

# Macroscopy of bile ducts

**H.U.B**

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*Leuven, 2<sup>th</sup> december 2023*

## Summary

Foreword

Common bile duct

Gallbladder

Intrahepatic  
cholangiocarcinoma

Hilar and perihilar ducts

Conclusion

## 1-Foreword

Macroscopic examination is **the first step** for surgical specimen in pathology lab.

**Standardized macroscopic approach** and **protocols** should be used for biliary (oncological) surgical specimens:

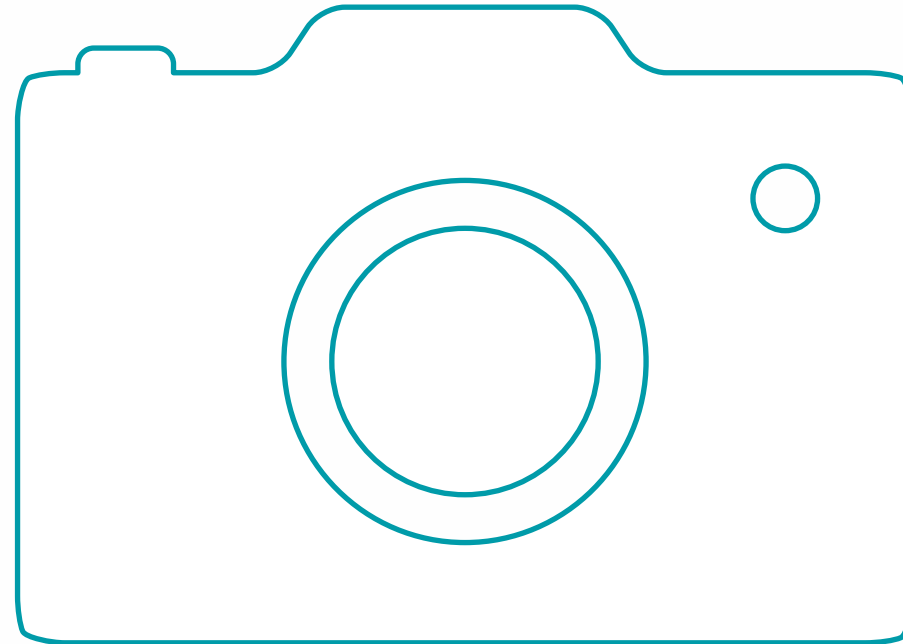
- »»» To make **correct preservation** of the surgical specimen (**accurate fixation!!!**);
- »»» To make **correct description** of tumoural lesions;
- »»» to make **accurate samples** of tumoural lesions;
- »»» **accurate microscopy** (e.g. TNM stage), **accurate immunohistochemistry**,  
**molecular biology**, ...

## 1-Foreword

Before macroscopic examination, clinical data:

- Site of tumour at diagnosis;
- Preoperative disease stage;
- Histological type of tumour;
- Previous histology, molecular data available;
- History of neoadjuvant therapy;
- Type of resection;
- If the patient is enrolled in a clinical trial as a specific pathology procedure may need to be followed.

# 1-Foreword



# 02

## GALLBLADDER

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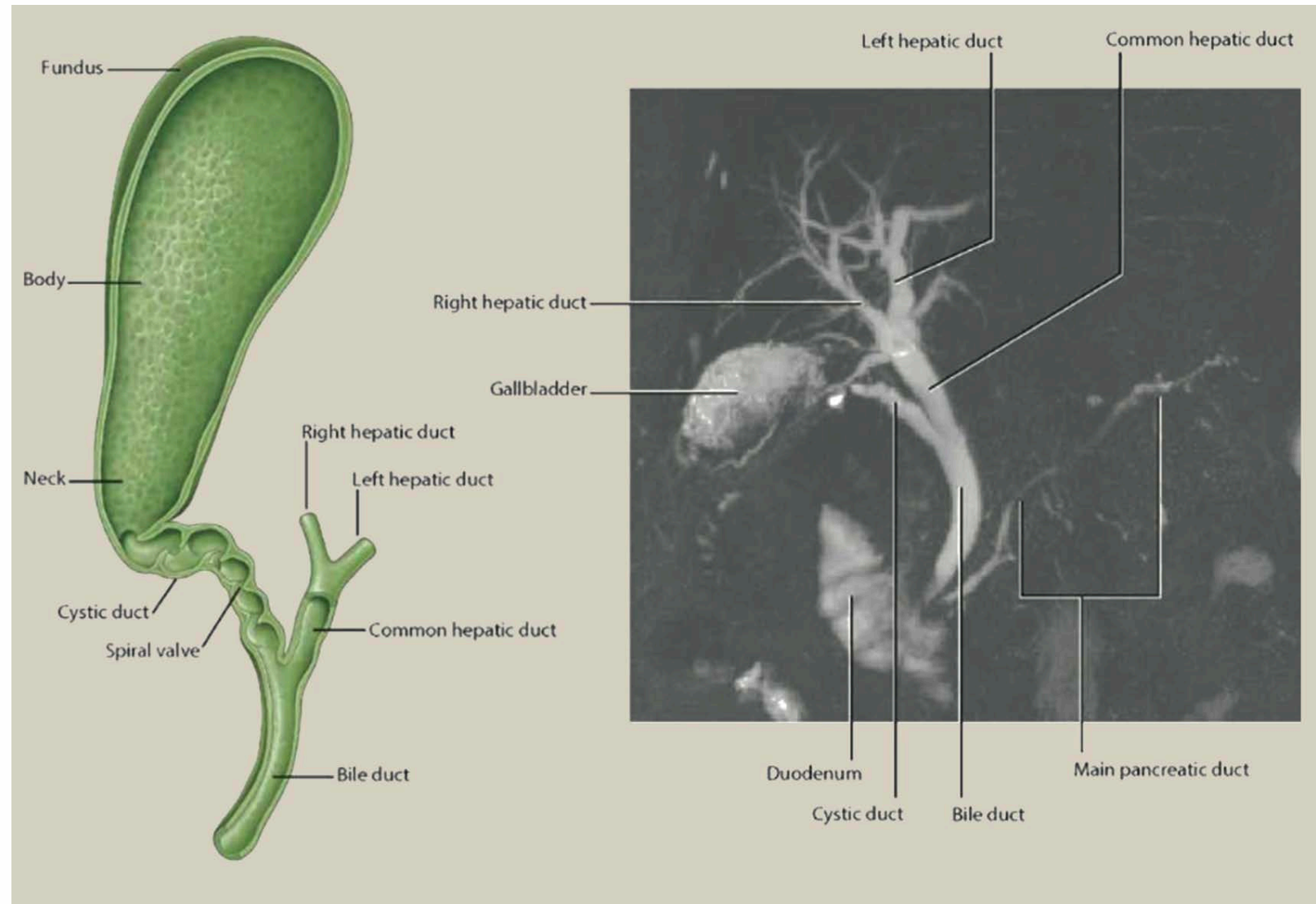


