Liver Transplantation

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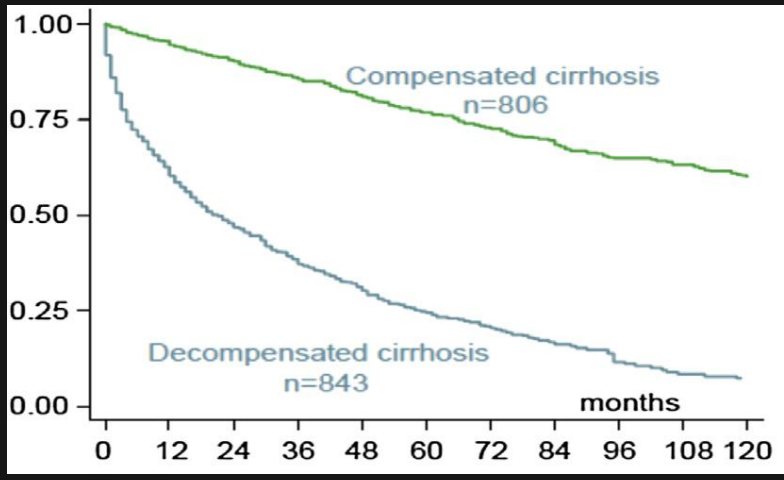
Overview

- Indications and contraindication for LT
- Evaluation of candidate
- Specific etiologies
- Listing and allocation of organ
- Care of patient on waiting list
- Post transplant Care of recipient
- Outcome

Indications for liver Transplant

- LT remains the treatment of choice for irreversible liver failure
- LT should be considered for any patient in whom anticipated overall survival exceeds life expectancy of the underlying disease or where a significant increase in quality of life can be achieved
- Survival following liver transplantation is 90% at 1 year and 75% at 5 years



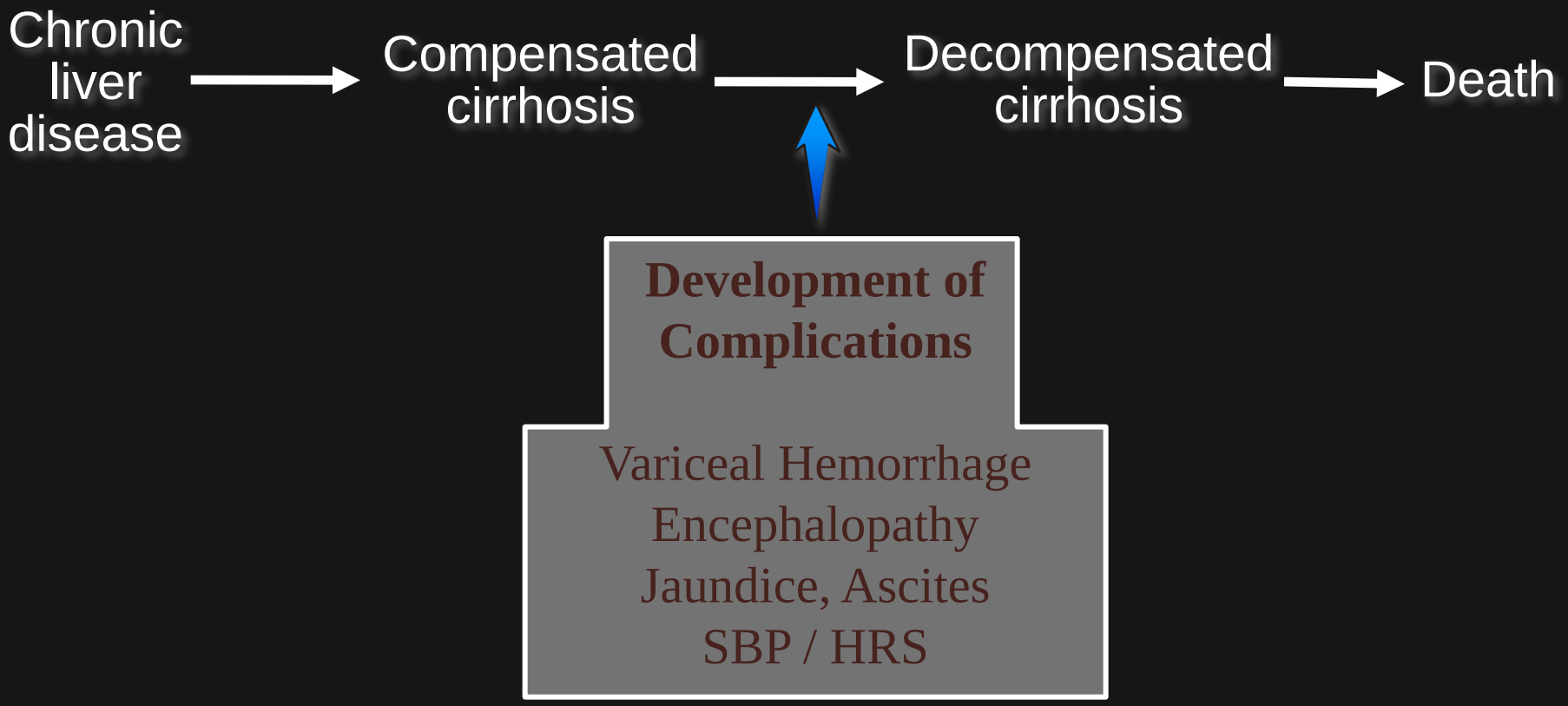
Indications

- Acute Liver Failure
- Decompensated Cirrhosis
- Chronic Cholestatic disorders
- Hepatic Malignancy
- Metabolic disorders

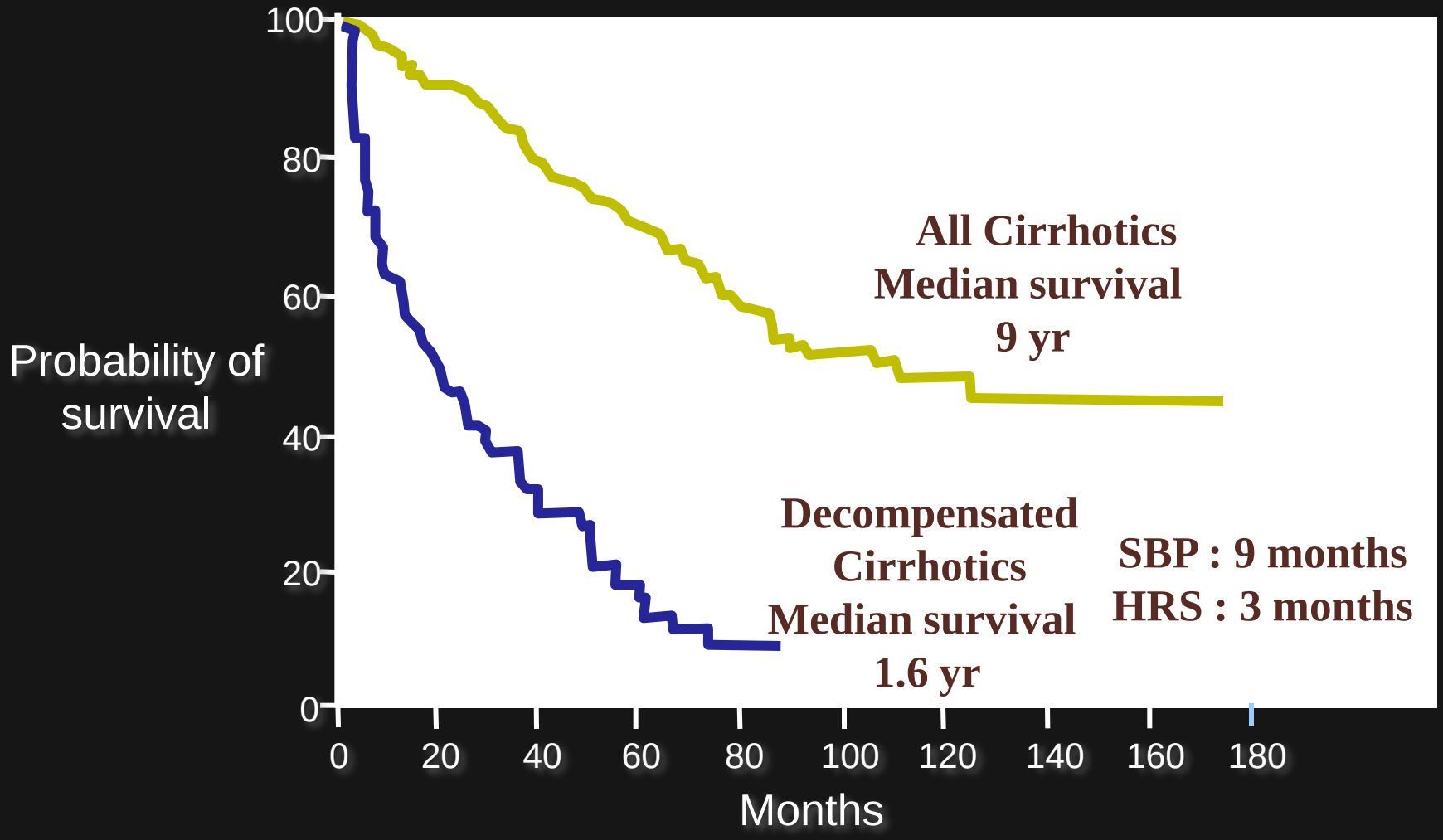
Indications for liver transplantation
Fulminant hepatic failure
Complications of cirrhosis
Ascites
Chronic gastrointestinal blood loss caused by portal hypertensive gastropathy
Hepatic encephalopathy
Liver cancer
Recurrent variceal bleeding
Synthetic dysfunction
Liver-based metabolic conditions
Alpha 1 antitrypsin deficiency
Familial amyloidosis
Glycogen storage disease
Hemochromatosis
Primary oxaluria
Wilson disease
Tyrosinemia
Urea cycle enzyme deficiencies
Systemic complications of chronic liver disease
Hepatopulmonary syndrome
Portopulmonary hypertension

Adapted from Martin P, DiMartini A, Feng S, et al. Evaluation for liver transplantation in adults: 2013 practice guideline by the AASLD. Hepatology 2013;59:1144–65.

Natural History of Chronic Liver Disease



Decompensation shortens survival



J Hepatol 2006, Clin Liver Dis 2008

MELD score

Prediction of severity of cirrhosis

(www.mayoclinic.org/meld/mayomodel6.html)

The MELD Model, UNOS Modification

In the following model, survival probability of a patient with end-stage liver disease is estimated based on the following variables. Please enter data in the corresponding boxes.

