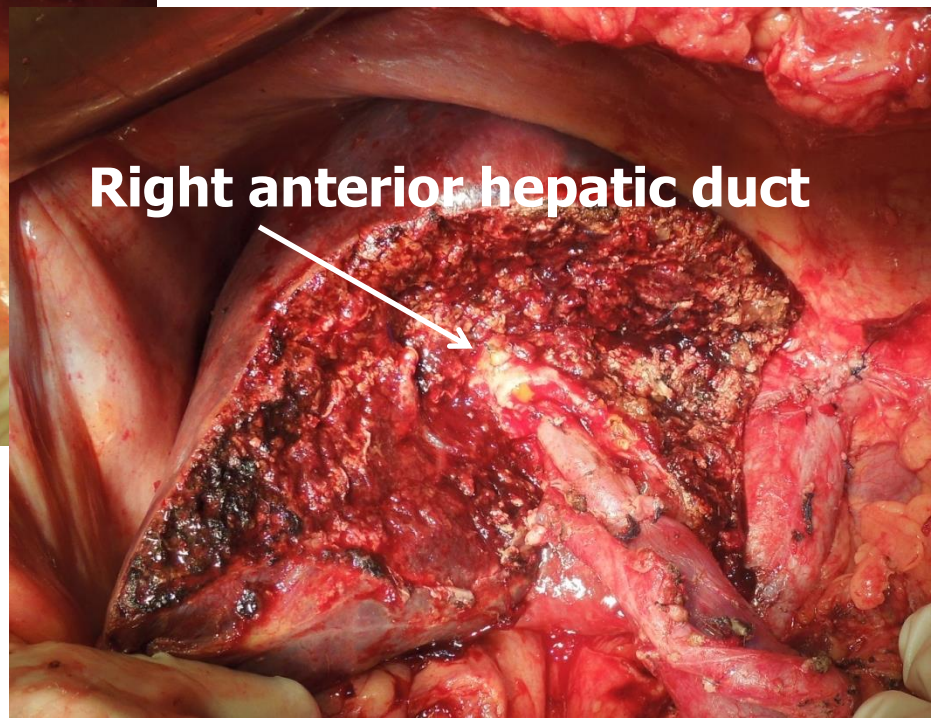




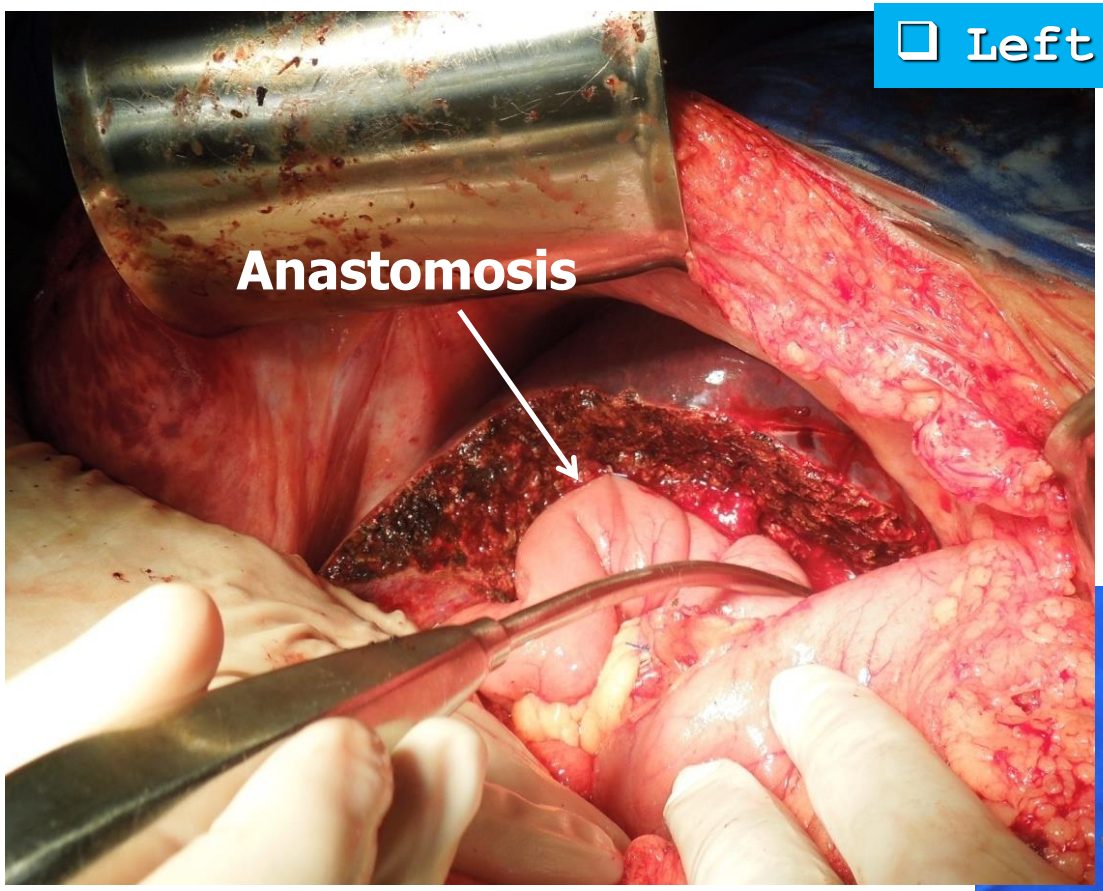
❑ Hanging

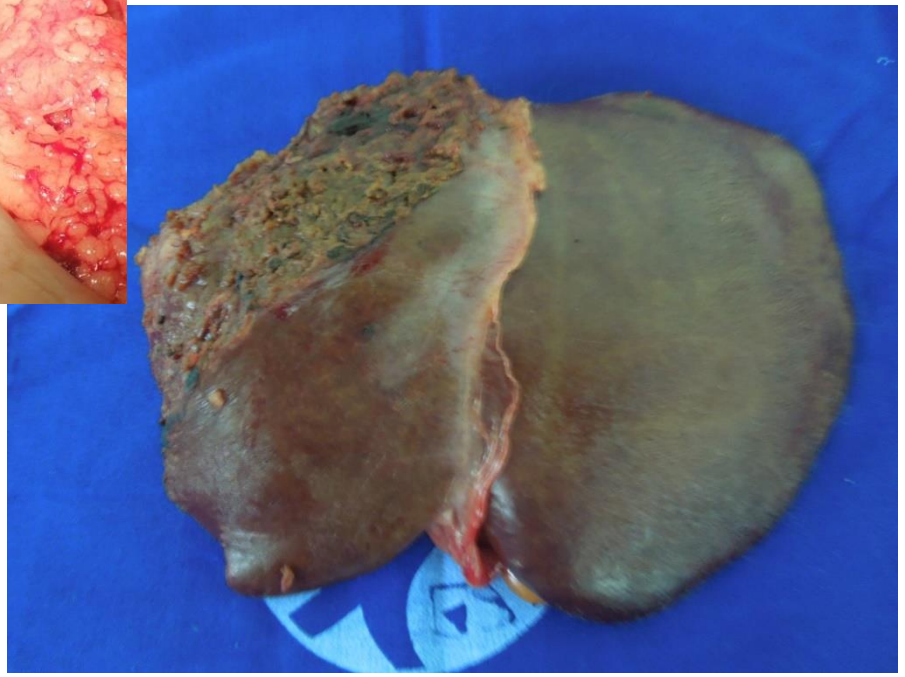
❑ Left hepatectomy + caudate

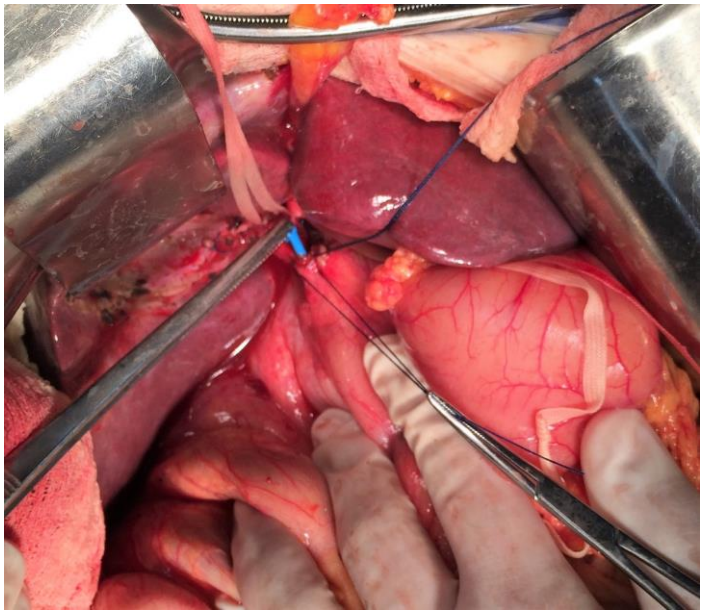




❑ Left hepatectomy + caudate

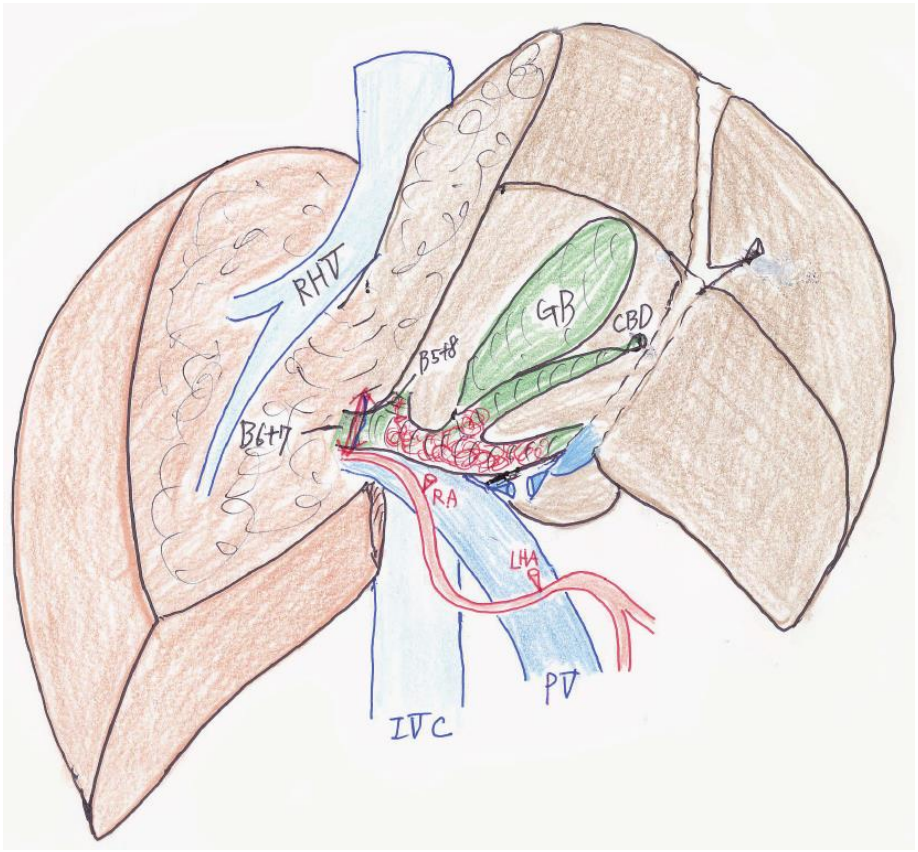