Tamm-art - <http://www.redbubble.com/people/tamm-ar>

## 2-Gallbladder

### Anatomy

- **Cystic duct** is:
  - 3–4 cm in length
  - 3 mm wide.
- It begins at the neck of the gallbladder and runs posteriorly, inferiorly, and medially towards the common hepatic duct.
- The cystic duct merges with the common hepatic duct to form the **common bile duct**.
- The mucous lining of the cystic duct is often raised into a spiral fold called the '**spiral valve (of Heister)**'. The fold consists of a variable number of turns and is continuous with a similar mucosal fold in the neck of the gallbladder



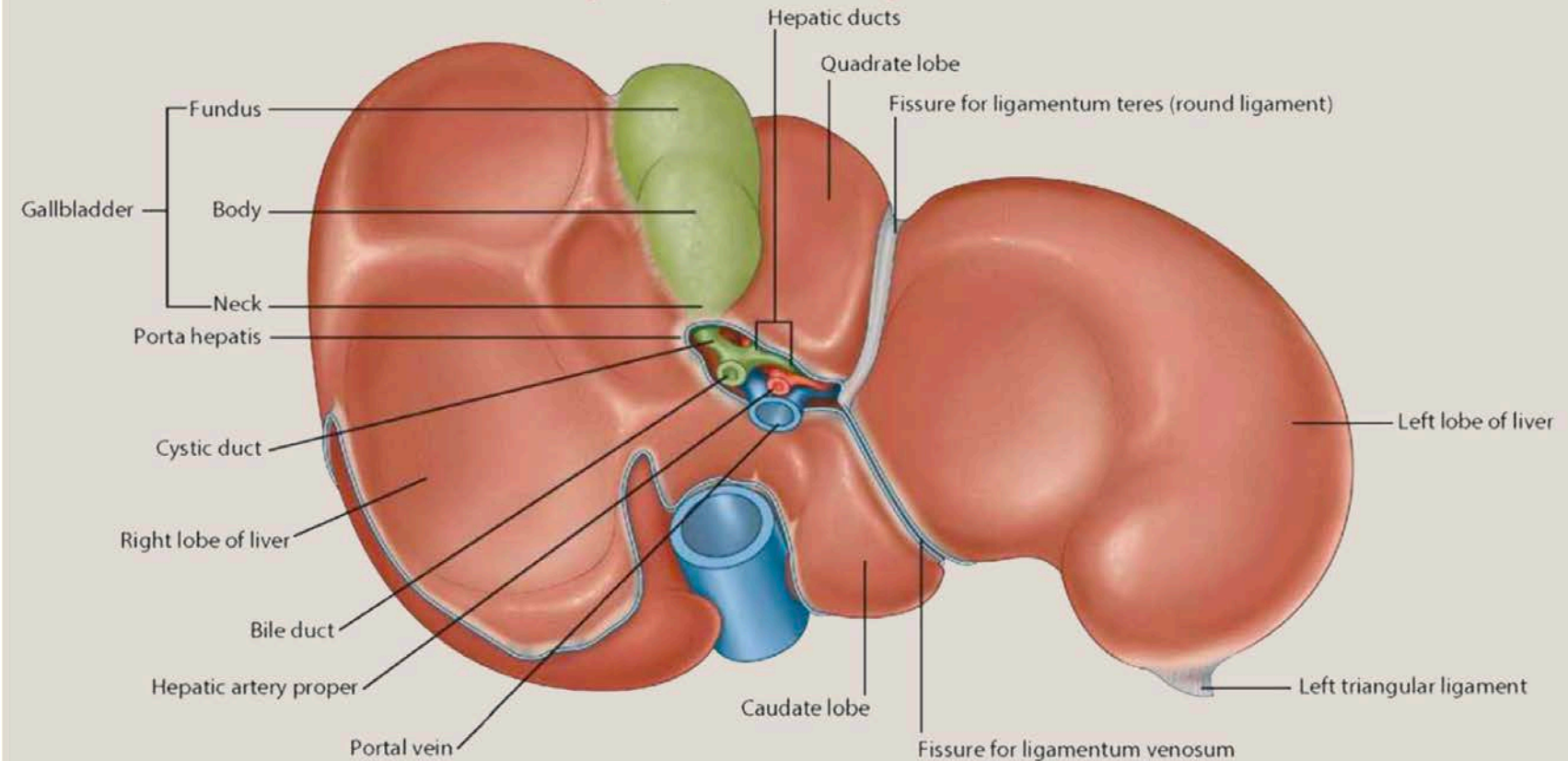
Bazira PJ. Anatomy of the gallbladder and bile ducts. *Surgery (Oxford)*. 2023, 41 (6): 319-324.

## 2-Gallbladder

### Anatomy

- pear-shaped, thin-walled, distensible sac with a capacity of approximately 50 ml.
- It lies on the visceral surface of the liver in a narrow depression, **the gallbladder (cystic) fossa**, lying immediately to the right of the quadrate lobe of the liver.

The visceral surface of the liver showing the position of the gallbladder



Reproduced from Drake R, Vogl W, Mitchell A, Tibbitts R, Richardson P. (2021). Gray's atlas of anatomy (3rd ed.). Philadelphia, PA: Elsevier, with permission



## 2-Gallbladder

### *External inspection*

#### **Describe and measure the anatomical components present.**

- Gallbladder, in three dimensions
- Cystic duct
- (Bile duct, length)
- Liver with gallbladder bed (for tumour), in three dimensions
- Other organs/tissue present, describe and measure

#### **Describe specimen integrity**

- Open/closed
- Fragmented (number of fragments, measure all the fragments)

#### **Examination of outer surface**

- Unremarkable/congestion/adhesion/Fibrinopurulent exudate/nodular/perforation/tumour

*<https://www.rcpa.edu.au/Manuals/Macroscopic-Cut-Up-Manual/Gastrointestinal/Gallbladder>*

## 2-Gallbladder

### *Dissection and internal inspection*

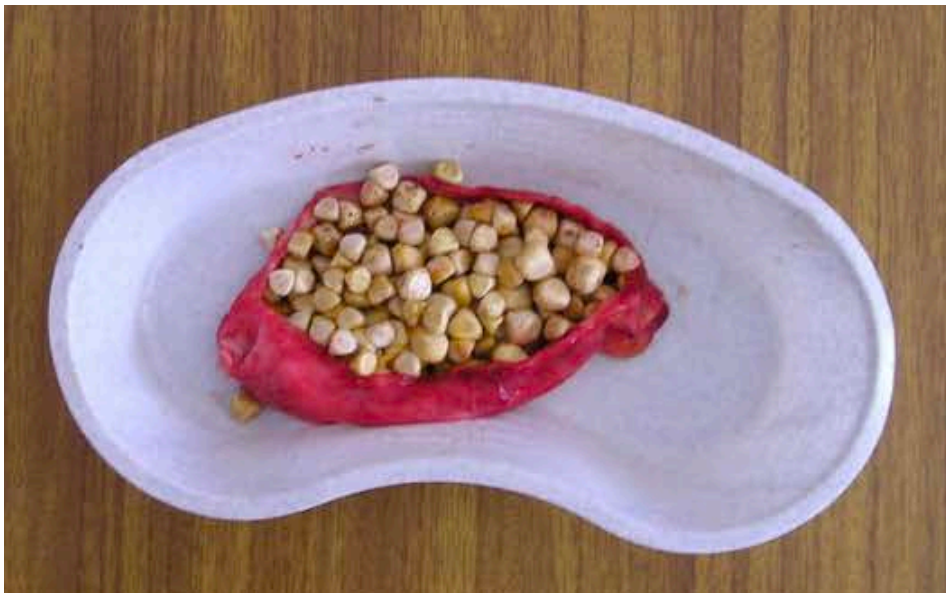
For adequate fixation: open the gallbladder longitudinally along the serosal surface, preserving the cystic duct and gallbladder bed margins.

