Posthepatectomy Liver Failure

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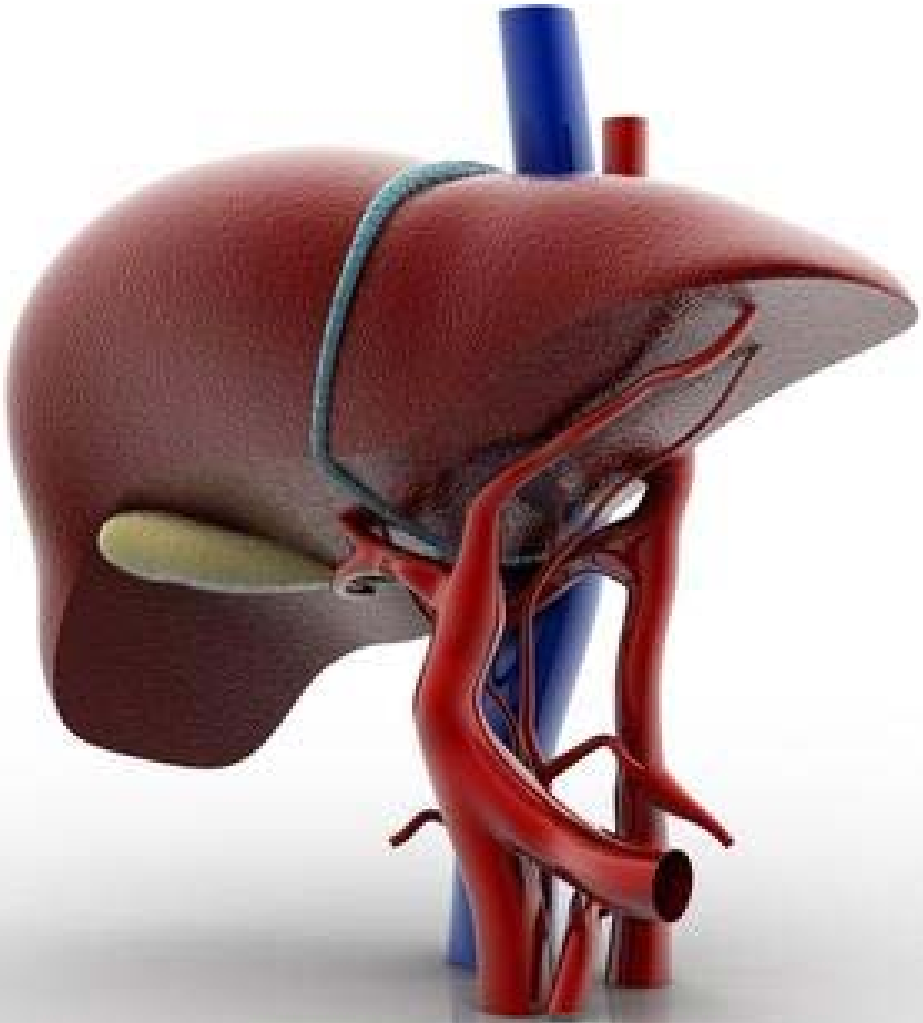


Introduction

- Major source of morbidity and mortality after liver resection
- Devastating complication
- Little treatment
- Incidence: 4-19%
- Recently < 10%
- Mortality following hepatectomy – 0-6%
- PHLF contributing in the majority

Definition

- Wide variety of definitions
- 50-50 criterion
- Snap peak total bilirubin > 7 mg/dL
- MELD score
- Child-Pugh score
- Composite integer-based risk score

Definition cont.

- International Study Group of Liver Surgery (ISGLS) defined PHLF as the “impaired ability of the liver to maintain its synthetic, excretory and detoxifying functions, which are characterized by an increased international normalized ratio and concomitant hyperbilirubinemia on or after postoperative day 5.”
- Also advocated a grading system.