What is the INR? [ ]

What is the bilirubin? [ ] (mg/dl)

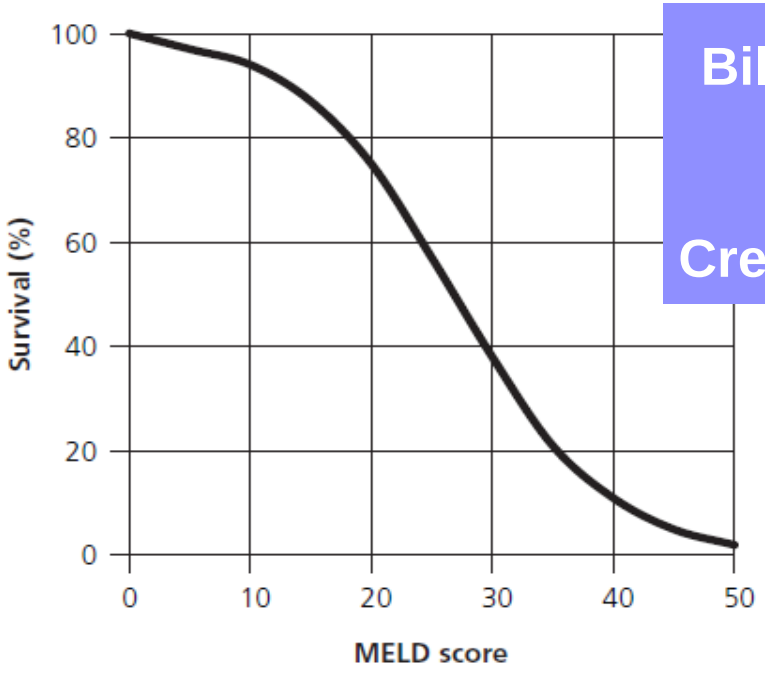
What is the creatinine? [ ] (mg/dl)

Has the patient had dialysis at least twice in the past week? ( ) No ( ) Yes

[Compute]

MELD score: [ ]

[Reset]

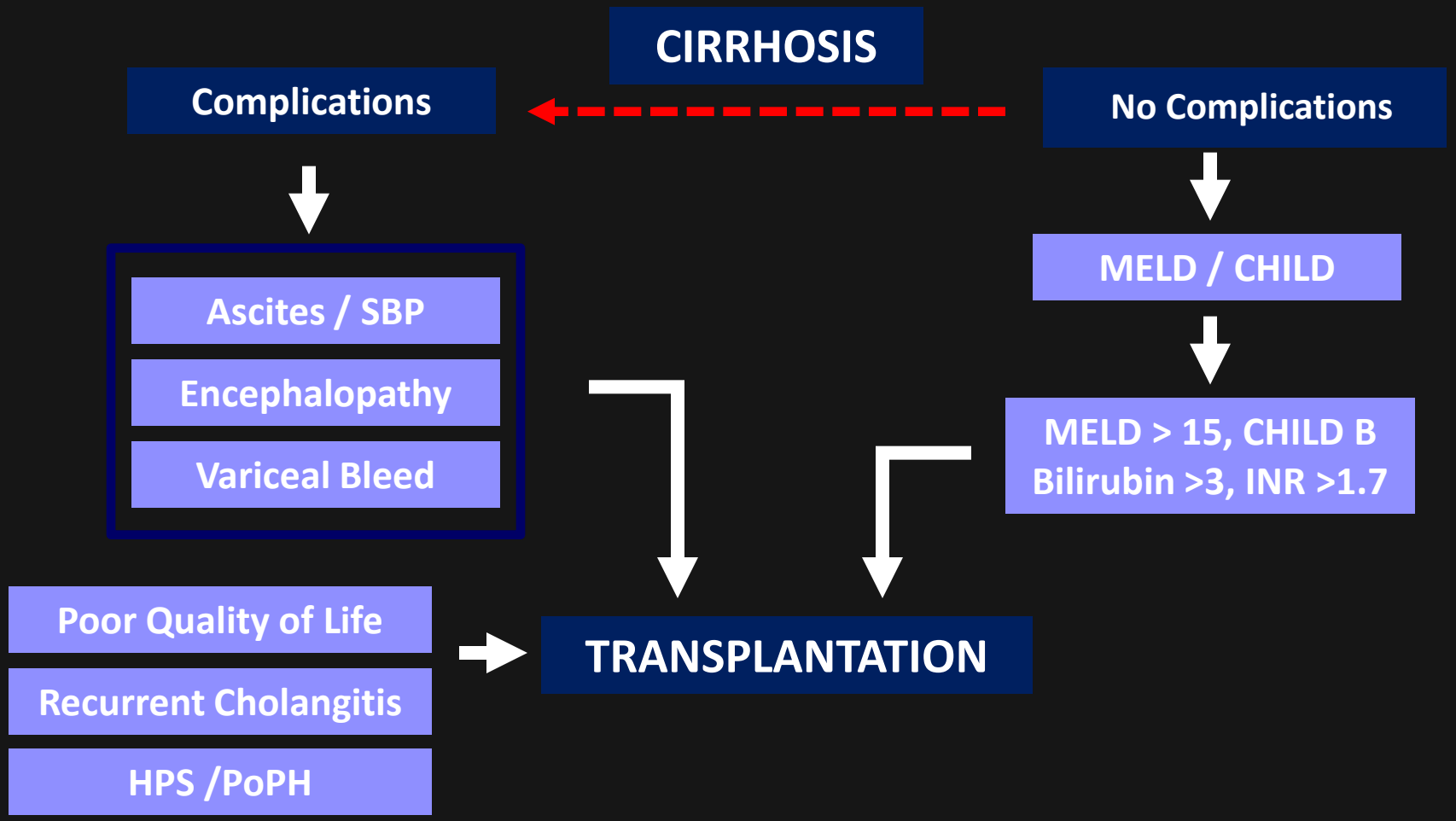


Bilirubin

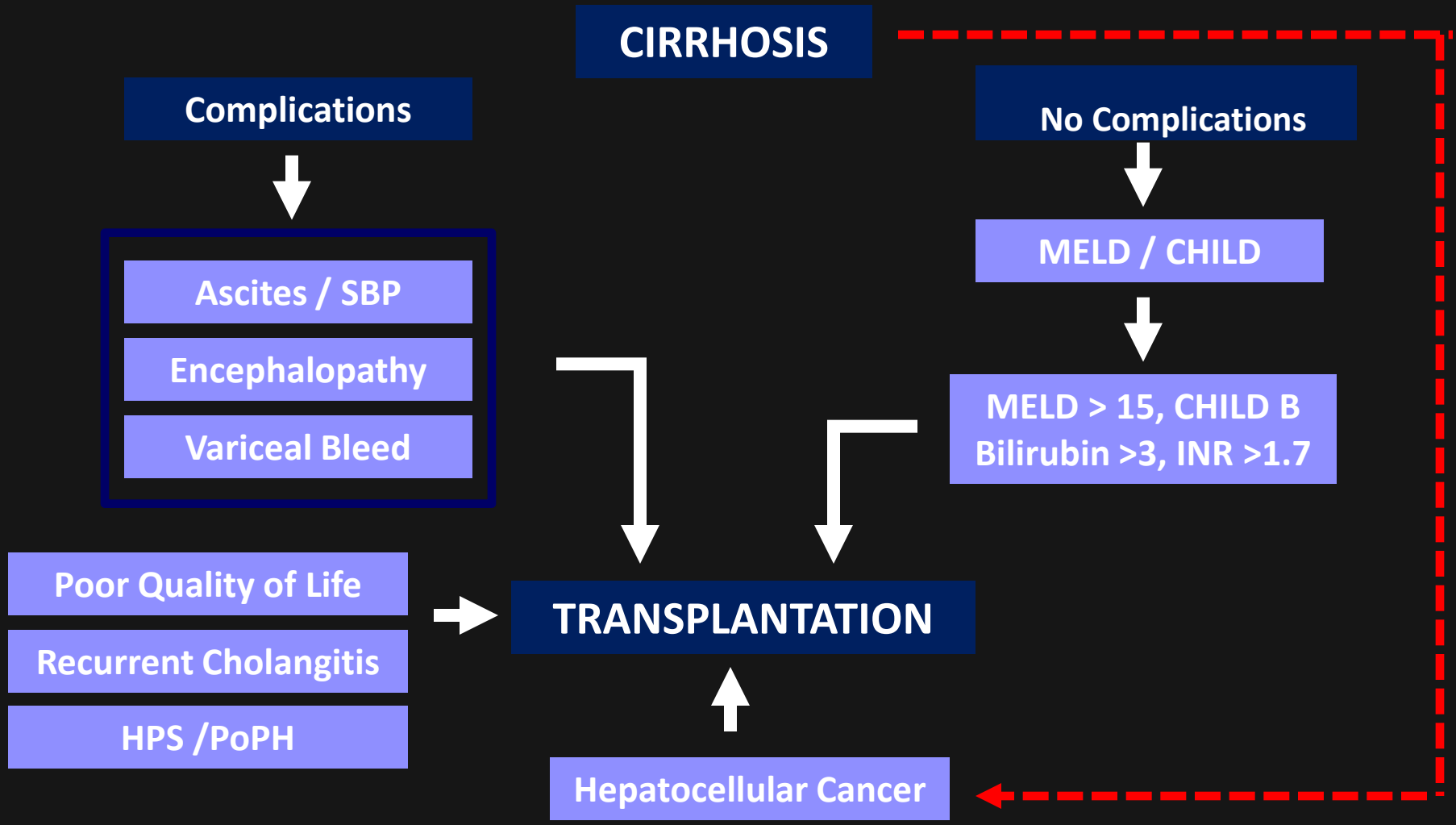
INR

Creatinine

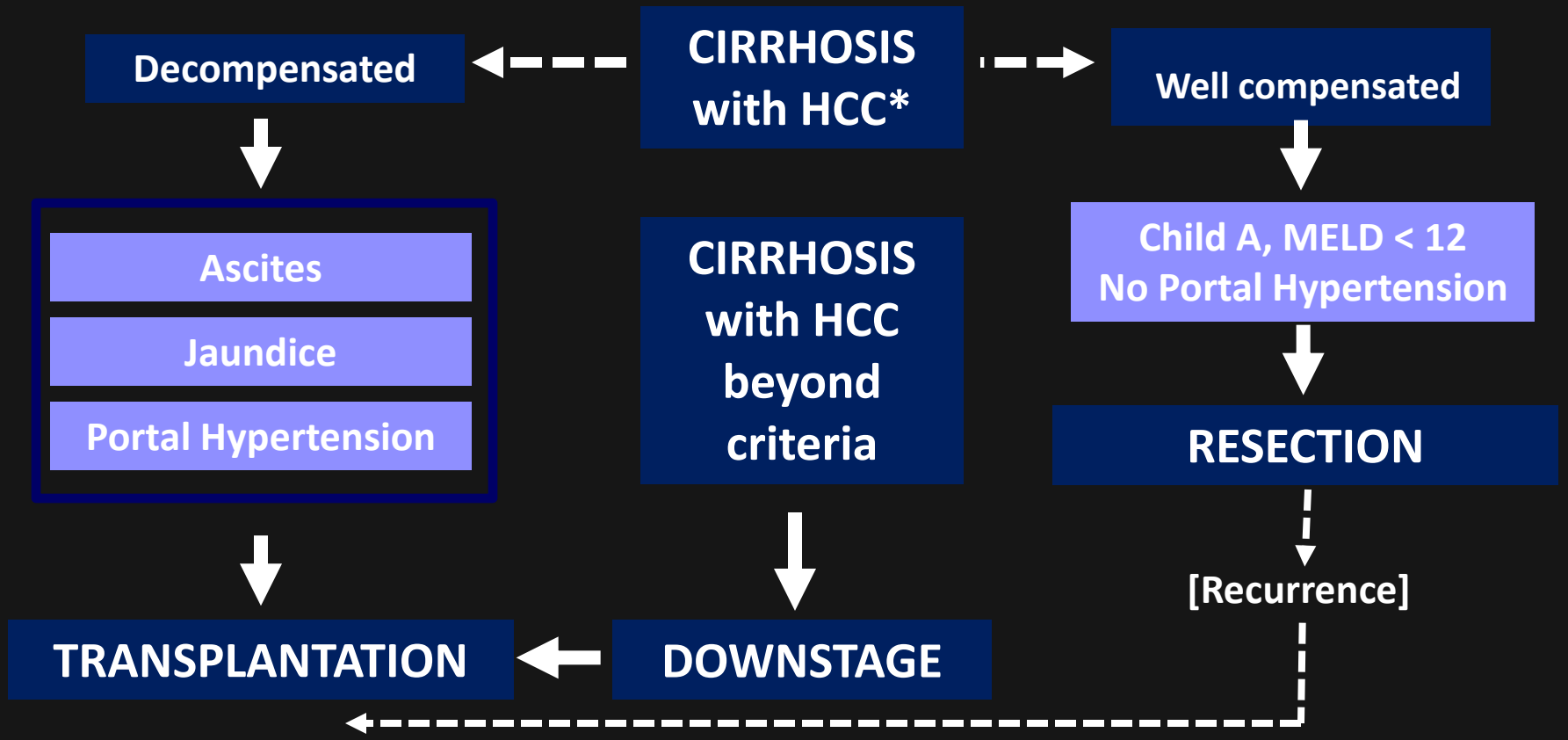
Transplantation for Cirrhosis



Transplantation for Cirrhosis



Transplantation for HCC



** Milan criteria : single nodule <5 cm, upto 3 nodules, each <3 cm*
UCSF criteria : single nodule <6.5 cm, upto 3 nodules, each <4.5 cm

Absolute Contraindications

- AIDS
- Active alcoholism or substance abuse
- Advanced cardiac or pulmonary disease
- Severe PAH (MPAP > 50 mm)
- Extra-hepatic malignancy
- Persistent noncompliance
- Uncontrolled sepsis

Evaluation

- Is the patient a candidate for liver transplantation
- Can the patient survive the operation and postoperative period?
- What will be the outcome after transplantation?
- Will the patient be compliant regarding the medical regimen?
- In patients with addictions. what is the chance of the patient staying abstinent lifelong?
- Psychosocial issues: Do psychological disorders or lack of social support compromise long-term outcome?

