

# MANAGEMENT OF HILAR CHOLANGIOCARCINOMA

Johannesburg 2018

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Department of Gastrointestinal Surgery  
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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
Clay-colored stools.....	+	*	+	+	+	*	+	+	+	+	+	+	*	0

# RISK FACTORS

## Established risk factors

Primary sclerosing cholangitis

Hepatobiliary parasites (O viverrini, C sinensis)

Hepatolithiasis

Caroli's disease

Choledochal cysts (types I and IV)

Thorotrast

## Possible risk factors

Cirrhosis

HBV

HCV

Diabetes mellitus

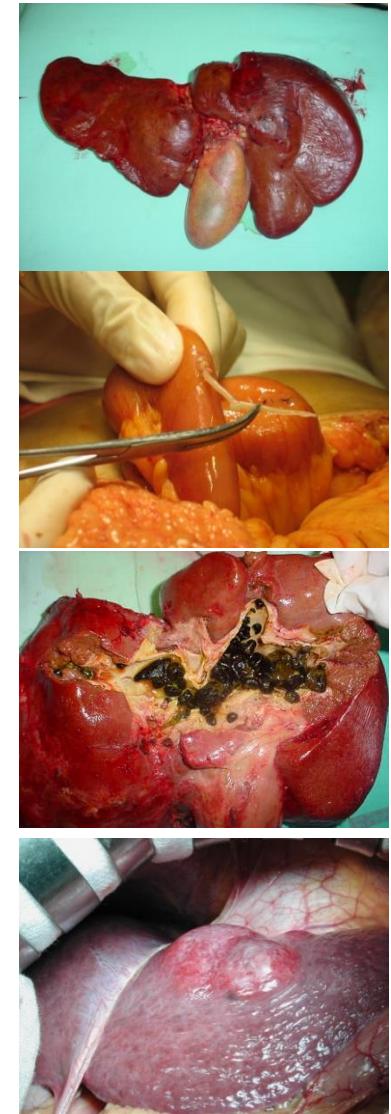
Obesity

Chronic alcohol use (> 80g/day)

Tobacco

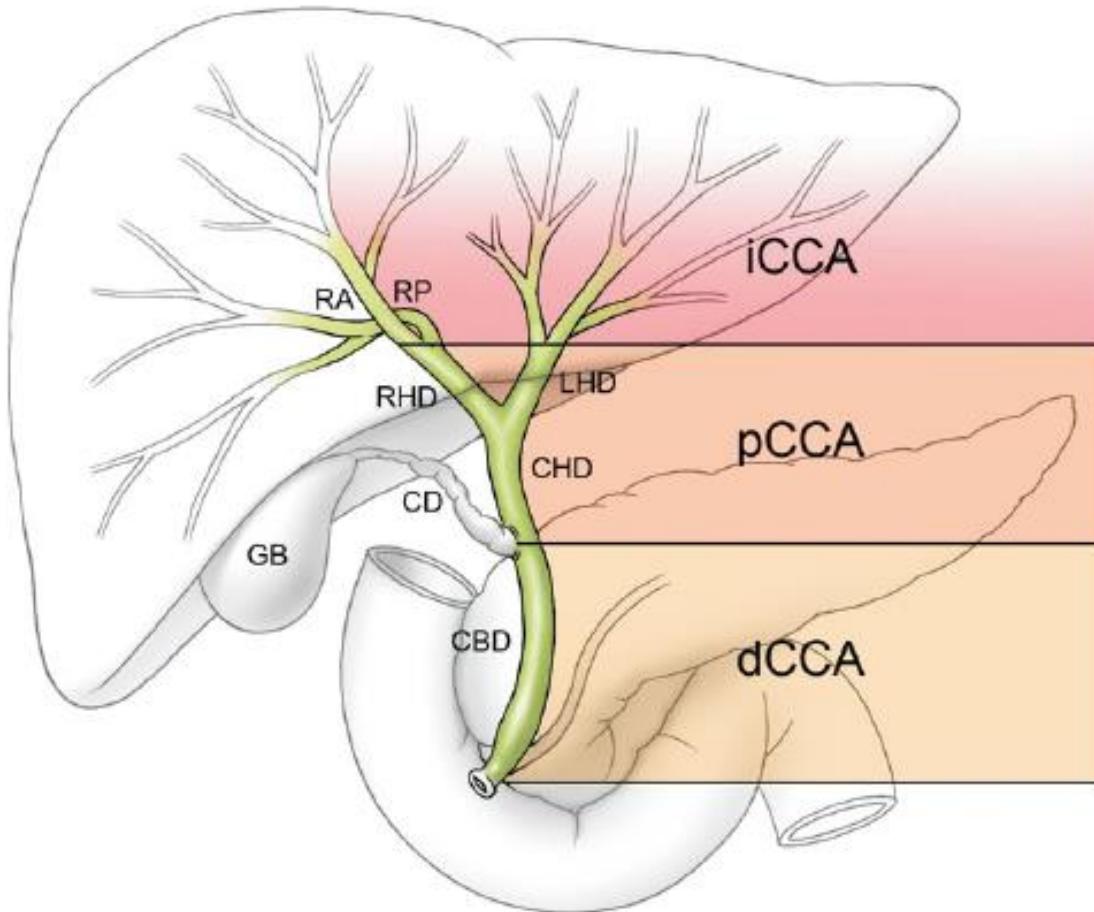
Biliary enteric drainage procedures

Toxins



# CHOLANGIOCARCINOMA

## Anatomic location



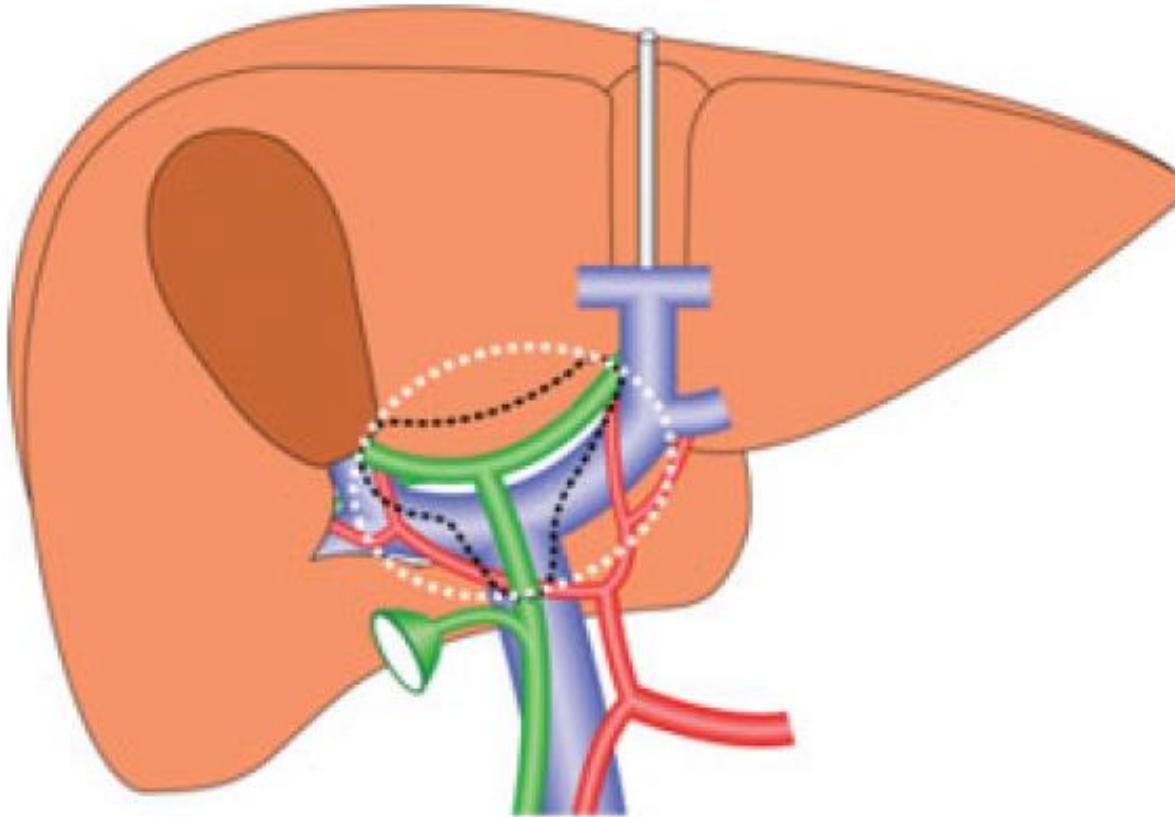
Intrahepatic 10%

Perihilar 70%

Distal (Extrahepatic) 20%

- . Second order biliary ducts
- . Site of cystic duct origin

# 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).

# CLASSIFICATION

Bismuth and Corlette (1975)

Type I



Type II



Type III a



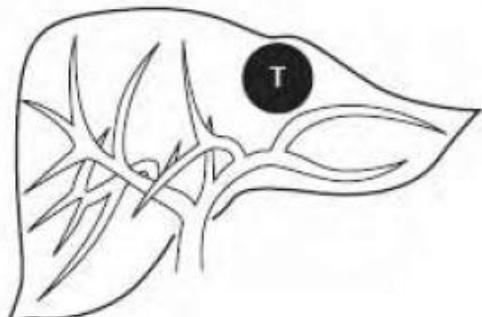
Type III b



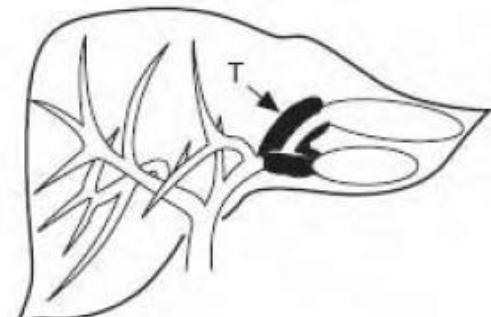
Type IV



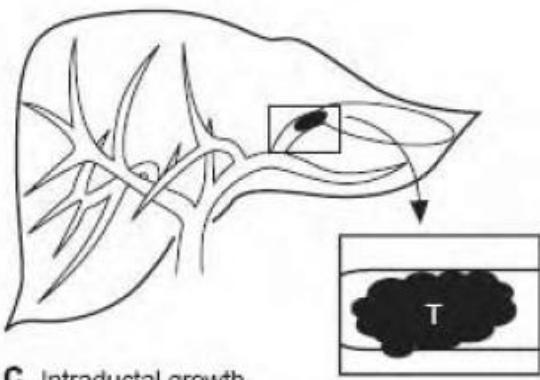
# CLASSIFICATION



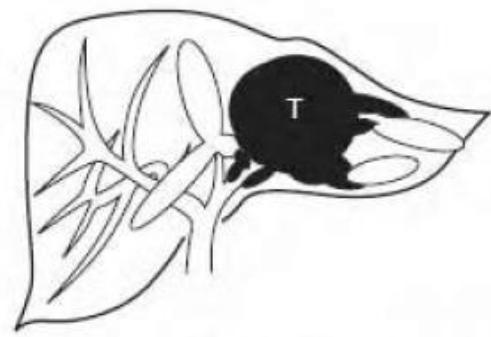
a Mass forming



b Periductal infiltrating



c Intraductal growth



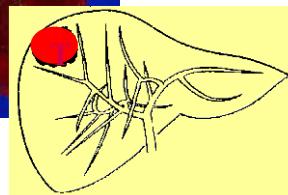
d Mass forming and periductal infiltrating

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

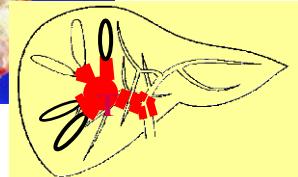
# CLASSIFICATION

Mass-forming (MF) type

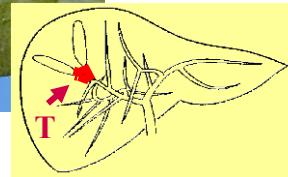
Mass-forming (MF) type



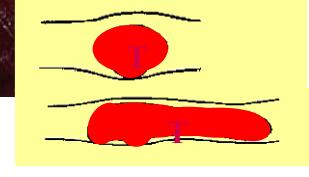
Mass-forming+periductal-infiltrating (MF+PI) type



Periductal-infiltrating (PI) type

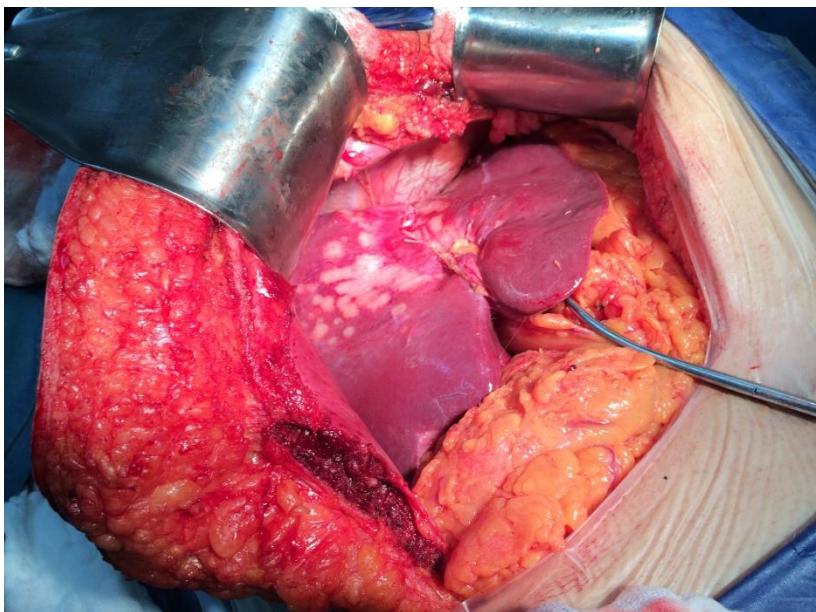


Intraductal growth (IG) type



# CLASSIFICATION

Mass forming



# ALTERNATIVE DIAGNOSES

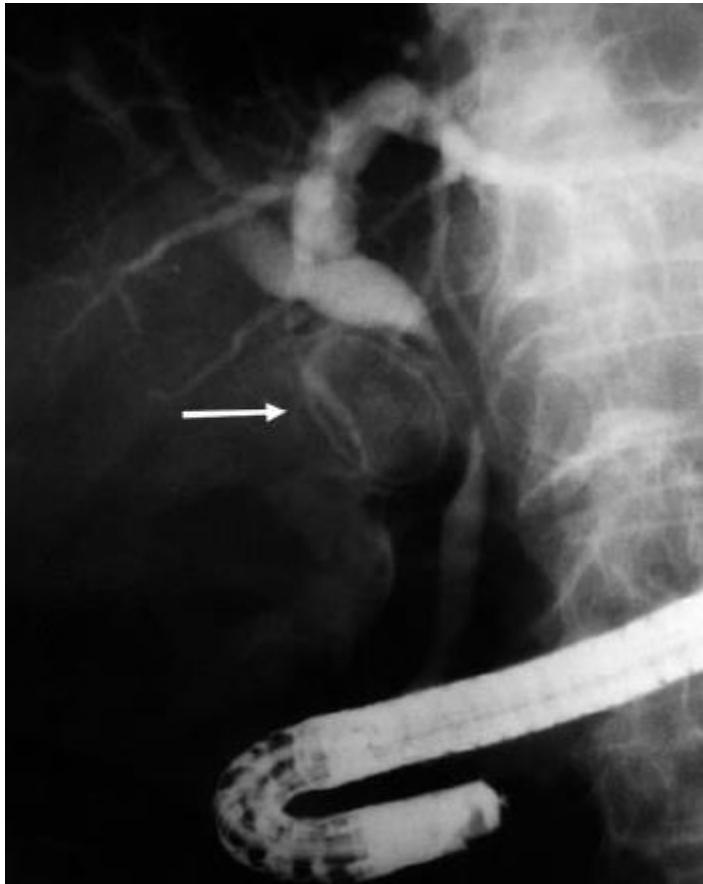
- Gallbladder carcinoma



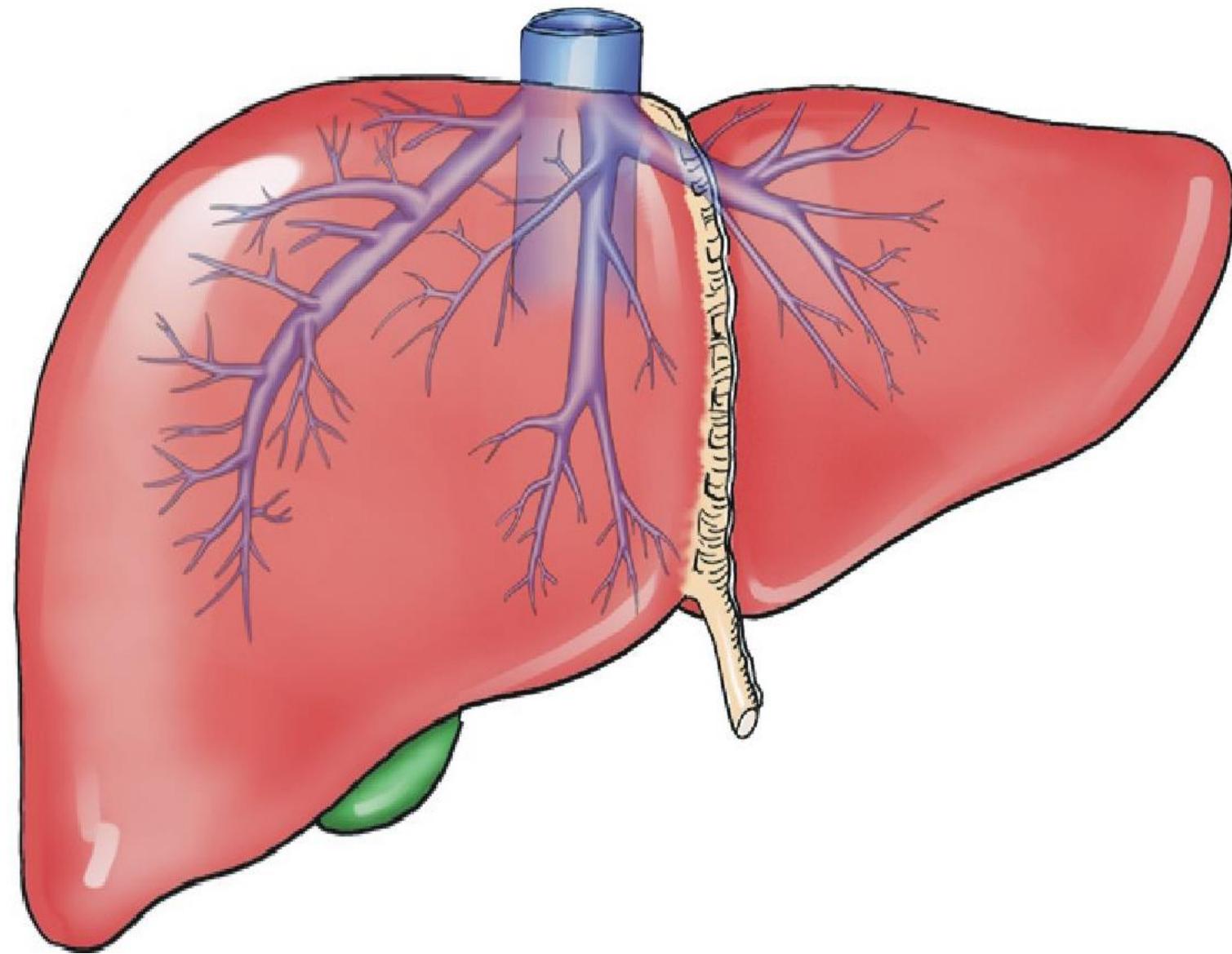
- Distended gallbladder (GC)
- Shrunken gallbladder (CC)

# ALTERNATIVE DIAGNOSES

## □ Mirizzi syndrome

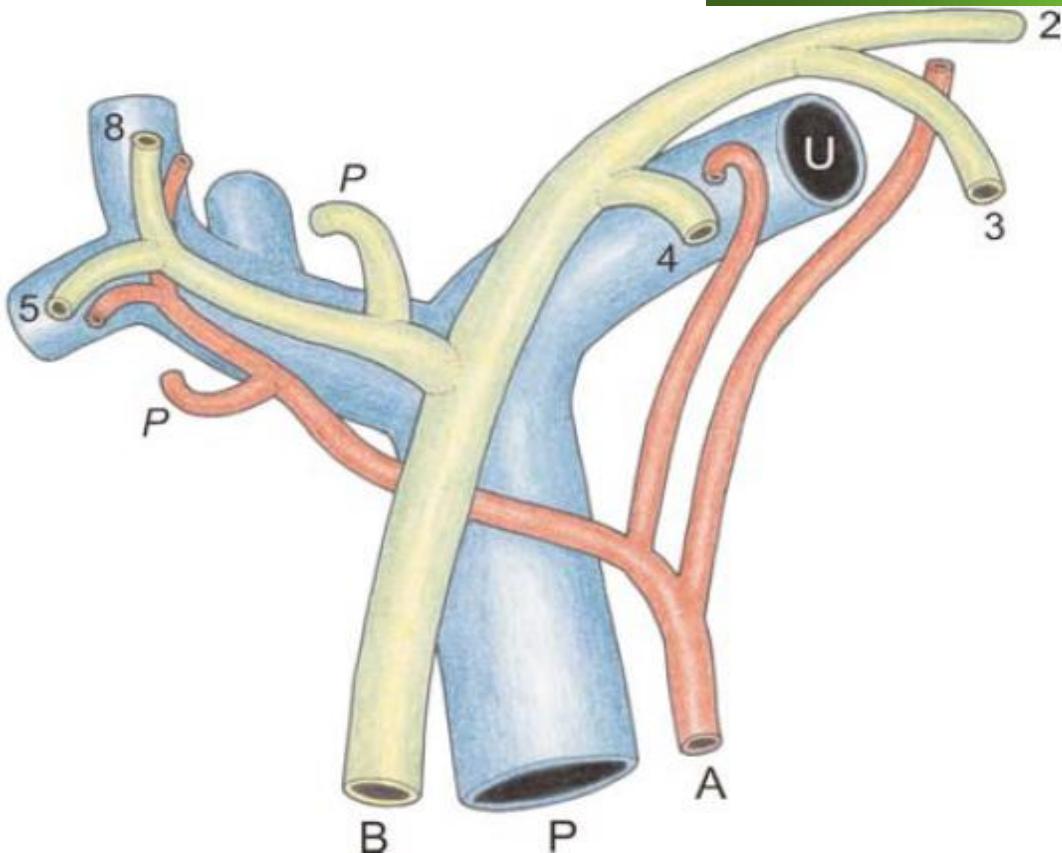


# ANATOMY



# ANATOMIC CONSIDERATIONS

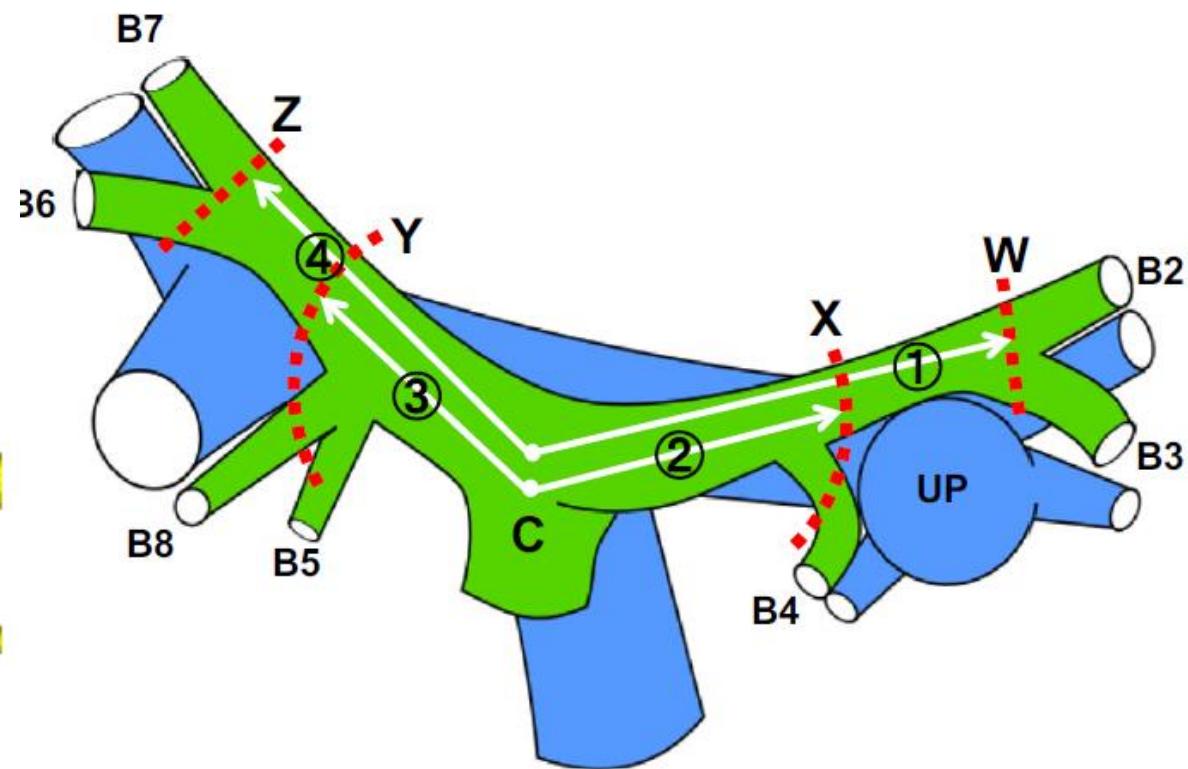
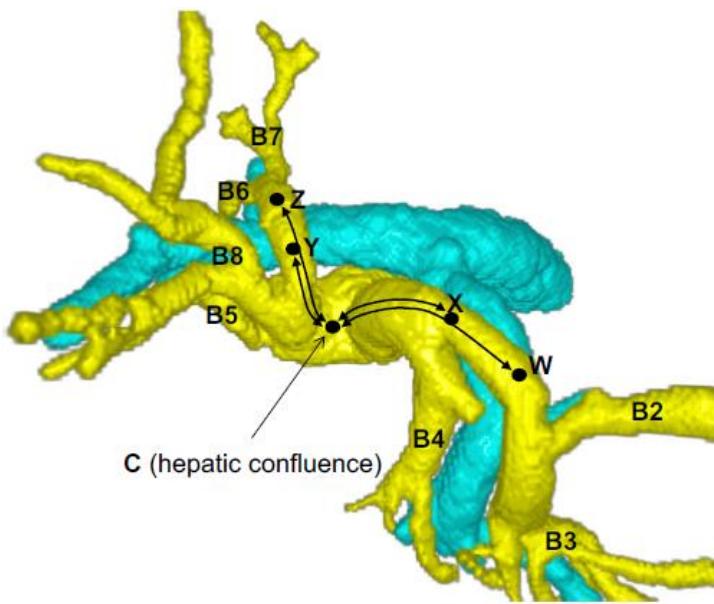
- Right hemihepatectomy
- Right hepatic trisectionectomy



U – umbilical portion  
P – posterior branch

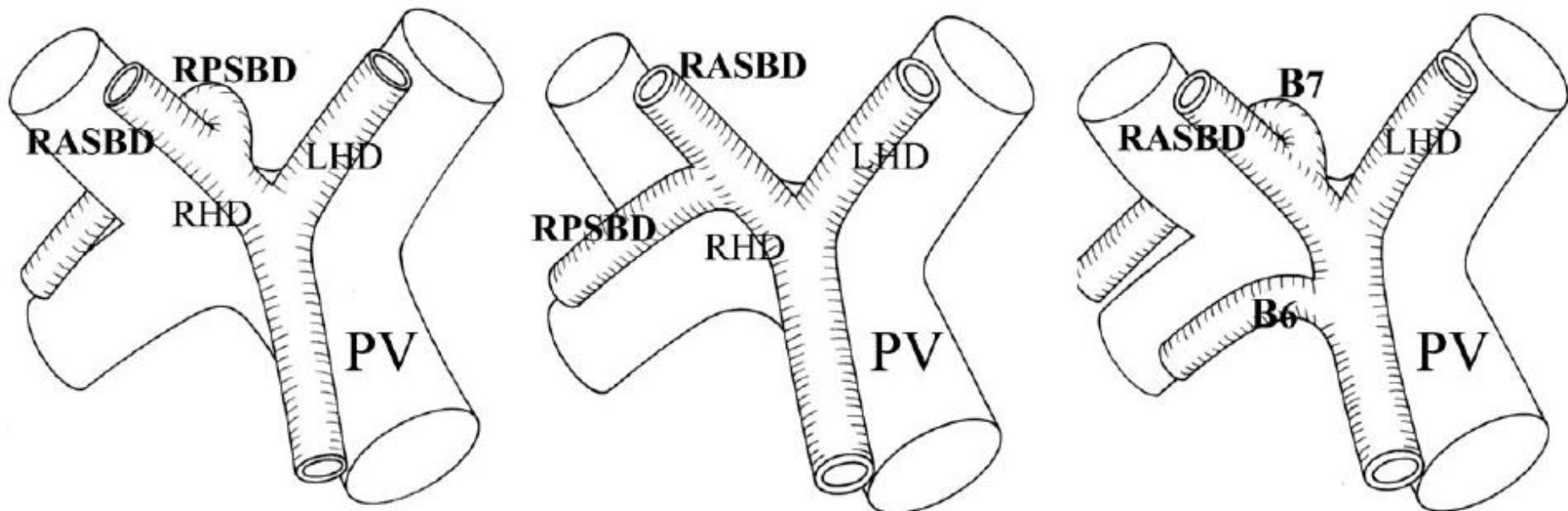
- The extrahepatic portion of the left hepatic duct is longer than that of the right hepatic duct.
- The right hepatic artery passes behind the common hepatic duct (often involved).
- Systematic caudate lobectomy can be performed more securely and easily.

# ANATOMIC CONSIDERATIONS



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

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



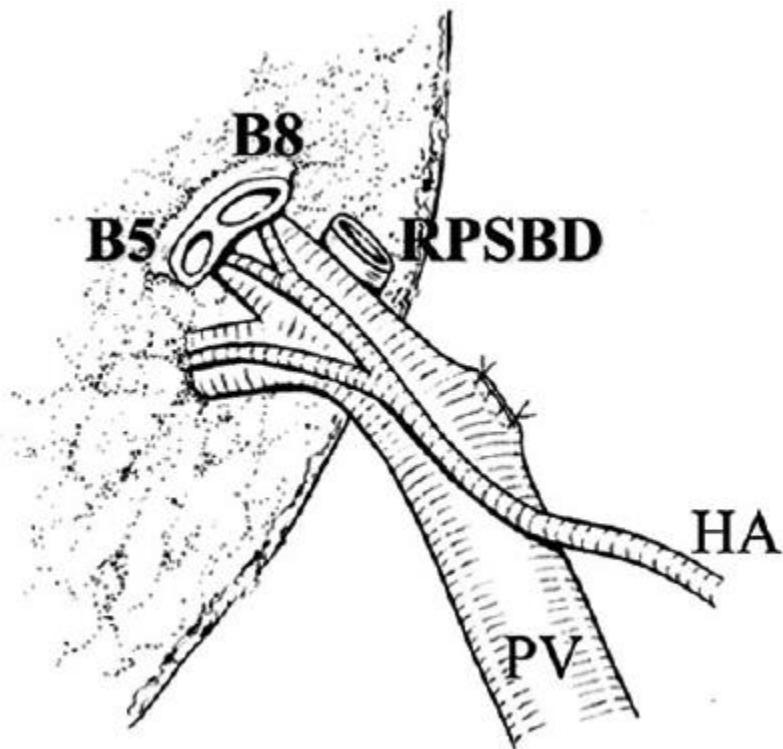
**A: Supraportal type**

**B: Infraportal type**

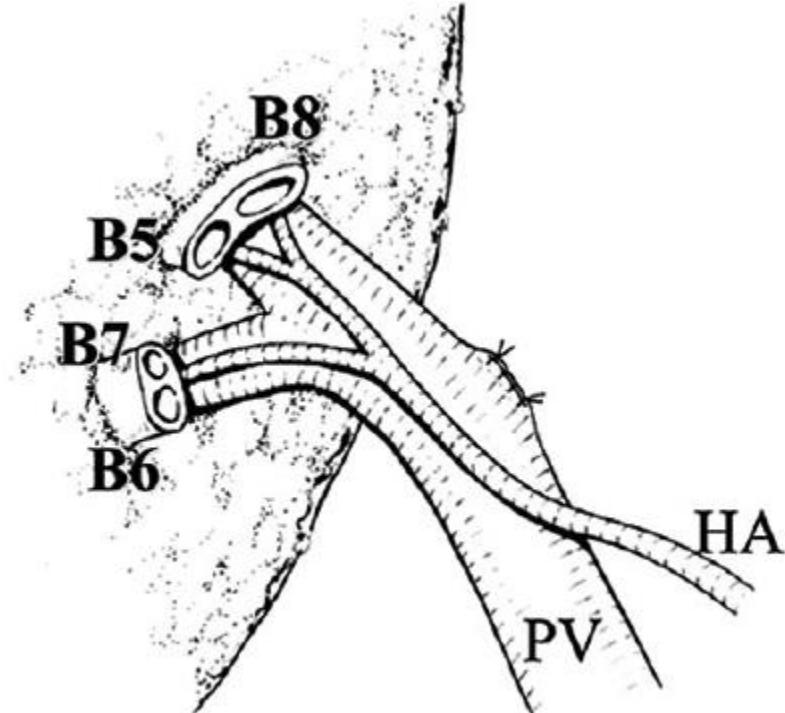
**C: Combined type**

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

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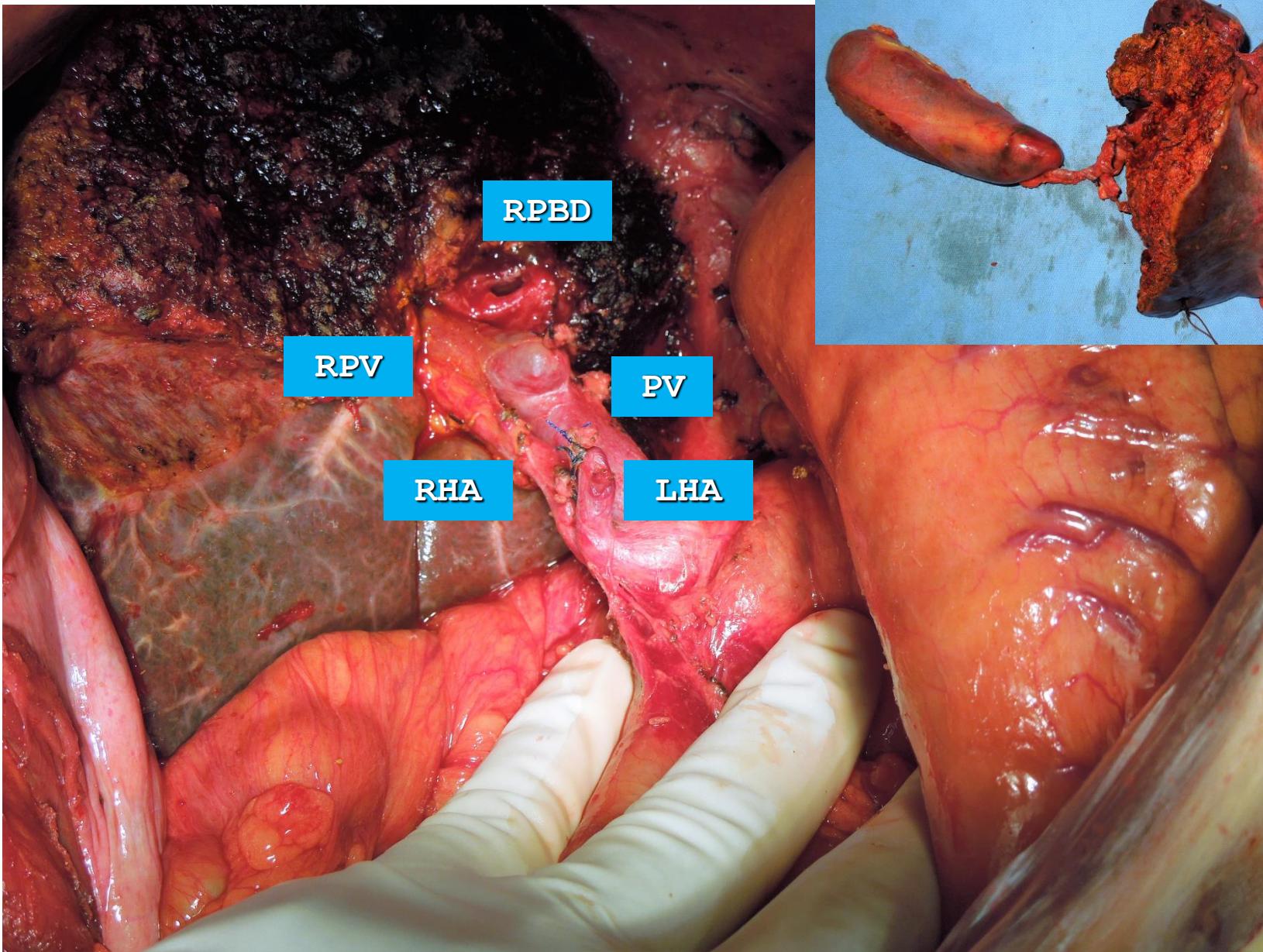


