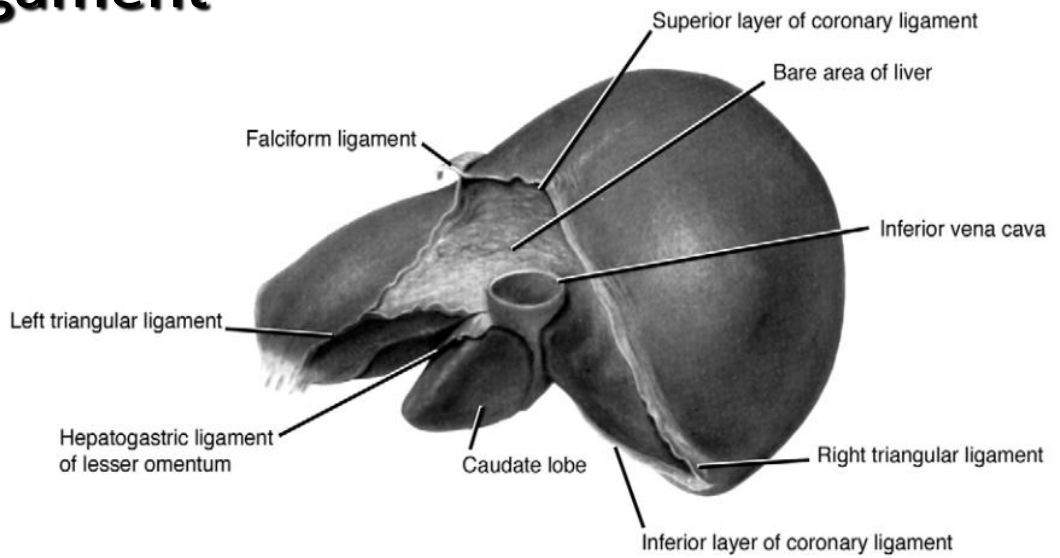
Introduction

- 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
- 3rd 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

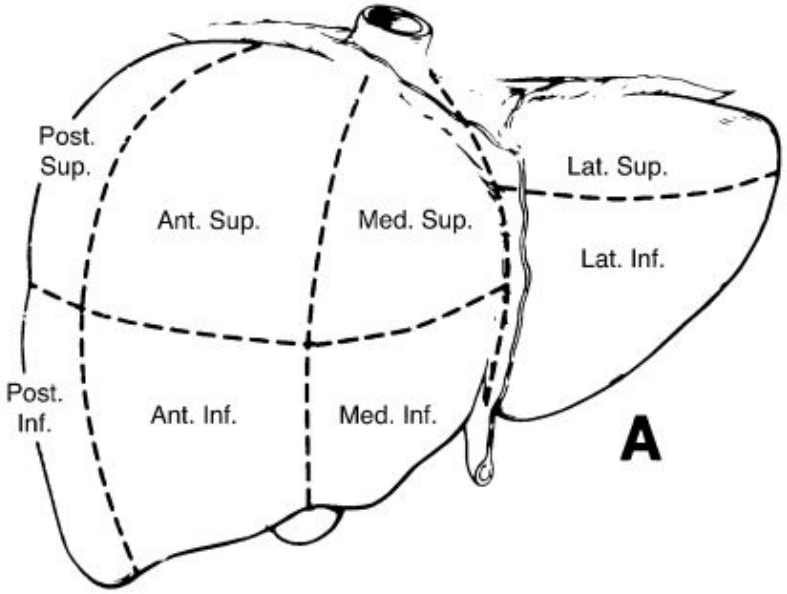
Okuda. Cancer 1985, 56; 918-928

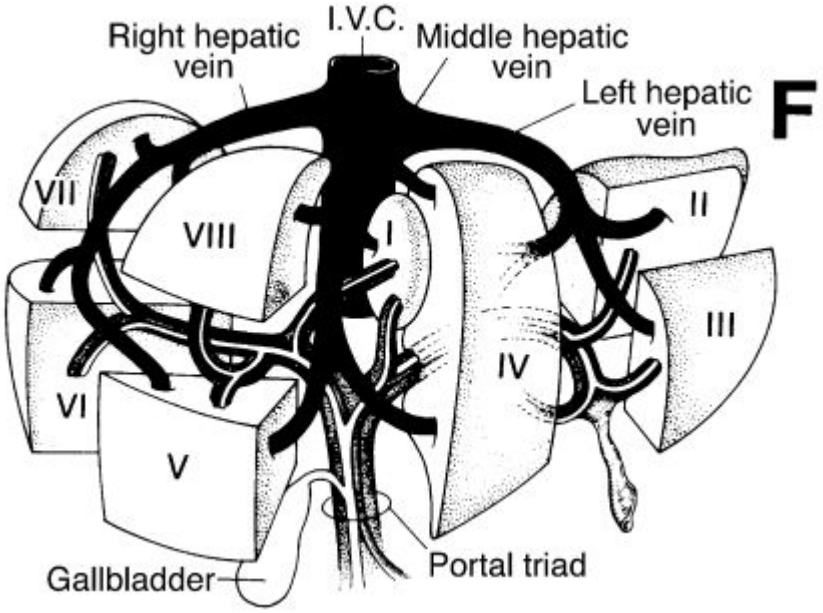
before Surgery….

- understanding **hepatic anatomy** is crucial

Liver anatomy

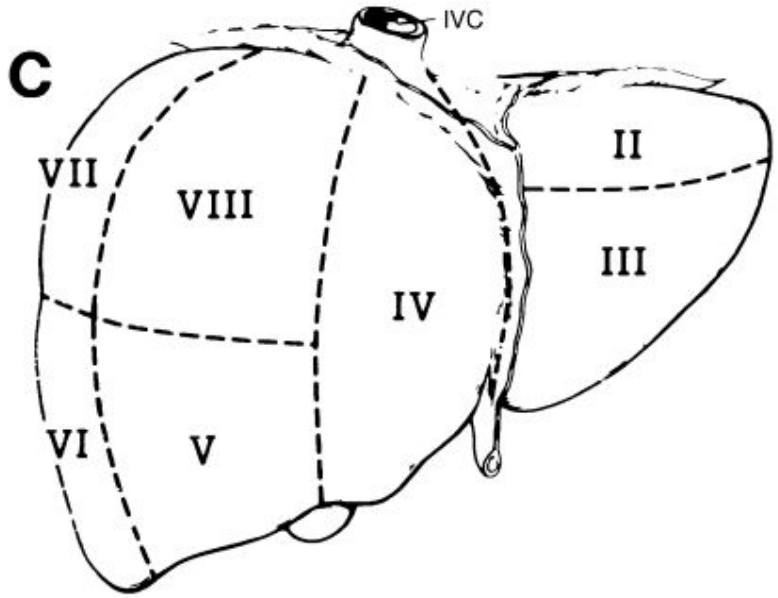
- Based on arterial blood supply, portal vein, biliary drainage, and hepatic venous drainage

