

# Perioperative Medicine: Liver Disease

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# Objectives

By the end of this module, readers should be able to:

- Recognize patients with liver disease pre-operatively
- Estimate surgical risks for patients with cirrhosis
- Identify ways to help reduce perioperative risks in patients with cirrhosis

# Your patient

Mr. C is a 57 yo man who presents for pre-op evaluation for left inguinal hernia repair.

## Past Medical History:

Cirrhosis

Ascites requiring LVP (last 4 months ago)

Hepatitis C

EtOH use

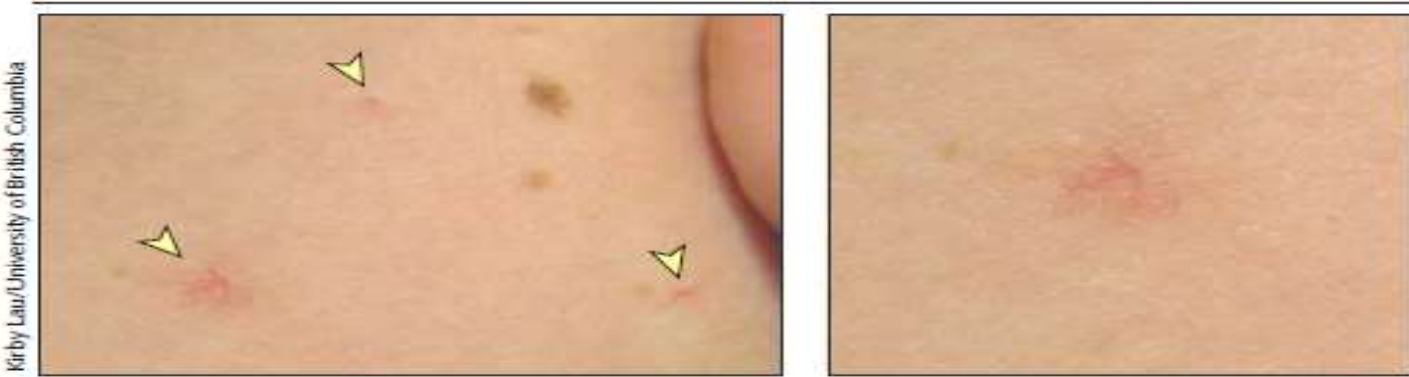
CKD (Cr 1.4) secondary to MPGN.

# Goals of pre-operative evaluation

1. Identification and/or diagnosis of medical condition
2. Estimation of surgical risk
3. Risk reduction
4. Post-operative monitoring and management of potential complications

# Diagnosis of liver disease

- History
- Exam for cirrhosis
  - Terry nails (LR 16-22), gynecomastia (LR 5.8-35), facial telangiectasia (LR 5.9-10), spider nevi (LR 4.3), ascites (LR 7.2), splenomegaly (LR 3.5)<sup>1</sup>, jaundice, edema



# Pre-operative diagnosis of liver disease

- Pre-op liver panel not recommended in healthy patients
- Obtain liver panel if evidence of liver disease
- Perform further evaluation if AST/ALT > 3x normal, ↑ bilirubin, ↓ hepatic synthetic function, ↓ platelets
- Surgery can proceed in asymptomatic patients with mild elevations in AST/ALT (<3x normal)
- Consider Hepatology referral

# Factors affecting surgical risk

- Etiology of liver disease
- Severity of liver disease
  - Presence of cirrhosis and portal HTN
- Type of surgery

# Contraindications to surgery

- Acute viral hepatitis
  - 10 to 13% post-operative mortality<sup>1</sup>
  - Defer elective (+/- urgent) surgery until clinical and biochemical resolution
- Acute alcoholic hepatitis
  - Defer elective (+/- urgent) surgery until clinical and biochemical resolution (~ 12 weeks with EtOH abstinence)
- Acute liver failure

1. Malik, SM and Ahmad J. *Med Clin N Am.*2009;93:917-29

2. O'Leary JG, et al. *Clin Liver Dis.*2009;13:211-31



# Does etiology of liver disease affect post-operative risk?

- Chronic viral hepatitis
  - No ↑ in surgical risk (mild/moderate disease, preserved hepatic function)<sup>1</sup>
- Non-alcoholic fatty liver disease (NAFLD)
  - Trend toward ↑ morbidity/mortality after hepatic resection
  - Role of obesity, DM, CV disease, diagnosis of cirrhosis?
  - NAFLD contribution to surgical risk is unknown

# Pre-operative assessment in patients with suspected liver disease

**Suspect liver disease from history/physical**

Labs –  
Liver panel, INR, BMP, CBC

Imaging –  
Ultrasound, CT, MRI, endoscopy

No cirrhosis, portal HTN, acute hepatitis, liver failure

Acute hepatitis

+ Cirrhosis or portal HTN

Proceed with surgery

Defer elective surgery until resolution

Risk stratification

# Mr. C

**Exam:** Vitals normal.

Mild abdominal distention, no edema, alert, oriented.

