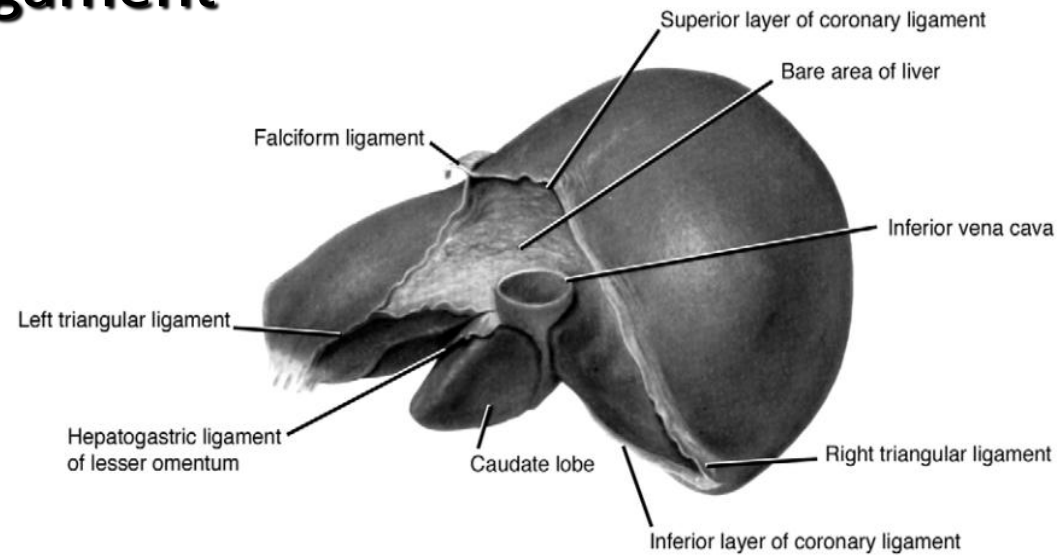


# Introduction

- liver is the largest internal organ
- 2-3% of total BW
- fixation of liver
  - IVC
  - **Rt + Lt triangular ligament**
  - **coronary ligament**
  - **falciform ligament**



# Liver surgery

- **Dr. Luis, 1886**
  - the first liver surgery
  - Pt died 6 hours later due to bleeding
- **Dr. Langenbuch, 1888**
  - the first successful liver resection
  - Re-open for bleeding
- **Kousnetzoff & Pensky, 1896**
  - suture fracture technique

# Liver surgery

- Dr. Cantlie, 1897
  - further understanding of liver anatomy
  - better bleeding control
- Dr. Pringle, 1908
  - compression of portal inflow
- Improvement in morbidity and mortality
  - subcostal incision with better exposure
  - anesthesia technique
  - technological advance
  - peri-operative care


# Hepatocellular Carcinoma

- HCC
  - the most common primary hepatic carcinoma
- 3<sup>rd</sup> leading cause of cancer deaths worldwide
  - **Asia & sub-Saharan Africa**
- HBV, HCV, alcohol
- **Liver cirrhosis**



# HCC survival to treatment

## Survival Analysis in 850 HCC Patients related to Treatment

	Stage I	Stage II	Stage III	Mean
 Surgery	25.6	12.2	-	21.6*
TAE	10.4	9.5	-	9.9
IAIC	10.3	3.7	1.3	5.1
Chemo	4.3	2.5	1.4	2.7
No Tx	8.3	2.0	0.7	1.6
Total	11.5	3.0	0.9	4.1

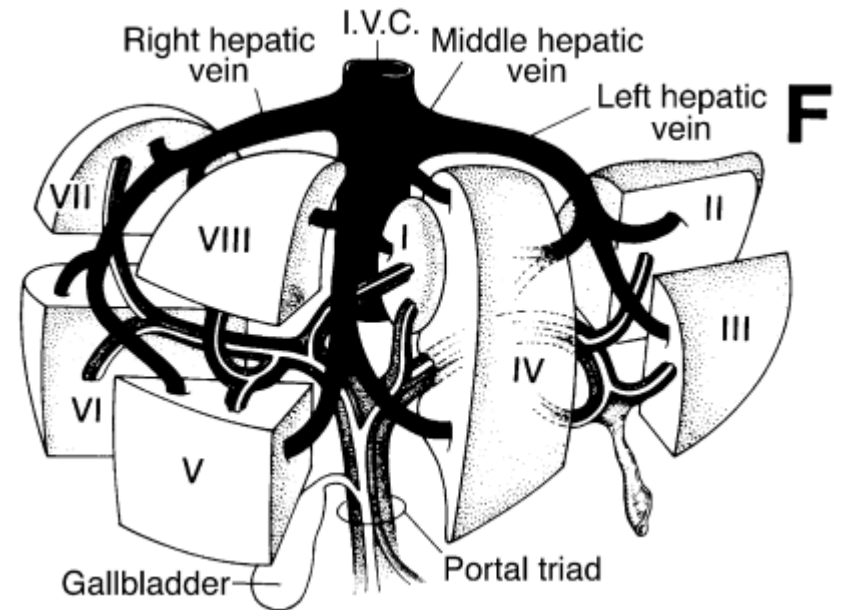
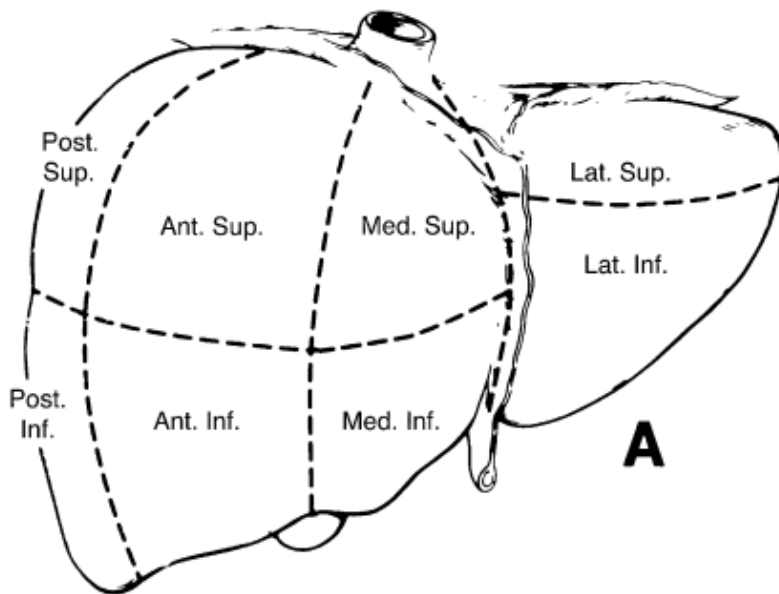
\* Survival months

# before Surgery....

- understanding **hepatic anatomy** is crucial

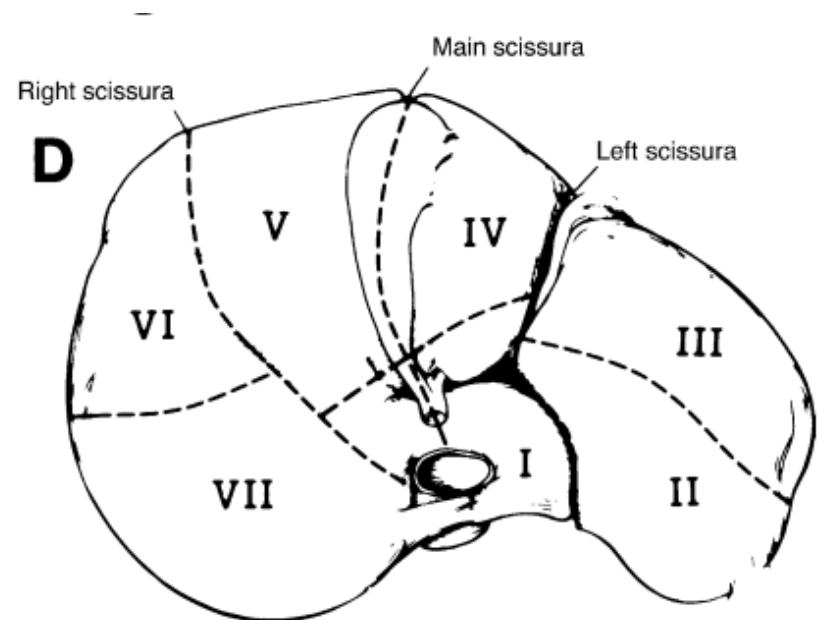
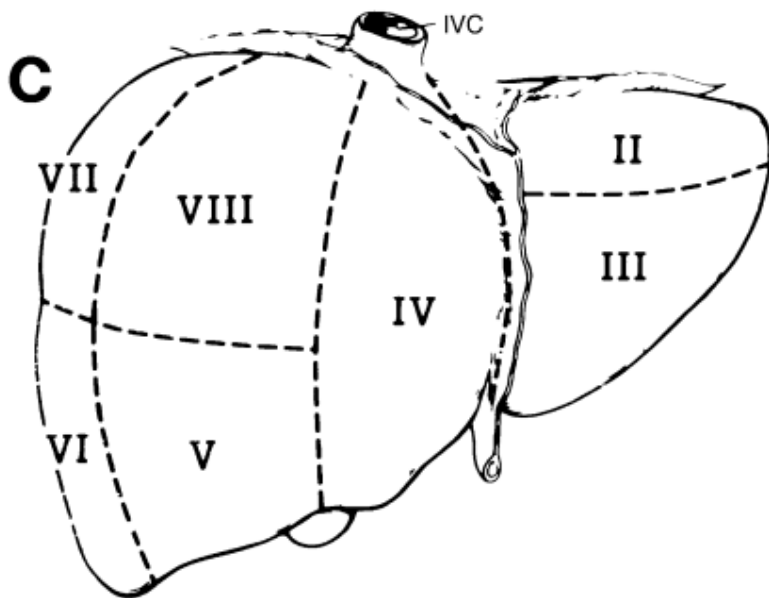
# Liver anatomy