Evaluation

Box 2. Blood tests to assess etiology of liver disease

- Hepatitis B, HBV-DNA, HBeAg, anti-HBe, and anti-Delta Abs
- Hepatitis C, HCV-RNA, HCV genotype
  immune: Anti–smooth muscle Ab (ASMA), antinuclear Ab (ANA), antimitochondrial Ab (AMA)
- α_1-antitrypsin level and phenotype
- Wilson: ceruloplasmin, 24-h urine copper, hepatic copper
- Hemochromatosis: iron saturation, ferritin, HFE gene test
- Blood group: for listing purposes

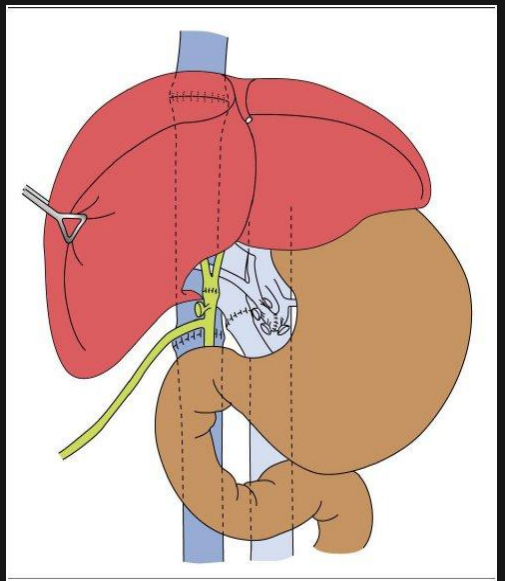
Box 3. Testing to assess the complications of liver disease

- Arterial blood gases: to exclude hypoxemia-hepatopulmonary syndrome
- Liver imaging: to exclude HCC
- Serum alpha fetoprotein, Ca19-9: to exclude HCC, cholangiocarcinoma
- Doppler ultrasound: to exclude portal vein thrombosis
- Upper gastrointestinal endoscopy: to assess portal hypertension
- Bone densitometry: selected patients
- Neuropsychologic testing: selected patients

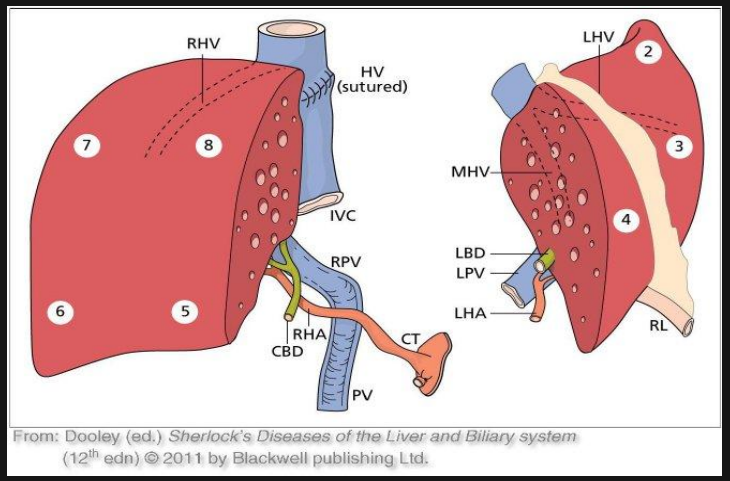
Testing to exclude contraindications	
Infectious disorders	HIV, syphilis, EBV, cytomegalovirus, toxoplasmosis
Malignancy	Colonoscopy in primary sclerosing cholangitis (ulcerative colitis)
	ERCP in primary sclerosing cholangitis (cholangiocarcinoma)
	In HCC: bone scan, lung CT (metastatic work-up)
	Screening (colon, breast, cervical, prostate cancer)
Cardiopulmonary status	Chest radiograph, electrocardiogram, two-dimensional-echocardiogram (routine)
	Thallium stress test, coronary angiography (patients at risk)
	Pulmonary function tests

Types of Liver Transplantation

- **Deceased donor**
  - Whole organ
  - Reduced size segmental graft
  - Split segmental graft (two recipients)

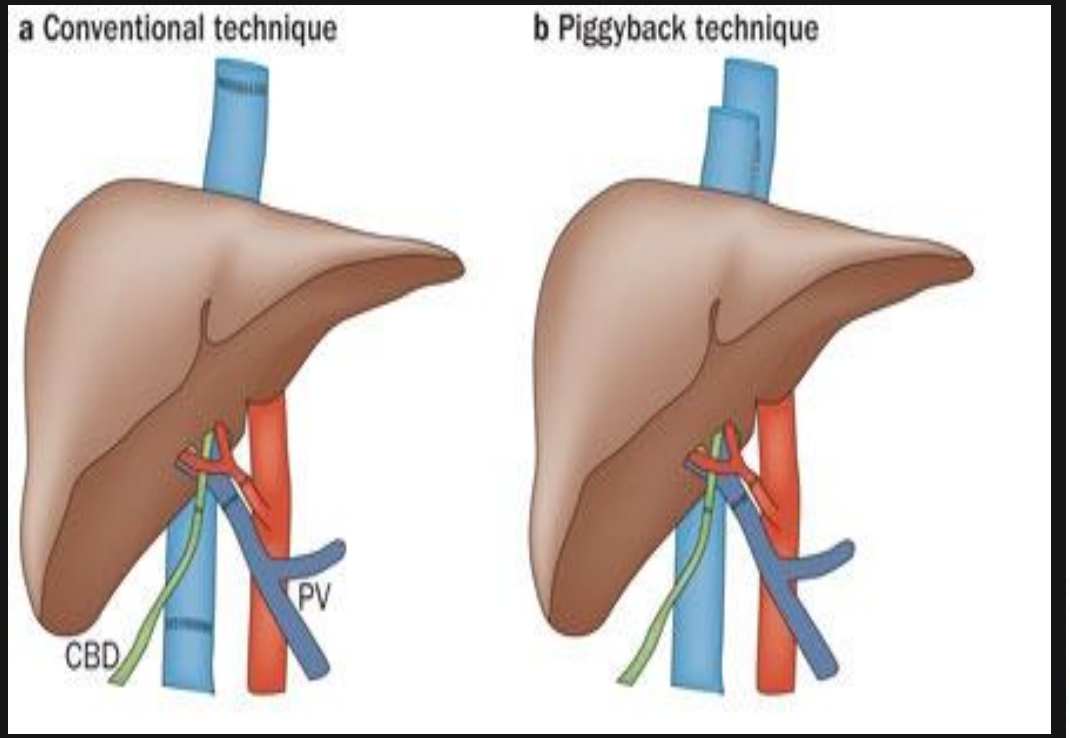


- **Living donor**
  - Segmental graft
    - Children (left lateral segment)
    - Adults (Right or left lobe)

