

Klatskin Tumor

Preoperative Management & Surgical Technique

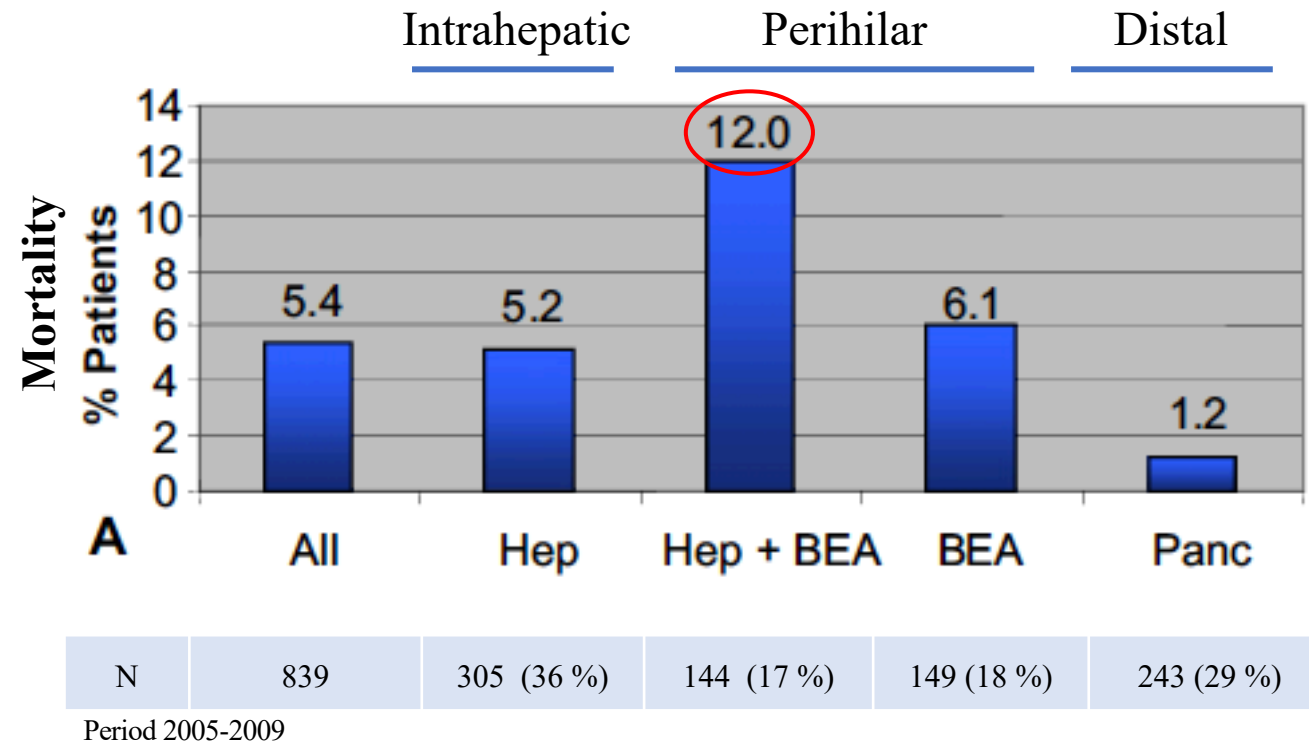


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BSHBPS Postgraduate Course
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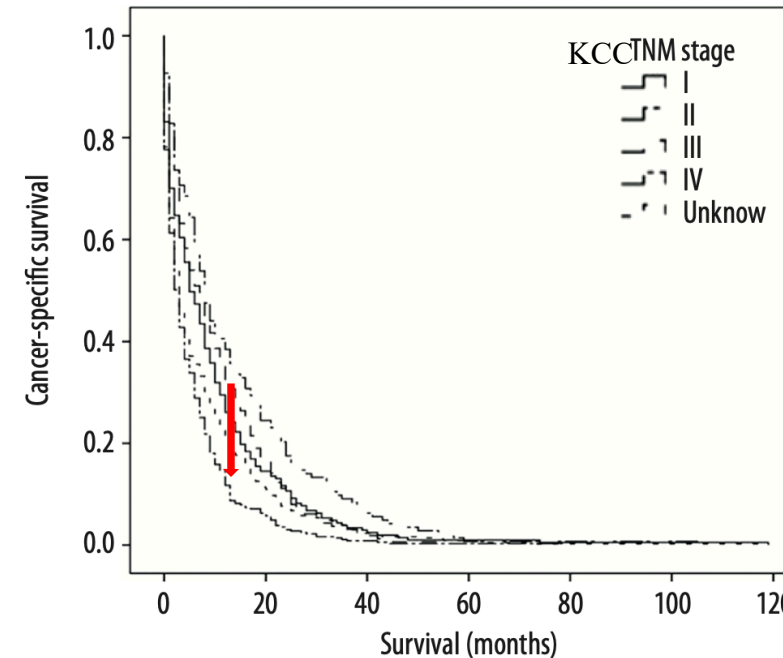