## **Labs**

Na 138

K+ 4.9

BUN 26

Cr 1.37

AST 63

ALT 54

Bilirubin 1.0

Albumin 3.2

INR 1.3

# Child-Turcotte-Pugh classification

Clinical Trait	1 Point	2 Points	3 Points
Ascites	None	Present	Moderate/Severe
Encephalopathy	None	Grade 1-2	Grade 3-4
Bilirubin (mg/dL)	<2	2-3	>3
Albumin (g/dL)	>3.5	2.8-3.5	<2.8
INR	<1.3	1.3-2.3	>2.3

Child's A: 5-6 points    Child's B: 7-9 points    Child's C: 10-15 points

# Cirrhosis & perioperative mortality

Type of Surgery	Child's class	Mortality (%)
Major abdominal	A	10
	B	30
	C	76-82
Cardiac	A	0-11
	B	18-50
	C	67-100
Emergency surgery	A	22
	B	38
	C	100

Malik, SM and Ahmad J. *Med Clin N Am.*2009;93:917-29

Garrison, et al. *Ann Surg.*1984;199(6):648-55

Mansour A, et al. *Surgery* 1997;122(4):730-5

# Model for End-Stage Liver Disease (MELD)

$$\text{MELD score} = (9.6 \times \log_e [\text{creatinine}]) + (3.8 \times \log_e [\text{bilirubin}]) + (11.2 \times \log_e [\text{INR}] \times 6.4)^*$$

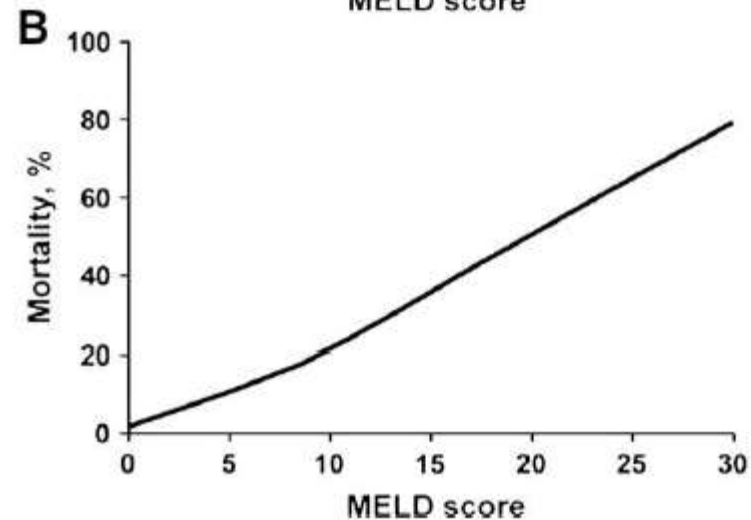
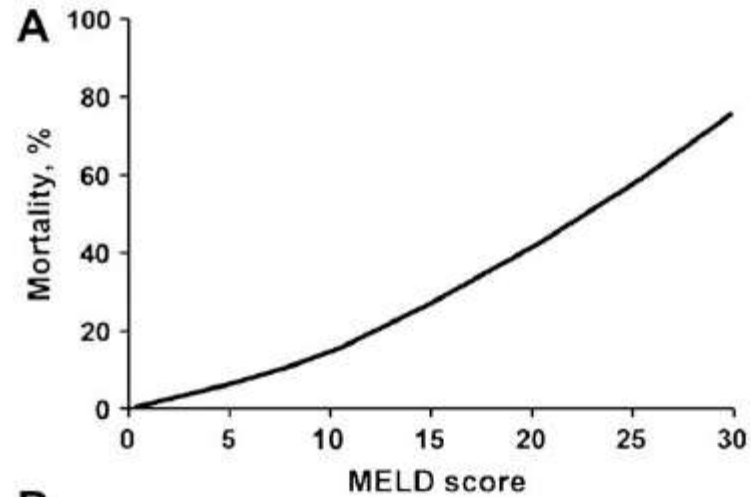
MELD < 10 – Low risk

