Hyponatremia and Cirrhosis

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DEFINITION:

- Serum sodium concentration <130 mEq/L
- Typically occurs gradually and is asymptomatic until sodium level falls below 120 mEq/L
  - If falls spontaneously below 120 mEq/L (not on diuretics), likely very close to death
- Occurs in cirrhotics with ascites and/or edema and termed dilutional hyponatremia
- Indicates more severe liver disease, worse control of ascites, and higher likelihood of hepatic encephalopathy, SBP, hepatorenal syndrome
  - Powerful and independent predictor of death in those with cirrhosis
  - Sodium-MELD score better predictor of death than MELD score alone
- Must rule out hypovolemic hyponatremia which typically occurs from water loss related to diuretics or GI losses (diarrhea, vomiting) and without presence of ascites or edema
- Evaluate for hepatoadrenal (see relevant protocol)

PATHOGENESIS:

- Systemic vasodilation → activation of endogenous vasoconstrictors (especially ADH, as well as renin-angiotensin and sympathetic nervous system) → water retention

CLINICAL PRESENTATION:

- Typically asymptomatic until <120 mEq/L if develops gradually
- Can markedly exacerbate mild hepatic encephalopathy
- Rapid development (occurs in less than 48 hours) may lead to neurologic symptoms due to cerebral edema
  - If <125-130 mEq/L → headache, nausea, vomiting, anorexia, muscle cramps, lethargy, irritability, restlessness, and disorientation
  - If <120 mEq/L → seizures, brain damage, coma, brain stem herniation, respiratory arrest, death

TREATMENT:

- If felt to be hypovolemic hyponatremia, administer normal saline and possible withdrawal of diuretics
- If dilutional hypernatremia, decision to treat determined by the presence of symptoms or possibility of imminent liver transplantation
  - Correct hypokalemia
  - Fluid restriction
    - Total fluid intake should be less than urine volume for this to be effective
  - Albumin
    - Typically transient rise in Na+ only
  - Vaptans (tolvaptan, conivaptan)
    - Tolvaptan (oral): Start 15 mg/day and then increase dose at 24 hr intervals to 30 mg daily and then 60 mg daily
      - Used if serum sodium <125 mEq/L and symptomatic
      - Must be started in the hospital
- Only evaluated for short term use (less than one month)
- Avoid rapid overcorrection of more than 8-10 mEq/L in 24 hours to prevent osmotic demyelination syndrome
- Monitor sodium 8-12 hours after initiation and then every 24 hours thereafter
- Contraindications: hypovolemic hyponatremia, those unable to sense or respond appropriately to thirst (altered mental status), those who require urgent increase in serum sodium, and anuric patients
  - Conivaptan (IV): 10 mg loading dose followed by 10 mg over 24 hours for 2-4 days only
  - All vaptan use requires liver test monitoring
- Hypertonic saline
  - Generally only warranted in those who are profoundly hyponatremic and within hours of imminent liver transplant
  - Use with furosemide to expedite free water removal
- Demeclocycline not beneficial due to high risk of nephrotoxicity
- Salt tablets should not be used as they lead to more water retention