

# Surgery for hilar cholangiocirconoma

Ulf Peter Neumann

## Operating on the most complex tumor in HBP Surgery

- **Preoperative management**
  - Does the patient require biliary stenting?
  - Is portal vein embolisation recommended prior to surgery?
- **Operative technique**
  - Hilar en bloc resection with or without PV resection?
  - Extended left or extended right resection?
  - Is arterial reconstruction worthwhile?
  - Is ALPPS feasible in hilar cholangiocarcinoma?
- **Clinical cases**
  - Extended right resection with portal vein resection
  - Left trisectionectomy with portal vein resection and arterial reconstruction

## Does preoperative optimization improve outcome?

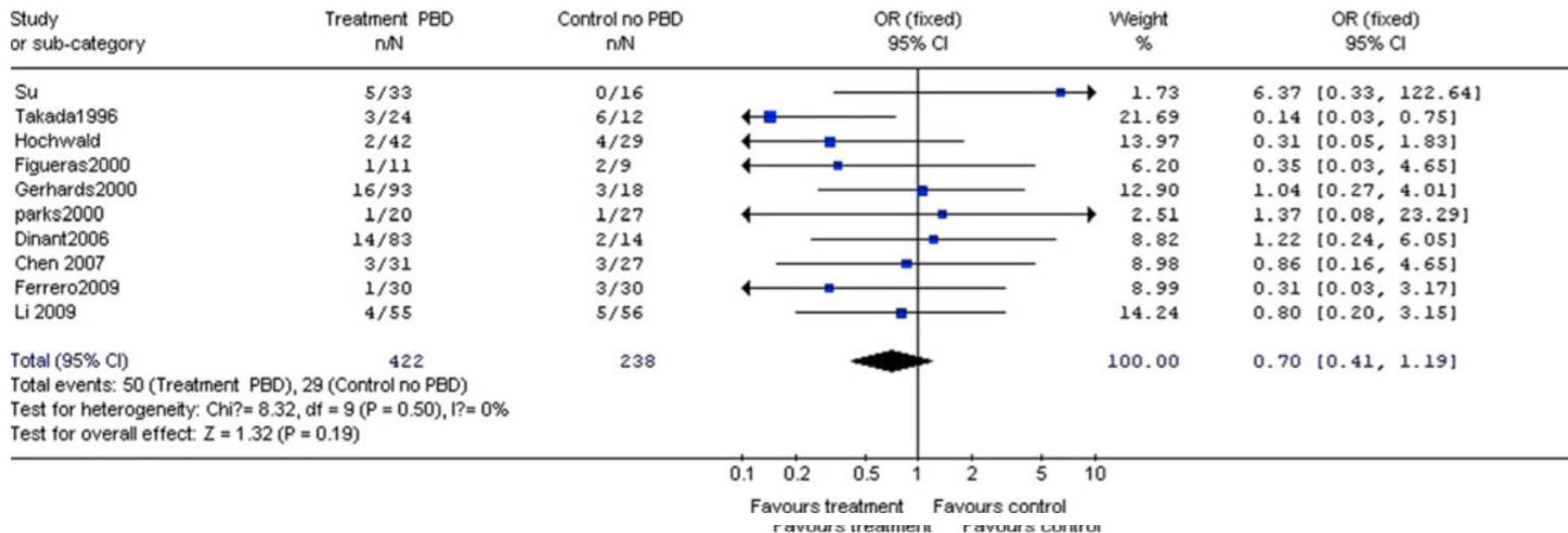


**Table 3** Morbidity according to preoperative optimization

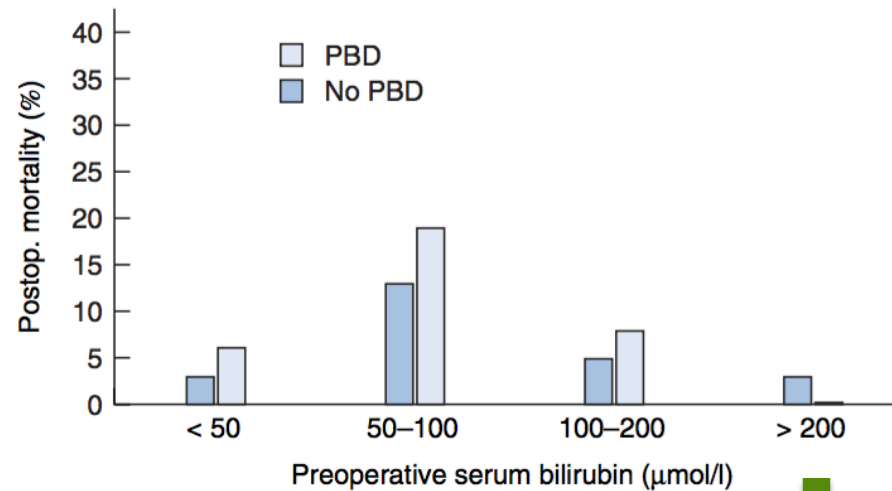
	Optimization	No optimization	<i>P</i>
Fever/sepsis	4 (7 %)	6 (26 %)	0.003
Hemorrhage	3 (5.3 %)	2 (8.7 %)	NS

Successful surgery for hilar cholangiocarcinoma begins with preoperative optimization of the liver

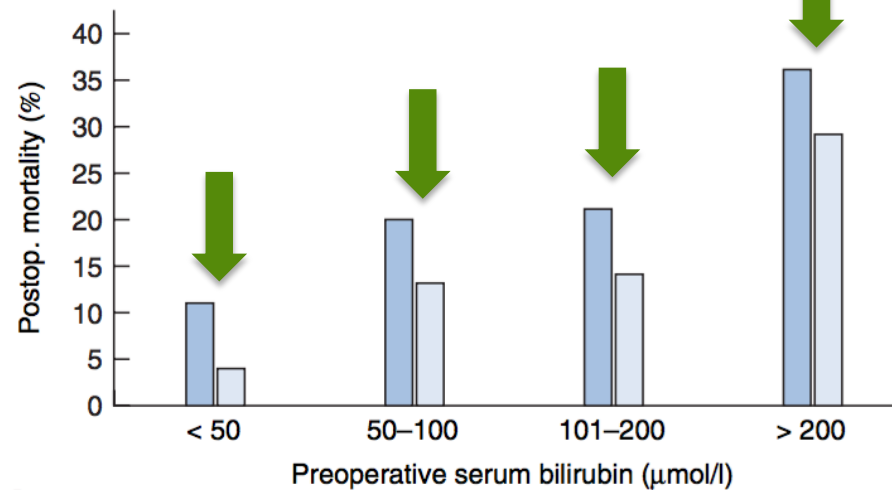
### Morbidity complications



## Biliary drainage for PHCC – Meta analysis 2



### a Left hepatectomy



### b Right hepatectomy

Farges et al., Br J Surg 2013

## What can be recommended regarding preoperative drainage?

### Selective preoperative Drainage

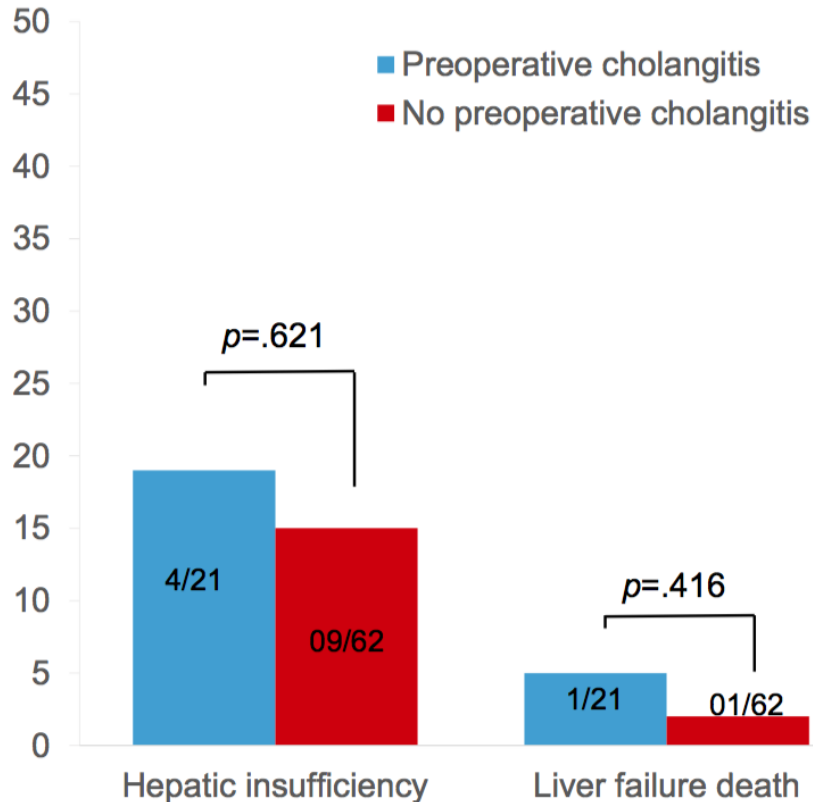
- Right lobectomy for Bismuth type IIIA or IV hilar cholangiocarcinoma
- Preoperative portal vein embolisation
- Biliary infection of the undrained bile duct
- Severe pruritus

### Total preoperative Drainage

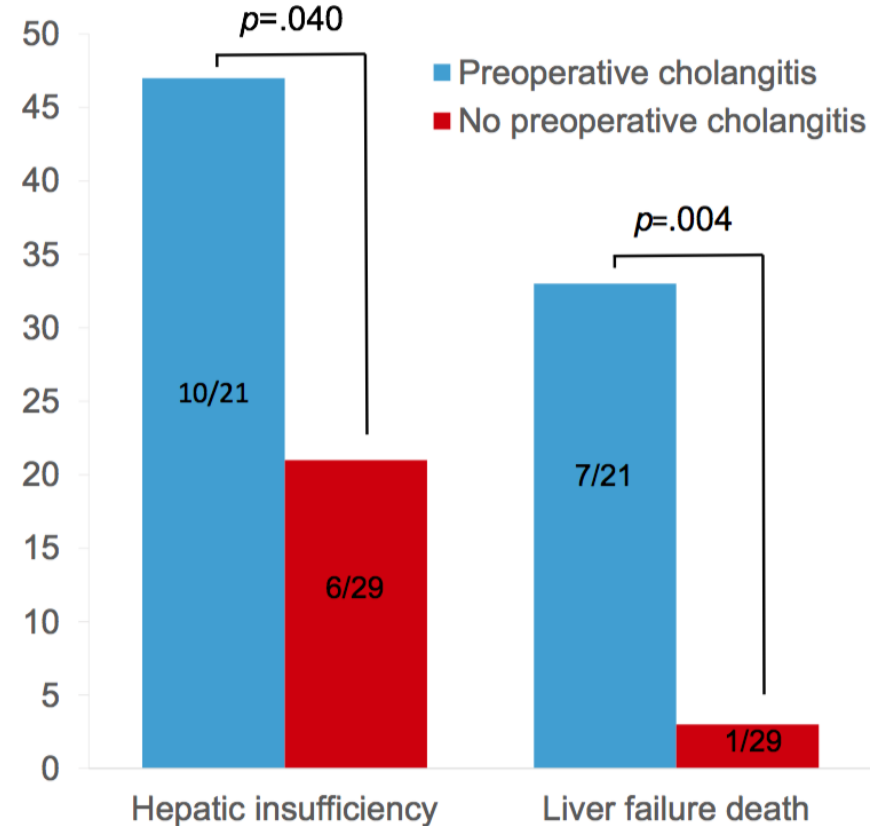
- Development of cholangitis after selective drainage
- Slow or insufficient resolution of hyperbilirubinemia