- Based on arterial blood supply, portal vein, biliary drainage, and hepatic venous drainage



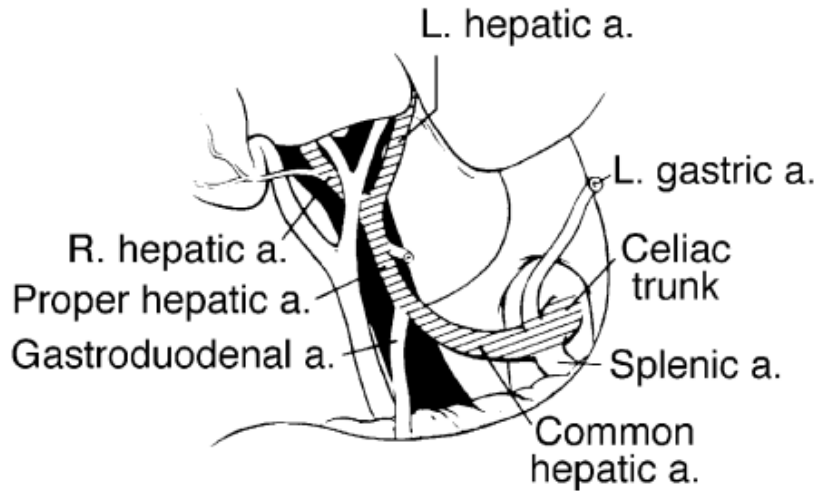
# Liver anatomy

- Couinaud, 1954
  - 8 segments

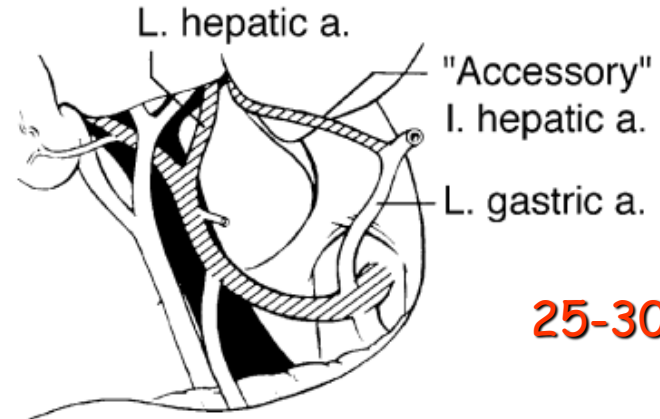




# Hepatic artery

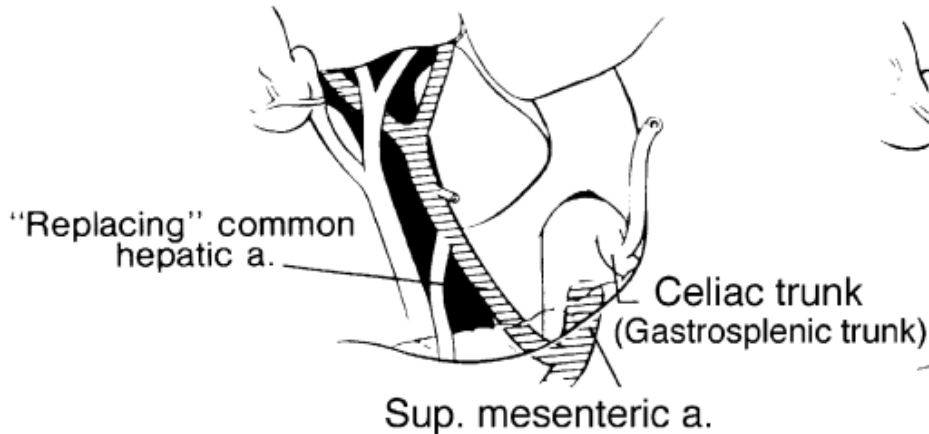


**A**

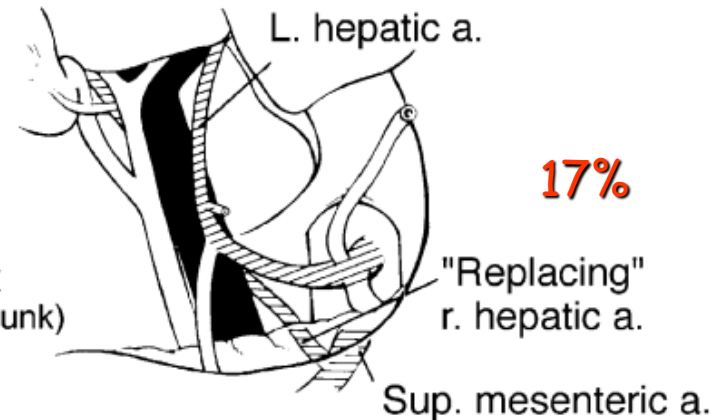


**B**

**25-30%**



**C**

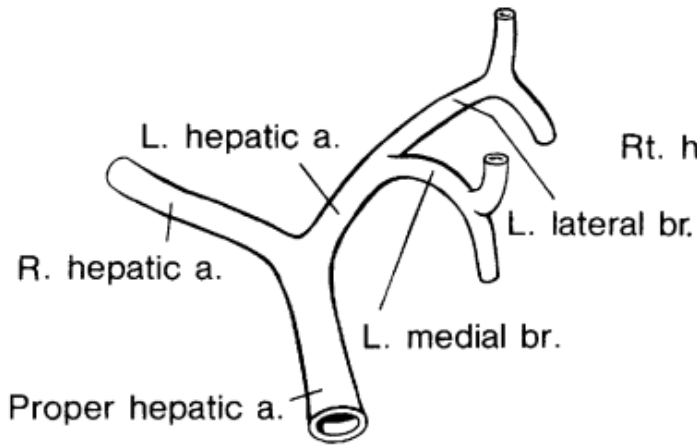


**D**

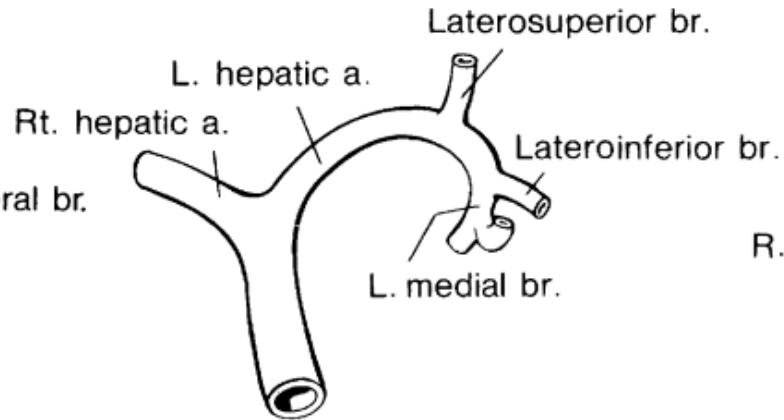