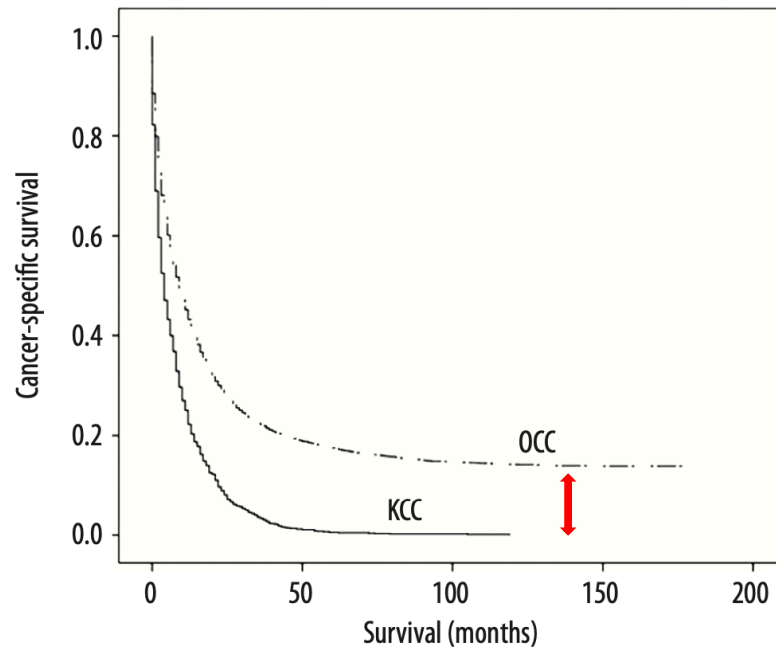
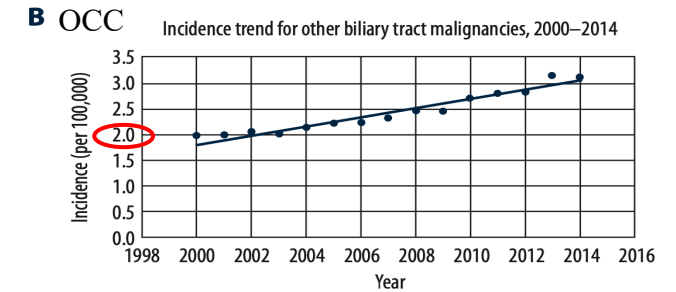
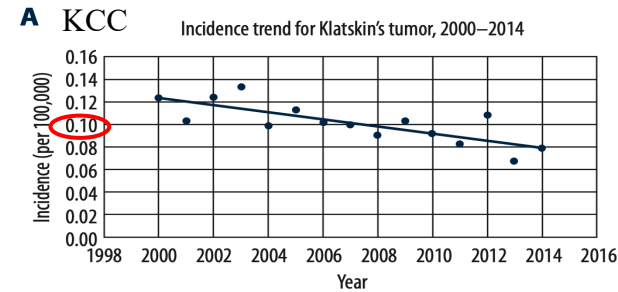
Mortality after Surgery for Cholangiocarcinoma



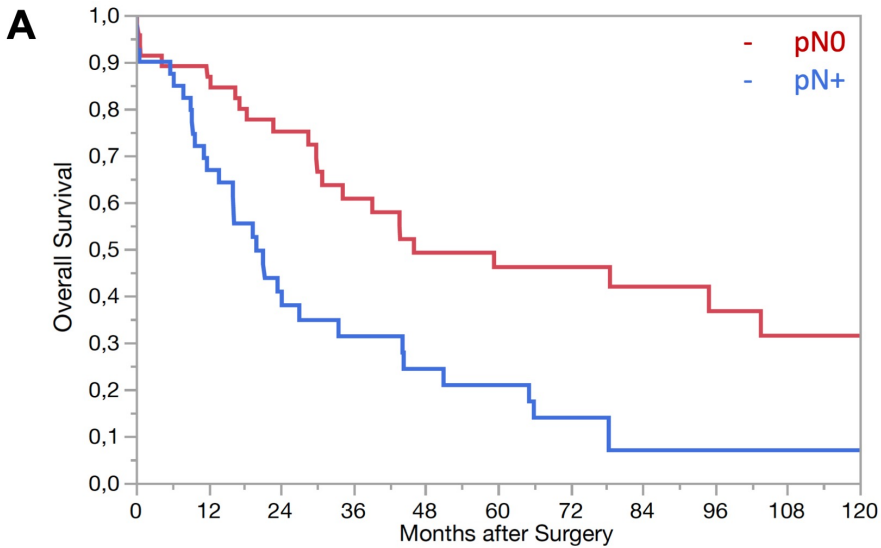
Incidence & Survival

SEER database (represents 28 % of US population)