## What about future liver remnant volume?

FLR  $\geq$  30%



FLR < 30%



**Preoperative biliary drainage is recommend dependent on the individual clinical situation**

**Volume modulation (PVE) should be considered if FLR is small**

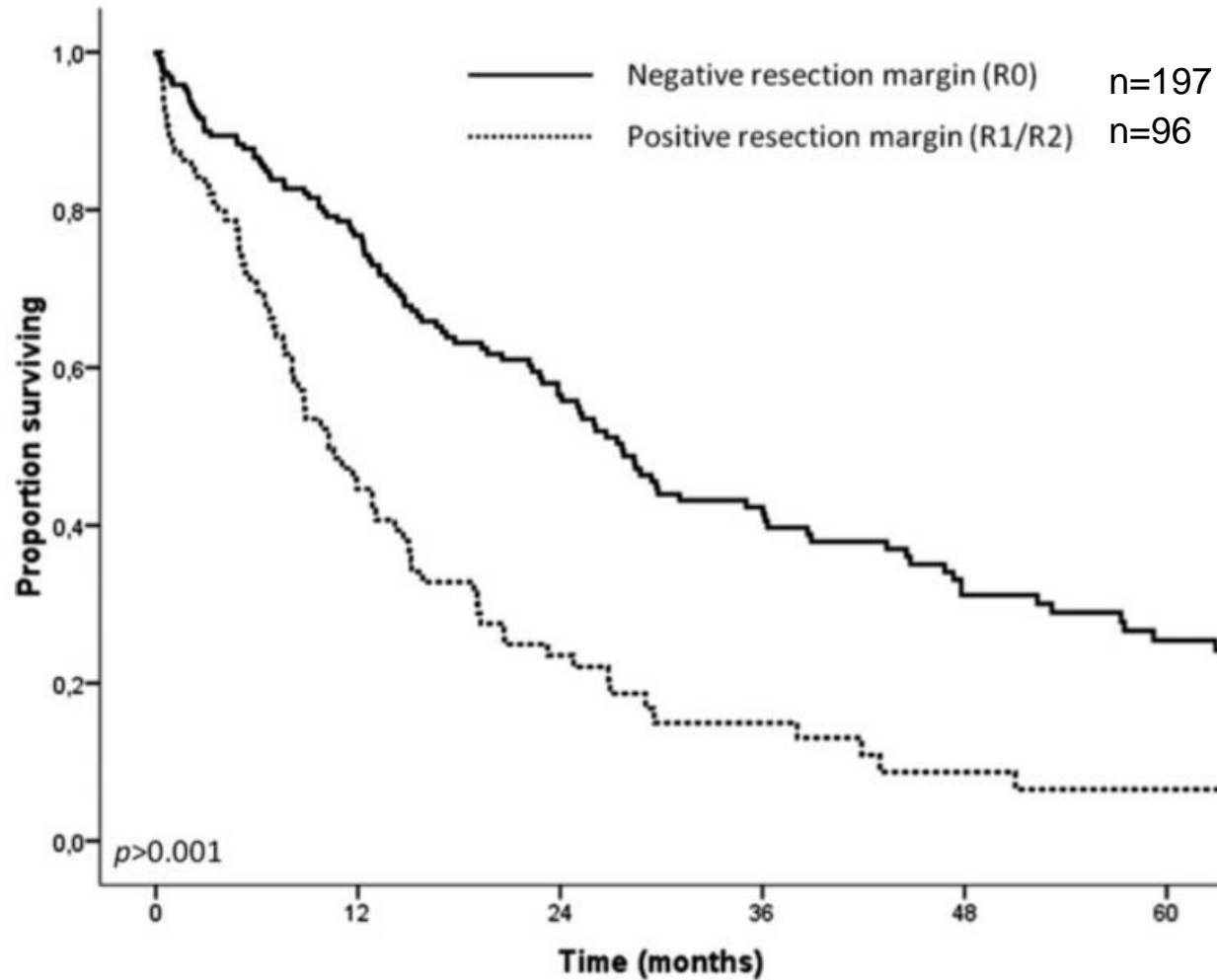


## Surgical Technique from an oncological perspective

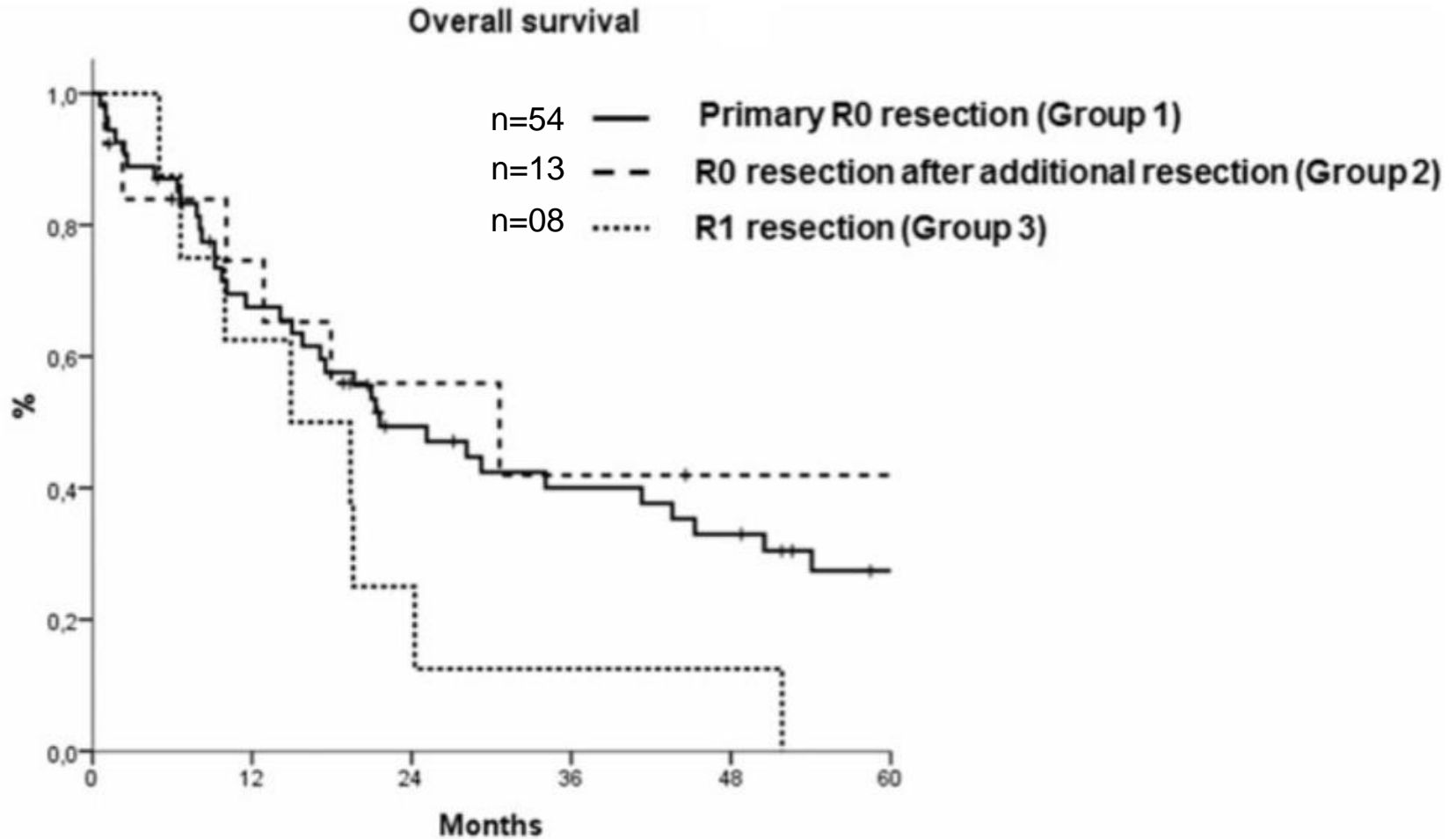
	Author / year	Cases	R0 (%)	Mortality	Overall Survival
<b>Isolated bile duct resection</b>	Miyazaki 1998	11	45	0	16 % (3-yrs.)
	Neuhaus 1999	14	29	0	33% (5-yrs.)
	Launois 1999	11	-	0	27% (5-yrs.)
<b>Liver resection</b>	Miyazaki 1998	65	75	15	33% (3-yrs.)
	Neuhaus 1999	66	61	9	45% (5-yrs.)
	Becker 2003	182	-	10	28% (5-yrs.)
	Jarnagin 2001	80	78	-	46 m. (median OS)
<b>Extended liver resection</b>	Neuhaus 2003	34*	-	15	72% (5-yrs.)
	Nagino 2006	8	87.5	0	50% (5-yrs.)
<b>OLT – Mayo protocol</b>	Iwatsuki 1998	38	83	21	25% (5-yrs.)
	Cherqui 1995	20	93	15	30% (5-yrs.)
	Heimbach 2004	28	-	11	82% (5-yrs.)

\* With portal vein resection

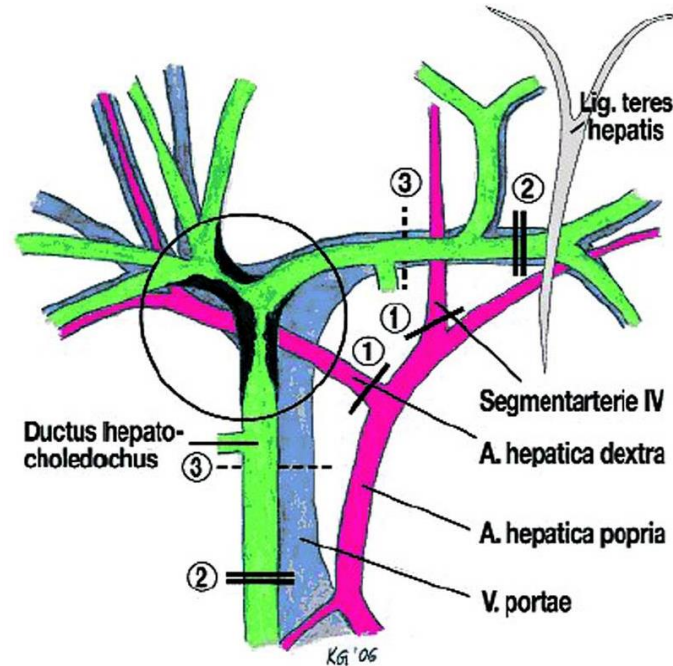
## R0 vs. R1/R2 resection in hilar cholangiocarcinoma



## R0 vs. R1/R2 resection in hilar cholangiocarcinoma

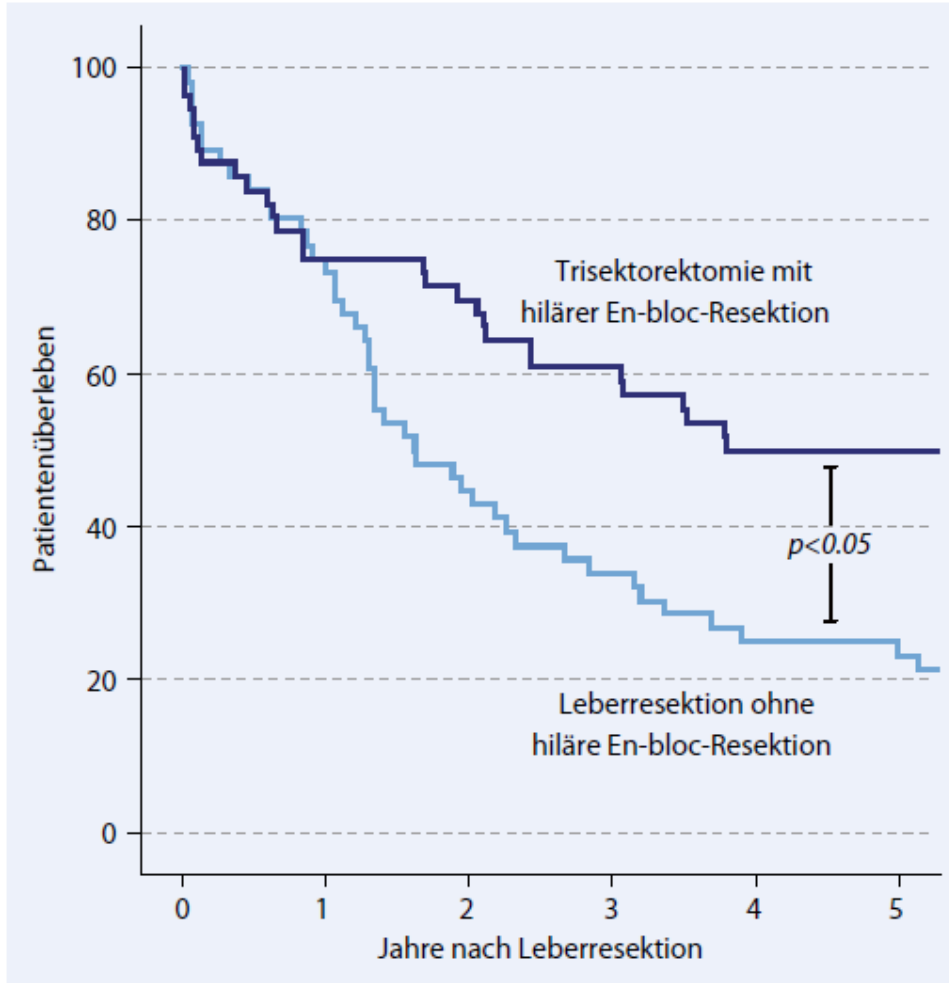


## Surgical evolution in treatment of PHCC



- Firstly described by Neuhaus (Berlin, Germany, 1999)
- Concept of hilar “no-touch” technique
- Procedure coined “hilar en-bloc resection” for PHCC

## Hilar en-bloc resection is superior to conventional resection



- 50 hilar en-bloc vs 50 conventional
- 1990-2004, Charité, Berlin
- 1-yr. survival: 87%
- 2-yr. survival: 70%
- 5-yr. survival: 58%

### No differences

- Surgical complications
- 30- / 90-day mortality

## Is portal vein resection mandatory?

Combined portal vein resection in the treatment of hilar cholangiocarcinoma: A systematic review and meta-analysis