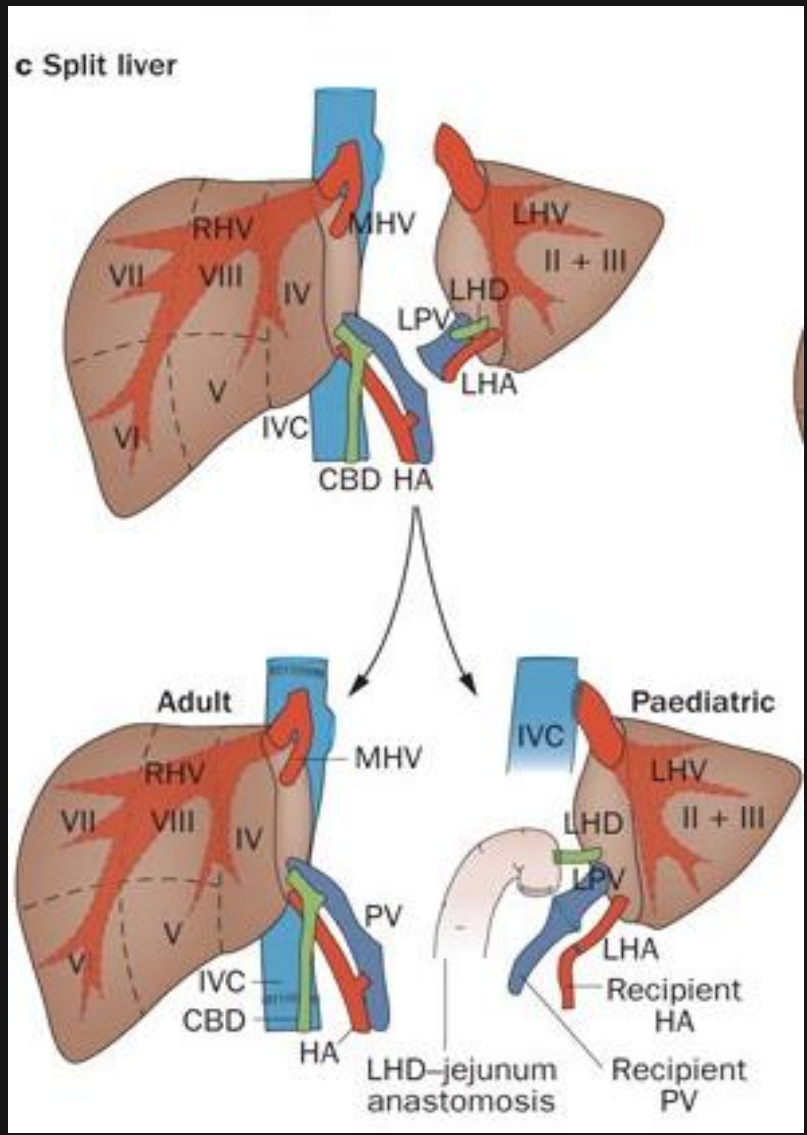


Deceased Donor Liver Transplantation

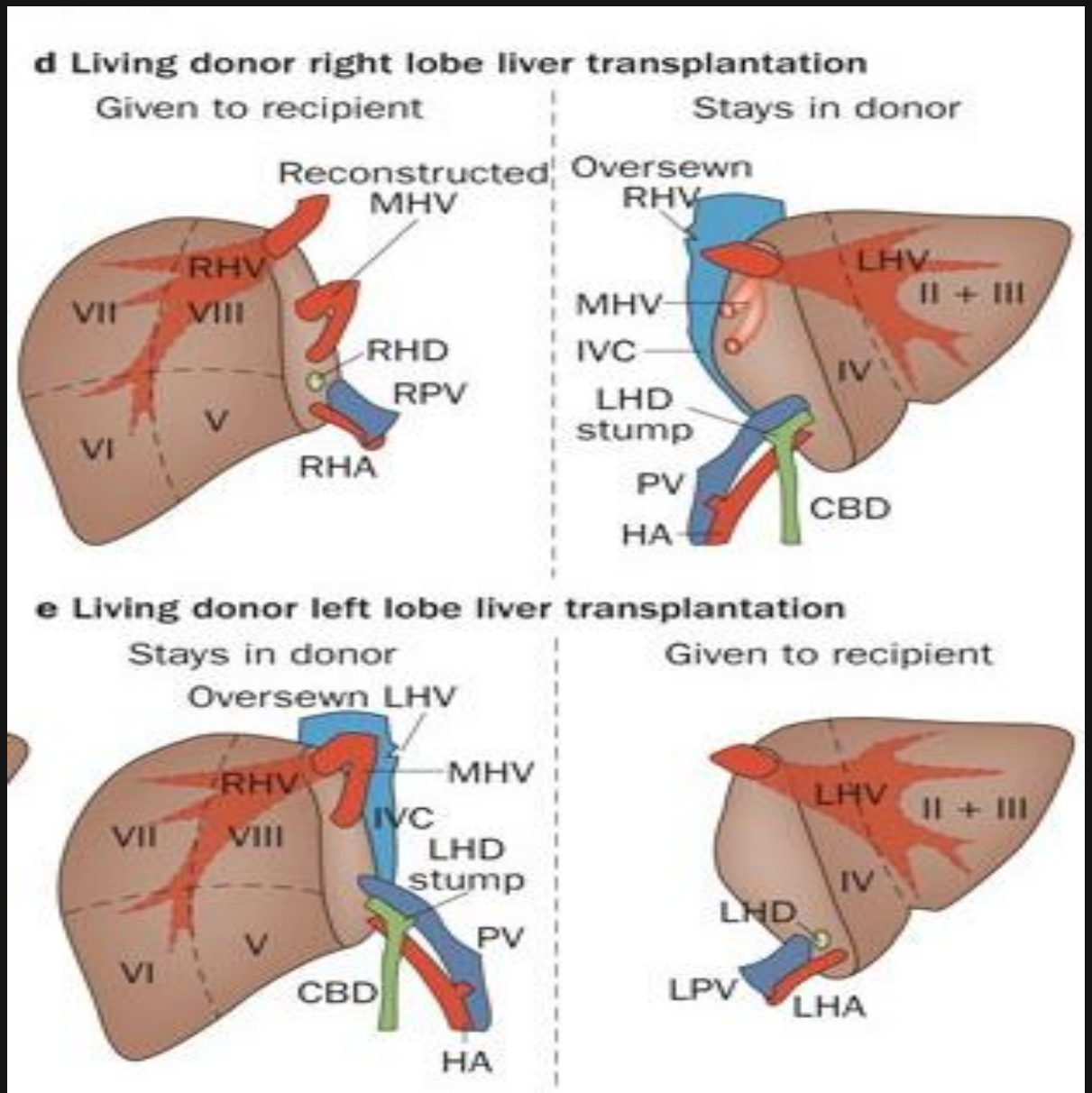
Whole Liver



Split Liver



Living Donor Liver Transplantation



Who can donate?

Deceased Donors

- Brain stem non-viability
- No age limit
- No infections
- No malignancies
  - Except treated CNS neoplasms
- Voluntary
  - Expressed wish during life
  - Next of kin voluntary expression of wish to donate

Selection of Living Donor

- Compatible blood group
- Age 18 - 55, BMI < 30, near relative
- Overall good health and physical condition
- Absence of
  - Active alcohol use
  - Diabetes
  - Heart and ling disease requiring medication
  - Psychiatric co-morbidity
  - Past history of malignancy
- No obvious liver disease (fatty liver)
- Compatible liver anatomy and adequate split liver volumes

Imaging

- CT scan used to estimate the volume to assess whether the liver mass is sufficient
  - graft-to-recipient weight ratio (GRWR) >0.8
- MR - noninvasive method to obtain a preoperative cholangiogram
- Liver biopsy is performed as required

Volume Analysis

Donor Name : Mrs. Manjula

Gender : Female

Healthy Liver volume : 1412 ML

Right Lobe Graft without MHV

857 ML (60.69 %)

Left Lobe Remnant with MHV

541 ML (38.31 %)

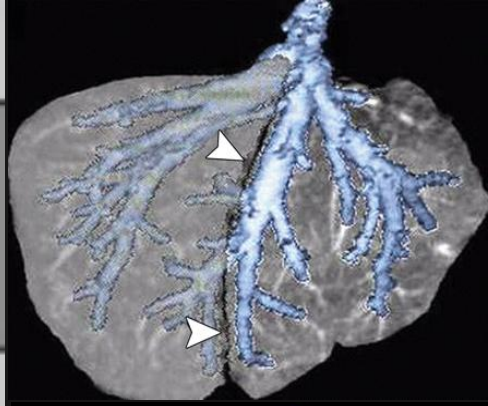
Cutting Plane Volume

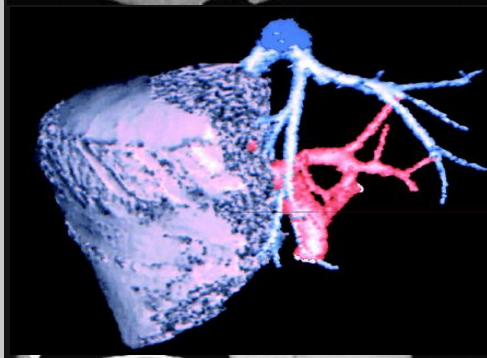
14 ML (0.99 %)

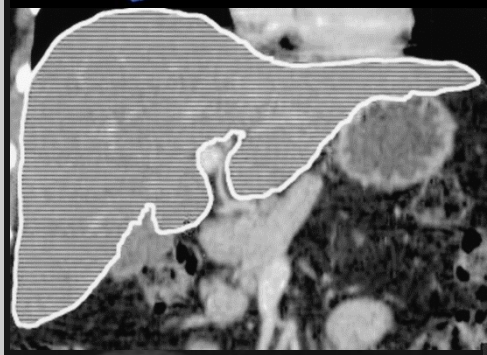
From the Desk of Dr.Sonal Asthana

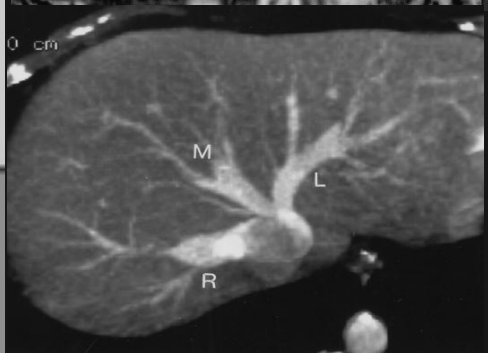
The Integrated Liver Care Team

Bangalore

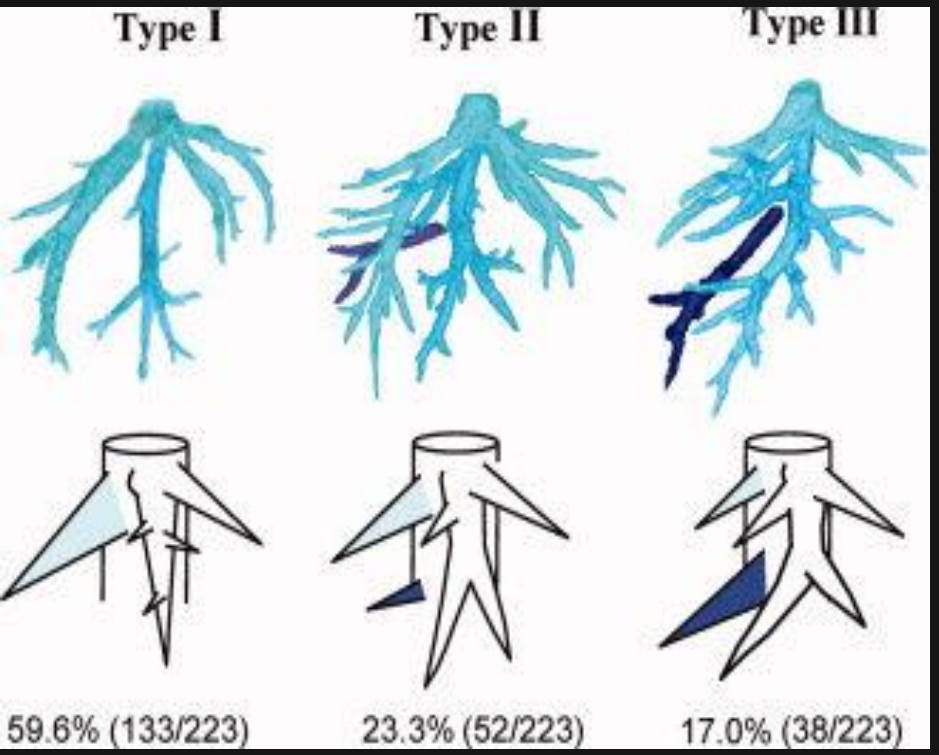


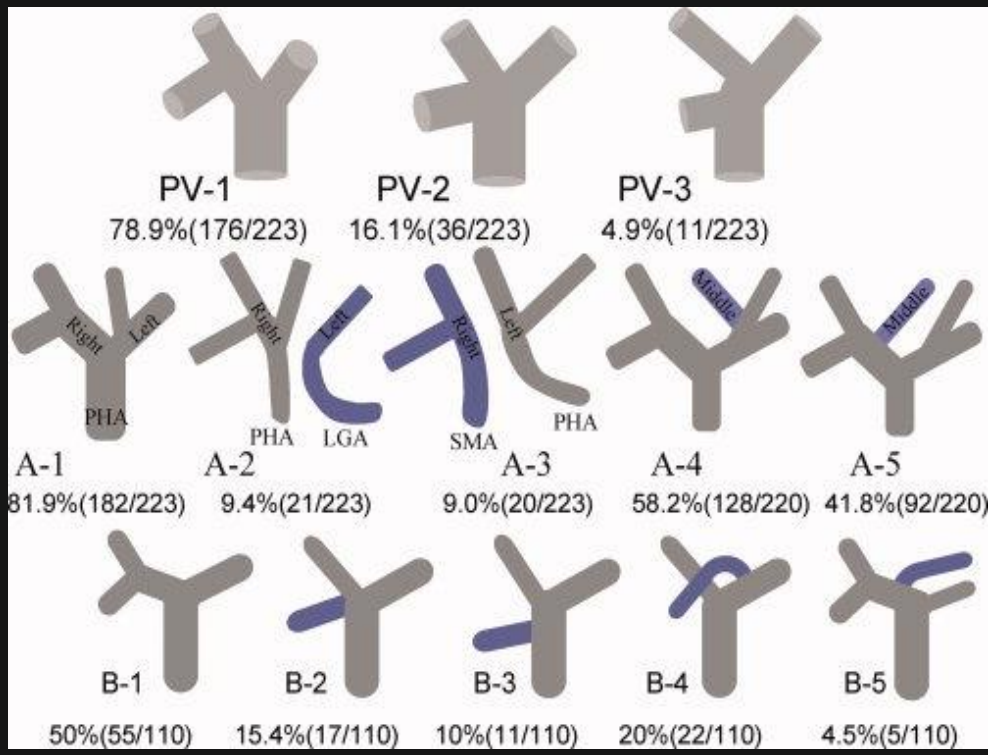






Three-dimensional computed tomography scan analysis of hepatic vasculature in the donor liver for living donor liver transplantation





Liver Transplantation
Volume 16, Issue 9, pages 1062-1068, 30 AUG 2010 DOI: 10.1002/lt.22109
http://onlinelibrary.wiley.com/doi/10.1002/lt.22109/full#fig2

Listing and Allocation of Organ (deceased donor)

- A model for the sickest-first policy, MELD
- MELD-based allocation ensures that those with the highest scores (the sickest patients) receive organs first

- Suitable candidates are placed on waiting list
- Waiting list is Dynamic
- Suitability of Donor
- Matching of Donor to recipient
- Recipients are chosen in descending MELD order from within their matched blood group.

Model for End-Stage Liver Disease	
MELD score	$= 0.957 \times \text{Log}_e(\text{creatinine mg/dL})$ $+ 0.378 \times \text{Log}_e(\text{bilirubin mg/dL})$ $+ 1.120 \times \text{Log}_e(\text{INR})$ $+ 0.643$

Living donor liver transplantation

The advantages

- The use of an optimal healthy donor
- Minimal ischemic time,
- Elective surgery, and timing of transplantation owing to the recipient's need and medical stability and not to deceased organ availability

The issues

- The donor - 20-30% morbidity and mortality up to 0.3%
- Increased risk of HAT, biliary complications, HVO problems and small for size syndrome (SFS)
- The remaining liver in the donor regenerates within 8wks to 90% of its original volume.