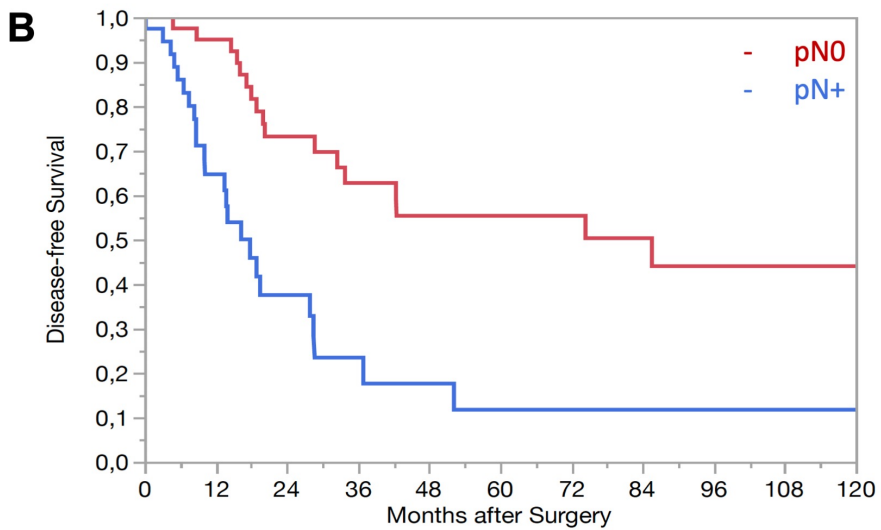
KCC (pCCA)	1341
OCC (other CCA)	24796



Parameter	N	
Type of resection (+ bile duct resection)		
- Left hepatectomy	29	32 %
- Right hepatectomy	27	30 %
- Central hepatectomy	4	4 %
- Extended right hepatectomy	3	3 %
- Extended left hepatectomy	2	2 %
- Segmental hepatectomy	2	2 %
- Bile duct resection only	23	26 %
Caudate lobe resection	57	63 %
Portal Vein resection/reconstruction	18	20 %
Common Hepatic Artery resection/reconstruction	3	3 %
R0-resection	74	84 %

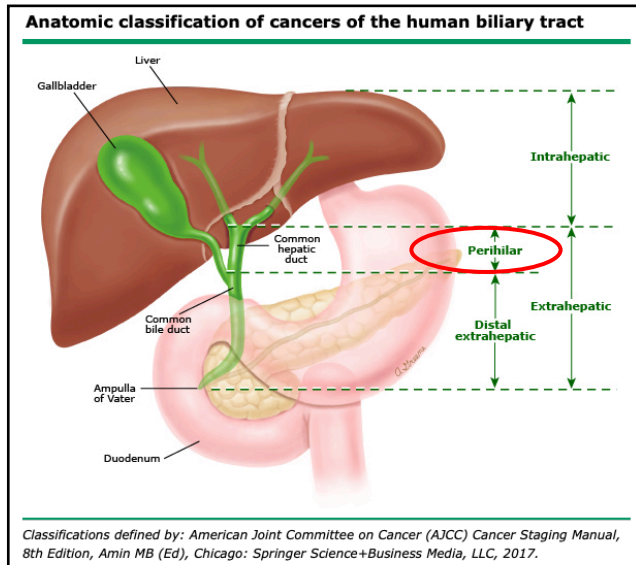
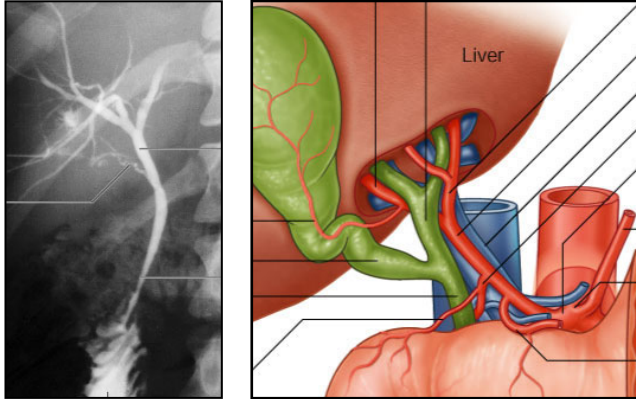


Number at risk	84	61	42	31	24	21	16	12	9	8	7
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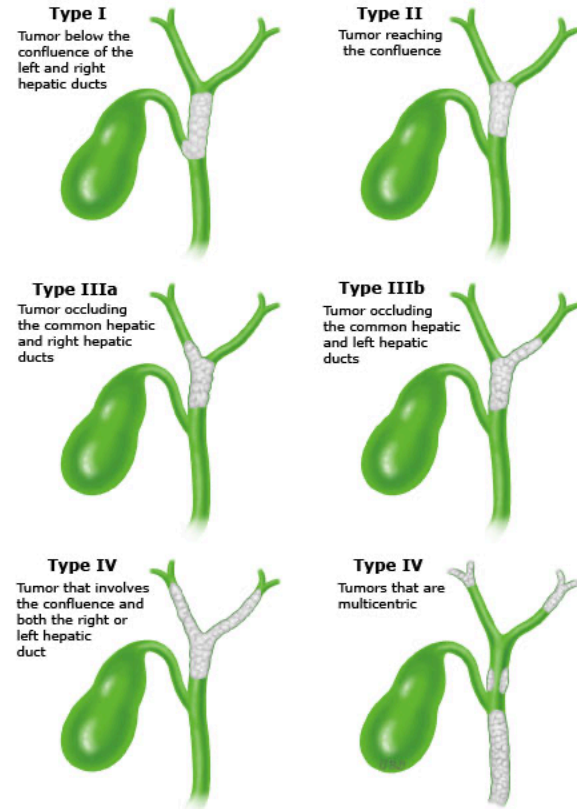