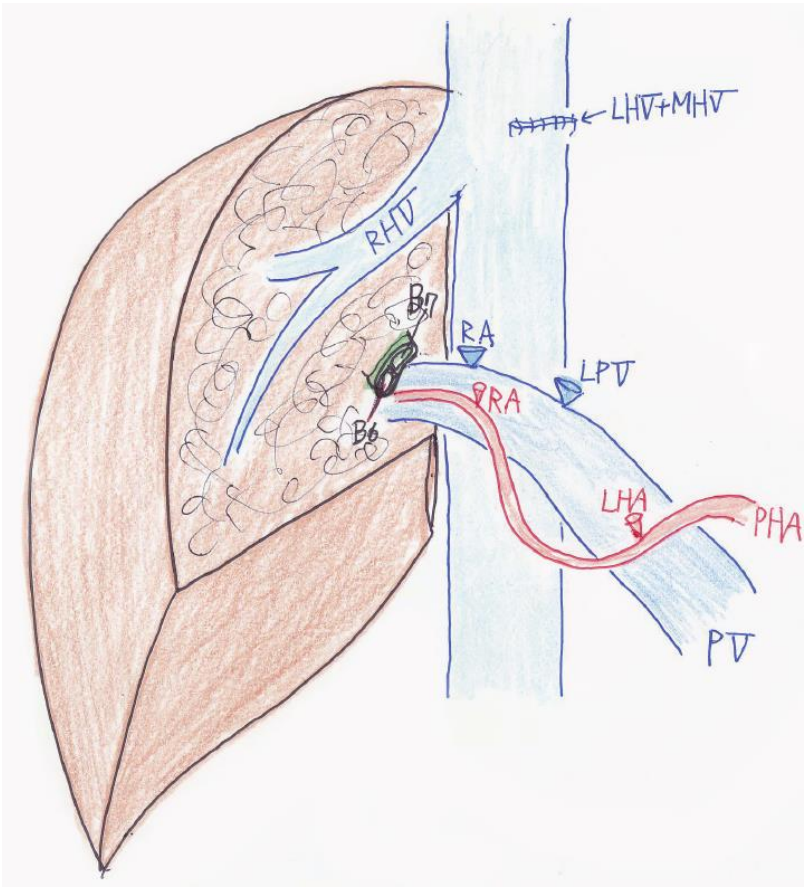




- Left hepatectomy + caudate

❑ Extended left hepatectomy





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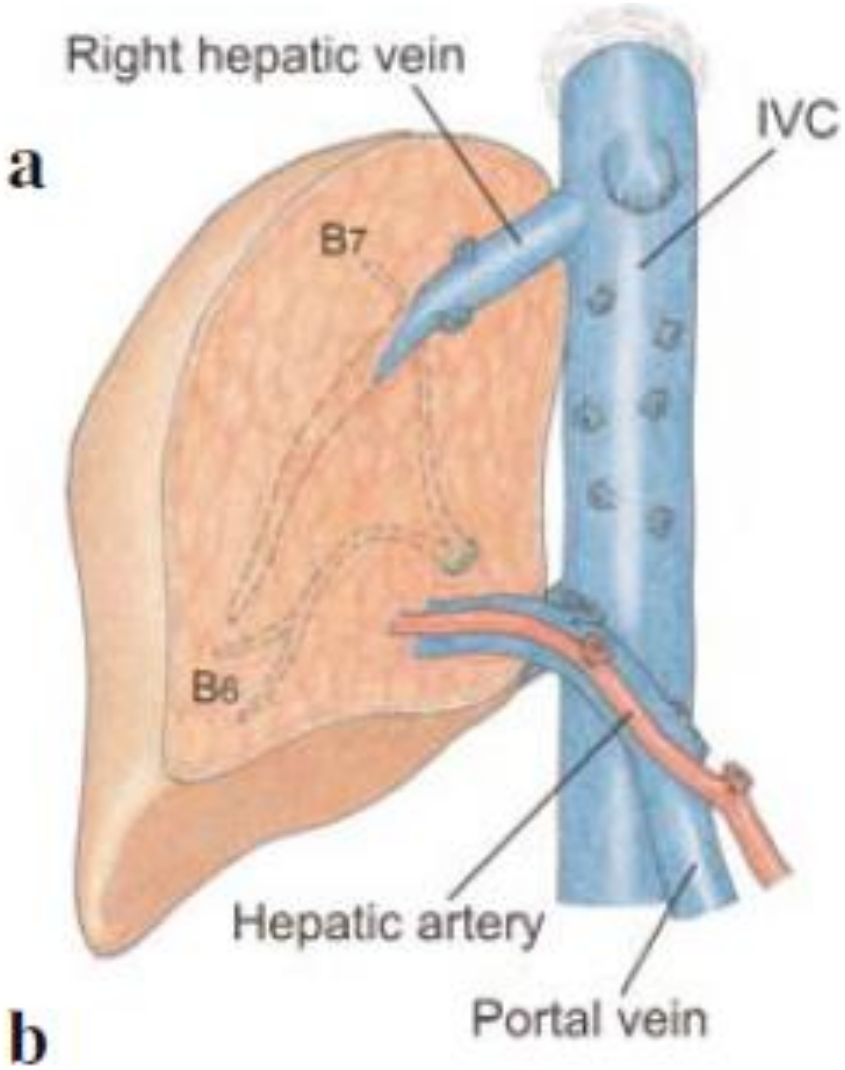
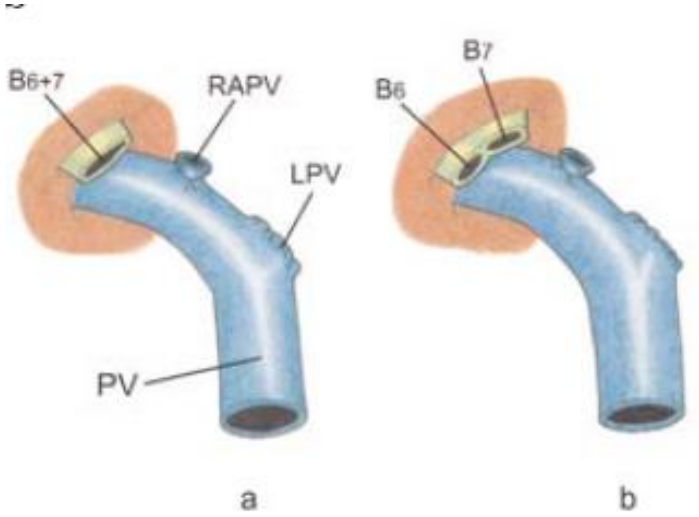
❑ Extended left hepatectomy