A: Supraportal type

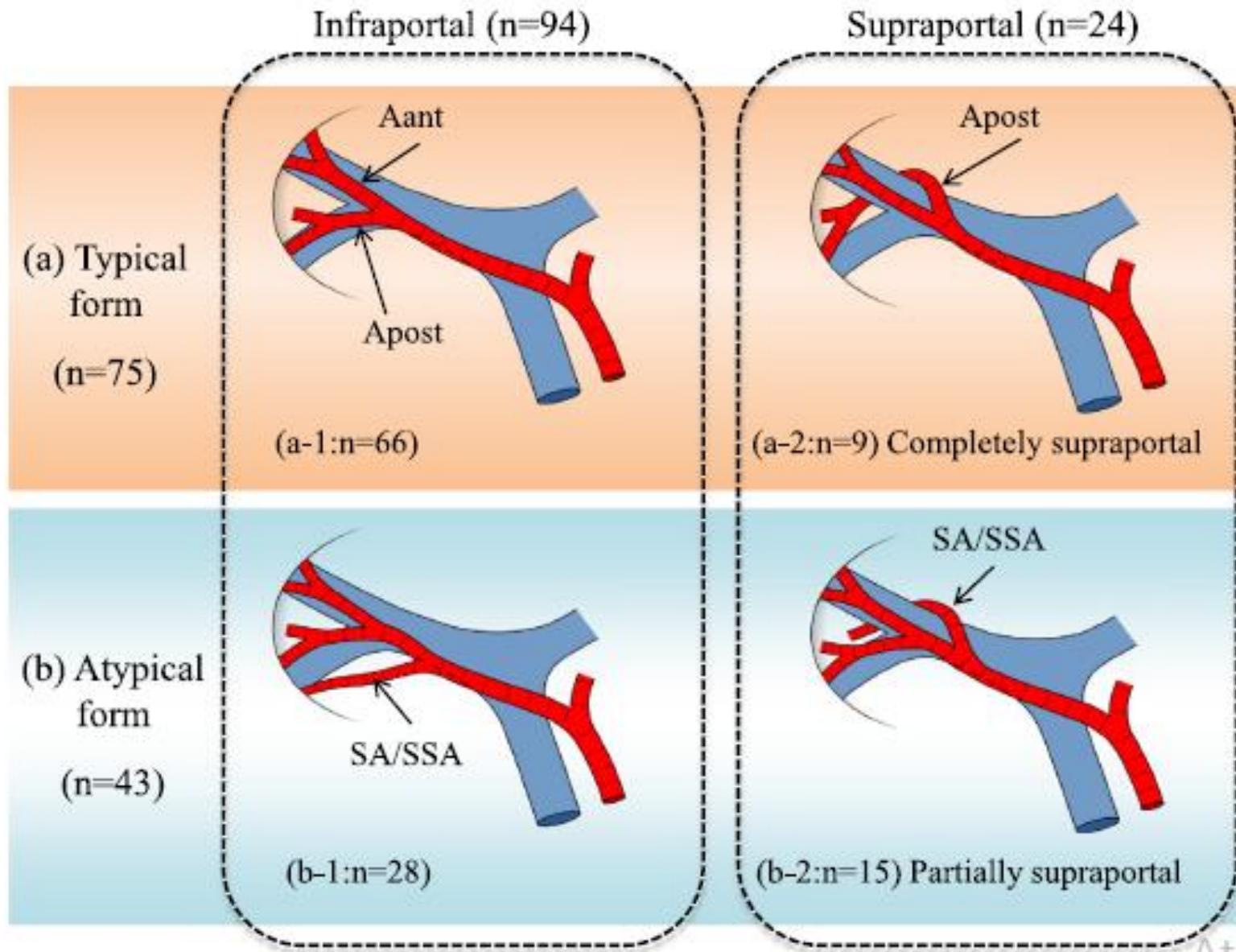


B: Infraportal type

Centro Cirúrgico

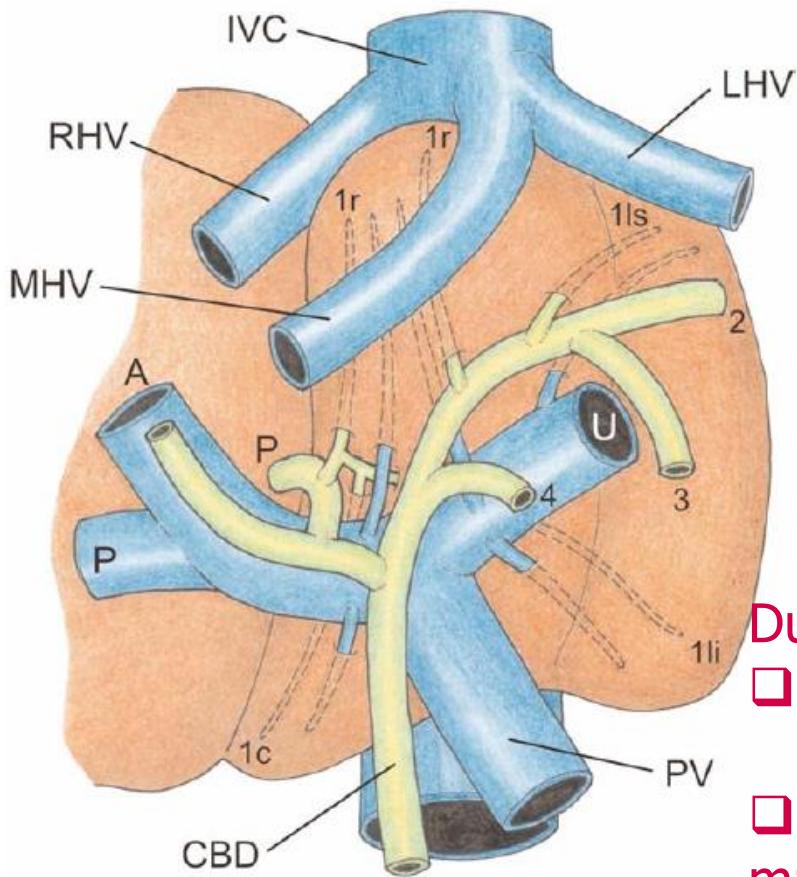


## Segmental and subsegmental arteries in Rouviere's sulcus



# CAUDATE LOBE

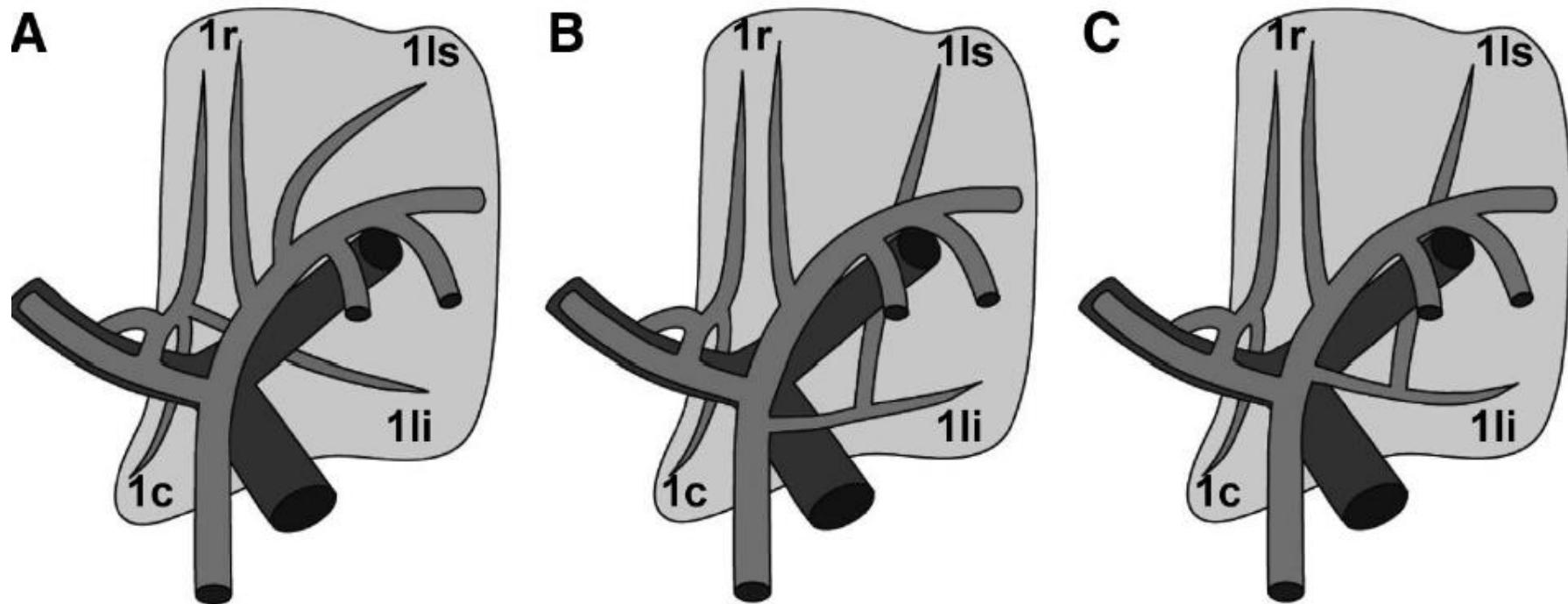
Vertical extension into the caudate duct



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

# CAUDATE LOBE



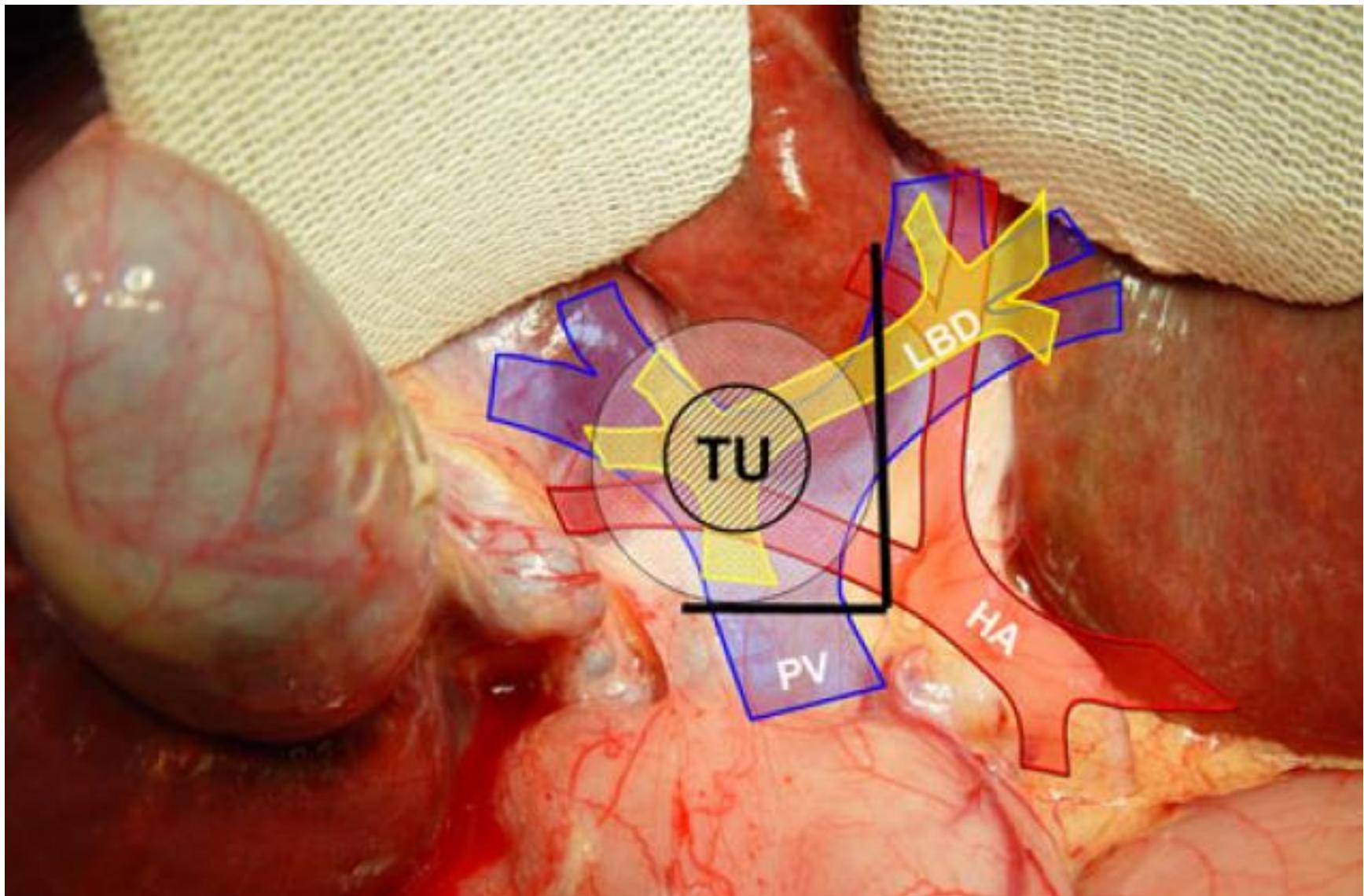
A:Normal; B:infraportal duct joining the common hepatic duct; C: infraportal duct joining the left hepatic duct.

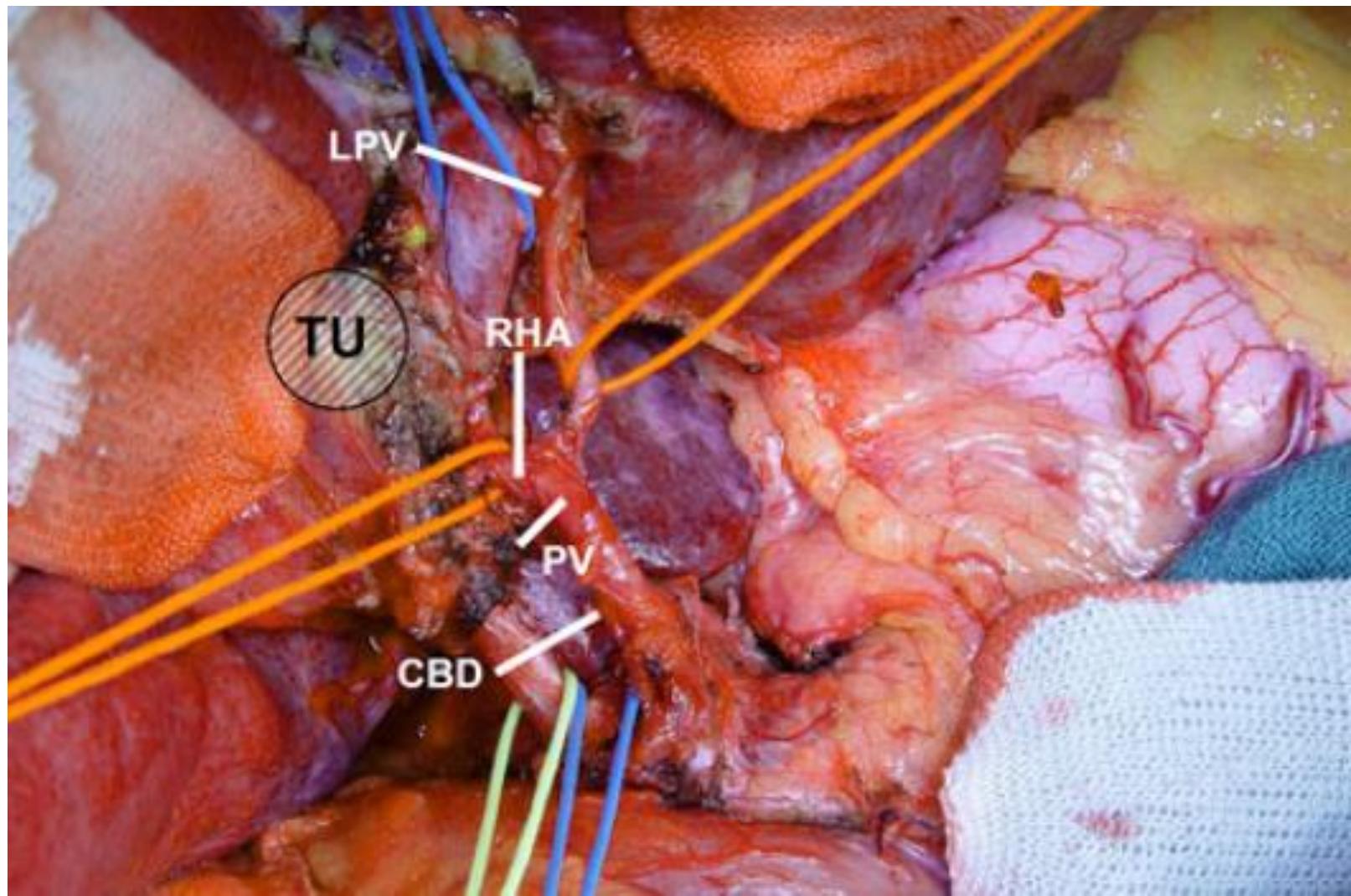
1r: bile duct running from the paracaval portion along the inferior vena cava.

1ls: bile duct running from the superior part of Spiegel's lobe.

1li: bile duct running from the inferior part of Spiegel's lobe.

1c: bile duct running from the caudate process.



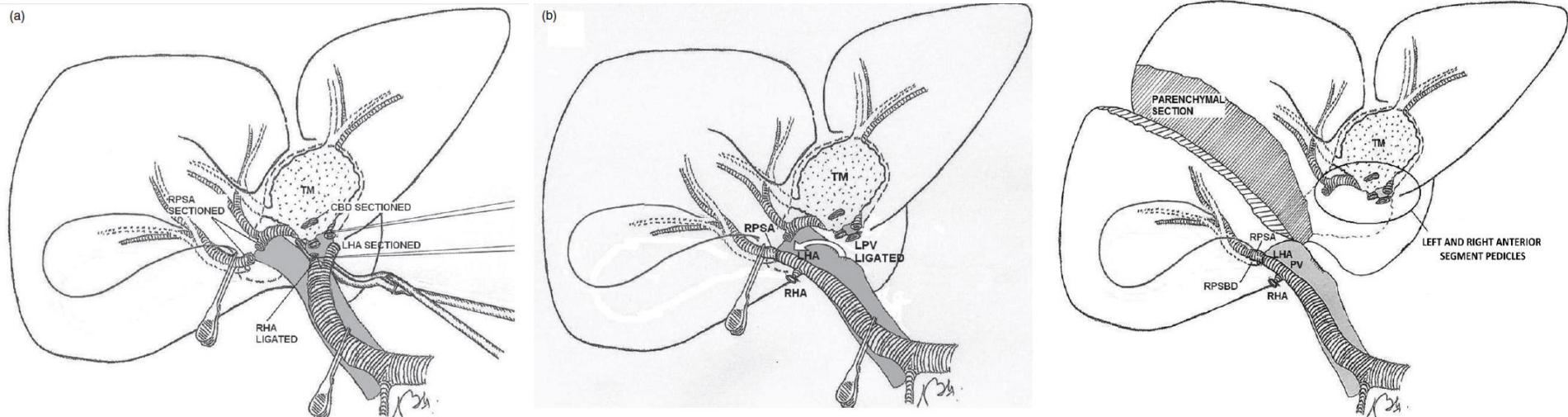


## BISMUTH-CORLETTTE IIIb

## 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



# IMAGING STUDIES

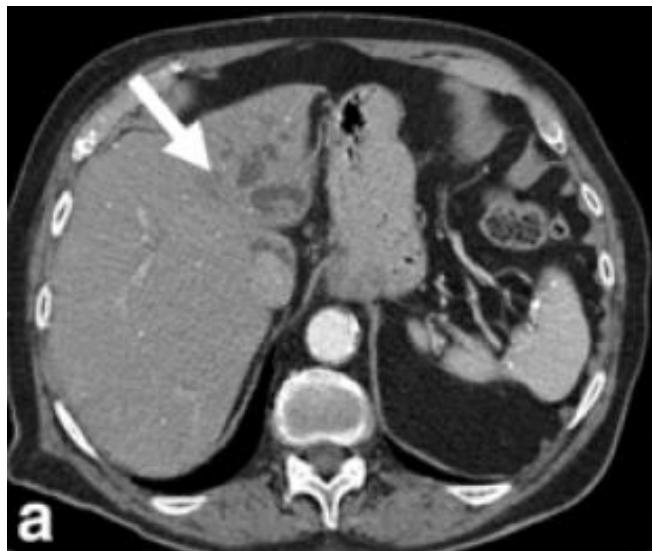
- Level and extent of tumor within the biliary tree
- Vascular invasion (portal vein/arterial)
- Hepatic lobar atrophy
- Distant metastatic disease (and lymph nodes)

# IMAGING STUDIES

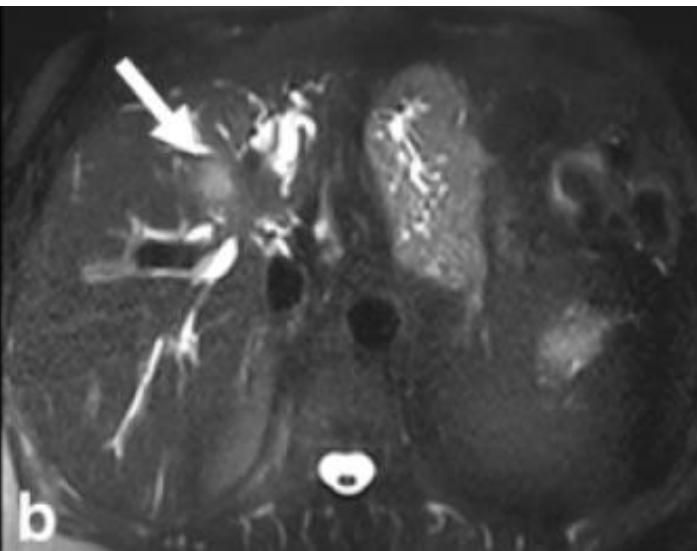
- Magnetic resonance cholangiopancreatography(MRCP)
  - Tumor
  - Level of biliary obstruction
  - Obstructed and isolated ducts
  - Presence of metastases
  - Lobar atrophy
- MR angiography
  - Assess involvement of hilar vascular structures