Number at risk	84	55	32	21	19	16	14	10	7	7	7
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Anatomy & Classification



Bismuth-Corlette classification of biliary tract cancers



The Bismuth-Corlette classification of biliary tract. White areas represent tumor and green areas normal bile duct.

Modified from de Groen PC, Gores GJ, LaRusso NF, et al. *N Engl J Med* 1999; 341:1368.

TNM Staging

American Joint Committee on Cancer (AJCC) TNM Staging for Perihilar Bile Duct Tumors (8th ed., 2017)

Table 7. Definitions for T, N, M

T	Primary Tumor
TX	Primary tumor cannot be assessed
T0	No evidence of primary tumor
Tis	Carcinoma <i>in situ</i> /high-grade dysplasia
T1	Tumor confined to the bile duct, with extension up to the muscle layer or fibrous tissue
T2	Tumor invades beyond the wall of the bile duct to surrounding adipose tissue, or tumor invades adjacent hepatic parenchyma
T2a	Tumor invades beyond the wall of the bile duct to surrounding adipose tissue
T2b	Tumor invades adjacent hepatic parenchyma
T3	Tumor invades unilateral branches of the portal vein or hepatic artery
T4	Tumor invades main portal vein or its branches bilaterally, or the common hepatic artery; or unilateral second-order biliary radicals bilaterally with contralateral portal vein or hepatic artery involvement
N	Regional Lymph Nodes
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	One to three positive lymph nodes typically involving the hilar, cystic duct, common bile duct, hepatic artery, posterior pancreaticoduodenal, and portal vein lymph nodes
N2	Four or more positive lymph nodes from the sites described for N1

M	Distant Metastasis
M0	No distant metastasis
M1	Distant metastasis

Table 8. AJCC Prognostic Groups

	T	N	M
Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
Stage II	T2a-b	N0	M0
Stage IIIA	T3	N0	M0
Stage IIIB	T4	N0	M0
Stage IIIC	Any T	N1	M0
Stage IVA	Any T	N2	M0
Stage IVB	Any T	Any N	M1

Histologic Grade (G)

GX	Grade cannot be assessed
G1	Well differentiated
G2	Moderately differentiated
G3	Poorly differentiated