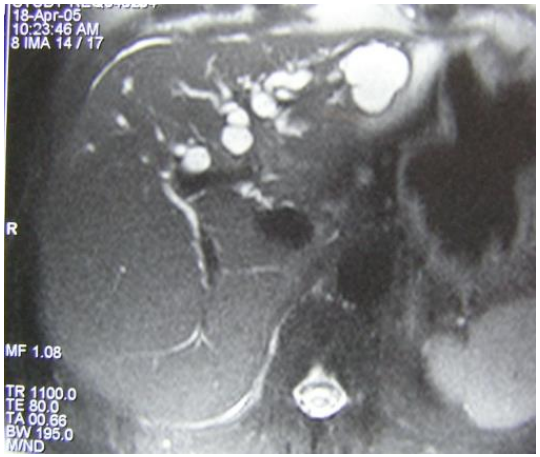




❑ The posterior segmental ducts (B6,B7) may be unique or separated

❑ Extended left hepatectomy

MRI



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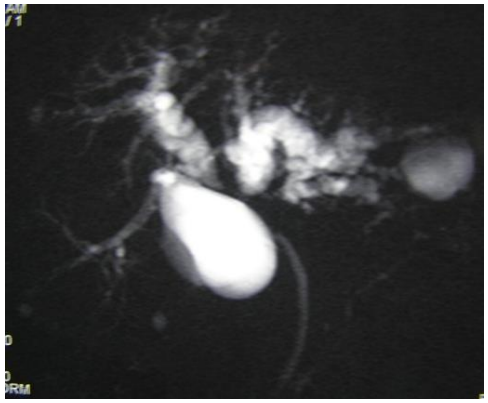
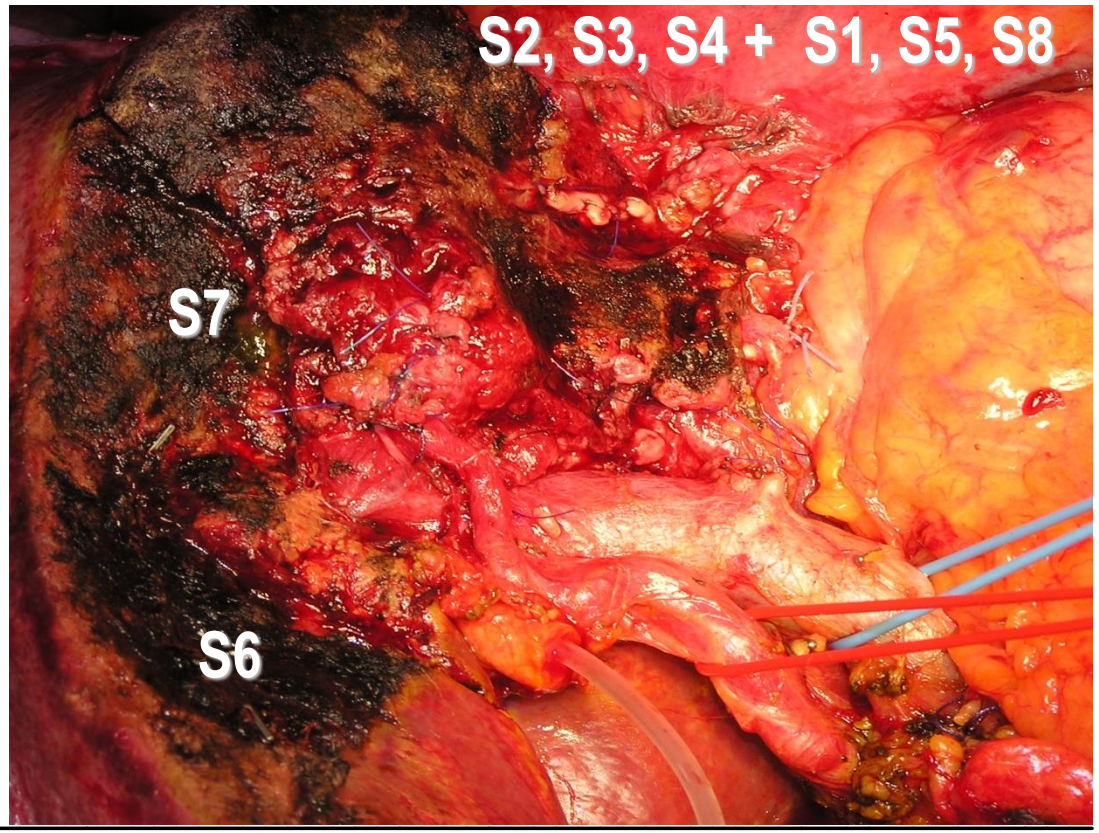
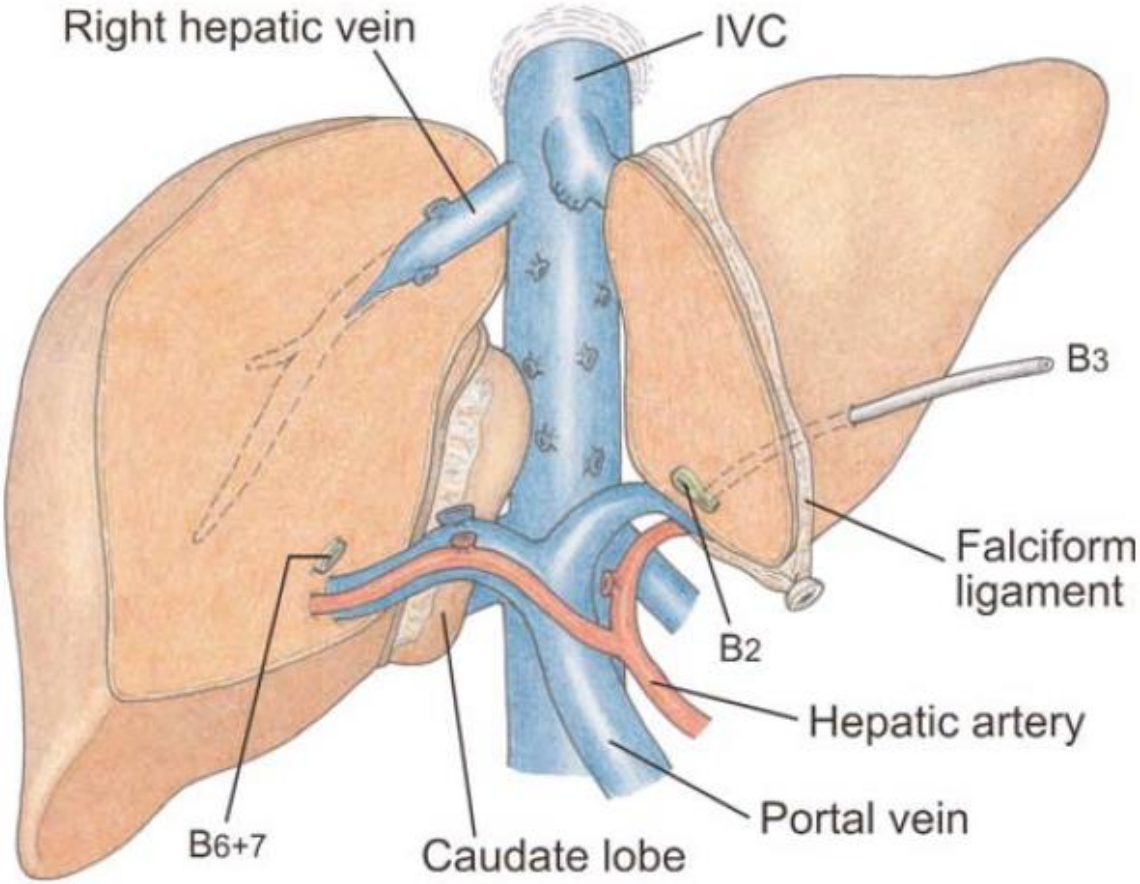
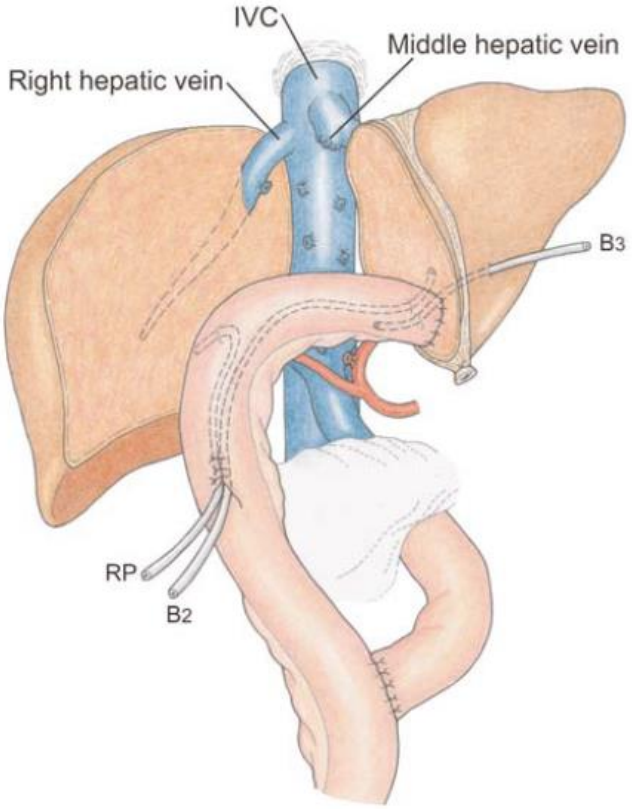