**17%**

# Lt hepatic artery

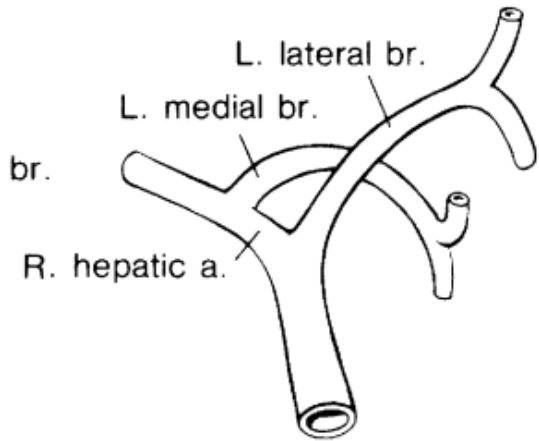
40%



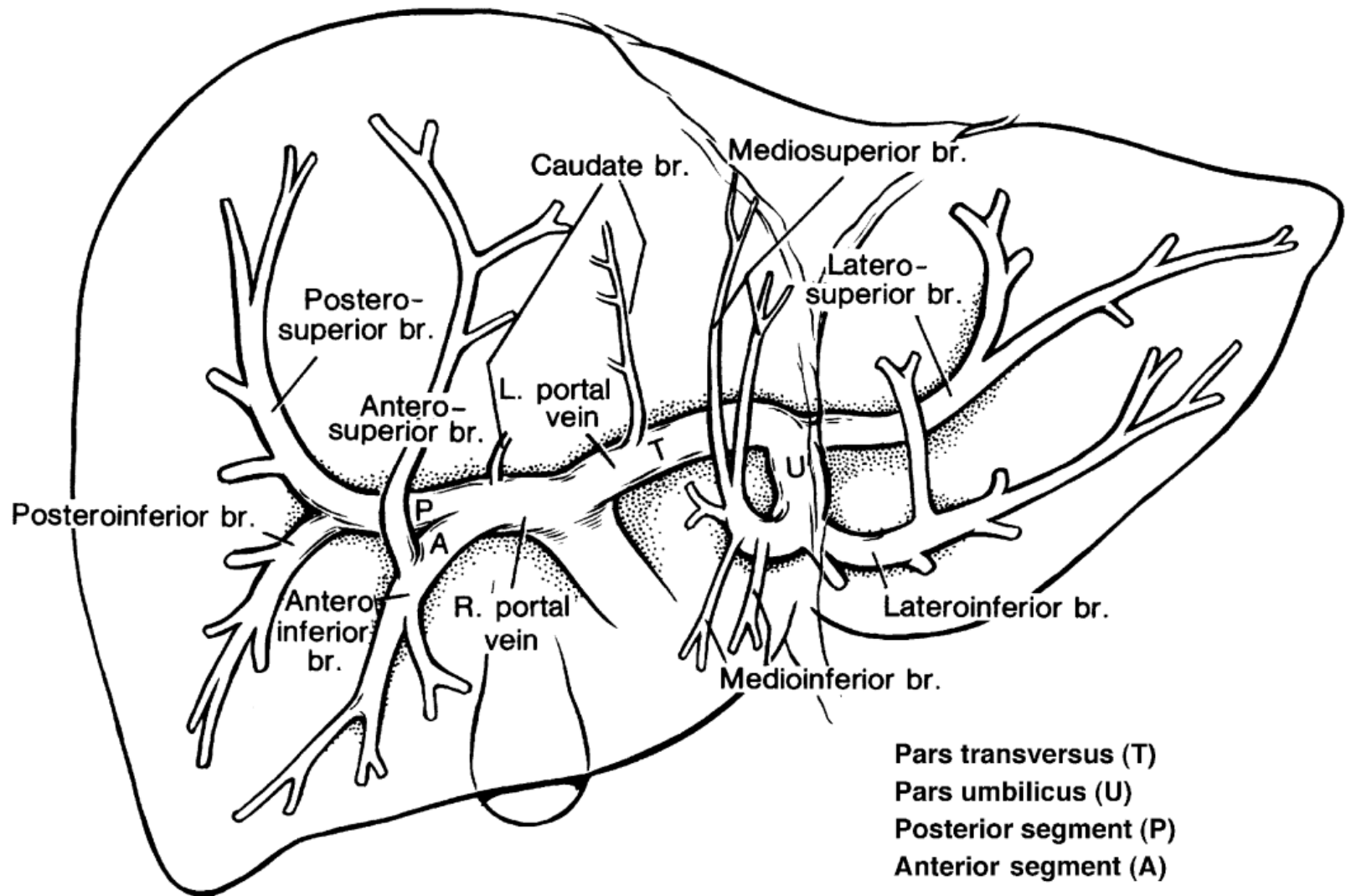
35%



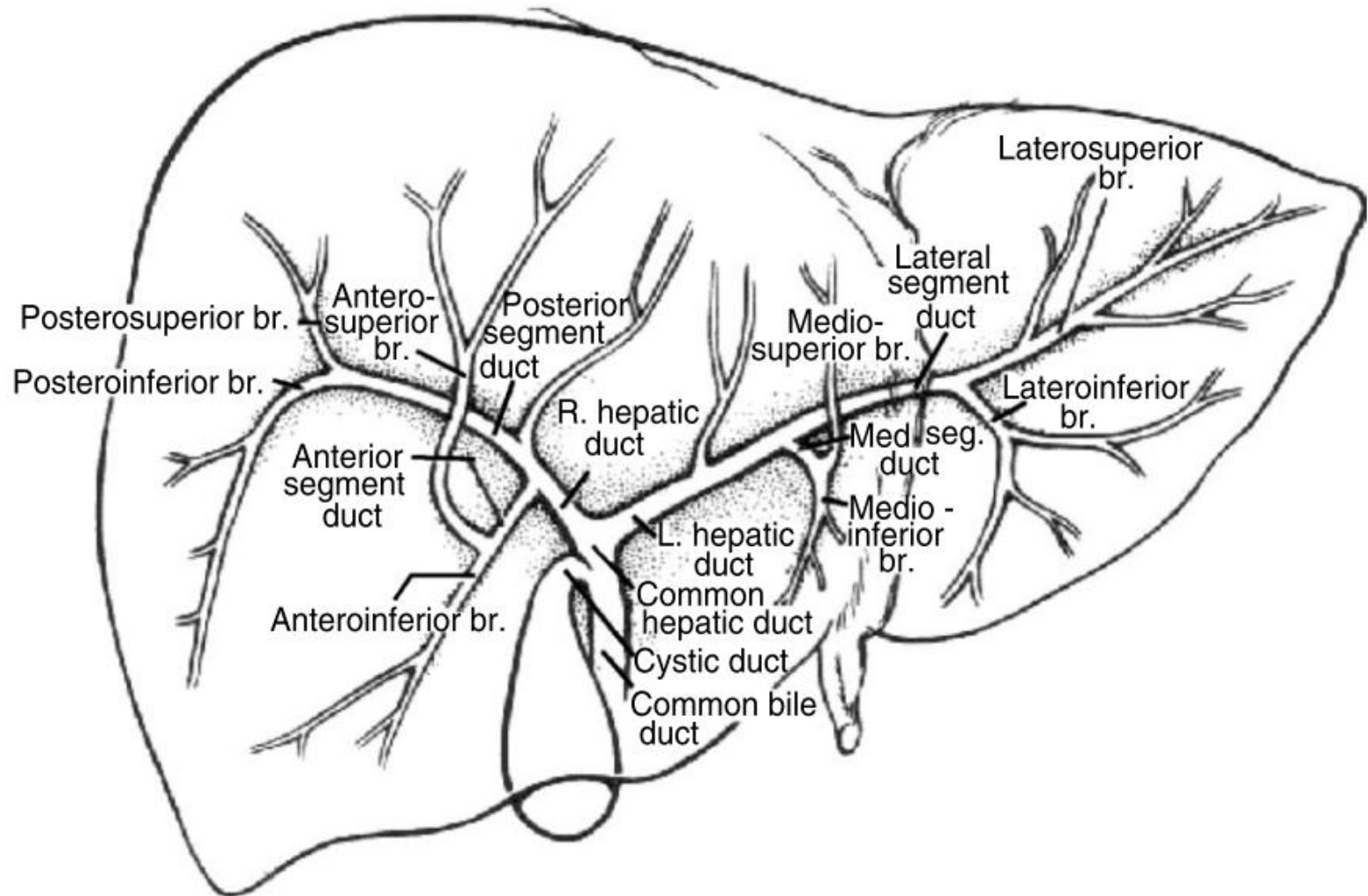
25%



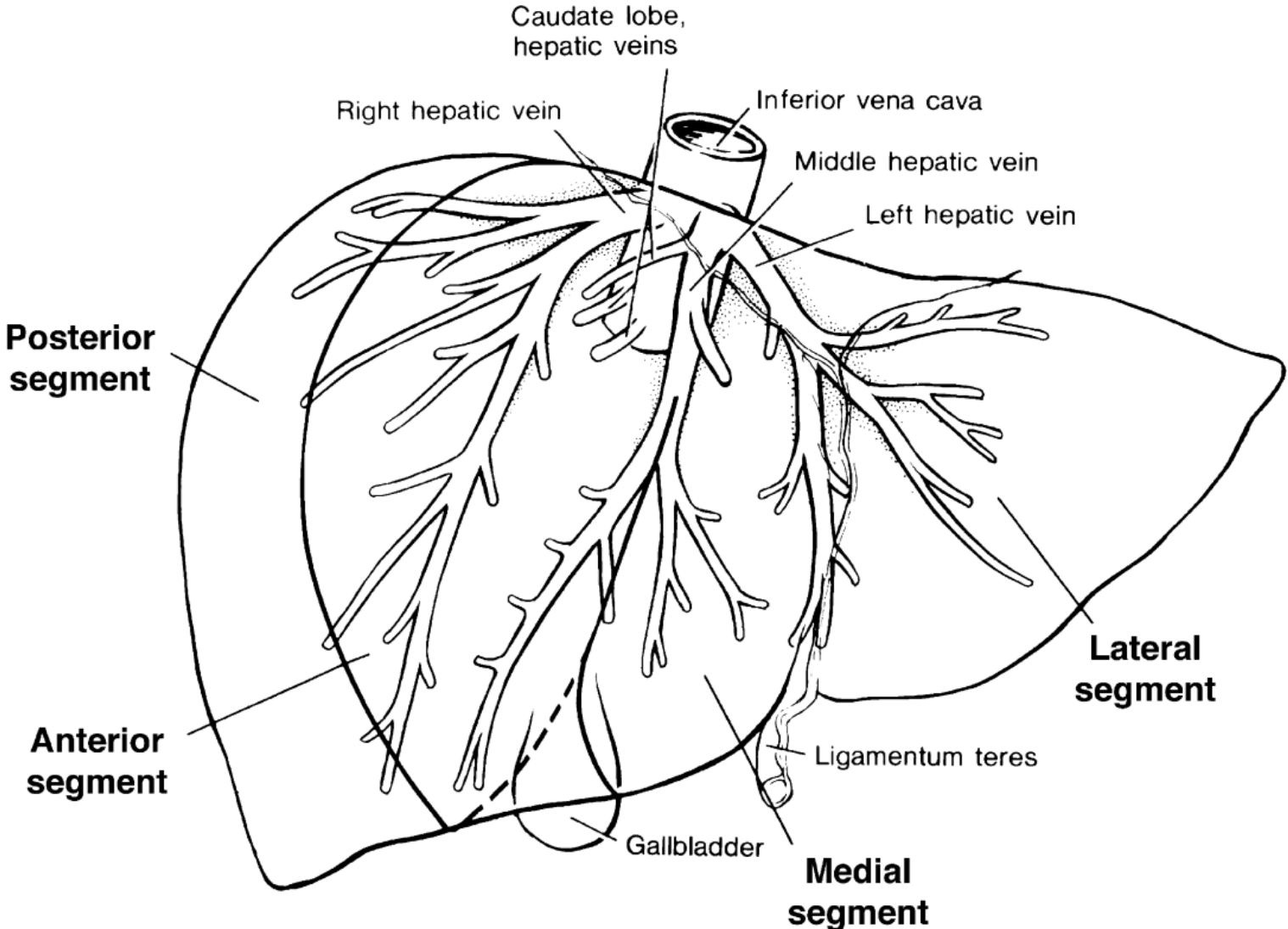
# Portal vein



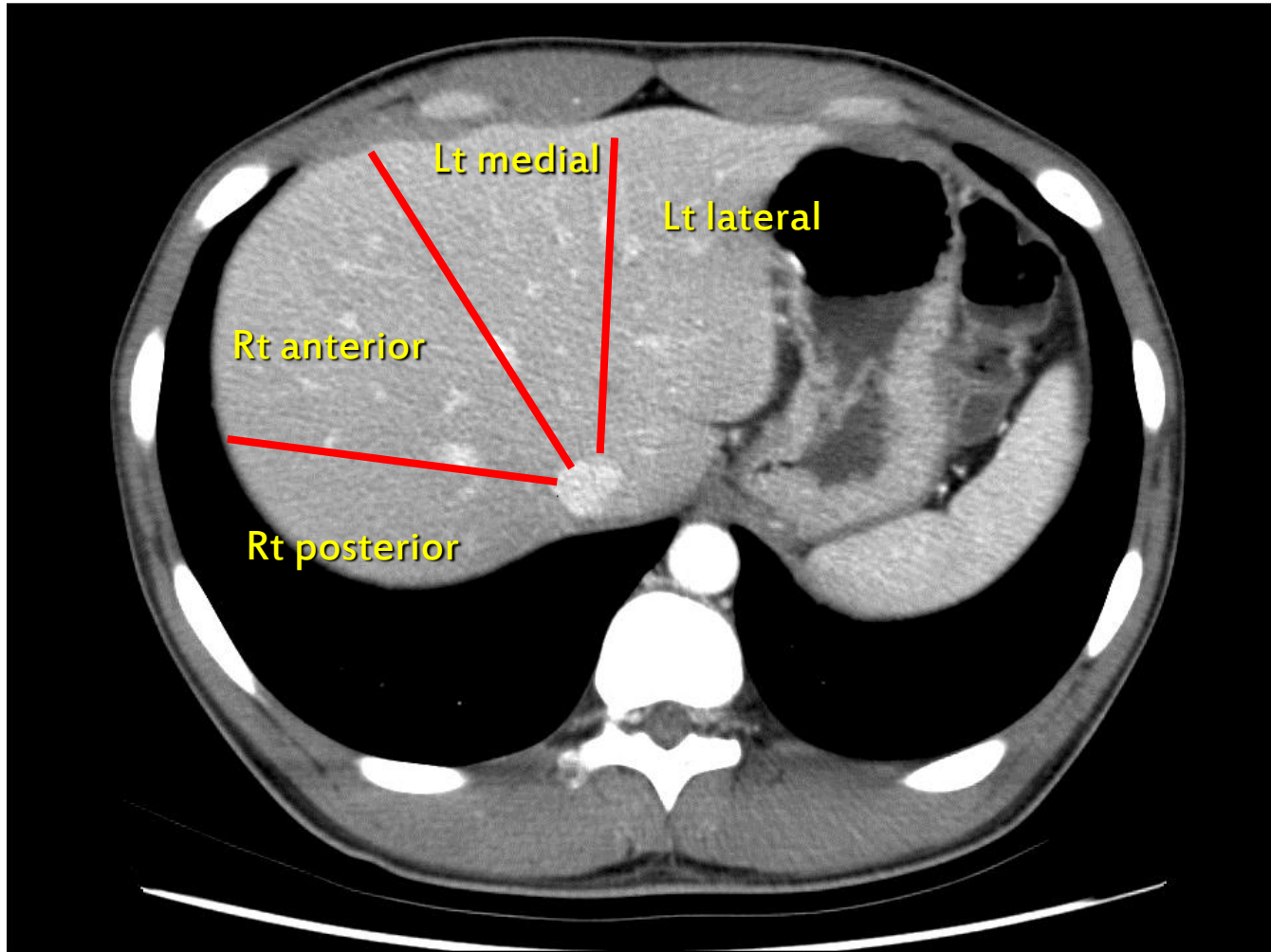
# Bile duct



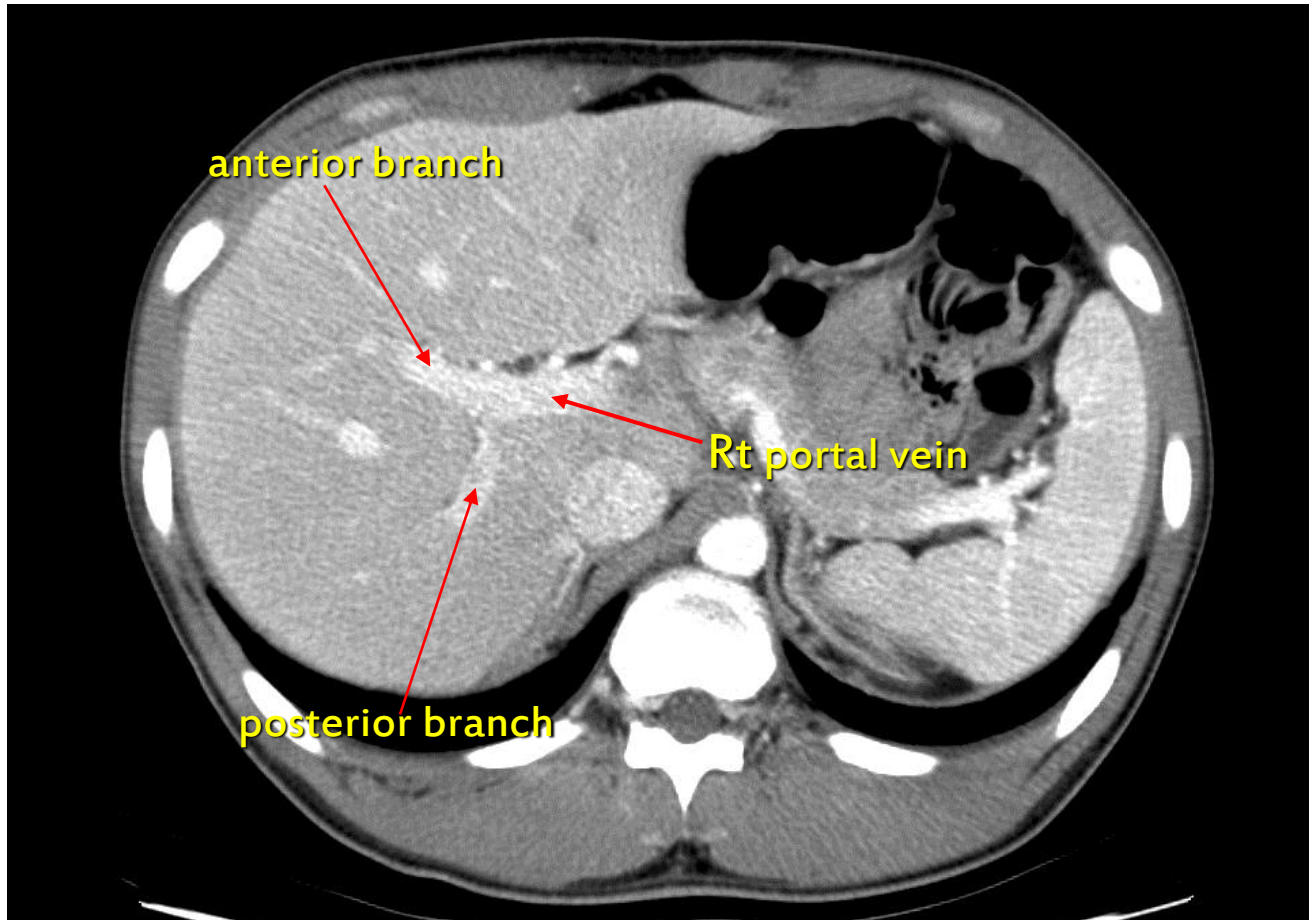
# Hepatic Vein



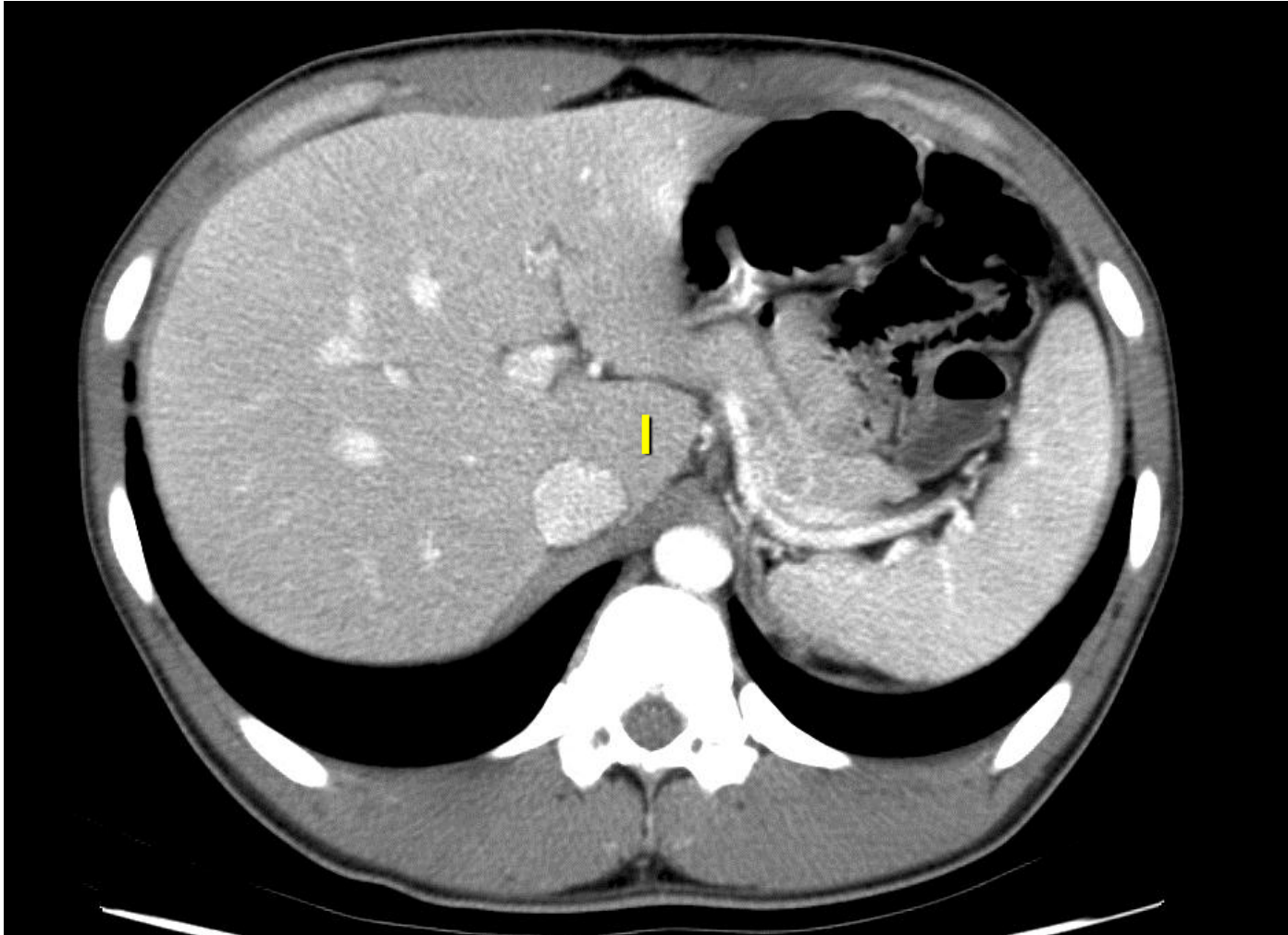
# CT interpretation of liver



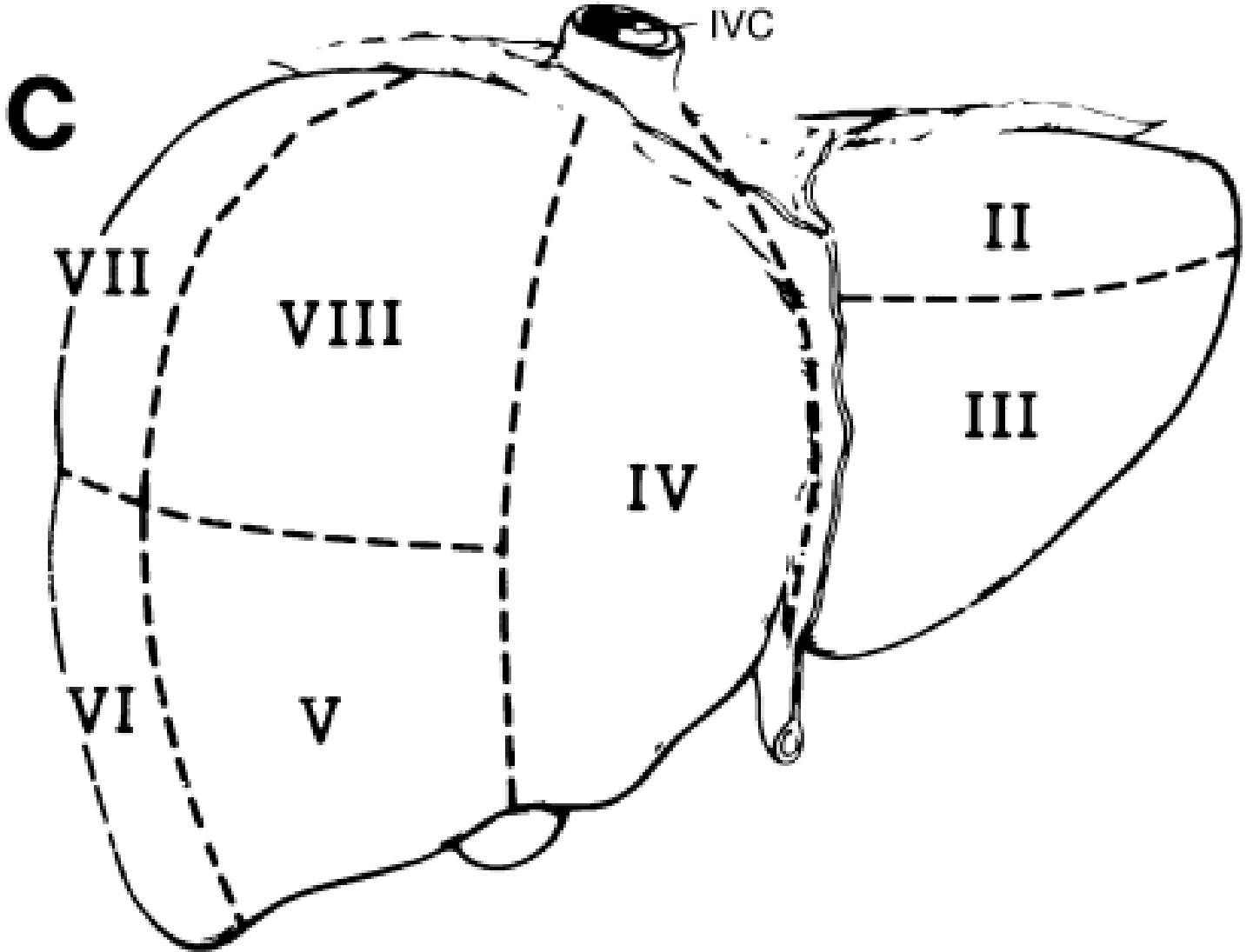