Blumgart Staging System

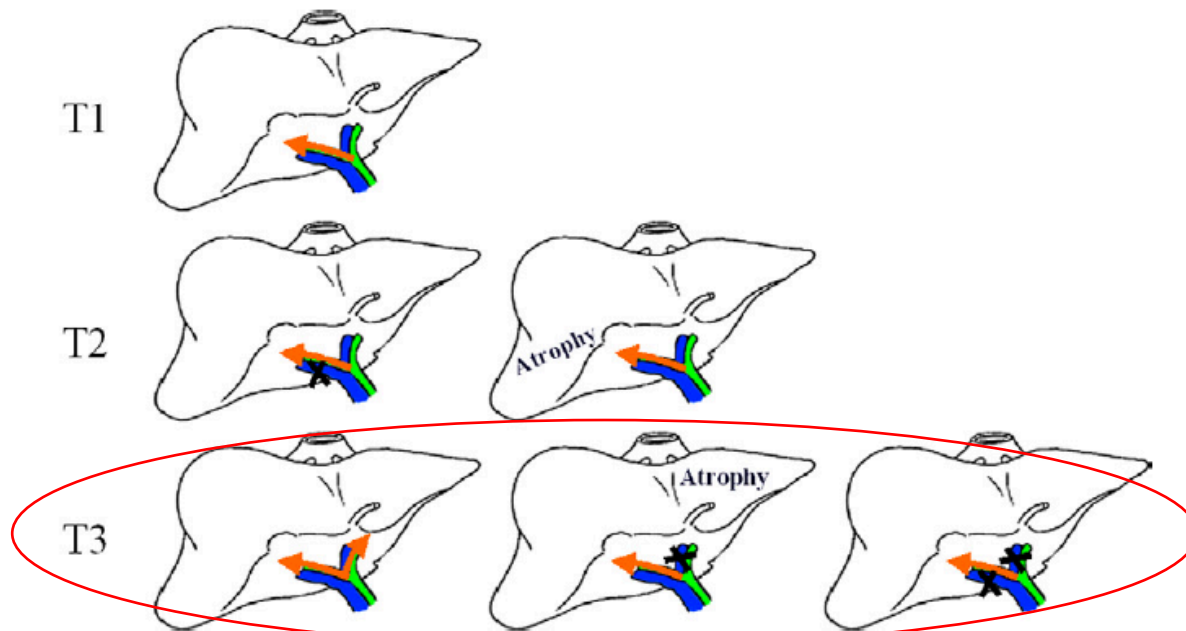


Figure 1. Proposed T stage criteria for hilar cholangiocarcinoma. T1 corresponds to tumor involving biliary confluence with unilateral extension to second-order biliary radicles. T2 corresponds to tumor involving biliary confluence with unilateral extension to second-order biliary radicles and ipsilateral portal vein involvement or ipsilateral hepatic atrophy. T3 corresponds to tumor involving biliary confluence with bilateral extension to second-order biliary radicles; or unilateral extension to second-order biliary radicles with contralateral portal vein involvement; or unilateral extension to second-order biliary radicles with contralateral hepatic lobar atrophy; or main or bilateral portal venous involvement.

- Preoperative clinical staging system
- To accurately assess resectability
- Based upon
 - Biliary tumor extent
 - Presence/absence of portal vein involvement
 - Presence/absence of hepatic lobar atrophy
- Independent confirmation needed

Surgical technique

1. Vascular involvement often **cannot** be detected effectively by imaging techniques
2. True resectability can often only be determined **at the time** of exploration
3. Laparoscopy often is not able to determine vascular involvement, but may rule out small peritoneal metastases
4. Curative resection aims at adequate negative **bile duct margins of 5-10 mm**
5. Curative resection often requires **major hepatectomy**
6. Curative resection is possible in $< 50 \%$

Criteria for Unresectability

M1

- Distant organ metastases
- Liver metastases
- Celiac lymph node metastases

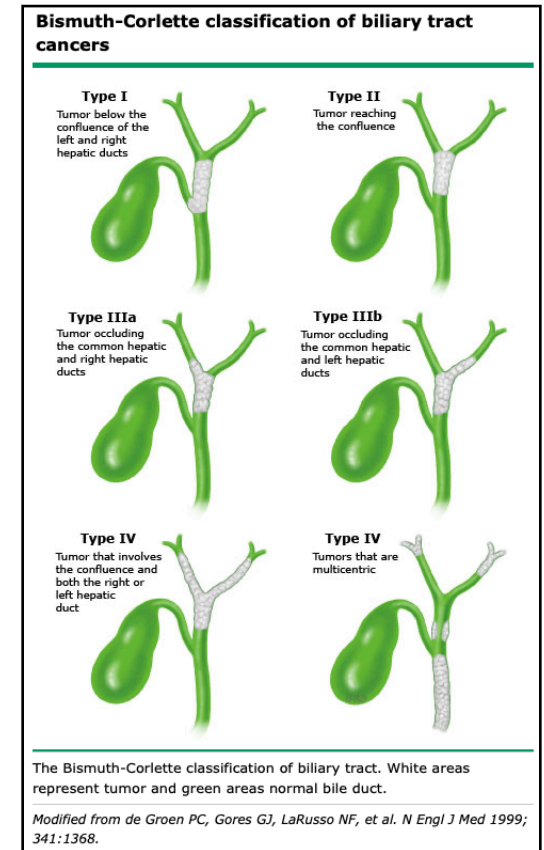
T4

- Invasion of main portal vein or its branches bilaterally
- Invasion of common hepatic artery or its branches bilaterally
- < Some centers support en-bloc resection with vascular reconstruction

- **Inadequate future liver remnant volume; FLRV should be $\geq 30\%$**
 - Atrophy of 1 liver lobe with encasement of contralateral PV-branch
 - Atrophy of 1 liver lobe with contralateral 2nd-order bile duct involvement

Surgical Technique is based on Bismuth-Corlette Classification

- **Type I-II**
 - En-bloc resection of the extrahepatic bile ducts and gallbladder
 - Type II: caudate branches often involved => Caudate lobe resection
 - Concomitant major hepatectomy is usually required to achieve 5-10 mm bile duct margins
- **Type III-IV**
 - Right/Left hepatectomy OR trisectionectomy
 - Caudate lobe resection recommended
- **Any type**
 - Regional lymphadenectomy
 - RY-hepaticojejunostomy
 - En-bloc portal vein resection/reconstruction to achieve R0-resection



Preoperative Management

- **Imaging**

- Diagnostic/Staging: CT-scan Abdomen/Thorax
- Cholangiopancreatography
 - MRI // EUS // ERCP // PTC

- **Biliary decompression of the future liver remnant**

- Yes/no = **controversial**
- Best methods = **controversial**
- Unrelieved biliary obstruction can cause
 - Cholestasis, liver dysfunction, and biliary cirrhosis => increased postoperative morbidity/mortality
 - Biliary stent may hinder intra-operative assessment of proximal tumor extent
 - Catheter tract (PTC) cancer recurrence in up to 6 %
- **Common practice in most centers**
 - Biliary decompression if Bili > 10 mg/dL
 - => Surgical intervention if Bili < 3 mg/dL; some centers if Bili < 5 mg/dL
 - Surgery without biliary decompression if Bili < 10 mg/dL