# IMAGING STUDIES

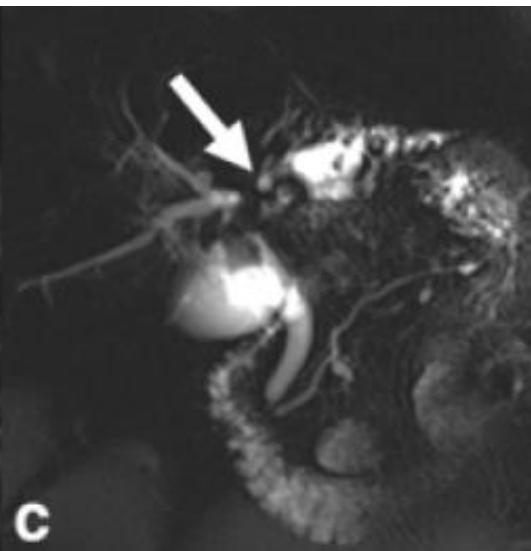
CT



MRI



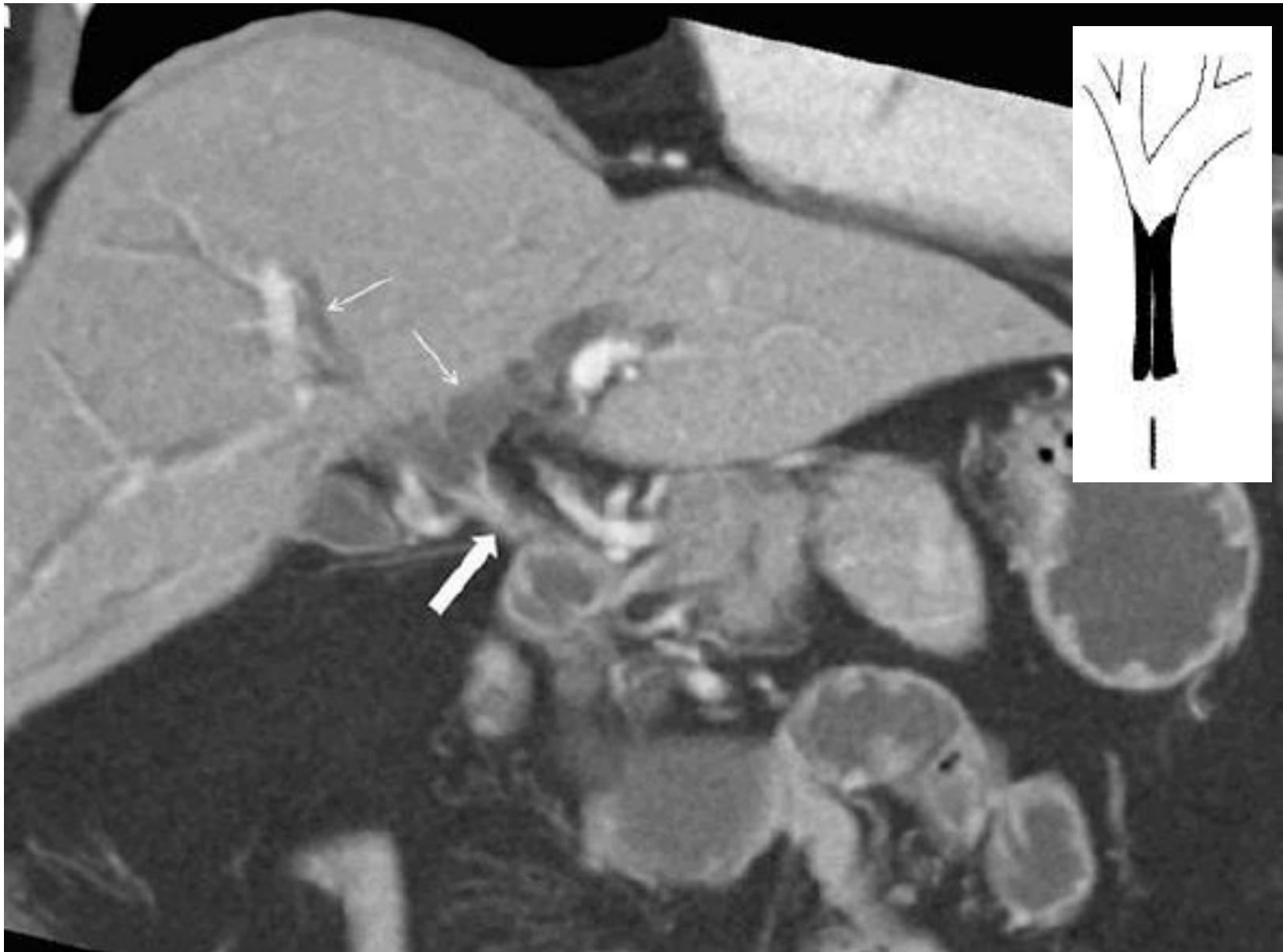
MRCP



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

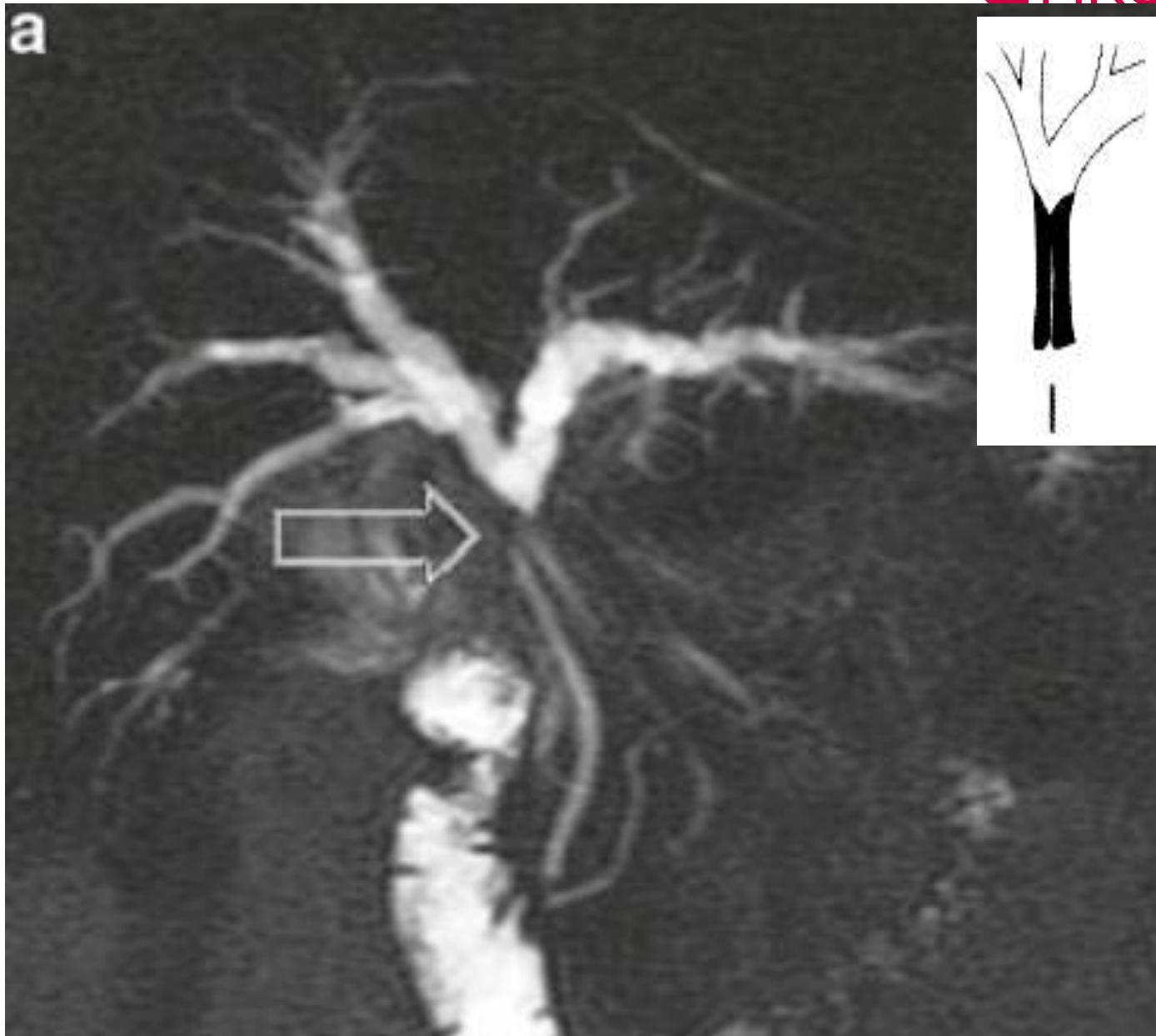
# IMAGING STUDIES

MRI

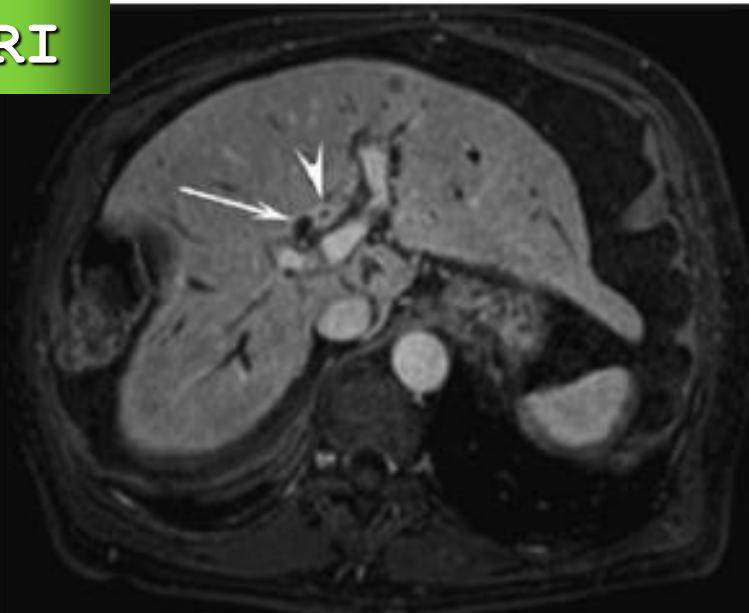


# IMAGING STUDIES

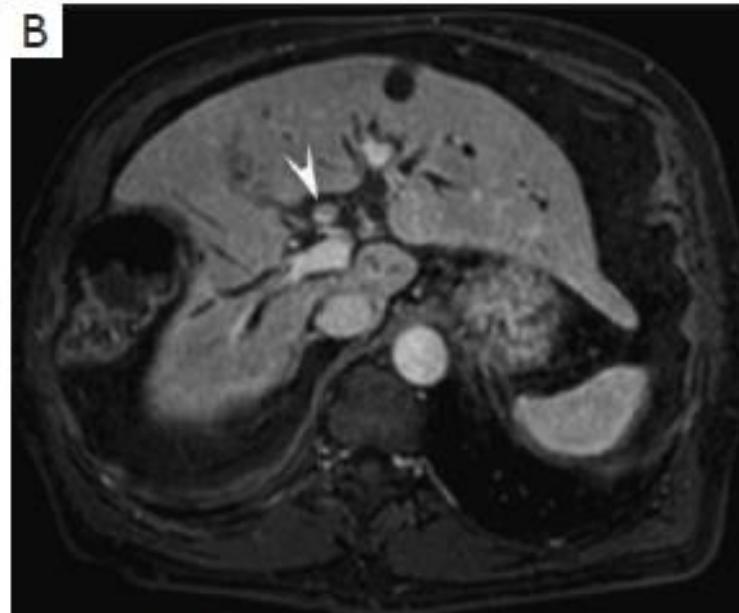
□ MRCP



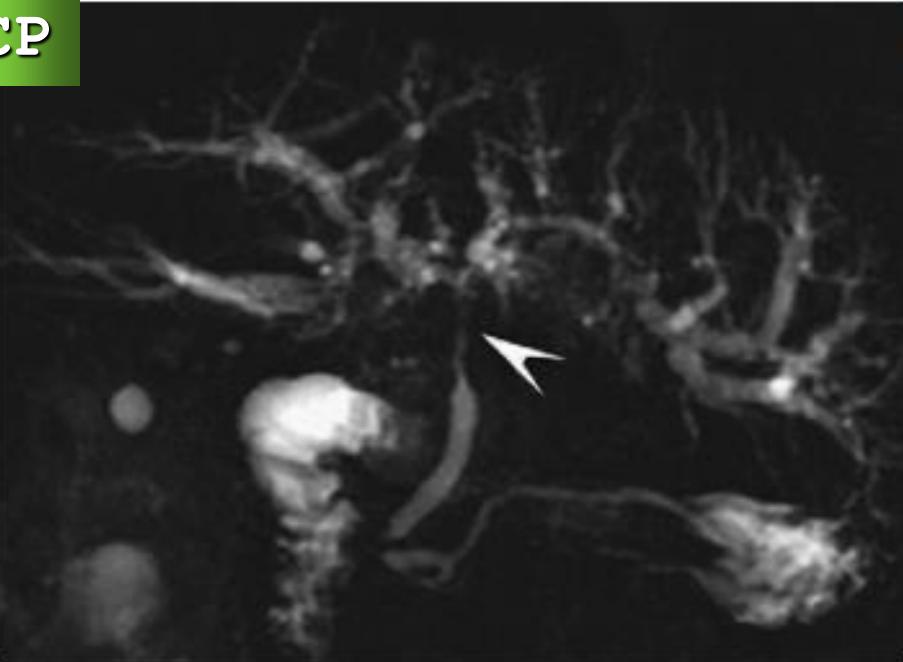
**MRI**



**B**



**MRCP**



**D**



**ERCP**

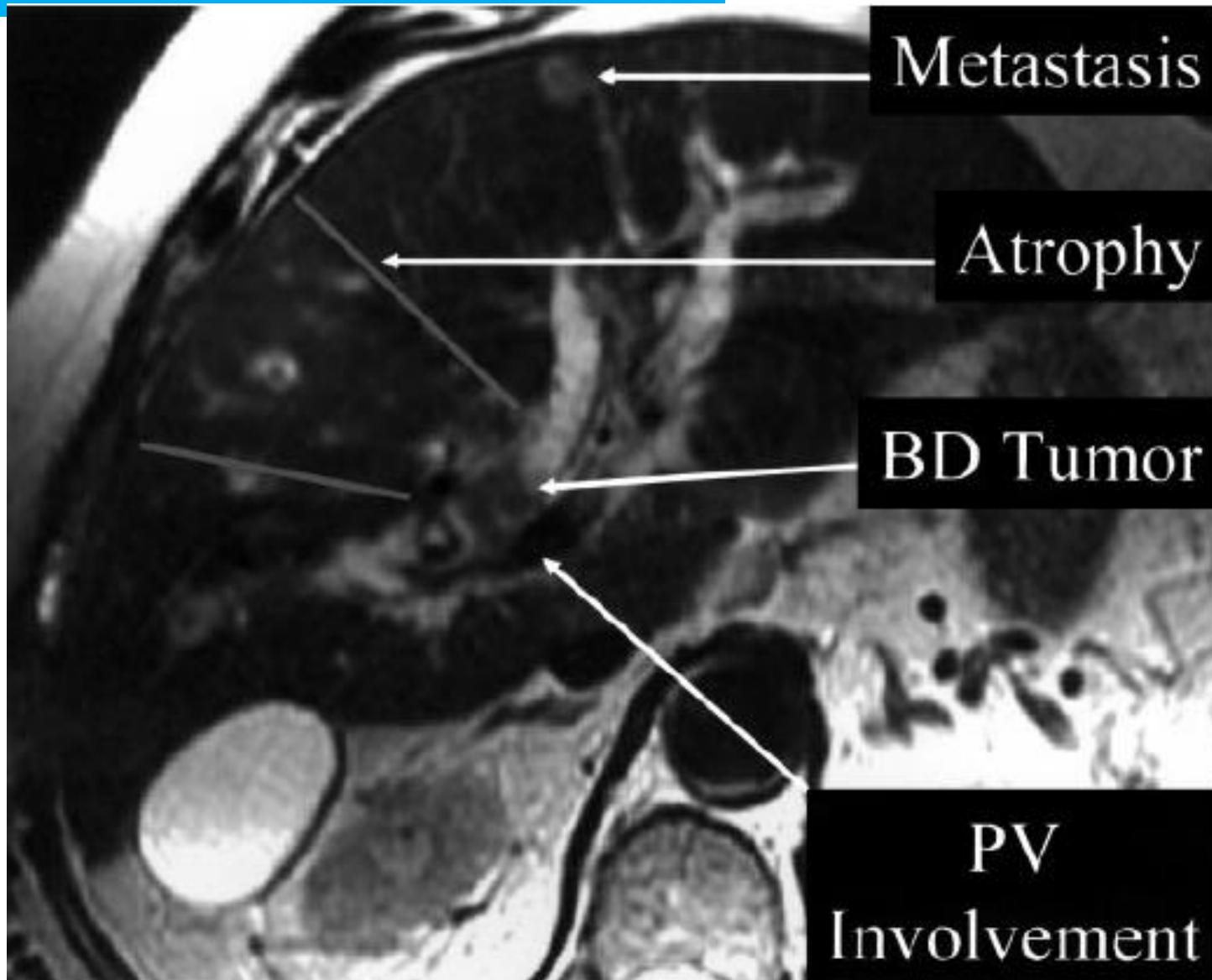
# IMAGING STUDIES

□ MRI and MRCP



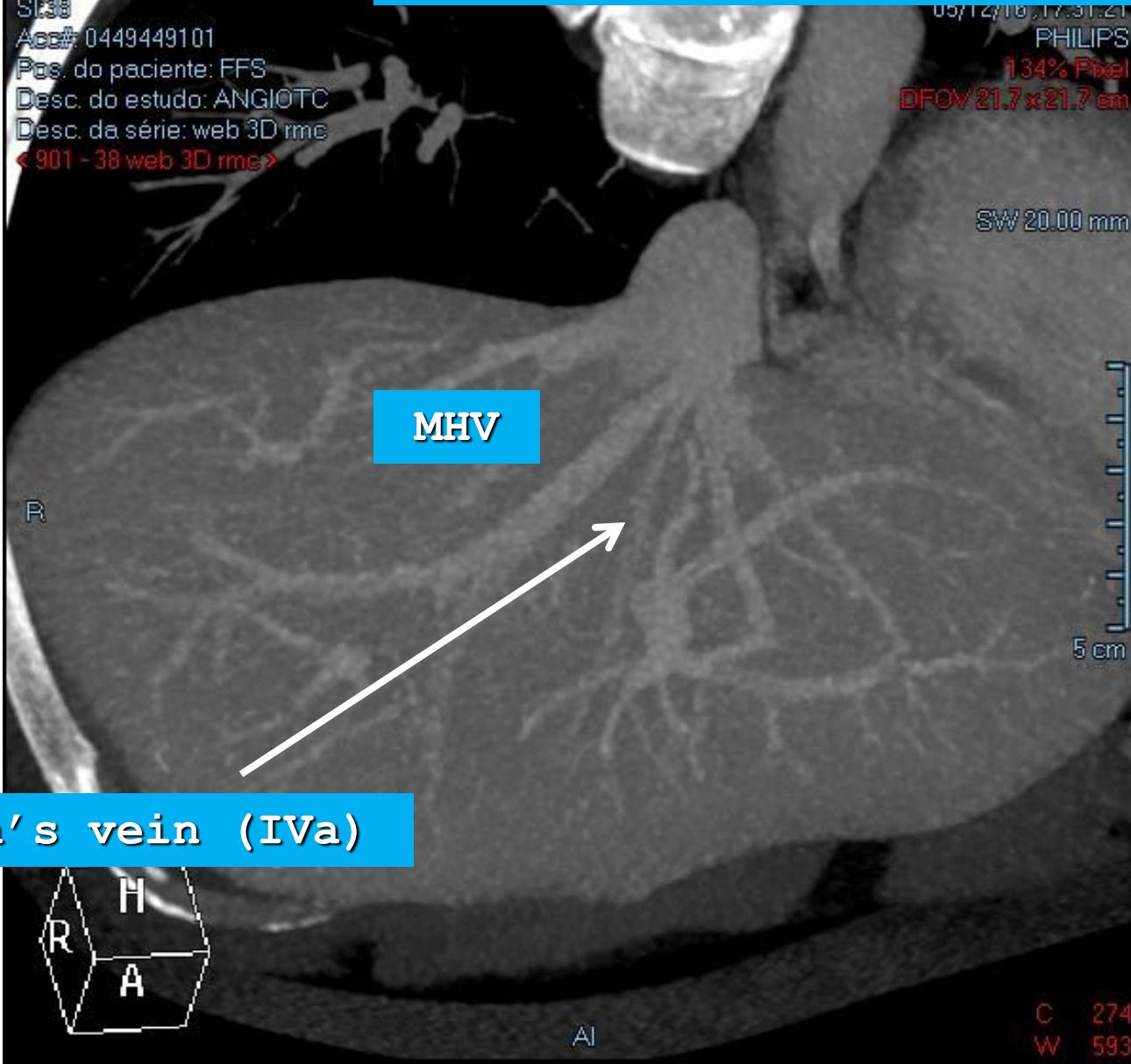
# IMAGING STUDIES

MRI

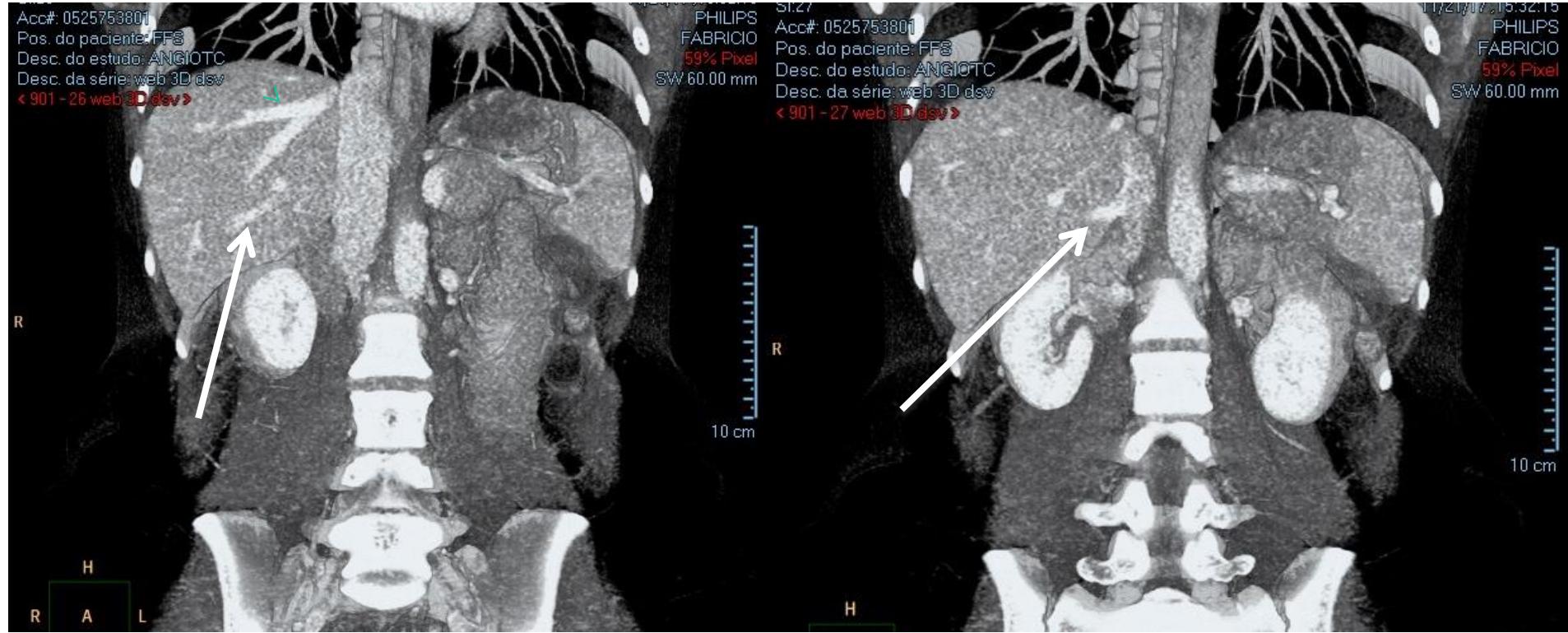


# IMAGING STUDIES

MARCIO CAMARINHA  
44Y 2MM.0009151301  
SI:38  
Acc#: 0449449101  
Pos. do paciente: FFS  
Desc. do estudo: ANGIOTC  
Desc. da série: web 3D rmc  
« 901 - 38 web 3D rmc »

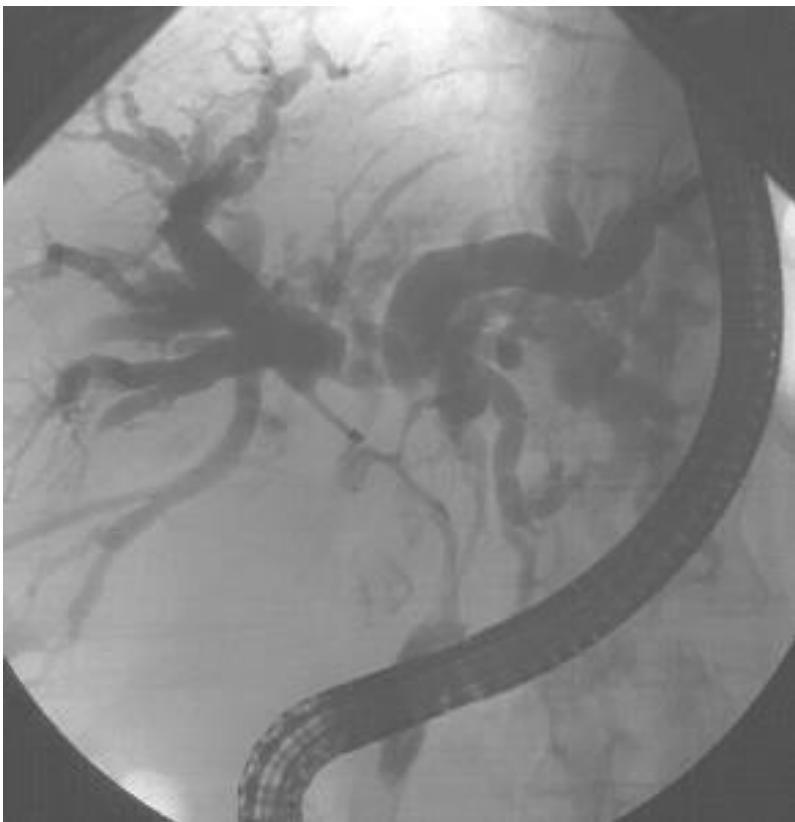


# MAKUCHI' S VEIN



# IMAGING STUDIES

□ ERCP



# IMAGING STUDIES

PTC



# UNRESECTABILITY

## Patient factors

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

# 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

# UNRESECTABILITY

## Metastatic disease

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

\* Peripancreatic, peridiudodenal, 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.

# 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

# 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

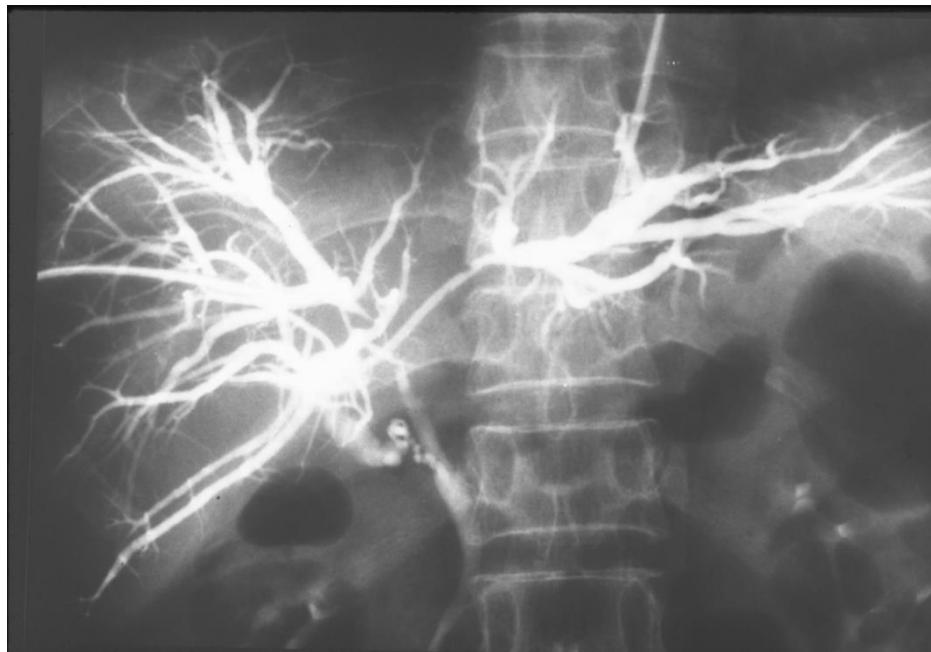
Cholangitis of the undrained lobe

### ❑ Postoperative complications

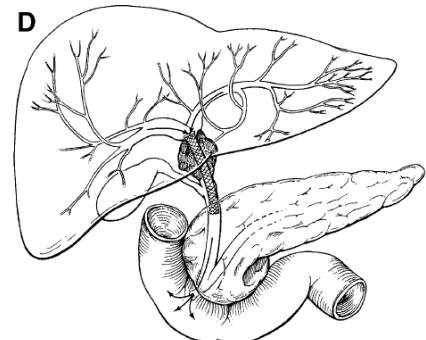
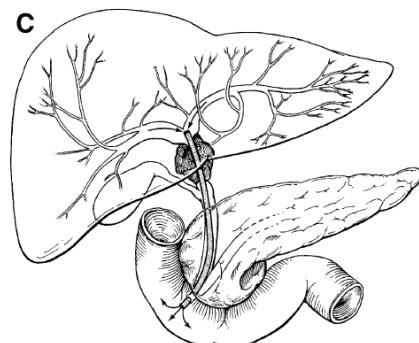
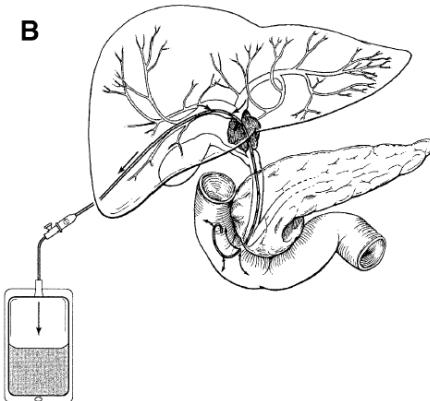
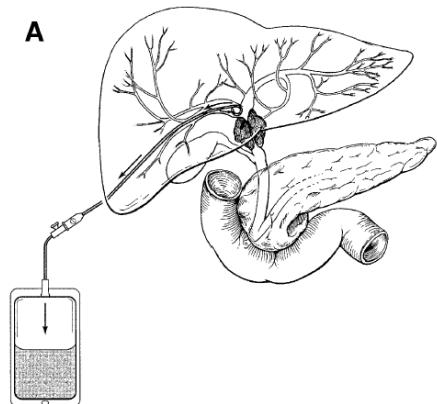
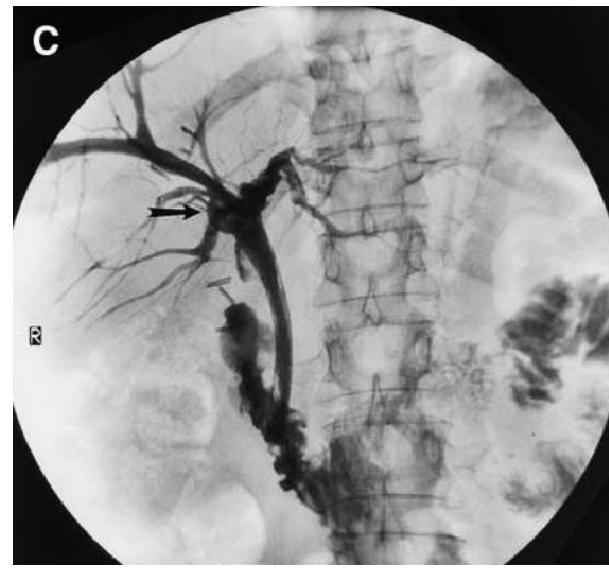
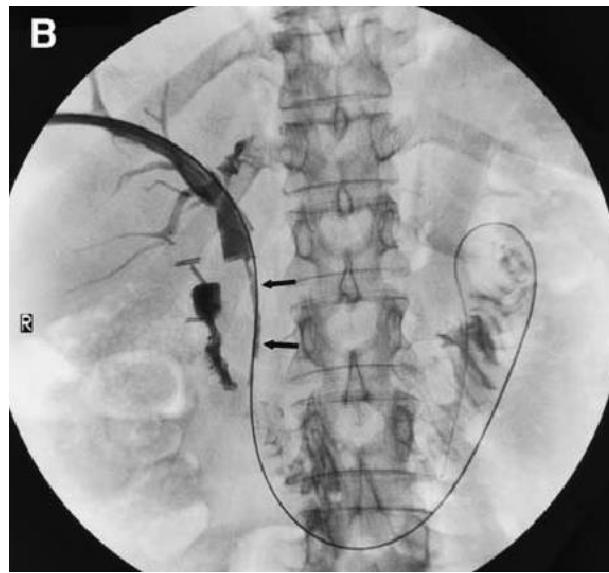
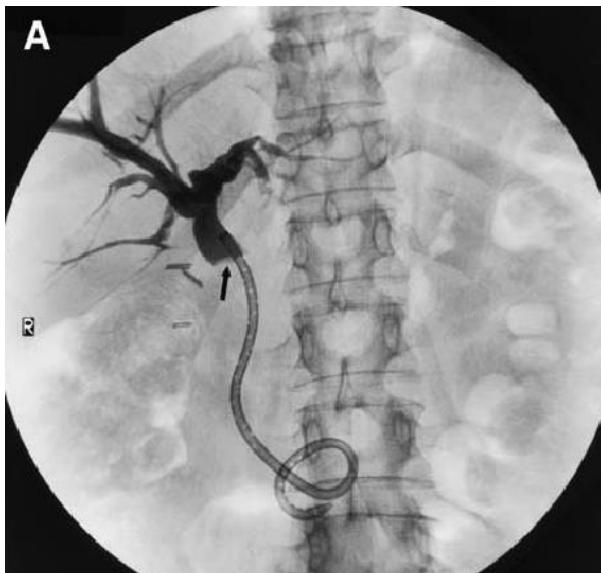
Surgical site infection

Organ/space infection

# Percutaneous or Endoscopic



# Percutaneous biliary drainage



REVIEW ARTICLE

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

Ahmer Hameed<sup>1,3</sup>, Tony Pang<sup>1,3</sup>, Judy Chiou<sup>2</sup>, Henry Pleass<sup>1,3</sup>, Vincent Lam<sup>1,3</sup>, Michael Hollands<sup>1,3</sup>, Emma Johnston<sup>1</sup>, Arthur Richardson<sup>1,3</sup> & Lawrence Yuen<sup>1,3</sup>

<sup>1</sup>Department of Surgery, Westmead Hospital, <sup>2</sup>Department of Medicine, Westmead Hospital, Sydney, and <sup>3</sup>Discipline of Surgery, University of Sydney, Australia

**Table 3** Post-procedure complications and post-operative results by type of PBD<sup>a</sup>

	EBD, total (%)	PTBD, total (%)	Studies explicitly reported in, n
<b>Post-procedure complications</b>			
Cholangitis	153/557 (27)	51/380 (13)	6 (EBD); 7 (PTBD)
Pancreatitis	51/562 (9)	3/42 (7)	7 (EBD); 1 (PTBD)
Catheter dislocation/dislodgment	21/90 (23)	7/156 (4)	1 (EBD); 3 (PTBD)
Haemobilia/Bleeding	1/87 (1)	14/277 (5)	1 (EBD); 6 (PTBD)
Portal vein injury and/or thrombosis	–	15/248 (6)	3 (PTBD)
Retroperitoneal or duodenal perforation	4/257 (2)	–	3 (EBD)
Cancer seeding (tract)	–	10/248 (4) <sup>b</sup>	3 (PTBD)
Failure to proceed to surgery	27/164 (16)	9/72 (13)	1 (EBD); 2 (PTBD) <sup>c</sup>
<i>Others</i>			
Biliary perforation/intra-peritoneal bile leak or peritonitis	2	1	2 (EBD); 1 (PTBD)
External bile leak	–	6	1 (PTBD)
AV shunt formation	–	2	1 (PTBD)
<b>Post-operative results</b>			
<i>Mortality</i> <sup>d</sup>	6/281 (2)	23/416 (6)	
<i>Morbidity</i> <sup>d</sup>			
Hepatic failure	22/194 (11)	56/432 (13)	
Sepsis/abscess/cholangitis	17/120 (14)	44/262 (17)	
Bile leak	NR	21/166 (13)	
Anastomotic leak	NR	25/205 (12)	
<i>Survival, %</i> <sup>d</sup>			
1-year, median (range)	91 (89–92)	73 (67–90)	2 (EBD); 6 (PTBD)
5-year, median (range)	46 (41–51)	30 (11–60)	2 (EBD); 5 (PTBD)

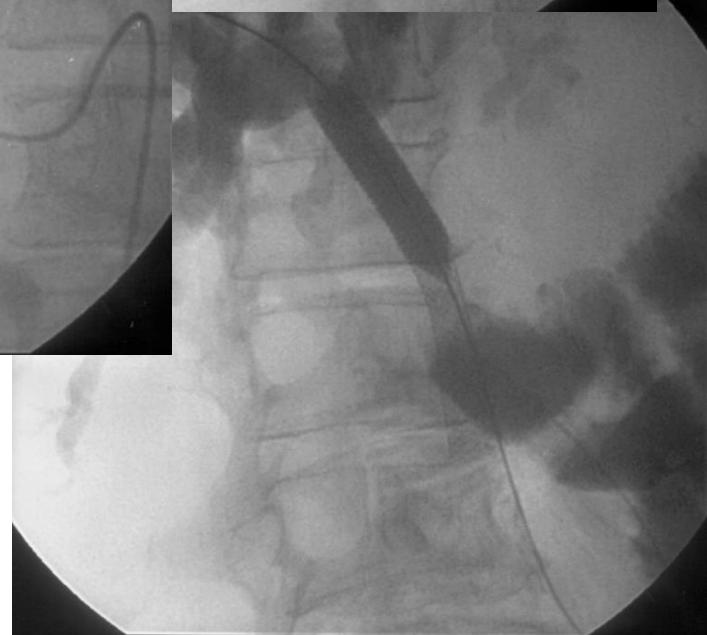
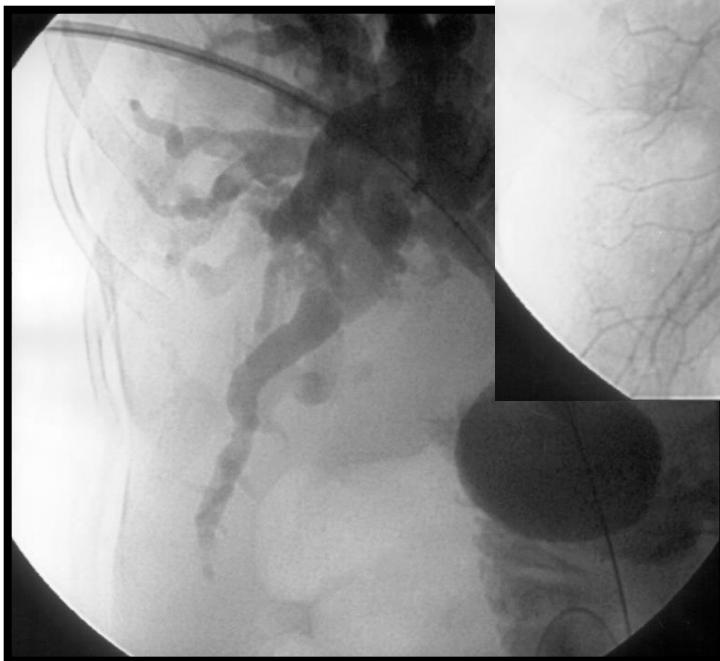
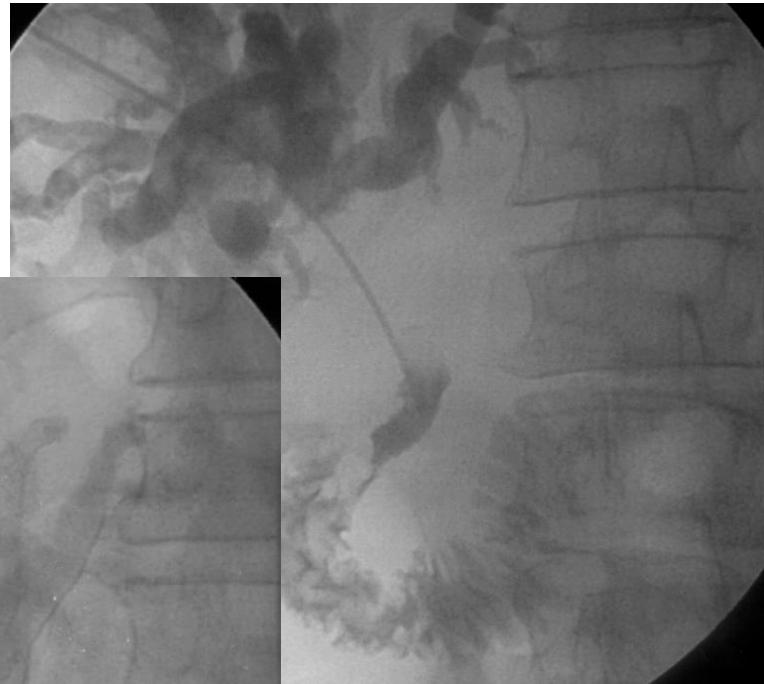
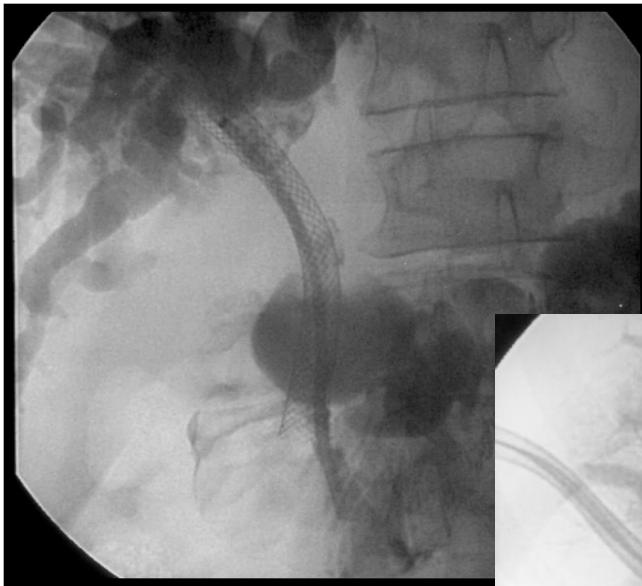
# Evolution of Surgical Treatment for Perihilar Cholangiocarcinoma

*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

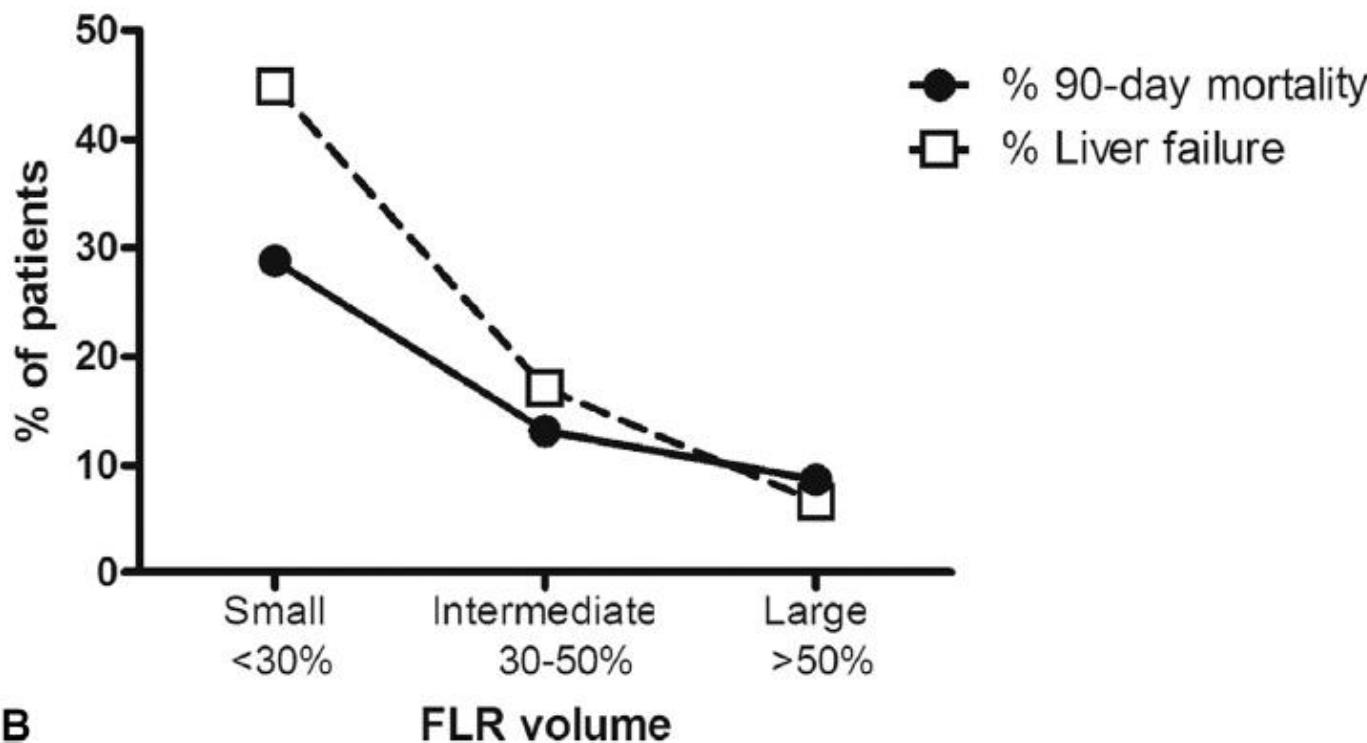


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# Postoperative Mortality after Liver Resection for Perihilar Cholangiocarcinoma: Development of a Risk Score and Importance of Biliary Drainage of the Future Liver Remnant



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



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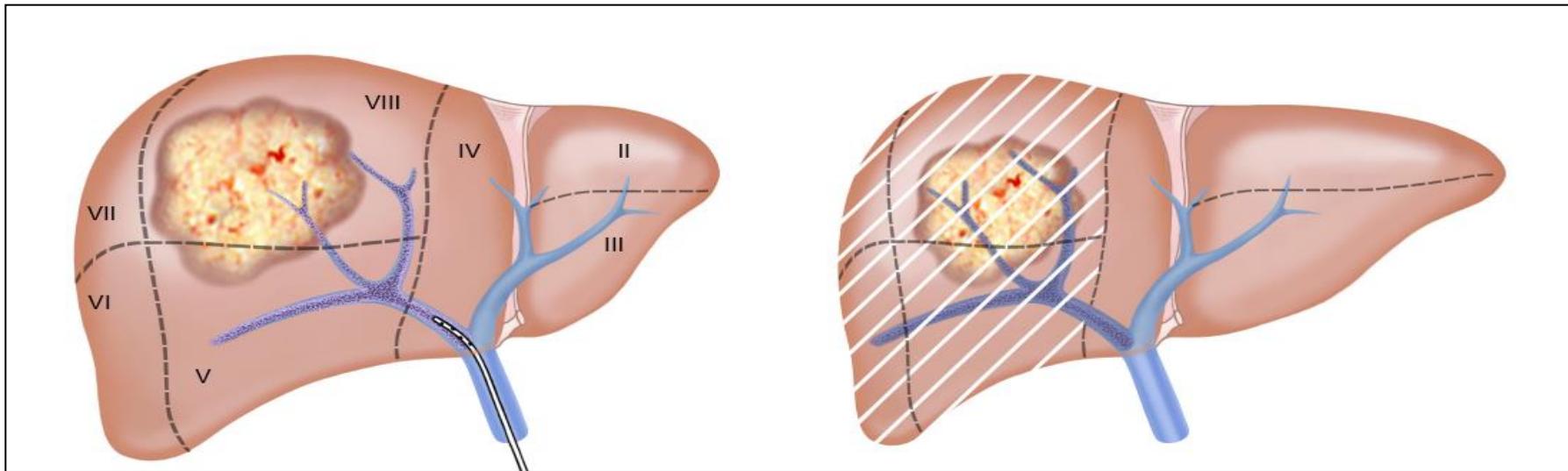
**Table 3.** Developed Mortality Risk Score to Predict 90-Day Postoperative Mortality after Liver Resection for Perihilar Cholangiocarcinoma

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

# 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%

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# 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		
$\geq 45\%$	0	17
30% to 45%	1	23
$< 30\%$	2	44
Immediate preoperative bilirubin $> 50 \mu\text{mol/L}^*$	2	52

\* $> 2.9 \text{ mg/dL}$ .