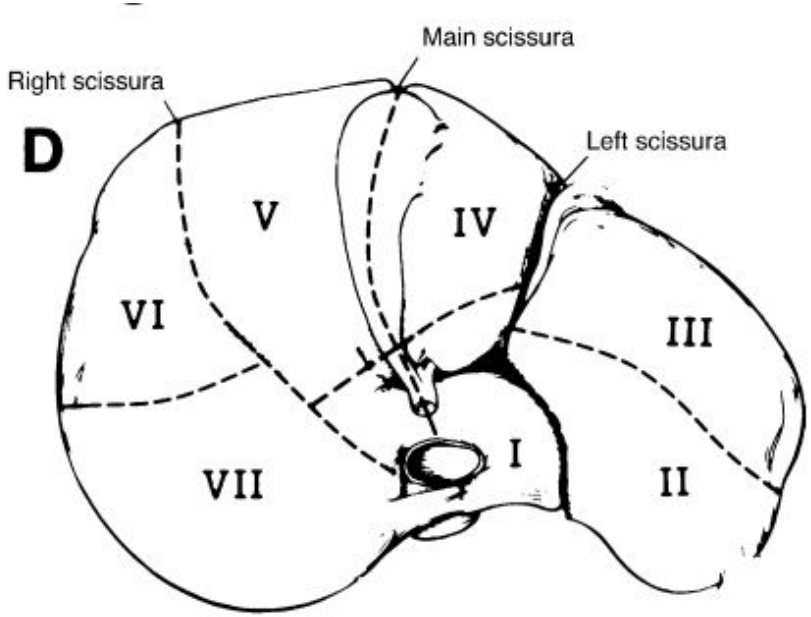




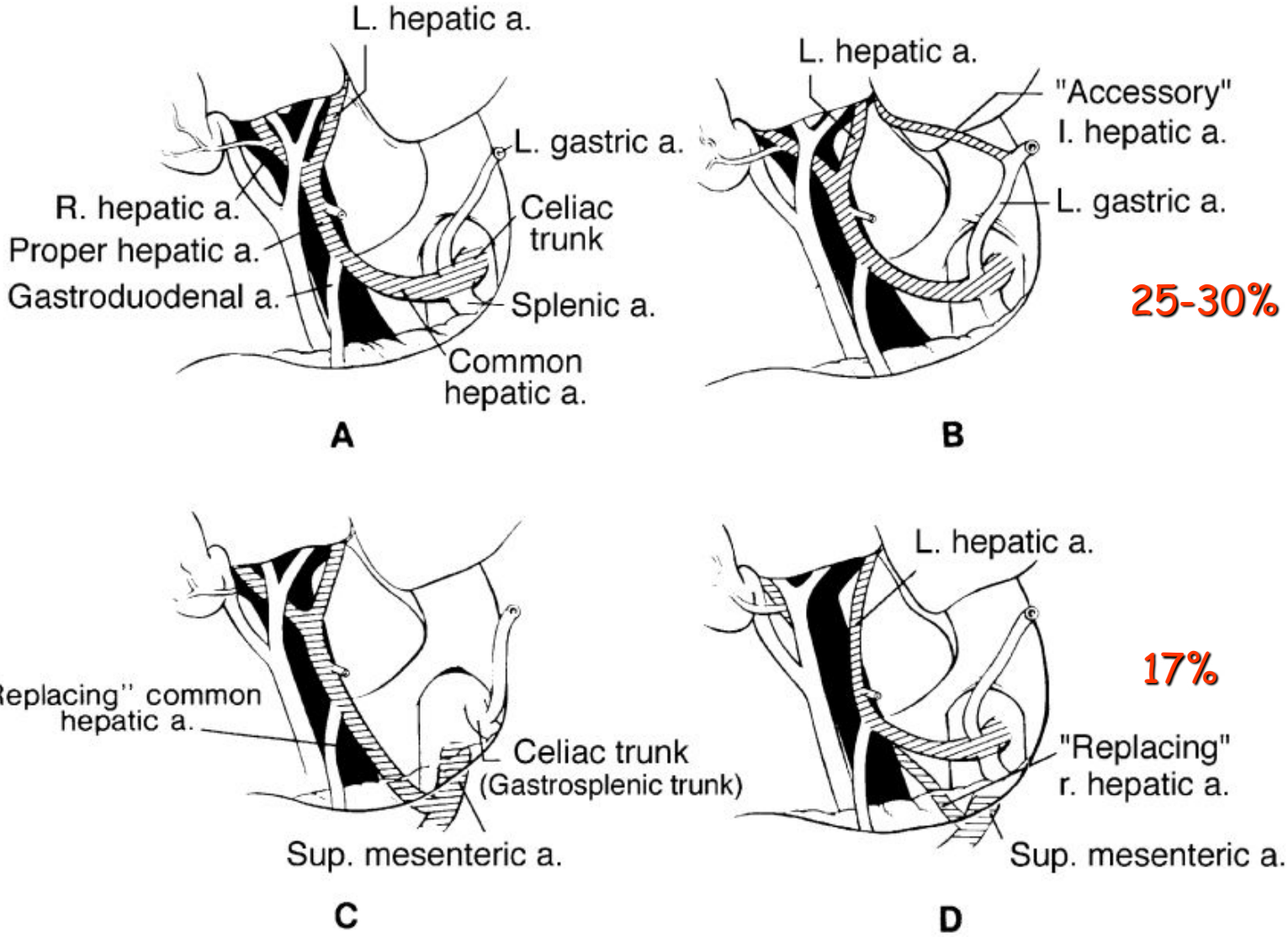
Liver anatomy

- Couinaud, 1954
  - 8 segments

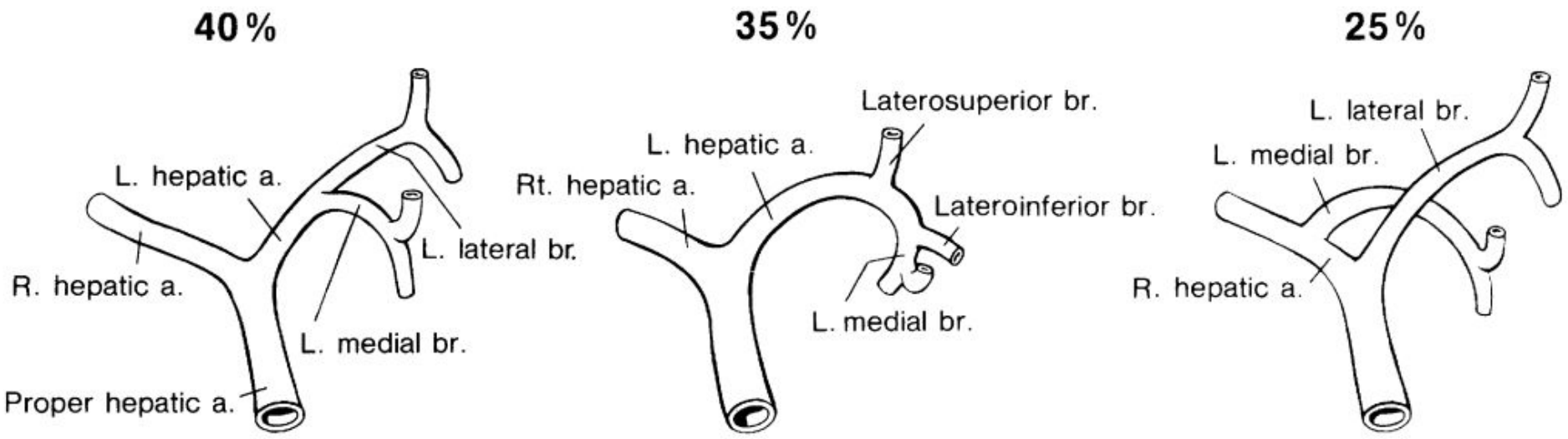




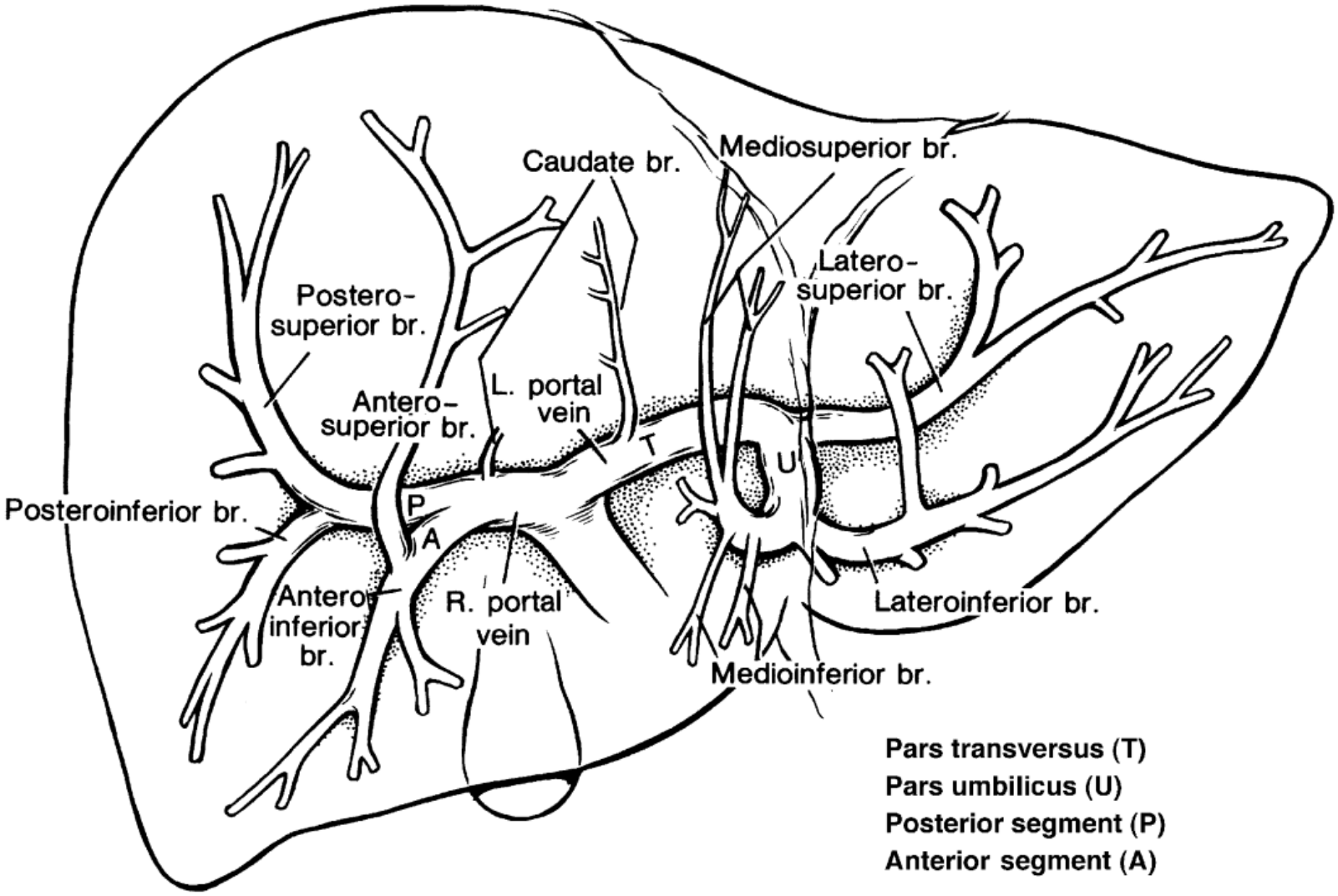
Hepatic artery



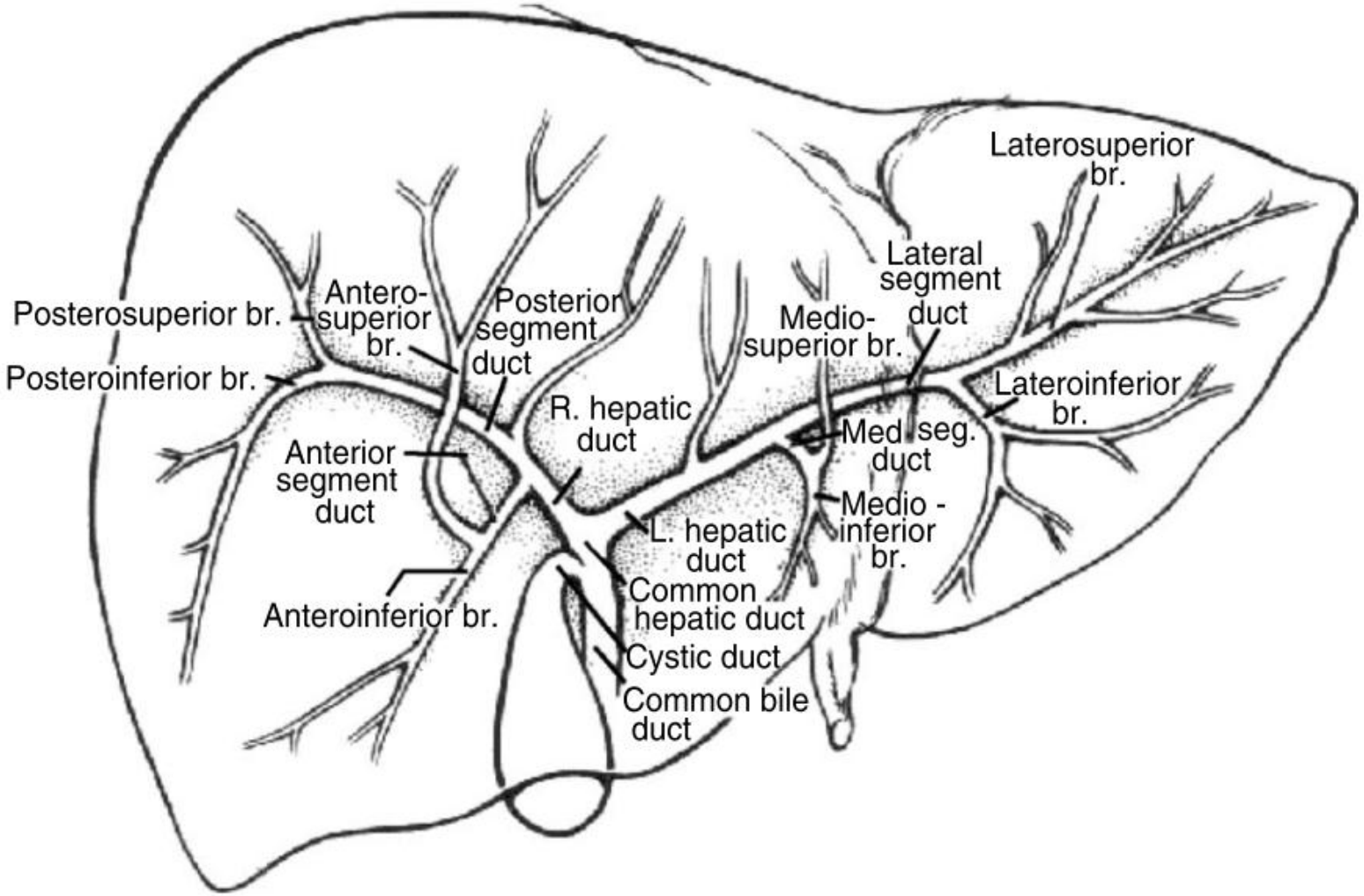
Lt hepatic artery



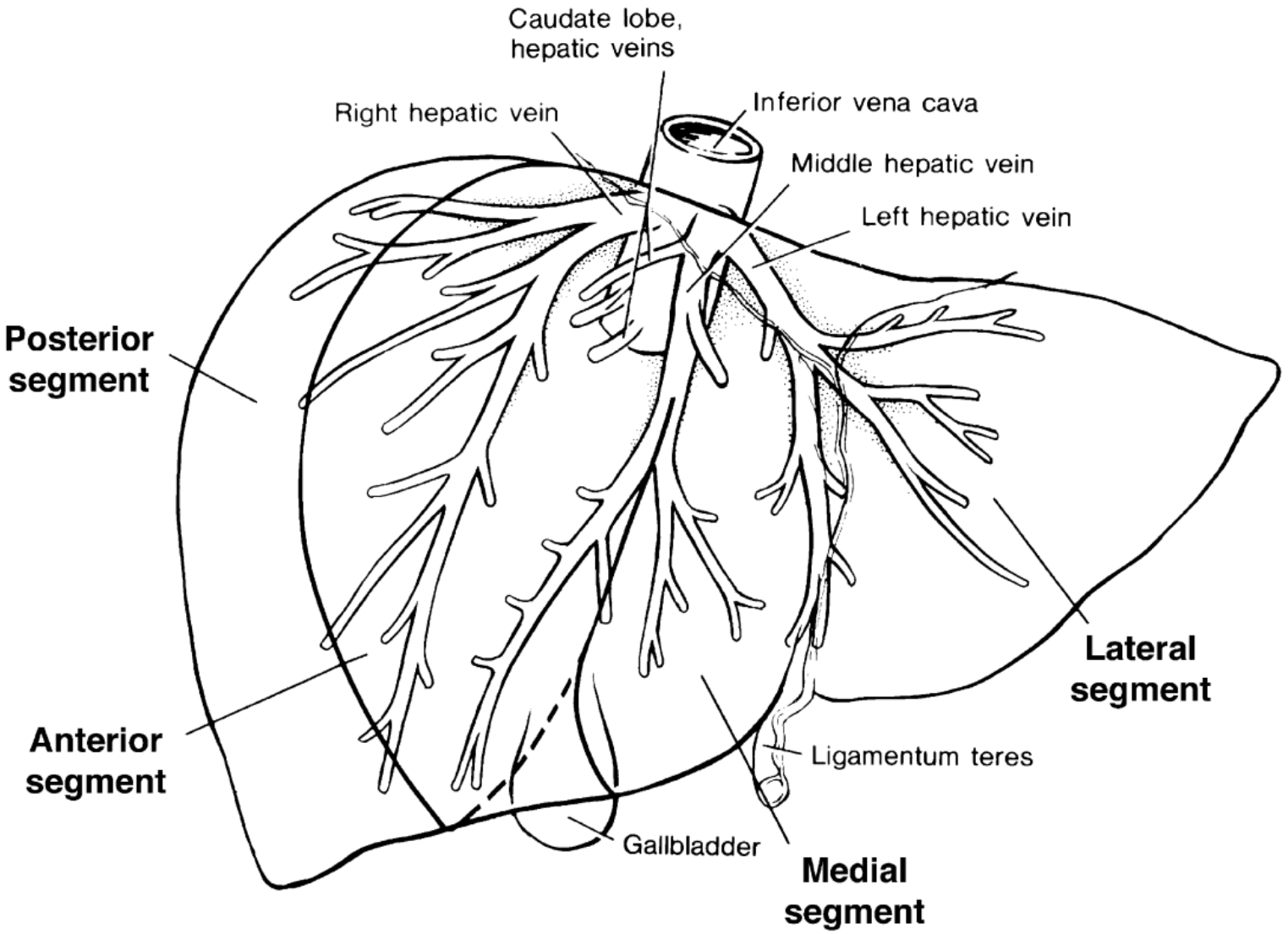
Portal vein


Caudate br.
Mediosuperior br.
Postero-
superior br.
Latero-
superior br.
Antero-
superior br.
L. portal
vein
T
U
P
A
Posteroinferior br.
Antero-
inferior
br.
R. portal
vein
Lateroinferior br.
Medioinferior br.
Pars transversus (T)
Pars umbilicus (U)
Posterior segment (P)
Anterior segment (A)