MELD 10-15 – Intermediate risk

MELD > 15 – High risk

\* Several online calculators

# MELD score and surgical risk (Teh, et al)



# MELD score and surgical risk (Teh, et al)

MELD Score	Ninety-day mortality
< 8	9.7%
9-11	17.7%
12-15	32.3%
>15	55.8%



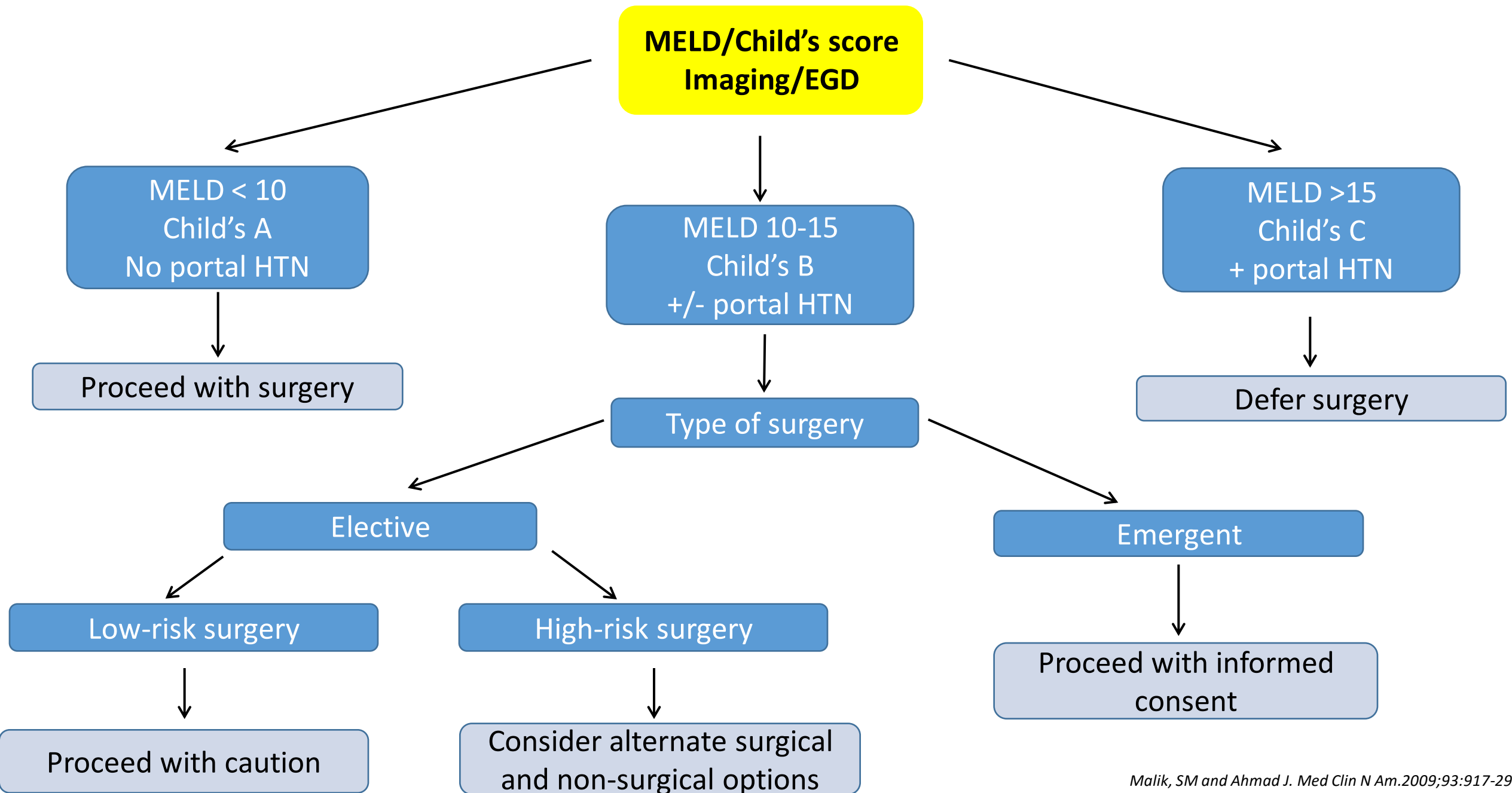
# Perioperative risk calculator for patients with cirrhosis

What is the age?	<input type="text"/>		
What is the <b>ASA score</b> ?	<input type="text"/>	Enter 3 for compensated cirrhosis Enter 4 for decompensated cirrhosis	<u>Probability (%) of Mortality</u>
What is the bilirubin?	<input type="text"/>	(mg/dl)	7 days
What is the creatinine?	<input type="text"/>	(mg/dl)	30 days
What is the INR?	<input type="text"/>		90 days
What is the etiology of cirrhosis?	<input type="radio"/>	Alcoholic or Cholestatic	1 year
	<input type="radio"/>	Viral/Other	5 years