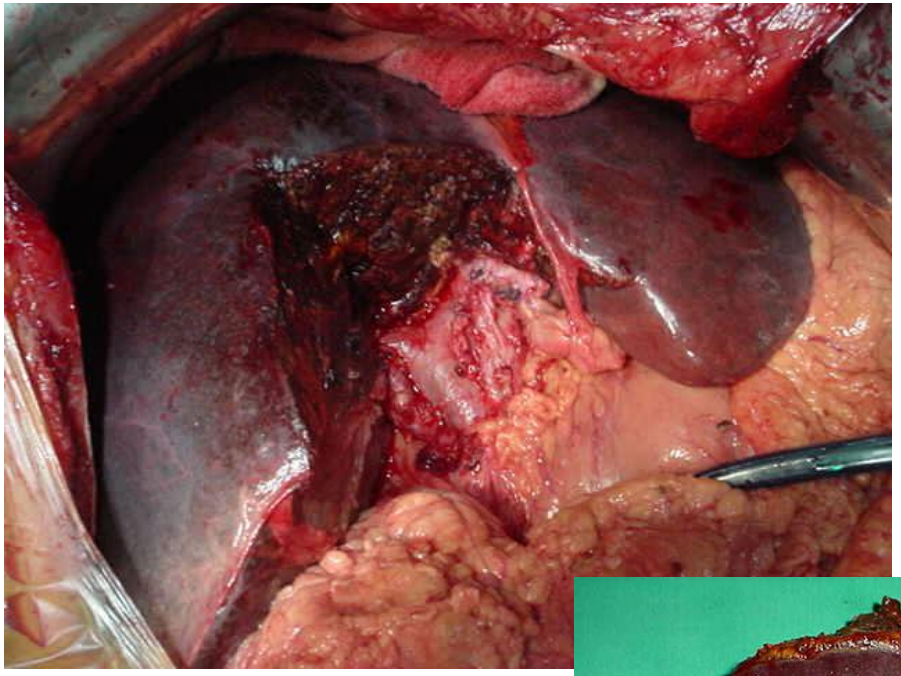


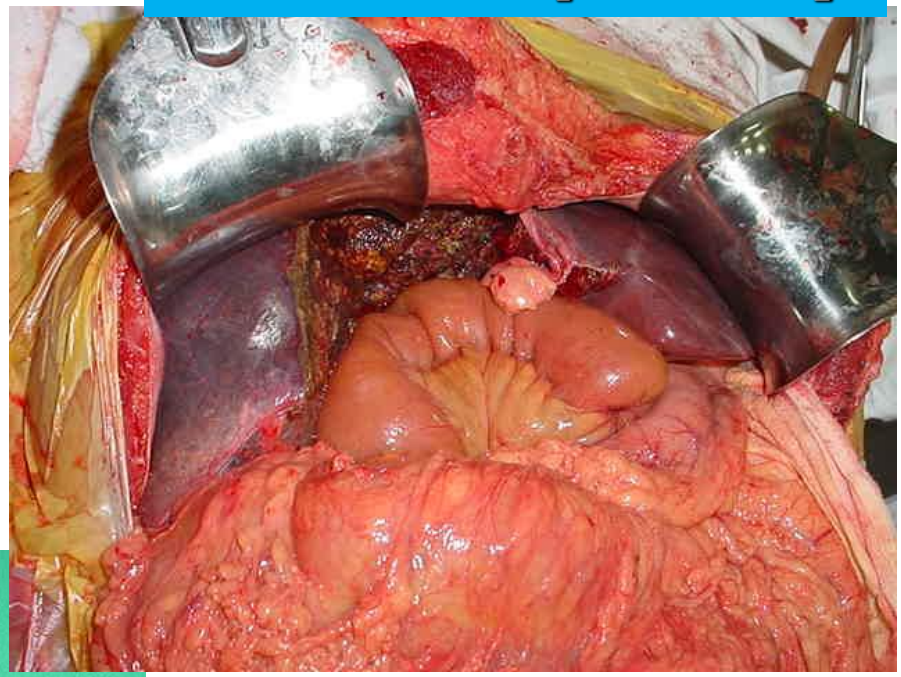
❑ Central hepatectomy





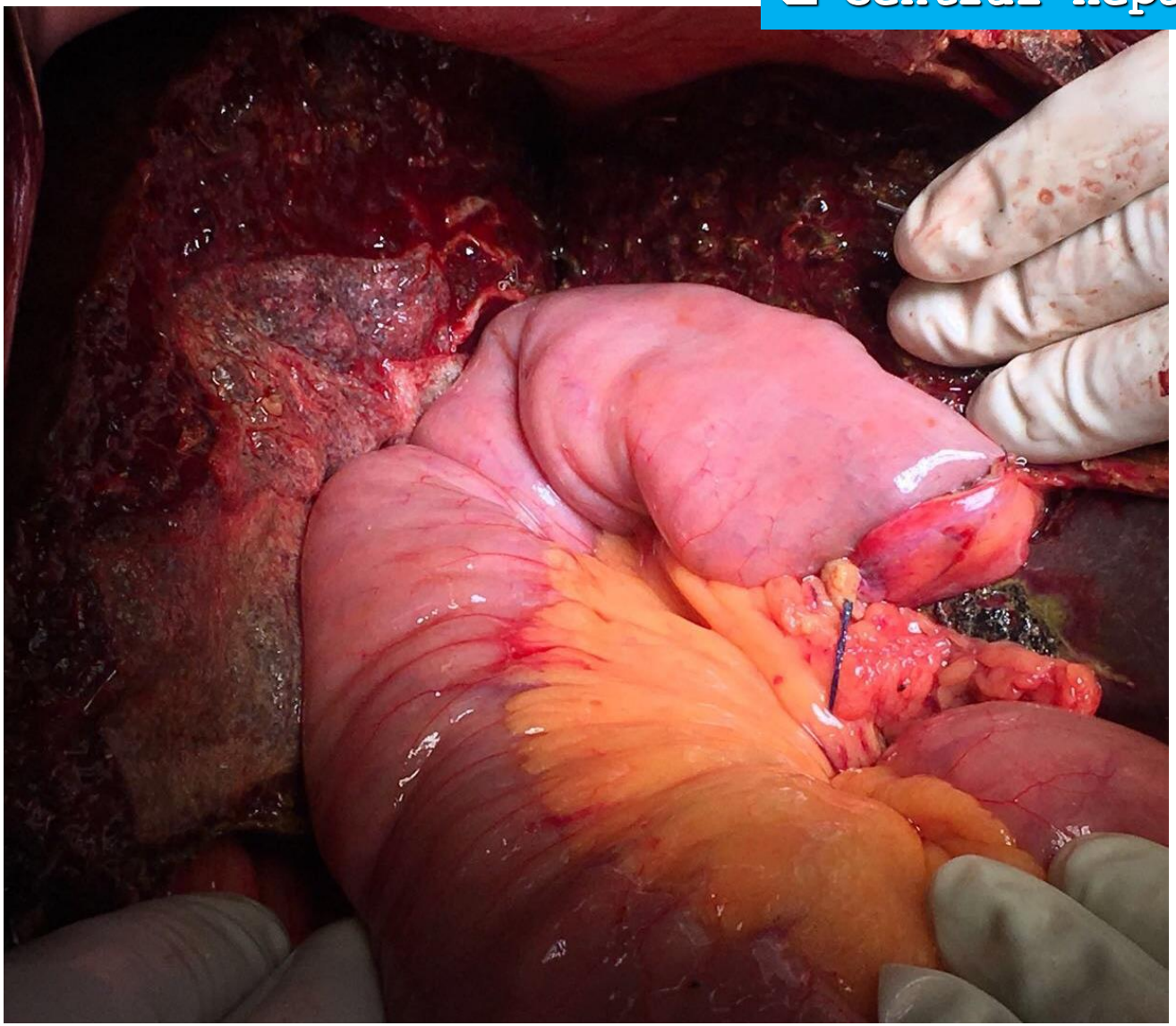
❑ Central hepatectomy

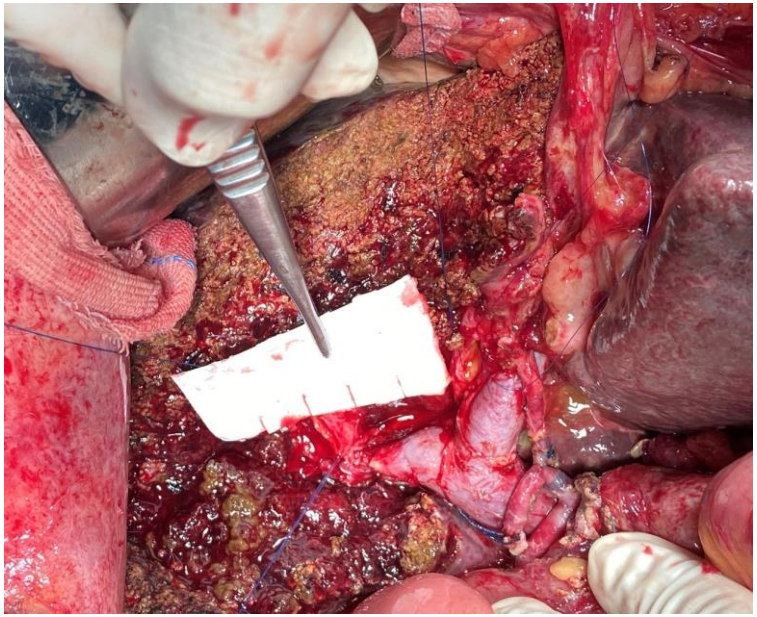


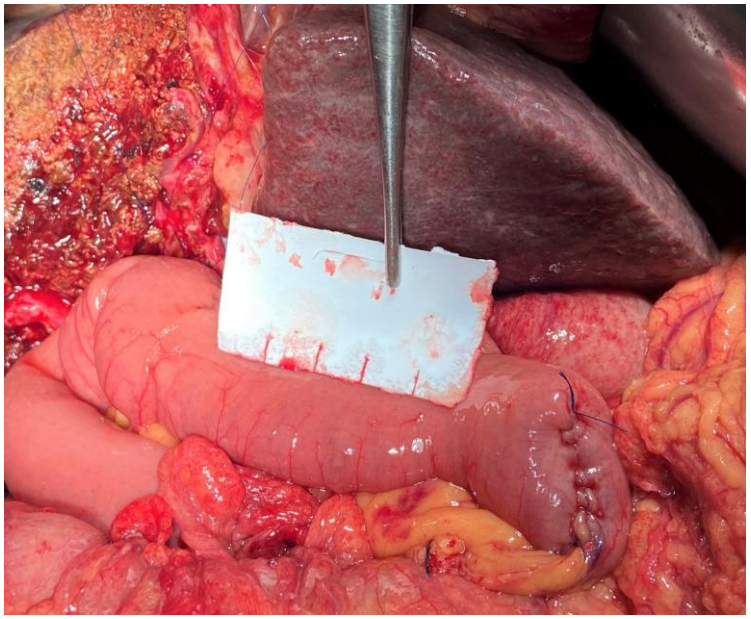


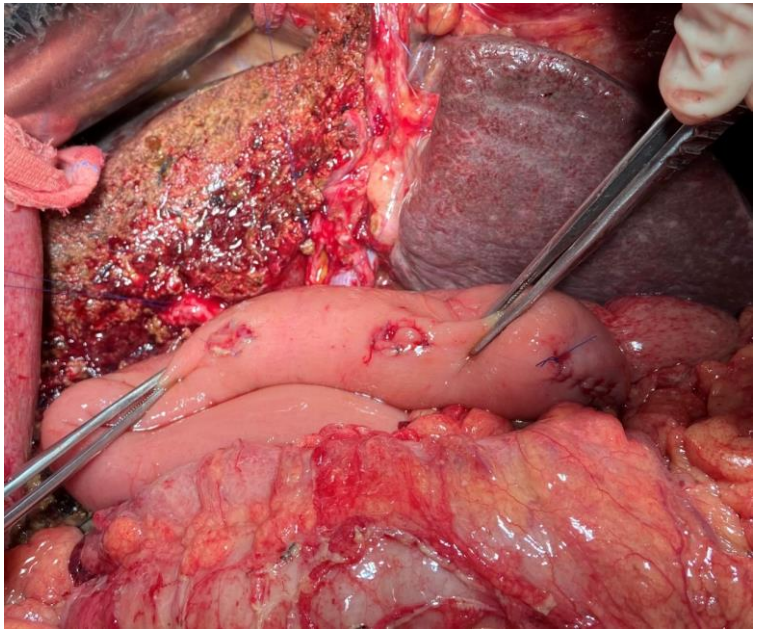
Courtesy: Dr. Eduardo Fernandes (RJ)