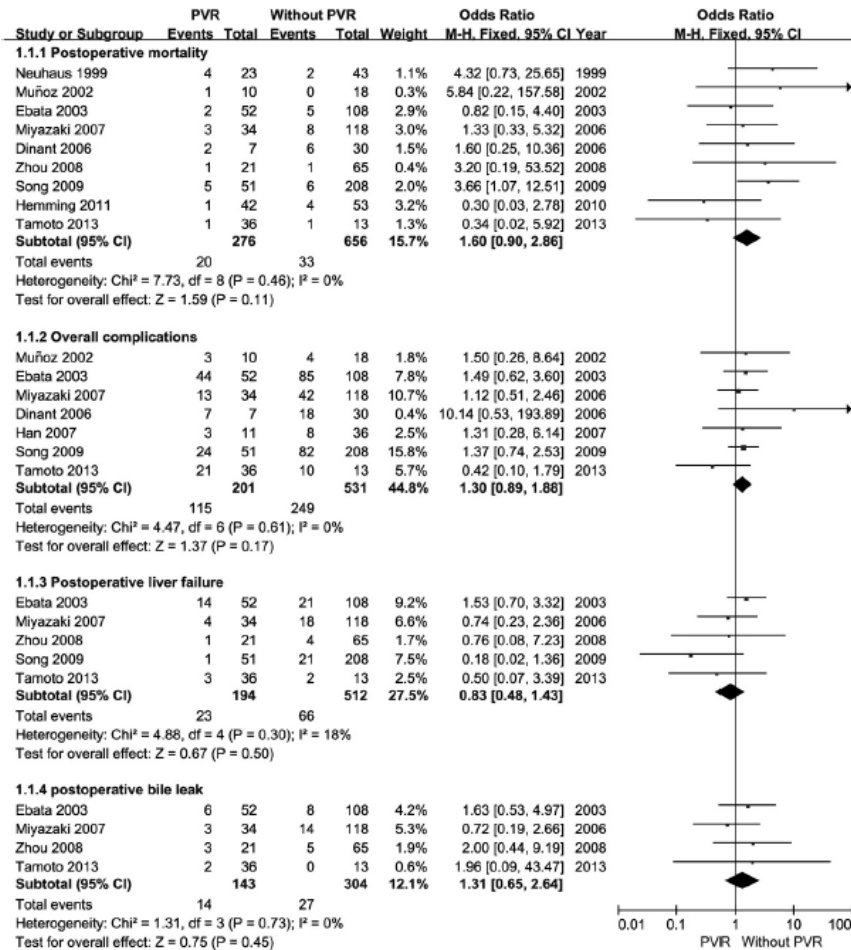
W. Chen, K. Ke, Y.L. Chen\*

*Department of Hepatobiliary Surgery, Union Hospital, Fujian Medical University, 29 Xin-Quan Road, Fuzhou, Fujian 350001, People's Republic of China*

Systematic review & meta analysis

- including 1921 patients from 13 studies

## Is portal vein resection mandatory?



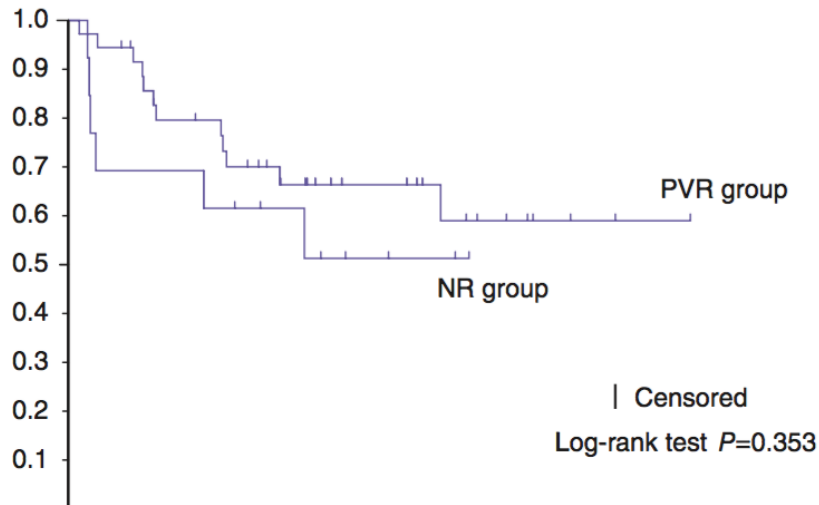
In PV-group significantly more patients with:

- LN-metastases
- Locally advanced tumors
- Perineural invasion
- Less R-0 resections

No differences in morbidity & mortality

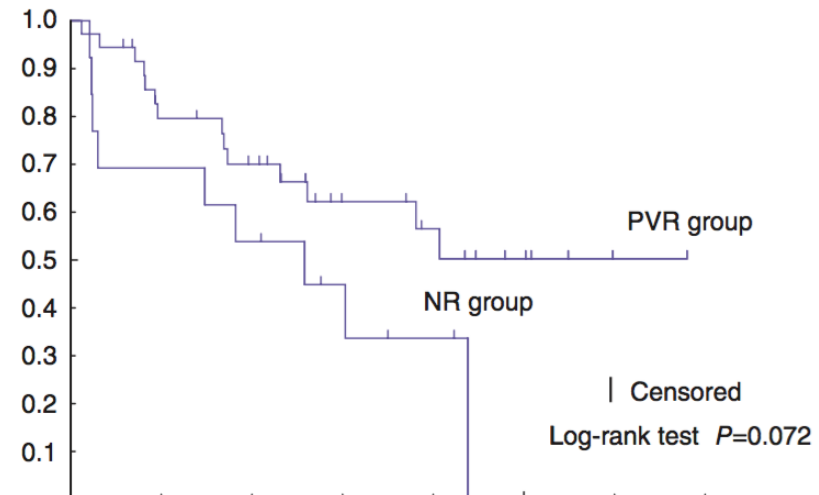
## Is portal vein resection mandatory?

### Overall survival



No. at risk	0	1	2	3	4	5	6	7
PVR group	36	26	21	12	9	5		
NR group	13	9	7	4	2			

### Recurrence-free survival



No. at risk	0	1	2	3	4	5	6	7
PVR group	36	26	21	12	9	5		
NR group	13	9	7	4	2			

**...tumors in the PVR group were more locally advanced...**

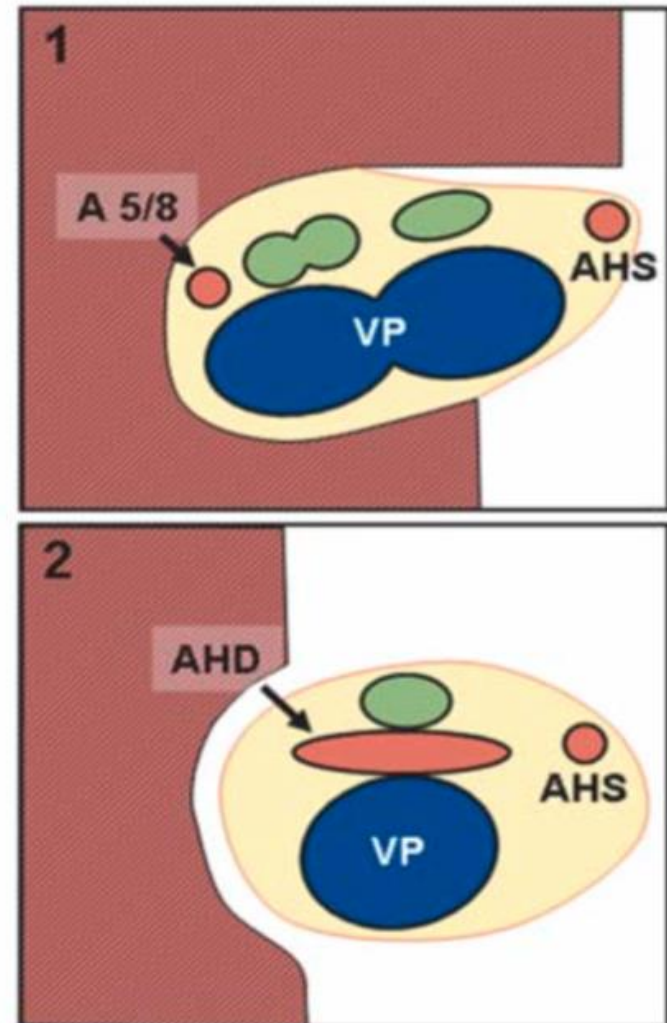
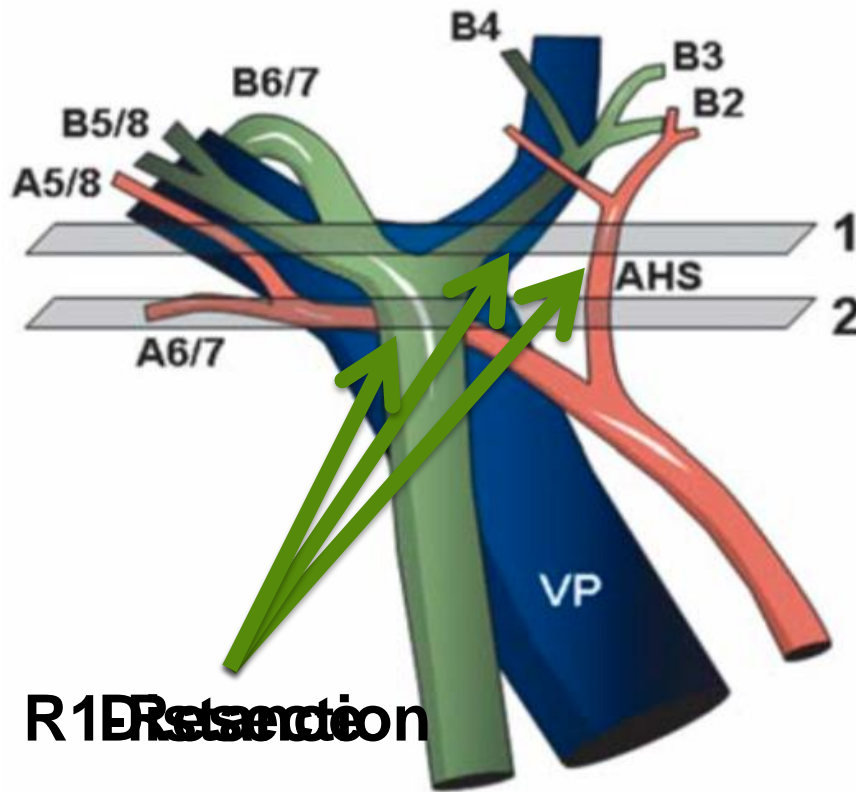


**R0 resection is key for long-term survival of patients with hilar cholangiocarcinoma**

**Preferred Technique: Hilar en-bloc resection (with PV resection)**

# Operative Technique

All surgical approaches should be conceptualised by anatomy



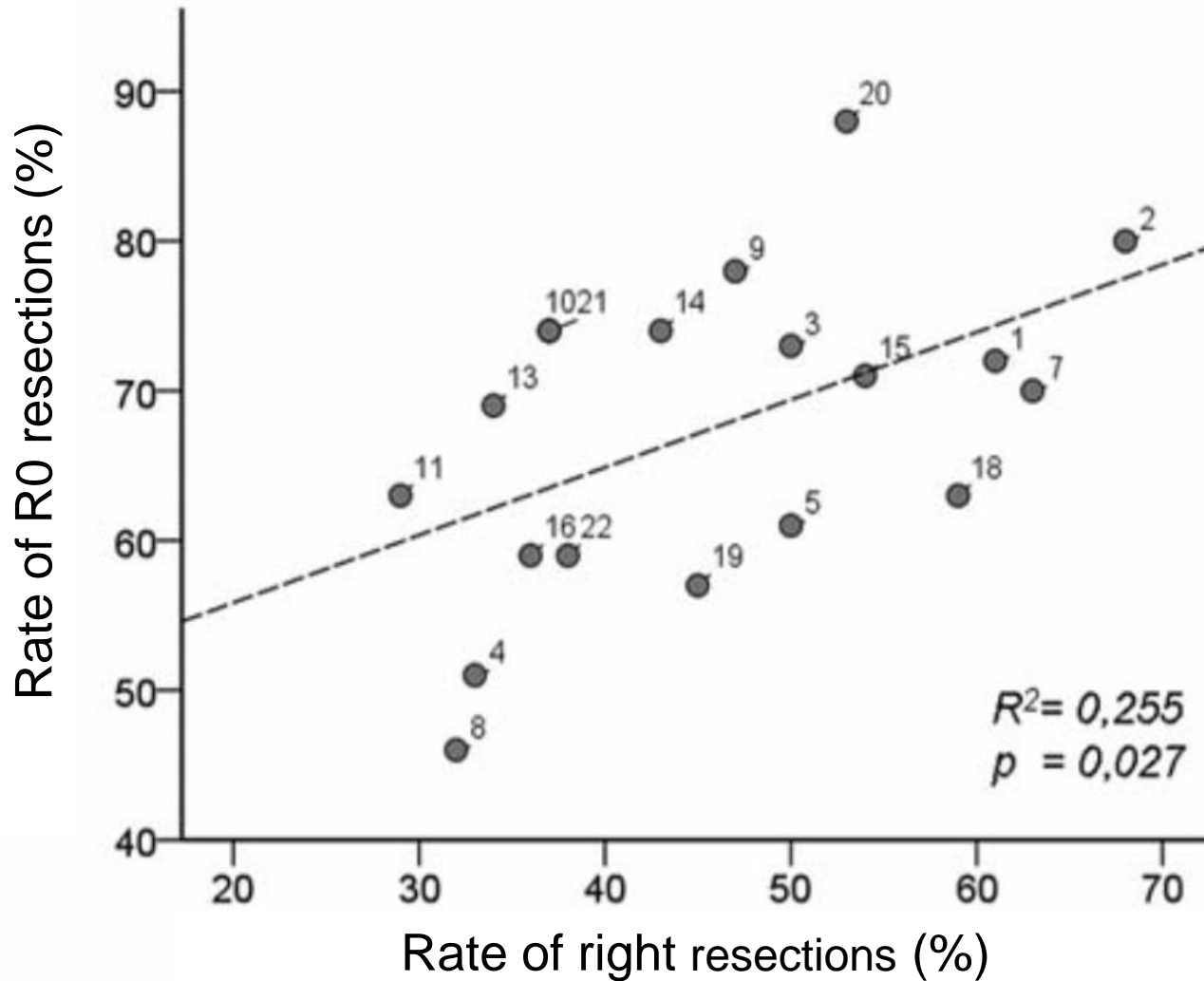
Seehofer et al., Zentralblatt Chirurgie 2014