Care of patient on waiting list

- Etiologic Treatment
- Severity Assessment
- Prevent/treat complications
- Variceal and HCC Screening
- Vaccinations
- Psychosocial Support

Care of transplant recipient

1. Hemodynamic stability
2. Awakening from anesthesia
3. Clearance of lactate
4. Resolution of hypoglycemia
5. Normalization of coagulation profile

- Assess liver function
- Assess liver perfusion
- Antibiotic, antifungal and CMV prophylaxis
- Watch for complications – Infection/Rejection/Vascular/Biliary
- immunosuppression

Immediate complications

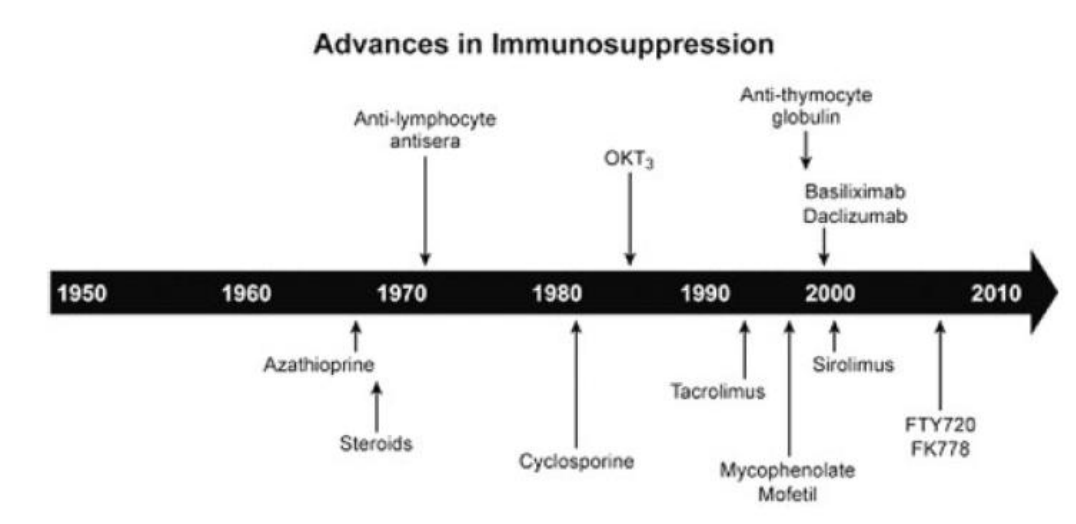
- Surgical and Anaesthetic complications
- Infections
- Acute cellular Rejection
- Vascular complications
- Biliary complications

Immediate

1. Primary allograft nonfunction
2. Primary allograft dysfunction
3. Hepatic artery thrombosis
4. Portal vein thrombosis
5. Hepatic vein and caval thrombosis
6. Biliary tract obstruction or leak

Immunosuppression

- Calcineurin inhibitors
  - Cyclosporin, Tacrolimus
- Anti metabolites
  - AZA, Mycophenolate
- Steroids
- mTOR Inhibitor
  - Sirolimus, Eveerolimus
- CNI Sparing - basilixumab



Long term care of recipients

- side effects of immunosuppression
- Acute and chronic rejection
- Recognition of biliary complications
- Metabolic syndrome
- Malignancy
- Recurrence of primary disease

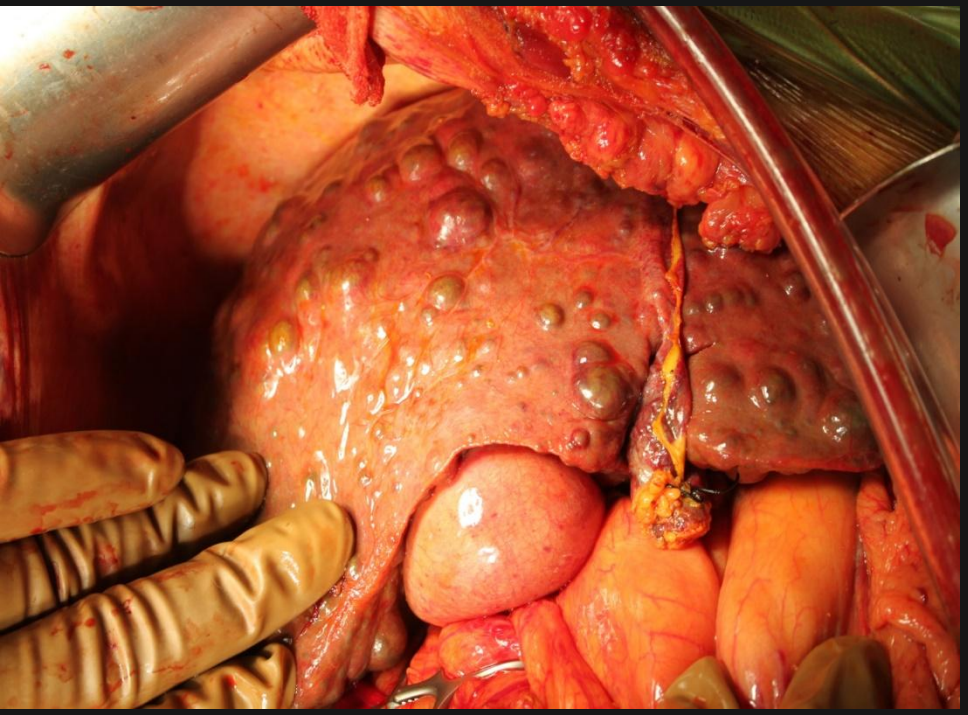
General assessments
Physical examination
Dental examination
Vaccinations: influenza, pneumonia, hepatitis A/B; live virus vaccinations should be avoided.

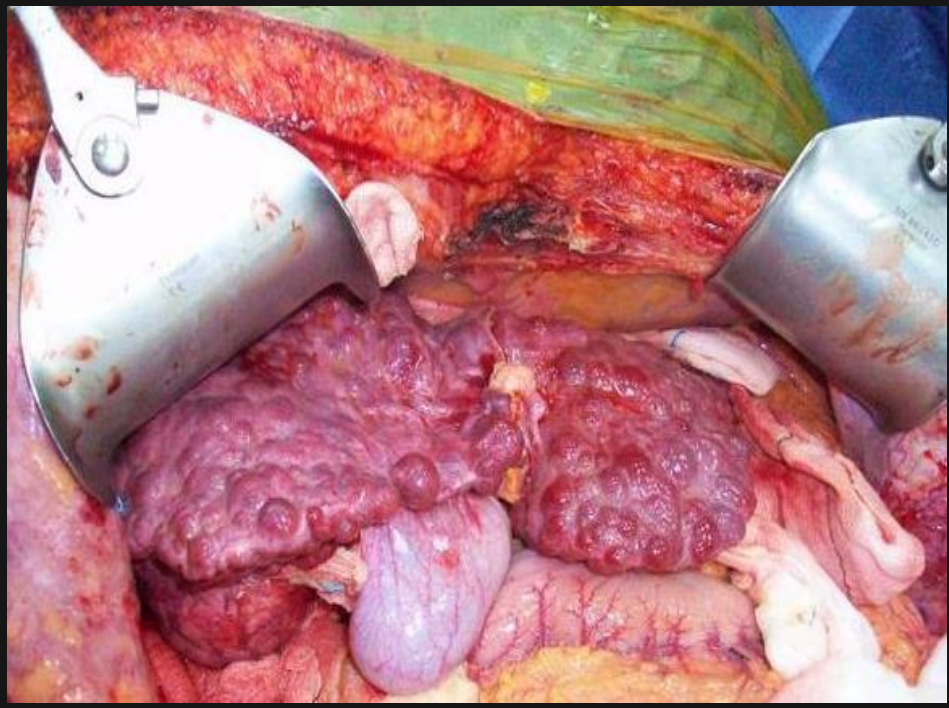
Screening for nonmalignant disease and immunosuppressant side effects
Hypertension
Renal dysfunction
Diabetes
Cardiovascular disease
Infection/opportunistic infection

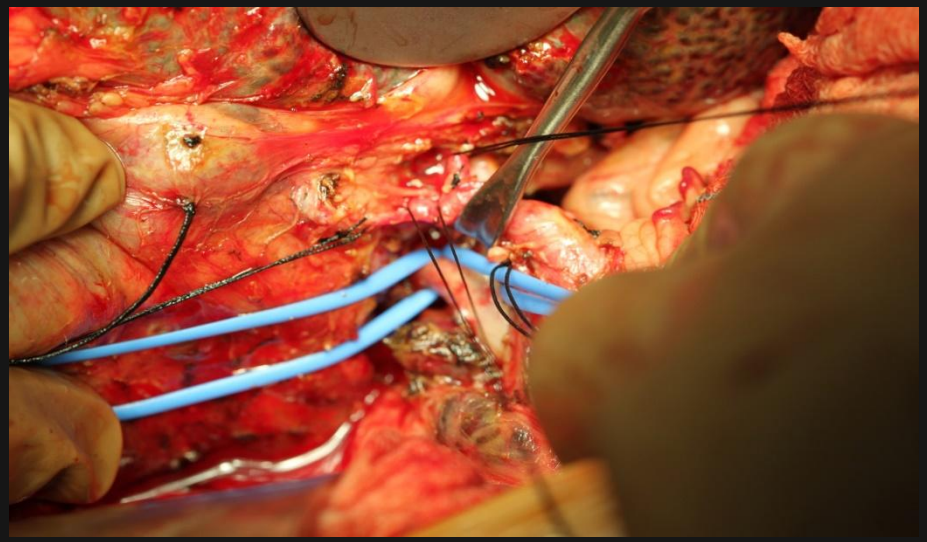
Screening for malignant disease
Annual skin cancer screening
Annual gynecology and mammography screening in women
Annual urologic and PSA screening in men
Colonoscopy at regular intervals (depending on risk factor)
Annual abdominal and pelvic ultrasound
In some centers: Annual chest + abdominal CT/MRI

Screening for recurrence of primary liver disease
Hepatitis B/C, PBC, PSC, autoimmune hepatitis, hemochromatosis, malignancy