FLRV, future liver remnant volume; PHLF, post-hepatectomy liver failure.

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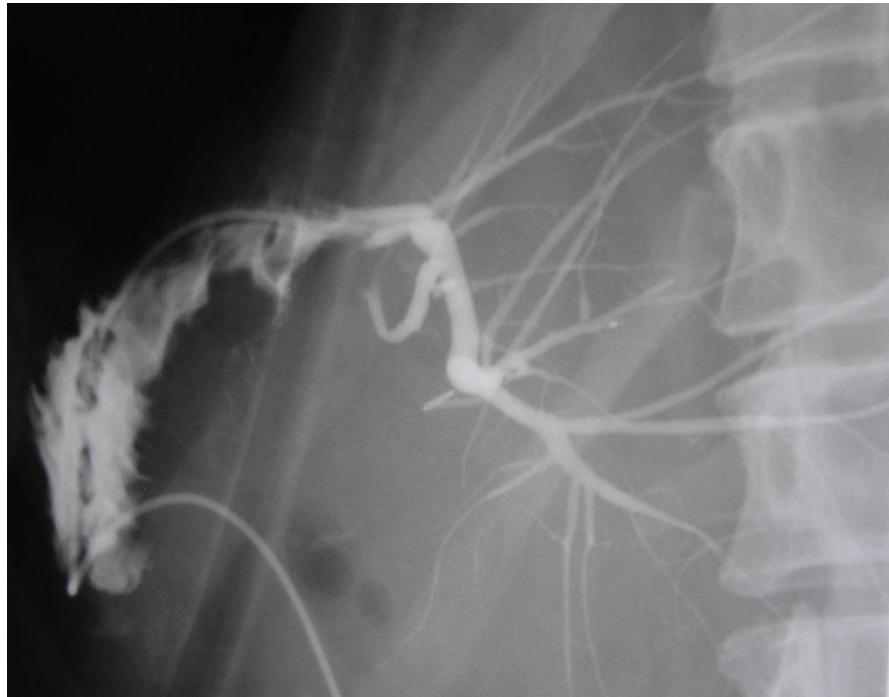
# Postoperative Liver Failure Risk Score: Identifying Patients with Resectable Perihilar Cholangiocarcinoma Who Can Benefit from Portal Vein Embolization

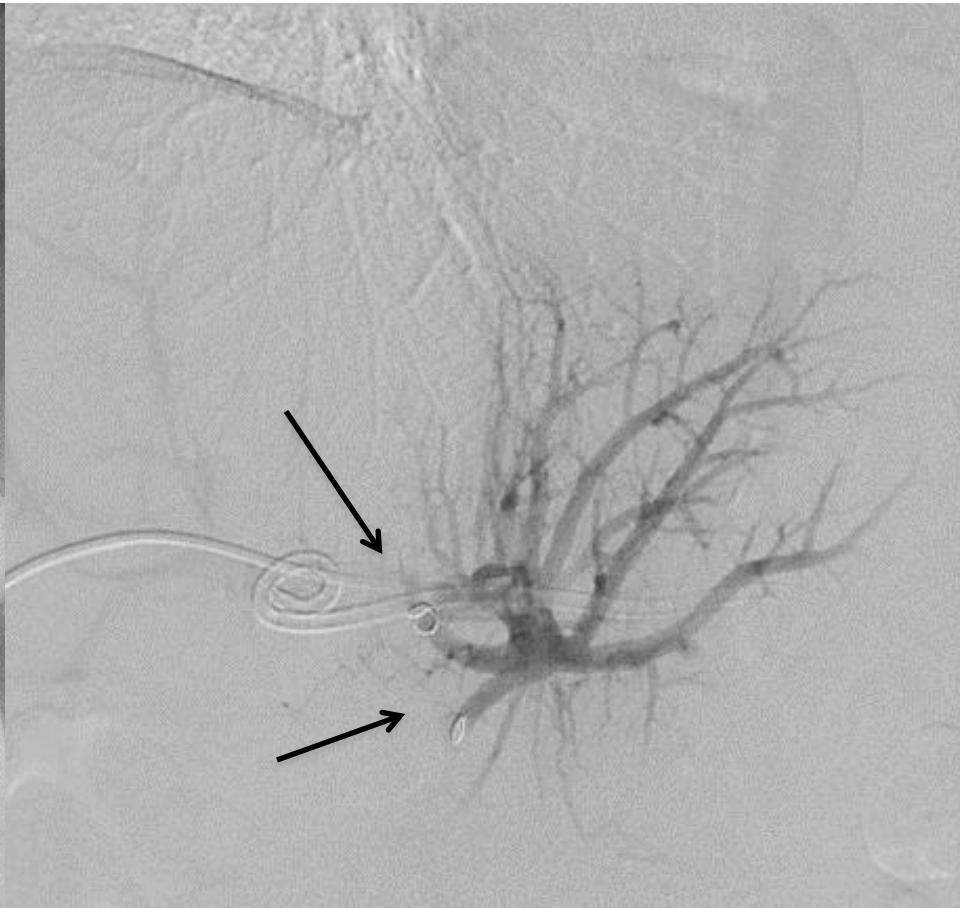
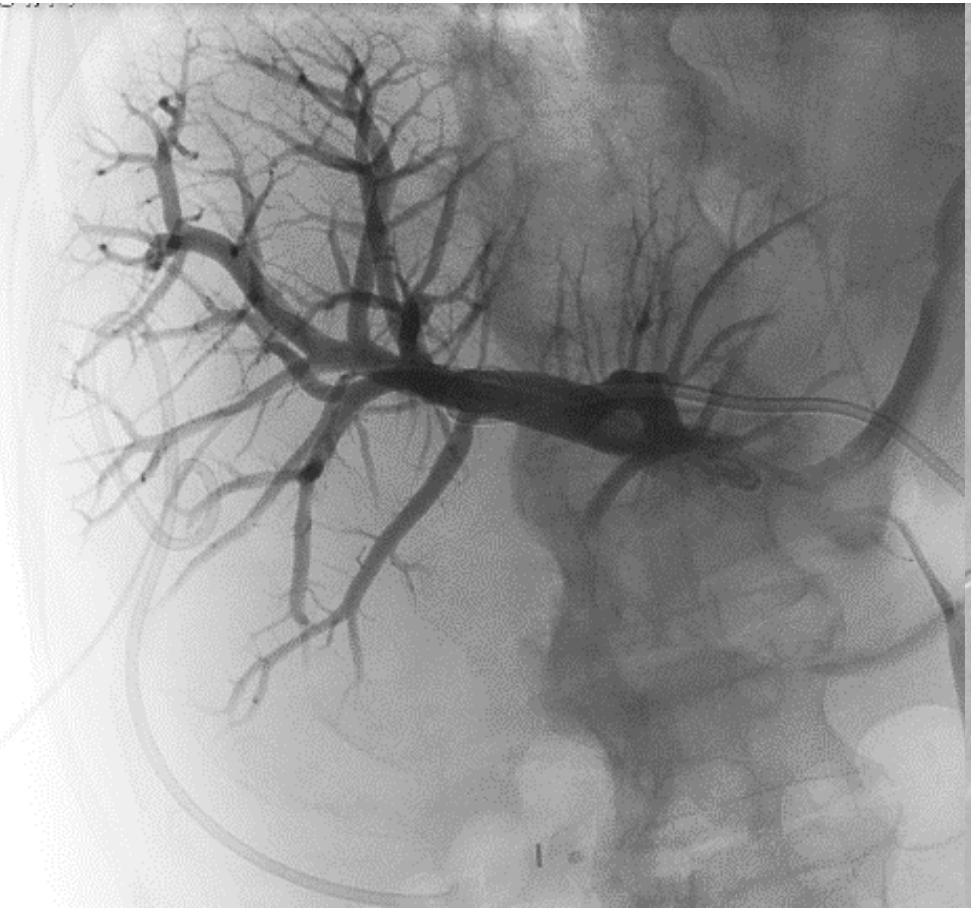


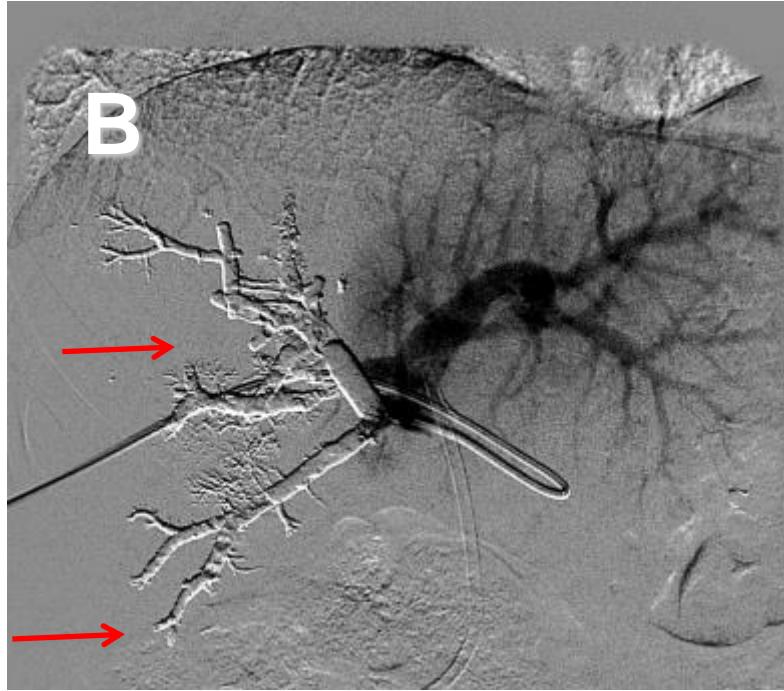
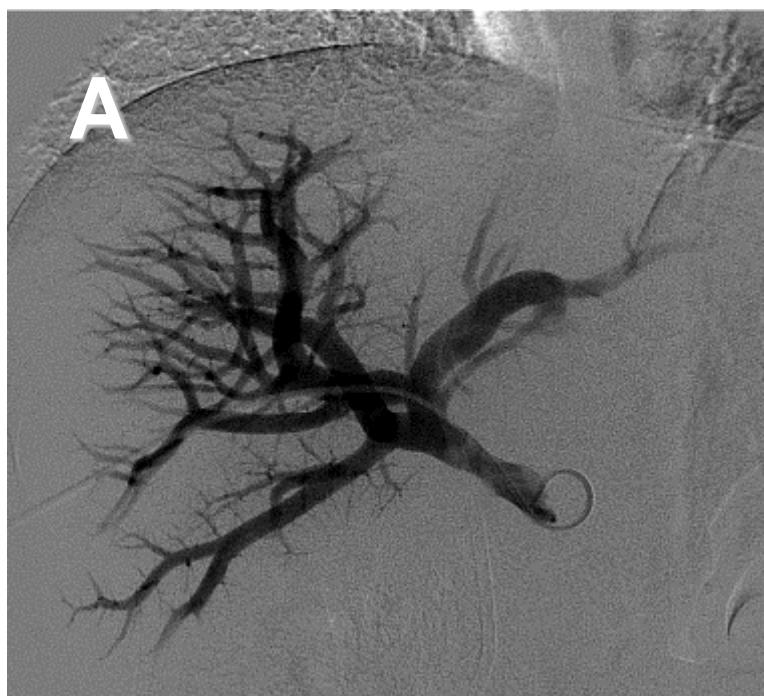
Pim B Olthof, MD, PhD, Jimme K Wiggers, MD, PhD, Bas Groot Koerkamp, MD, PhD, Robert J Coelen, MD, PhD, Peter J Allen, MD, FACS, Marc G Besselink, MD, PhD, Olivier R Busch, MD, PhD, Michael I D'Angelica, MD, FACS, Ronald P DeMatteo, MD, FACS, T Peter Kingham, MD, FACS, Krijn P van Lienden, MD, PhD, William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

**Table 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		

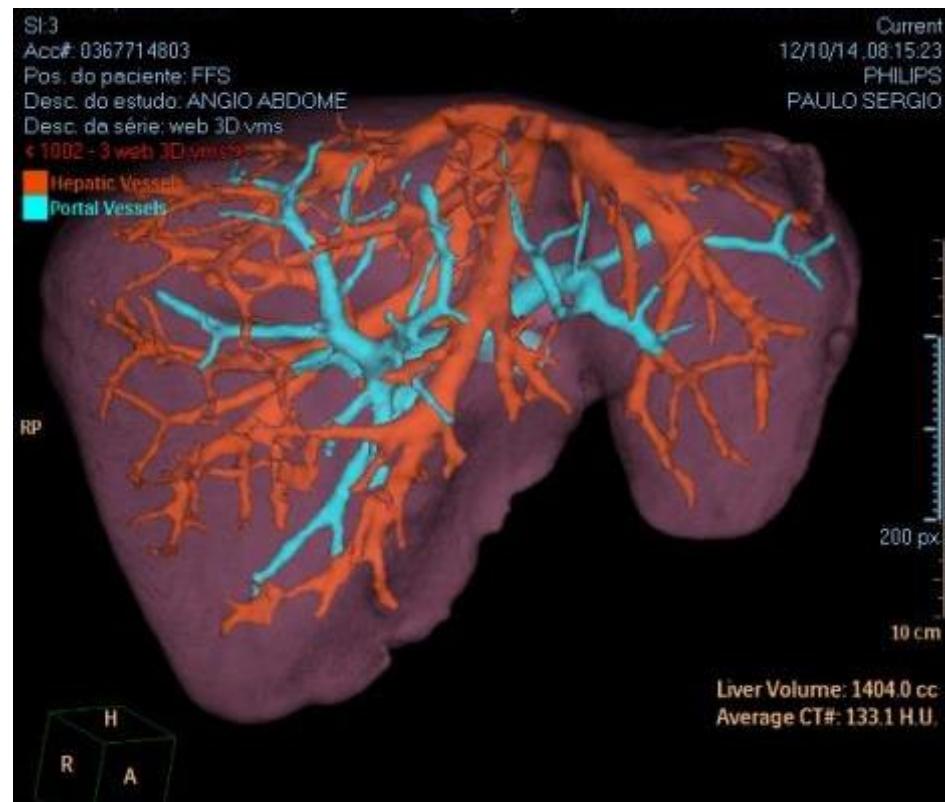
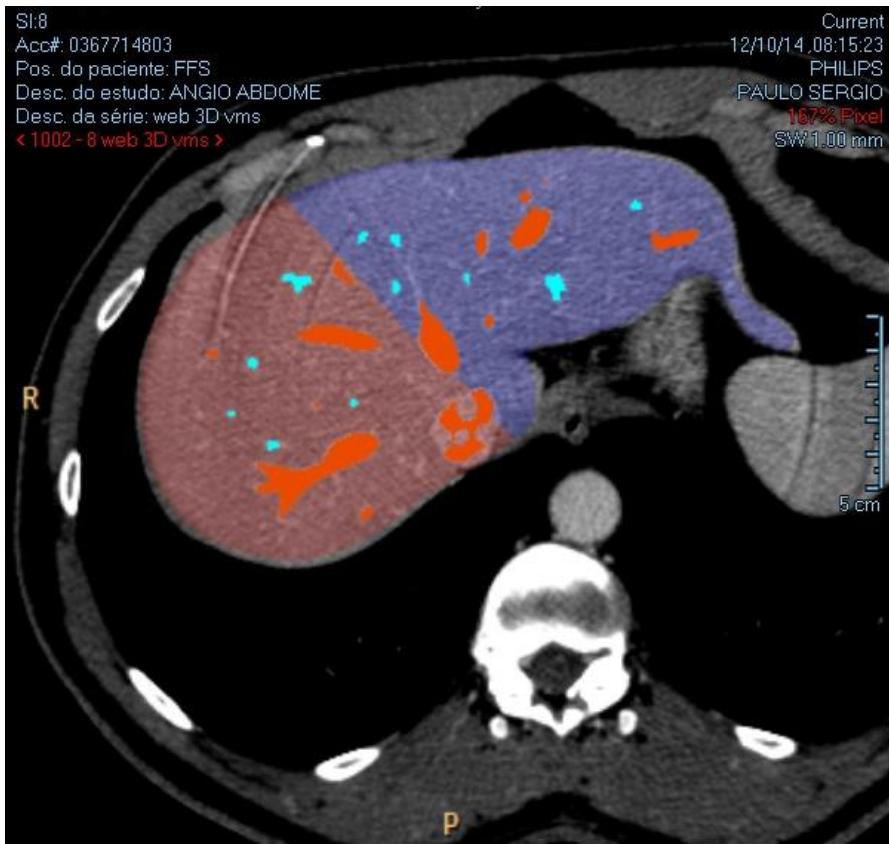






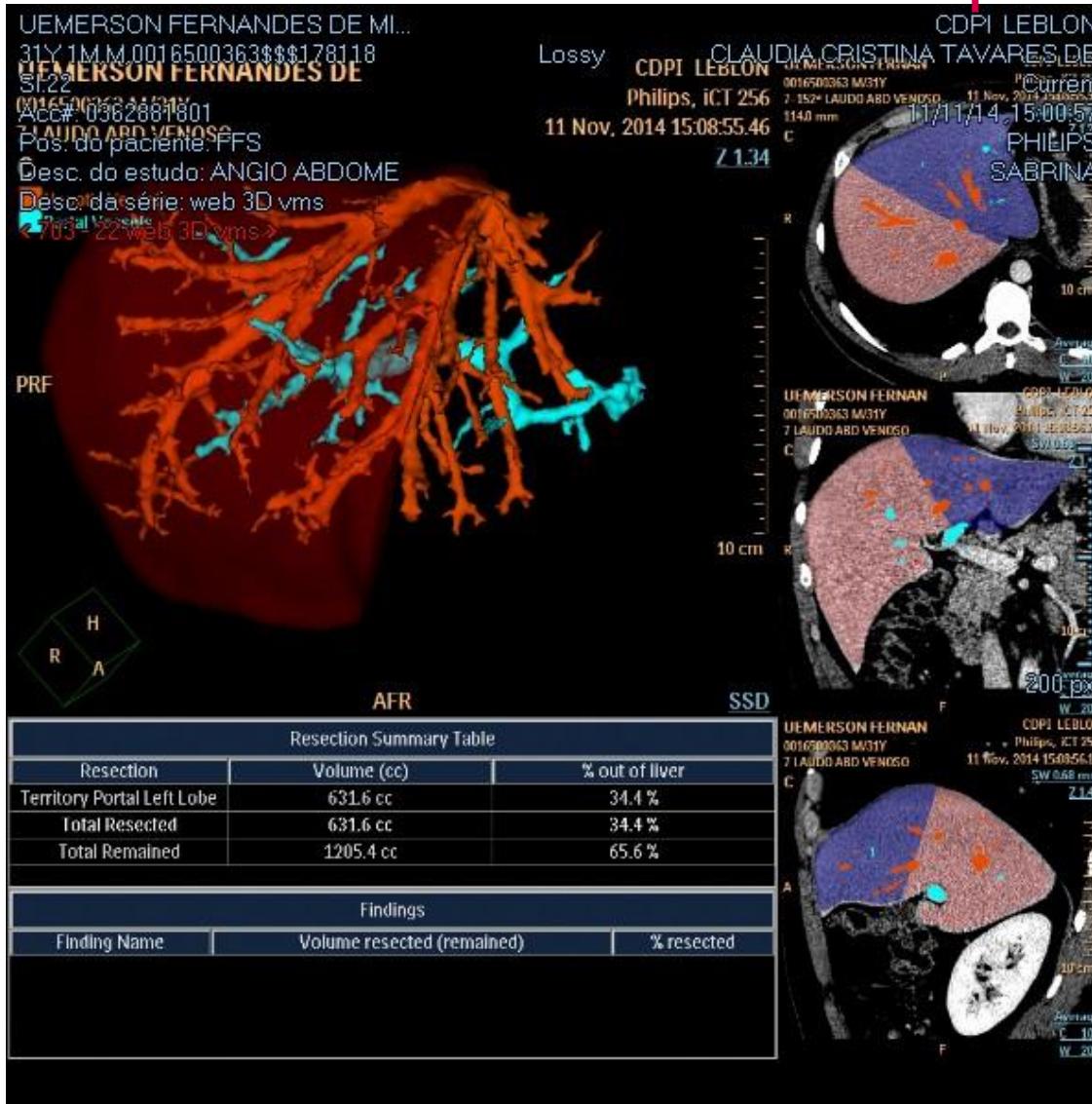
# VOLUMETRIA

☐ Left hepatectomy + caudate



# VIRTUAL HEPATECTOMY

□ Left hepatectomy + caudate

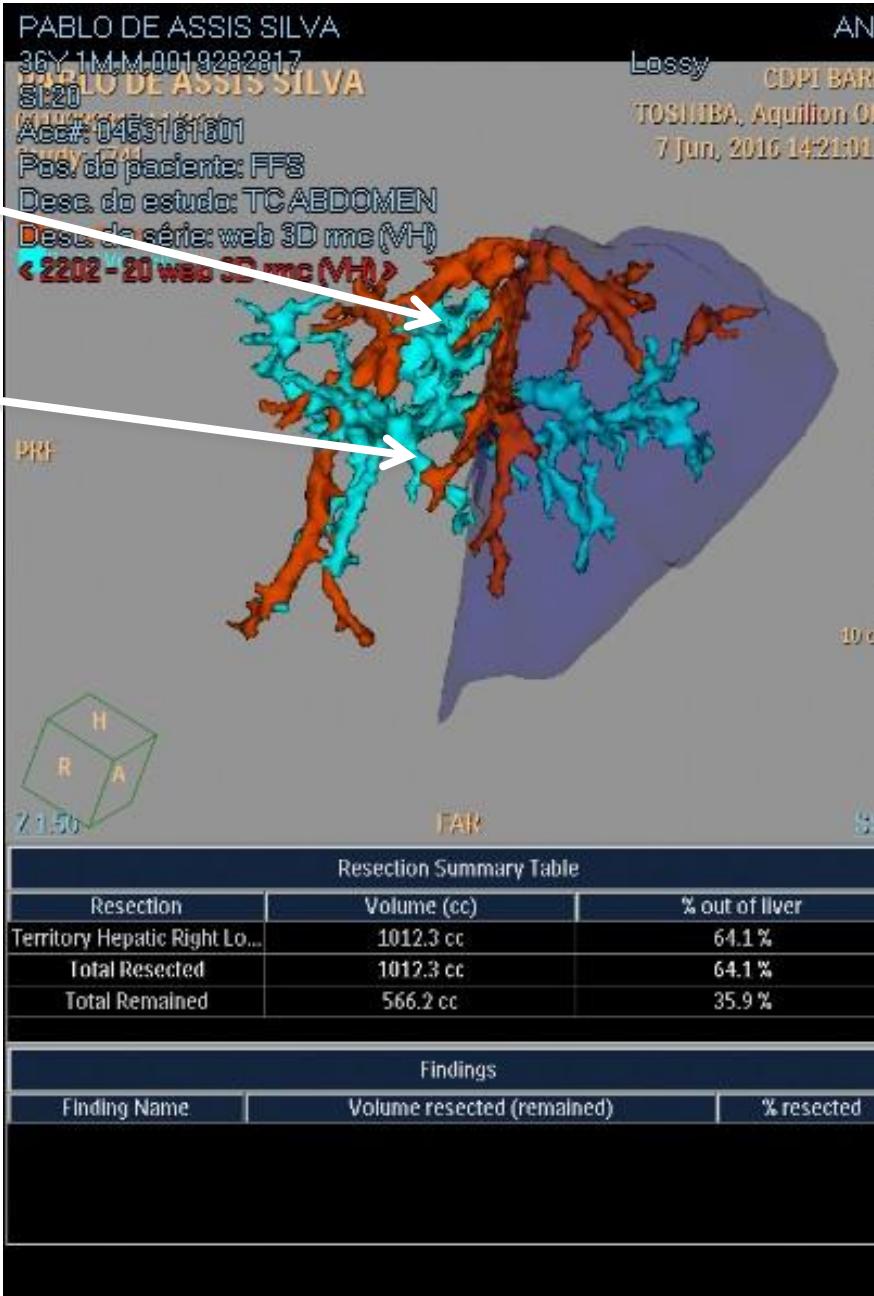




# ☐ Right hepatectomy + caudate

V8

V5



MARCIO CAMARINHA

44Y 2M M 0009151301

**MARCIO CAMARINHA**

0009151301 M 44Y

Acc#: 0449449101

Study: 6053

Pos. do paciente: FFS

Desc. do estudo: ANGIOTC

Desc. da série: web 3D rmc -

< 1002 20 web 3D rmc - vol >

Portal Vessels

Part 1

Part 2

Part 3

Part 4

Part 5

Part 6

Part 7

Part 8

Part 9

Part 10

Part 11

Part 12

Part 13

Part 14

Part 15

Part 16

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Part 294

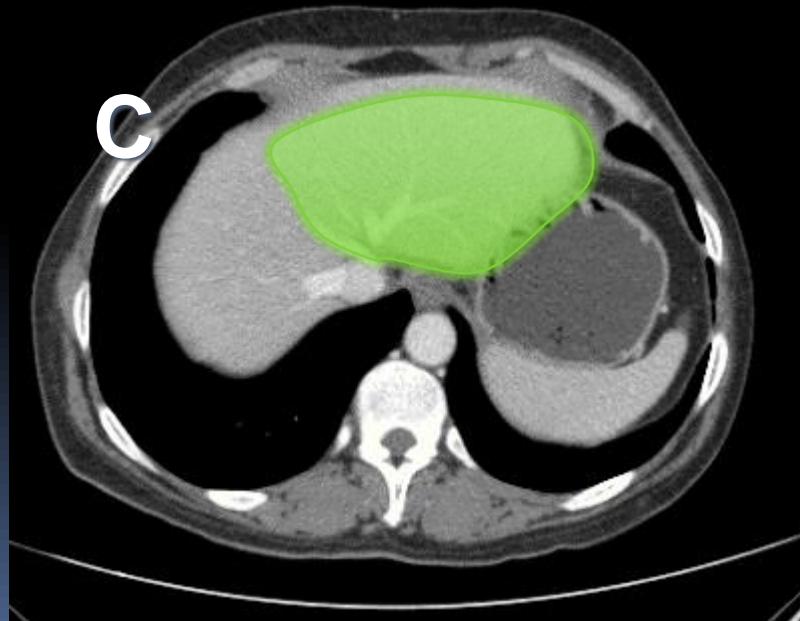
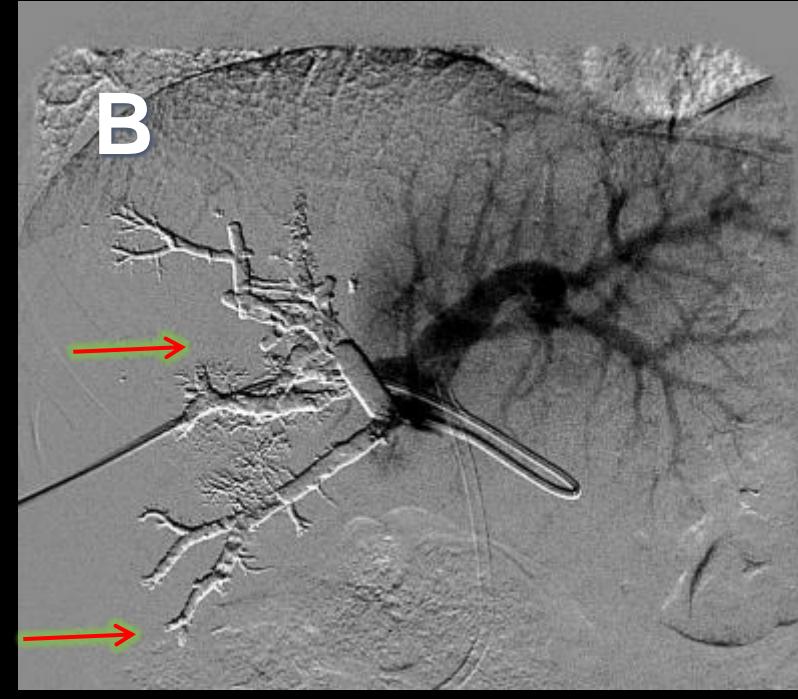
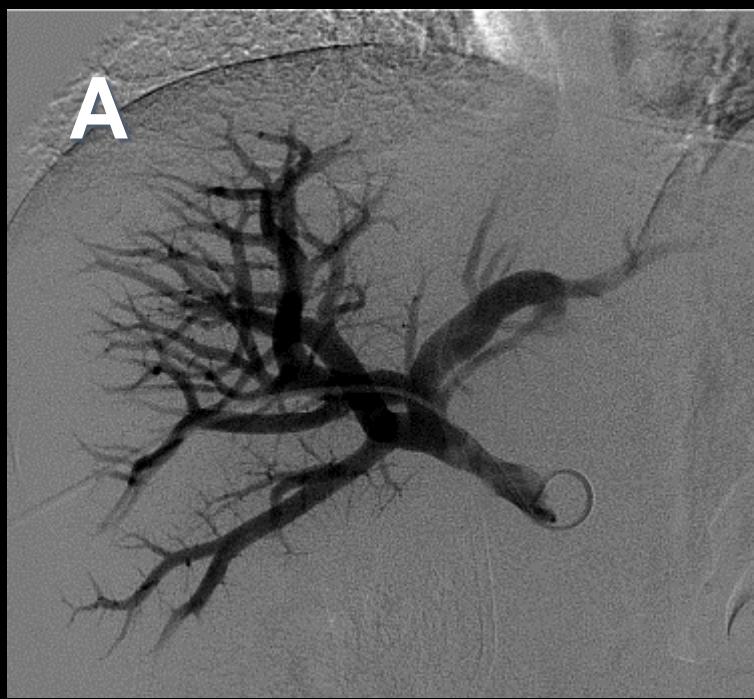
Part 295

Part 296

Part 297

Part 298

Part



# SURGICAL MANAGEMENT

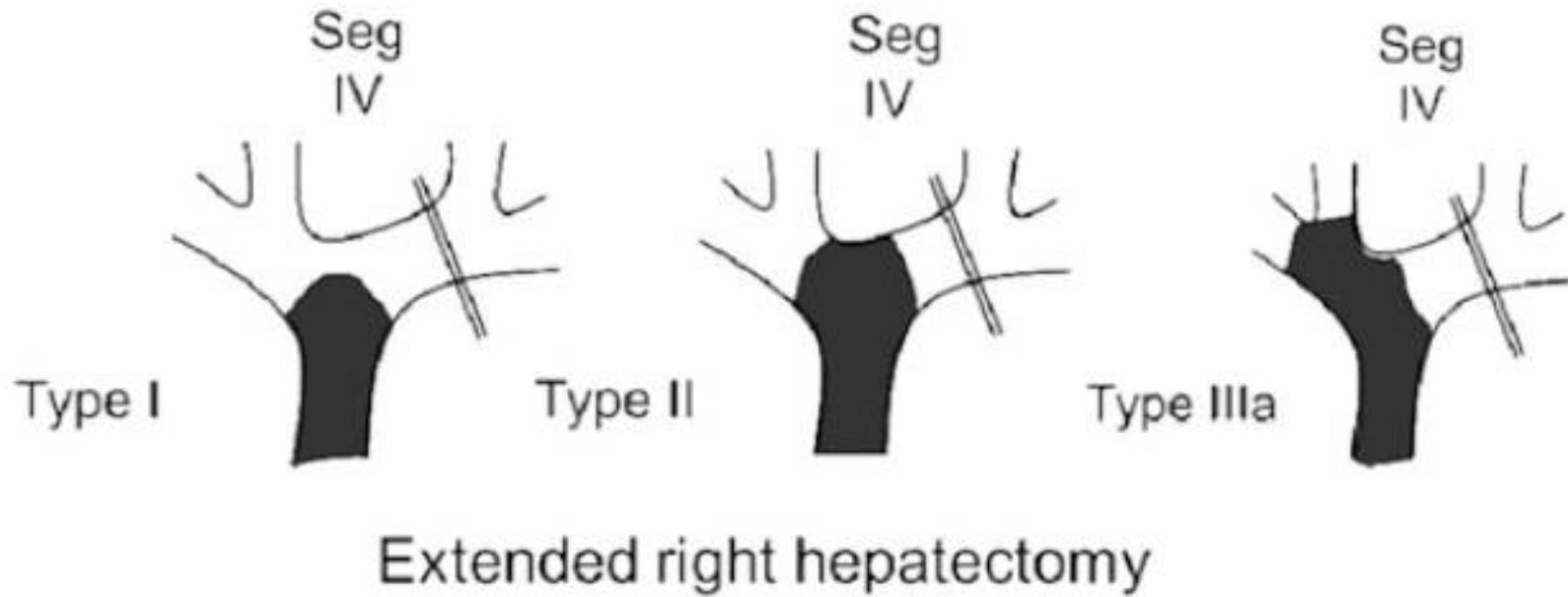
- Local excision
- Hepatectomy
- Liver transplantation