# Operative Technique

## How to achieve R0 resections

Author, Study period	N	Ext. R. (%)	R0 (%)	Mort (%)	5-yr-OS R0	5-yr-OS R1	5-yr-OS
Mansfield, 1995–2003	18	61	72	17			21
Hemming, 1997–2004	53	68	80	9	45	0	35
Lai, 1998–2002	26	50	73	8	16	0	12
Silva, 1992–2003	45	33	51	9	41	24	
Sano, 2000–2004	102	50	61	0			44
Cheng, 1997–2002	75	33		1			12
Witzigmann, 1994–2004	59	63	70	12	27	10	22
Baton, 1984–2003	59	32	46	5	28	6	20
Hasegawa, 1990–2003	49	47	78	2			40
Otani, 1990–2005	27	37	74	0	~34	0	27
Ito, 1985–2006	38	29	63	3	~62	0	31
Yubin, 1990–2004	115						~25
Konstadoul, 1988–2006	59	34	69	7			35
Murakami, 1990–2007	42	43	74	7			30
Lee, 2001–2008	302	54	71	2	47	8	33
Miyazaki, 2001–2008	107	36	59	2	33	21	~28
Rocha, 2001–2008	60		80	5	~55	~20	
Unno, 2001–2008	125	59	63	8	46	19	35
Young, 2001–2008	51	45	57	8	40		20
Hirano, 2001–2008	146	53	88	3			36
Igami, 2001–2008	298	37	74	2			42
van Gulik, 1998–2003	29	38	59	10			34

## How to achieve R0 resections



## Extended left or extended right resections?

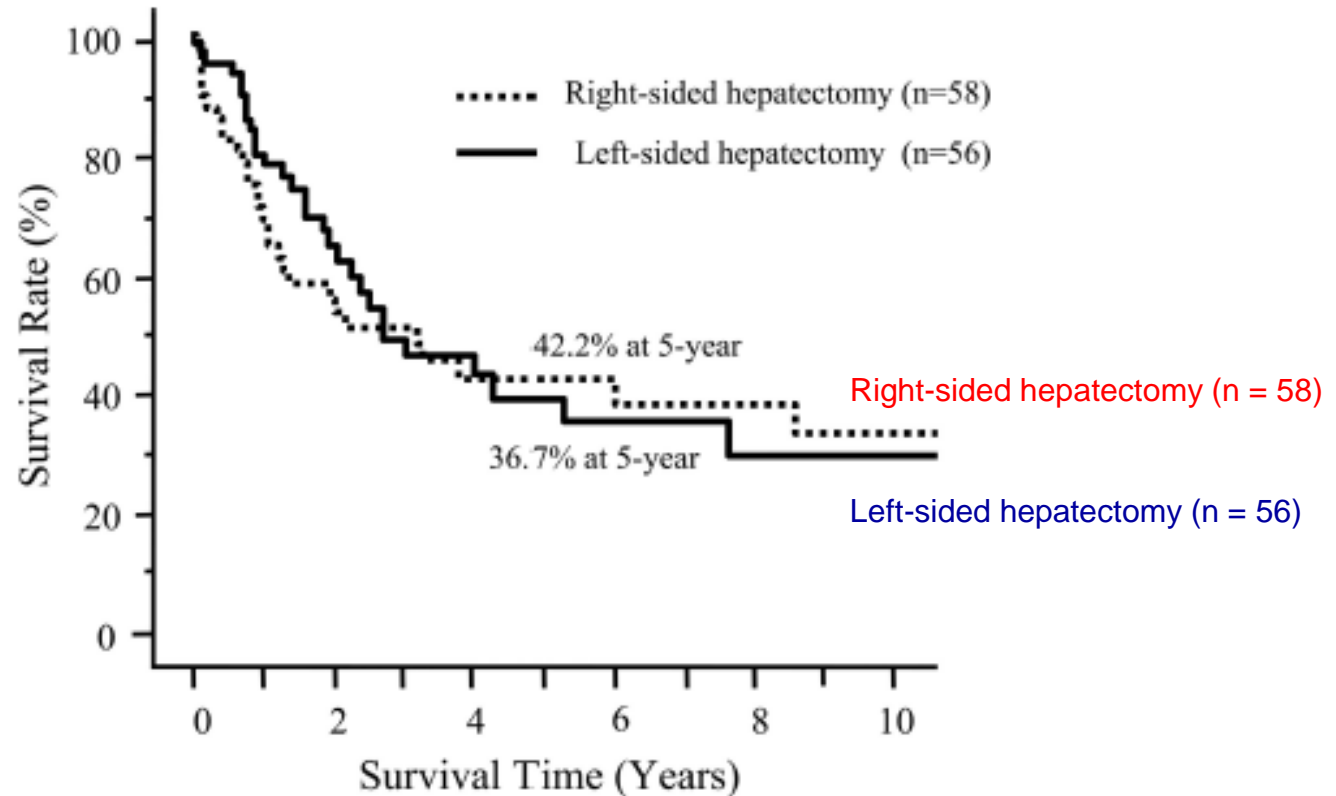
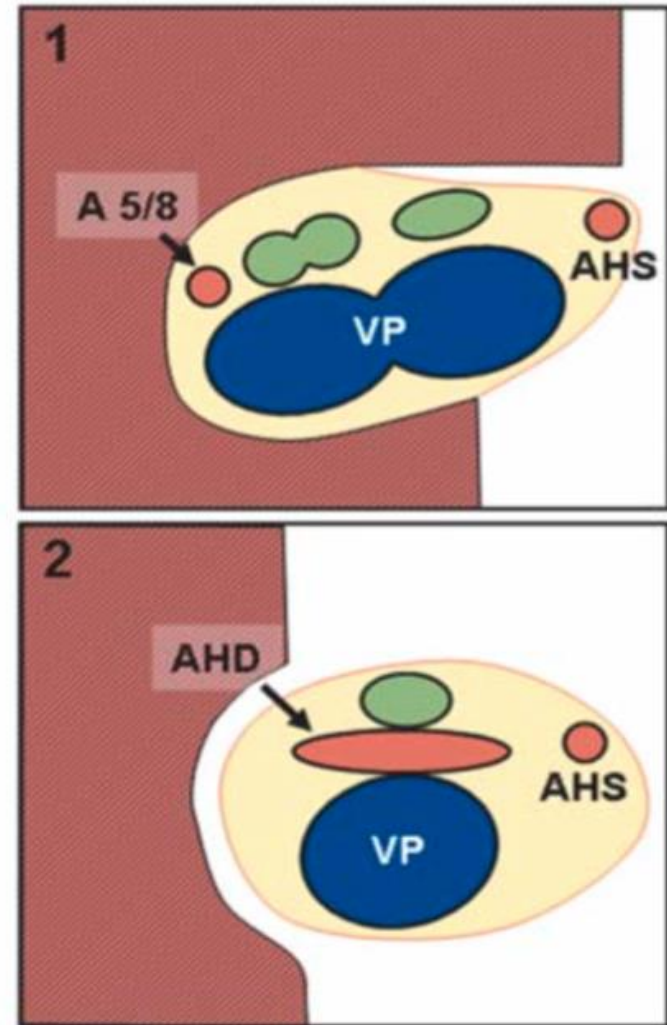
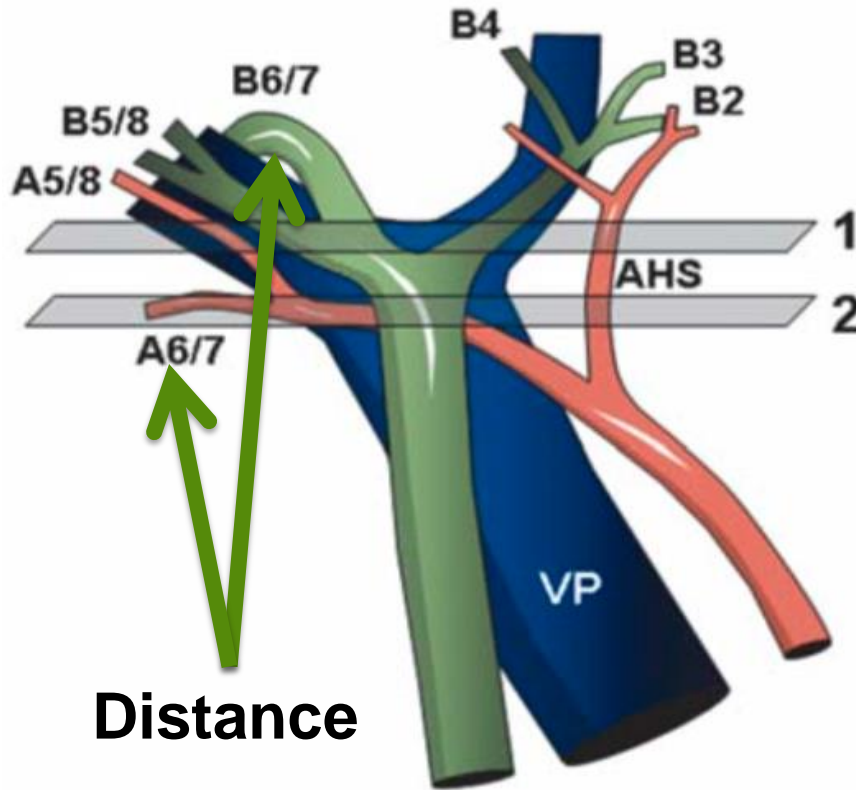


FIGURE 2. Survival curves after curative (R0) resection in patients undergoing right- or left-sided hepatectomy for hilar cholangiocarcinoma.