- **Gallbladder wall**: maximum thickness (mm)
- **Gallbladder content** (if not bile): mucus, purulent
- **Gallstones**:
  - present or not
  - number
  - range of size
  - colour (pigmented green-black/yellow/mixed)
  - site of gallstones (in bile, embedded in mucosa, impacted in neck/cystic duct)

<https://www.rcpa.edu.au/Manuals/Macroscopic-Cut-Up-Manual/Gastrointestinal/Gallbladder>

## 2-Gallbladder

### Gallstones



cholesterol gallstones



Cholesterol and pigmented gallstones (bile, salt, Ca++)

<https://en.wikipedia.org/wiki/Gallstone>

## 2-Gallbladder

### *Internal inspection*

#### - **Aspect of mucosa:**

- Velvety
- Roughened
- Eroded/ulcerated
- Fibrotic/trabeculated
- Cholesterolosis



<https://www.rcpa.edu.au/Manuals/Macroscopic-Cut-Up-Manual/Gastrointestinal/Gallbladder>

<https://www.pathologyoutlines.com/topic/gallbladdercholesterolosis.html>

## 2-Gallbladder

### *Internal inspection*

#### - Aspect of mucosa:

- Tumour
  - Number
  - Size (mm)
  - Location (cystic duct, neck, body, fundus)

#### - Surface assessment:

- Serosal aspect
- Gallbladder bed
- Not assessable (e.g. for fragmented specimen)

#### - Tumour appearance:

- Polyp
- Nodule
- Ulcer
- Thickening

#### - Distance from margin

- Distance from margin (gallbladder bed and margin of cystic duct)

<https://www.rcpa.edu.au/Manuals/Macroscopic-Cut-Up-Manual/Gastrointestinal/Gallbladder>

## 2-Gallbladder

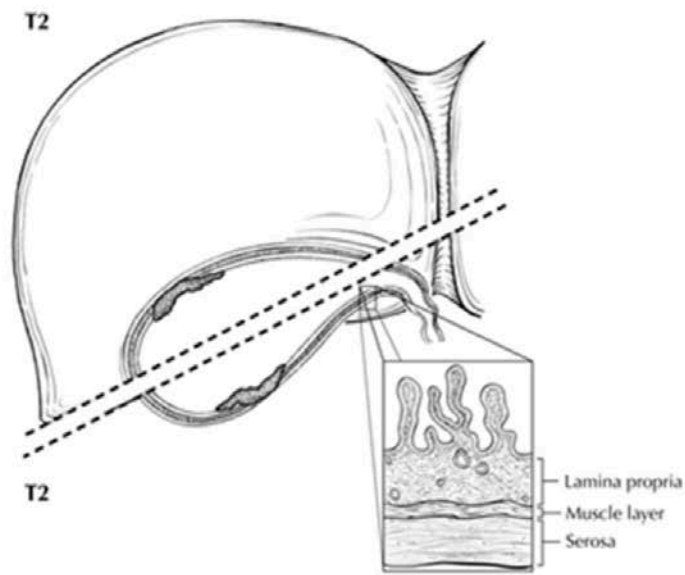
- In tumoral condition, ink the  
gallbladder bed and also  
serosal surface (identify  
perforation)

Gallbladder bed



<https://www.rcpa.edu.au/Manuals/Macroscopic-Cut-Up-Manual/Gastrointestinal/Gallbladder>

## 2-Gallbladder



**Figure 2.** Two views of T2: Tumor invading perimuscular connective tissue (below dotted line) on the peritoneal side without serosal involvement (T2a) and tumor invading the perimuscular connective tissue (above dotted line) on the hepatic side (T2b) without liver involvement. From Greene et al.<sup>13</sup> Used with permission of the American Joint Committee on Cancer (AJCC), Chicago, Illinois. The original source for this material is the *AJCC Cancer Staging Atlas* (2006) published by Springer Science and Business Media LLC, [www.springerlink.com](http://www.springerlink.com).

### +Distance from Invasive Carcinoma to Liver Parenchymal Margin

Specify in Centimeters (cm)

Exact distance in cm: \_\_\_\_\_ cm

Greater than 1 cm

Specify in Millimeters (mm)