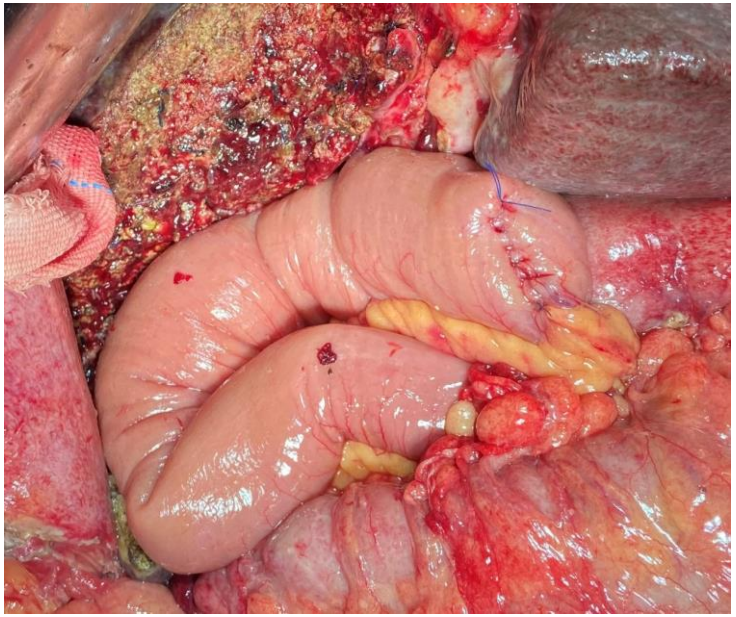
❑ Central hepatectomy

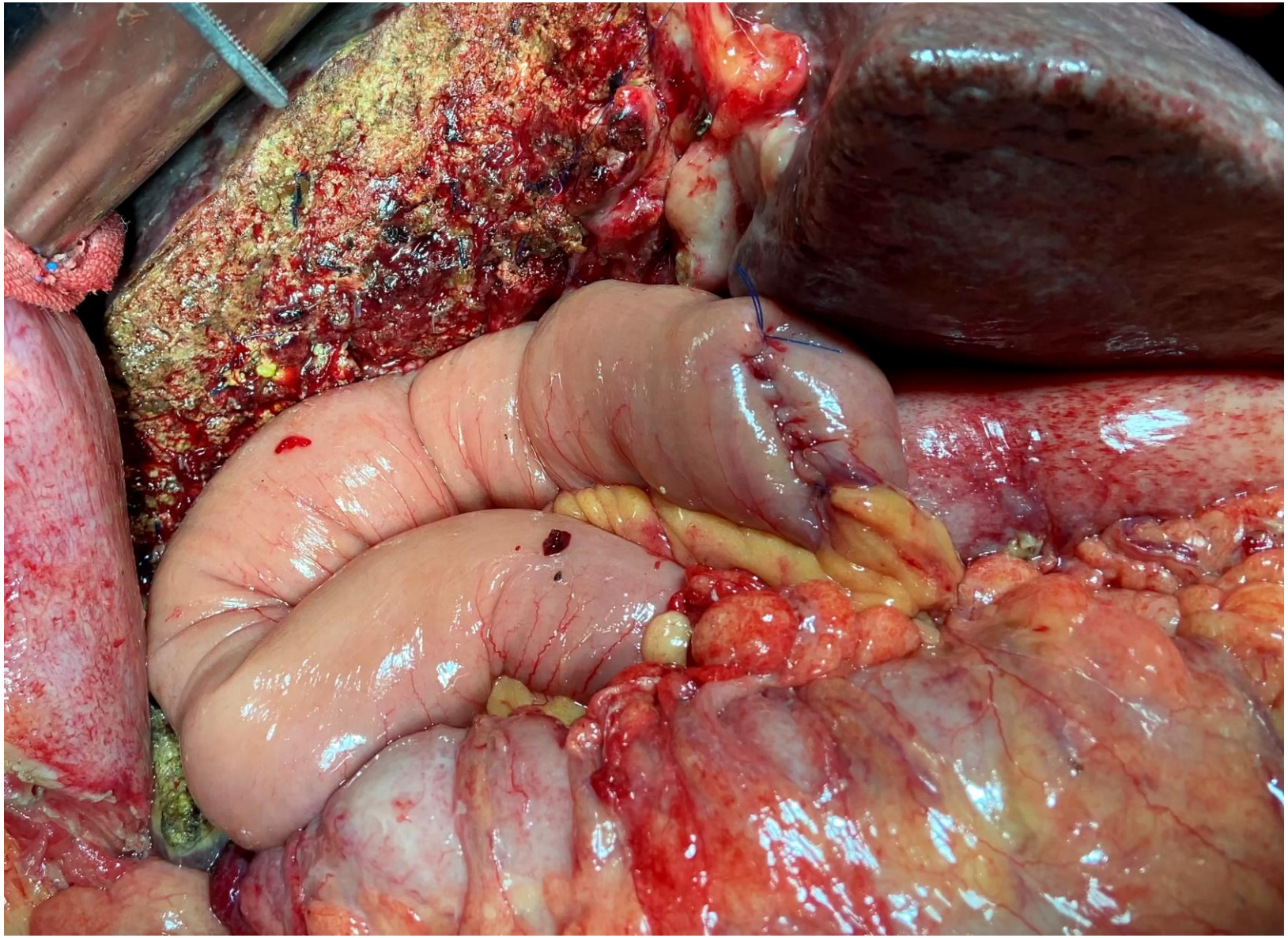




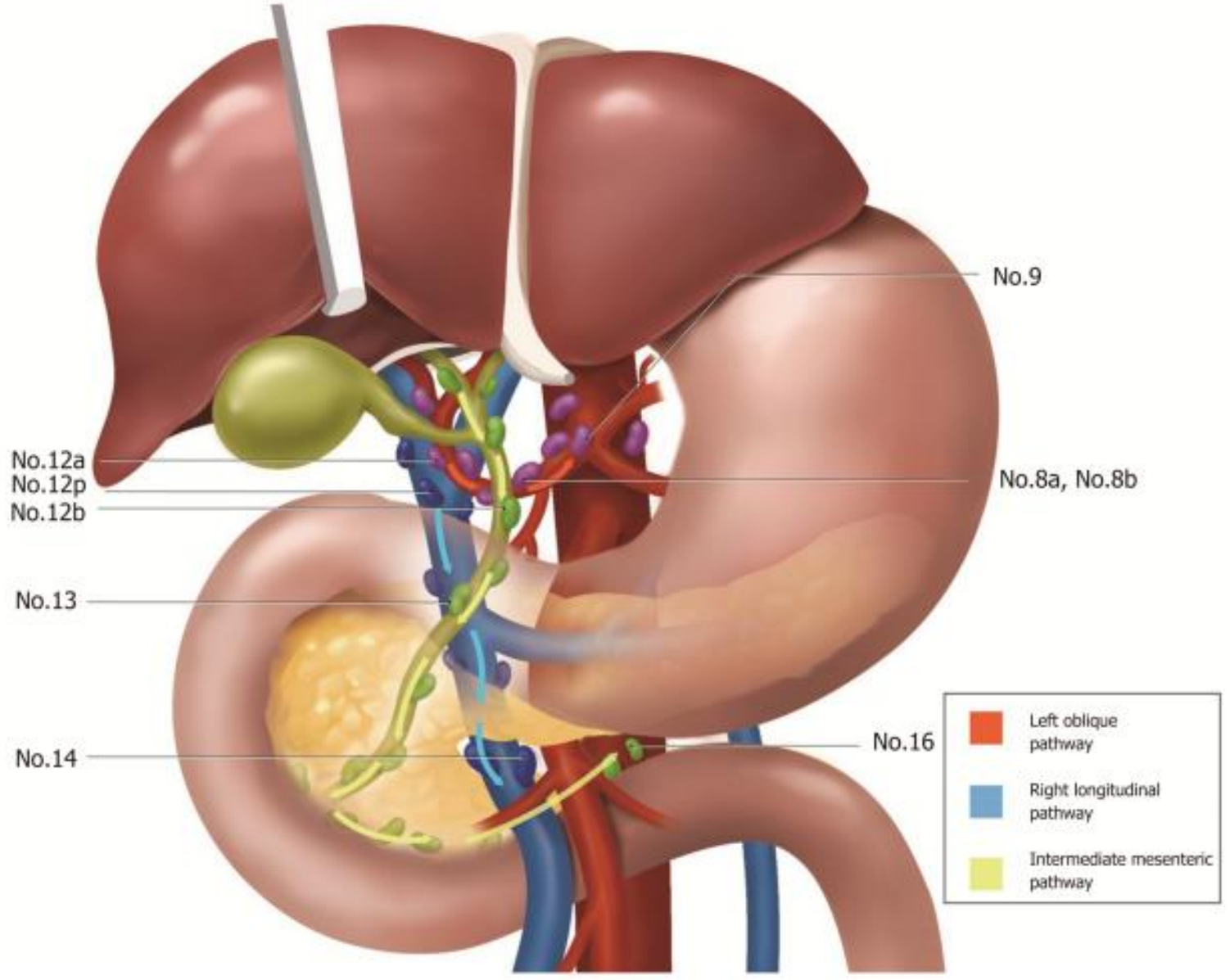








EXTENT OF LYMPH NODE DISSECTION



Li J, et al. World J Gastroenterol 2020

LYMPHADENECTOMY

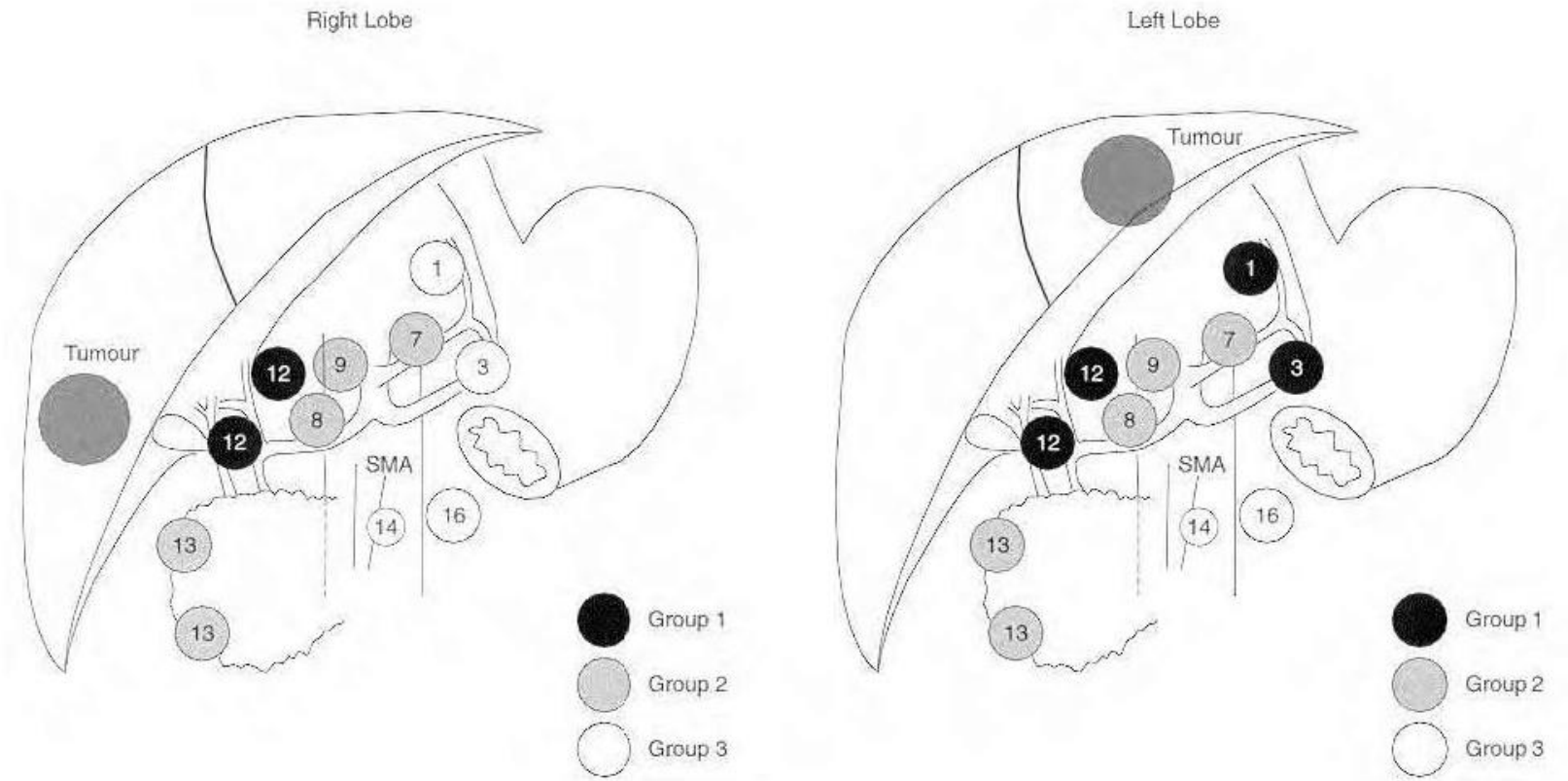


FIGURE 14.4

"Right" and "left" nodal drainage pathways. Nozaki, Y et al. *Cancer* 1998, 83:1923-1929

ANNALS OF SURGERY
Vol. 233, No. 3, 385–392

Lymph Node Metastasis from Hilar Cholangiocarcinoma: Audit of 110 Patients Who Underwent Regional and Paraaortic Node Dissection