# CT interpretation of liver



# CT interpretation of liver

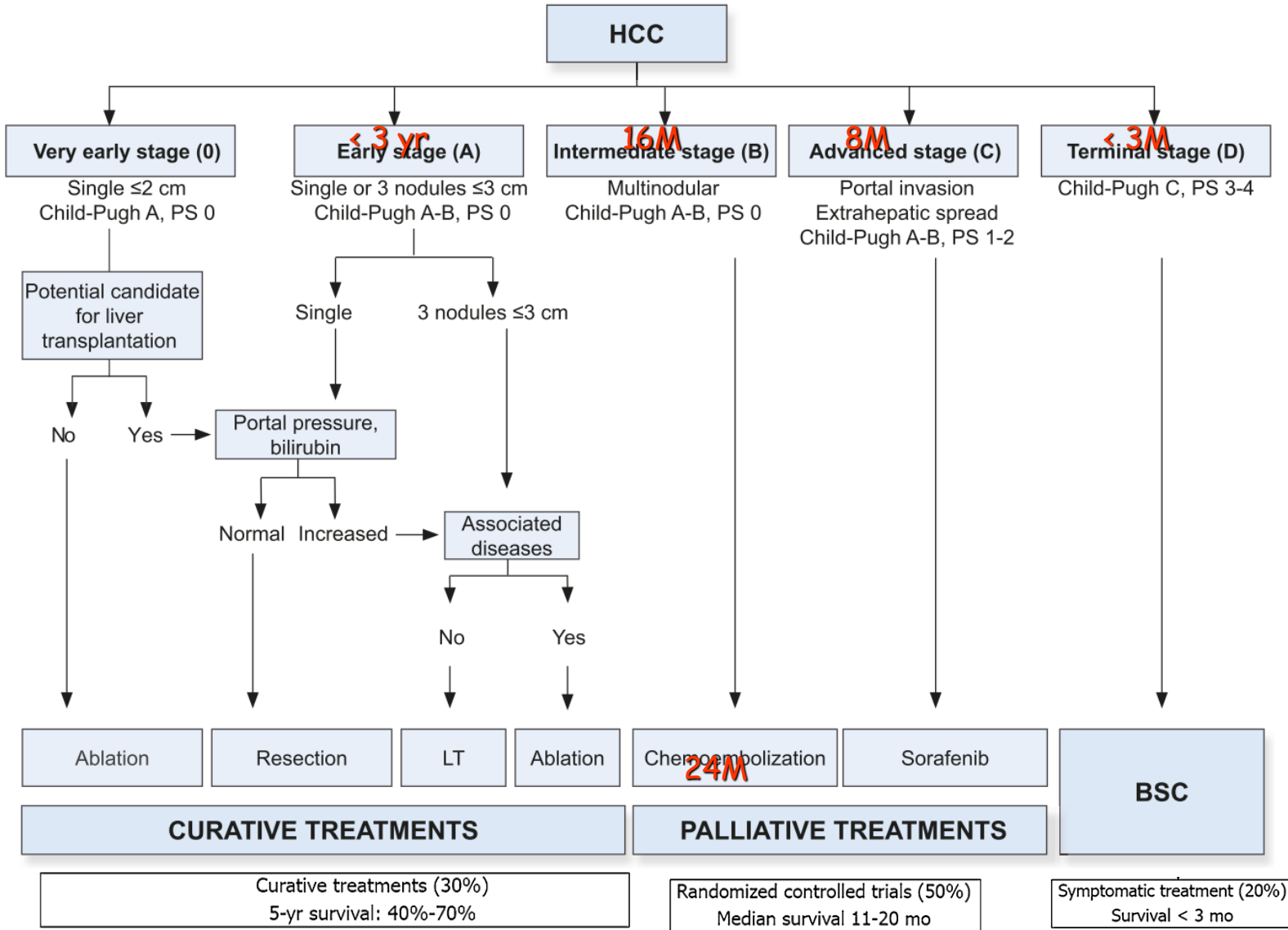






# HCC management

## BCLC staging 2011



# Pre-OP evaluation

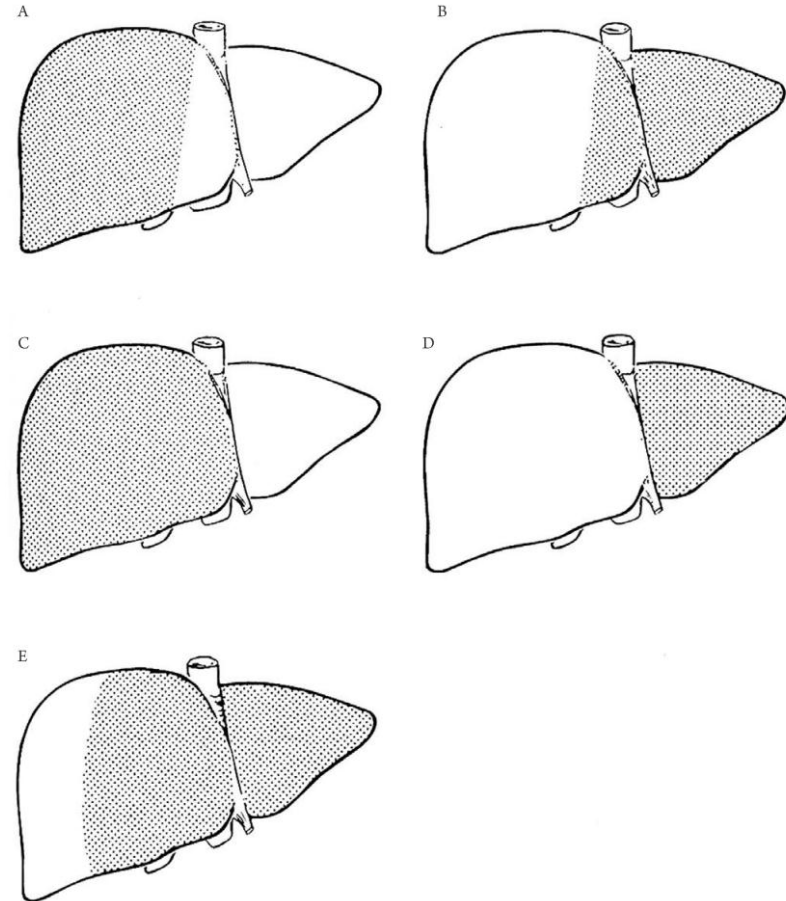
- CBC, PT/aPTT
- liver function test
- $\alpha$ -FP
- Abd CT – Tri-phasic
- Angiography  $\pm$  CT (*CTAP* )
- ICG test (15min <20%)

# Resectability

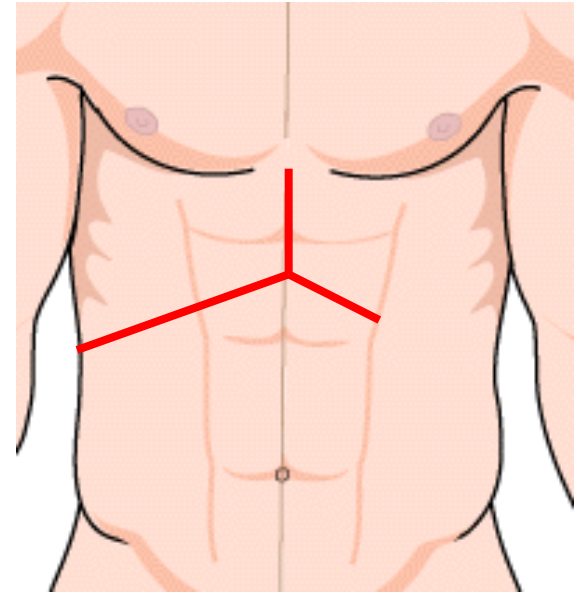
