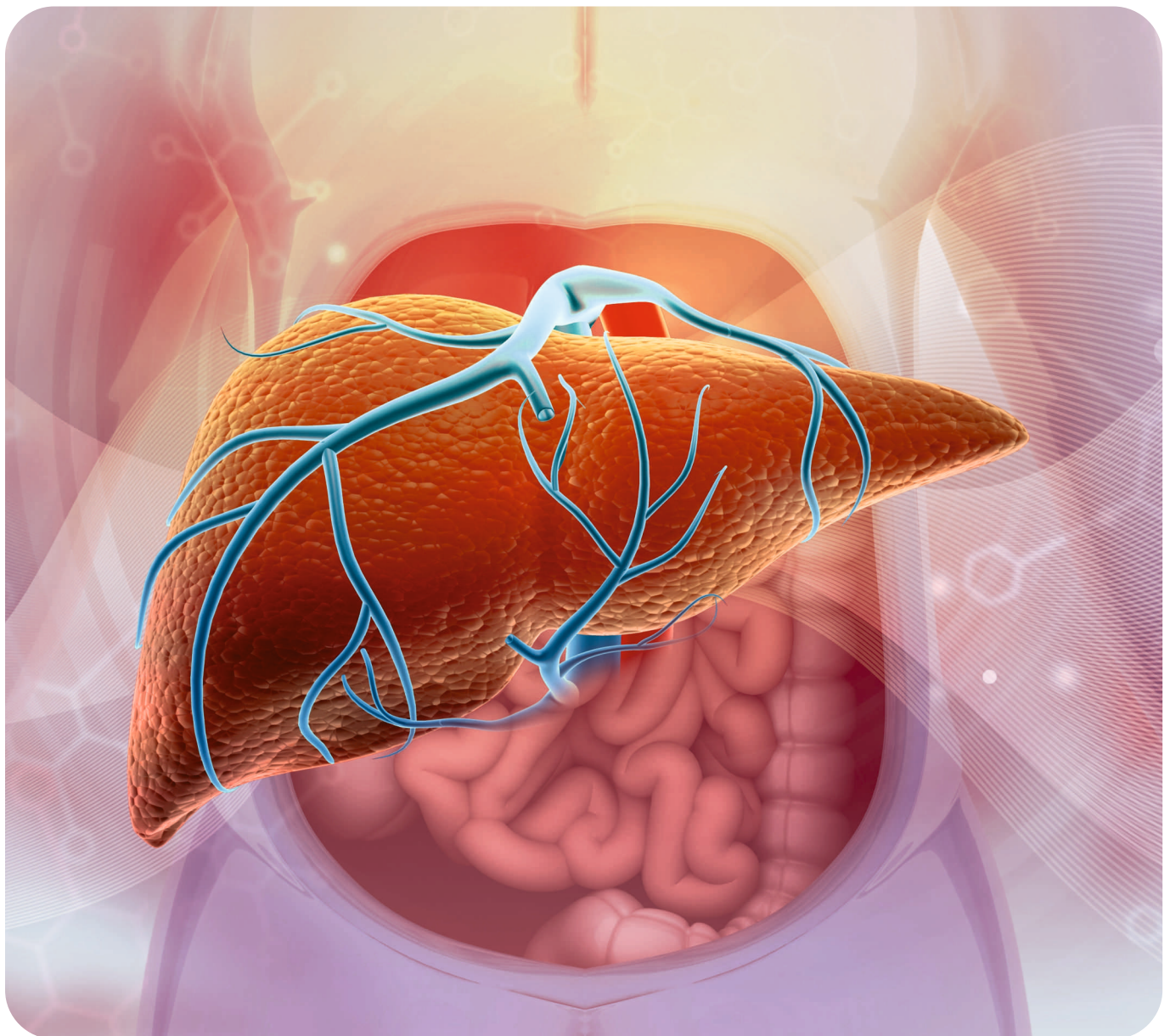


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# JHACC

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## CONTENTS

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### EDITORIAL

3

Anaesthesia for Liver Transplantation:

*Dr. Prakash*

### REVIEW ARTICLE

7

Extra Corporeal Oxygenation (ECMO)

Learning Package:

*Dr. ABCD*

### ORIGINAL RESEARCH ARTICLES

11

Anesthesia techniques in liver transplantation:

*Dr. ABCD*

### CLINICAL TRIALS

17

Perioperative management of patients with chronic liver disease

*Dr. XYZ*

## CONTENTS

### REVIEW ARTICLE 20

- Critical care of hepatic failure and post-transplant patients  
Dr. ABC, Dr. XYZ