Exact distance in mm: \_\_\_\_\_ mm

Greater than 10 mm

Other

Other (specify): \_\_\_\_\_

Cannot be determined: \_\_\_\_\_

Invasive carcinoma present at margin

## 2-Gallbladder

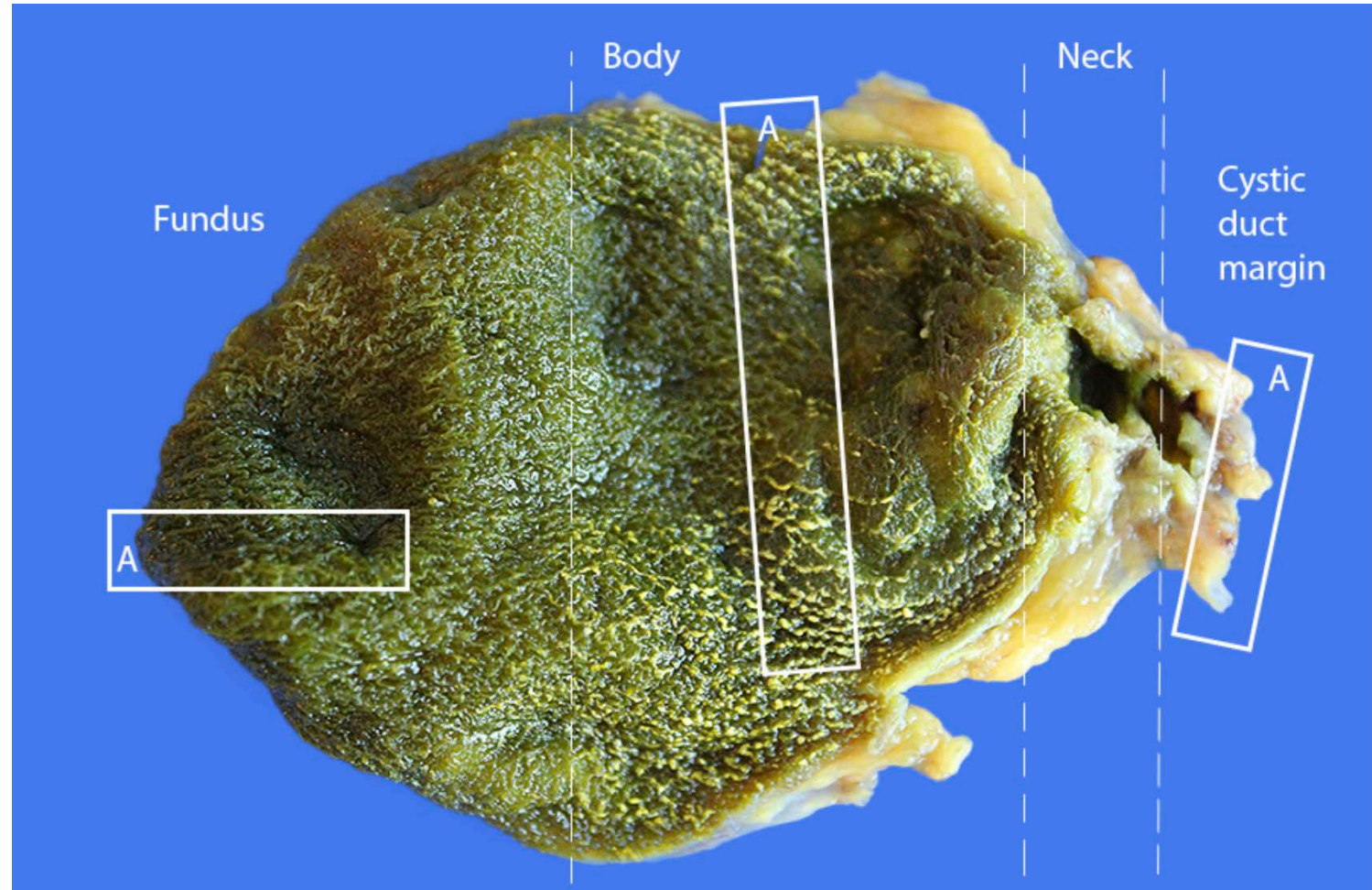




## 2-Gallbladder

### Dissection

- **non tumoral condition**
- one block (with cystic duct margin, sample of body and fundus).



<https://www.rcpa.edu.au/Manuals/Macroscopic-Cut-Up-Manual/Gastrointestinal/Gallbladder>

## 2-Gallbladder

### *Dissection*

#### - **Tumoral condition**

- Separate samples in different blocks:

A. Cystic duct margin

B. Tumour, deepest point of invasion (serial slices of 3 mm)

C. Tumour with gallbladder bed margin (if applicable)

D. Tumour, representative sections

E. Background mucosa

F. Lymph node (sometimes, presence of lymph node along the cystic duct).

<https://www.rcpa.edu.au/Manuals/Macroscopic-Cut-Up-Manual/Gastrointestinal/Gallbladder>

## 2-Gallbladder

*Particular macroscopic aspect*

### - Porcelain gallbladder

- calcification of gallbladder wall
- rare, less than 1% of all cholecystectomy
- Incidence of gallbladder cancer is higher in calcified gallbladder reaching 6% (general incidence is around 2% to 8%)



Jones MW, Weir CB, Ferguson T. Porcelain Gallbladder Treasure Island (FL): StatPearls Publishing; 2023  
<https://www.pathologyoutlines.com/topic/gallbladderporcelaingb.html>

## 2-Gallbladder

*Particular macroscopic aspect*

### - Gallbladder adenomyomatosis

- thickened gallbladder wall with multiple intramuscular cystic spaces



*Lee KF et al. Ann Transl Med. 2020 Dec;8(23):1600.*

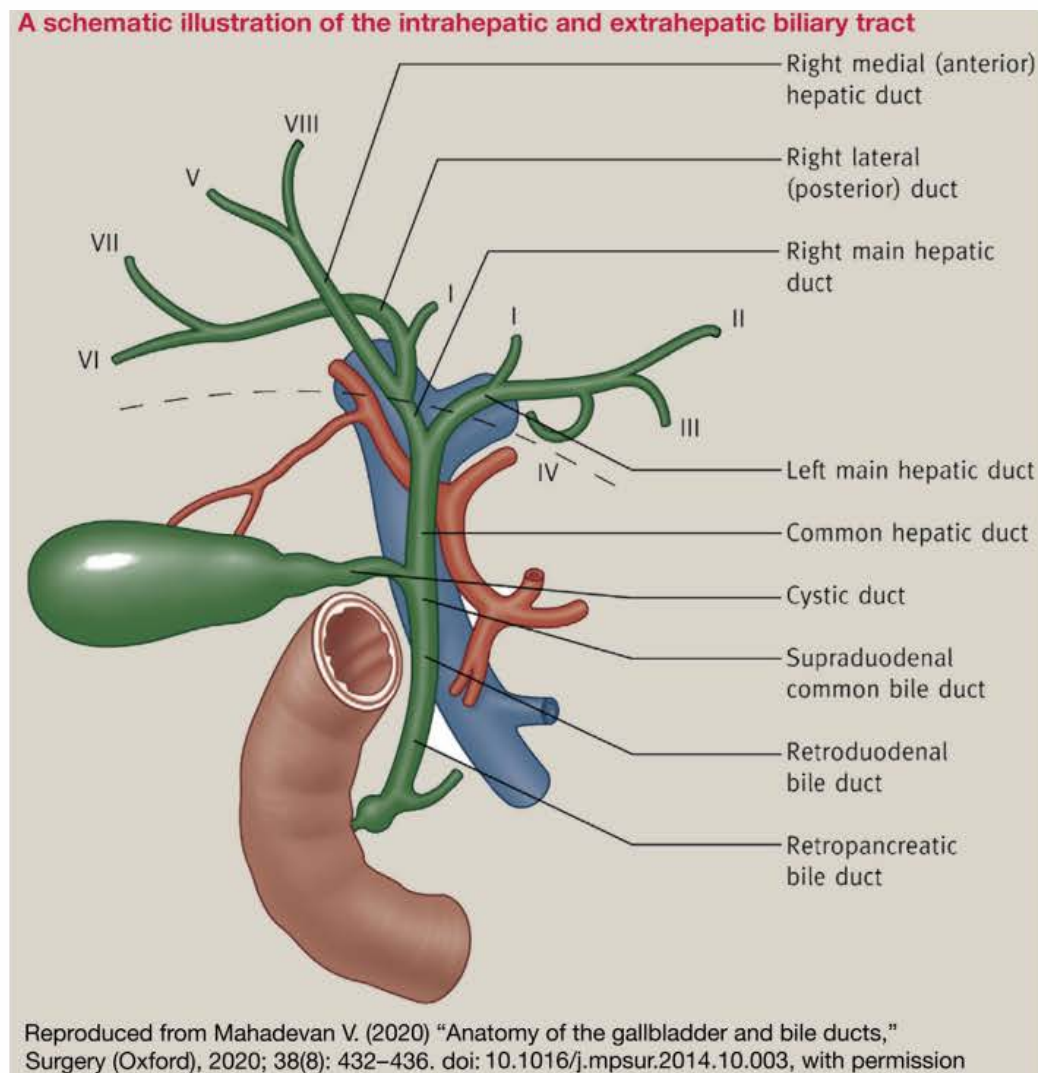
03

HILAR AND PERIHILAR DUCTS

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## 03-Hilar and perihilar ducts