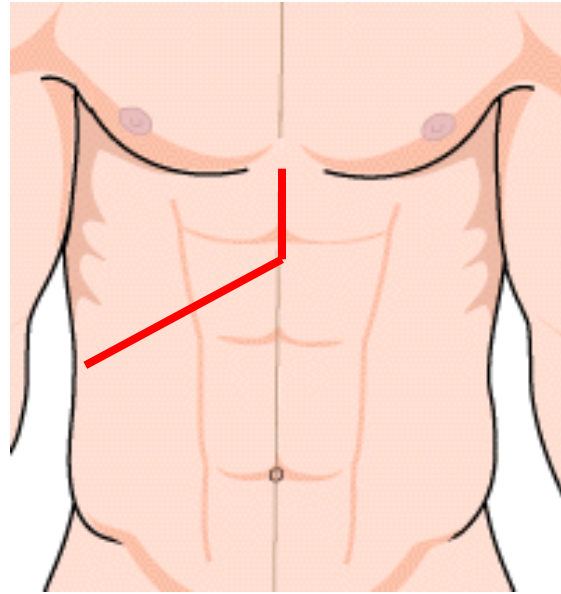
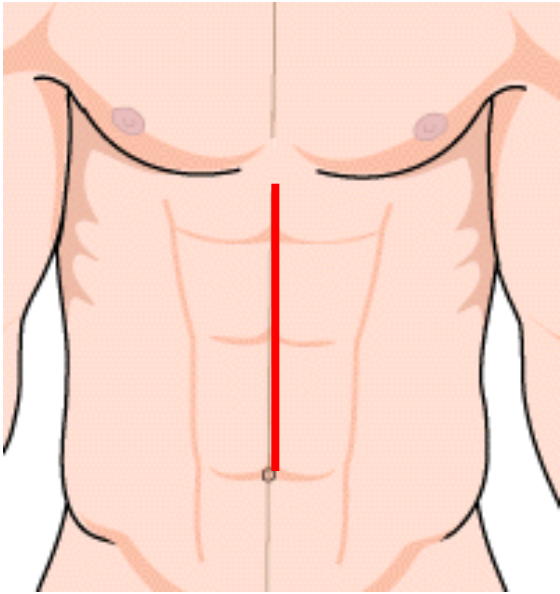
- Tumor **size, number, location, relation to vessels**
- Liver resection / hepatic failure
- Liver condition
  - cirrhosis, post-chemotherapy
- portal vein embolization
- Anatomical resection
- Resection margin

# Types of major resection

- **Rt lobectomy**
- **Lt lobectomy**
- **Lt lateral segmentectomy**
- **extended Rt lobectomy**
- **extended Lt lobectomy**



