AGA Clinical Practice Update: Evaluation and Management of AKI in Patients with Cirrhosis

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Acute Kidney Injury (AKI) happens in 47% of patients hospitalized with complications of cirrhosis and is associated with 7x increase in morbidity and mortality

- Severity of renal function in cirrhosis often underestimated (impaired hepatic production of creatine, reduced muscle mass)
- ↓ effective arterial blood volume from splanchnic vasodilation and ↑ systemic vasoconstrictor pathways (RAAS, sympathetic nervous system, arginine vasopressin) → renal sodium retention, impaired solute free water excretion, renal vasoconstriction → ↓ renal blood flow

BPA 1: Diagnose AKI:

- sCr increased by ≥0.3 mg/dL within 48 hrs or is ≥50% from baseline
- Urine output <0.5 ml/kg/hr for >6 hrs

BPA 2: Preventative measures against development of AKI in cirrhosis

- Avoid nephrotoxic meds (ex NSAIDs), excessive or unmonitored diuretics or NSBBs, large volume paracentesis without albumin, and alcohol use

BPA 3: Determine cause of AKI

- Hypovolemic causes are most common
- Obtain careful history and physical exam
- Check blood biochemistry, urine microscopy, urine chemistry (Na and urea), urine biomarkers, and renal ultrasound

Flamm, S.L. et al. AGA Clinical Practice Update on the Evaluation and Management of Acute Kidney Injury in Patients With Cirrhosis: Expert Review. Clinical Gastroenterology and Hepatology 20, 2707–2716.. doi:10.1016/j.cgh.2022.08.033

BPA 4 & 5: When AKI is diagnosed:

1. Search for infection (incl. Dx paracentesis)
2. Hold diuretics and NSBB; stop NSAIDs
3. Treat precipitating cause of AKI
4. Replace any fluid losses with albumin (1g/kg/d for 2 days) if sCr is >2x from baseline

*monitor fluid status with urine output, vital signs, +/- echocardiography or CVP

BPA 6: When sCr remains > 2x baseline despite above in BPA 4&5, treat for HRS-AKI

- Start albumin 1 g/kg IV followed by 20-40 g daily + vasoactive agents
- Continue until 24 hrs following return of sCr to within ≤0.3 mg/dL of baseline for 2 consecutive days, OR for total of 14 days of therapy

Diagnostic Criteria for HRS	
HRS-AKI	↑ sCr ≥ 0.3mg/dL within 48 hours OR
	↑ sCr > 50% within 7 days using closest available value of sCr within last 3 months as baseline
	• No response to diuretic withdrawal and 2-day albumin challenge • Cirrhosis with ascites • Absence of shock • No current or recent nephrotoxins • No signs of structural kidney injury (normal renal US with absence of proteinuria and hematuria)
HRS-Non AKI	
HRS-AKD	eGFR < 60 ml/min per 1.73 m^2 for < 3 months in absence of other causes of kidney diseases
	↑ sCr > 50% within 3 months using closest available value of sCr within last 3 months as baseline
HRS-CKD	eGFR < 60 ml/min per 1.73 m^2 for ≥ 3 months in absence of other causes of kidney disease

BPA 7 –9 : Dosing of vasoactive drugs for HRS-AKI

- Terlipressin: bolus 1 mg q4-6 hrs (4-6 mg/d); ↑to max 2 mg q4-6 hrs (8-12 mg/d) if sCr does not reduce >25% compared to baseline. IV infusion also available. Avoid in sCr ≥5 mg/dL or O2 sat <90%
- Midodrine 7.5 mg titrated to 12.5 mg TID + octreotide 100 µg titrated to max 200 µg sq TID
- Norepinephrine: continuous IV infusion starting 0.5 mg/h & ↑ q4 hrs by 0.5 mg/h to max of 2 mg/h

BPA 10: Monitor for ischemic side effects of terlipressin and norepinephrine including angina and ischemia of fingers, skin, and intestine

- Minimize side effect by starting at lowest dose and titrating upwards gradually

BPA 11: Monitor fluid status closely because of risk of pulmonary edema with excessive albumin use

BPA 12: Renal replacement therapy may be used in:

- AKI secondary to ATN
- HRS-AKI in potential transplant candidates
- AKI of uncertain etiology (case by case basis)

BPA 13: Transjugular intrahepatic portosystemic shunts should not be used as a specific treatment of HRS-AKI

BPA 14: Liver transplant is the most effective treatment for HRS-AKI

- Pharmacotherapy for HRS-AKI pre-liver transplant may have better post-transplant outcomes
- Simultaneous liver kidney transplant may be required in selected patients