Grade	Clinical	Treatment	Diagnosis	Clinical symptoms	Location for
A	Deterioration in liver function	None	• UOP >0.5 mL/kg/h	None	Surgical ward
B	Deviation from expected post-operative course without requirement for invasive procedures	Non-invasive: fresh frozen plasma; albumin; diuretics; non-invasive ventilatory support; abdominal ultrasound; CT scan	• UOP ≤0.5 mL/kg/h • BUN <150 mg/dL • <90% O2 saturation despite oxygen supplementation • INR ≥1.5, <2.0	• Ascites • Weight gain • Mild respiratory • Confusion	Intermediate unit or ICU
C	Multi-system failure requiring invasive treatment	Invasive: hemodialysis; intubation; extracorporeal liver support; salvage hepatectomy; vasopressors; intravenous glucose for hypoglycemia; ICP monitor	• UOP ≤0.5 mL/kg/h • BUN ≥150 mg/dL • ≤85% O2 saturation despite high fraction of inspired oxygen support	• Renal failure • Hemodynamic Instability • Respiratory failure	ICU

Rahbari NN, et al. Surgery. 2011;149.

- Problems with ISGLS definition:
  - Found to be least predictive of major complications and risk of post-op death when compared with 50-50 criteria and snap peak bili > 7.

Skrzypczyk C, et al. Ann Surg. 2014;260

Risk factors

- Patient-related factors
- Liver-related
- Surgery-related

Patient-related factors

- Age
- Male gender
- Malnutrition
- Diabetes
- ASA score

Liver-related factors

- Underlying hepatic parenchymal disease
  - Cirrhosis
  - Steatosis and steatohepatitis
  - Chemotherapy induced liver injury

Surgery-related factors

- Blood loss and transfusion requirements
- Extent of resection
- Complex operations
- Duration of Pringle Maneuvre

Preop risk assessment

- Quality assessment of the liver
- Quantity assessment

Quality assessment

- Traditional liver function markers:
  - Child-Pugh score and MELD score
- Indocyanine Green retention at 15 min
- Other liver function tests
  - Based on clearance of substrate
    - Lidocaine, galactose, aminopyrine, amino acid, and methacetin
  - Based on synthetic functions
    - Serum hyaluronate, type IV collagen, energy production, number of receptors for asiaglycoprotein

Quantity assessment

- CT and MRI volumetry

- Pre-op CT imaging focus on:
  - Liver attenuation - steatohepatitis
  - Splenomegaly, varices or ascites – suspect underlying cirrhosis

Prevention

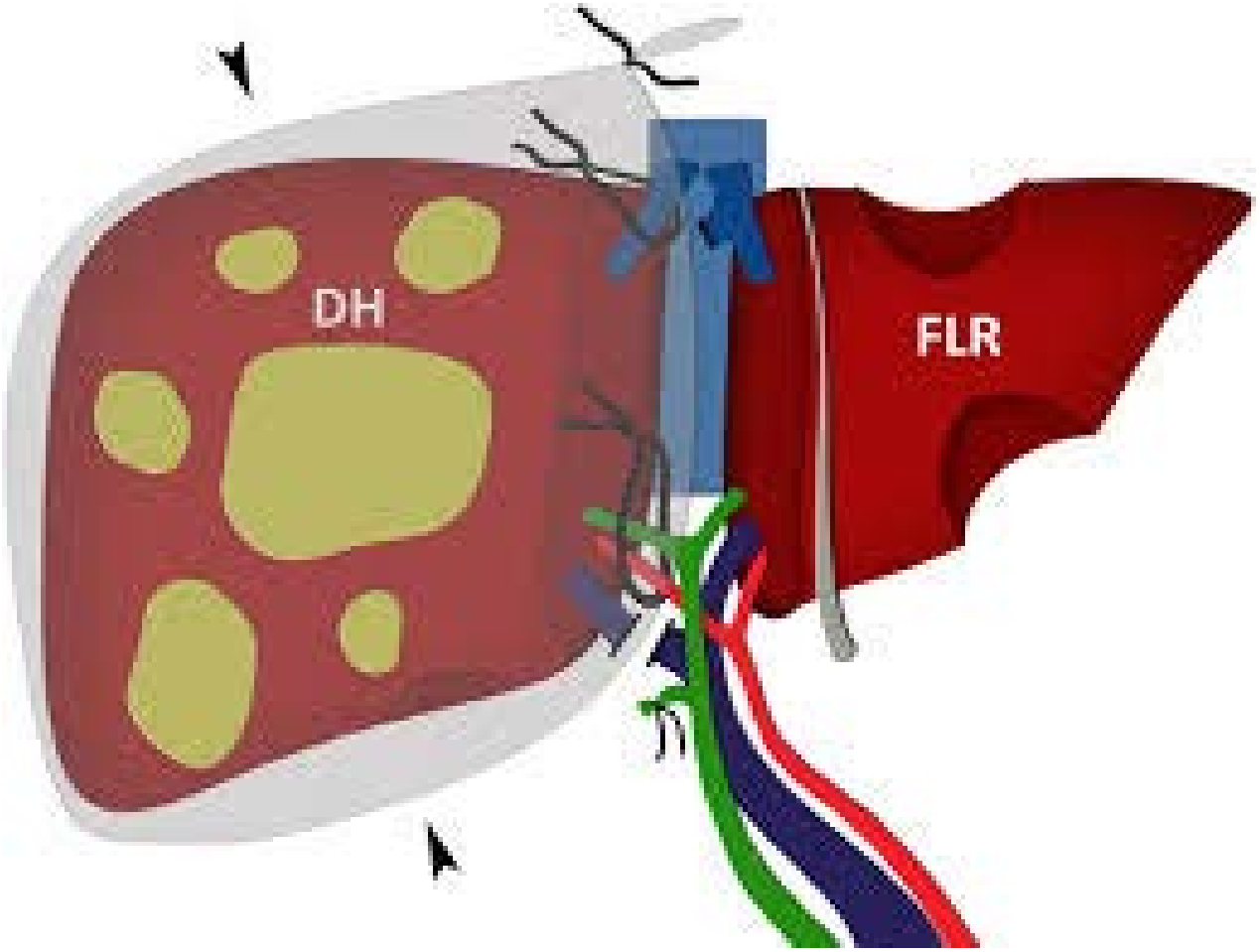
- Preventive strategies aimed at increasing future liver remnant (FLR):
  - Portal vein embolization (PVE)
  - Portal vein ligation (PVL)
  - Associating liver partition and portal vein ligation for staged hepatectomy (ALPPS) procedure