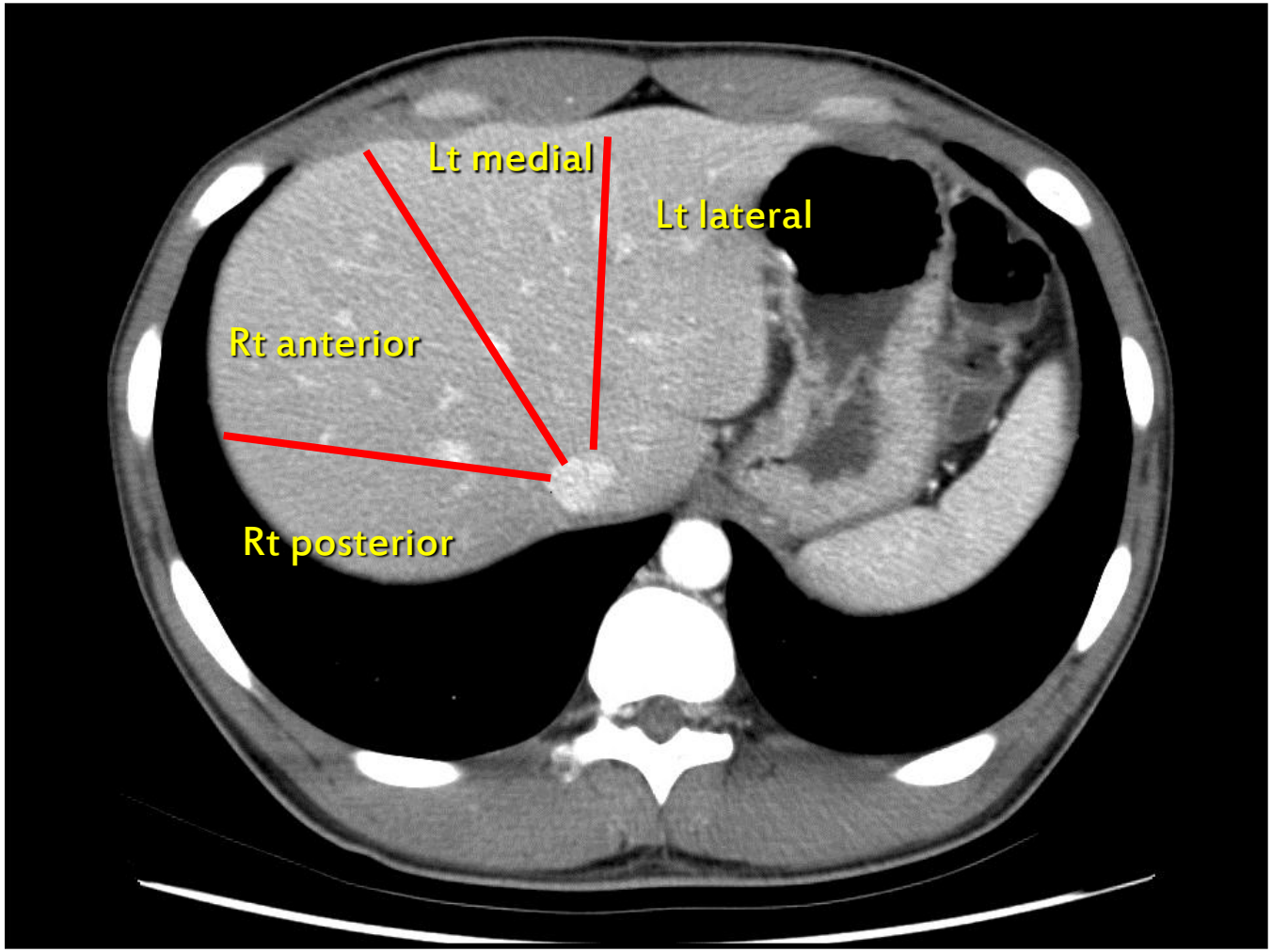
Bile duct


Laterosuperior br.
Lateral segment duct
Medio-superior br.
Posterosuperior br.
Antero-superior br.
Posterior segment duct
Posteroinferior br.
Lateroinferior br.
R. hepatic duct
Med. seg. duct
Anterior segment duct
Medio - inferior br.
L. hepatic duct
Common hepatic duct
Anteroinferior br.
Cystic duct
Common bile duct