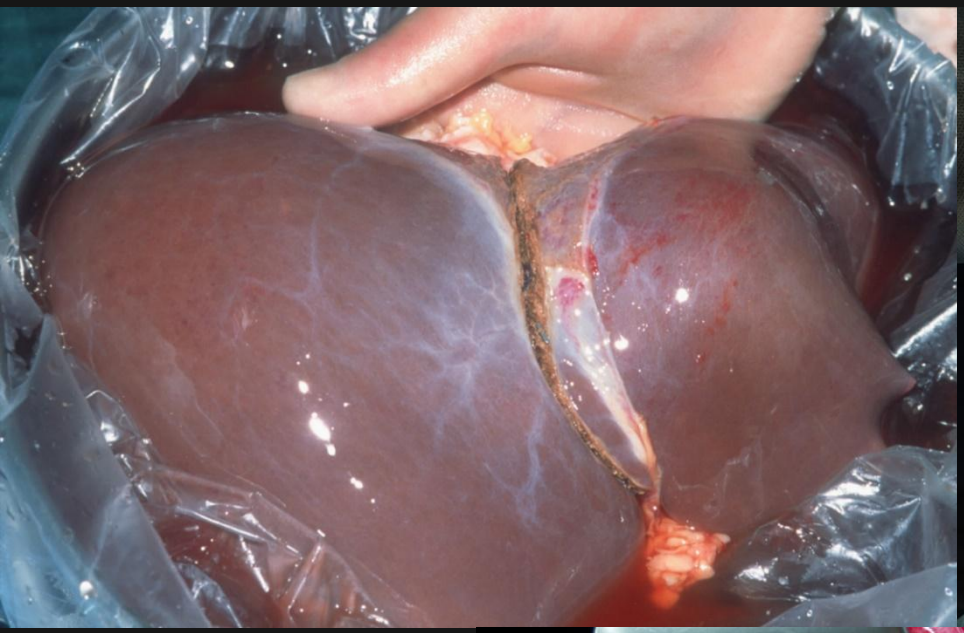
Liver Explant

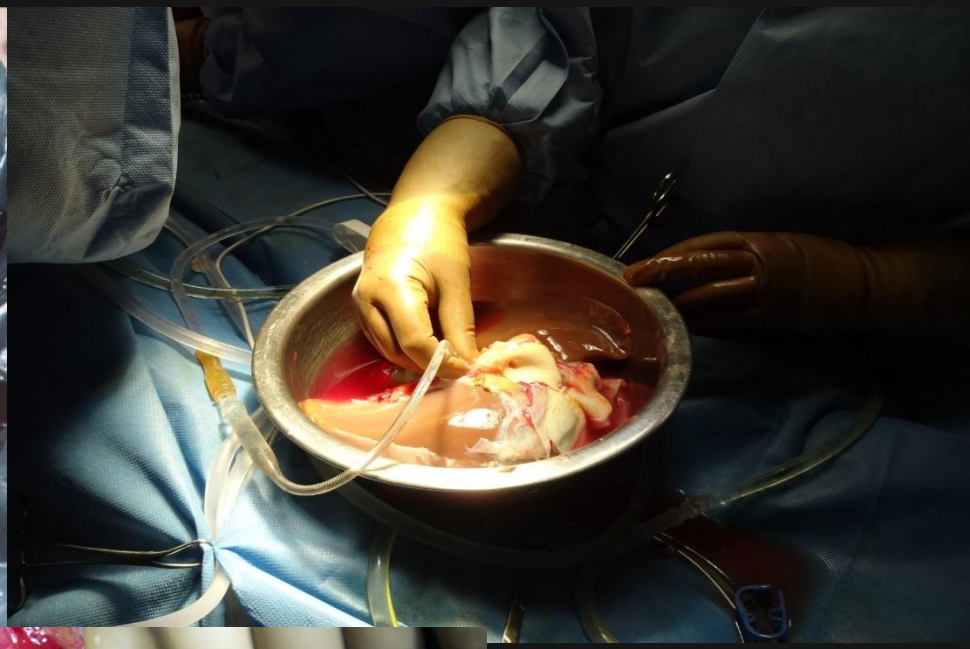


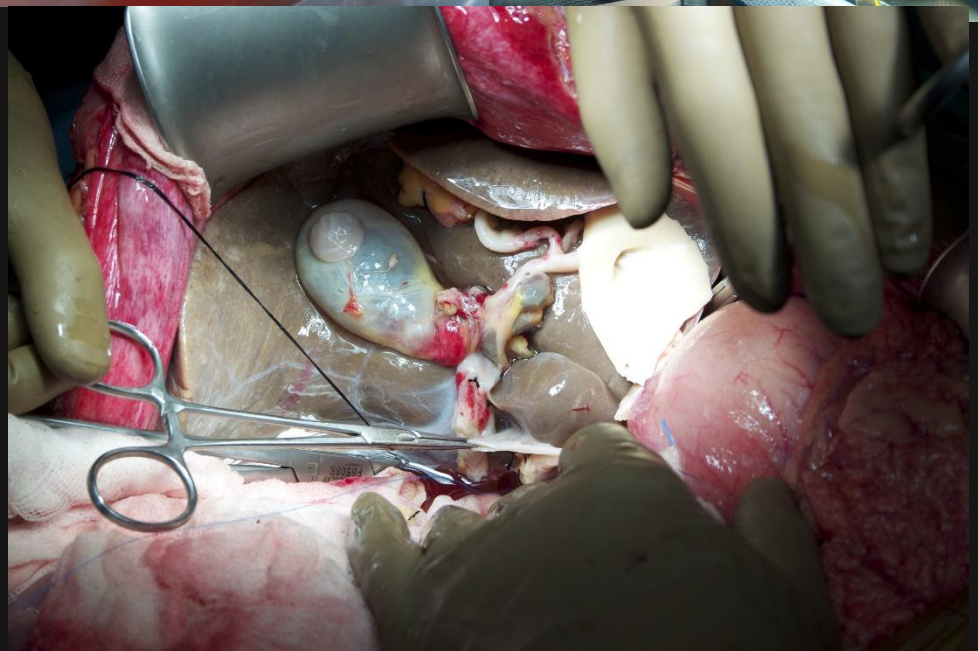




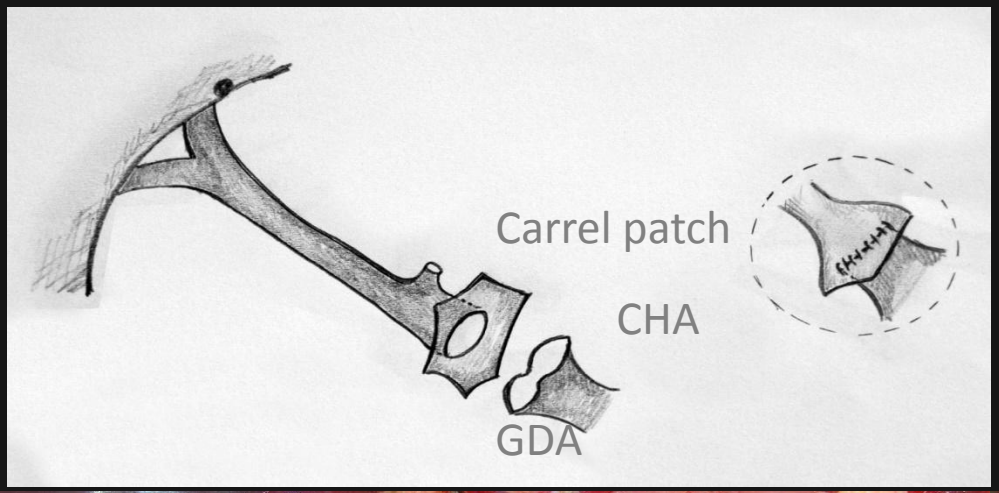
Whole Liver Transplantation - Deceased Donor