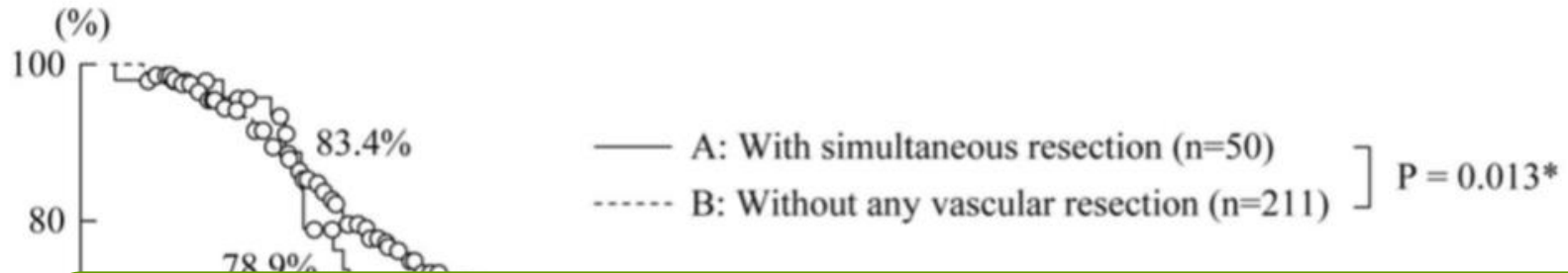
# Operative Technique

## Management of the right liver artery

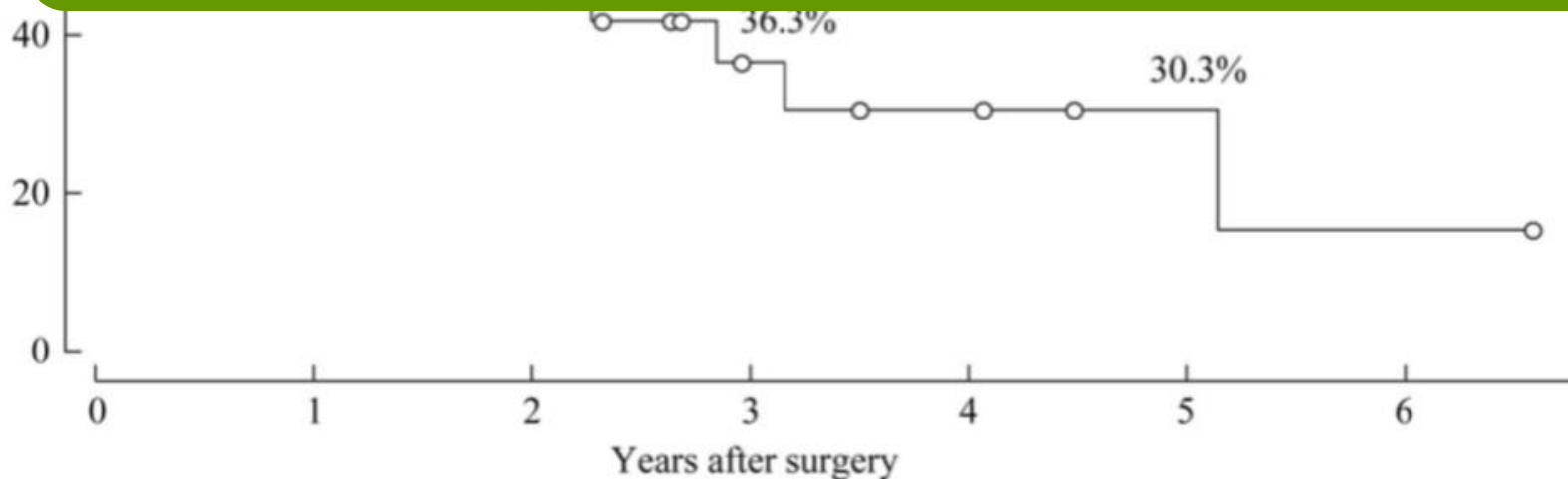


Seehofer et al., Zentralblatt Chirurgie 2014

## Is arterial reconstruction worthwhile?



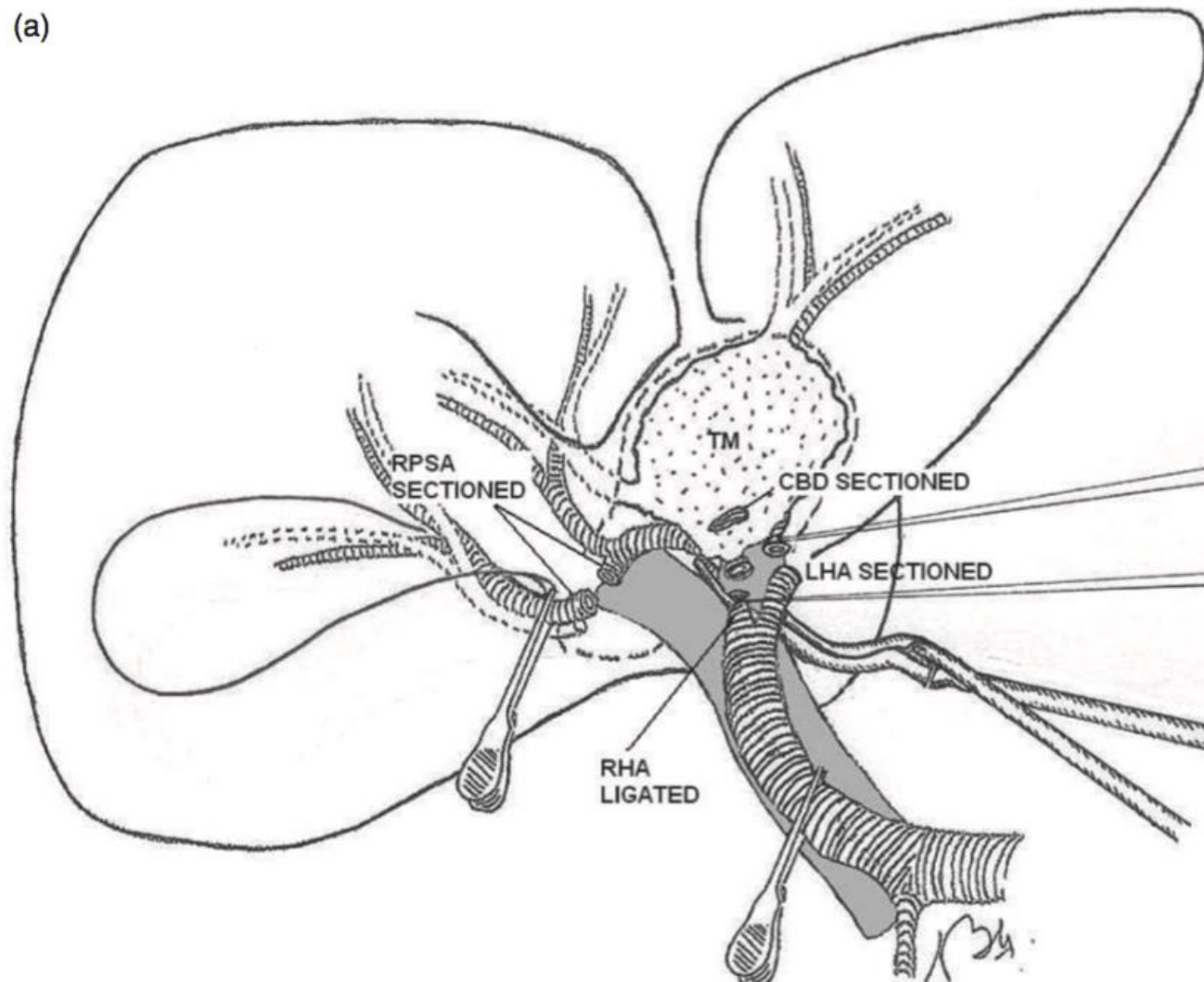
Arterial reconstruction results in increased morbidity (and mortality)





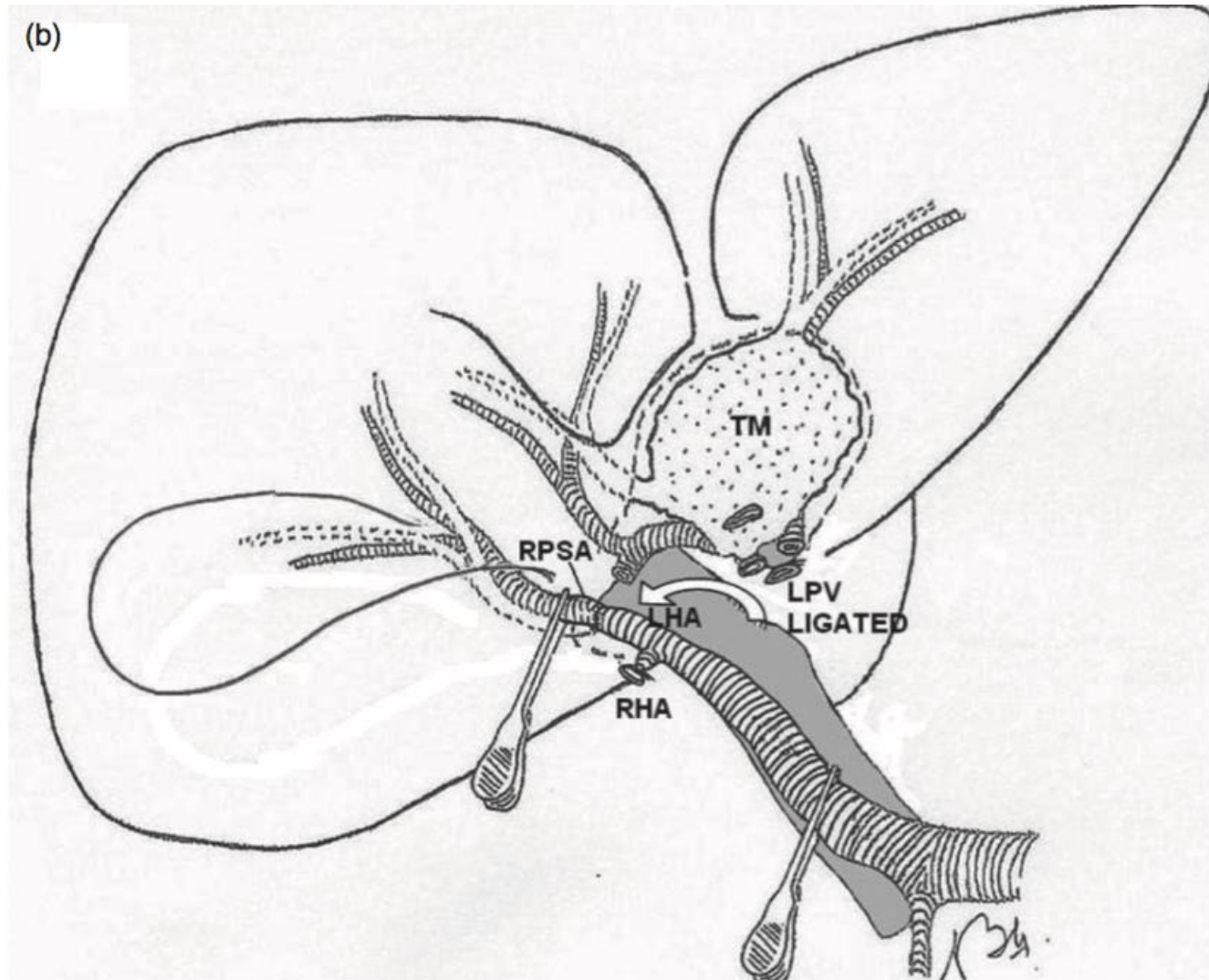
## Example of arterial reconstruction

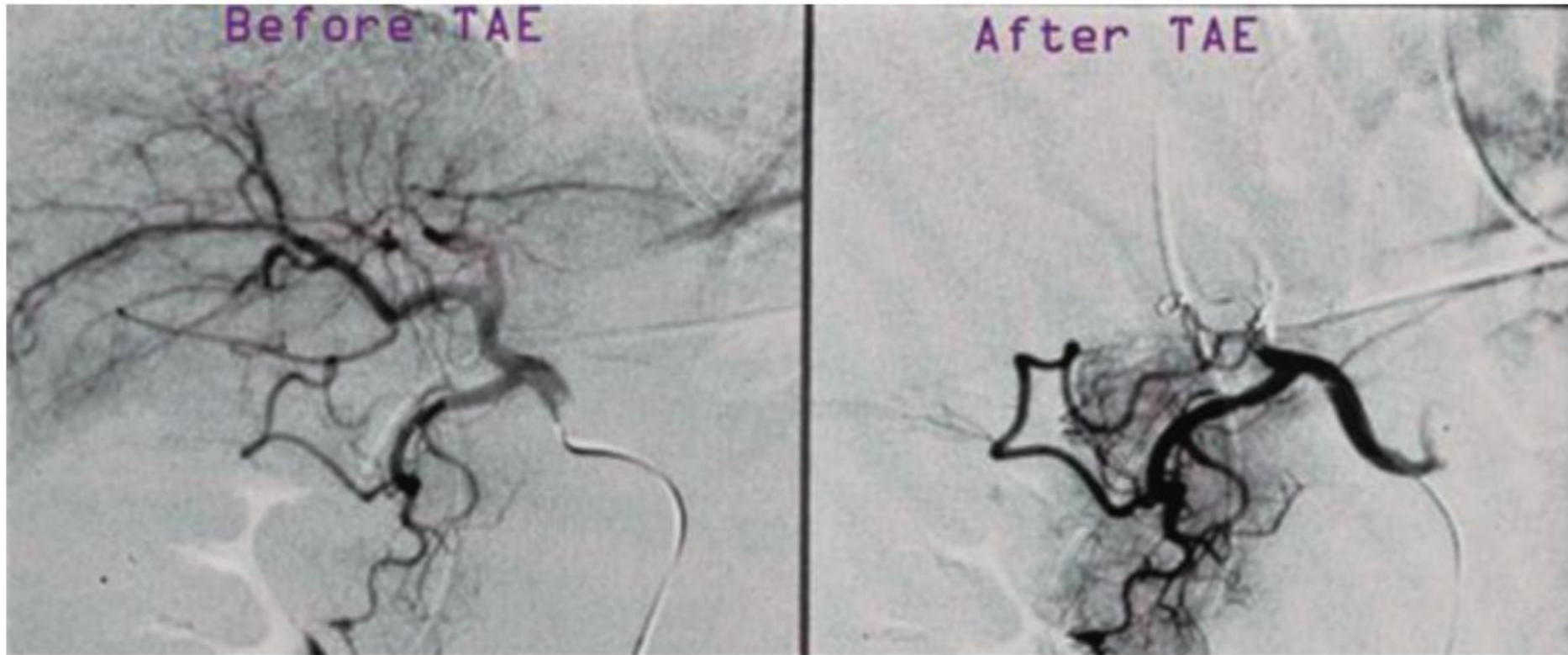
(a)