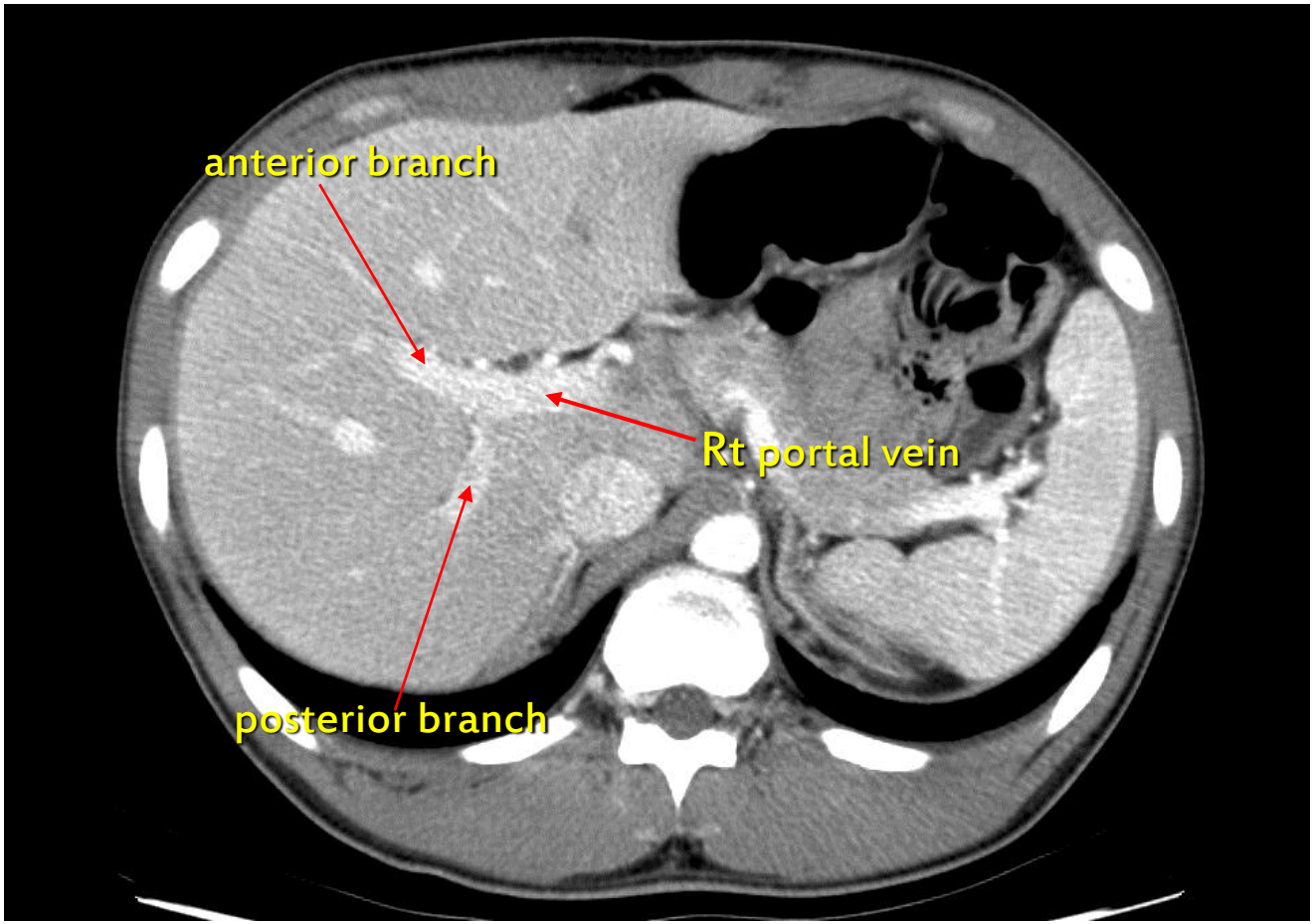
Hepatic Vein



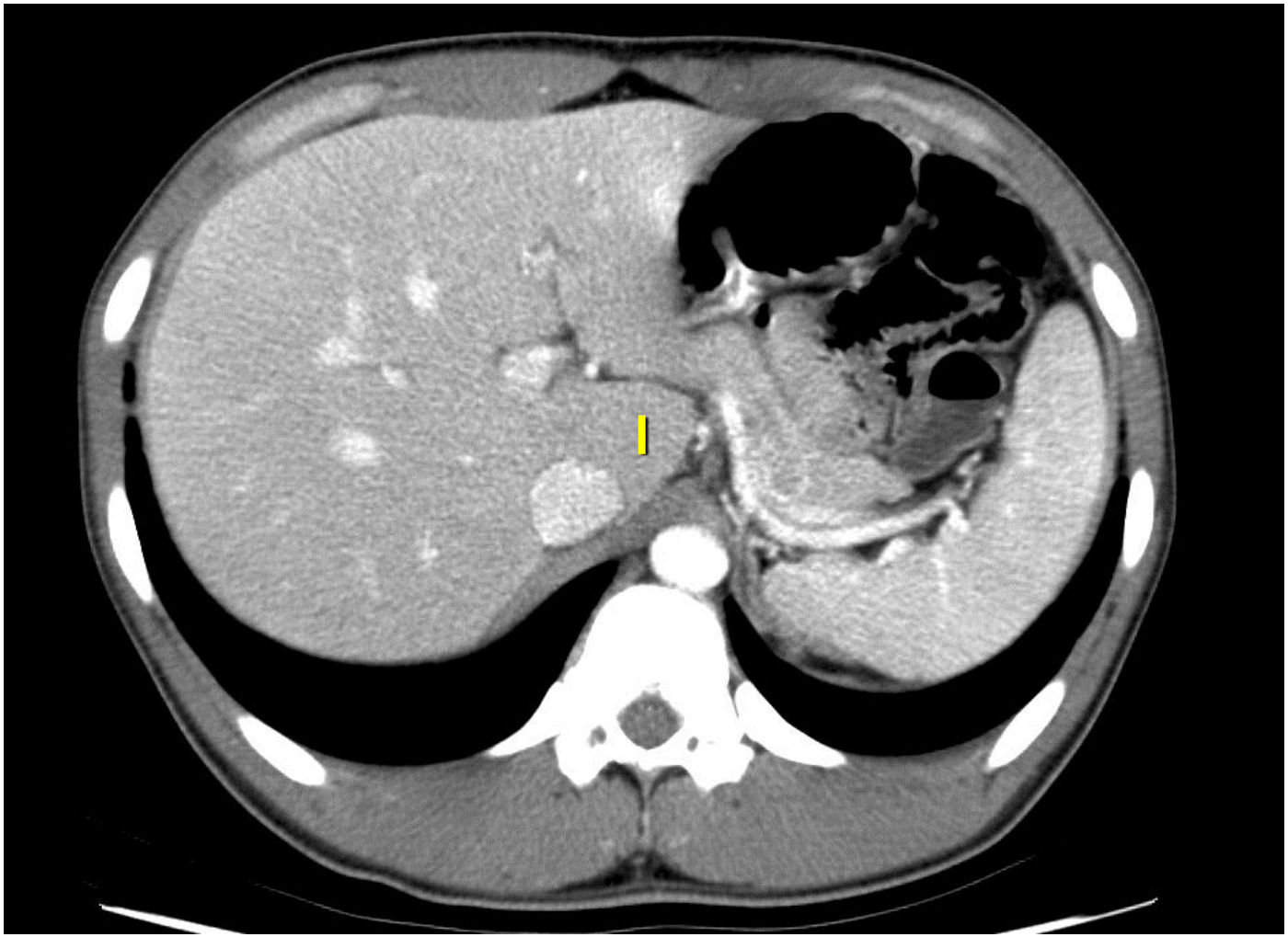
CT interpretation of liver

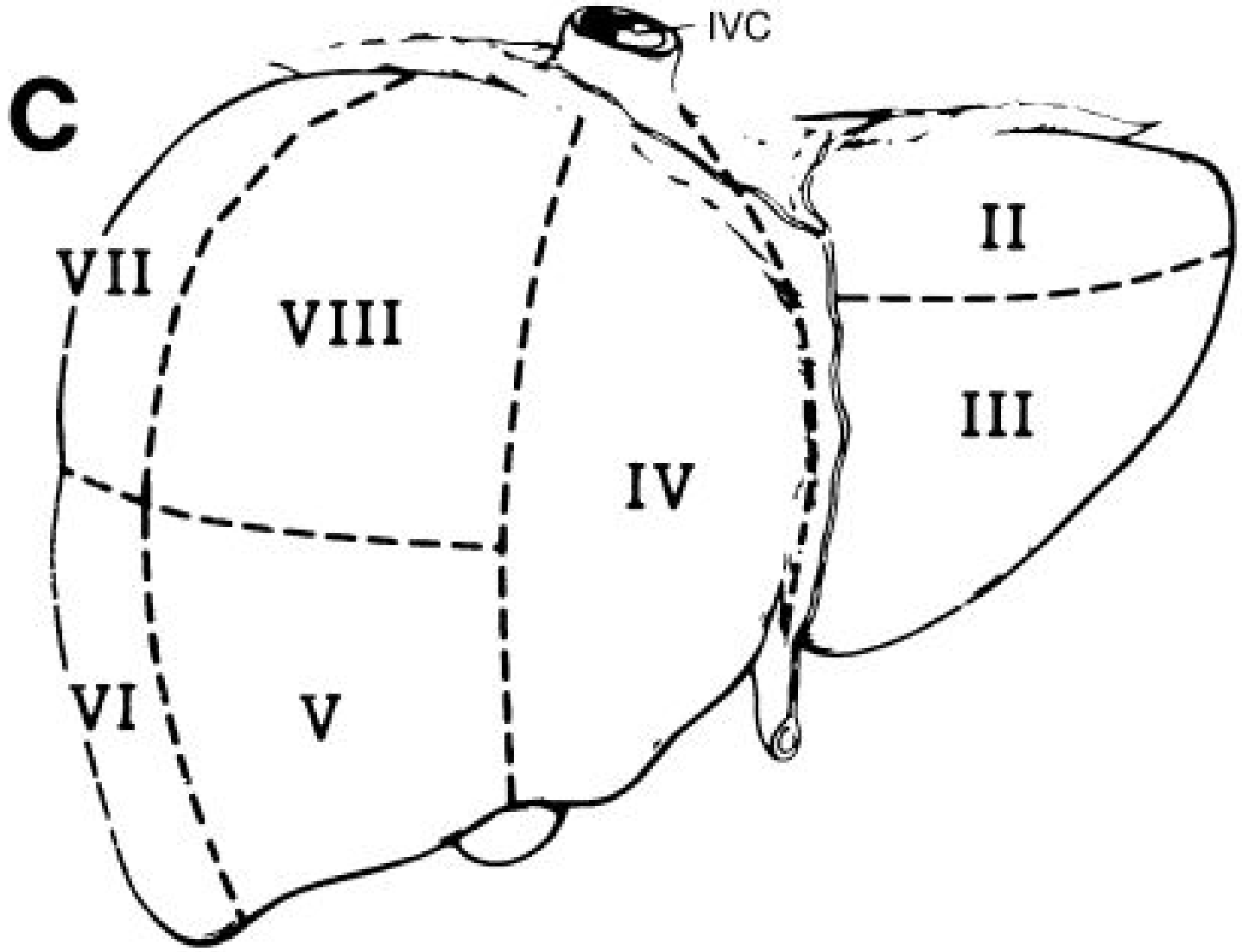


CT interpretation of liver



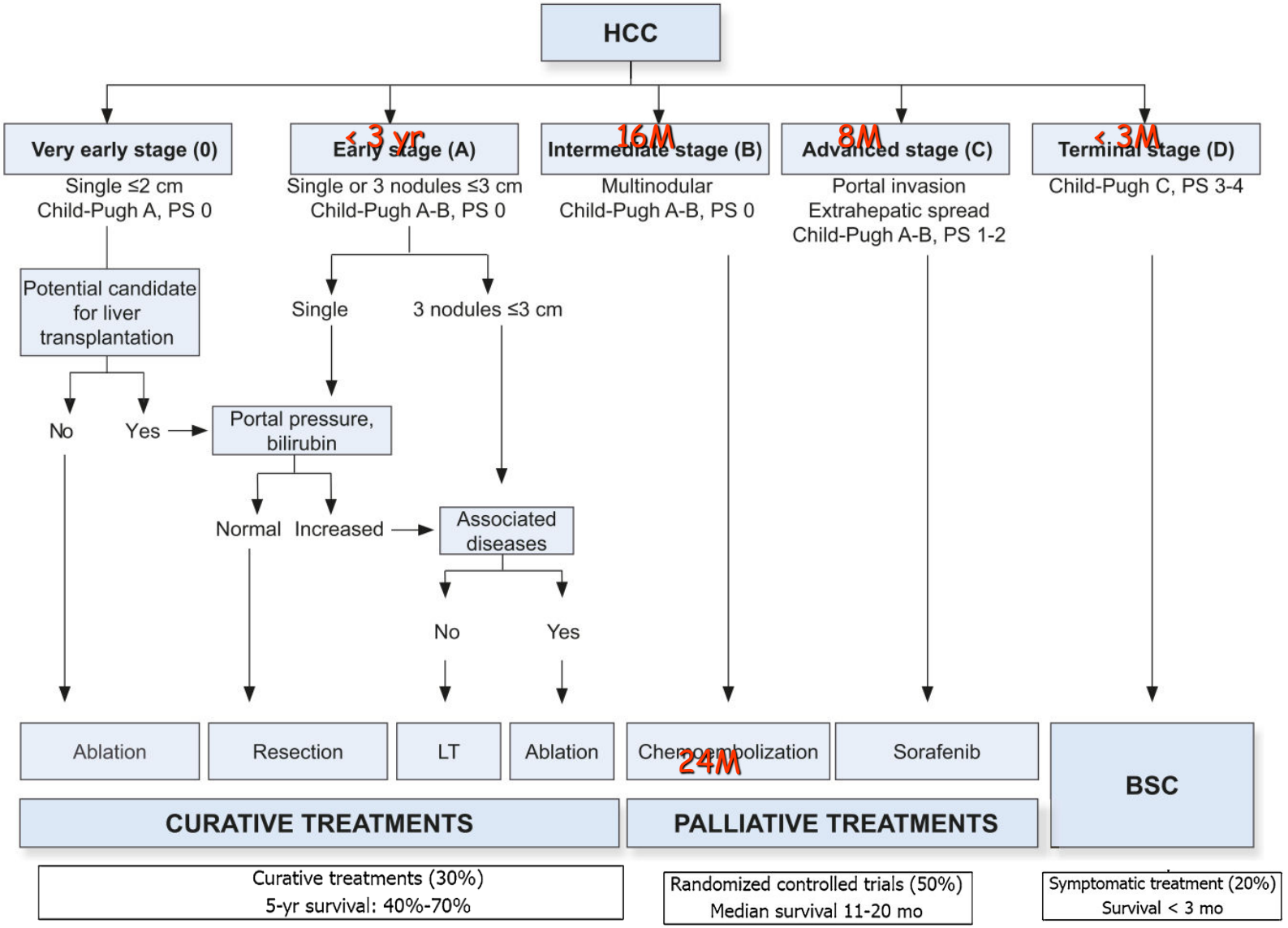
CT interpretation of liver




C
IVC
VII
VIII
II
III
IV
VI
V

HCC management

BCLC staging 2011



Pre-OP evaluation

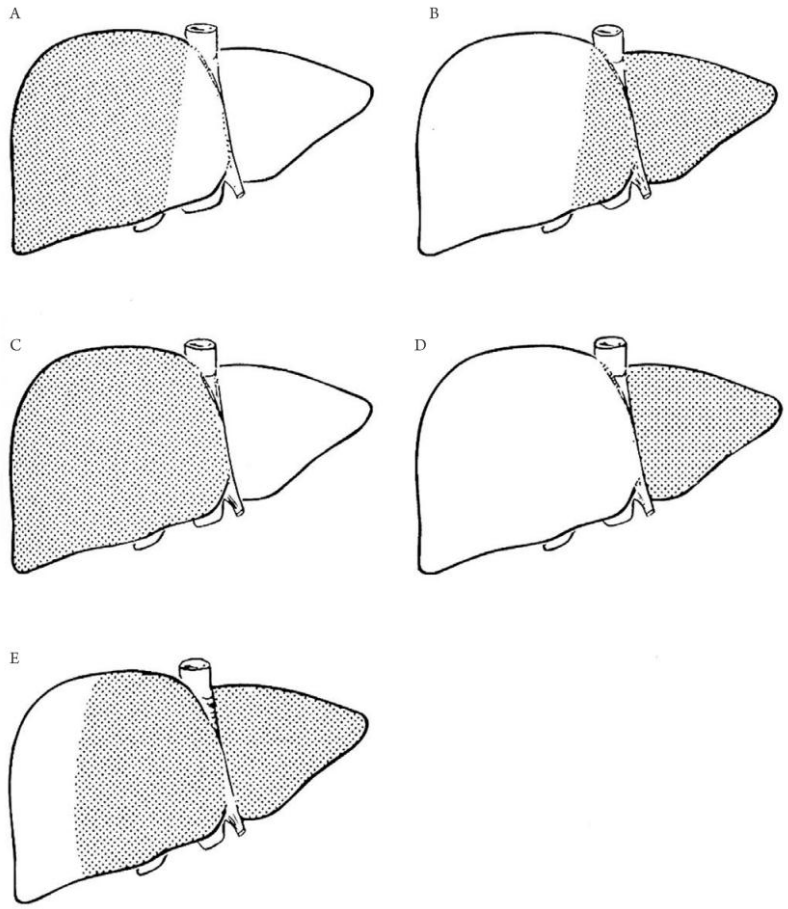
- CBC, PT/aPTT
- liver function test
- α-FP
- Abd CT – Tri-phasic
- Angiography ± CT (*CTAP*)
- ICG test (15min <20%)

Resectability

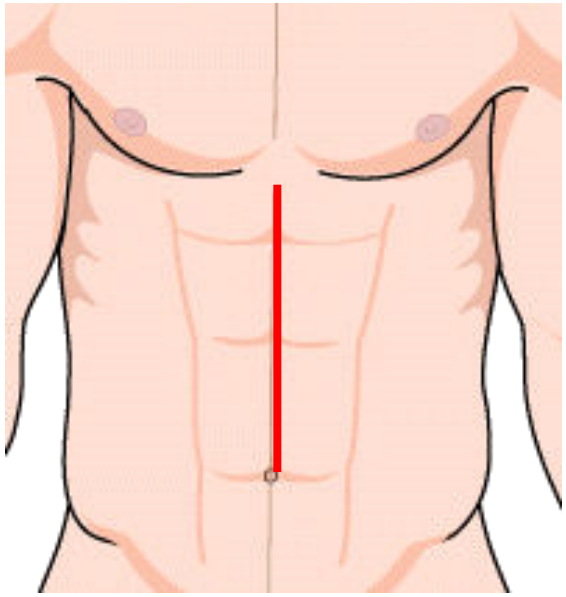
- Tumor **size**, **number**, **location**, **relation to vessels**