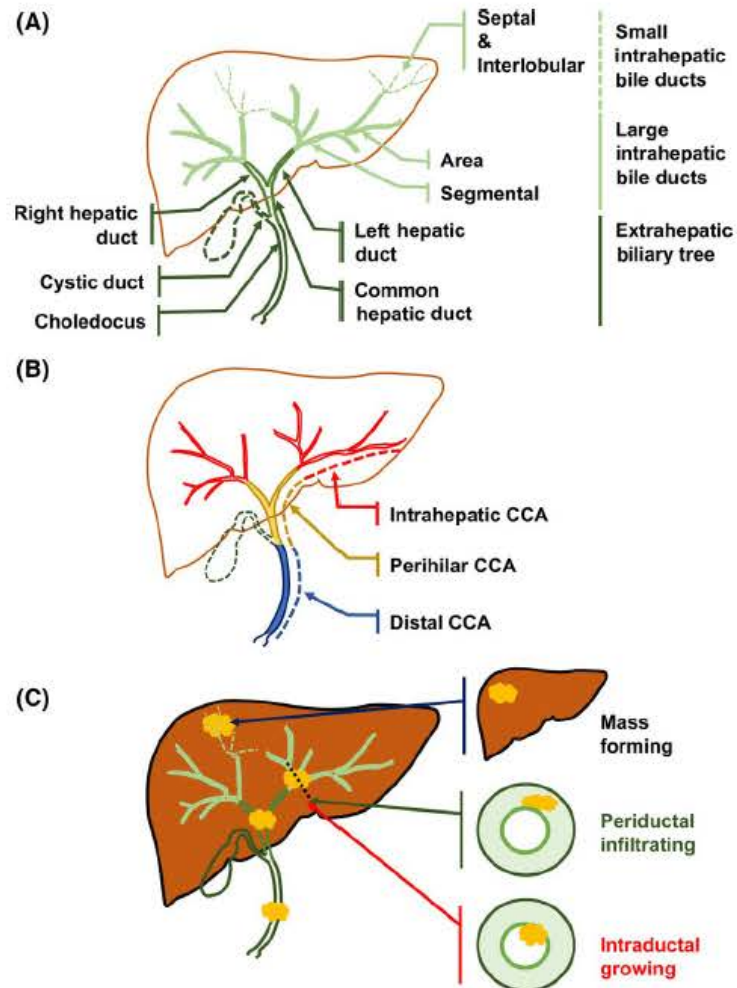
### Anatomy



Bazira PJ. *Anatomy of the gallbladder and bile ducts. Surgery (Oxford)*. 2023, 41 (6): 319-324.

## 03-Hilar and perihilar ducts

### Anatomy



Based on **its location**, cholangiocarcinoma (CCA) is classified into:

- intrahepatic CCA,
- perihilar CCA
- distal CCA.

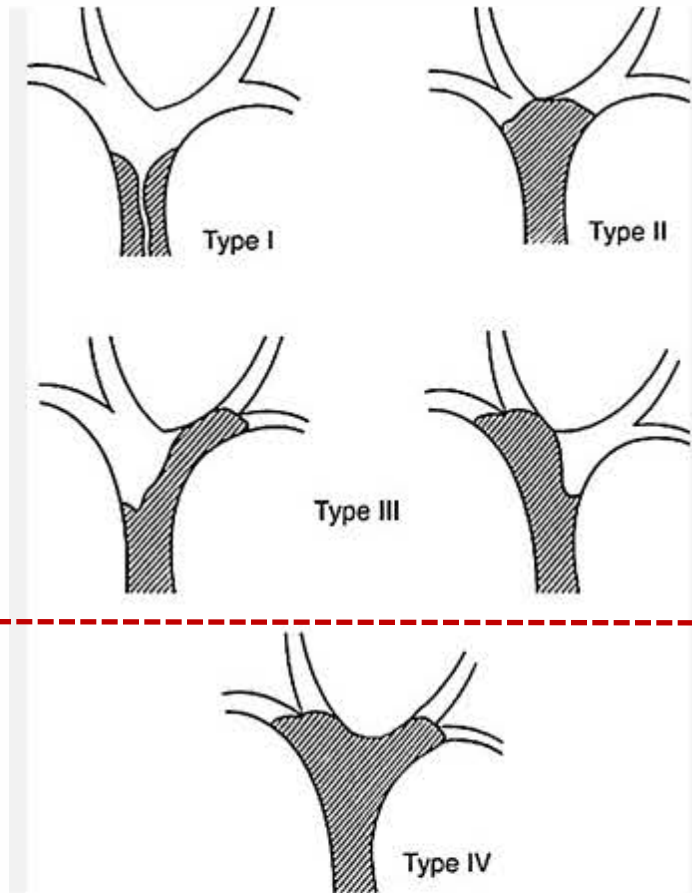
**Intrahepatic CCA** is a malignancy located proximal to the second order bile ducts.

**Perihilar CCA** arises in the right and left hepatic duct or at their junction.

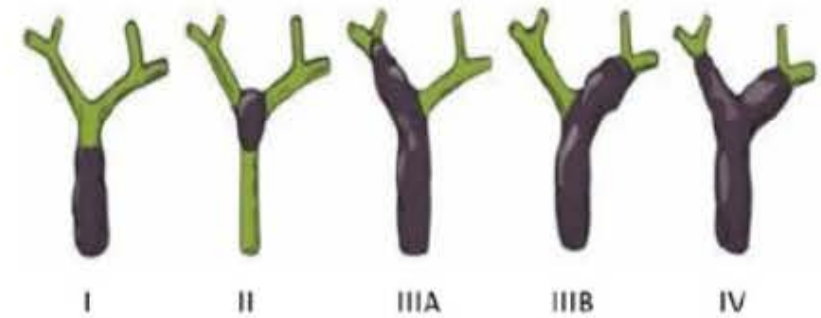
**Distal CCA** involves the common bile duct

## 03-Hilar and perihilar ducts

### Hilar tumor



### Bismuth-Corlette classification



Faraoun SA. Feuilletts de radiologie 2012  
<https://www.snfge.org/content/8-cancer-des-voies-biliaires>







## 03-Hilar and perihilar ducts

### *External inspection*

**Orientation markers!! And good communication with the surgeon! Ask questions about orientation**

### **Type of specimen**

**Describe and measure the anatomical components present.**

*Record three dimensions of:*

- Liver (antero-posterior x medio-lateral x supero-inferior)

*Record length x diameter of:*

- Common bile duct
- Right hepatic duct
- Left hepatic duct
- Common hepatic duct
- Cystic duct