PVE

- Embolization of portal vein ipsilateral to the side of the disease.
- Leads to hypertrophy of the contralateral side, i.e FLR.
- Hypertrophy of 30-40% in 80% of pts.[1]
- Guidelines recommend PVE in:[2]
  - Cirrhotics with FLR of <40%
  - Normal liver FLR <20%

1. Golse N, et al. J Gastrointest Surg. 2013;17.
2. Thakrar PD, et al. Semin Roentgenol. 2011;46

ALPPS



ALPPS

- Developed to decrease time between PVL and resection
- May facilitate superior hypertrophy compared to PVE – 74% volume increase in mean of 9 days
- Higher operative morbidity (16-64%) and perioperative mortality (12-23%).

Zhang GQ, et al. Int J Surg. 2014;12.

Treatment

- When present:
  - Multi-organ failure
  - Renal insufficiency
  - Encephalopathy
  - Need for ventilator support
  - Need for pressor support
  - Develop persistent hyperbilirubinemia
  - Coagulopathy

Rx cont.

- Monitor postop to identify and treat PHLF early
- Monitor for early clinical and laboratory signs of liver failure
- Monitor for early signs of infection, hemodynamic failure, renal failure, malnutrition, or metabolic disorders

Rx cont.

- Management principles: American Association for the Study of Liver Diseases Guidelines for the management of acute liver failure.
- Severity followed using lab values
- Resuscitative measures and organ support – optimize environment for liver regeneration

Rx cont.

- Establish antimicrobial therapy
- Look for vascular complication
- Radiological drainage if biliary fistula
- Optimize vital functions
- Prevent malnutrition
- Review all medication – stop hepatotoxic and nephrotoxic medication
- Symptomatic treatment
- Coagulopathy

Rx cont.

- Artificial liver
- Liver transplantation

Conclusion

- Major contributor to posthepatectomy morbidity and mortality
- Current definition ISGLS – not without problems
- Important to risk stratify patients before embarking on surgery
- Vitally important to determine FLR before surgery

- Implement preventative techniques in high risk patients
- Meticulous surgical technique
- Identify PHLF early and initiate treatment
- Rx mainly based on supportive treatment

- List of references in the handbook.

Thank you