- Liver resection / hepatic failure
- Liver condition
  - cirrhosis, post-chemotherapy
- portal vein embolization
- Anatomical resection
- Resection margin

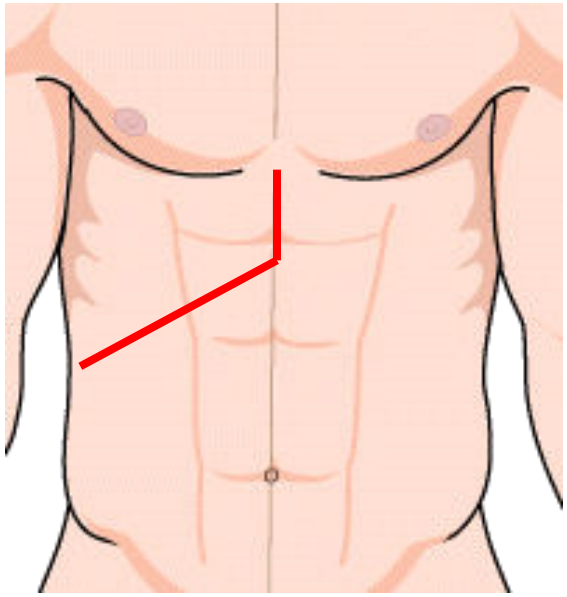
Types of major resection

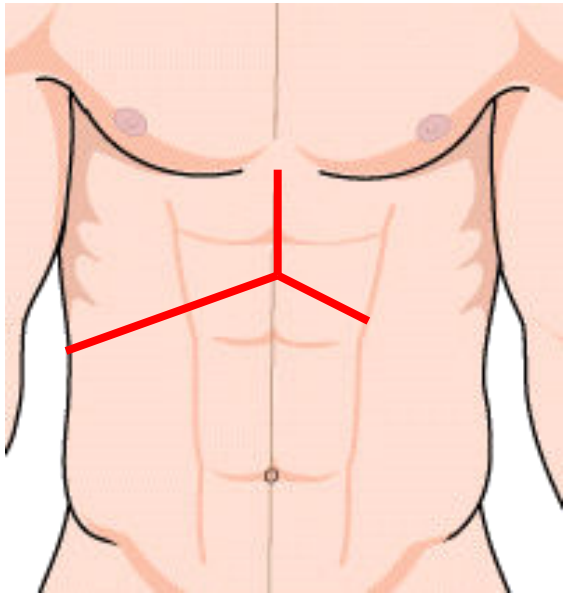
- **Rt lobectomy**
- **Lt lobectomy**
- **Lt lateral segmentectomy**
- **extended Rt lobectomy**
- **extended Lt lobecomy**



Abd wall Incision







Hepatic Resection Techniques

Vascular control

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

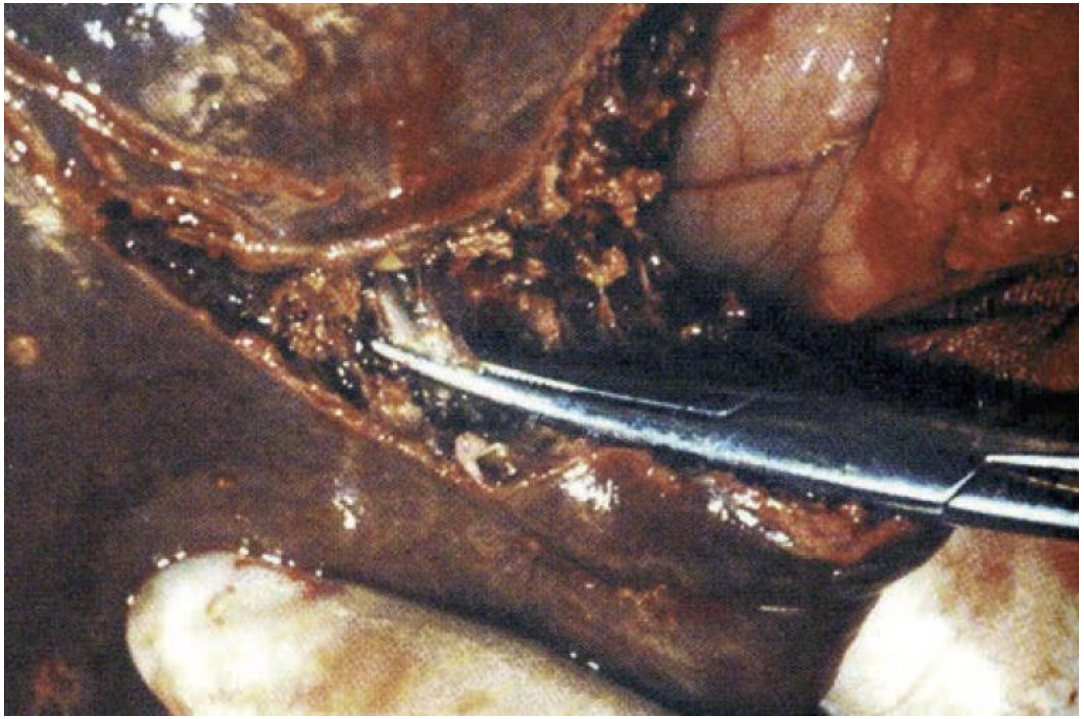
- Pringle's maneuver
- Total hepatic vascular exclusion
- Intra-hepatic pedicle ligation