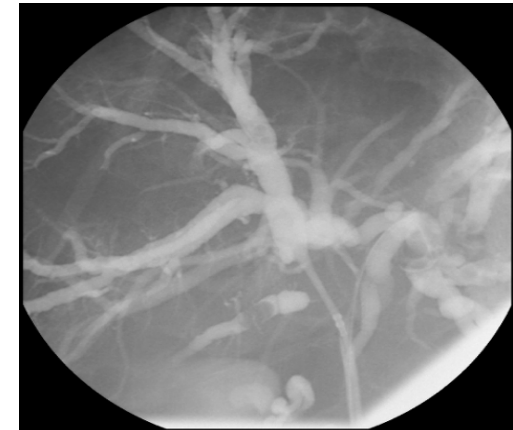
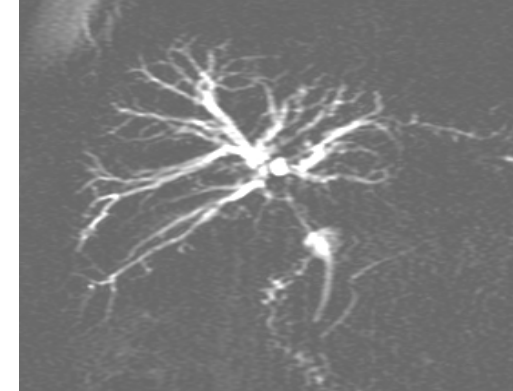
- **Portal vein embolisation**

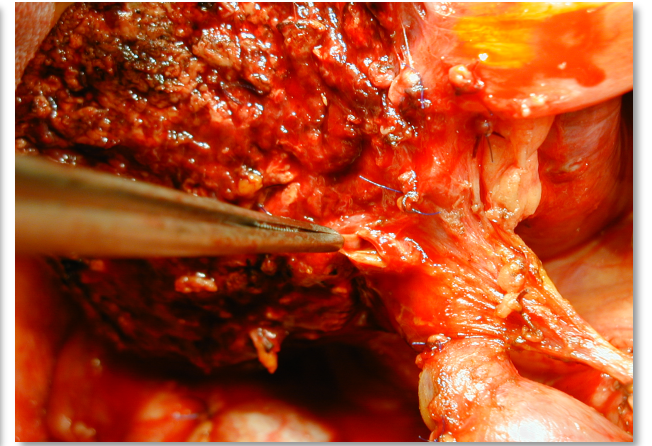
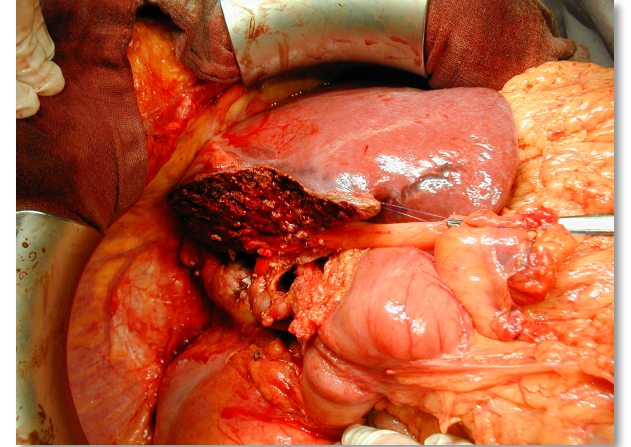
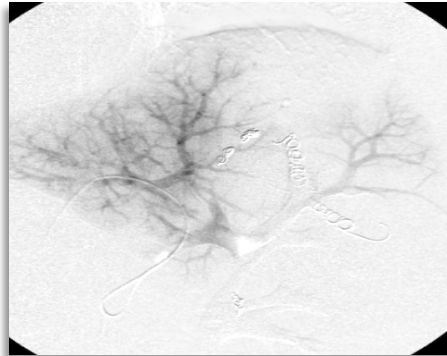
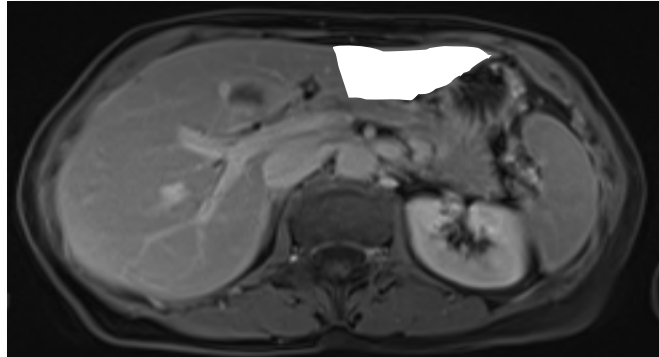
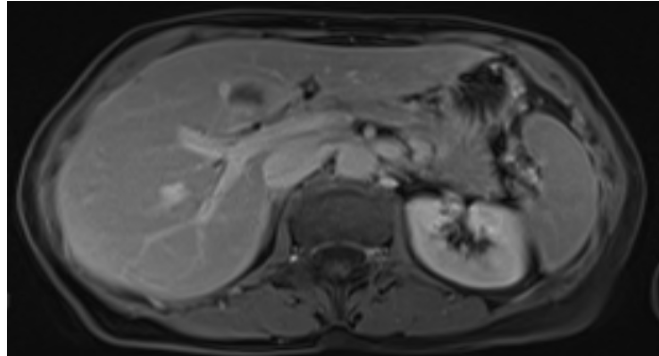
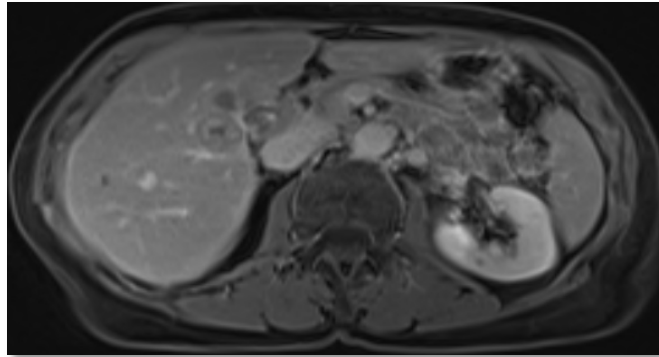
- M 63y; ASA 2: AHT & NIDDM
- Jaundice + itching; No pain; No fever