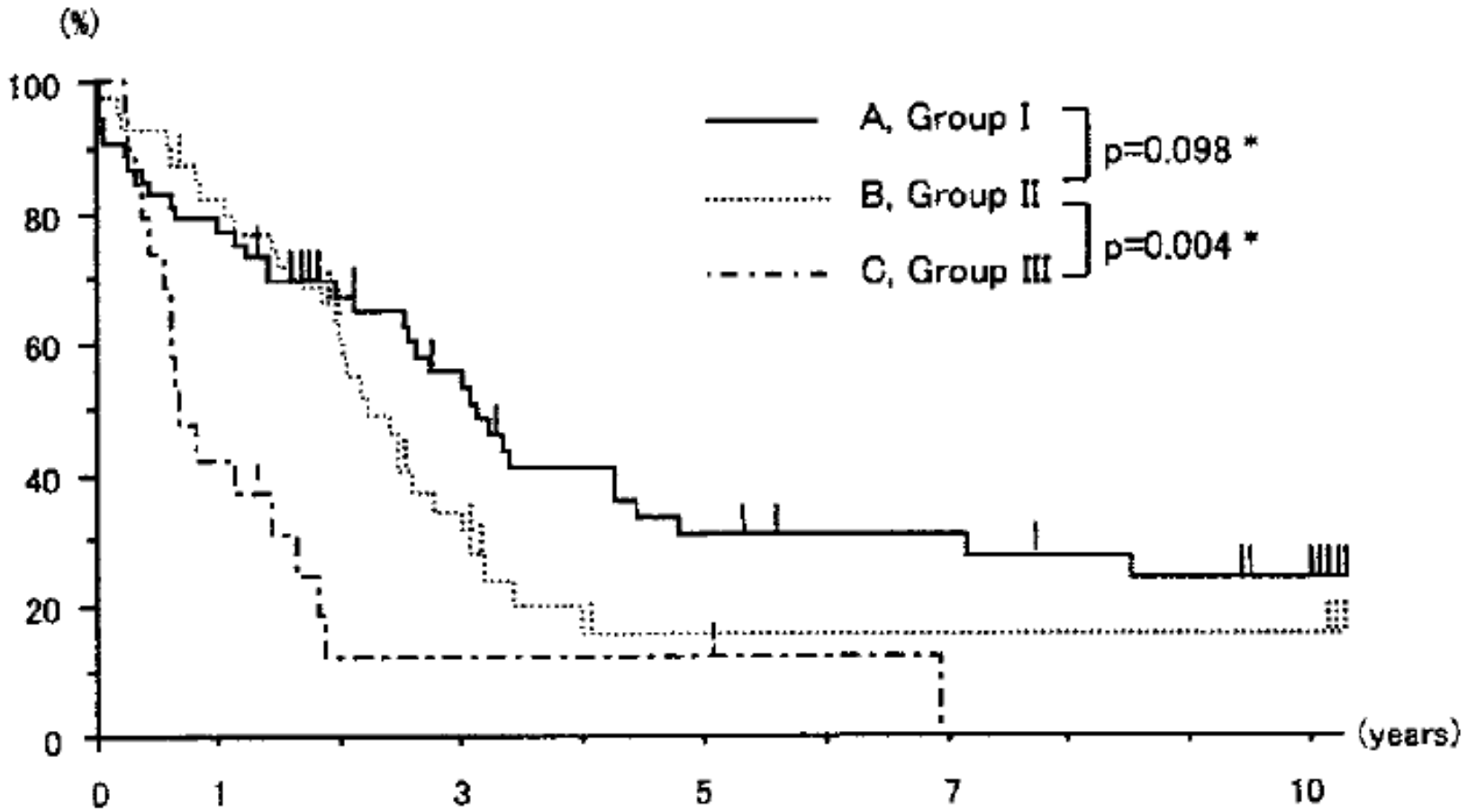
Table 2. DEFINITION OF REGIONAL LYMPH NODE GROUPS

TNM classification	This Study
N1	N1
Hilar	Pericholedochal (No. 12h, 12c, 12b)
Cystic duct	
Pericholedochal	
N2	N2
Periportal	Periportal (No. 12 p, 12a)
Periduodenal	Common hepatic (No. 8a, 8p)
Peripancreatic	Posterior pancreaticoduodenal (No. 13a)
Celiac	Celiac (No. 9)
Superior mesenteric	Superior mesenteric (No. 14)

Numbers in parentheses indicate lymph node group according to the classification by the Japanese Society of Biliary Surgery.

Kitagawa Y, et al. Ann Surg 2001; 233:385-92

LYMPHADENECTOMY



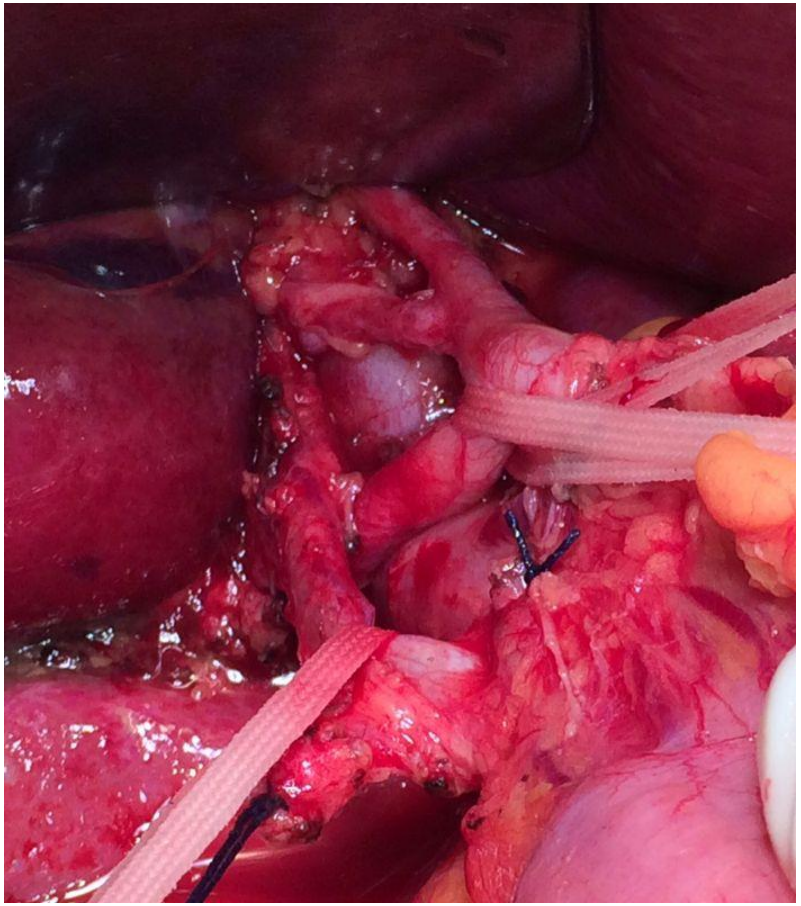
- Group I – No lymph node metastasis
- Group II – Regional lymph node metastasis
- Group III – Paraaortic lymph node metastasis

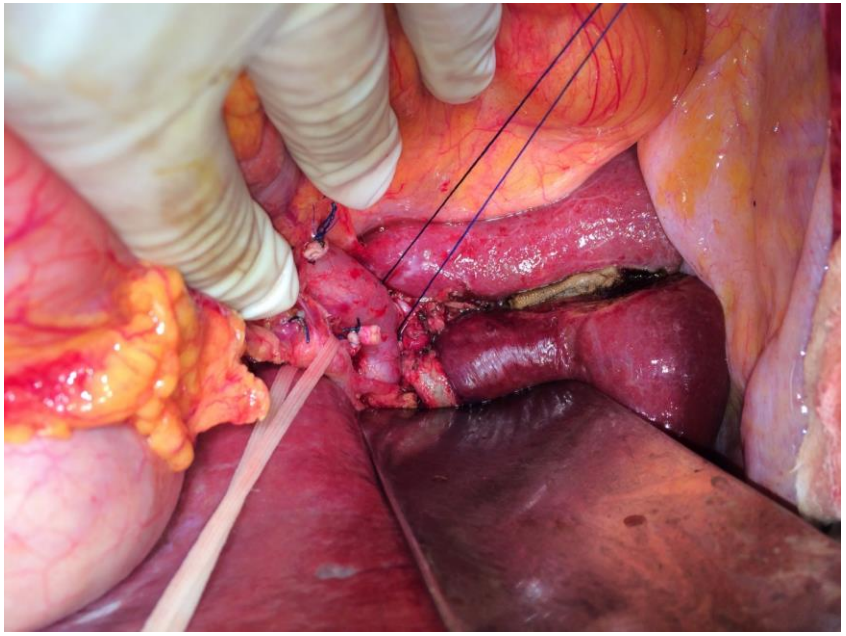
Kitagawa Y, et al. Ann Surg 2001; 233:385-92

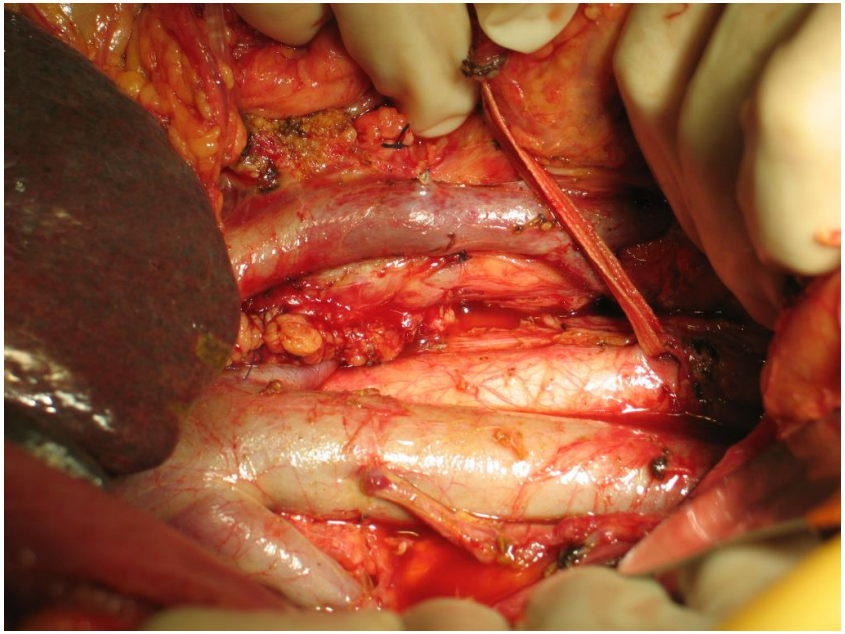
LYMPHADENECTOMY

- Hilar (12h)
- Pericholedochal (12b and 12c)
- Peripancreatic (13a)
- Periportal (12p)
- Commom hepatic artery (8a and 8p)
- Periaortic
  - 2-3 nodes for nodal staging
  - Node dissection has no impact on survival