Liver parenchymal transection

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

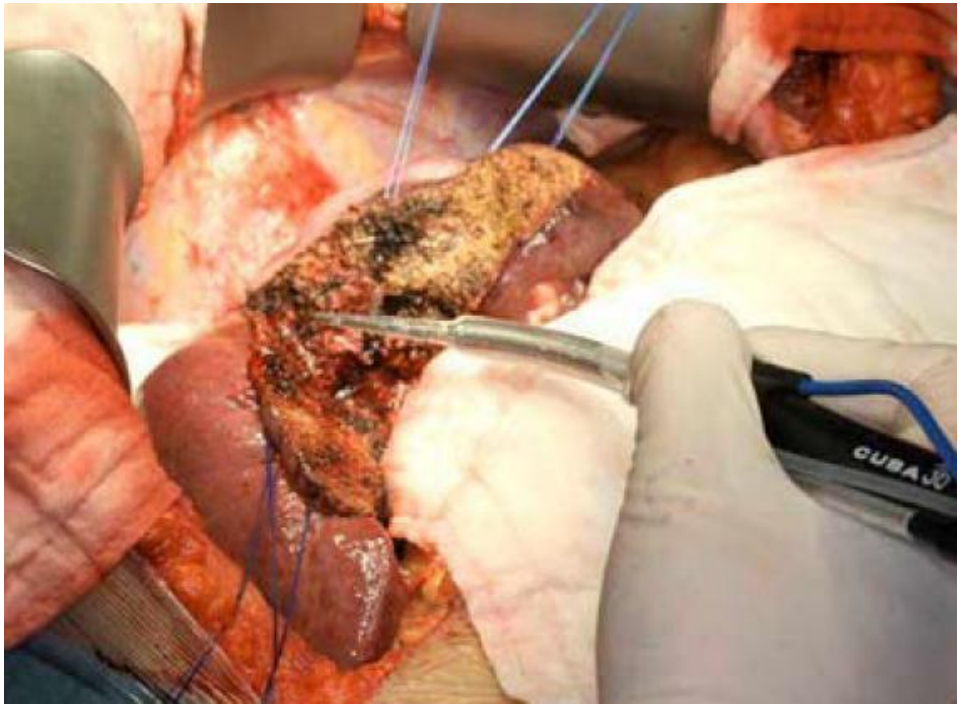
Crush-Clamp Technique

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



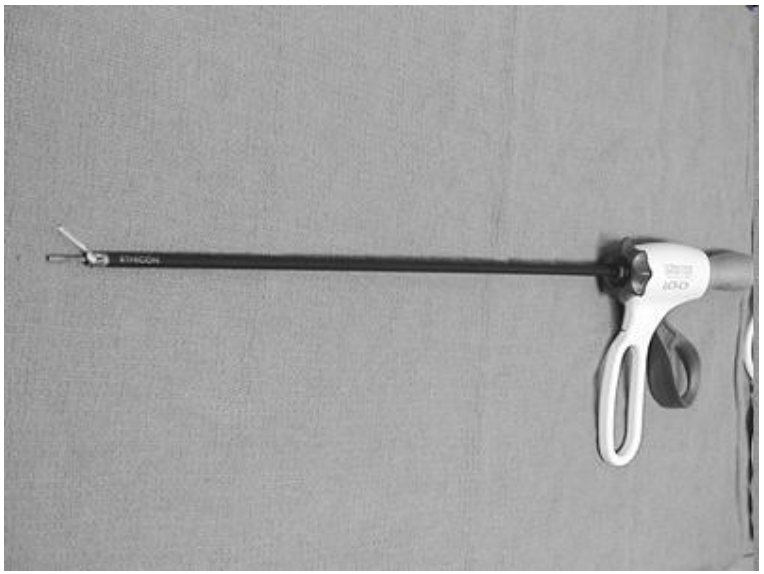
CUSA [Cavitron Ultrasonic Surgical Aspirator]

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



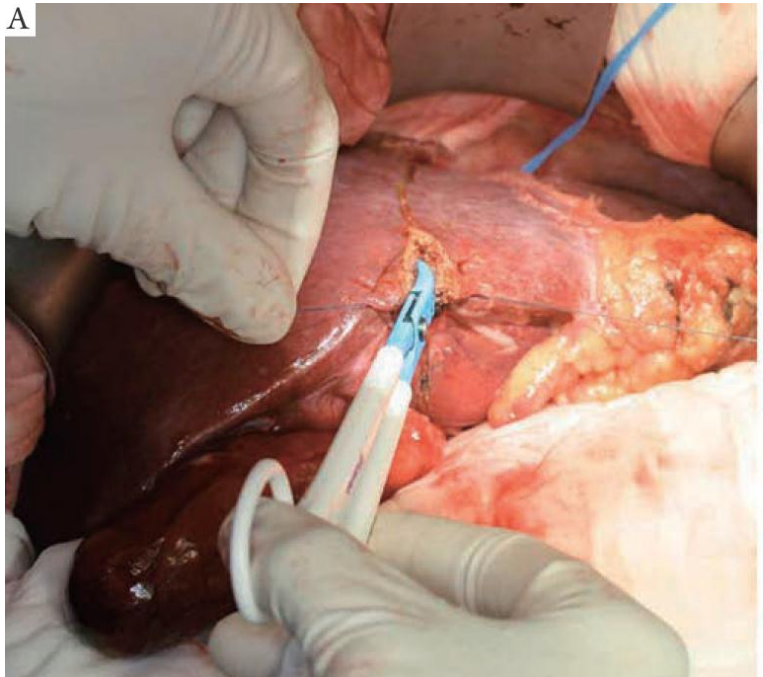
Harmonic scalpel

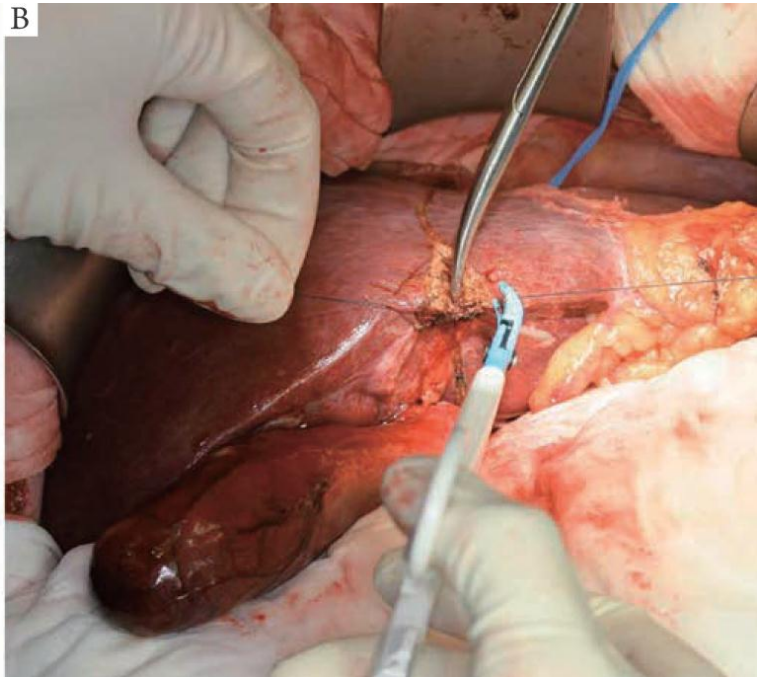
- 55,500Hz vibration cut and seal vessel up to 3mm
- protein denaturization, not heat
- increase risk of bile leak



LigaSure Vessel Sealing System

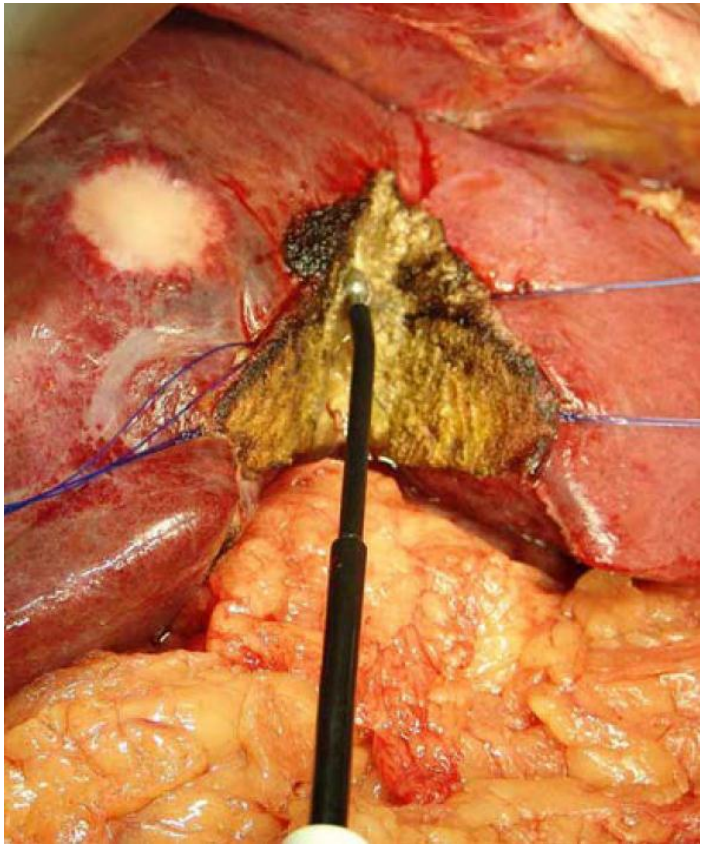
- simultaneous parenchymal division and vessel hemostasis
- bipolar vessel sealing device, up to **7mm**