### **SPECIMEN WEIGHT (g)**

#### **LIVER CAPSULE**

Normal

- Abnormal
- Breached by tumour
- Evidence of previous biopsy or surgery, e.g. scar or sutures
- Nodular

<https://www.rcpa.edu.au/Manuals/Macroscopic-Cut-Up-Manual/Gastrointestinal/Liver/Liver-resection-for-hilar-cholangiocarcinoma>

## 03-Hilar and perihilar ducts

### *Dissection*

#### **Ink margins:**

Biliary resection margins (intraoperative consultation);  
Liver parenchymal resection margin (if applicable)

#### **Two methods of dissection are possible:**

- **Serial section ;**
- Open the ducts longitudinally

#### **Pictures of slices**

<https://www.rcpa.edu.au/Manuals/Macroscopic-Cut-Up-Manual/Gastrointestinal/Liver/Liver-resection-for-hilar-cholangiocarcinoma>

## 03-Hilar and perihilar ducts

### *Internal inspection and samples*

Tumour size (three dimensions)

Tumour description:

- Extent of invasion into the biliary tree
- Depth of invasion beyond the biliary tree
- Involvement of liver (if present)
  - Distance from closest resection margin (mm) including hepatic resection margin (if applicable)
- **Check the circumferential margin**

Presence or absence of vascular involvement

Background parenchyma

| Cassette id | Site  | No. of pieces |
|-------------|---|---------------|
| A           | Distal margin of the biliary tree   |               |
| B           | Proximal margin left hepatic duct (if segmental resection)                          |               |
| C           | Proximal margin right hepatic duct (if segmental resection)                         |               |
| D           | Cystic duct margin if present   |               |
| E           | Left/right portal veins and or hepatic artery margins should be sampled if included |               |
| F-H         | Serial sections along common bile duct from pancreatic to hepatic aspect            |               |
| I-K         | Serial sections along common hepatic duct from pancreatic to hepatic aspect         |               |
| L-M         | Left hepatic serial sections from bifurcation proximally                            |               |
| N-O         | Right hepatic serial sections from bifurcation proximally                           |               |

<https://www.rcpa.edu.au/Manuals/Macroscopic-Cut-Up-Manual/Gastrointestinal/Liver/Liver-resection-for-hilar-cholangiocarcinoma>

04

COMMON BILE DUCT



## 04-Common bile duct

### *External inspection*

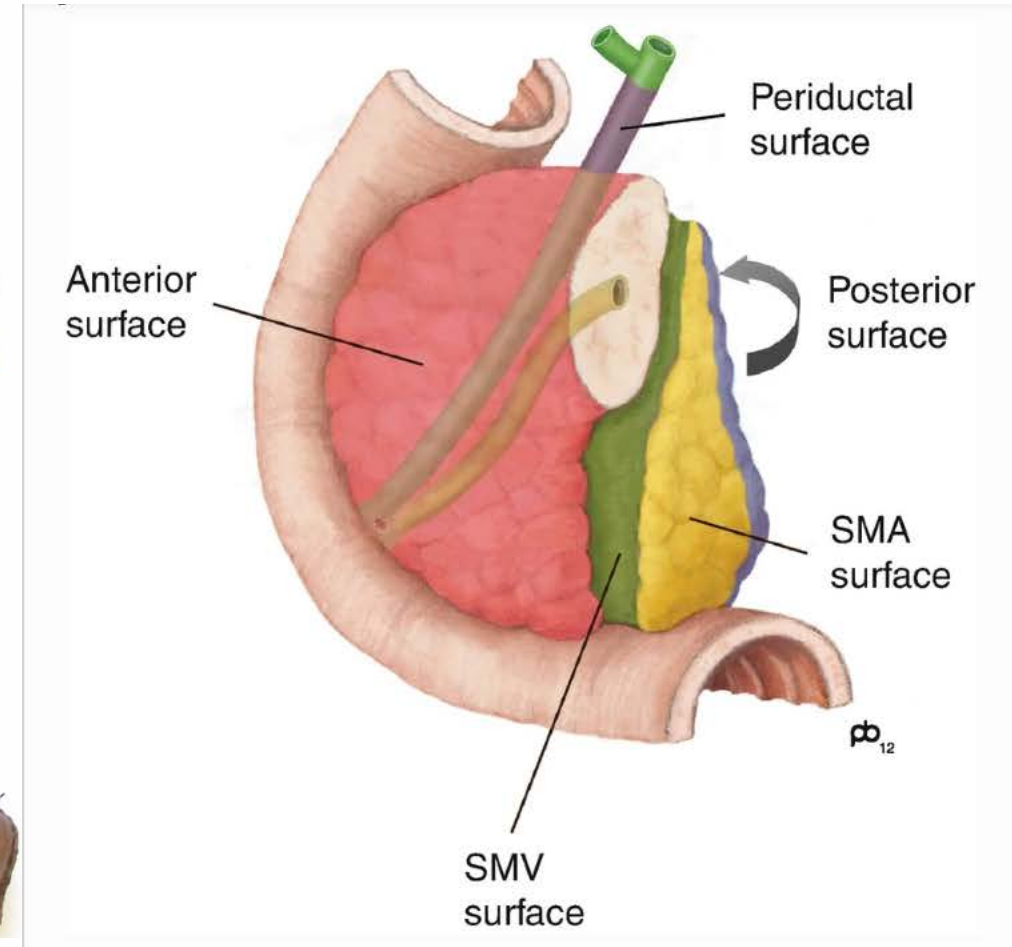
Pancreatoduodenectomy specimen including the distal stomach

Fresh specimen, open stomach and duodenum for fixation

Ink circumferential margin of pancreatic head

Measurement:

- Stomach
- Duodenum
- Pancreatic head
- Gallbladder



*Campbell F, Verbeke C. Pathology of the pancreas (book) 2020*

## 04-Common bile duct

### Dissection

#### Margins

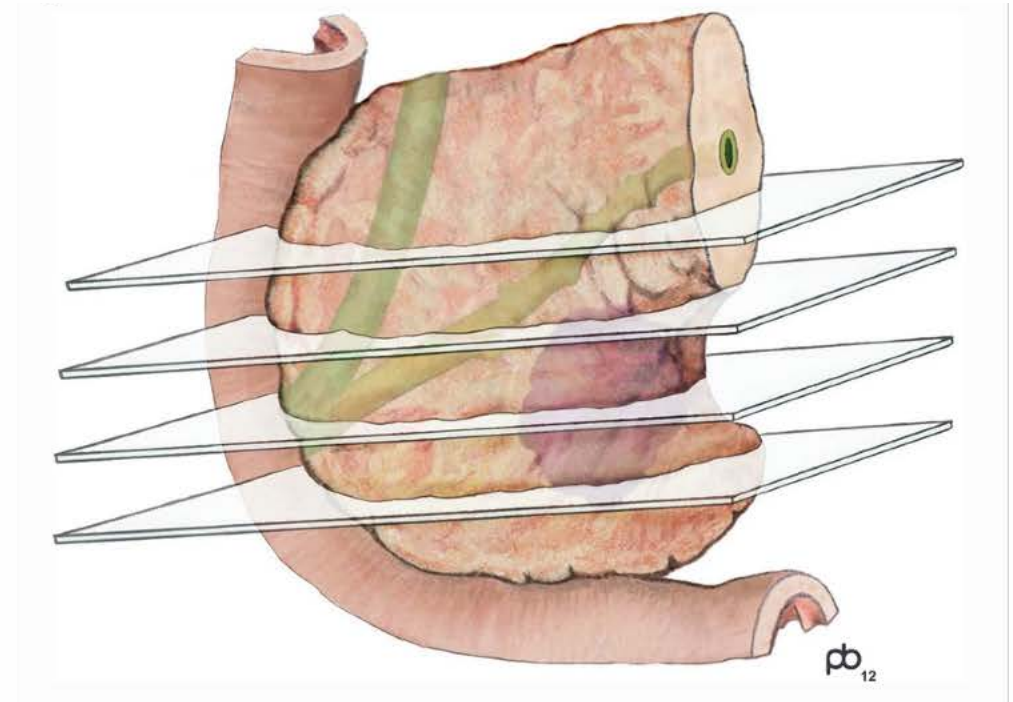
- Intraoperative consultation (margin of the common bile duct and pancreatic margin)
- Gastric and duodenal margin

#### Serial section (Axial slicing technique)

#### Pictures of slices

#### Samples:

- Margins (CBD, pancreatic, gastric, duodenal)
- Tumour (sampling of the most invasive part of the CBD wall)
- Lymph nodes



Campbell F, Verbeke C. Pathology of the pancreas (book) 2020



## 04-Common bile duct

### *Dissection*



05

## INTRAHEPATIC CHOLANGIOCARCINOMA

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## 05-Intrahepatic cholangiocarcinoma

*External inspection and dissection*

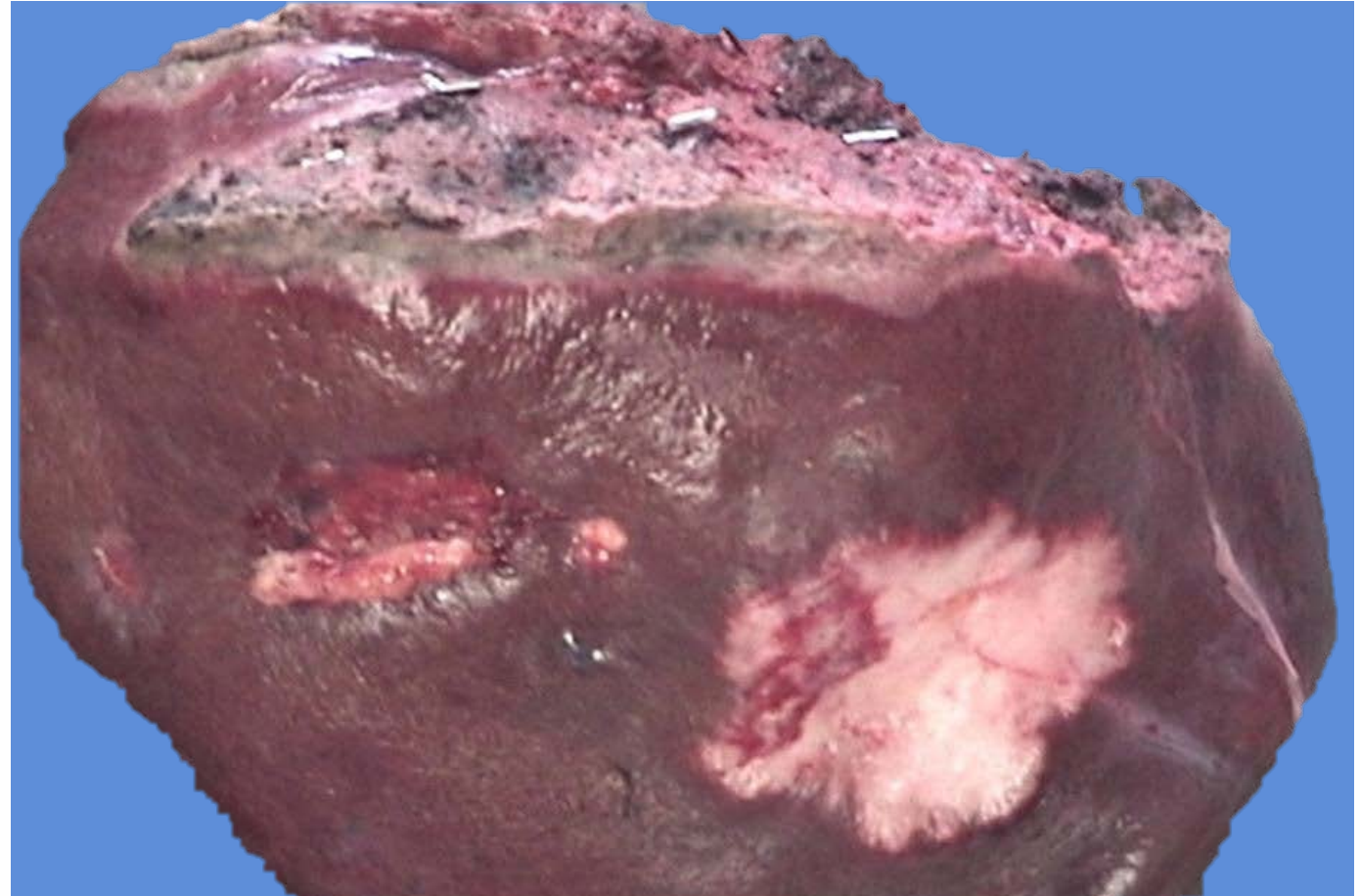
Type of specimen (lobectomy, hepatectomy)