- Biochemistry
 - Bili tot 12.65 mg% Bili dir 8.76 mg%
 - AP 1305 U/L gGT 1628 U/L
 - AST/ALT 125/117 U/L

- US: Intrahepatic bile duct dilatation

- CT-scan Abdomen/Thorax: M0





PBD for pCCA: Yes or No?

Meta-analysis

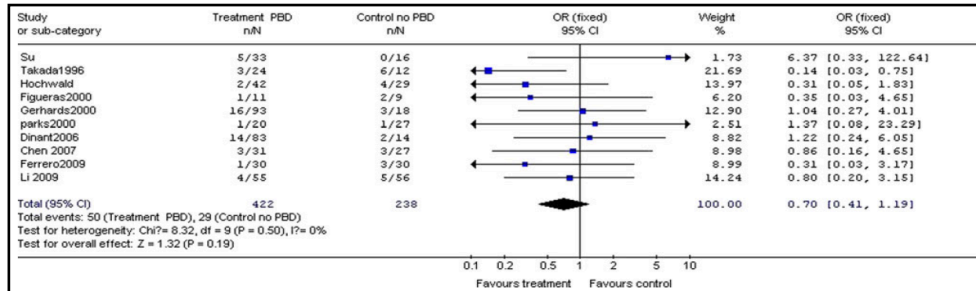


Fig. 3 Odds ratios for in-hospital mortality after surgical therapy for hilar cholangiocarcinoma according to PBD versus no PBD

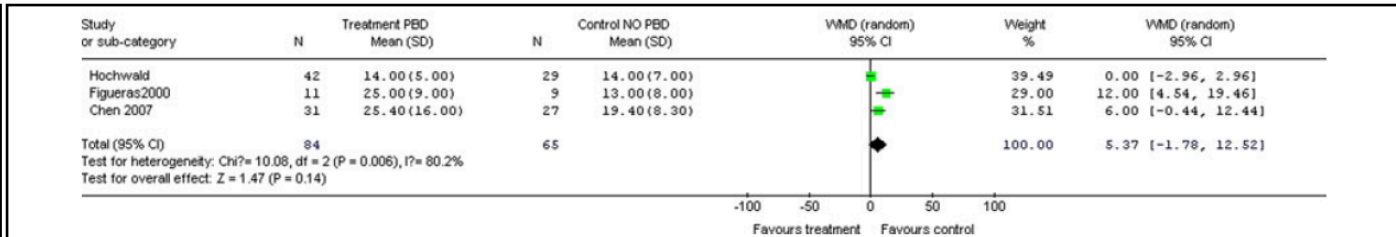


Fig. 5 Weighted mean difference for postoperative hospital stay after surgical therapy for hilar cholangiocarcinoma according to PBD versus no PBD

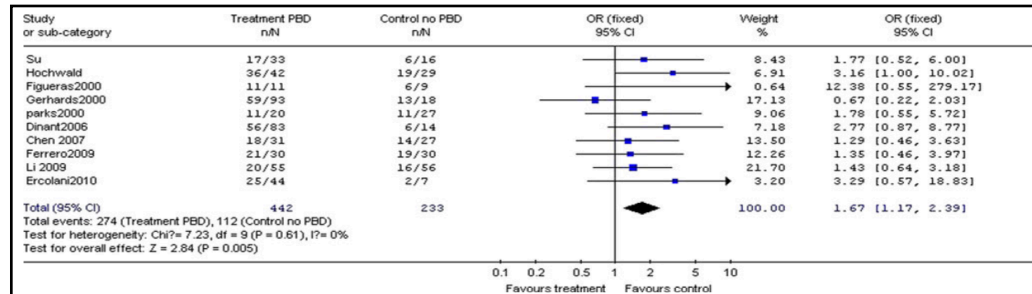


Fig. 1 Odds ratios for postoperative complications after surgical therapy for hilar cholangiocarcinoma according to PBD versus no PBD