## STANDARD THERAPY

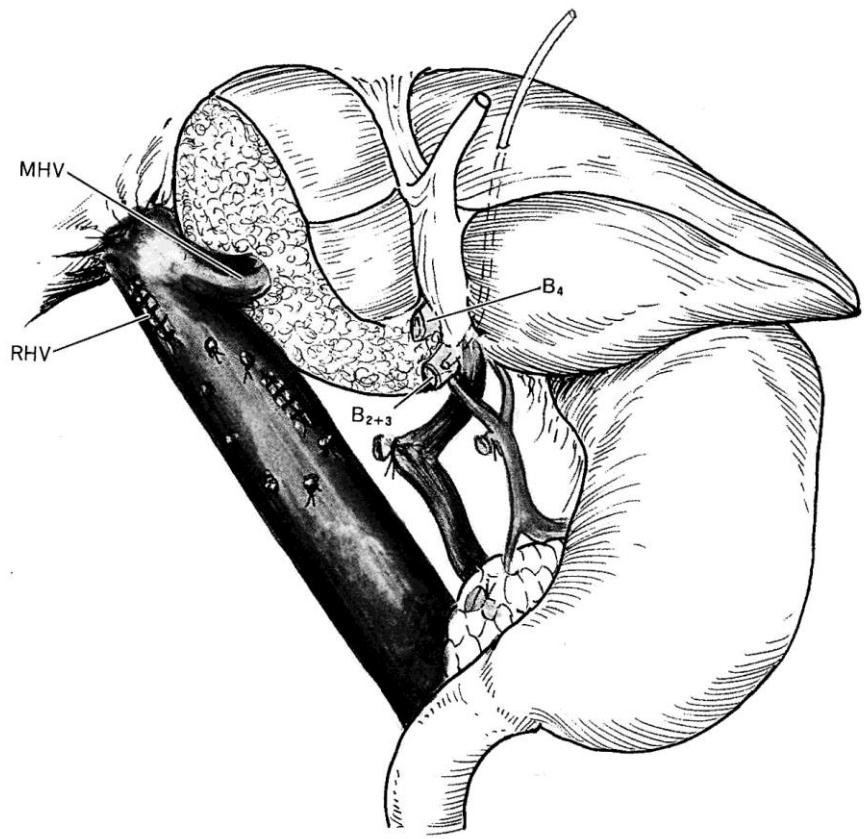
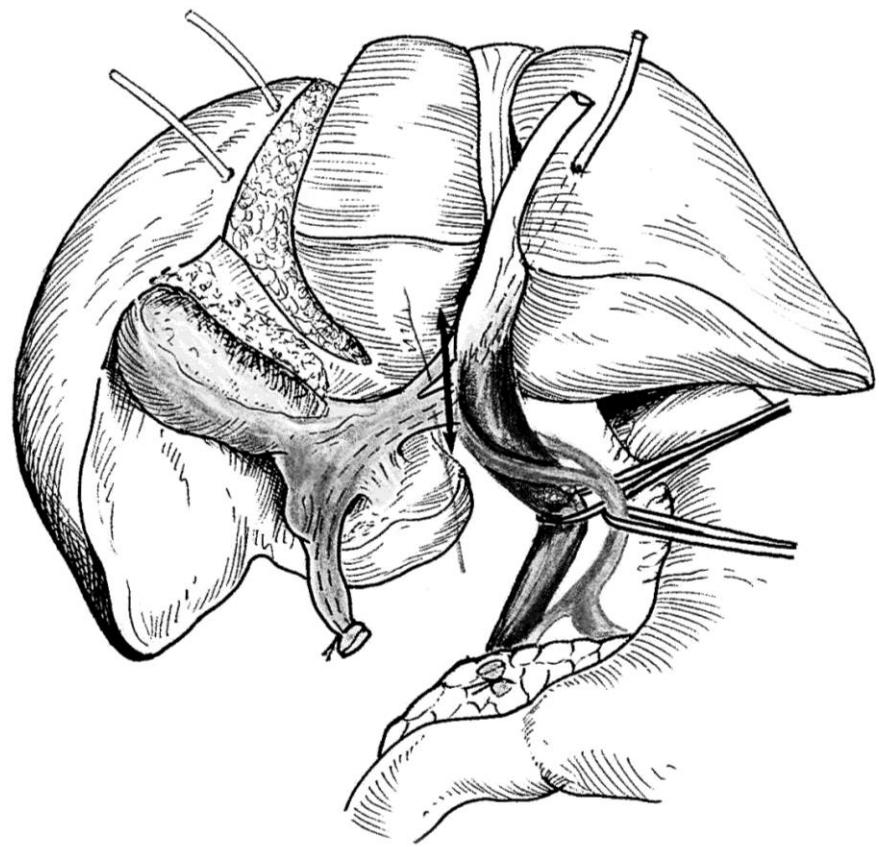
- Major hepatectomy
- Extrahepatic biliary tree resection
- Lymphadenectomy
- Caudate resection
- Biliary reconstruction
- Portal vein resection (?)
- R0 resection

# BISMUTH-CORLETTTE I, II, and IIIa

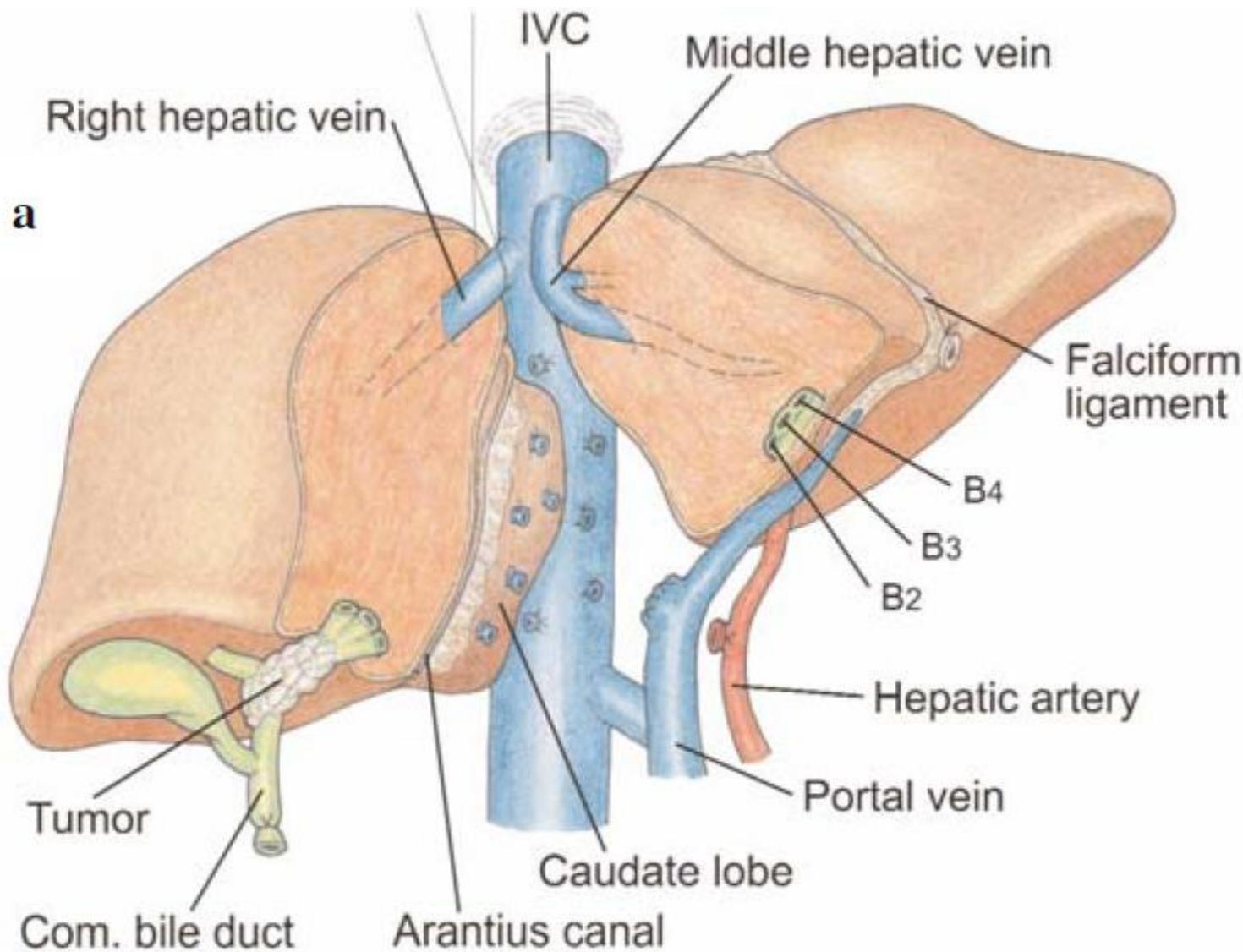
- ☐ Right hepatectomy
- ☐ Extended right hepatectomy



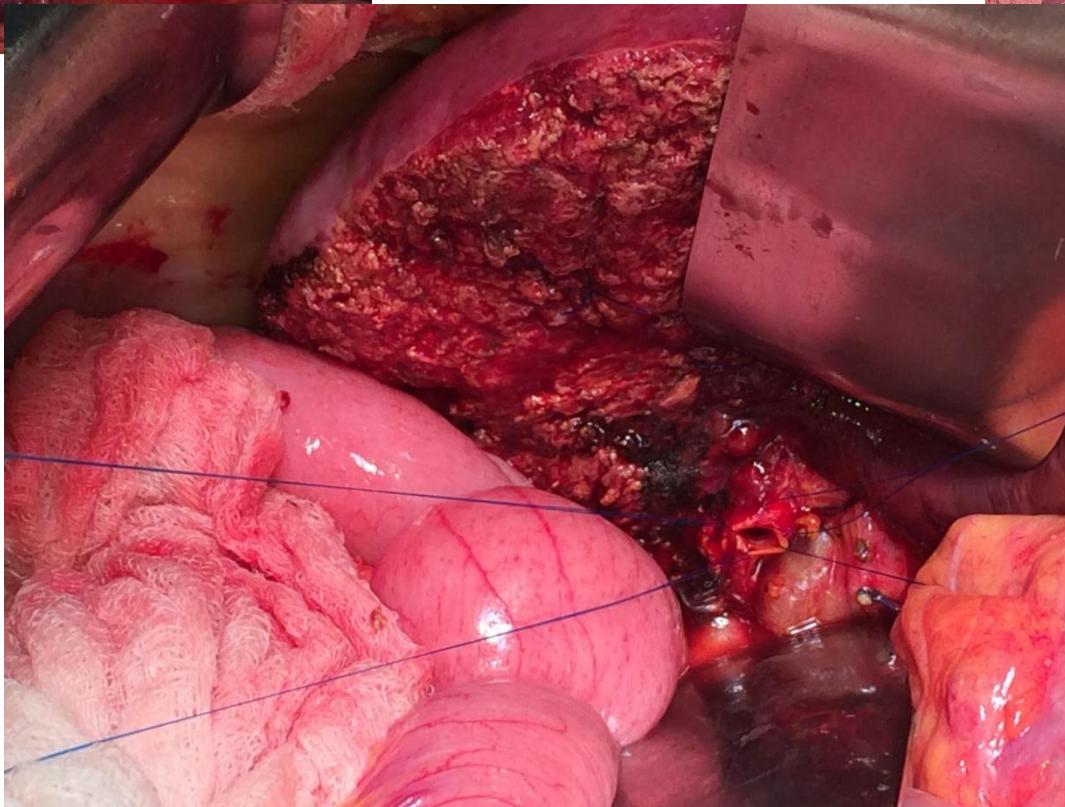
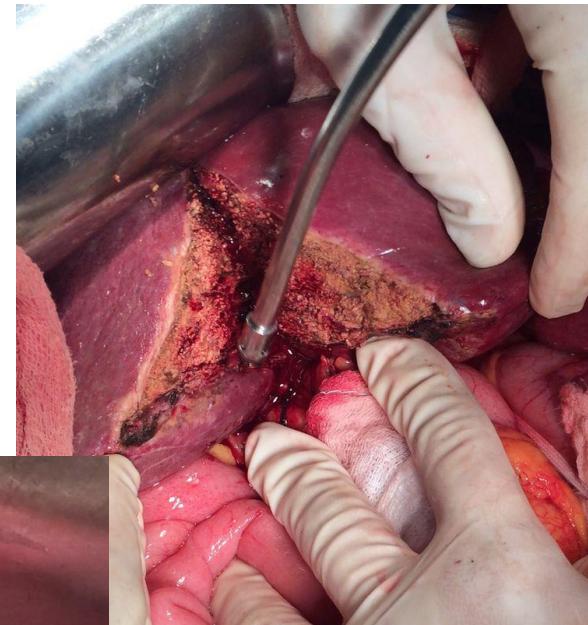
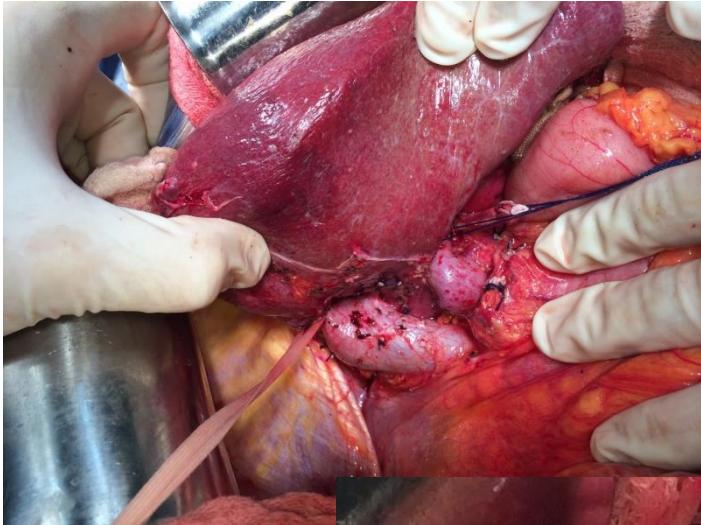
## ☐ Right hepatectomy + caudate



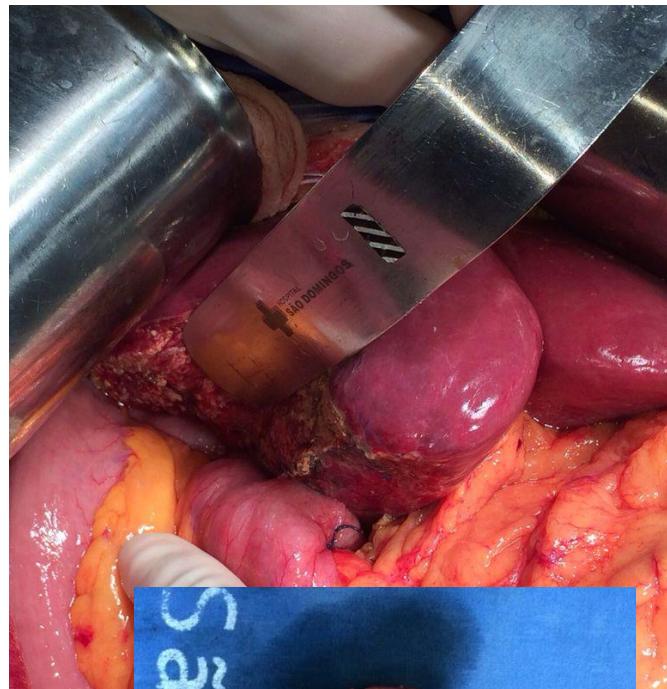
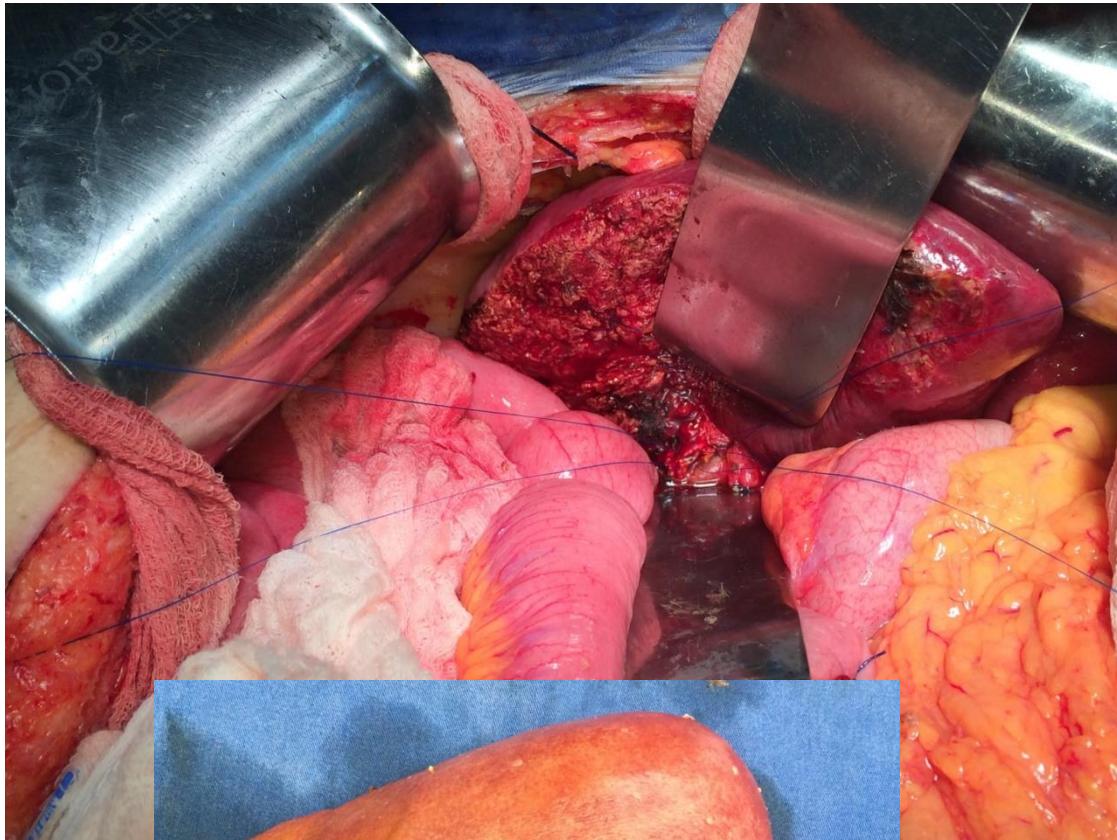
## □ Right hepatectomy + caudate

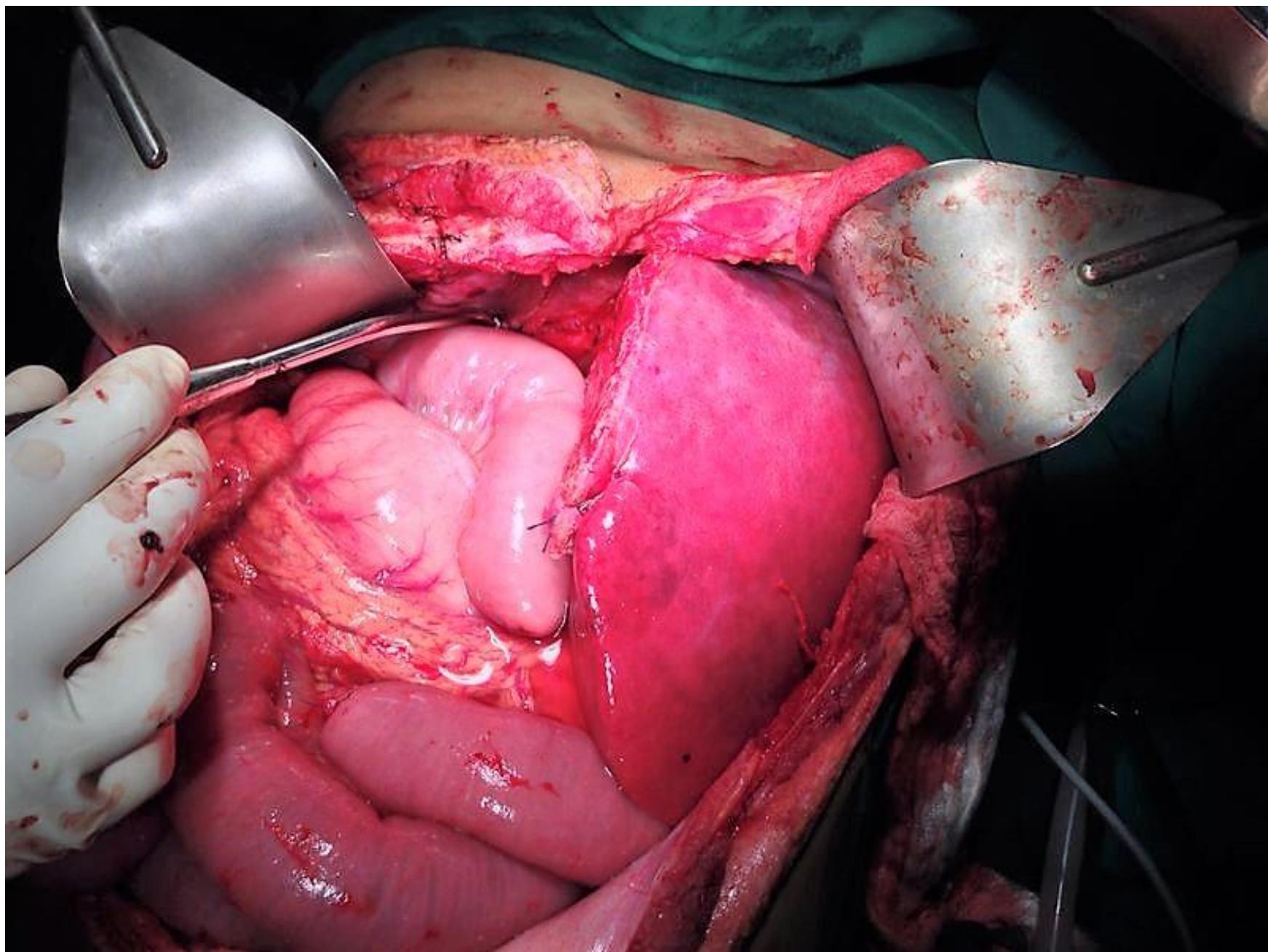


## ☐ Right hepatectomy + caudate



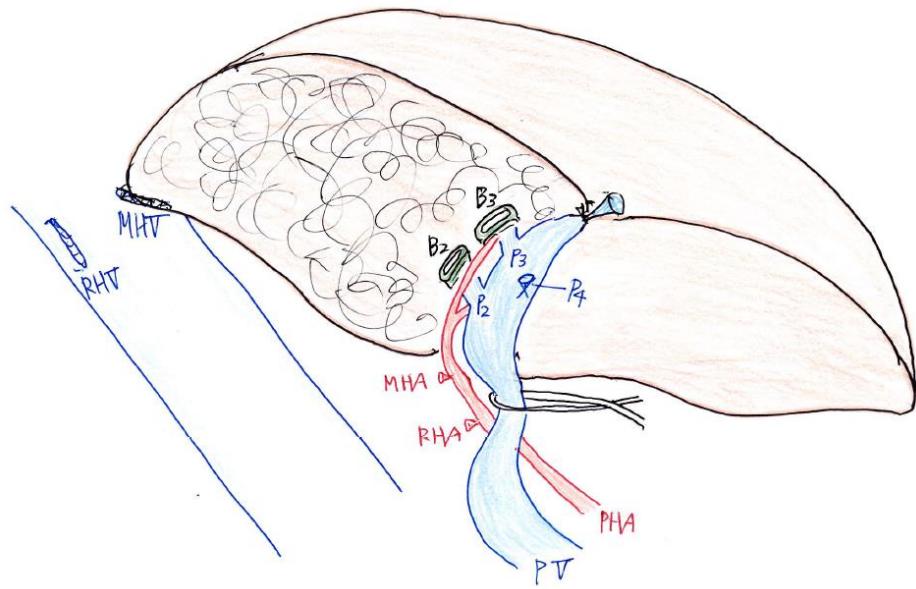
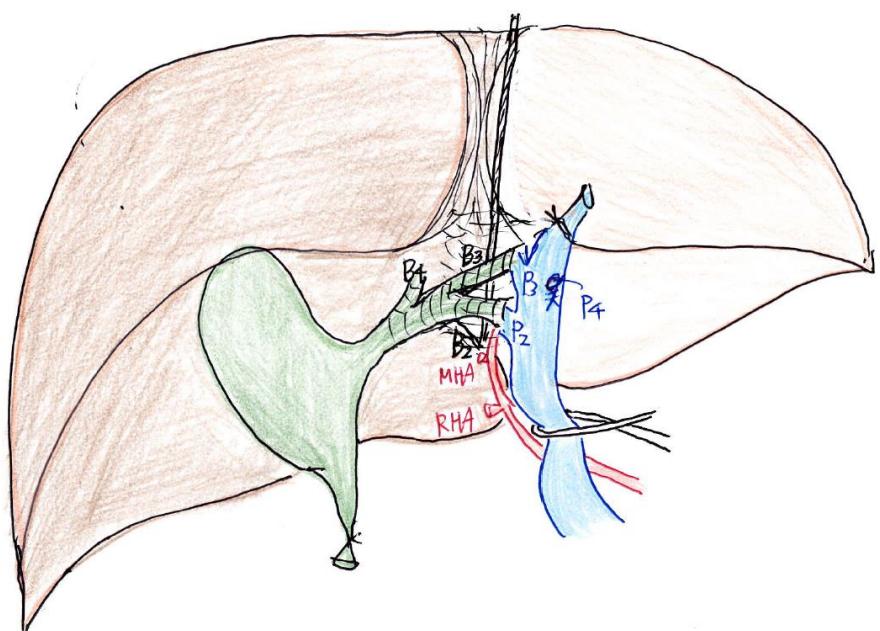
## ☐ Right hepatectomy + caudate



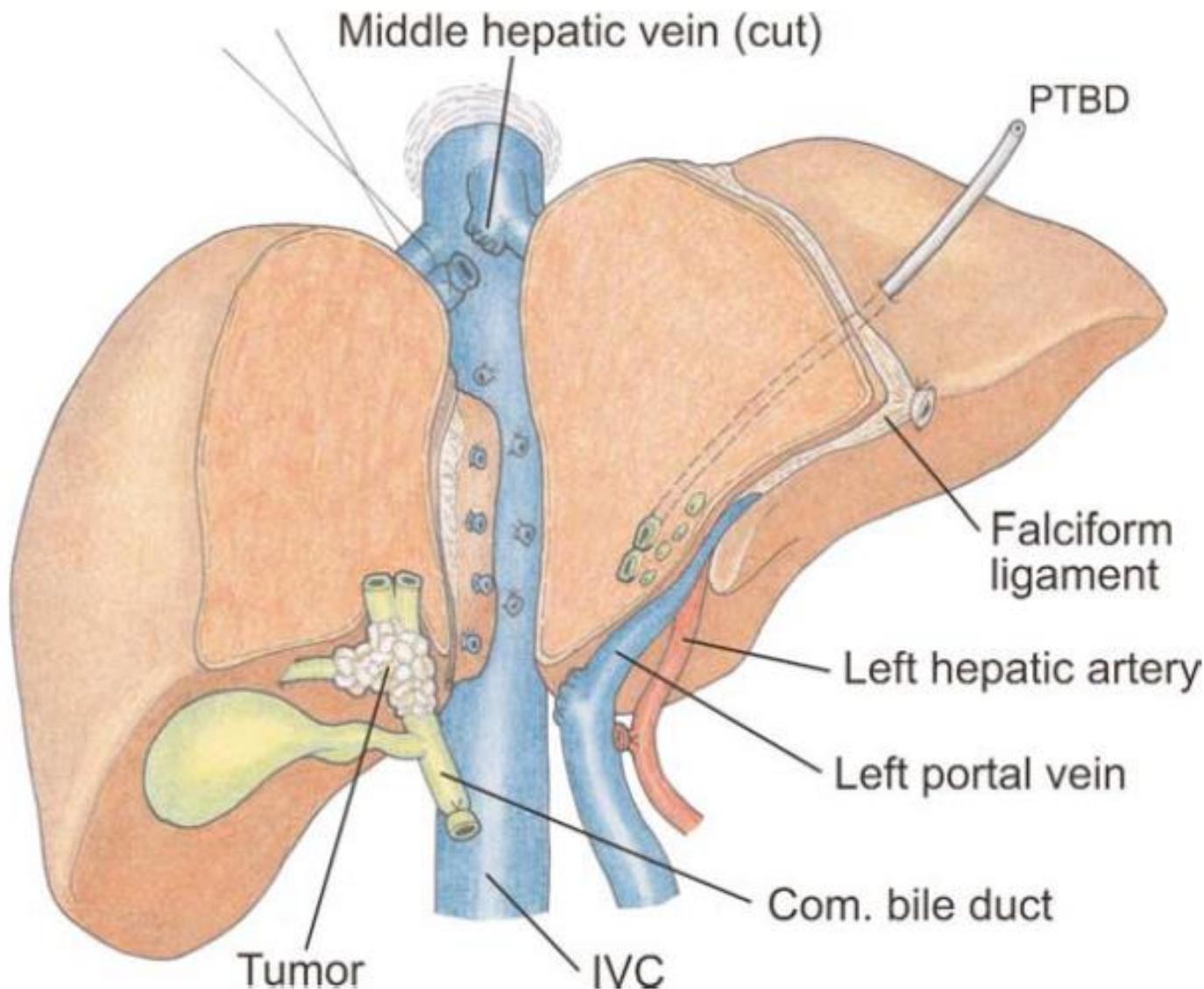


# □ Extended right hepatectomy + caudate

Demarcation

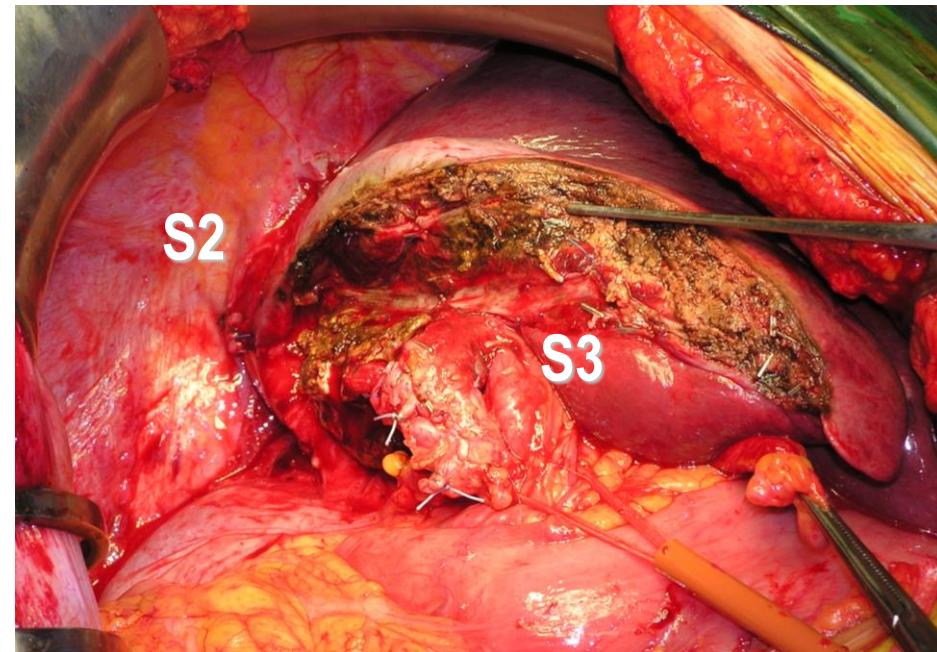
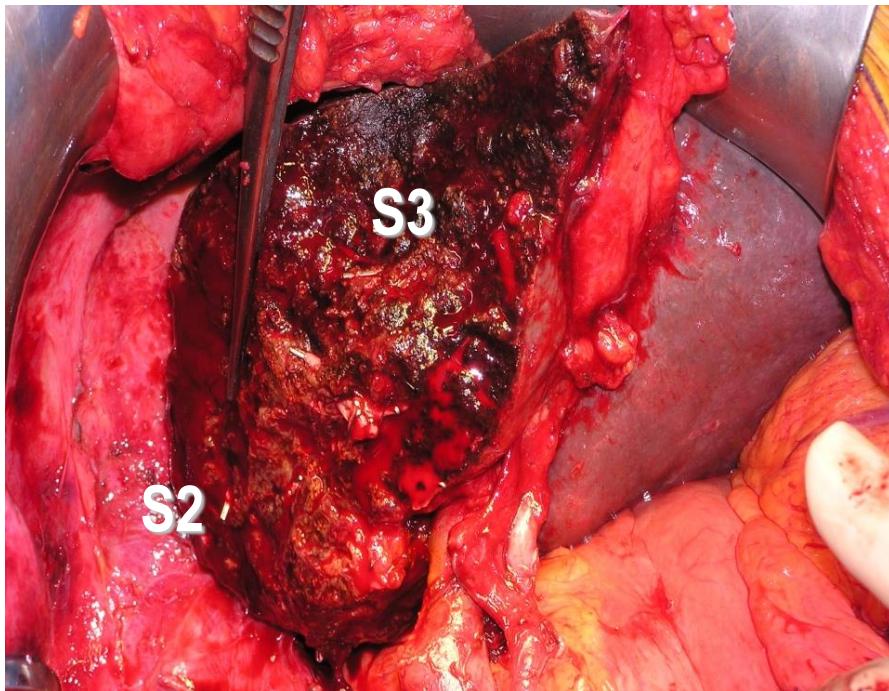