Nagino M, et al. Ann Surg 2013;258: 129–40

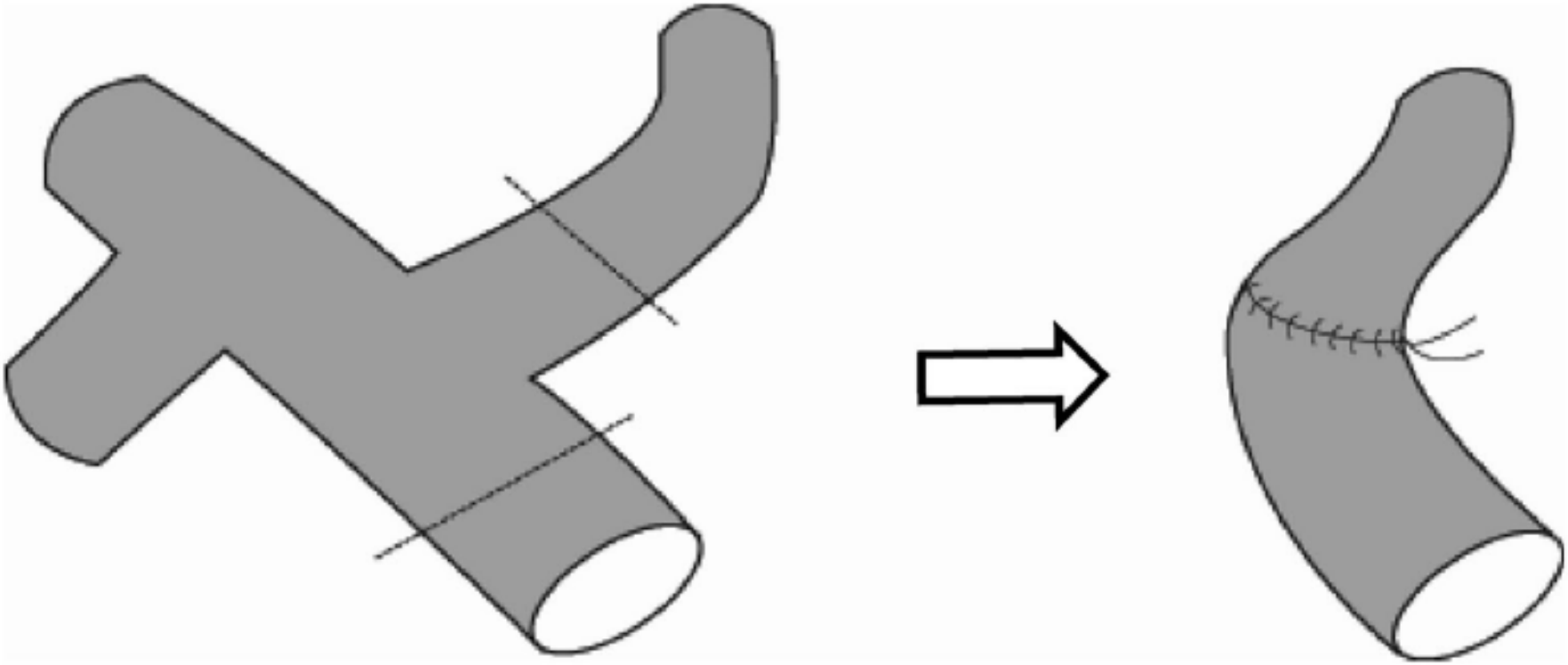




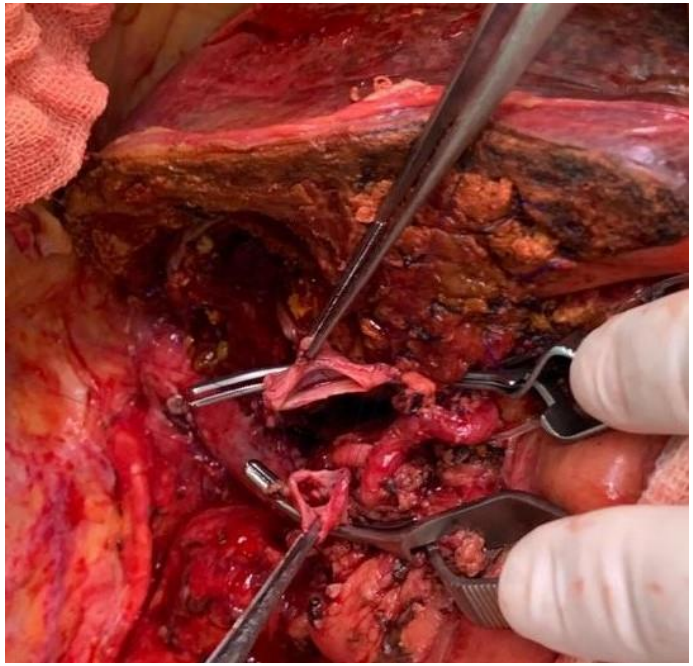


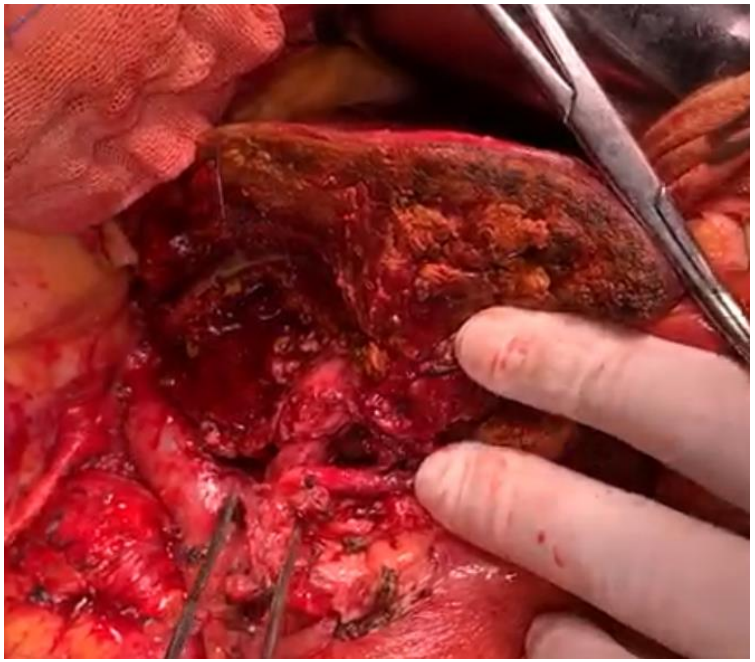
PORTAL VEIN INVOLVEMENT

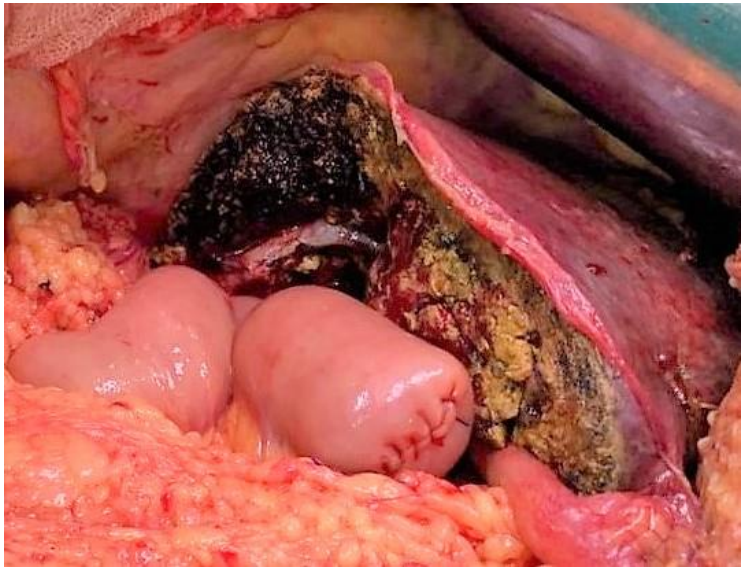
- Right hepatectomy and portal vein resection