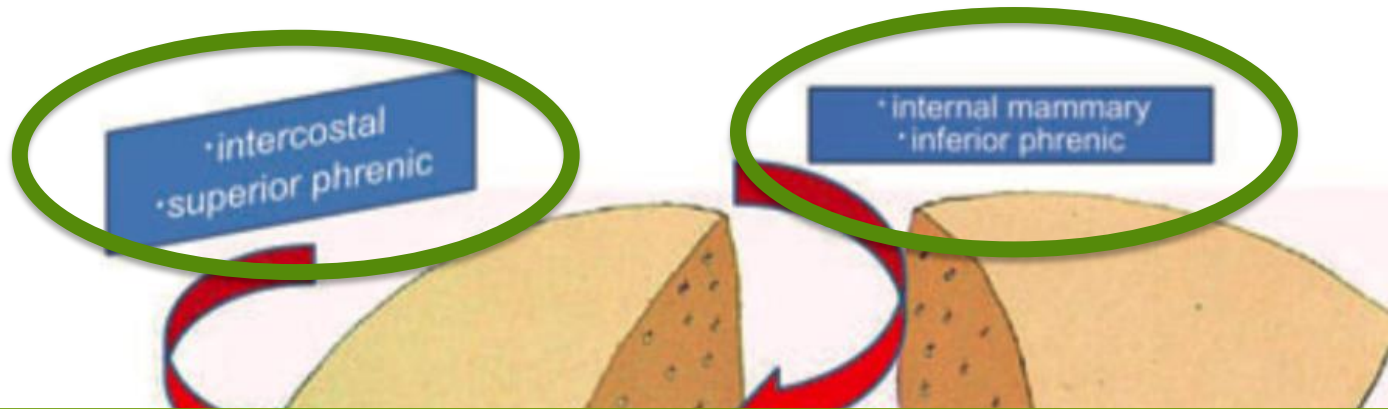


*De Santibanes et al., HBP 2012*







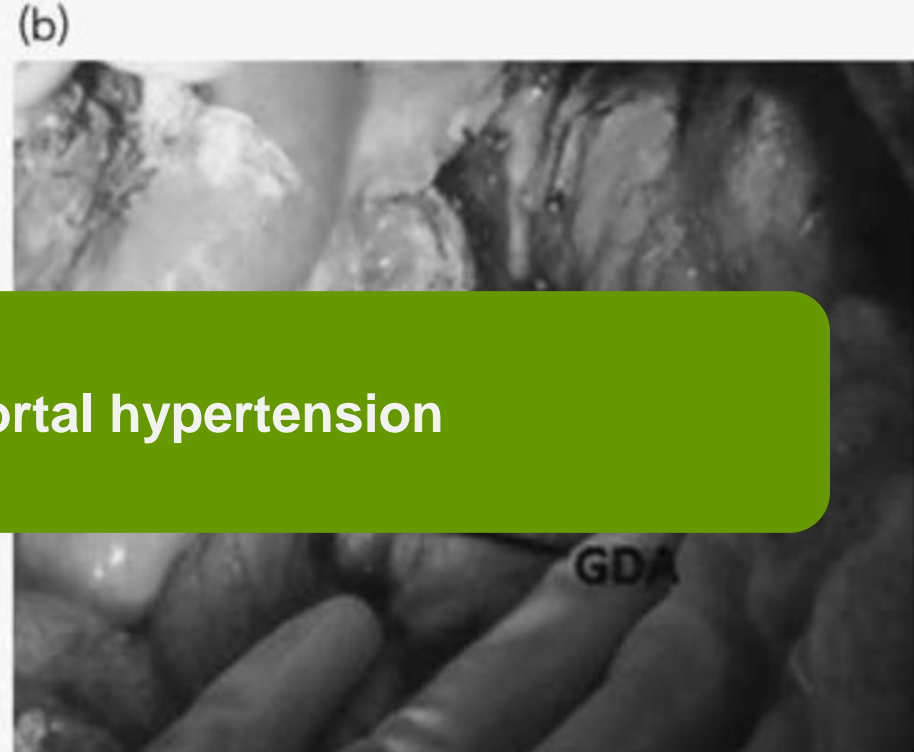


**Avoid extensive mobilization of the right liver lobe to preserve arterial collaterals**



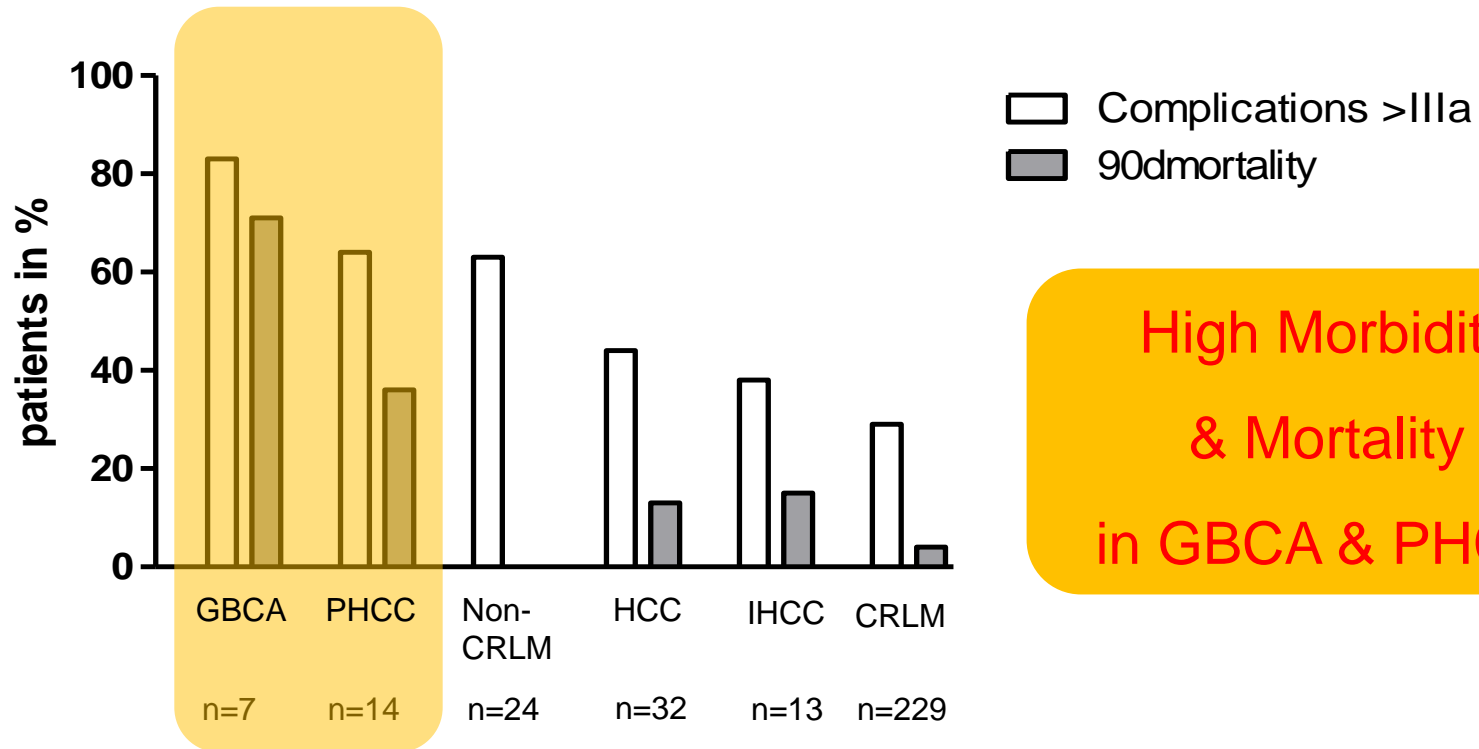
# Operative Technique

## Arterialisation of the portal vein



Might result in portal hypertension

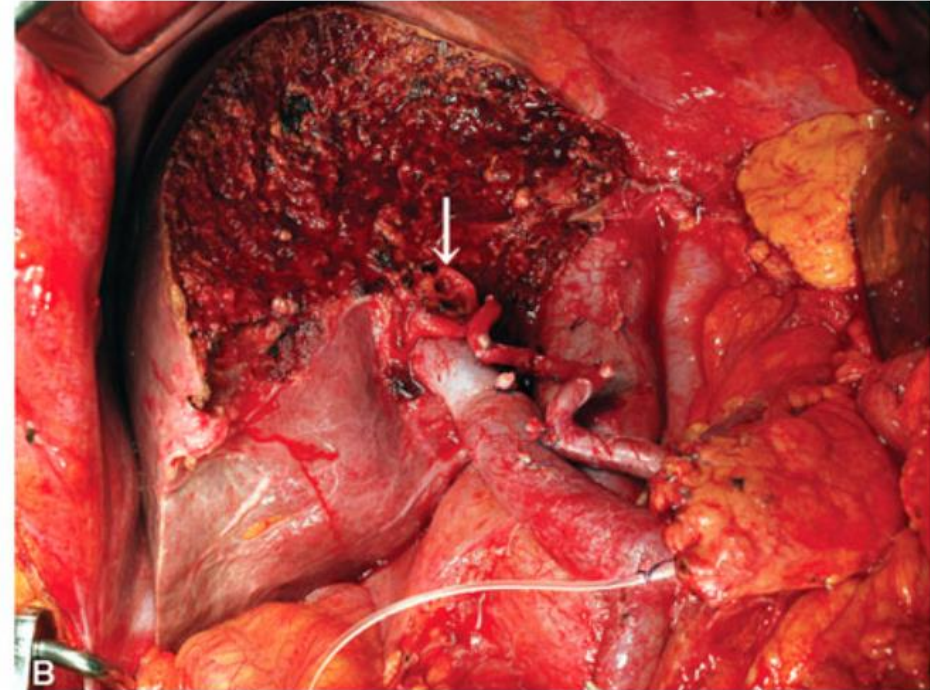
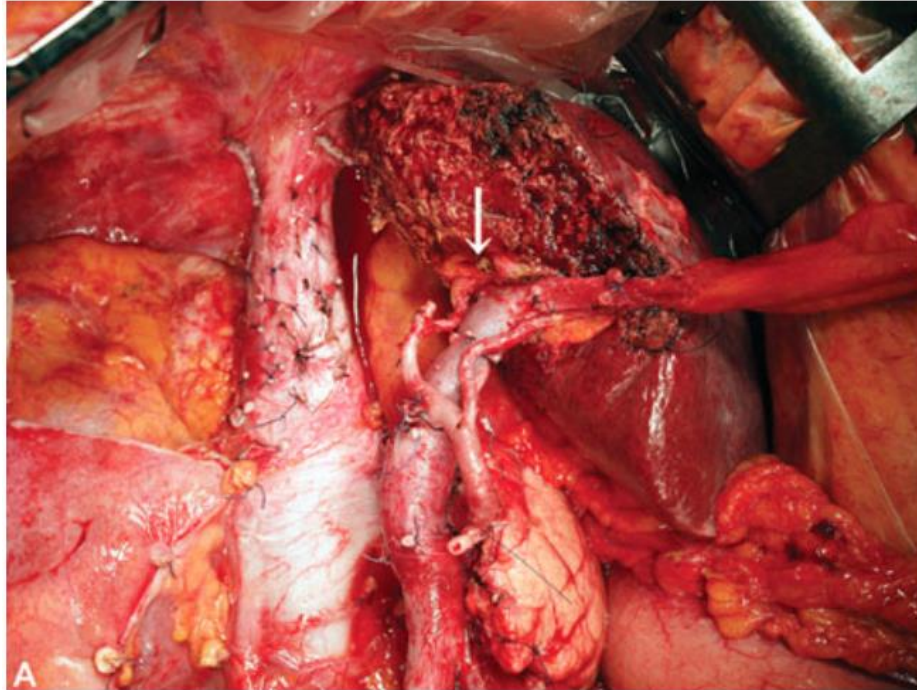
## Should we use ALPPS for hilar cholangiocarcinoma



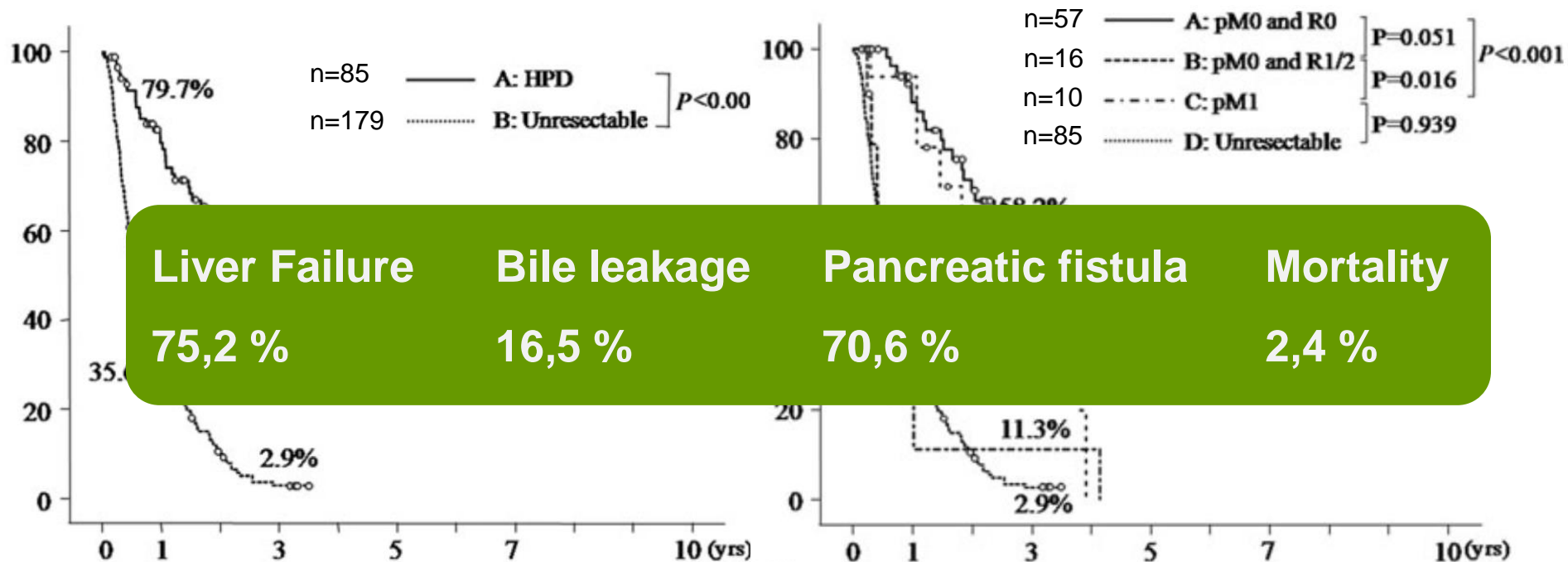
High Morbidity  
& Mortality  
in GBCA & PHCC