# Abd wall Incision



# Hepatic Resection Techniques

## Vascular control

**Blood loss** is the most important factor to post-op outcome

- Pringle's maneuver
- Total hepatic vascular exclusion
- Intra-hepatic pedicle ligation

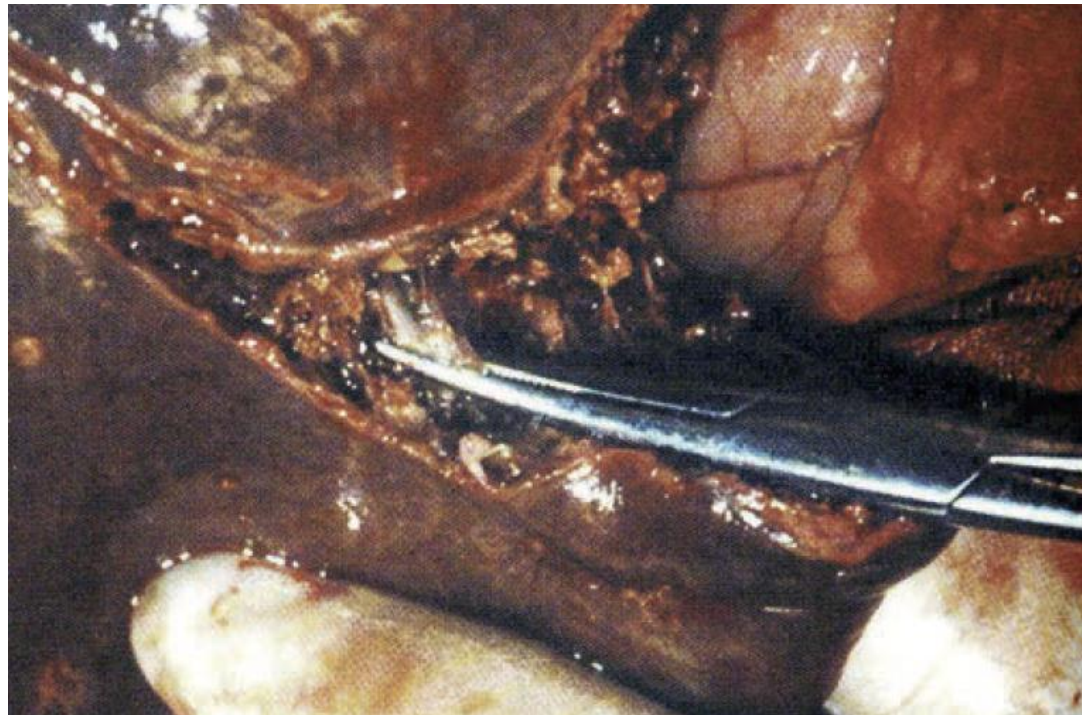
# Liver parenchymal transection

- finger or clamp-fracturing the tissue
- ultrasonic or radiofrequency energy
- water-jet
- tissue-sealing device
- surgical stapler