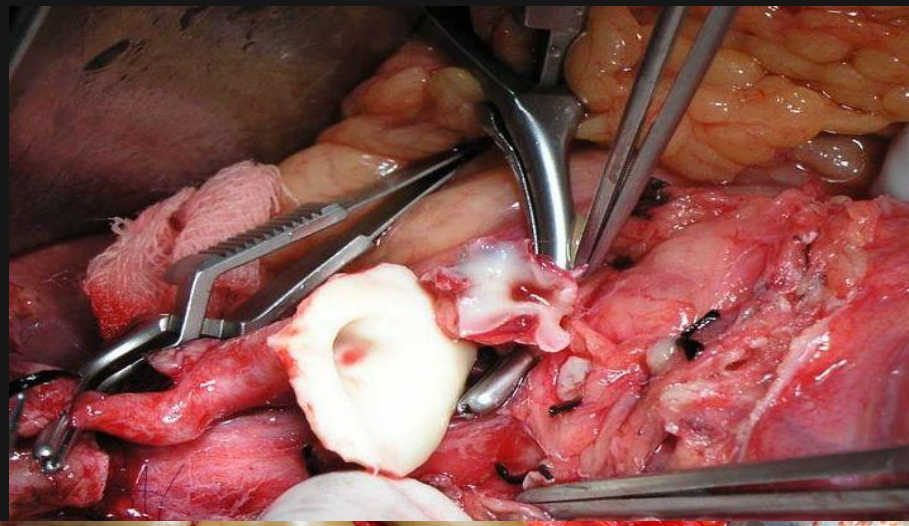


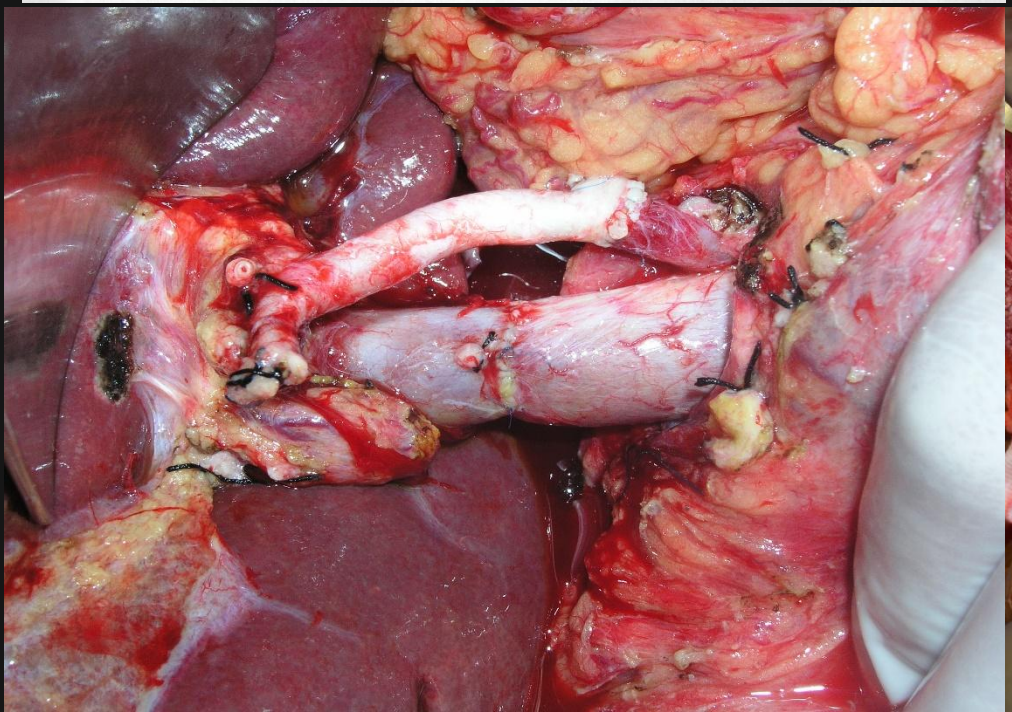


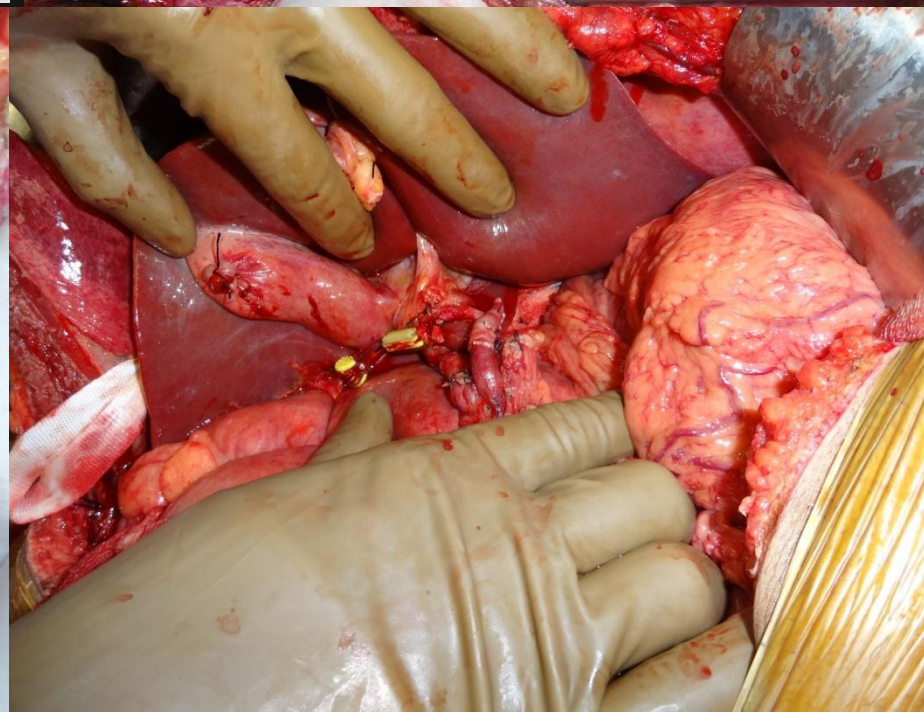


End-to-end anastomosis of the donor celiac axis to a recipient HA

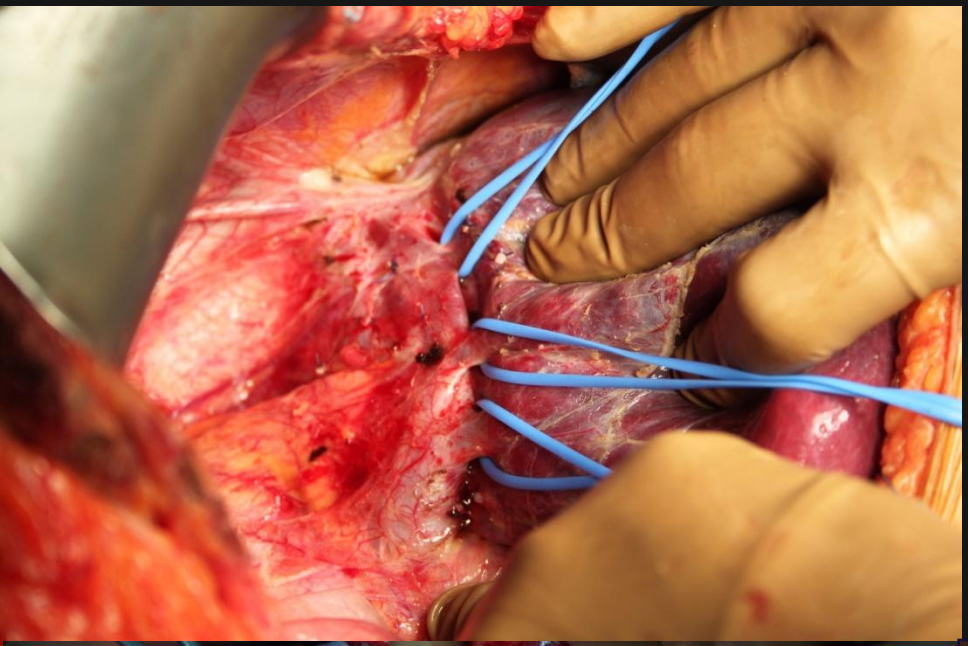


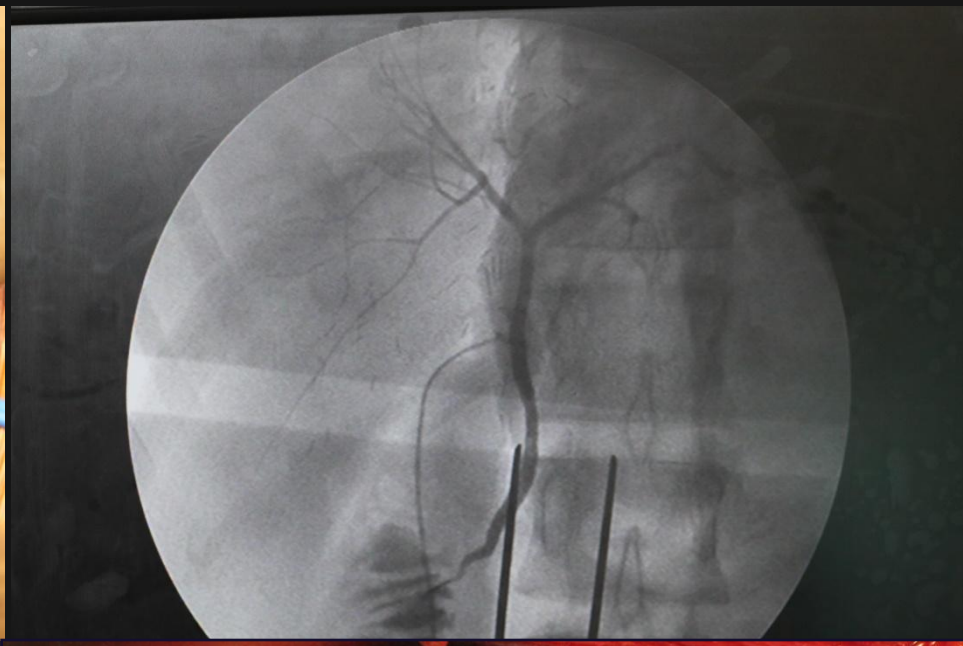


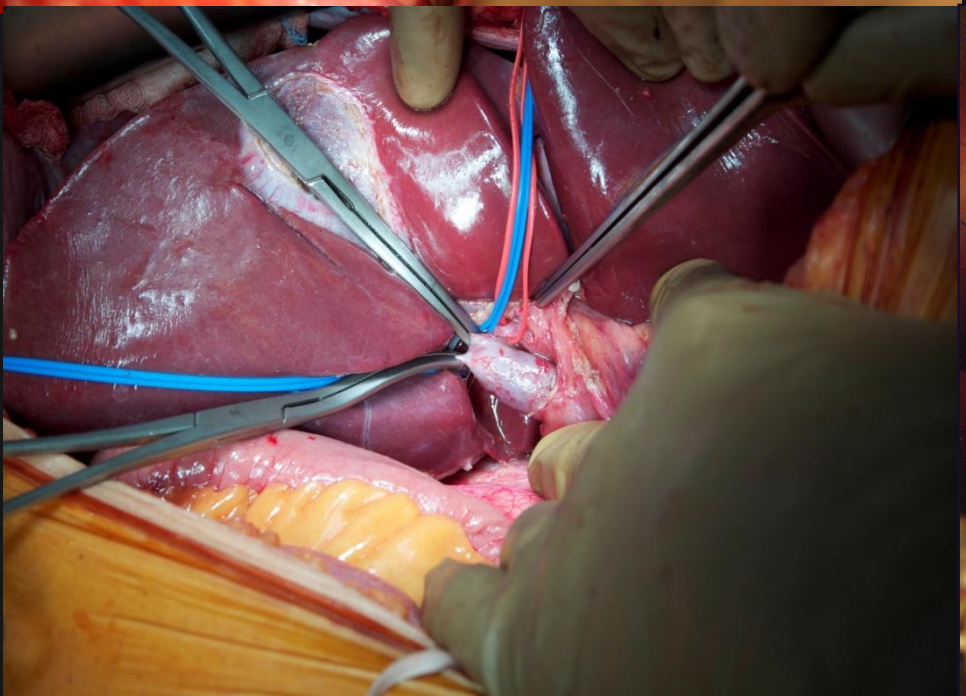


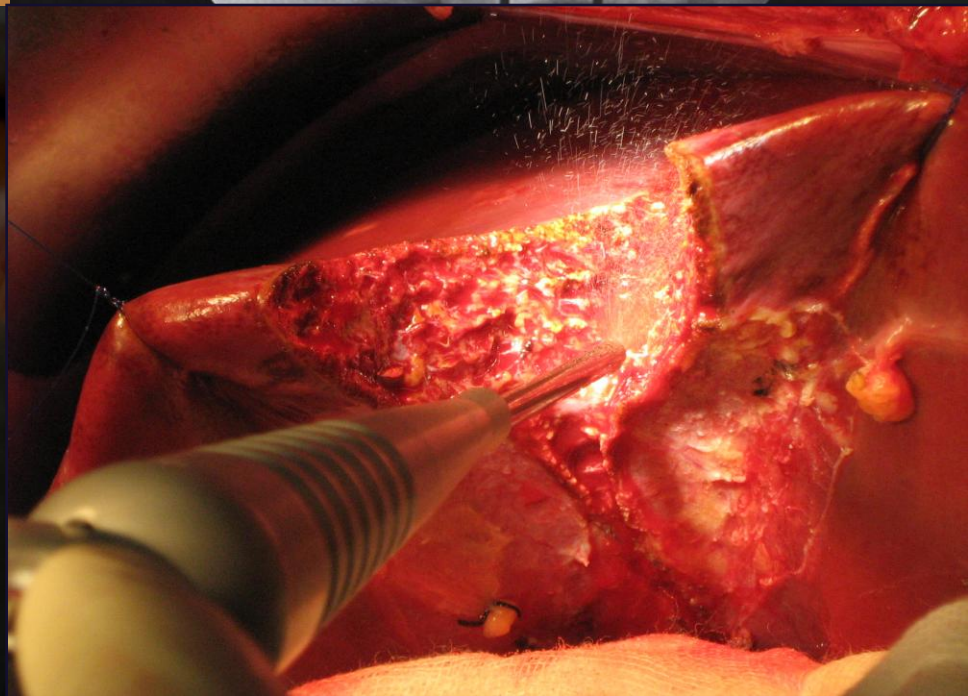


LDLT - R lobe harvest

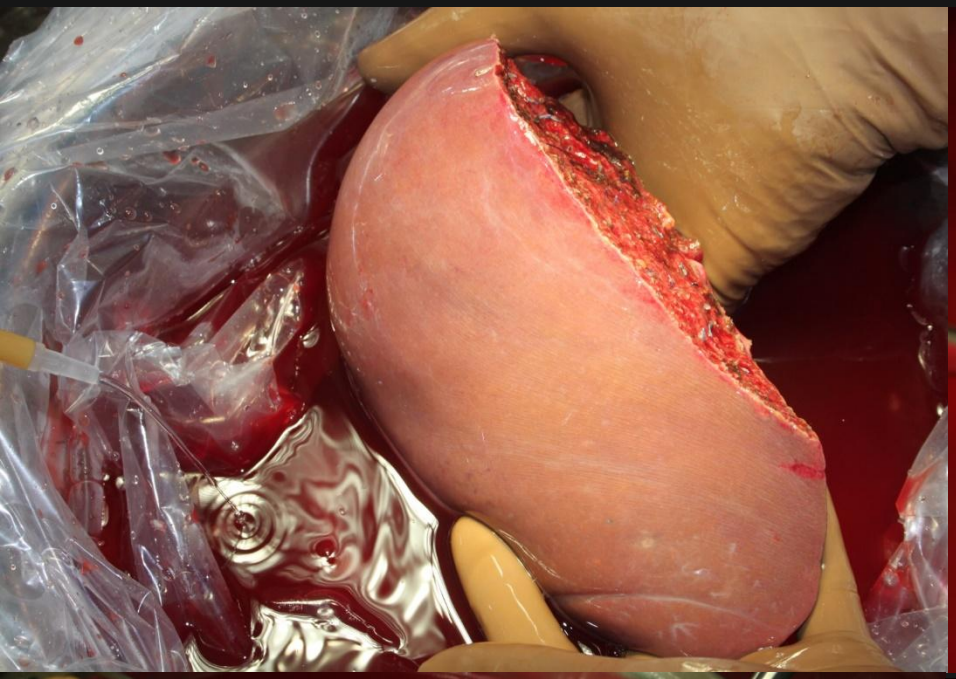


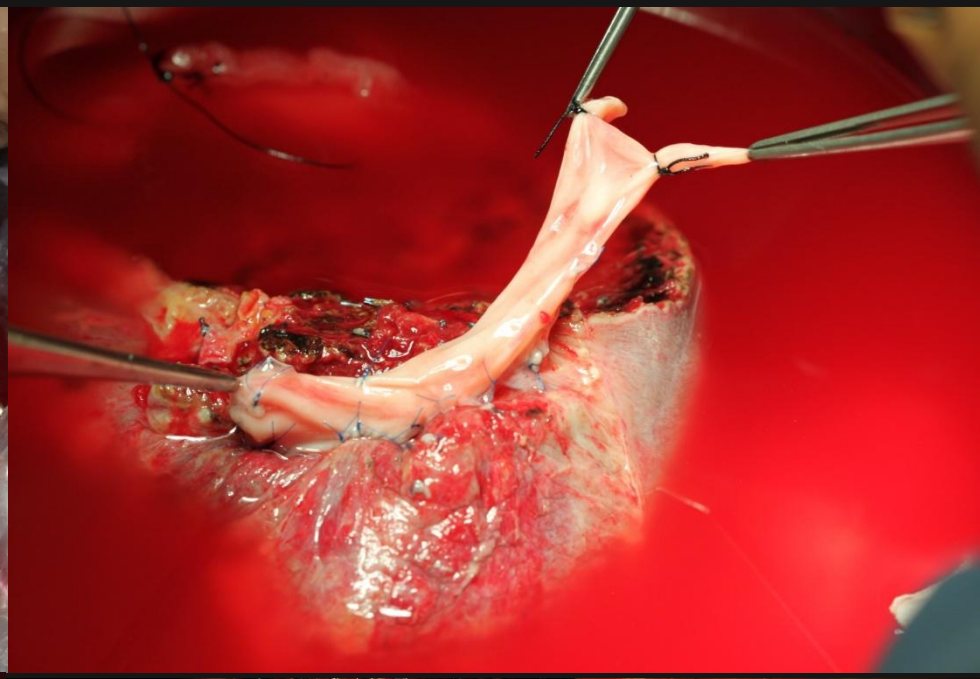


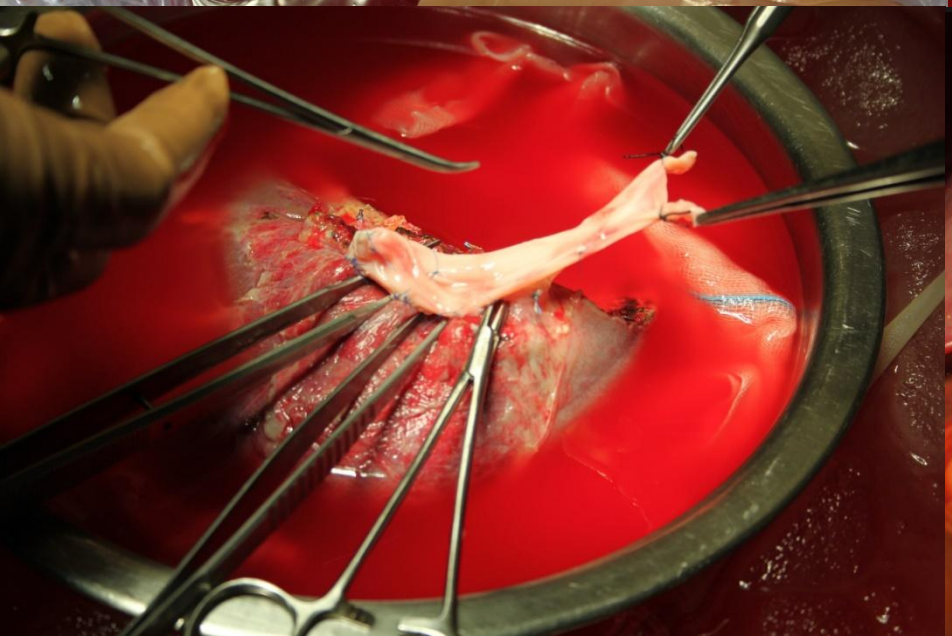




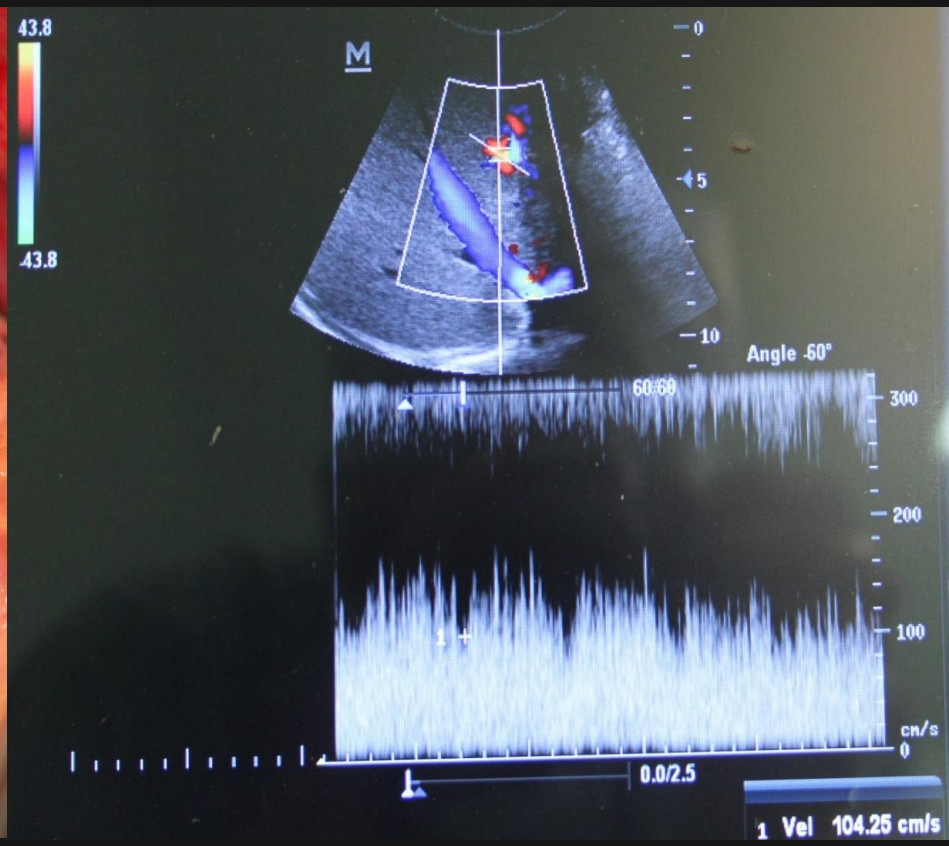
R Liver graft - back bench



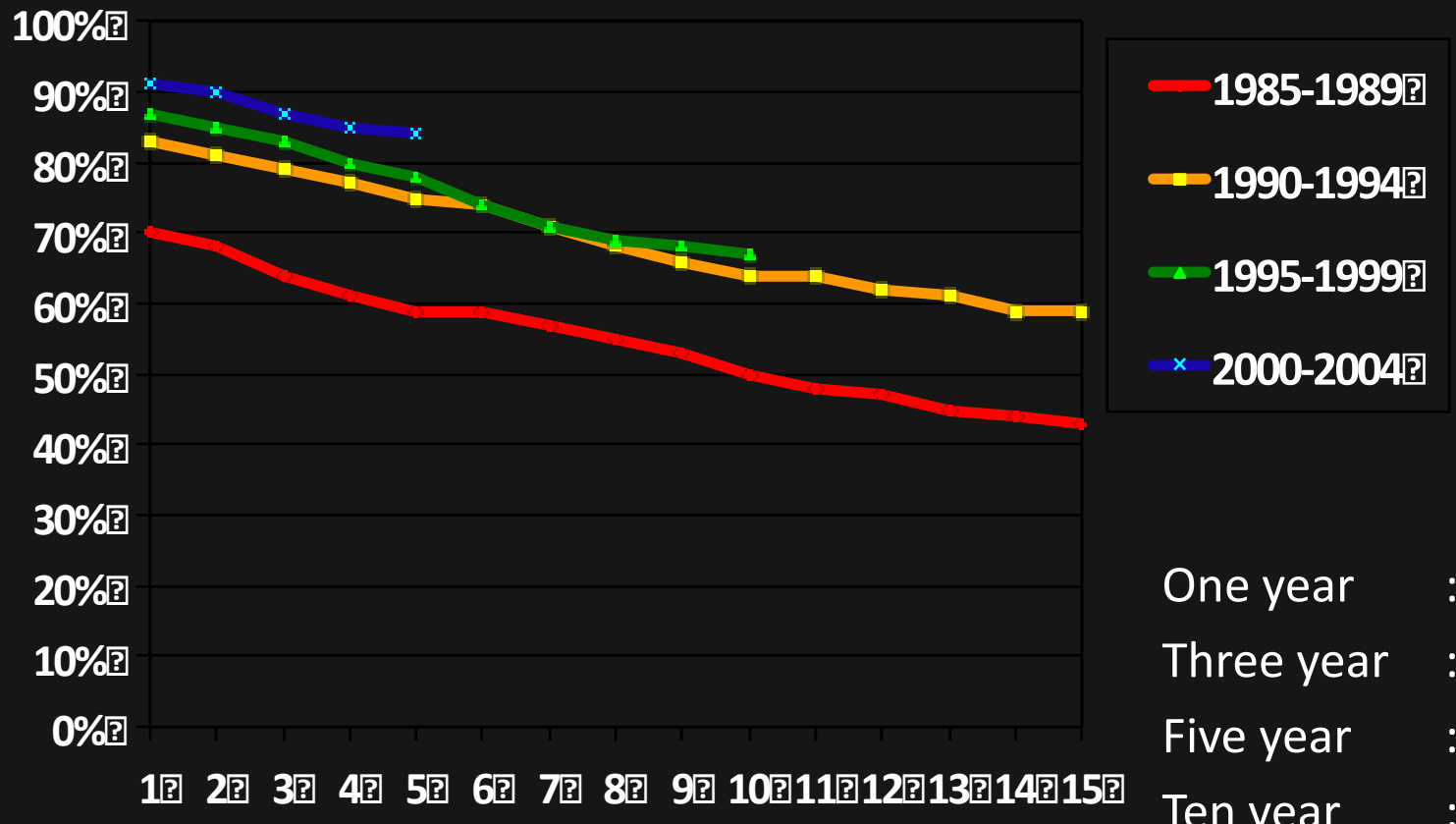




Graft Doppler



Patient survival after DDLT



One year : 80 - 93%

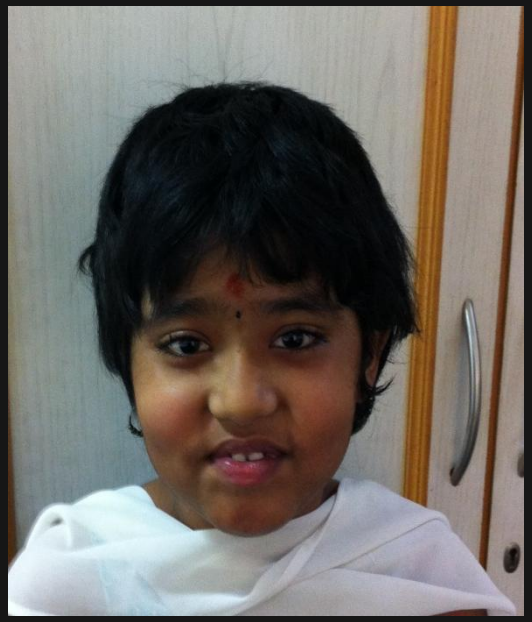
Three year : 70 - 76%

Five year : 65 - 79%

Ten year : 44 - 62%

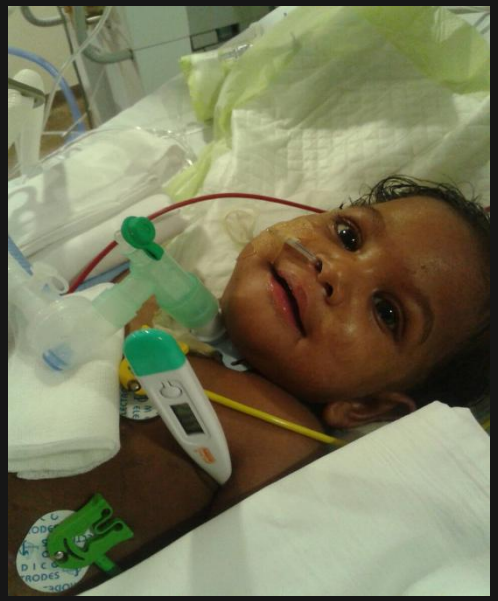
UNOS Data (2008)

Lucky few ……



Acute Wilson's Disease

6 months Post Transplant




HAPPY
BIRTHDAY
ANJANA

Liver Transplantation

Integration of several specialties

- Hepatologist/Gastroenterologist
- Transplant Surgeons
- Liver Transplant Anesthetists
- Liver Intensivists
- Transplant Coordinator
- Social Worker/psychologist
- Physiotherapist
- Nutritionist
- OT Nurses / Transplant ICU nurses
- Interventional Radiologist
- Therapeutic Endoscopist
- Cardiologist
- Pulmonologist
- Psychiatrist
- ENT specialist
- Dentist
- Pathologist
- Transfusion Medicine

Our transplants

- 274 liver transplants
- 41 paediatrics (15%), 7% Acute liver failure
- Male>female
- NASH/ALD - commonest indication
- Multi organ – liver / kidney
- Smallest 5 Kg child (our series)
- Smallest live donor liver/kidney
- 91% survival

Summary

- Identify candidates early - counsel
- Most patients are referred late - early referral improves results
- Near relatives who can donate offer the most realistic chance of transplantation for many
- Good long term results
- Metabolic disease major challenge for long term

Aster Integrated Liver Care Group

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Rajiv Lochan
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