## □ Extended right hepatectomy + caudate

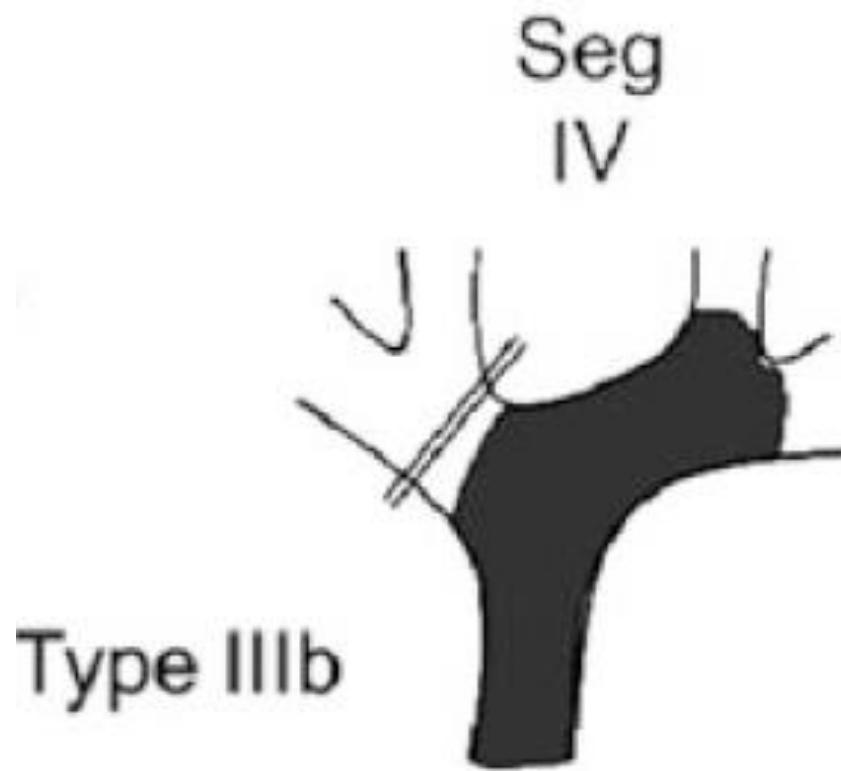


# BISMUTH-CORLETTE I, II, and IIIa

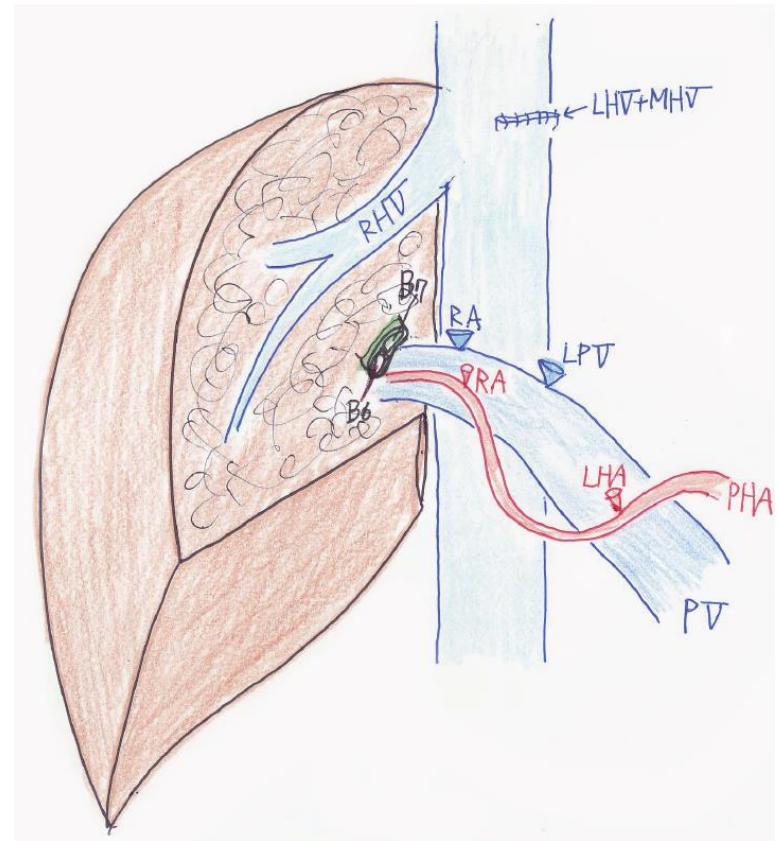
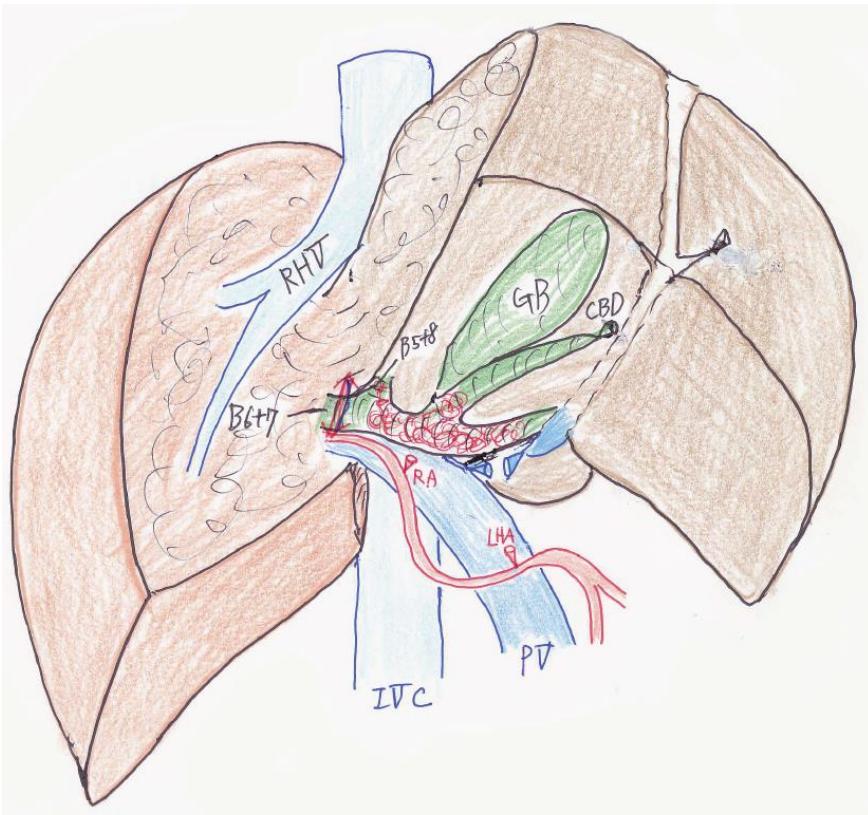
## Extended right hepatectomy + caudate



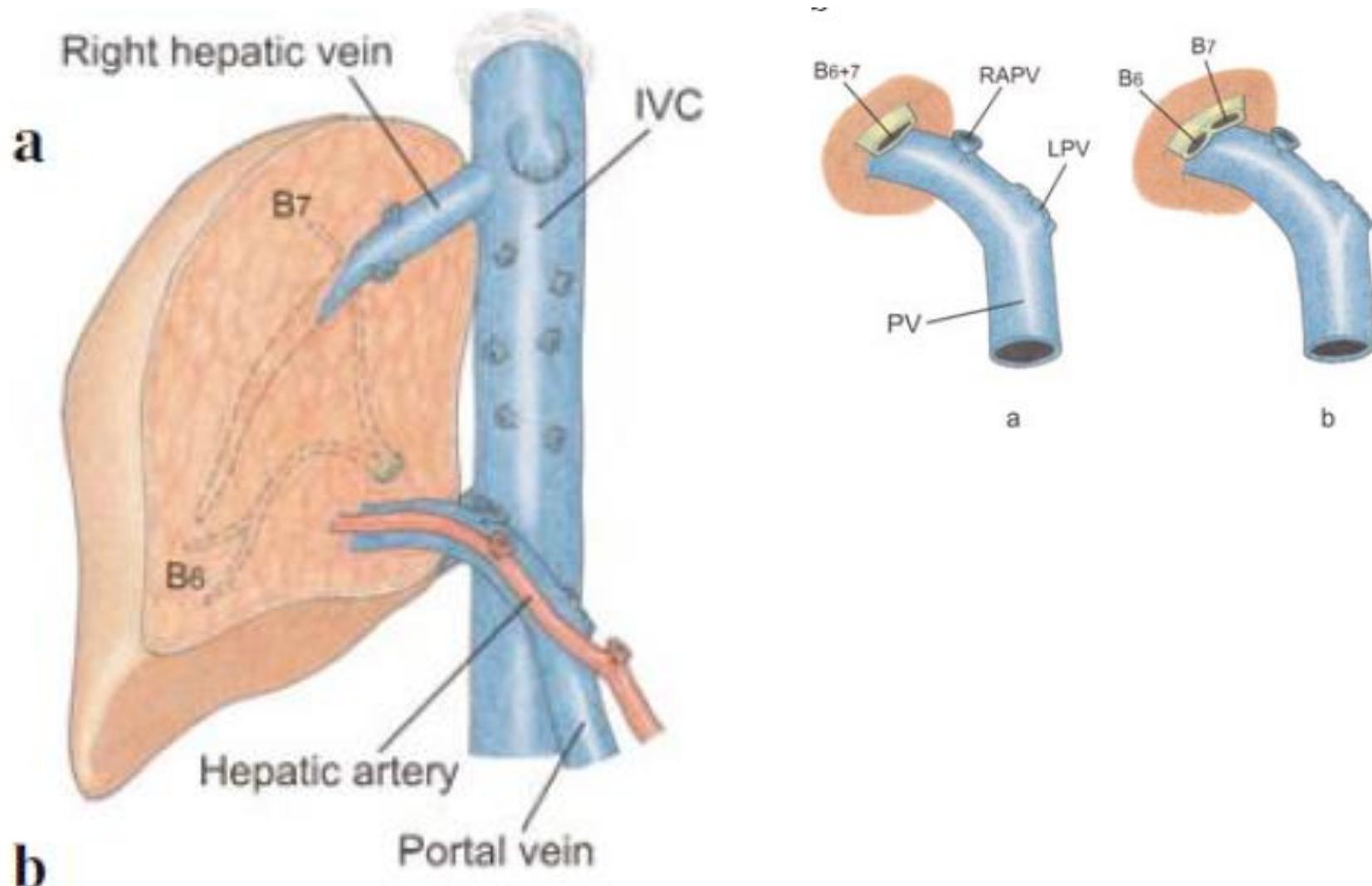
- Left hepatectomy
- Extended left hepatectomy



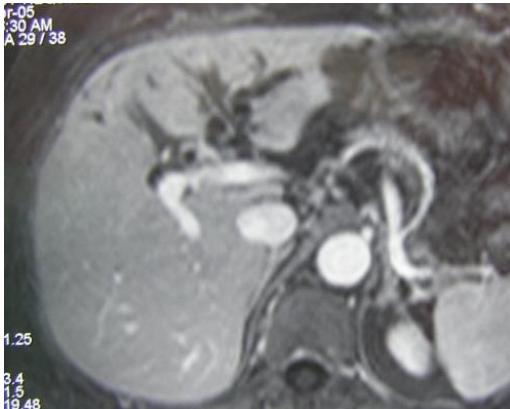
## □ Extended left hepatectomy



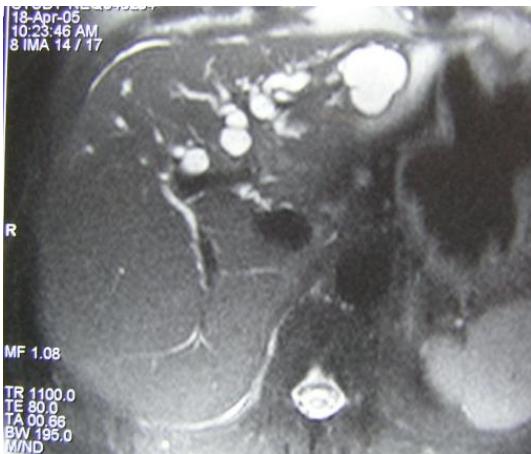
## □ Extended left hepatectomy + caudate



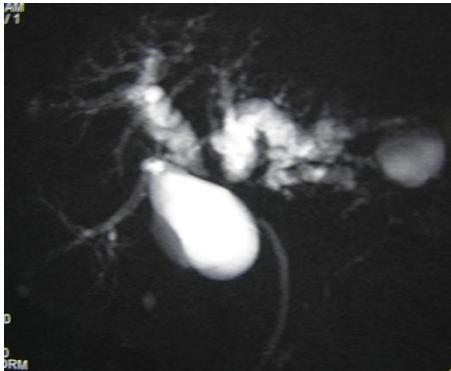
□ The posterior segmental ducts (B6,B7) may be unique or separated



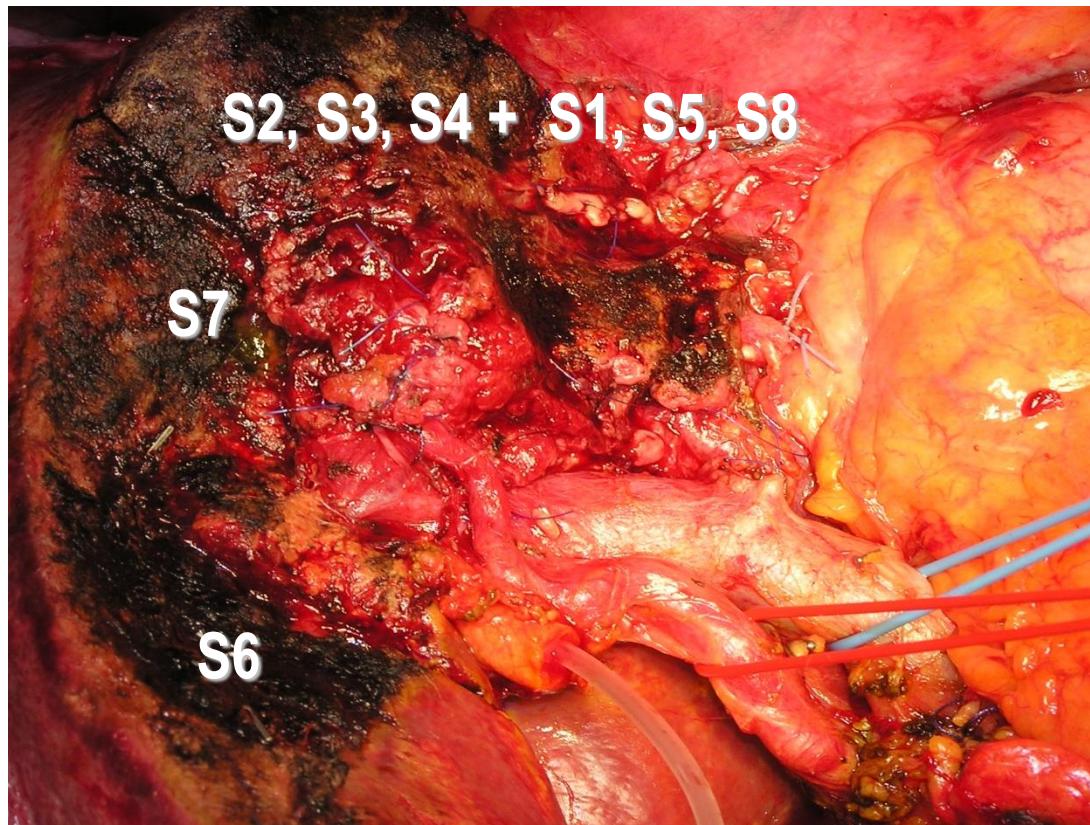
**MRI**



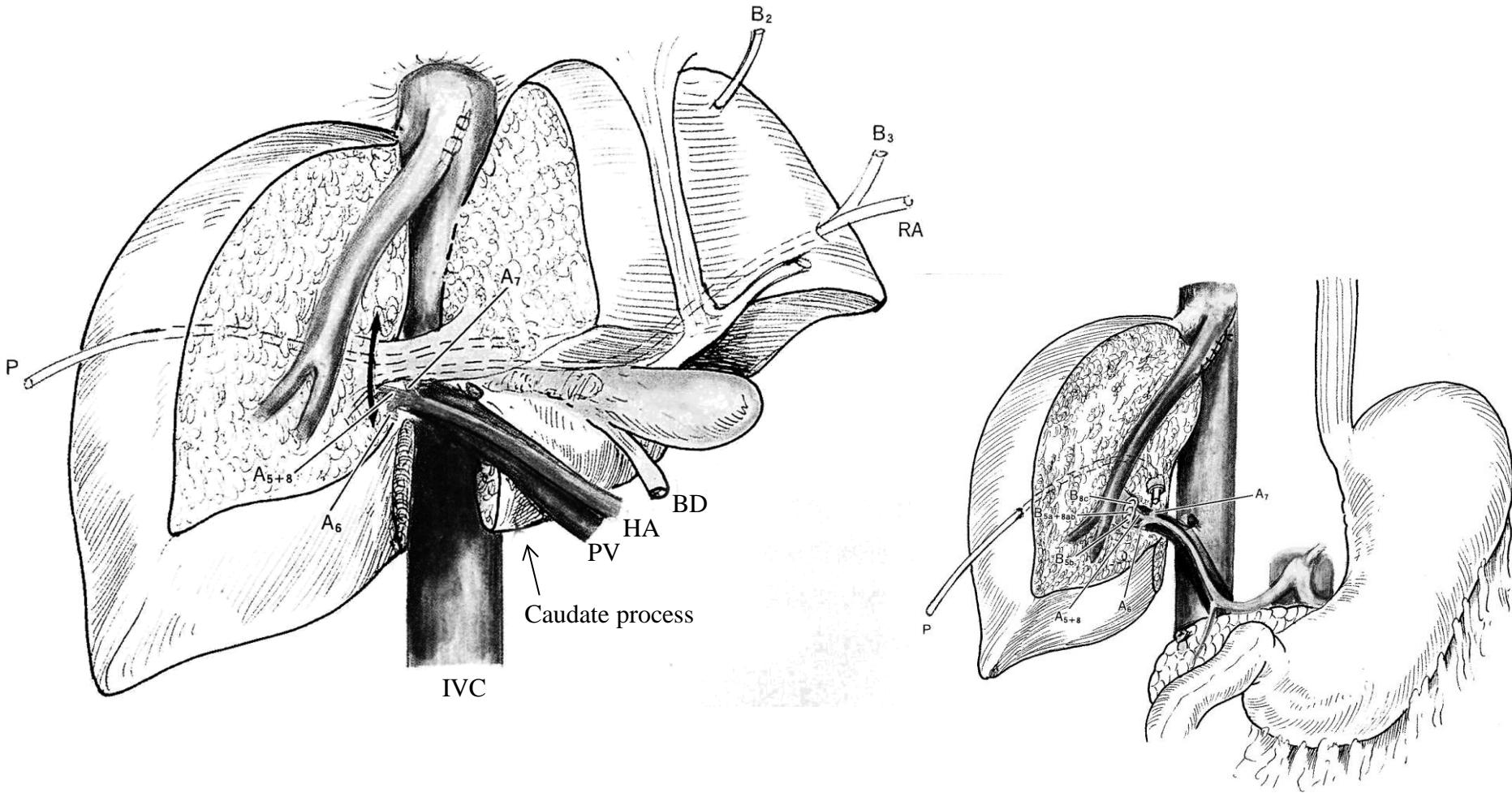
**MRCP**



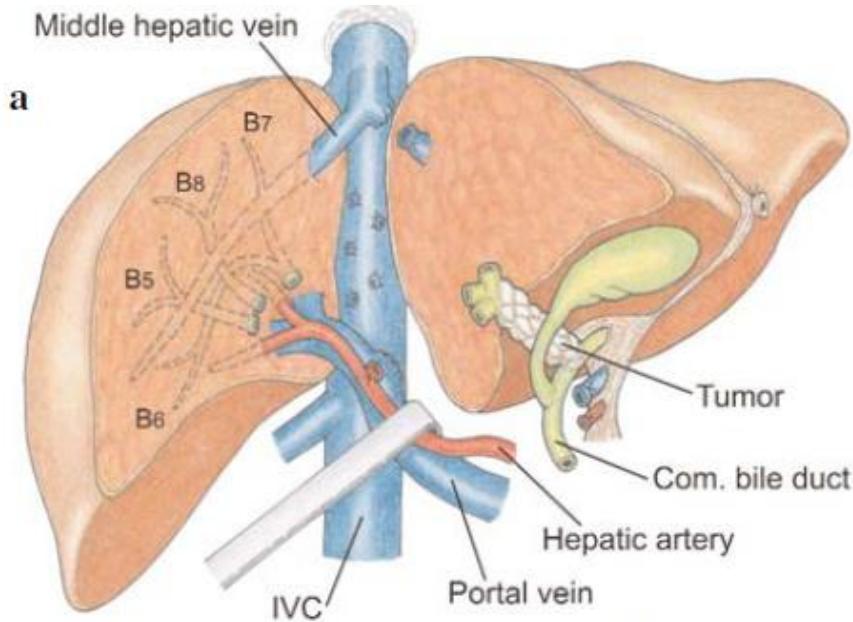
## ☐ Extended left hepatectomy



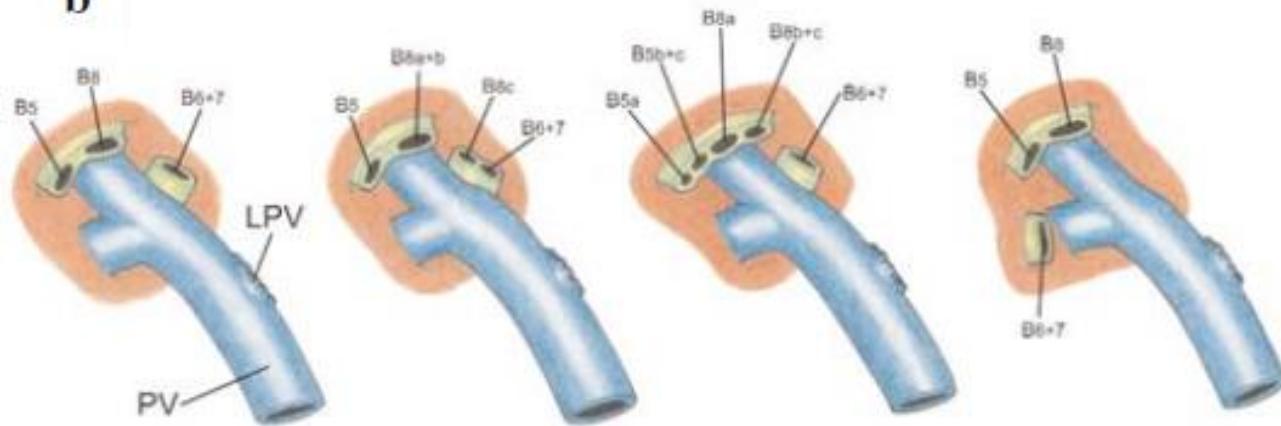
# □ Left hepatectomy + caudate



## □ Left hepatectomy + caudate

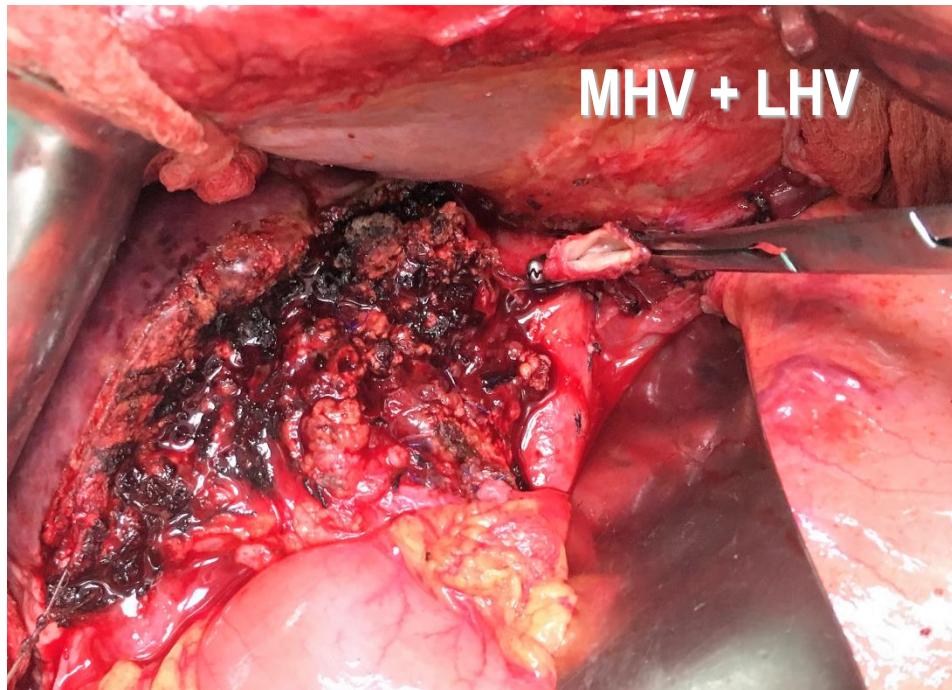


**b**



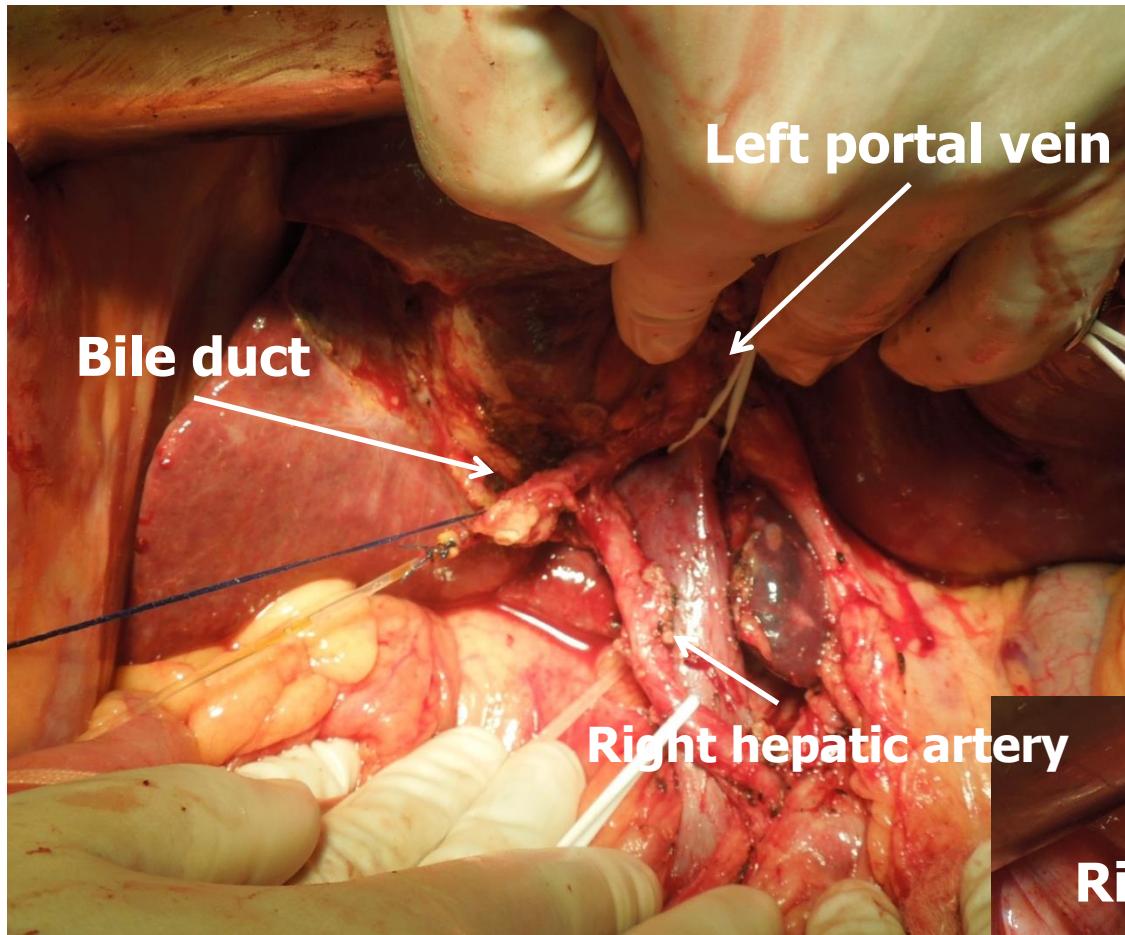
□ The right anterior and posterior bile duct (B5,B8/B6,B7) and different possibilities

## □ Left hepatectomy + caudate

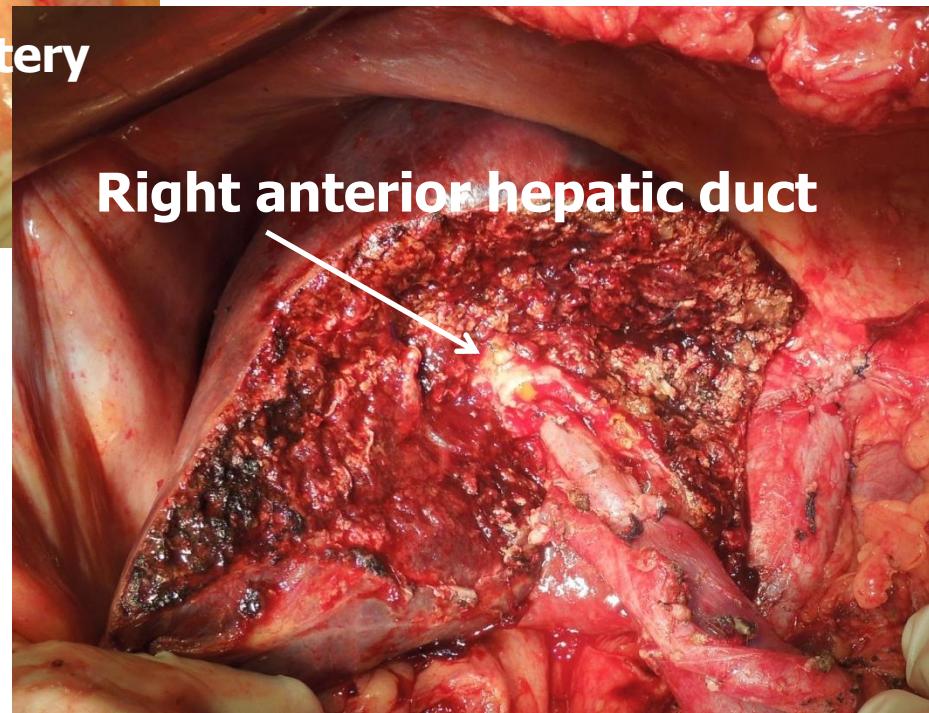


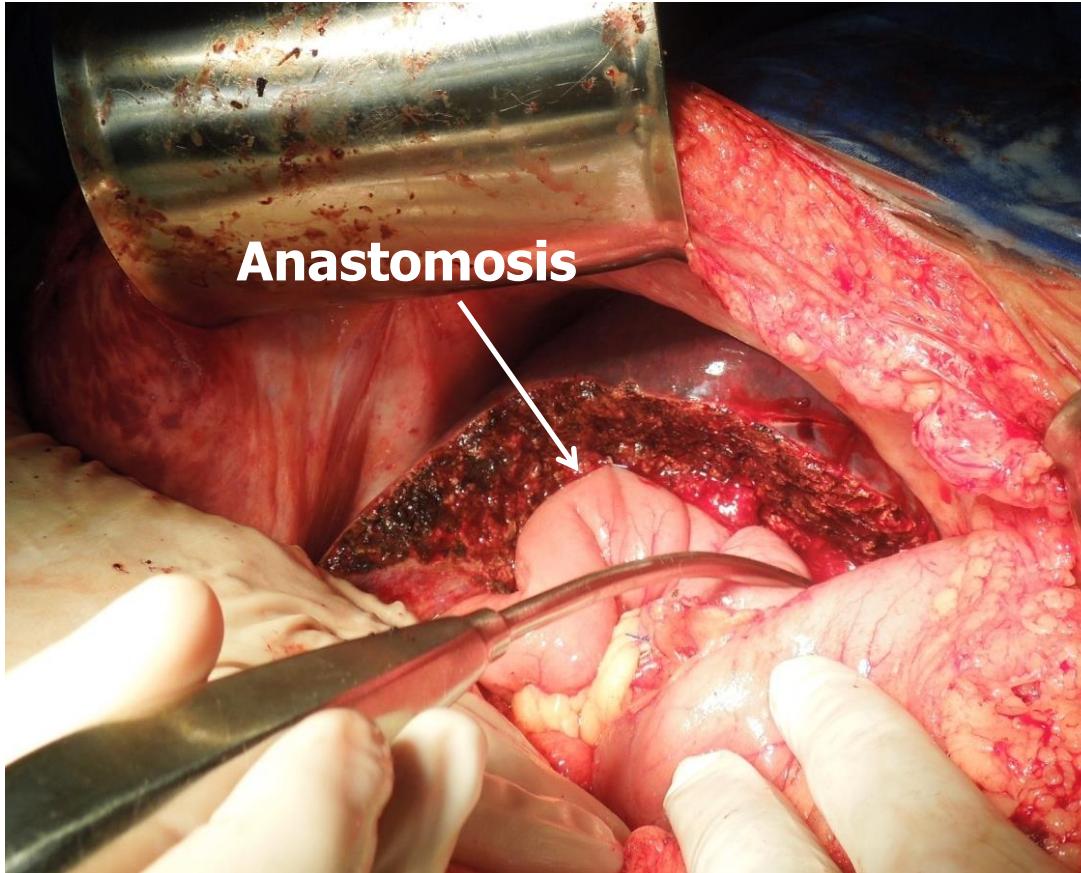
## □ Hanging

Left hepatectomy + caudate

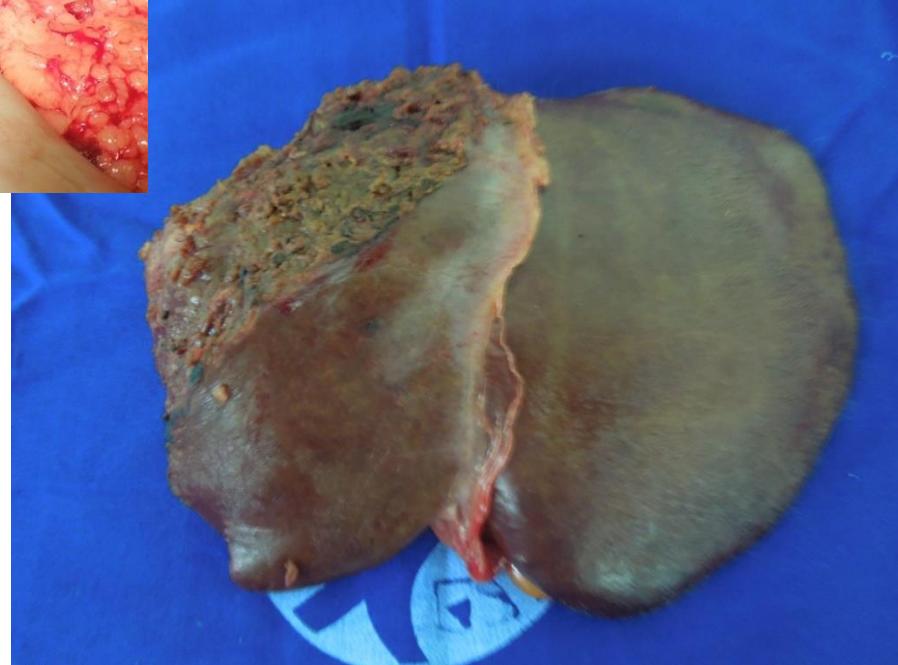


**Right anterior hepatic duct**

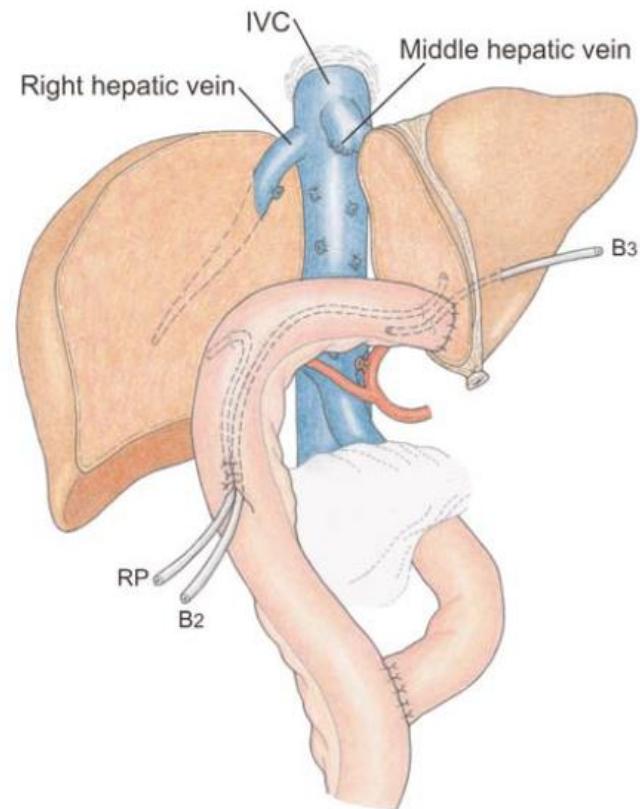
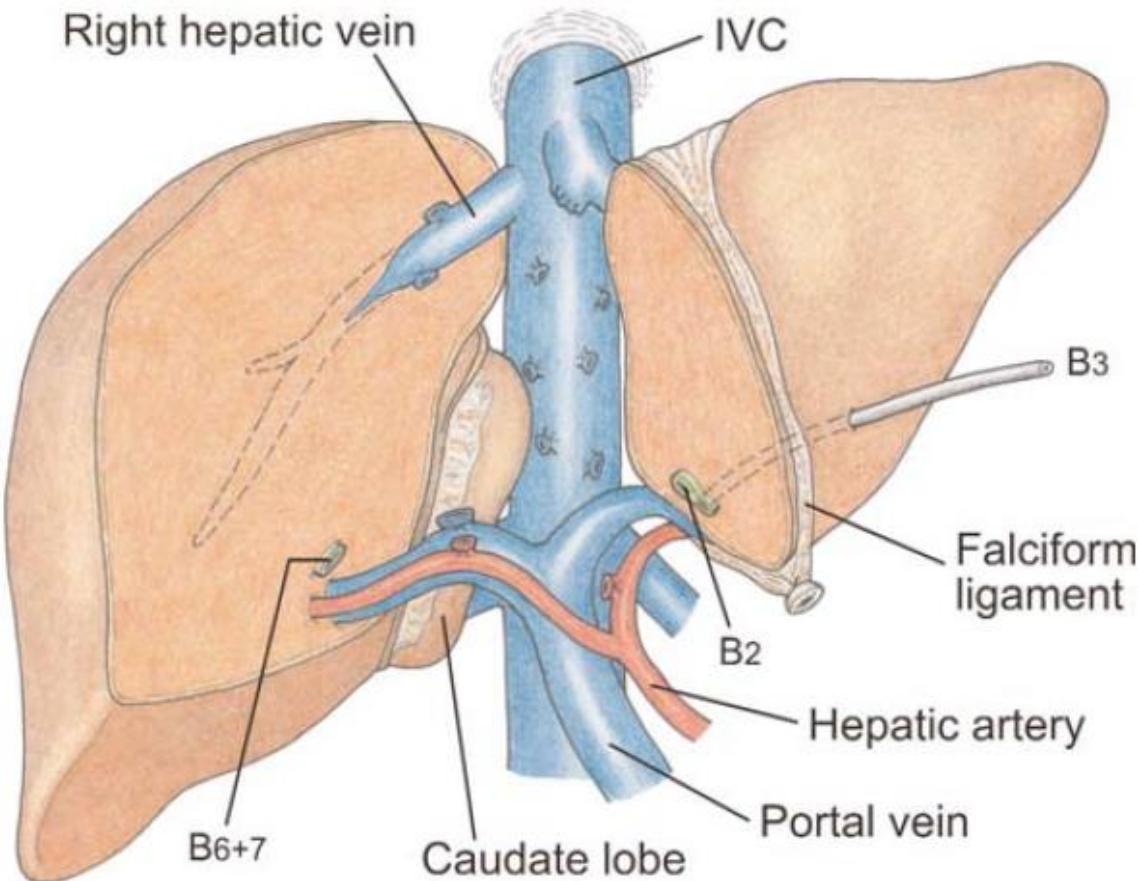