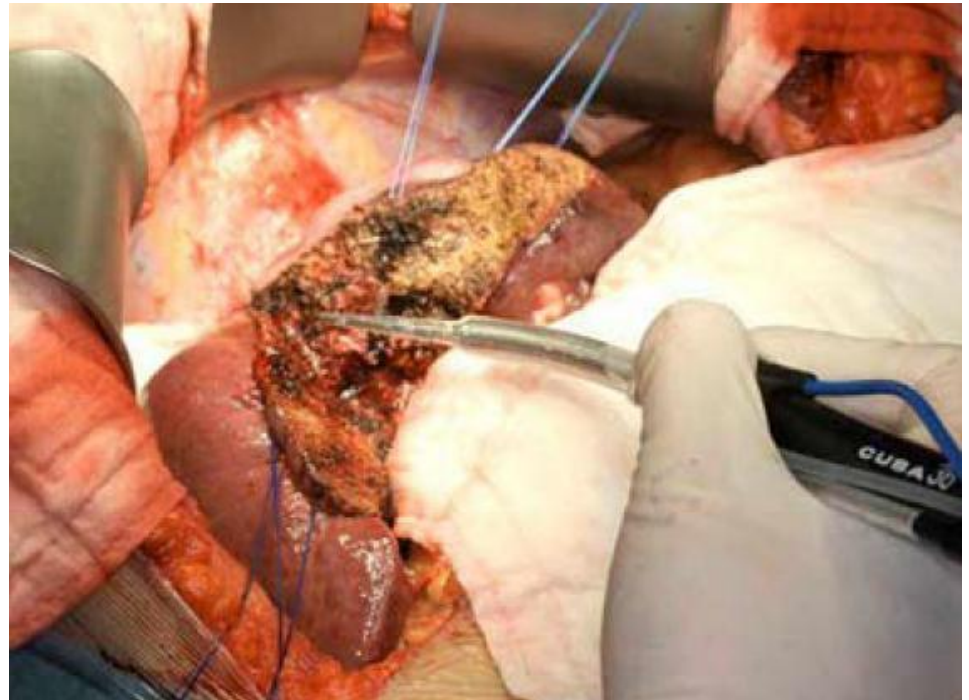
# Crush-Clamp Technique

- crushing parenchyma to expose small vessels and bile duct
- **Pringle maneuver**
- **non-cirrhotic liver**



# CUSA [Cavitron Ultrasonic Surgical Aspirator]

- well-defined transection plane
- low blood loss + low risk of bile leak



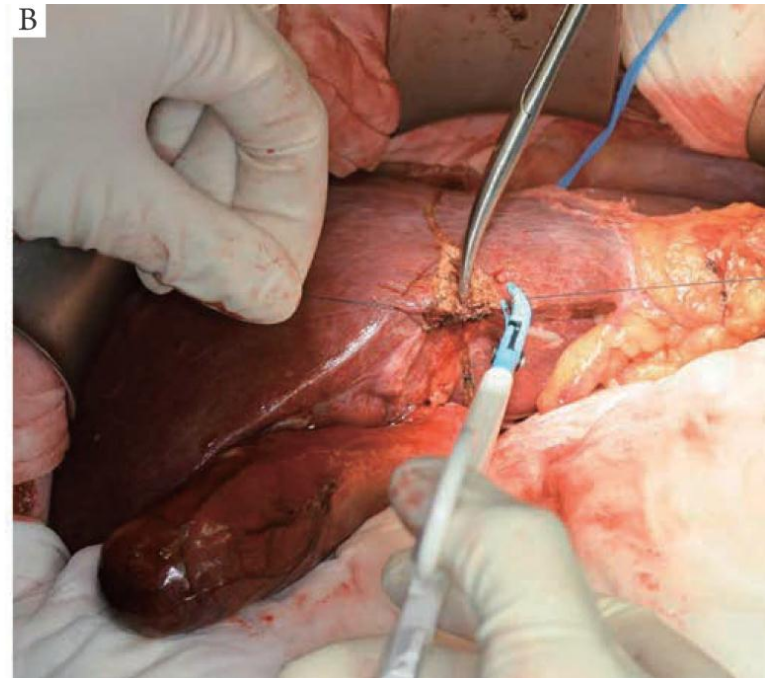
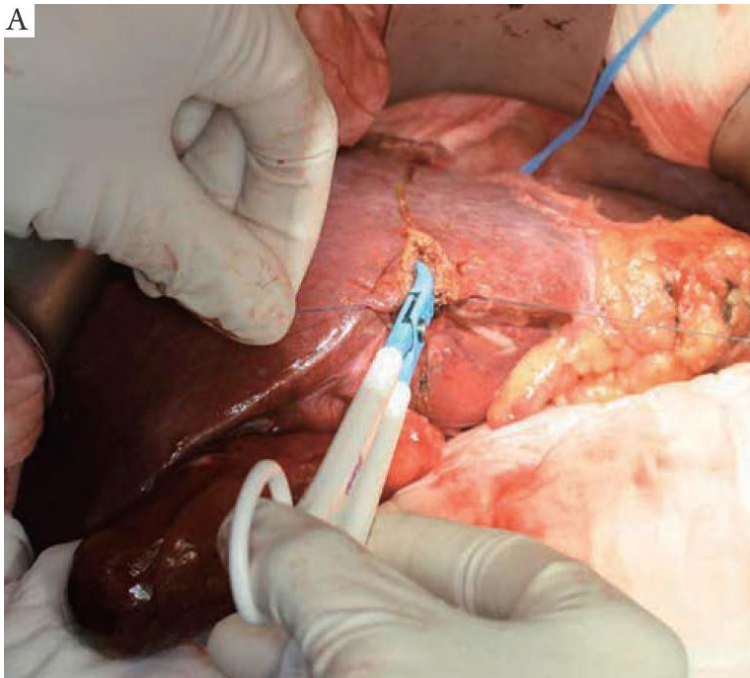
# Harmonic scalpel

- 55,500Hz vibration cut and seal vessel up to 3mm
- protein denaturization, not heat
- increase risk of bile leak



# LigaSure Vessel Sealing System

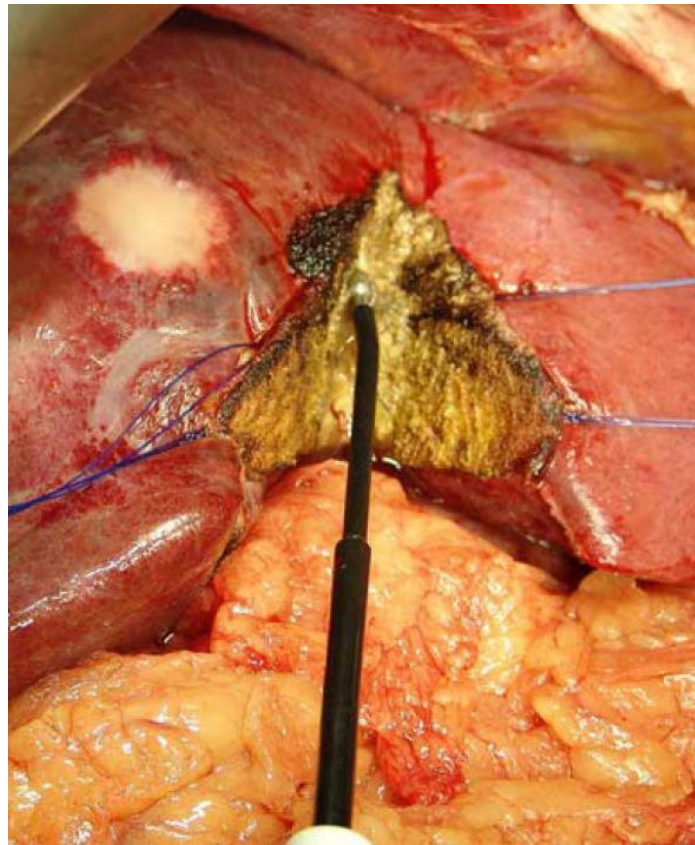
- simultaneous parenchymal division and vessel hemostasis
- bipolar vessel sealing device, up to **7mm**