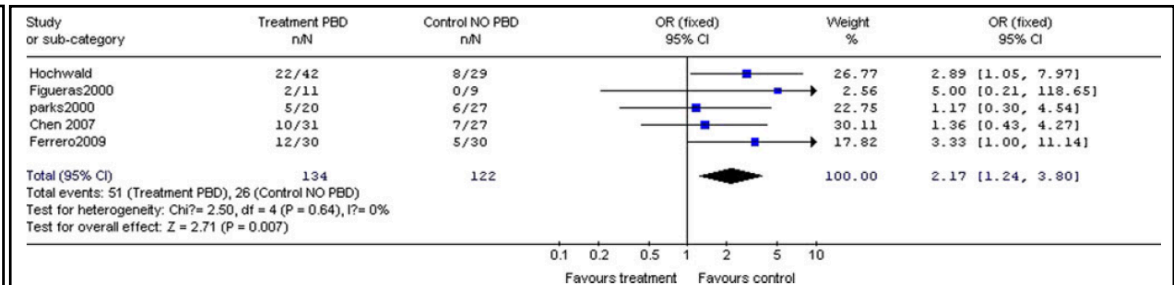


Fig. 4 Odds ratios for postoperative infectious morbidity after surgical therapy for hilar cholangiocarcinoma according to PBD versus no PBD

Postoperative	PBD vs NoPBD
Mortality	=
Hospital stay	=
Complications	>
Infectious complications	>



**PBD should not be
routinely performed**

RCT needed

Portal Vein Embolization before Extended Hepatectomy for Biliary Cancer: Current Technique and Review of 494 Consecutive Embolizations

PVE in pCCA

Dropout 17 %

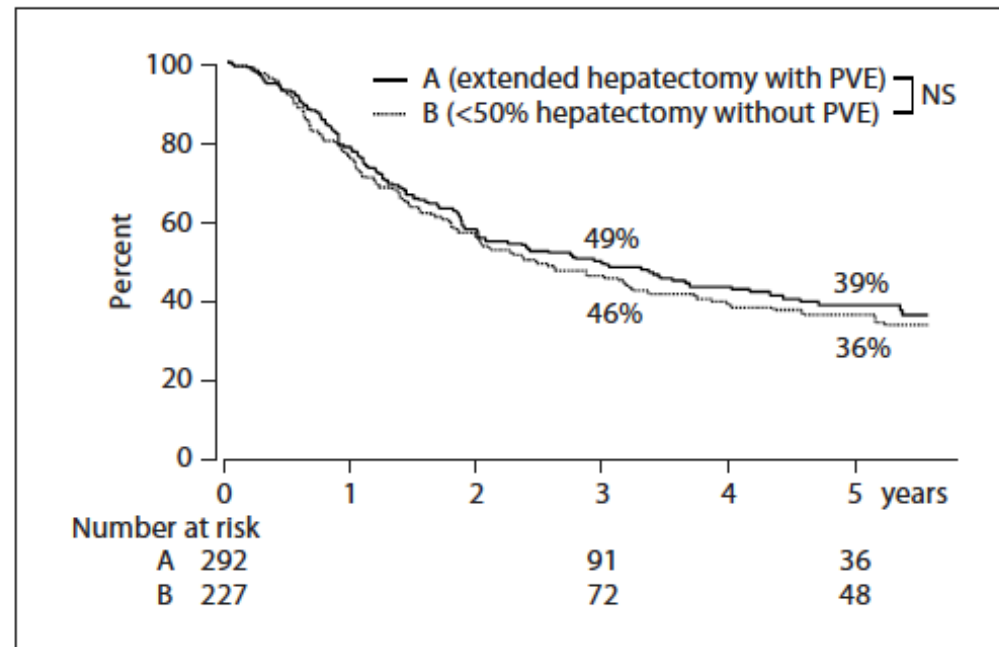


Fig. 5. Overall survival for patients with cholangiocarcinoma. Statistical analysis by log-rank test.

Take-home Messages

- **Surgical management of perihilar cholangiocarcinoma**
 - Only curative option
 - Often concomitant major hepatectomy
 - High-risk procedure
 - Curative resectability rate < 50 %
- **Imaging & classification systems cannot accurately predict resectability**
- **True resectability can often only be determined at the time of surgical exploration**
- **Preoperative biliary drainage (PBD) is controversial**
 - Should not be routinely performed
 - Most centers: PBD in case of Bili Total > 10 mg/dL => surgery in case of Bili < 3-5 mg/dL
- **Preoperative portal vein embolisation results in increased FLRV in up to 80 % of patients**
- **Long-term survival is determined by**
 - R0-resection with tumor-free bile duct margins of 5-10 mm
 - Locoregional lymph node status