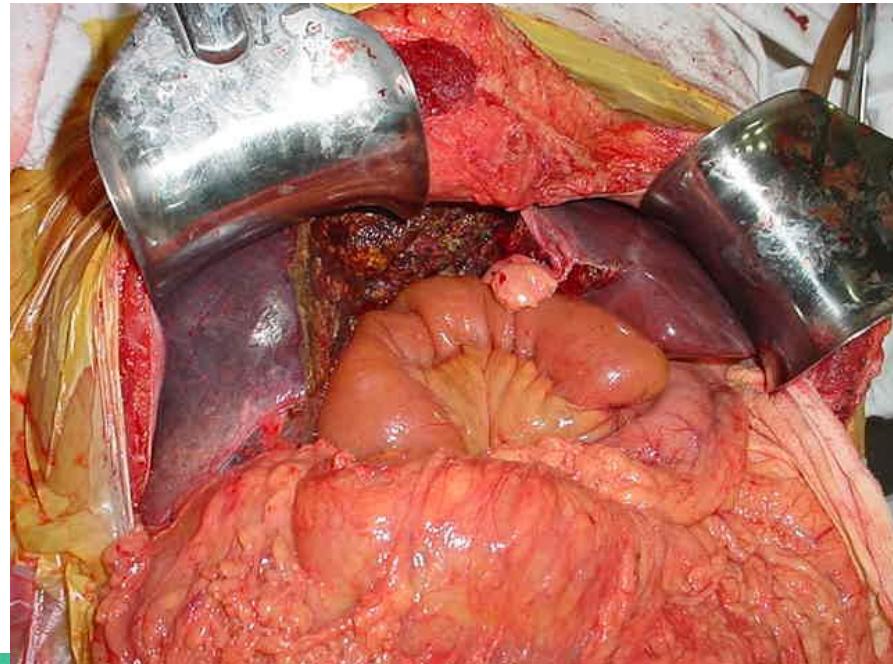
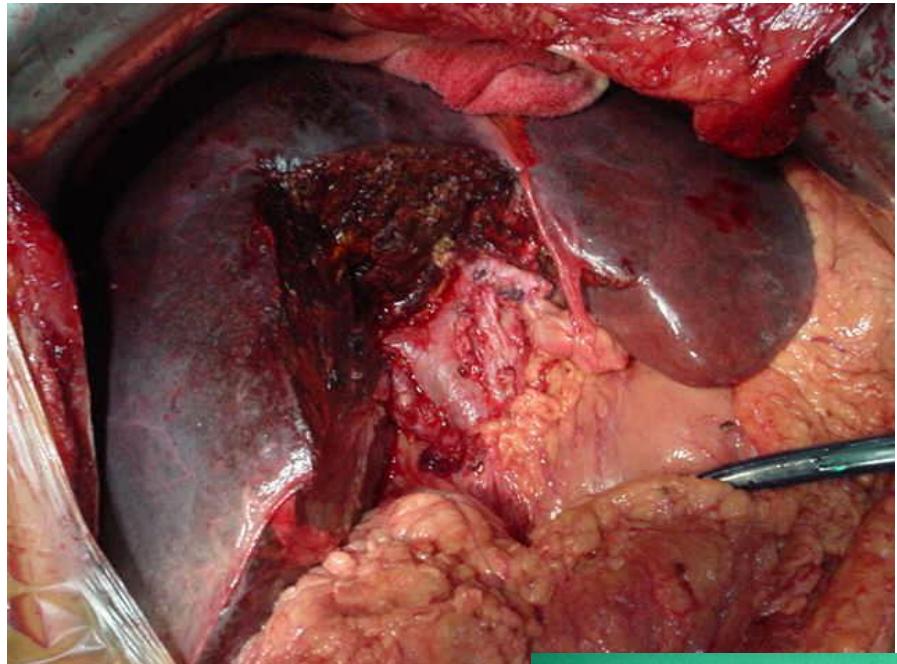
Left hepatectomy + caudate



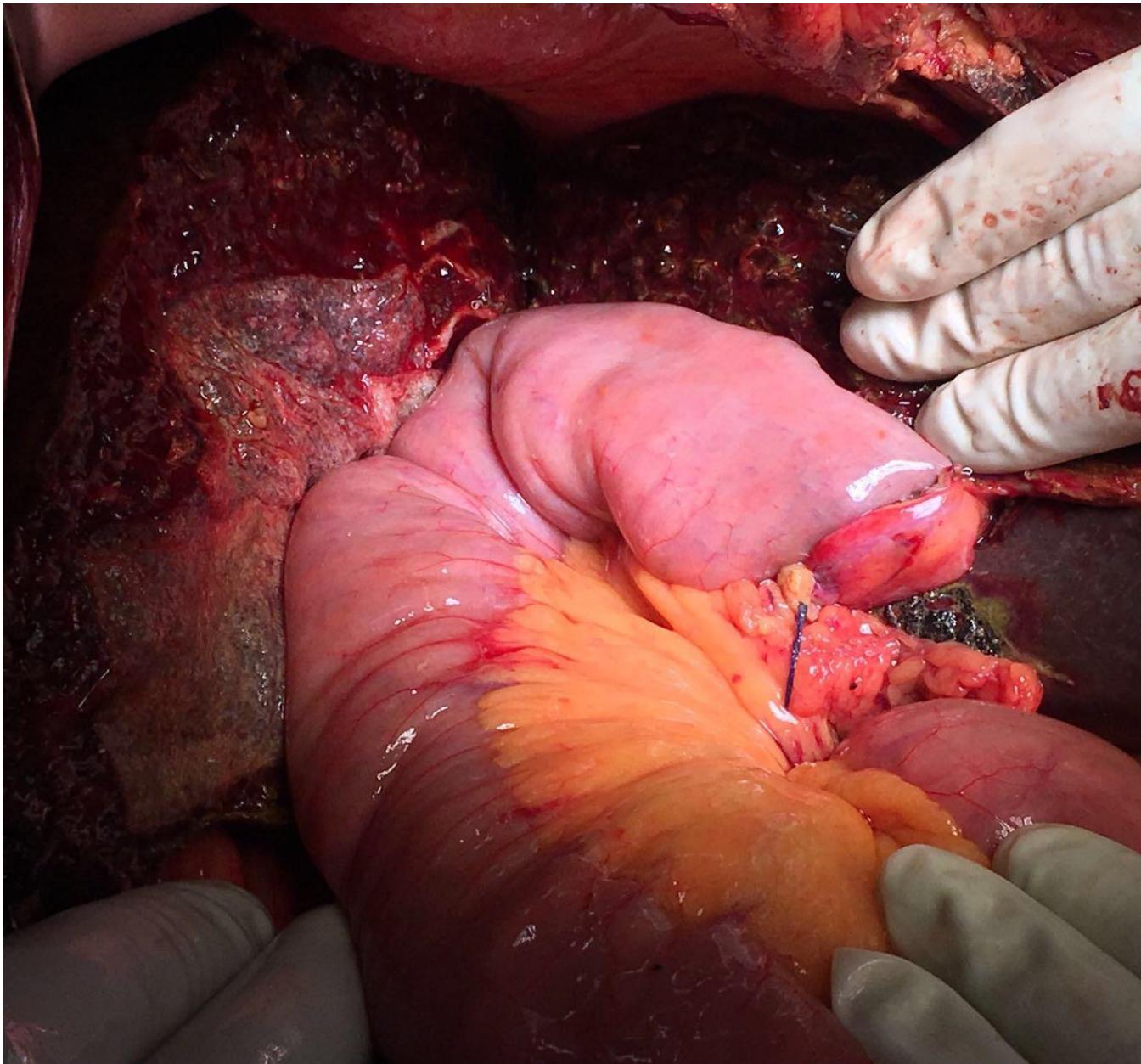
# □Central hepatectomy



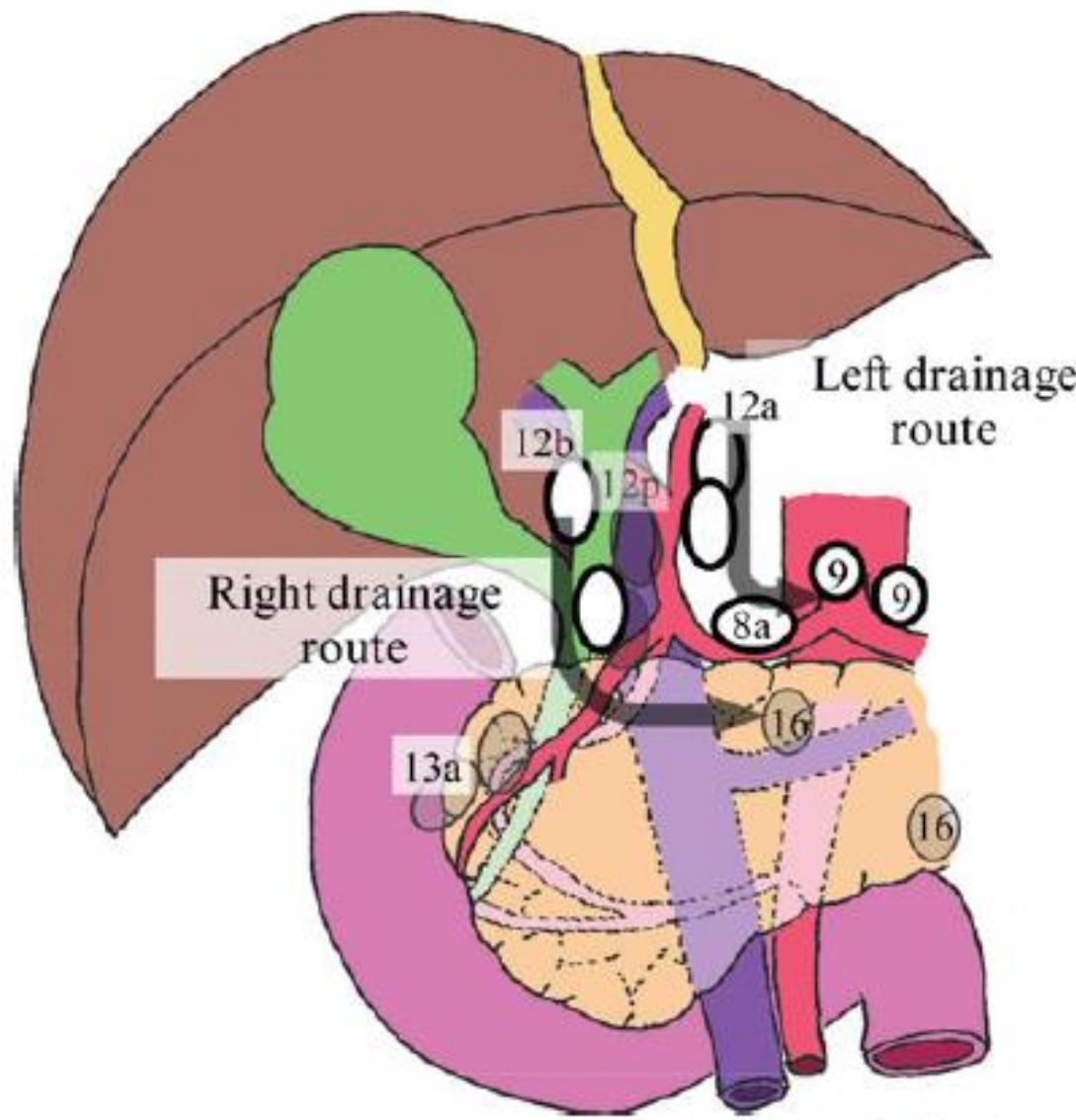
# □Central hepatectomy



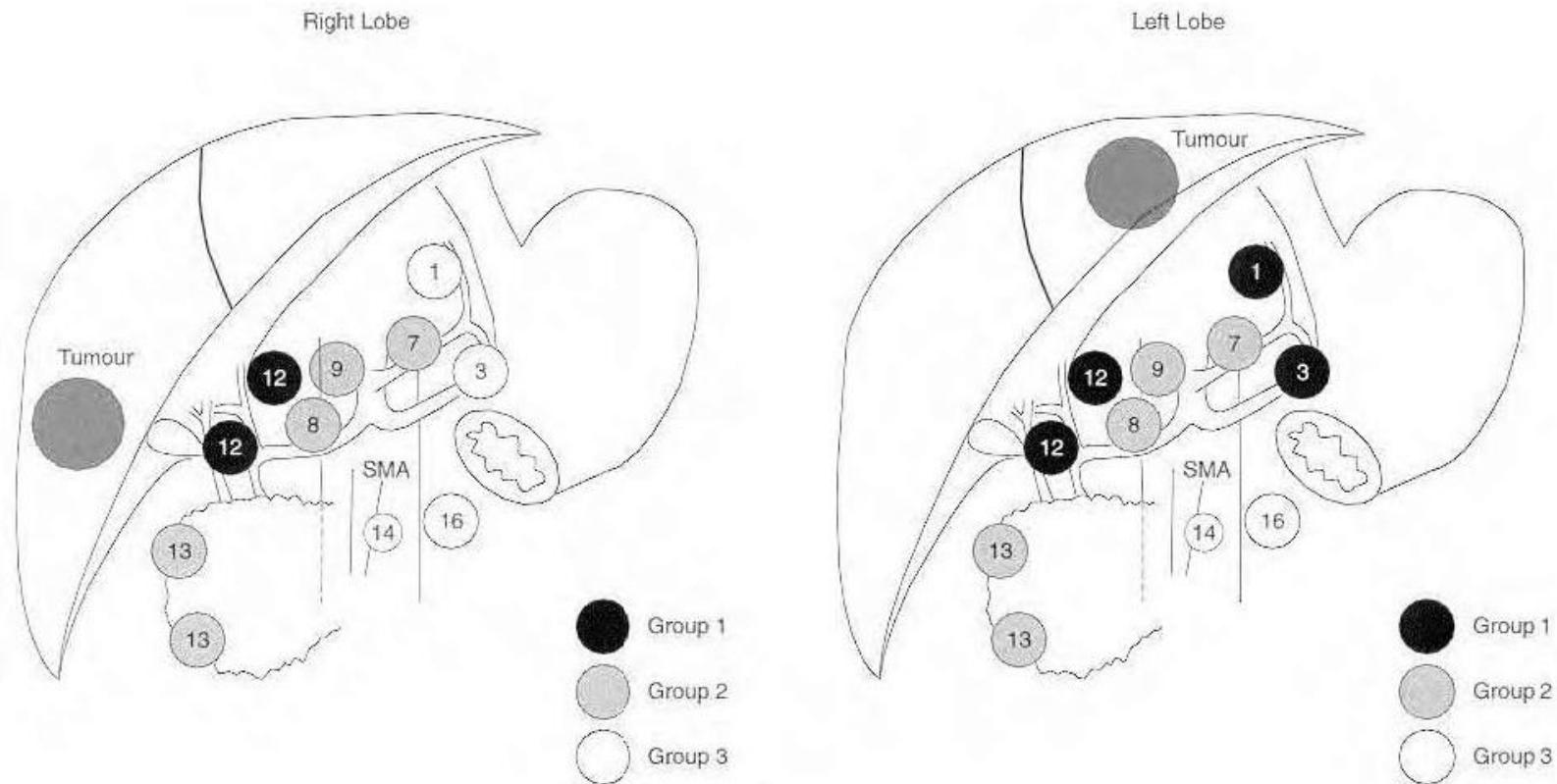
# □Central hepatectomy



# LYMPHADENECTOMY



# LYMPHADENECTOMY



**FIGURE 14.4**

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

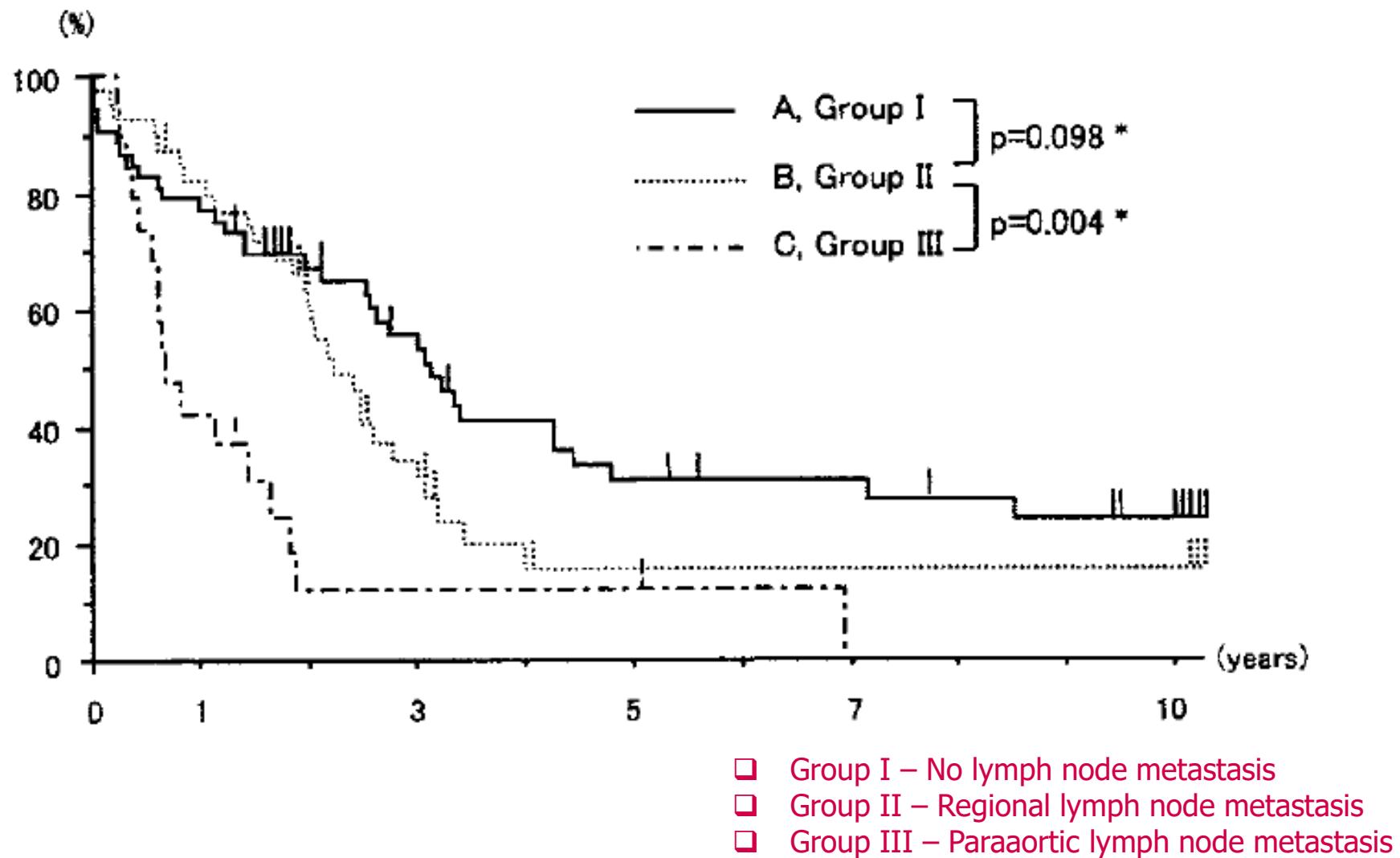
## Lymph Node Metastasis from Hilar Cholangiocarcinoma: Audit of 110 Patients Who Underwent Regional and Paraaortic Node Dissection

Table 2. DEFINITION OF REGIONAL LYMPH NODE GROUPS

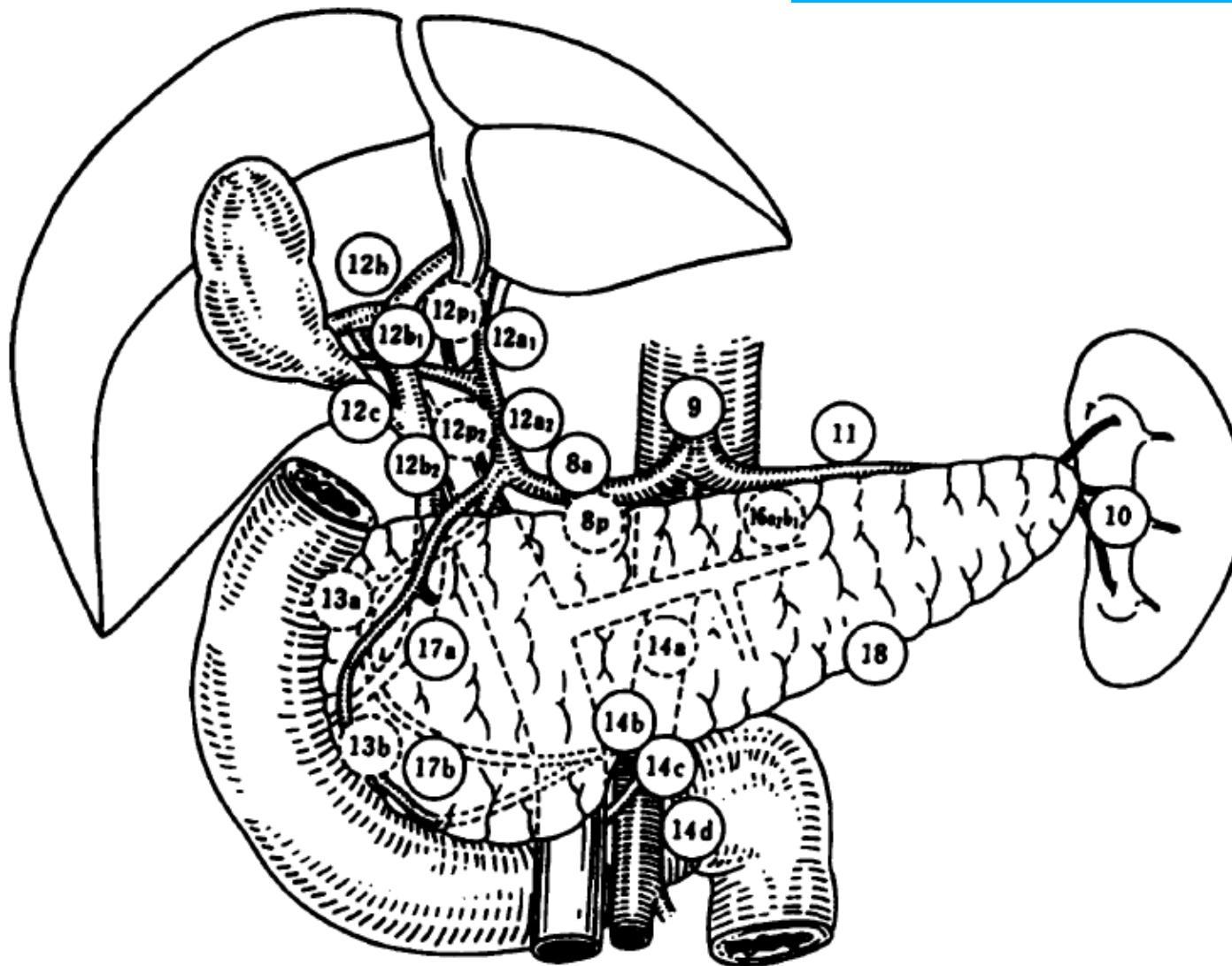
TNM classification	This Study
N1	N1
Hilar	Pericholedochal (No. 12h, 12c, 12b)
Cystic duct	
Pericholedochal	
N2	N2
Periportal	Periportal (No. 12 p, 12a)
Peri duodenal	Common hepatic (No. 8a, 8p)
Peripancreatic	Posterior pancreaticoduodenal (No. 13a)
Celiac	Celiac (No. 9)
Superior mesenteric	Superior mesenteric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

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

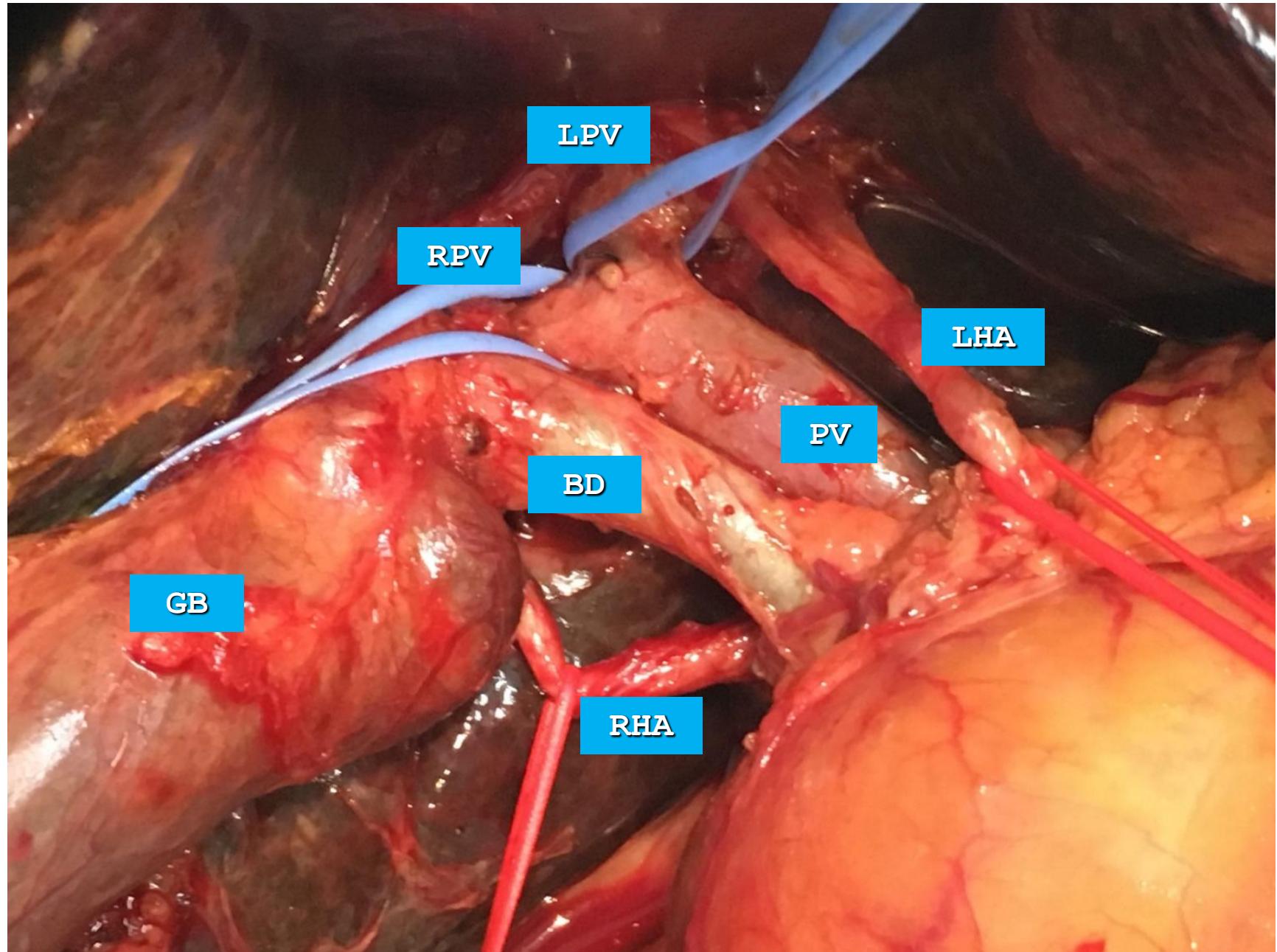
# LYMPHADENECTION

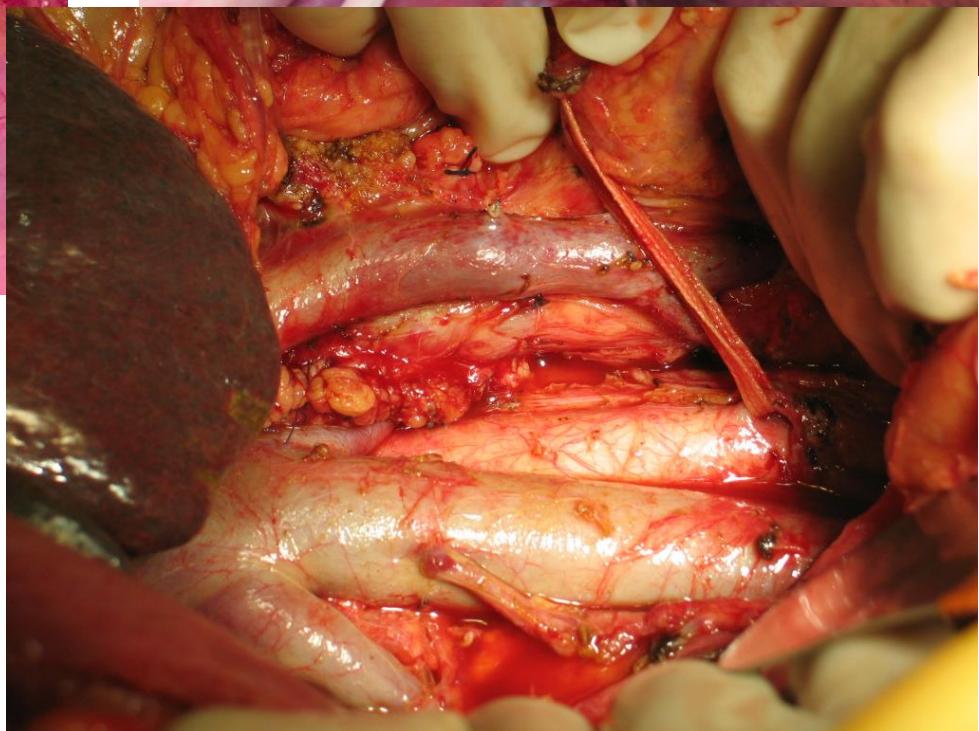
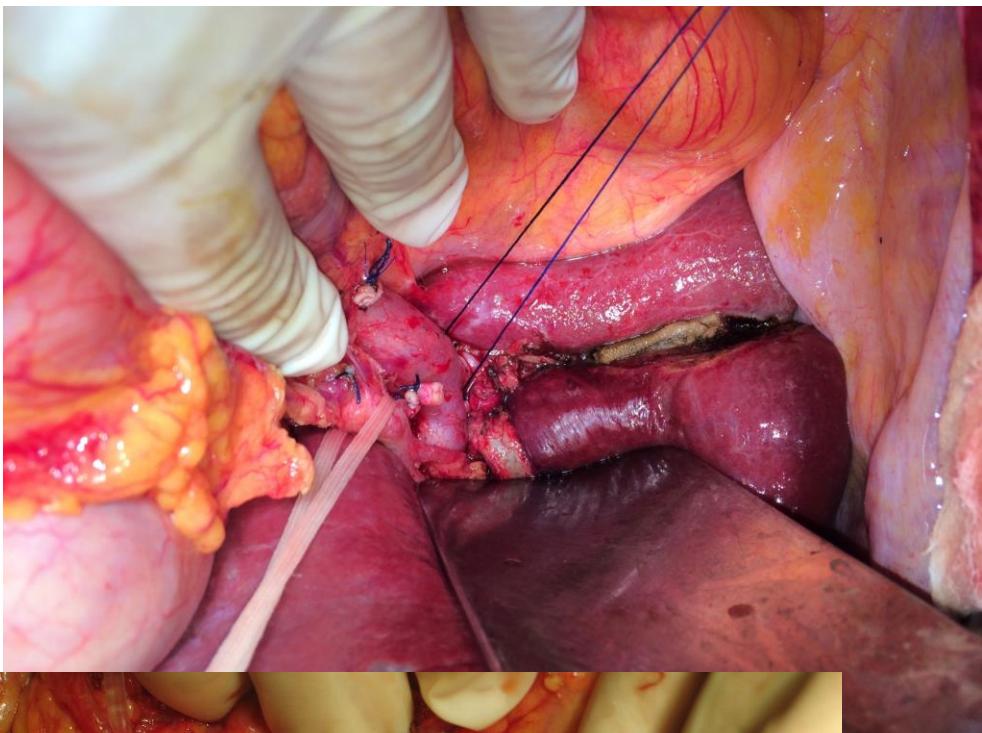
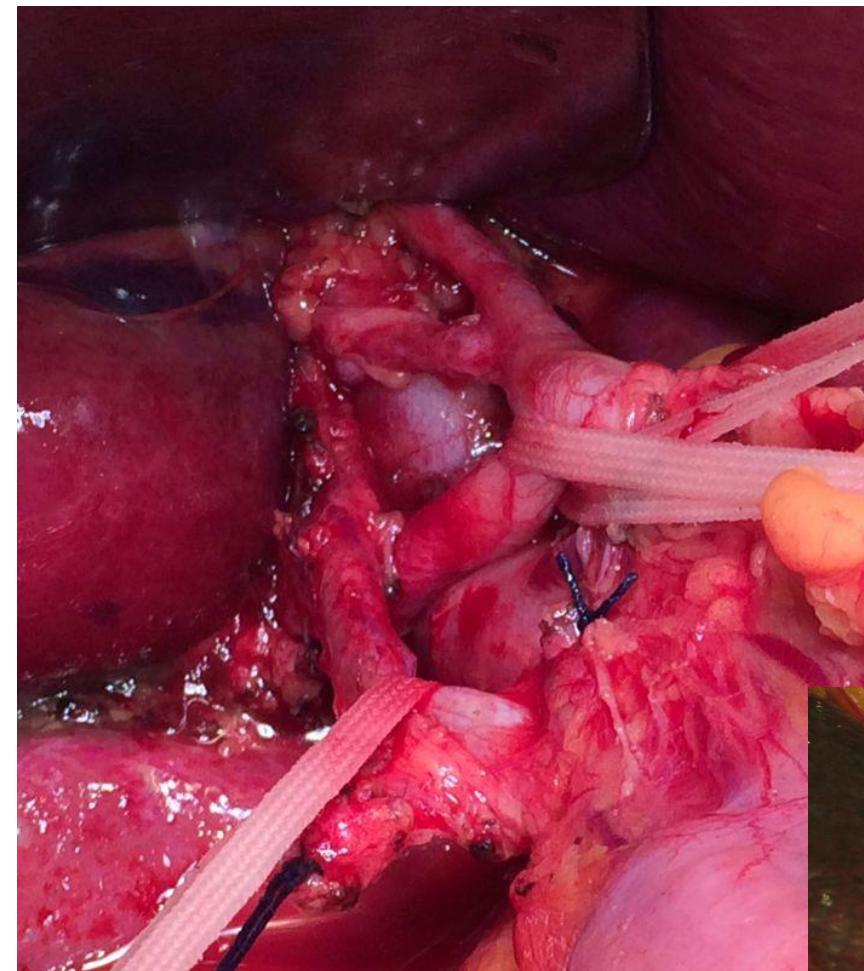