## Hepatopancreatoduodenectomy for advanced tumors



## Hepatopancreatoduodenectomy for advanced tumors



**Liver Failure**

**75,2 %**

**Bile leakage**

**16,5 %**

**Pancreatic fistula**

**70,6 %**

**Mortality**

**2,4 %**

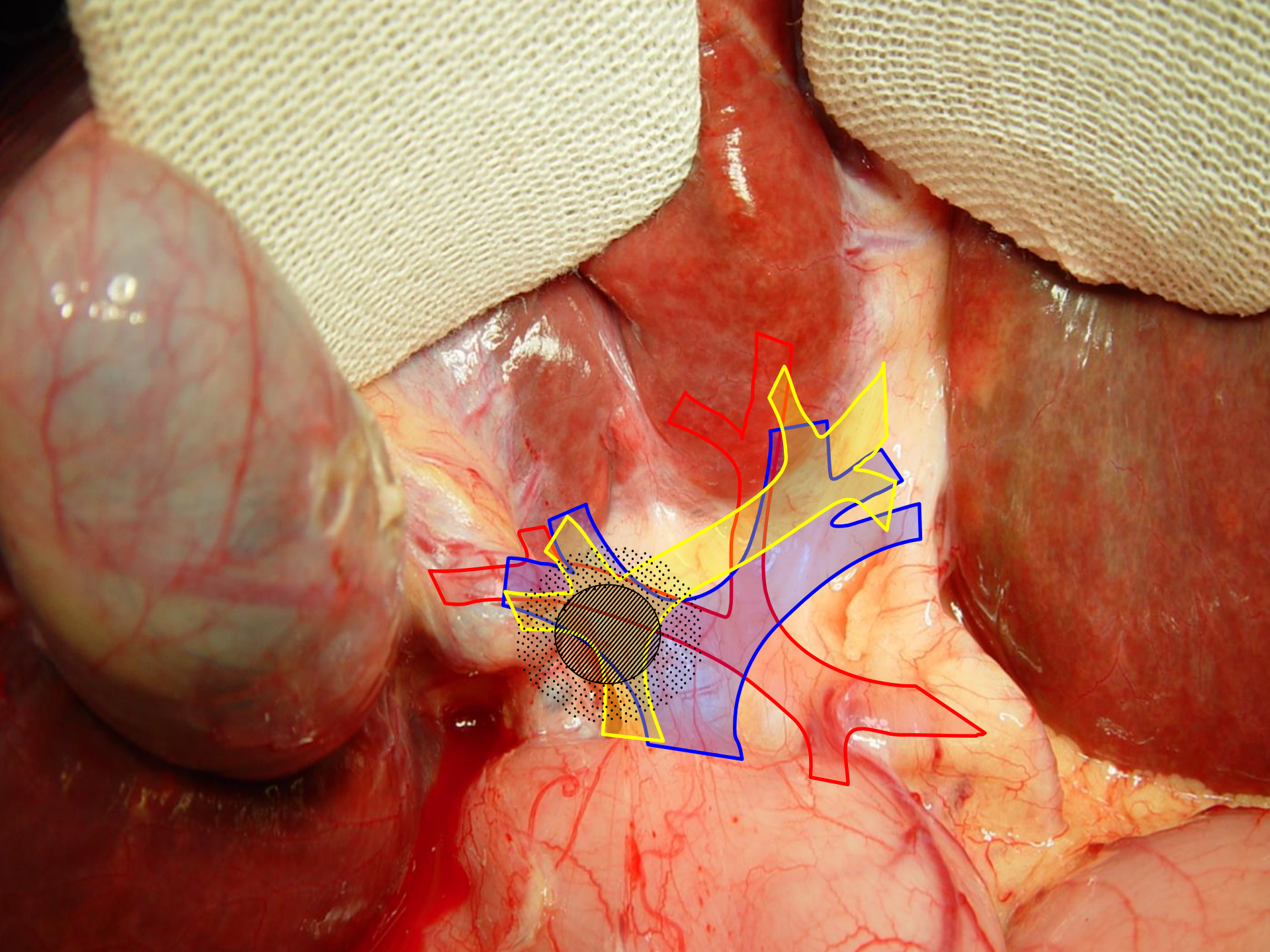
**Extended right resections should be performed to achieve a high rate of R0 resections if technically feasible**

**Preoperative portal vein embolisation in case of right resections**

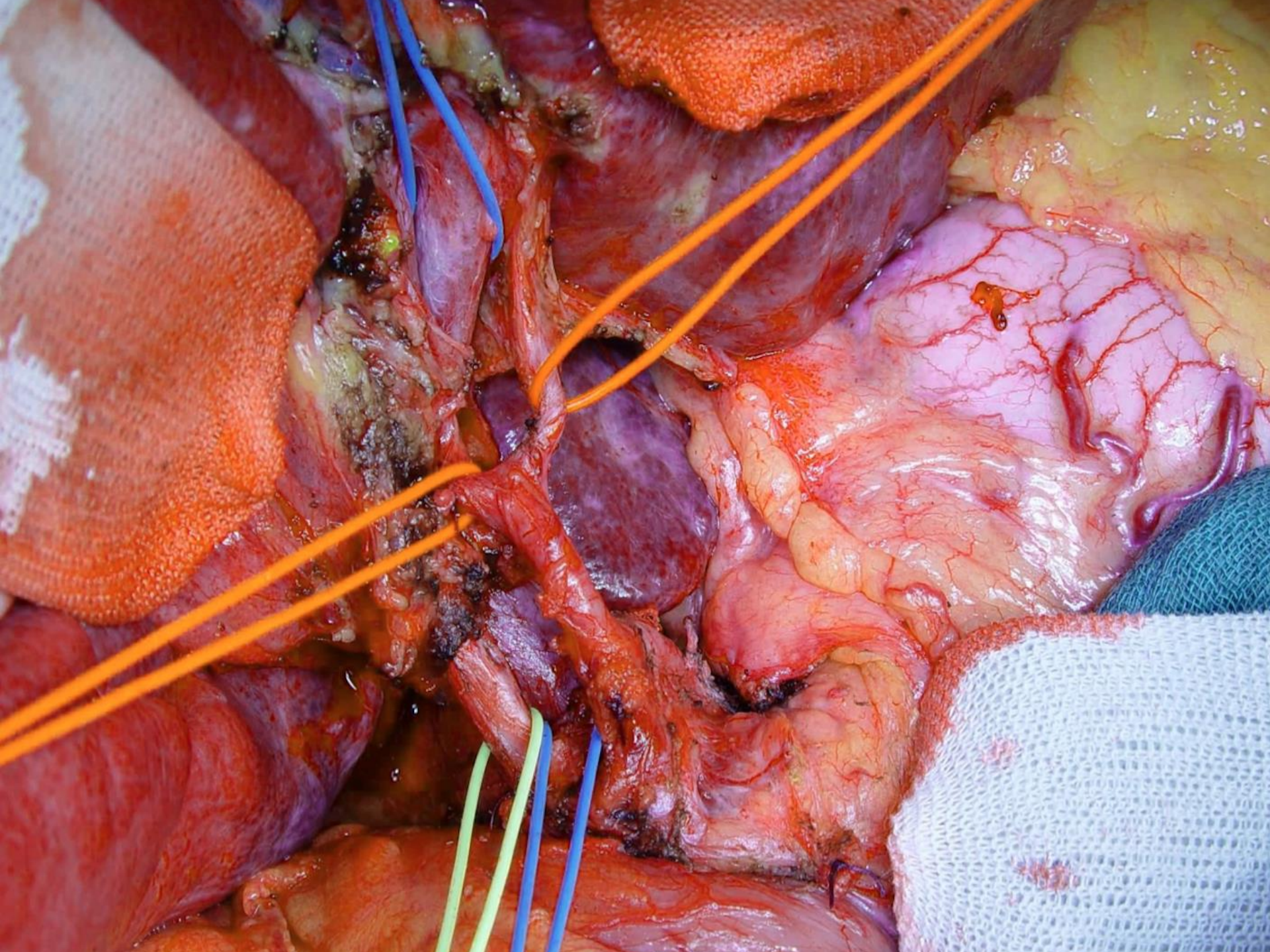
**Arterial reconstruction and/or Hepatopancreatoduodenectomy is an option in selected cases**



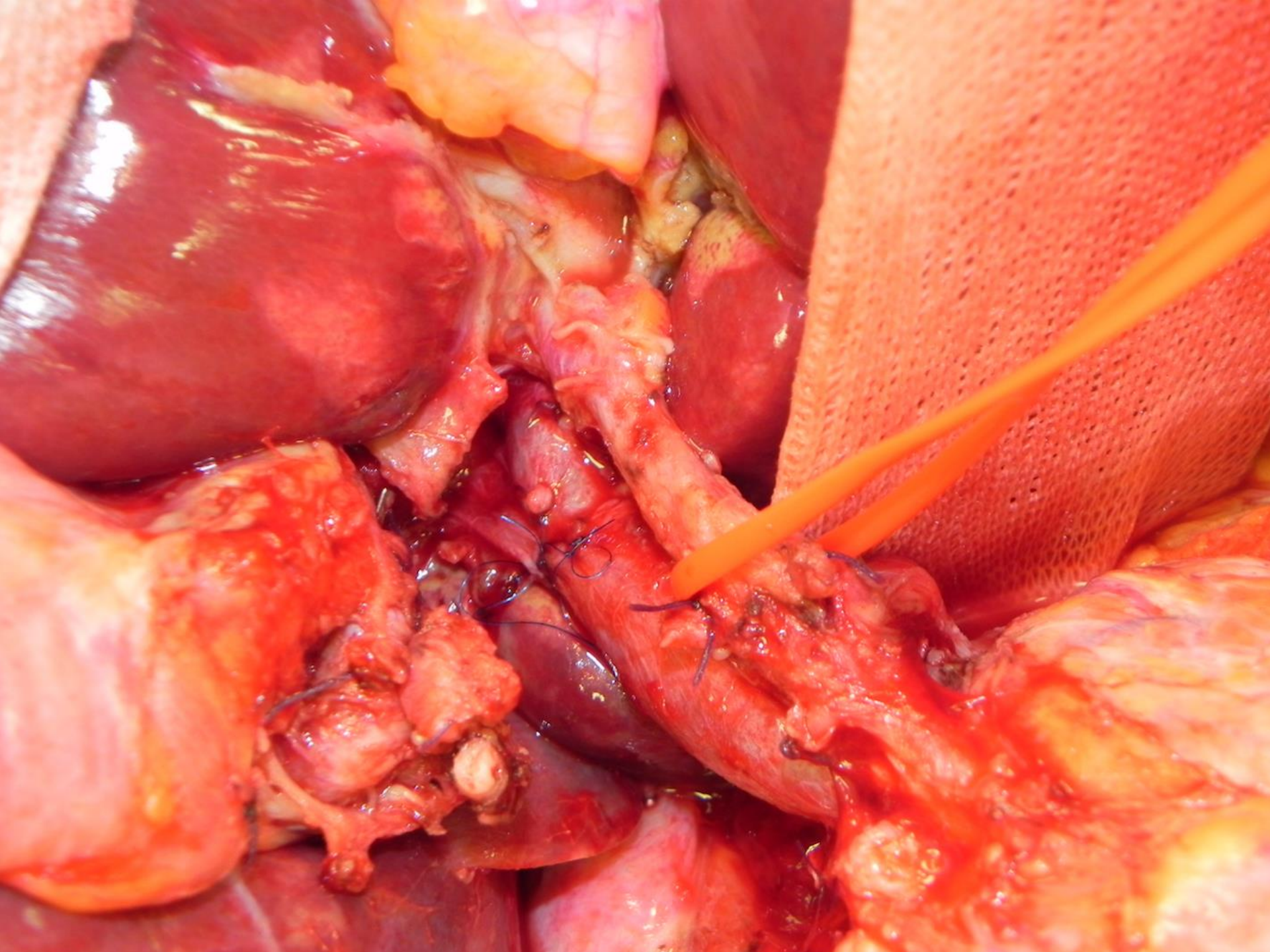
## **Extended right resection combined with portal vein resection**