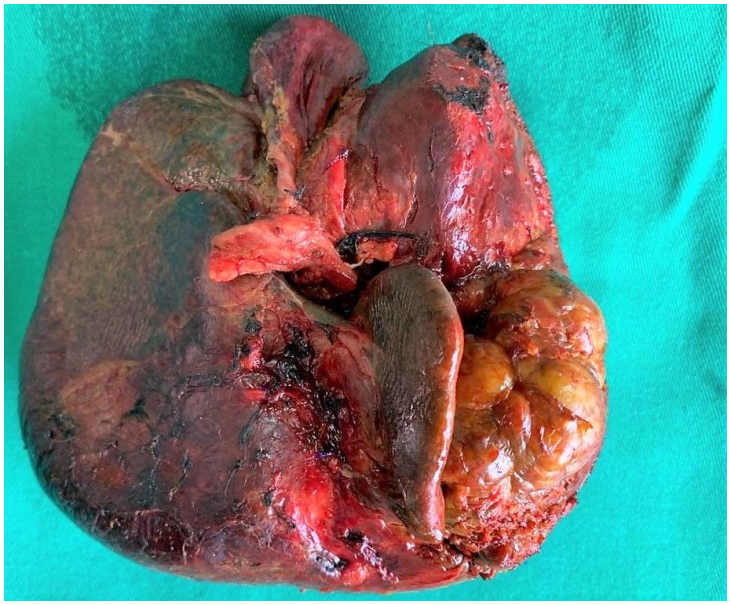


Nagino M, et al. Ann Surg 2010;252: 115–23



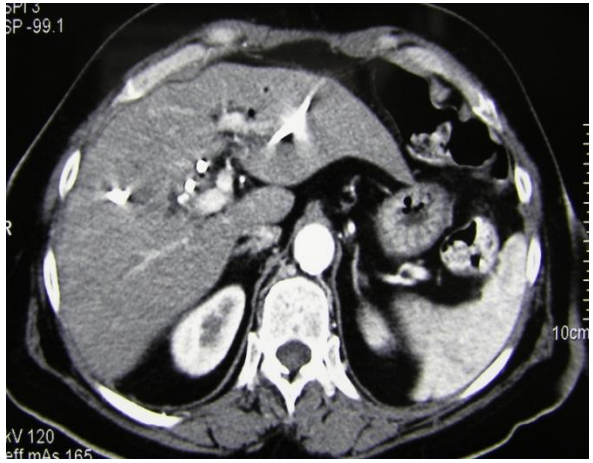


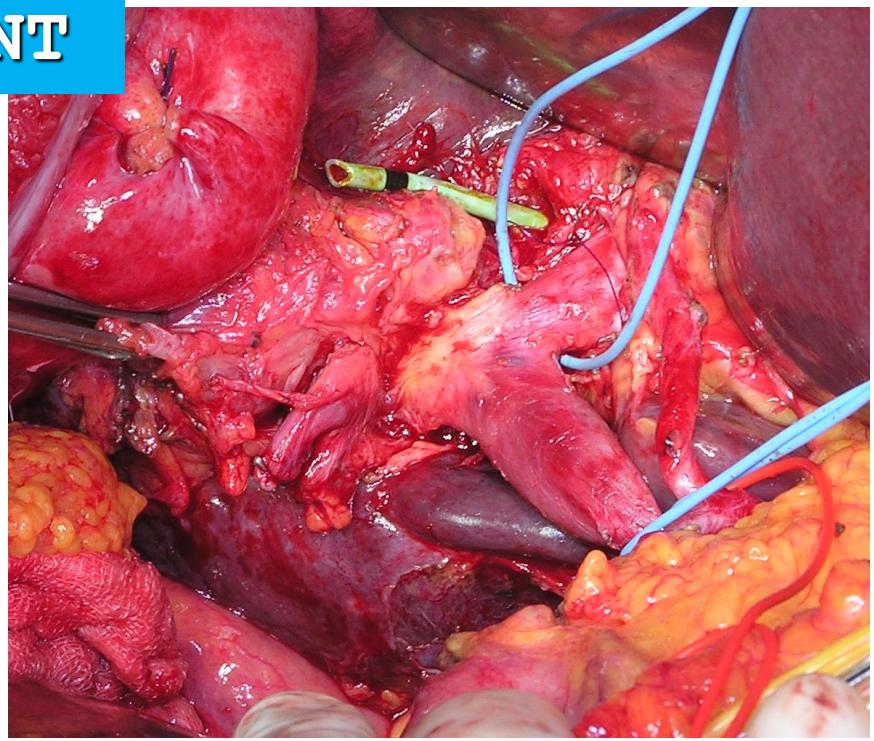


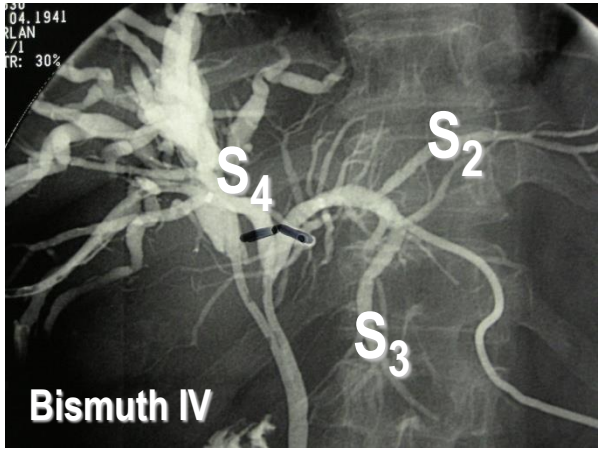


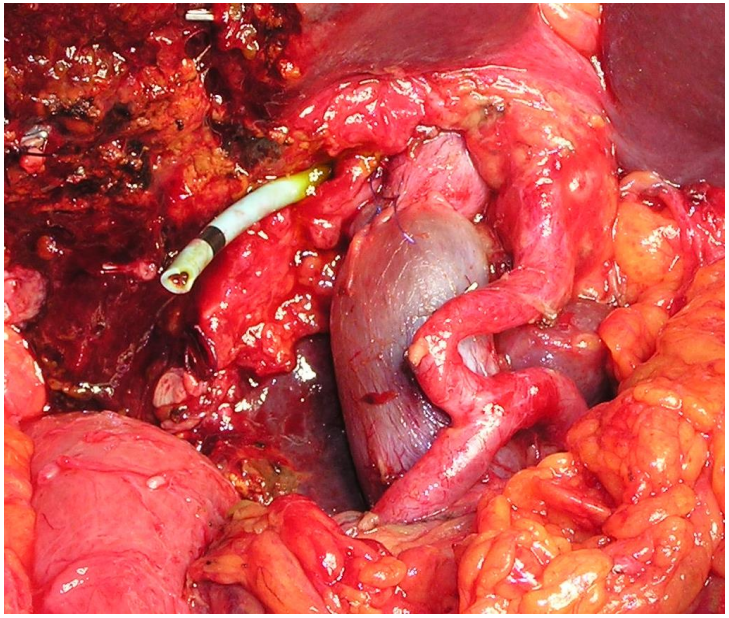
PORTAL VEIN INVOLVEMENT

- Right hepatectomy
- Portal vein resection



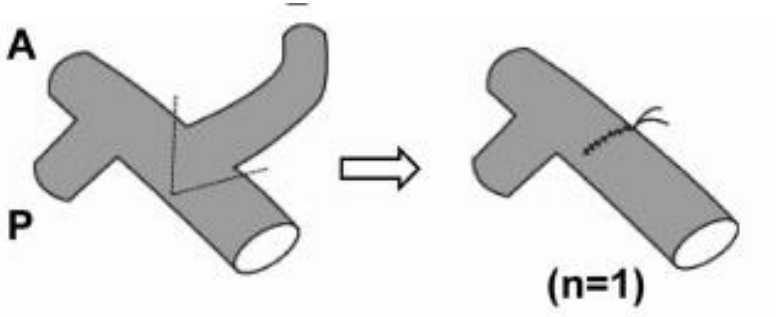


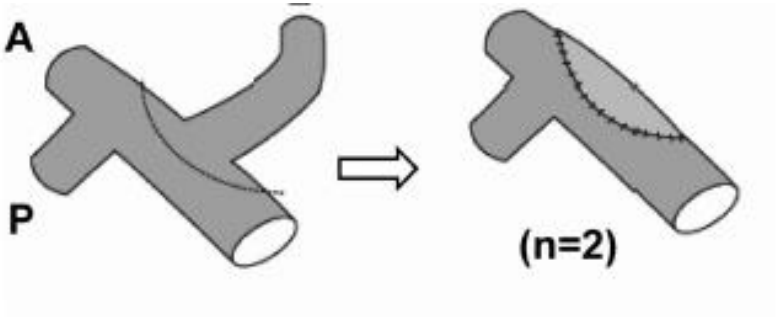


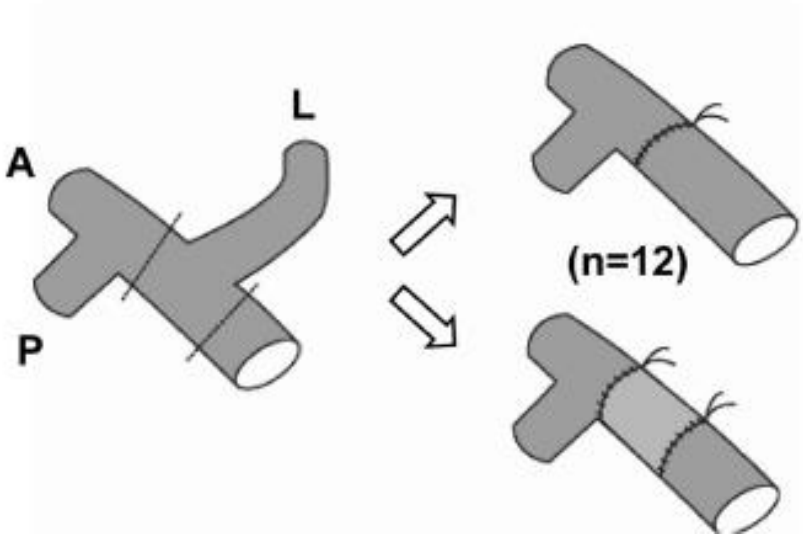


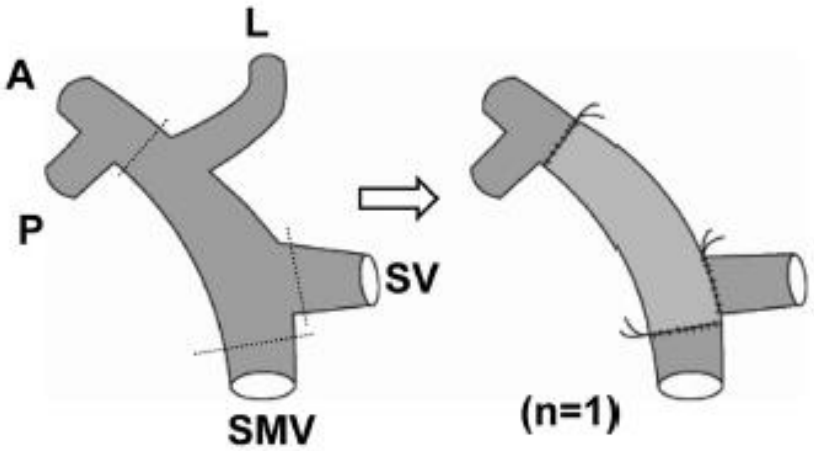
PORTAL VEIN INVOLVEMENT

- Left hepatectomy and portal vein resection





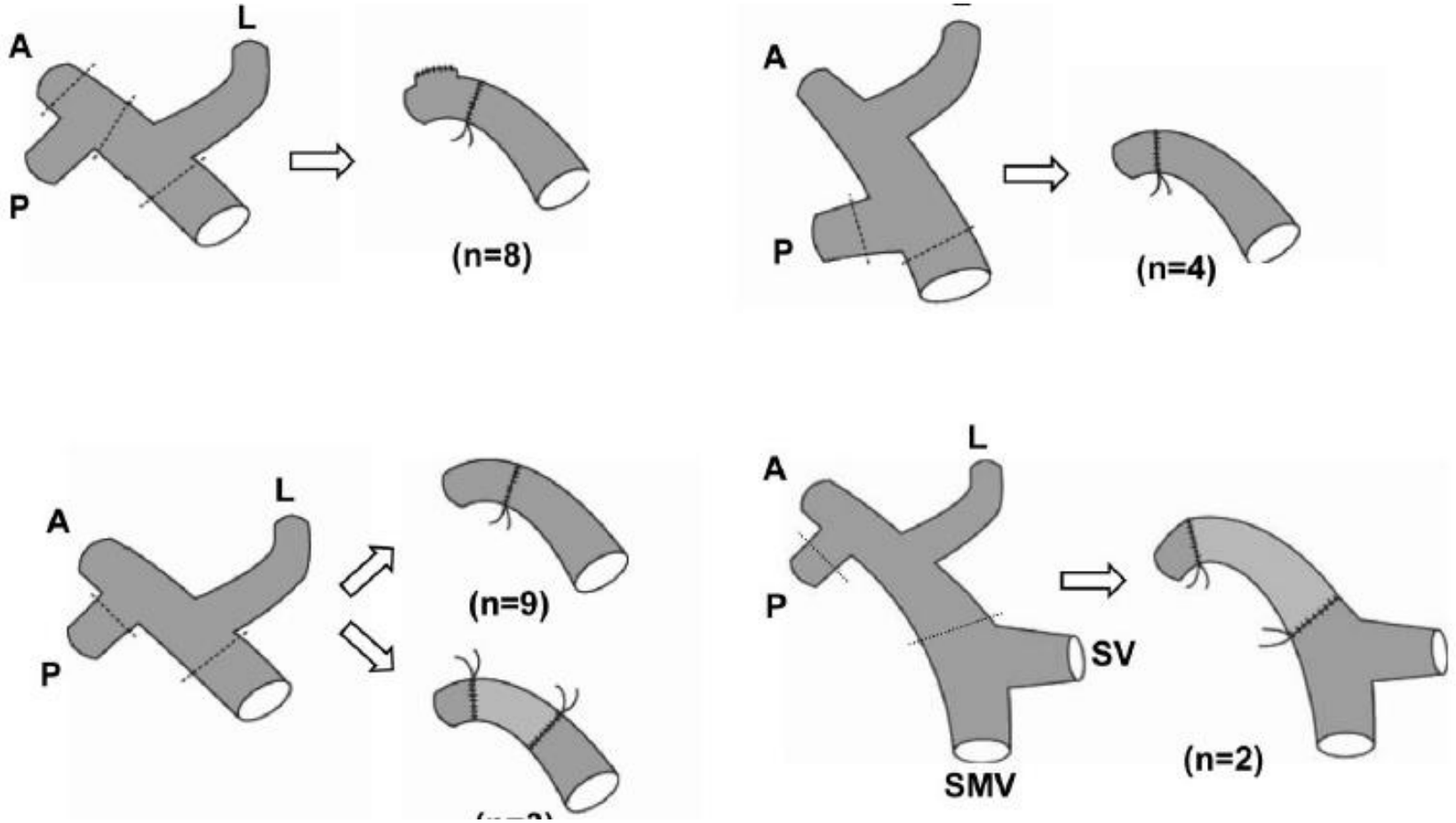




Nagino M, et al. Ann Surg 2010;252: 115–23

PORTAL VEIN INVOLVEMENT

- Left trisectionectomy and portal vein resection



Nagino M, et al. Ann Surg 2010;252: 115–23

HILAR CHOLANGIOCARCINOMA

- Liver transplant
- ALPPS
- Chemotherapy

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