# LYMPHADENECTOMY



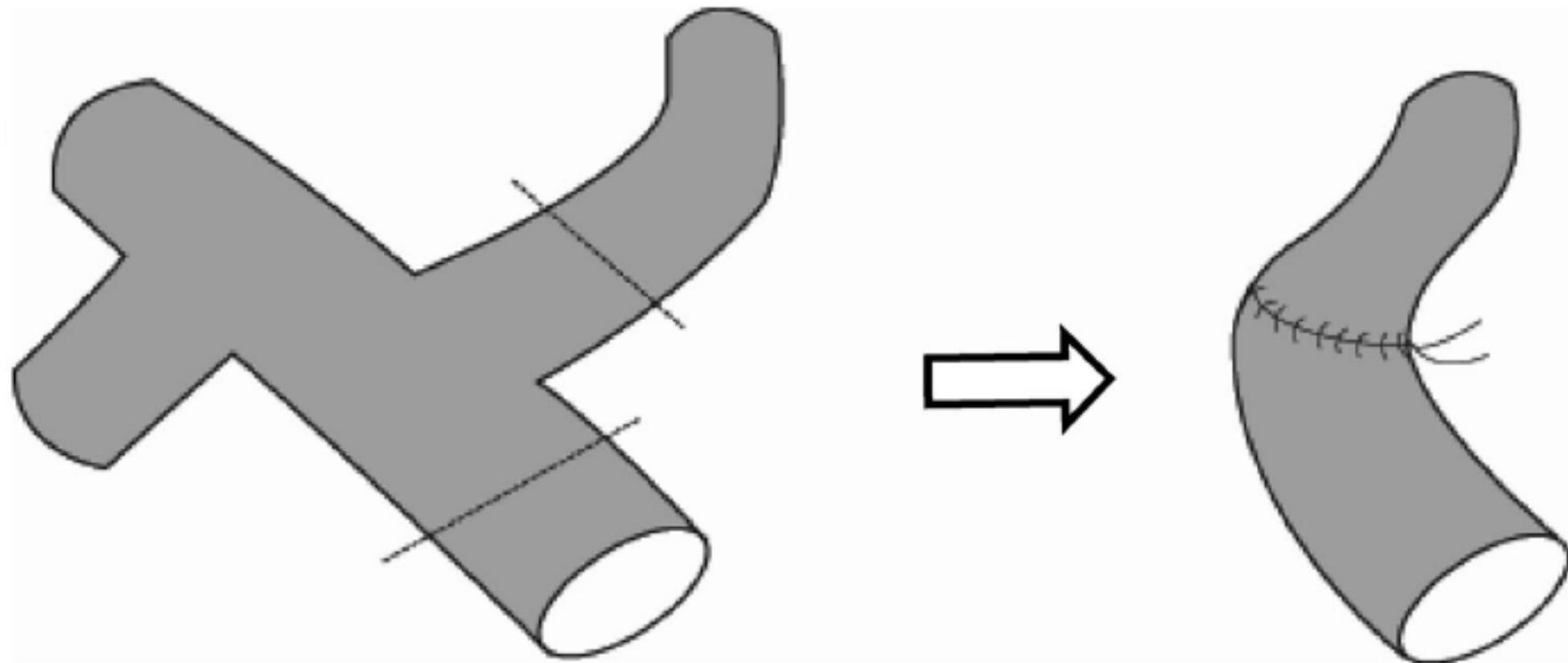
- Hilar (12h)
- Pericholedochal (12b and 12c)
- Peripancreatic (13a)
- Periportal (12p)
- Common hepatic artery (8a and 8p)
- Periaortic
  - 2-3 nodes for nodal staging
  - Node dissection has no impact on survival





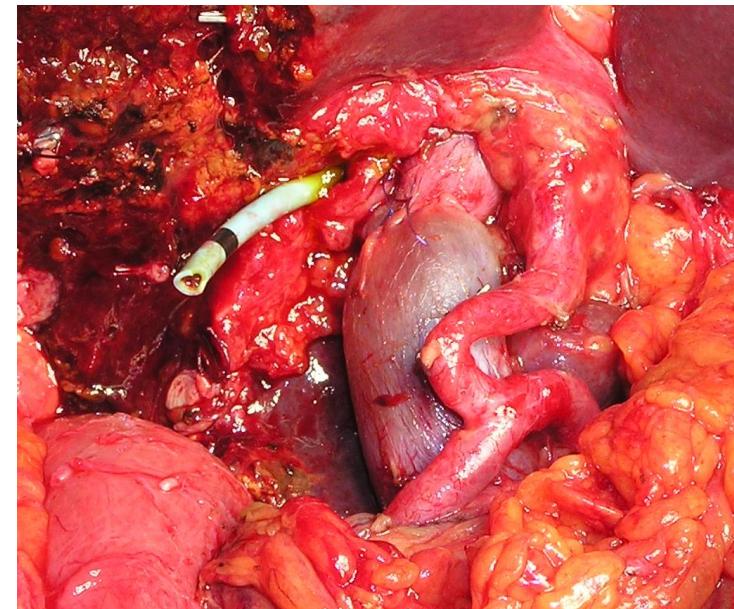
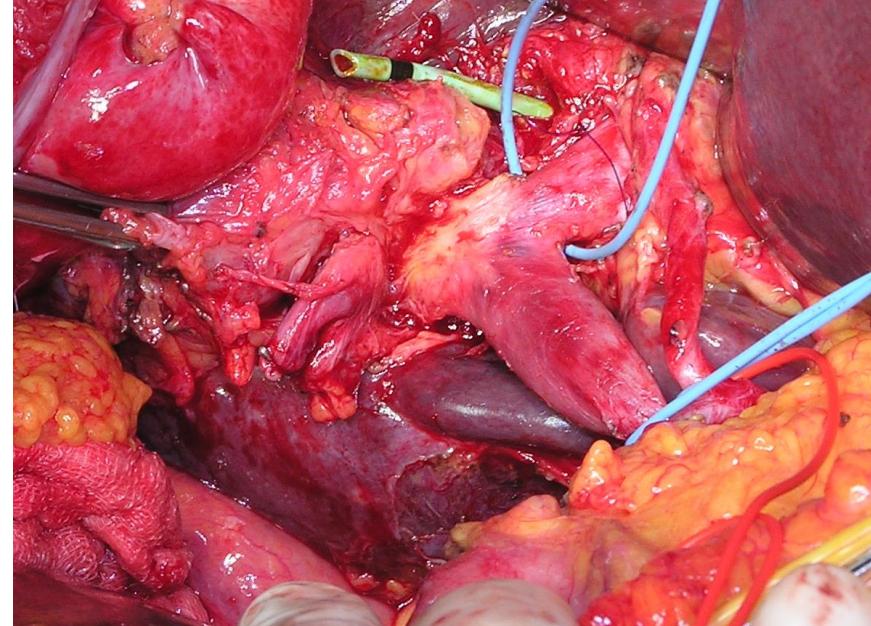
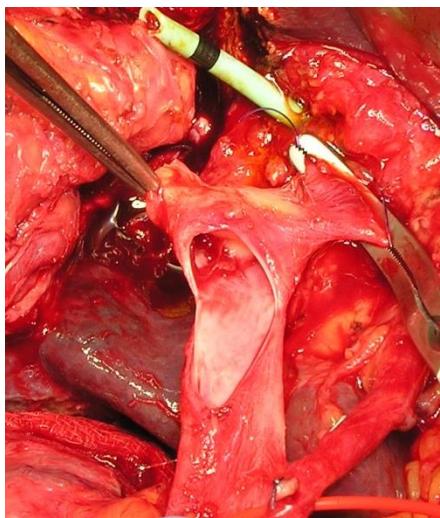
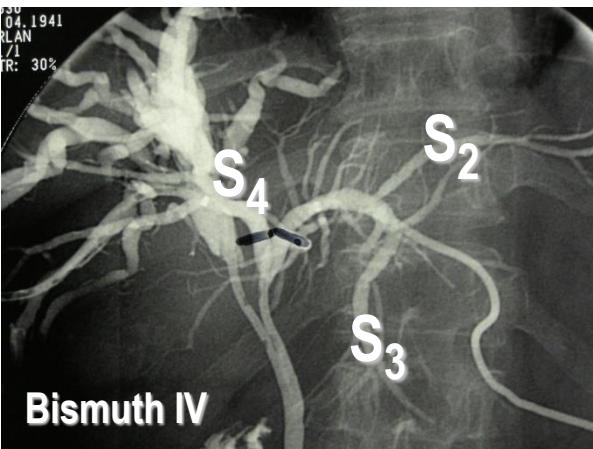
# PORAL VEIN INVOLVEMENT

- Right hepatectomy and portal vein resection



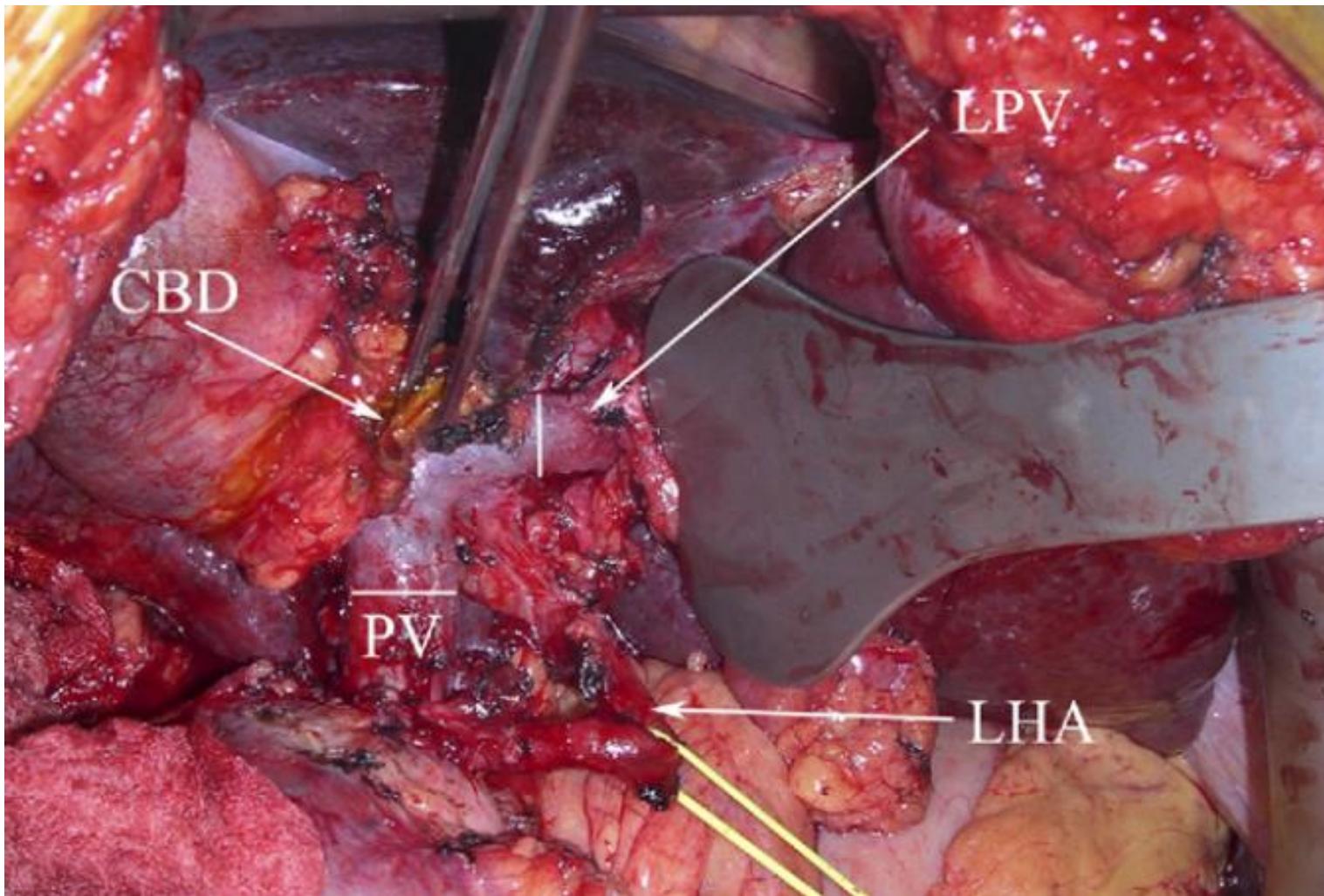
# PORtal VEIN INVOLVEMENT

- Right hepatectomy
- Portal vein resection



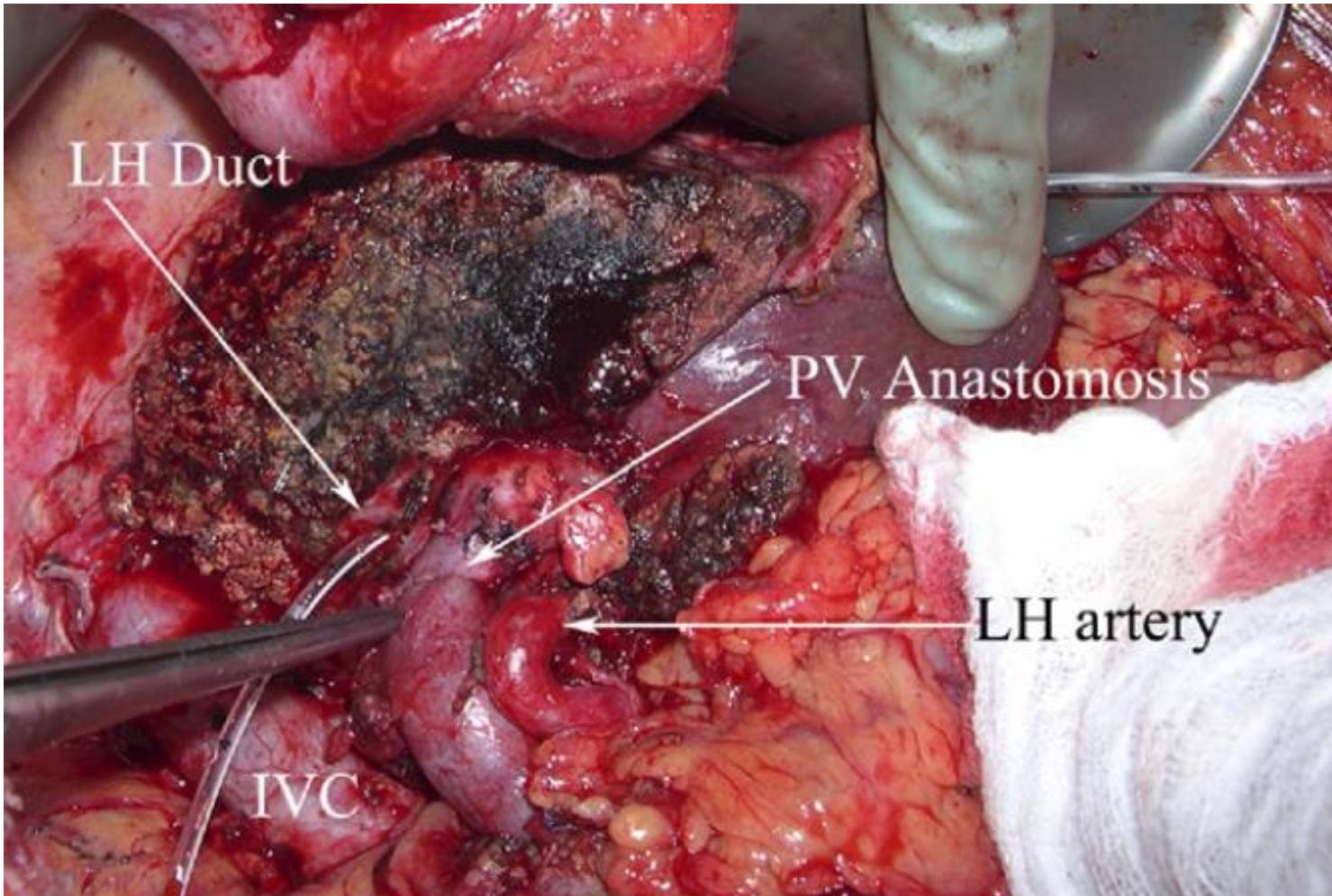
# PORtal VEIN INVOLVEMENT

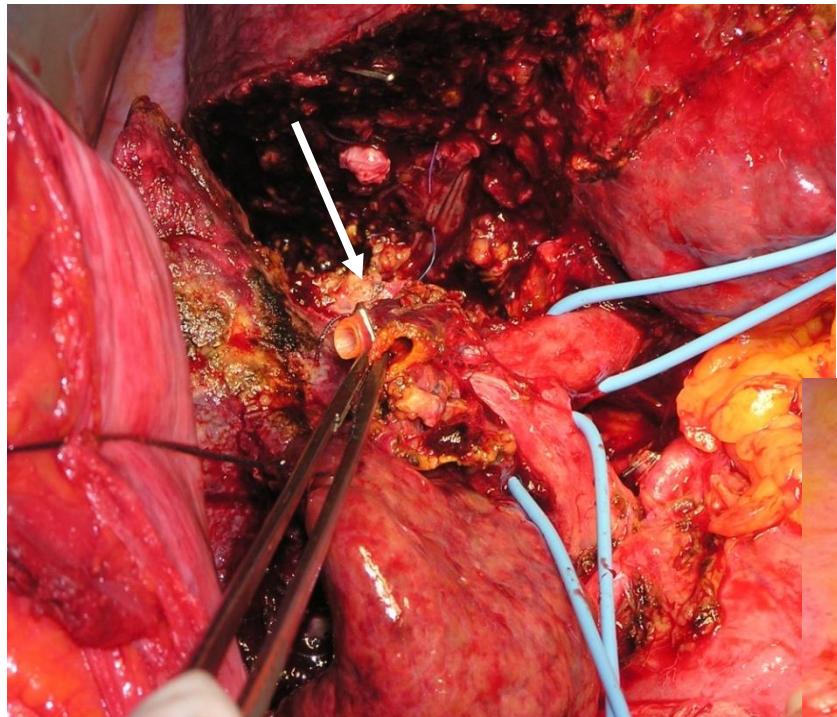
## ☐ Portal vein resection



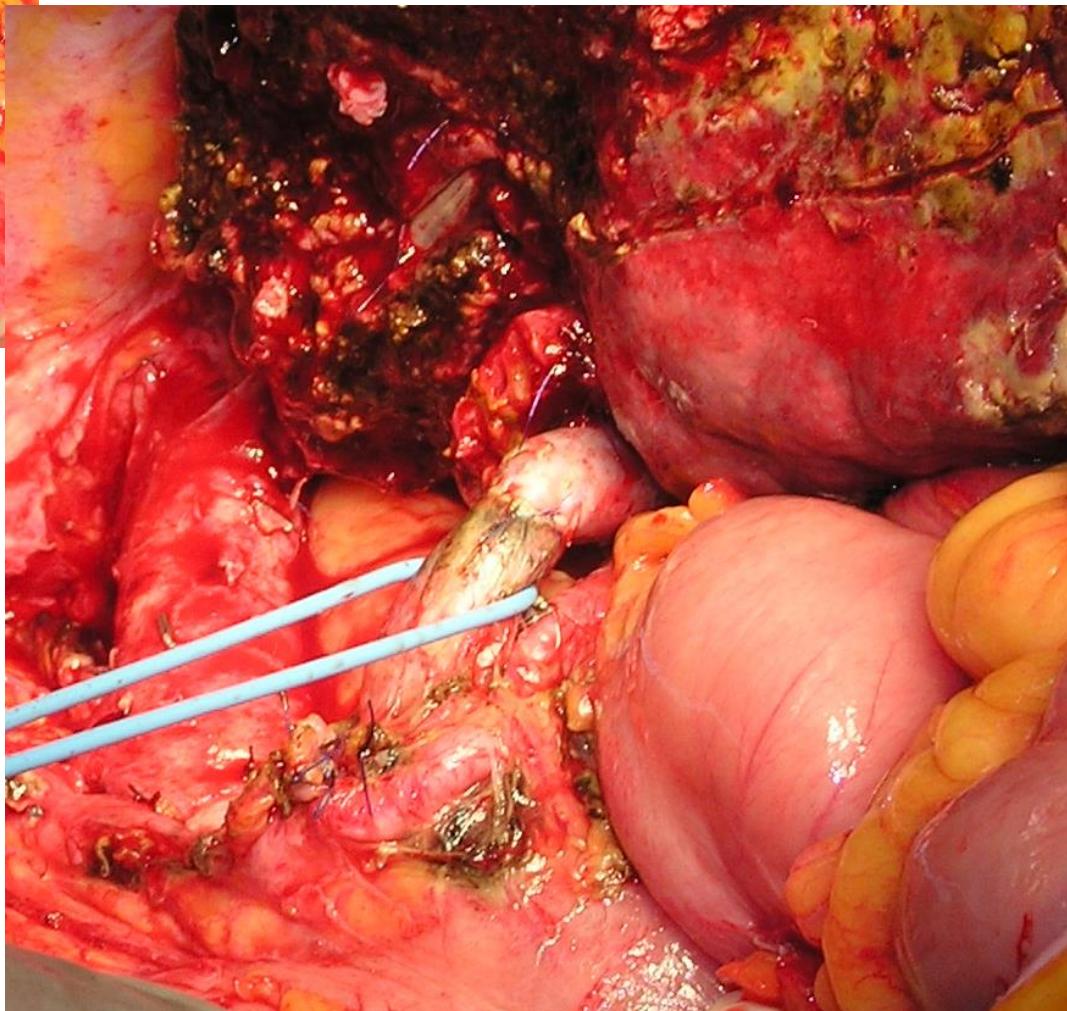
# PORtal VEIN INVOLVEMENT

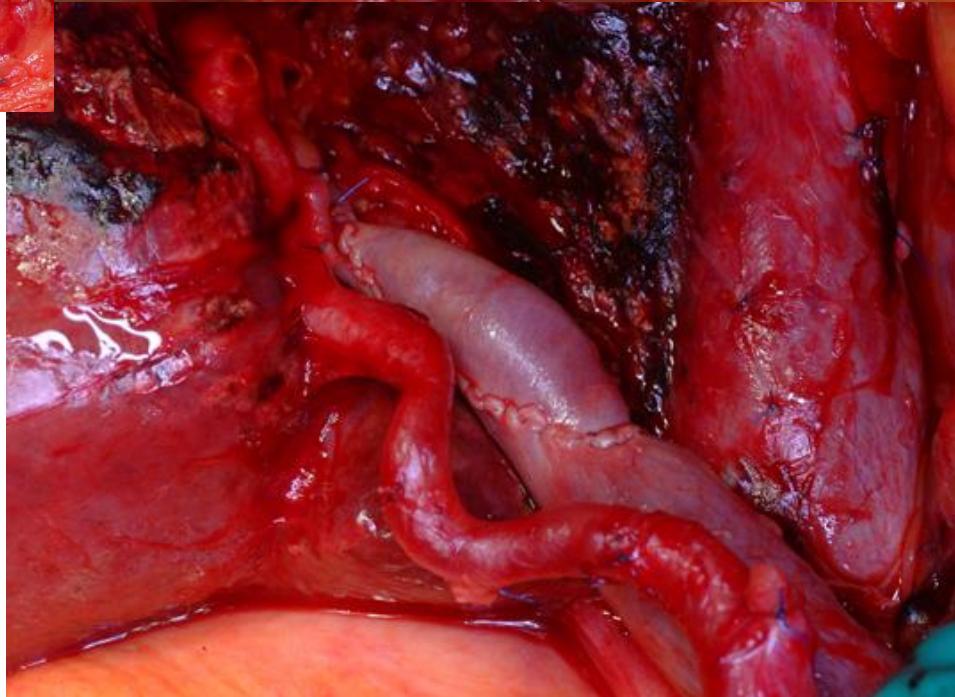
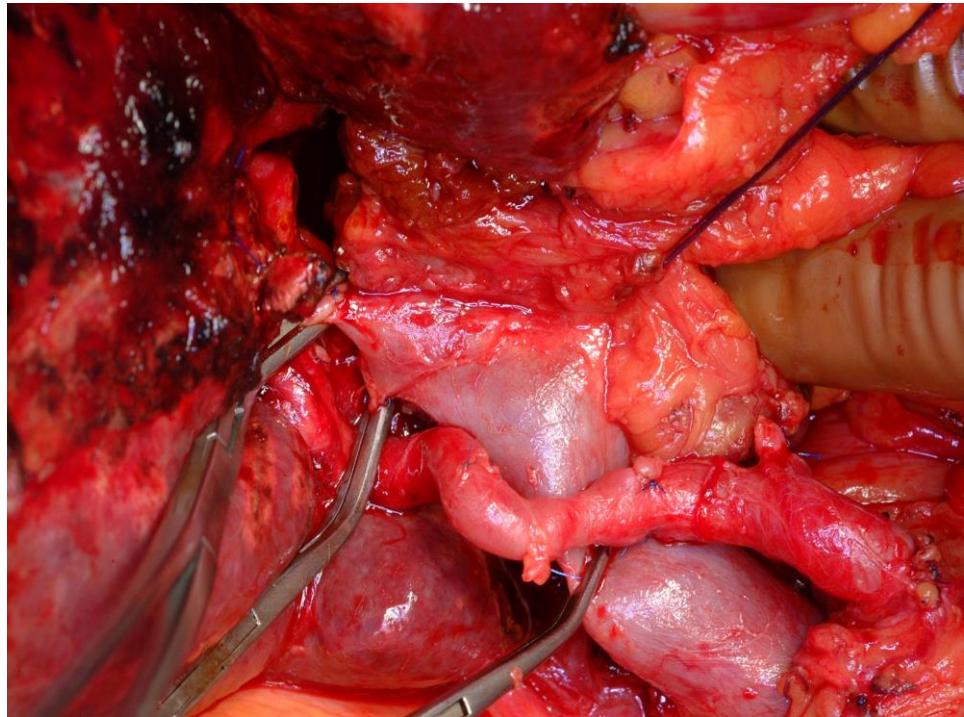
## ☐ Portal vein resection





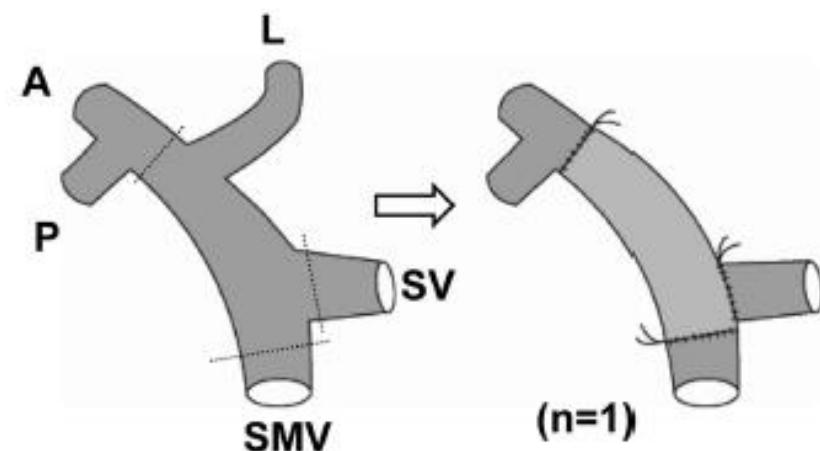
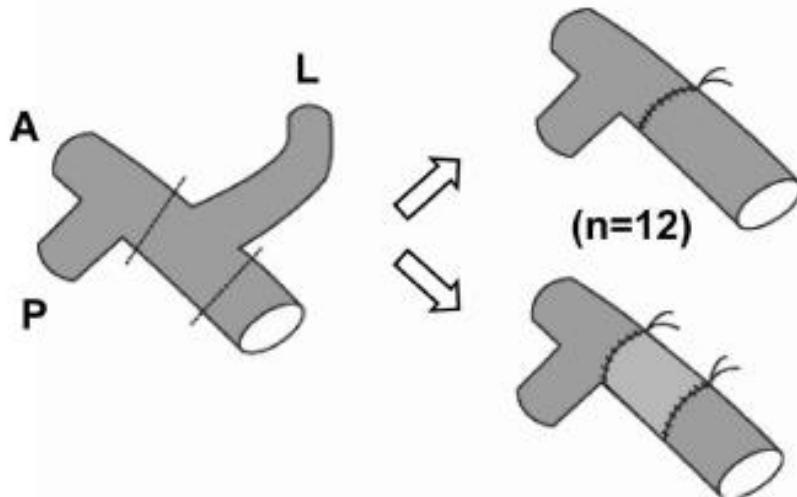
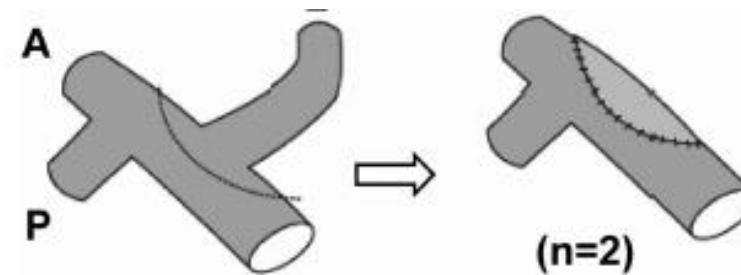
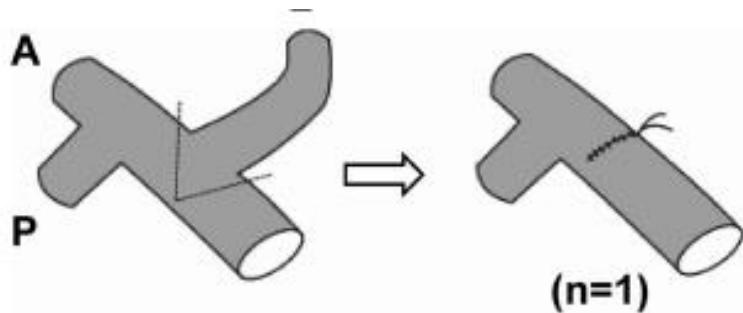
- Hilar cholangiocarcinoma
- Right portal vein involvement





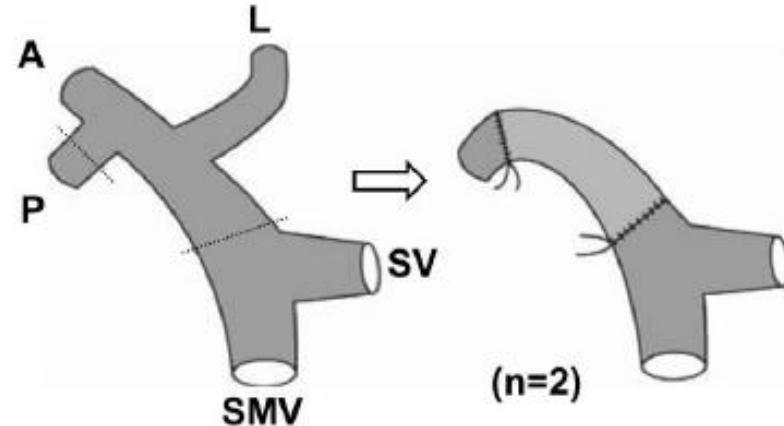
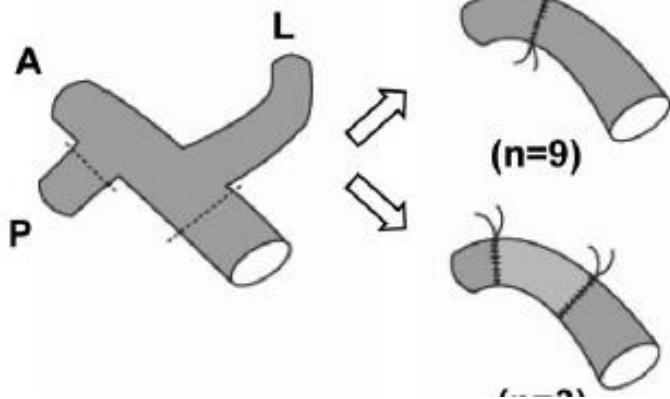
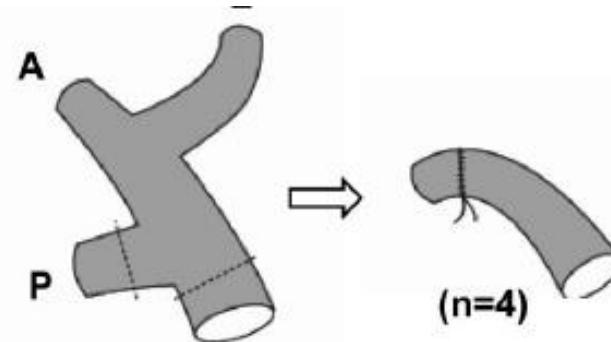
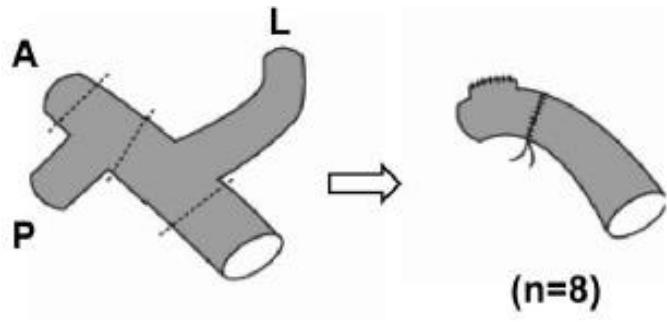
# PORtal VEIN INVOLVEMENT

## □ Left hepatectomy and portal vein resection



# PORAL VEIN INVOLVEMENT

## □ Left trisectionectomy and portal vein resection



# HILAR CHOLANGIOCARCINOMA

- Liver transplant
- ALPPS
- Chemotherapy



Obrigado!



Lençóis Maranhenses