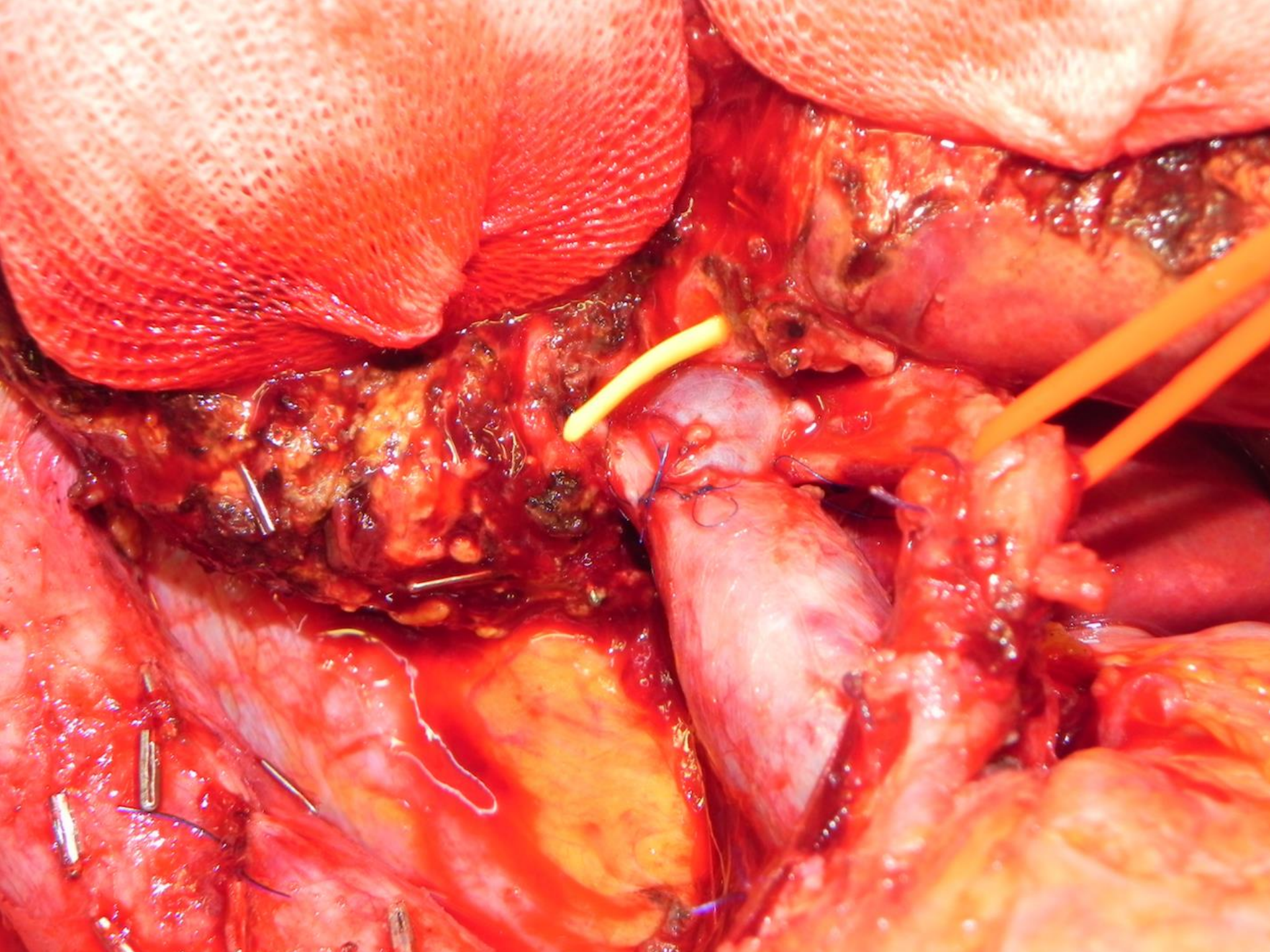












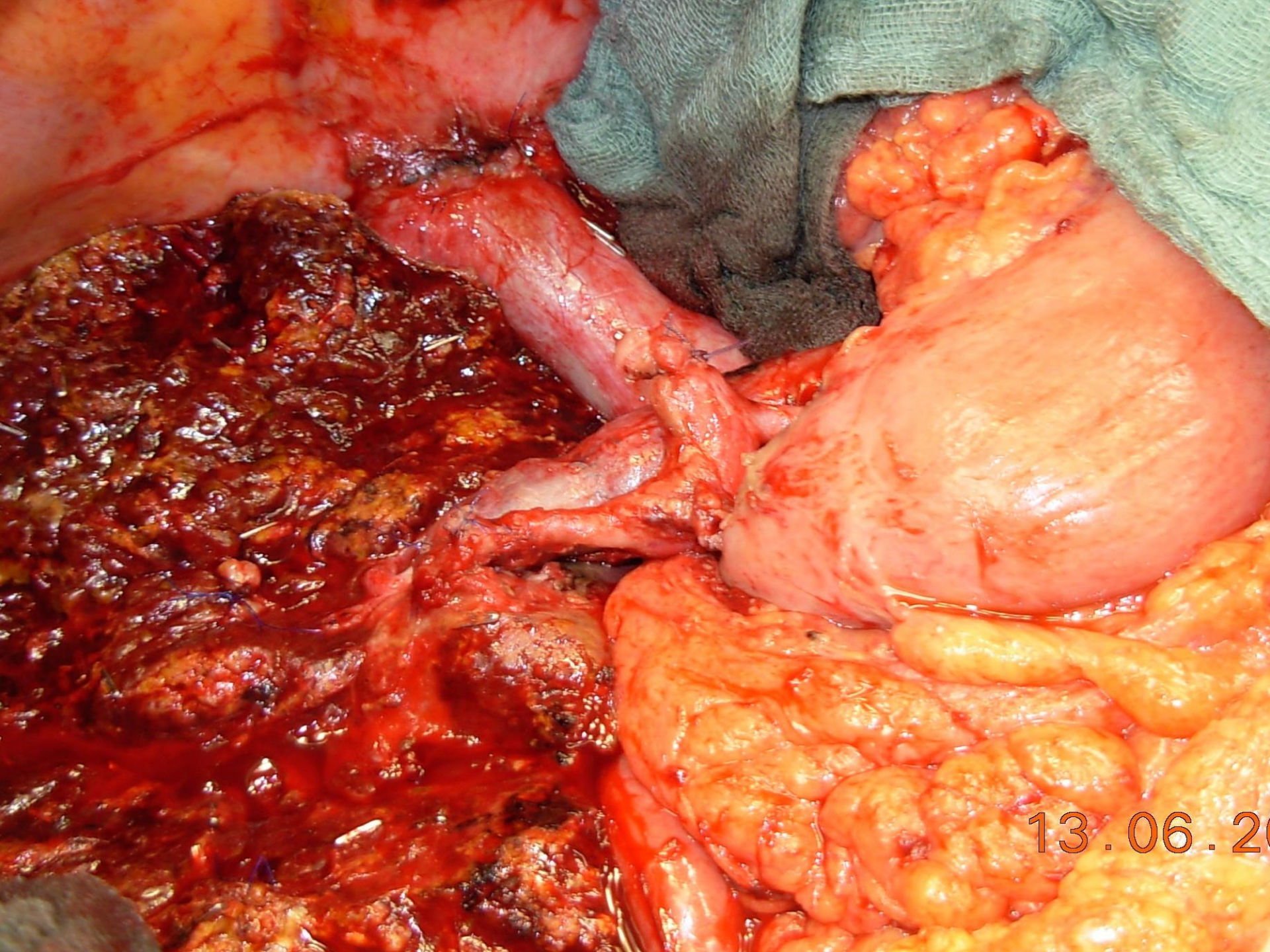
## **Left trisectionectomy combined with portal vein resection and arterial reconstruction**



## Left trisectionectomy with PV resection and arterial reconstruction



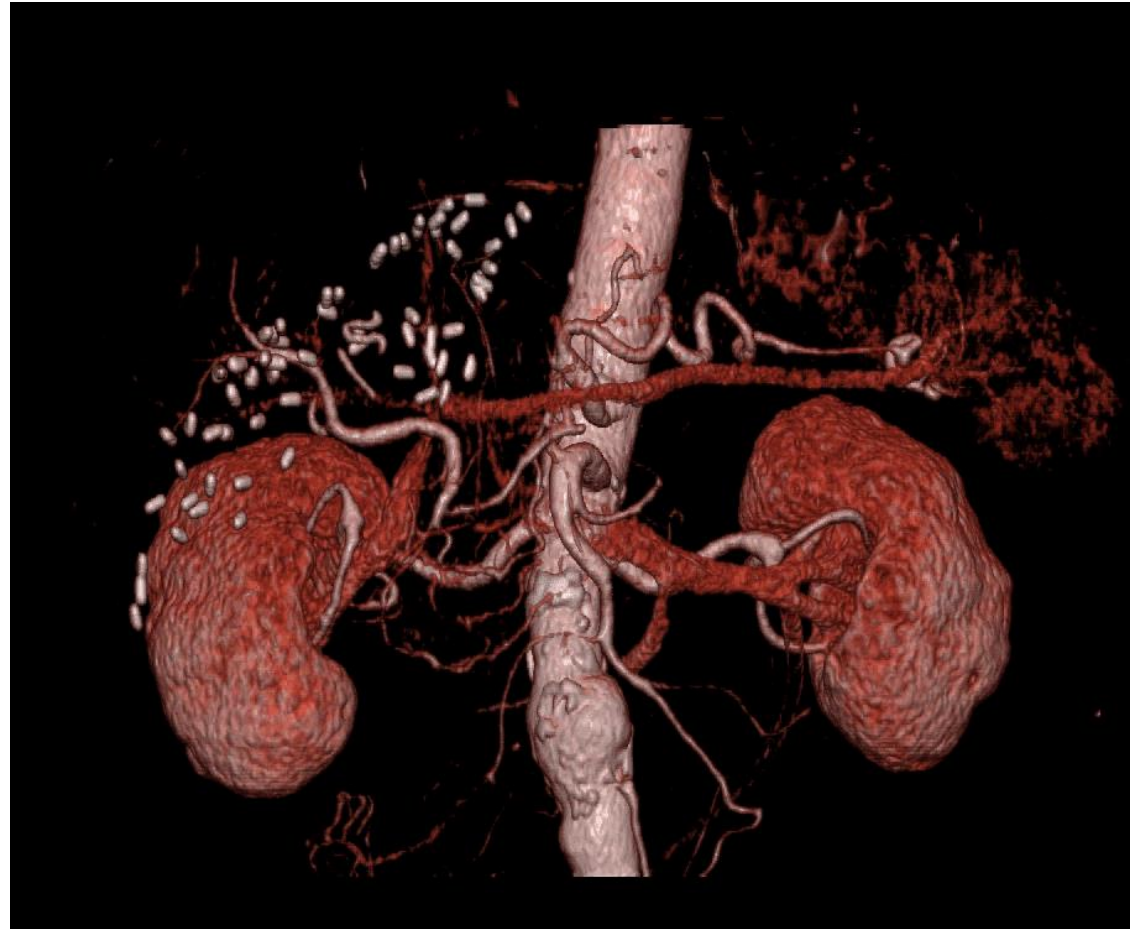
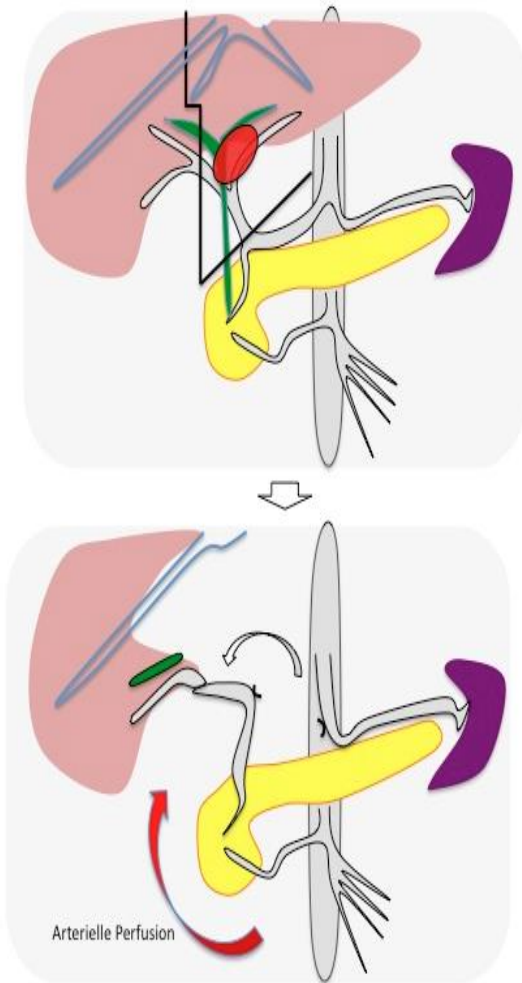




13.06.20



## Left trisectionectomy with PV resection and arterial reconstruction





# Thank you for your attention

## ESCAM – European Surgical Center Aachen - Maastricht



- **Newly founded HPB center in the heart of Europe**
- Merge of 2 tertiary referral University HPB units (10/2015)
  - University Hospital Aachen (1500 beds), Germany
  - University Hospital Maastricht (500 beds), Netherlands
- ~ 400 Liver resections / yr., ~ 200 Pancreas resections / yr.
- 60-80 liver transplants, 40-50 kidney transplants