

Liver Failure

Anesthetic Pearls: Signs and Laboratory Tests of Liver Failure

The liver is the largest gland in the body and performs a number of vital functions. Hepatic function is remarkably resilient and can retain normal function even after 80% resection. Quick helpful mnemonic to remember hepatic physiologic functions: (A-I)

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| A. <u>A</u> lbumin synthesis | F. <u>F</u> at metabolism |
| B. <u>B</u> ilirubin secretion | G. <u>G</u> lucose / <u>G</u> lycogen metabolism |
| C. <u>C</u> oagulation homeostasis | H. <u>H</u> ormone metabolism |
| D. <u>D</u> rug metabolism | I. <u>I</u> mmunologic function / modulation |
| E. <u>E</u> limination of waste products | |

Liver failure can be classified into two broad groups. 1) **Parenchymal disease** which includes acute / chronic viral hepatitis, drug induced, primary biliary sclerosis, hemochromatosis, autoimmune, and alcoholic liver disease. 2) **Cholestasis** (obstructive jaundice) which causes obstruction of the extra-hepatic biliary pathway. **Cirrhosis** becomes the final common pathway for multiple chronic liver disease states.

Signs of liver failure by organ system:

SYSTEM	EFFECT	ASSESSMENT BY HX	PE	TEST
CV	Hyperdynamic circulation		Tachycardia Skin spiders	Measure CO, SVR
RESP	Hypoxemia		Tachypnea	ABG
GI	Bleeding Ascites Jaundice Hypoalbuminemia Hepatitis	Hx of bleeding Increasing abdominal girth Dark urine	Hemoccult+ material Fluid wave on abdominal exam Icteric sclera Ascites, pedal edema Abdominal pain	Het, endoscopy Bilirubin Serum albumin ALT, AST
ENDO	Hypoglycemia	Altered consciousness		Blood sugar
HEME	Anemia Thrombocytopenia Immunosuppression Coagulopathy	Easy bruisability Infections Abn bleeding	Bruises	Het Pit count PT (low factors V, VII, IX, X, fibrinogen)
RENAL	Hepatorenal syndrome Hyponatremia Hypokalemia	Altered consciousness, seizures Taking diuretics	Oliguria	Urinary Na ⁺ low Serum Na ⁺ Serum K ⁺
CNS	Encephalopathy	Mental status exam	Level of consciousness Asterixis	

Key Reference: Roizen MF, Fleisher, LA: Essence of Anesthesia Practice

Liver function tests:

Liver Functions Tests & Differential Diagnosis of Hepatic Dysfunction

	<u>Bilirubin Overload</u> (Hemolysis)	<u>Hepatocellular Dysfunction</u>	<u>Cholestasis</u>
Bilirubin	Unconjugated	Conjugated	Conjugated
Aminotransferases	Normal	Increased	Normal → Increased
Alkaline Phosphatase	Normal	Normal	Increased
Prothrombin Time	Normal	Prolonged	Normal → Prolonged
Serum Proteins	Normal	Decreased	Normal → Increased

Isolated disturbances of liver function tests indicate the probability of liver disease, and elective surgery should be delayed until the cause can be determined. Patients with acute hepatic disease are at increased surgical risk (approximately 10% mortality with acute viral / alcoholic hepatitis) and should **not** have purely elective surgery.