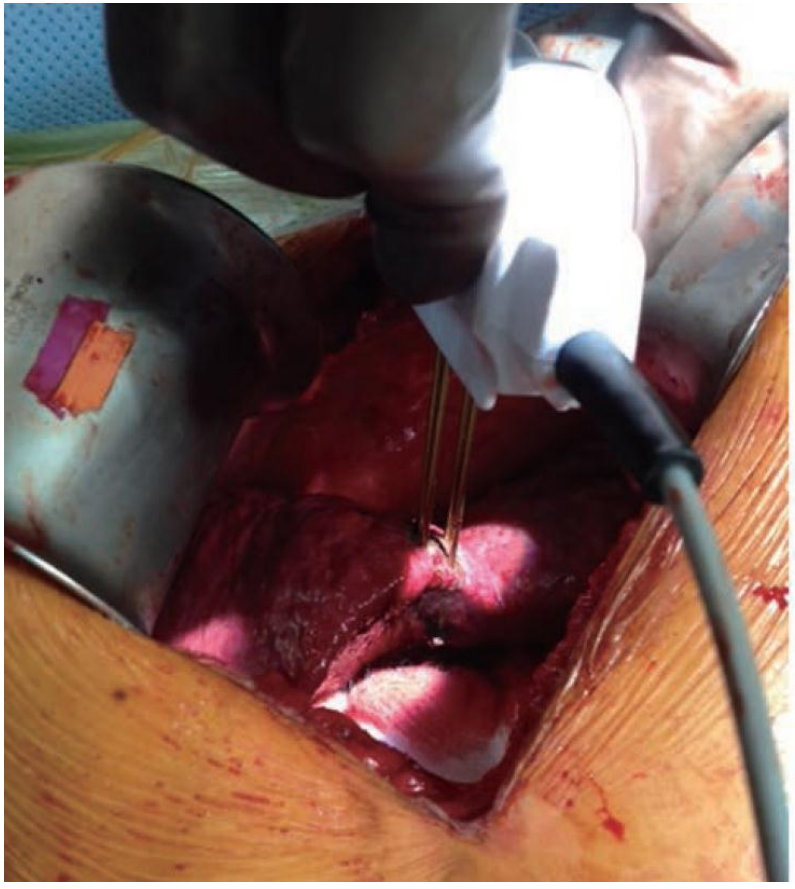
TissueLink

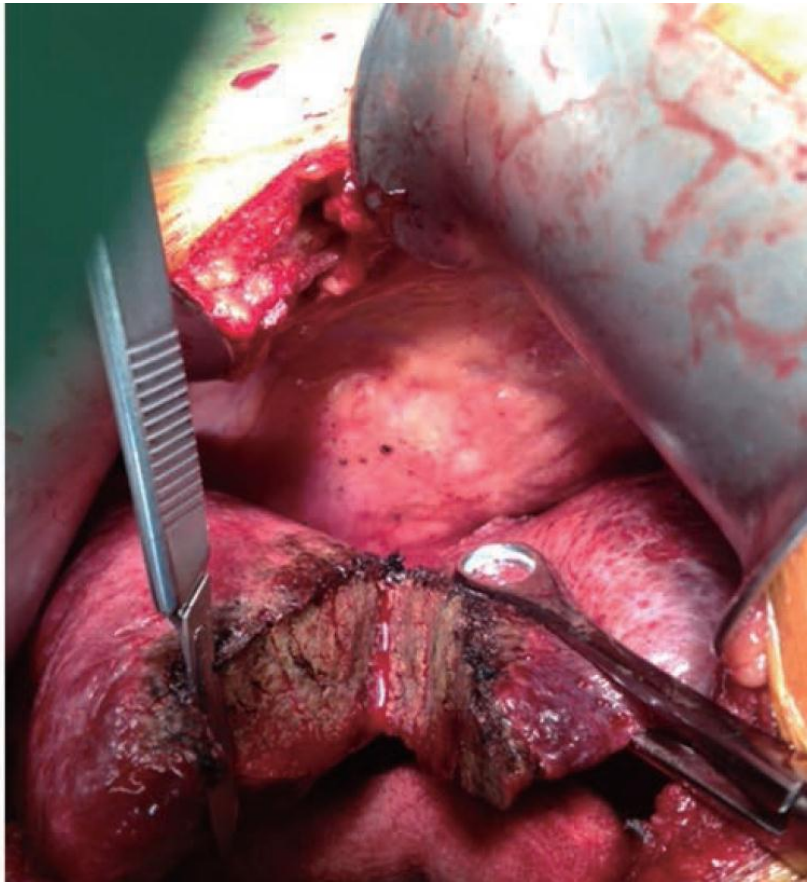
- radiofrequency energy
- blunt parenchymal dissection and hemostasis



Radiofrequency-assisted liver resection

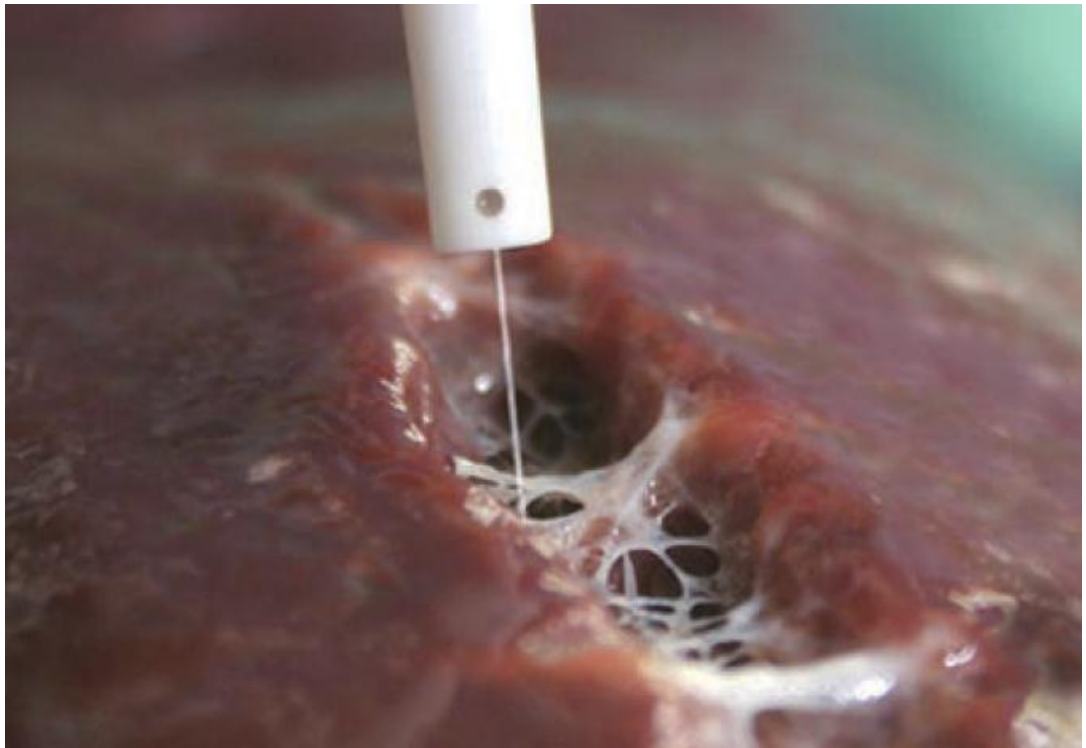
- Radiofrequency energy to thermocoagulate liver parenchyma





Water-jet dissection

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

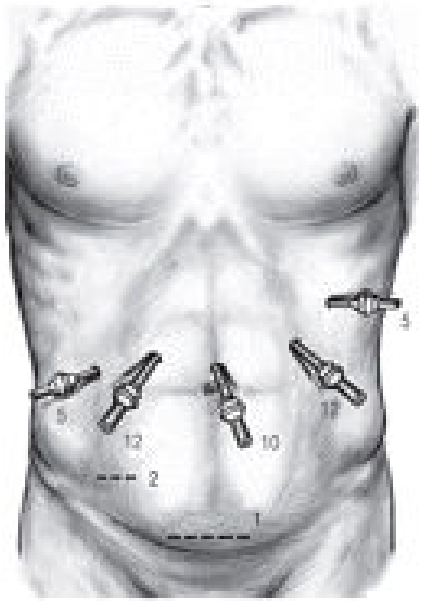


Vascular Stapler

- Division of major vessel and liver parenchyma

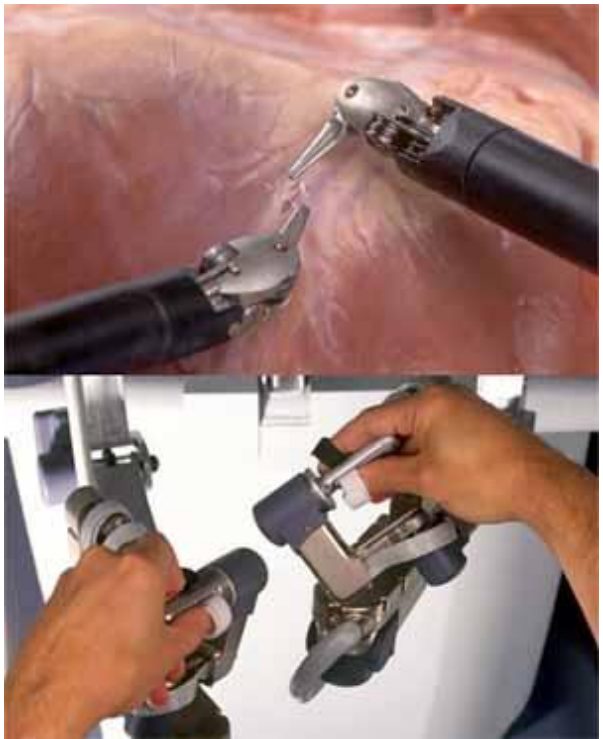
Laparoscopic Liver Resection

- 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 ≤5cm or if multiple, a maximum of 3 nodules ≤3cm
  - without vascular invasion or extrahepatic spread
  - the 5-year survival > 70%
  - recurrence ranging from 5% to 15%

Thank You for Your Attention!!