### CLINICAL GUIDELINES 25

- Organ preservation and donor anesthetic management  
Dr. XYZ

### CASE REPORTS 33

- Regional anesthesia and analgesia in hepatobiliary surgery  
Dr. Xyz

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*The Journal of Hepatic Anesthesia and Critical Care (JHACC) is a peer-reviewed, open-access medical journal dedicated to advancing knowledge and clinical practice in the anesthetic and critical care management of patients with liver disease, particularly those undergoing liver transplantation and hepatobiliary surgery.*

*JHACC aims to serve as a leading platform for anesthesiologists, intensivists, hepatologists, surgeons, and researchers involved in the multidisciplinary care of patients with hepatic dysfunction. The journal encourages the dissemination of high-quality, evidence-based research, innovative clinical practices, and emerging technologies related to perioperative and critical care in liver disease and transplantation.*

Photo

# EDITORIAL

## Editorial Heading

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Scope of the Journal Includes (but is not limited to):

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- Perioperative management of patients with chronic liver disease
- Critical care of hepatic failure and post-transplant patients
- Hemodynamic and coagulation management in liver surgery
- Liver-specific pharmacology and anesthetic implications
- Point-of-care testing and monitoring in hepatic anesthesia
- Organ preservation and donor anesthetic management
- Postoperative complications and ICU strategies
- Liver disease and critical illness syndromes (e.g., ACLF, hepatorenal syndrome)
- Pediatric liver anesthesia and critical care
- Regional anesthesia and analgesia in hepatobiliary surgery
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- JHACC seeks to foster international collaboration and welcomes submissions from clinicians, researchers, and academicians across the globe. The journal follows a rigorous peer-review process and aims for timely and transparent publication.

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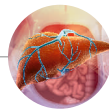
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# Anaesthesia for Liver Transplantation

AUTHORS NAME

## Abstracts

*Liver transplantation (LT) is the preferred treatment for end-stage liver disease regardless of its cause. Significant challenges still exist for the transplant team because the procedure is performed on high-risk patients with compromised cardiovascular, pulmonary, renal, and coagulation systems. Adequate perioperative care is crucial for ensuring prompt graft function, which facilitates organ system recovery and enhances the recipient's quality of life. A successful LT requires teams with specific skills and competencies, including a thorough understanding of the multi-organ pathophysiology of liver failure, its implications, and management during the three stages of surgery. Many innovations and procedural changes have been made in the anesthetic management of these patients over time.*

**Keywords:** Liver transplantation, anesthetic, pulmonary, renal, coagulation systems etc...

## INTRODUCTION

Liver transplantation (LT) is the preferred treatment for end-stage liver disease regardless of its cause. Significant challenges still exist for the transplant team because the procedure is performed on high-risk patients with compromised cardiovascular, pulmonary, renal, and coagulation systems. Adequate perioperative care is crucial for ensuring prompt graft function, which facilitates organ system recovery and enhances the

recipient's quality of life. A successful LT requires teams with specific skills and competencies, including a thorough understanding of the multi-organ pathophysiology of liver failure, its implications, and management during the three stages of surgery. Many innovations and procedural changes have been made in the anesthetic management of these patients over time.

### Indications for liver transplantation

The indications for liver transplantation are outlined in Table 1.

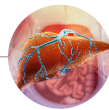
### Indications for liver

Table 1. Indications for liver transformation  
 Class Disease Non-cholestatic liver disease

- Hepatitis B
- Hepatitis C
- Hepatitis D
- Hepatitis A
- Alcoholic liver disease
- Autoimmune hepatitis
- Cryptogenic cirrhosis
- Non-alcoholic steatohepatitis
- OtherCholestatic liver disease
- Primary biliary cirrhosis
- Secondary biliary cirrhosis (Caroli disease, choledochal cyst)
- Primary sclerosing cholangitis
- OtherMalignant disease
- Hepatocellular carcinoma
- Cholangiocarcinoma
- Hepatoblastoma
- OtherExtrahepatic biliary atresia or hypoplasia
- Alagille syndrome
- OtherMetabolic diseases

### About the Author

Name.....  
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 Hospital Name.....