<http://www.mayoclinic.org/meld/mayomodel9.html>

# Mr. C

- Child's Class B
- MELD score 12
- Probability of post-operative mortality
  - 7-day → 2.4%
  - 30-day → 9.5%
  - 90-day → 15%



**MELD/Child's score  
Imaging/EGD**

MELD < 10  
Child's A  
No portal HTN

Proceed with surgery

MELD 10-15  
Child's B  
+/- portal HTN

Type of surgery

MELD > 15  
Child's C  
+ portal HTN

Defer surgery

Elective

Emergent

Low-risk surgery

High-risk surgery

Proceed with informed  
consent

Proceed with caution

Consider alternate surgical  
and non-surgical options

# ACS NSQIP

**Procedure**  Clear

Begin by entering the procedure name or CPT code. One or more procedures will appear below the procedure box. You will need to click on the desired procedure to properly select it. You may also search using two words (or two partial words) by placing a '+' in between, for example: "cholecystectomy+cholangiography"

**Reset All Selections**

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**Are there other potential appropriate treatment options?**  Other Surgical Options  Other Non-operative options  None

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*Please enter as much of the following information as you can to receive the best risk estimates.  
A rough estimate will still be generated if you cannot provide all of the information below.*

Age Group	<input type="text" value="Under 65 years"/>	Diabetes	<input type="text" value="None"/>
Sex	<input type="text" value="Female"/>	Hypertension requiring medication	<input type="text" value="No"/>
Functional status	<input type="text" value="Independent"/>	Previous cardiac event	<input type="text" value="No"/>
Emergency case	<input type="text" value="No"/>	Congestive heart failure in 30 days prior to surgery	<input type="text" value="No"/>
ASA class	<input type="text" value="I - Healthy patient"/>		
Wound class	<input type="text" value="Clean"/>	Dyspnea	<input type="text" value="None"/>
Steroid use for chronic condition	<input type="text" value="No"/>	Current smoker within 1 year	<input type="text" value="No"/>
<b>Ascites within 30 days prior to surgery</b>	<input type="text" value="No"/>	History of severe COPD	<input type="text" value="No"/>
Systemic sepsis within 48 hours prior to surgery	<input type="text" value="None"/>	Dialysis	<input type="text" value="No"/>
		Acute Renal Failure	<input type="text" value="No"/>
Ventilator dependent	<input type="text" value="No"/>	BMI Calculation:	<input type="text" value=""/>
Disseminated cancer	<input type="text" value="No"/>	Height (in)	<input type="text" value=""/>
		Weight (lbs)	<input type="text" value=""/>

# Post-operative morbidity

## *Morbidity and Mortality in Cirrhotic Patients Undergoing Anesthesia and Surgery*

Avishai Ziser, M.D.,\* David J. Plevak, M.D.,† Russell H. Wiesner, M.D.,‡ Jorge Rakela, M.D.,§  
Kenneth P. Offord, M.S.,|| David L. Brown, M.D.#

Pneumonia (8%)  
Ventilatory dependence (7.8%)  
Other infections (7.5%)  
Re-operations (7%)  
Ascites (6.7%)

Bacteremia (6.7%)  
Arrhythmia (5%)  
GI bleeding (4.6%)  
Hepatorenal syndrome (3.3%)  
Grade 4 encephalopathy (1%)

# Risk reduction for patients with cirrhosis

## Drug metabolism

Limit benzodiazepines (ie. diazepam)  
Short-acting analgesics favored  
Attention to acetaminophen dosing

## Pulmonary

Manage ascites (↓ restrictive physiology)  
Pre-op assessment pulmonary HTN or HPS  
Pulmonary hygiene

## Renal insufficiency

Pre- and post-operative labs  
Monitor urine output

# Risk reduction for patients with cirrhosis

## Bleeding

Correct coagulopathy with Vit. K & FFP  
Transfuse platelets (discuss goal w/surgeon)  
Consider cryoprecipitate, DDAVP, Factor VII  
Appropriate treatment of varices  
Small case series support pre-op TIPS<sup>1</sup>

## Infection

Standard precautions  
Manage ascites to ↓ abdominal wound dehiscence

## Encephalopathy

Pay attention to medications  
Maintain K<sup>+</sup> and Mg<sup>+</sup>  
No data to support prophylactic lactulose

# Take Home Points

- Diagnose and assess severity of cirrhosis pre-operatively
- Use the Child class, MELD scores, and online risk calculator to help estimate surgical risk
- Treat ascites pre-operatively to help reduce risk of pulmonary and infectious complications



# References

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