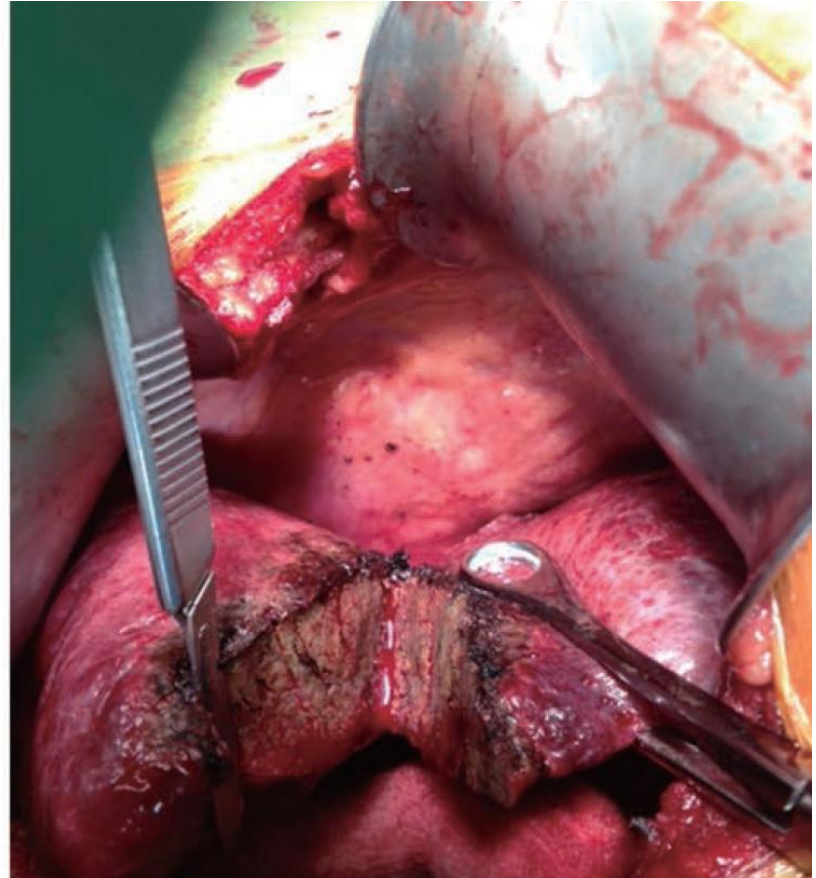
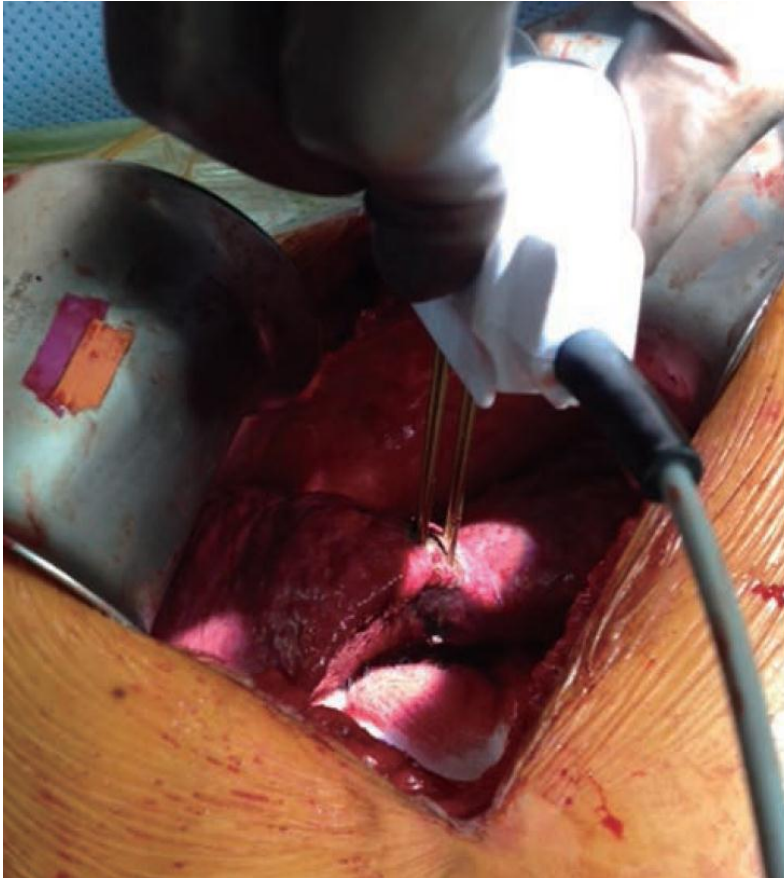
# TissueLink

- radiofrequency energy
- blunt parenchymal dissection and hemostasis



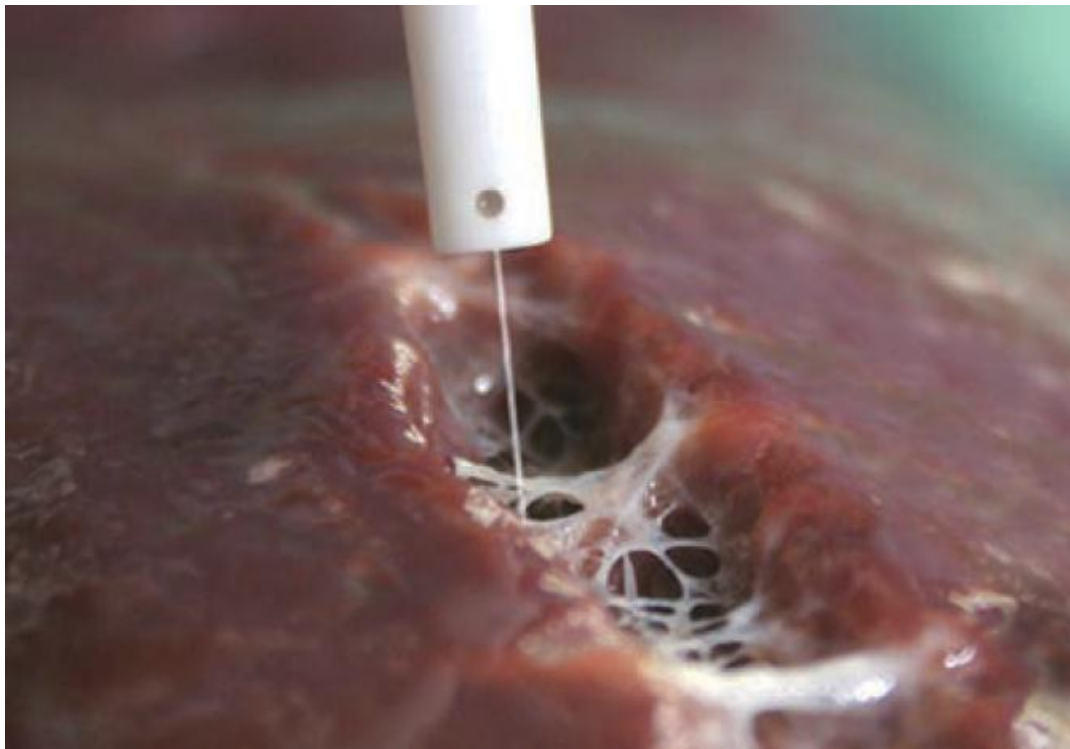
# Radiofrequency-assisted liver resection

- Radiofrequency energy to thermocoagulate liver parenchyma



# Water-jet dissection

- high-pressure water jet to break apart the liver tissue
- No thermal damage





# Vascular Stapler

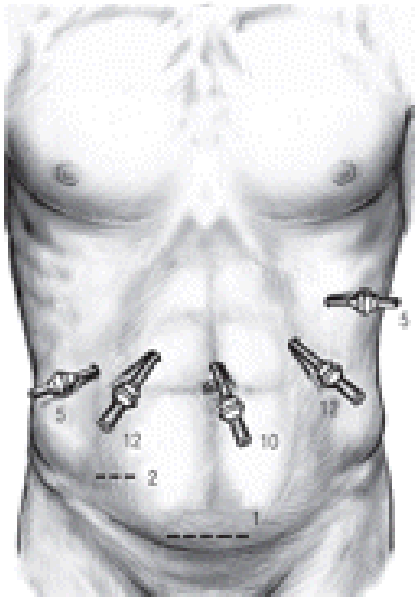
- Division of major vessel and liver parenchyma





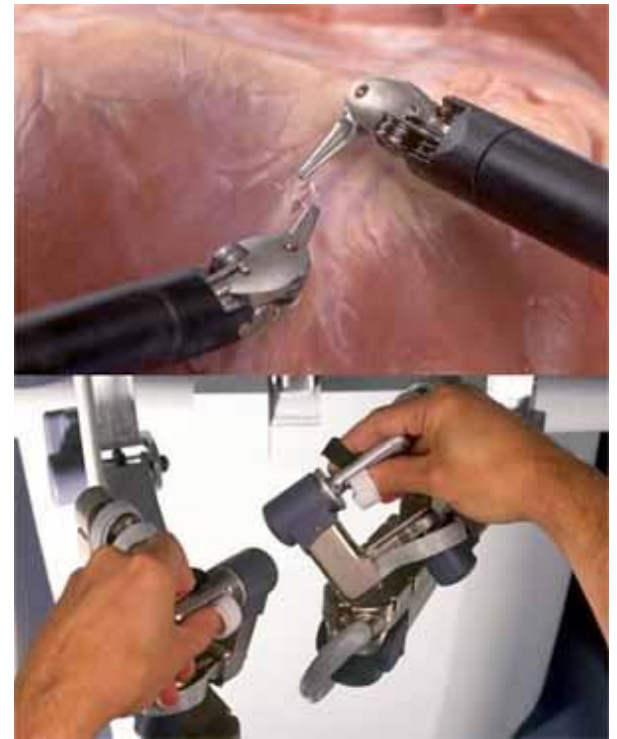
# Laparoscopic Liver Resection

- segment II, III, IVb, V, VI
  - wedge resection
  - Lt lateral segmentectomy



# da Vinci Robot

- 3D visualization + Wristed instruments
  - more flexibility to perform fine movements not possible with laparoscopy



# Liver Transplantation

- Milan criteria
  - solitary  $\leq 5\text{cm}$  or if multiple, a maximum of 3 nodules  $\leq 3\text{cm}$
  - without vascular invasion or extrahepatic spread
  - the 5-year survival  $> 70\%$
  - recurrence ranging from 5% to 15%

Thank You for Your Attention!!