- Alpha-1 antitrypsin deficiency
- Crigler-Najjar disease type I
- Byler's disease
- Glycogen storage disease type I
- Wilson's disease
- Hemochromatosis
- Tyrosinemia
- Wolman's disease
- Familial amyloidotic polyneuropathy
- Primary hyperoxaluria type 1
- Other Hepatic vein thrombosis
- Budd-Chiari Acute hepatic failure
- Hepatitis
- Drugs
- Unknown etiology Re-transplantation
- Primary non-function
- Hepatic artery thrombosis
- Acute/chronic rejection

**Assessment and prioritization criteria**

A grading system that ranges from 6 to 40 points depends on four laboratory variables: serum creatinine, serum bilirubin, the international normalized ratio (INR), and serum sodium. It assesses the severity of chronic liver disease in patients aged 12 years or older. The

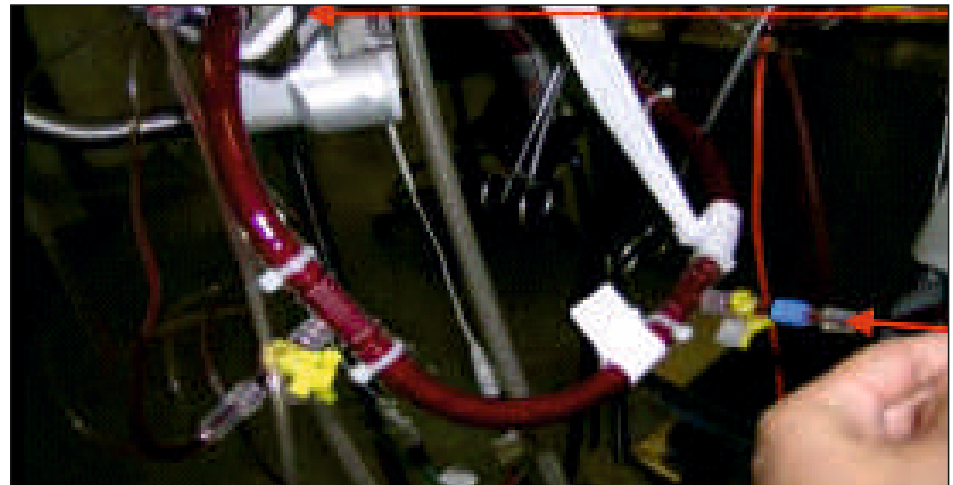


Figure : Return Line for CRRT connection to ECMO Circuit

etiology of liver disease has been shown to be ineffective in predicting patient mortality. Certain medical conditions, defined as "standard model for end-stage liver disease (MELD) exceptions," are eligible for an increase in MELD points and require periodic reassessment. These include hepatocellular carcinoma (HCC), hepatopulmonary syndrome, portopulmonary hypertension, familial amyloid polyneuropathy, primary hyperoxaluria, cystic fibrosis, hilar

cholangiocarcinoma, and hepatic artery thrombosis (which occurs within 14 days after LT but does not meet the criteria).

Another notable exception to the MELD prioritization system is patients with acute liver failure, who are classified as United Network for Organ Sharing (UNOS) status 1A or 1B. Their severity and priority for liver transplantation are determined based on the King's College Criteria.

The Milan criteria are used to select patients with primary liver tumors who may benefit from LT. Patients with a single tumor of 5 cm or less, or up to 2–3 tumors between 1-3 cm in diameter, are considered eligible for LT.

**SURGICAL STAGES OF LIVER TRANSPLANTATION**

LT is a complex procedure marked by significant haemodynamic instability across its three distinct surgical phases:

**Pre-anhepatic phase:** This phase spans from the skin incision to the clamping of the inferior vena cava (IVC), portal vein, and hepatic artery. During this stage, the native liver is dissected, and substantial bleeding may occur.

**Anhepatic phase:** This begins once

**Table 1. Definitions of nutritional deficiencies**

| Term                         | Definition   |
|------------------------------|--|
| Malnutrition/ Undernutrition | Nutrition-related disorder arising from decreased intake or absorption of nutrition, leading to decreased mental and physical ability and impaired clinical outcome from disease.              |
| Muscle wasting               | Ongoing, progressive loss of muscle mass; can lead to muscle atrophy.  |
| Sarcopenia                   | Generalized decrease in overall muscle mass and function. Frailty Loss of reserve (physiologic, cognitive, and functional) leading to decreased ability to perform activities of daily living. |
| Immunonutrition              | Use of specific nutrients in an attempt to modulate the immune system and to improve overall health (such as using various amino acids, nucleotides, and fatty acids).                         |
| Deconditioning               | Declining capacity of muscle function, usually due to immobility or debilitating disease.  |