Size and weight

Capsule

Ink the surgical margin

Slicing for optimal fixation

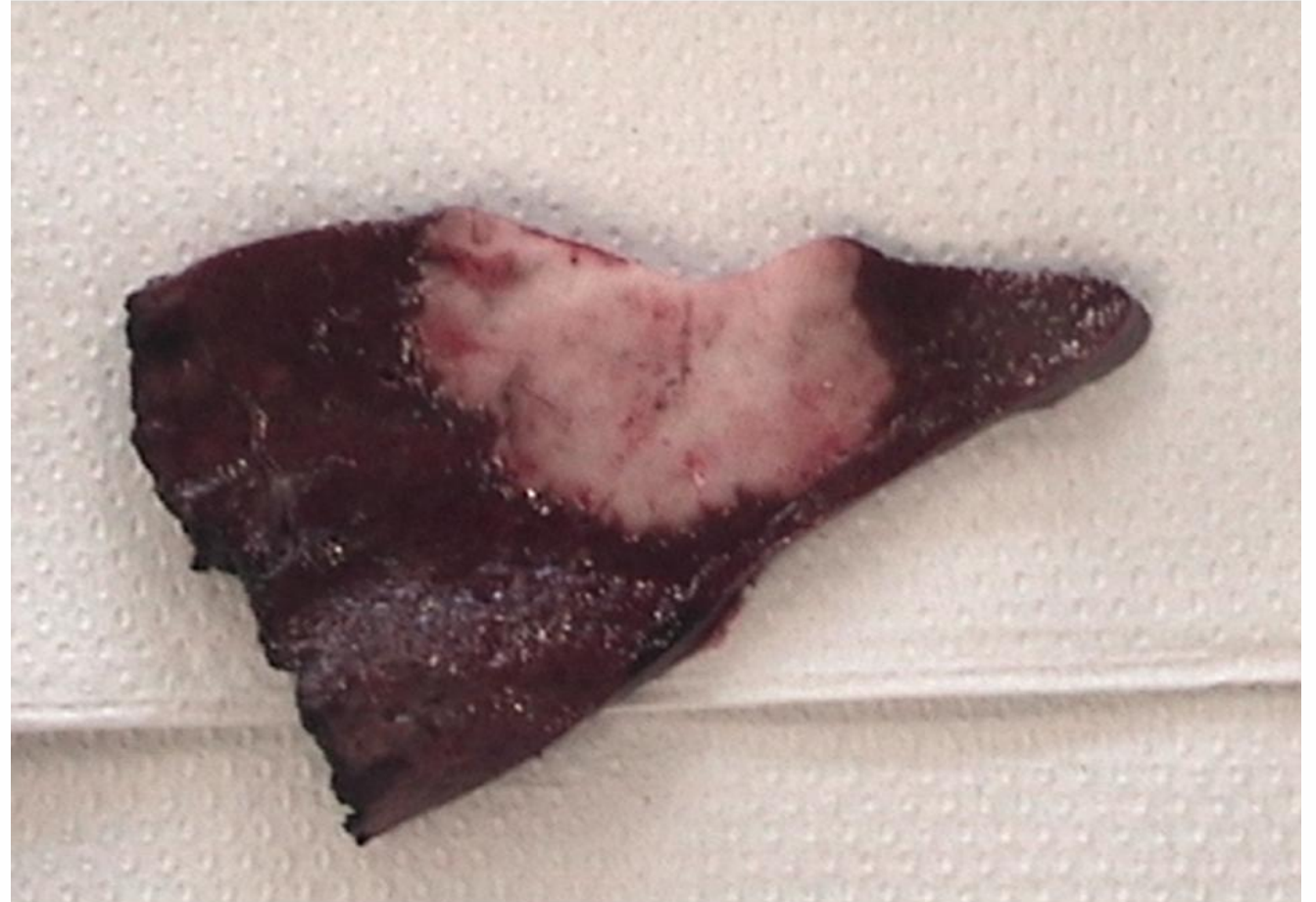


## 05-Intrahepatic cholangiocarcinoma

*External inspection and dissection*

Distance from the closest margin

Mass forming type



## 05-Intrahepatic cholangiocarcinoma

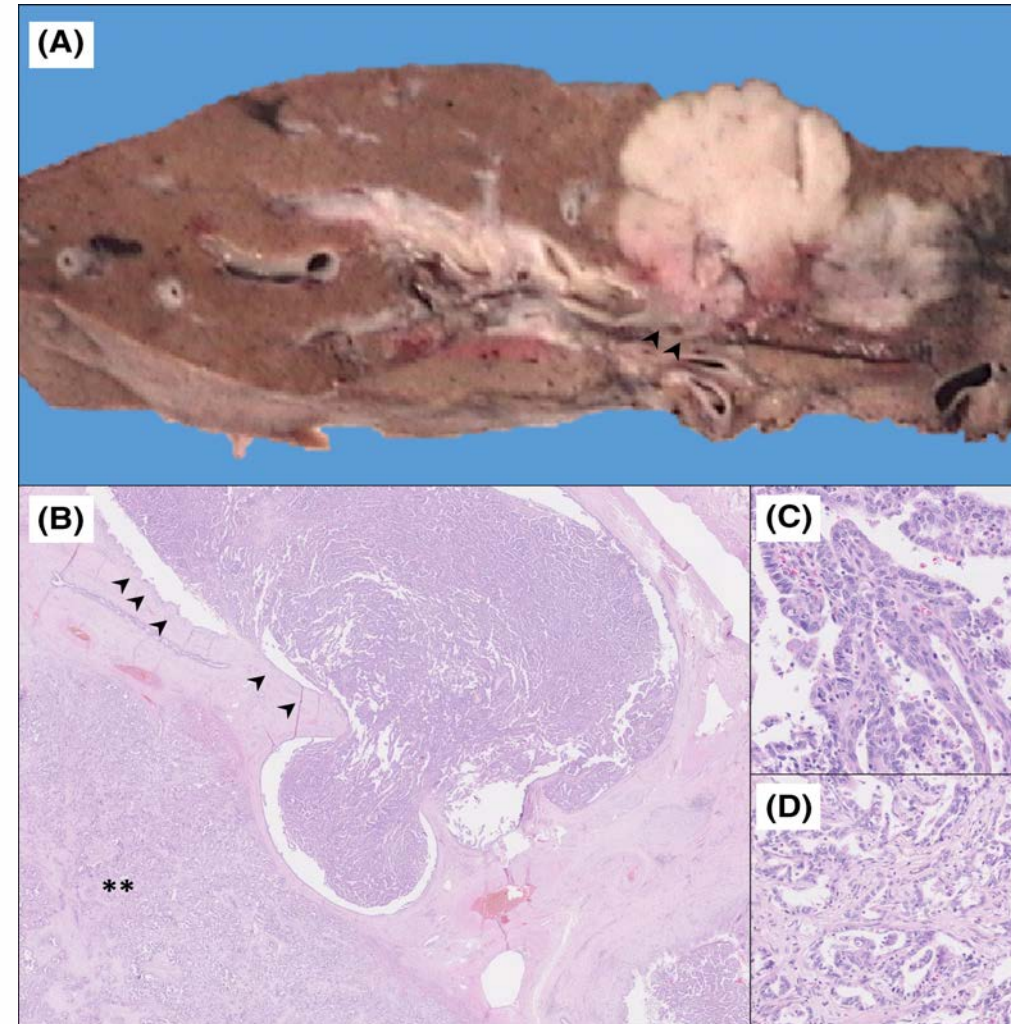
*External inspection and dissection*



## 05-Intrahepatic cholangiocarcinoma

*External inspection and dissection*

Endobiliary growth (IPNB) with mass-forming cholangiocarcinoma



Verset L et al. *Liver international* 2018

# CONCLUSION-KEY MESSAGES

- Gallbladder:
  - Thickness of the gallbladder wall (porcelain gallbladder!)
  - Aspect of mucosa
  - Gallbladder bed! Don't forget to ink
- Hilar and perhilar ducts:
  - Anatomy, good communication with the surgeon (margin)
  - Circumferential margin
- Common bile duct: macroscopy like pancreas
- Intrahepatic cholangiocarcinoma: pattern of growth (don't forget IPNB).

THANKS FOR ATTENTION

QUESTIONS?

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