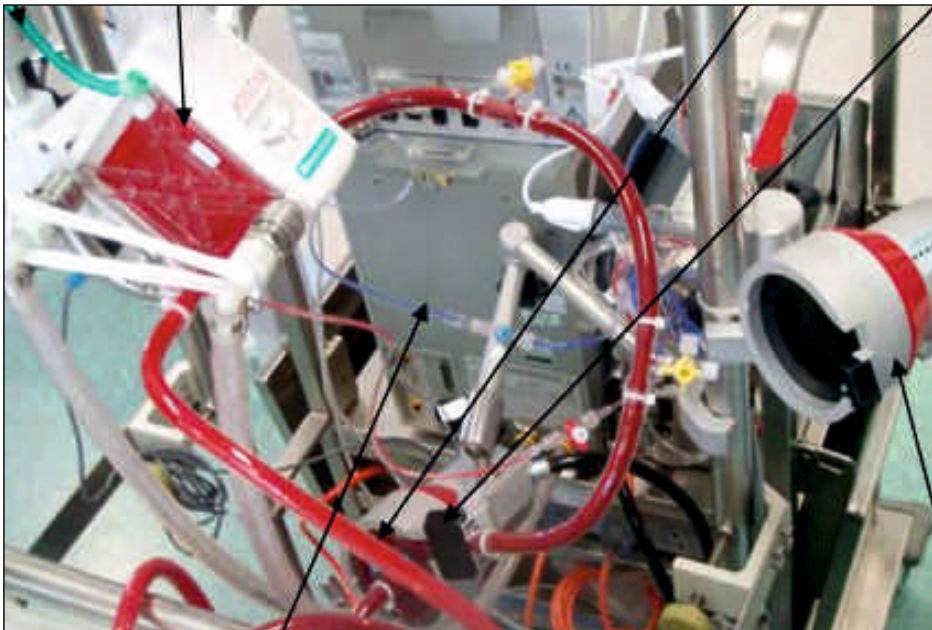
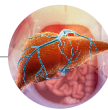


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**Anhepatic phase:** This begins once hepatic venous inflow is clamped and continues until graft reperfusion.

Clamping of the IVC during this phase leads to a reduction in cardiac output (CO), often requiring vigilant haemodynamic support.

**Neo-hepatic phase:** Starting at the moment of graft reperfusion, this phase involves the restoration of blood flow through the portal vein and IVC. It may be

complicated by post-reperfusion syndrome (PRS) or bleeding from vascular anastomosis sites such as the IVC, hepatic artery, or portal vein.

Anesthetic management for liver transplantation

Anesthetic management for LT includes standard monitoring as per the American Society of Anaesthesiologists (ASA) guidelines. This comprises:

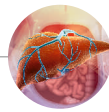
- ·A five-lead ECG
- ·Pulse oximetry
- ·Non-invasive blood pressure measurement
- ·Temperature monitoring
- Intra-operative monitoring
- Hemodynamic monitoring

A central venous catheter is inserted to monitor central venous pressure (CVP) and to administer vasopressors. A second central line, introducer sheath, or large-bore peripheral cannula may be placed to facilitate rapid infusion of blood products and fluids.

The introducer sheath can also serve as a conduit for pulmonary artery (PA)

Table 1. Definitions of nutritional deficiencies

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- Hemodynamic monitoring

A central venous catheter is inserted to monitor central venous pressure (CVP) and to administer vasopressors. A second central line, introducer sheath, or large-bore peripheral cannula may be placed to facilitate rapid infusion of blood products and fluids.

The introducer sheath can also serve as a conduit for pulmonary artery (PA) catheter placement, particularly in patients with pulmonary hypertension (PHT) who require continuous haemodynamic monitoring.

Invasive arterial blood pressure (BP) monitoring is considered the gold standard during liver transplantation and is typically initiated after induction of anaesthesia.

•One or two radial arterial lines are often inserted. However, it is important to note that radial artery pressure may underestimate central aortic pressure in hypotensive states—especially when high-dose vasopressors are used or following graft reperfusion.

•For more accurate BP measurements, a catheter can be placed in the femoral or

brachial artery, which is less affected by peripheral vasoconstriction.

## CONCLUSION

Anesthesia for liver transplantation remains one of the most complex and demanding disciplines in clinical practice. Haemodynamic instability, coagulopathy, and the physiological alterations associated with cirrhosis all contribute to the challenges encountered during the three surgical phases. A comprehensive understanding of LT pathophysiology and meticulous perioperative management is essential to improving patient outcomes and graft survival.

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