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Management of Hyponatremia in Patients With Cirrhosis

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No financial relationships to disclose.
Background – Hyponatremia & Cirrhosis

• Definition
  – Sodium (Na) < 135 mEq/L
  – In cirrhosis, Na < 130 mEq/L
  – Serum osmolality will be less than 280 mosmol/Kg

• Contributing Factors
  – Splanchnic vasodilation
  – Antidiuretic hormone (ADH)
  – Nitric oxide
Hyponatremia

Serum Osmolality >295 mosmol/kg (Hypertonic)

- Trans-locational Hyponatremia (Hyperglycemia, Mannitol, Sorbitol)

Serum Osmolality <280 mosmol/kg (Hypotonic)

- True Hyponatremia

  - Hypovolemic (Low TBW & Low total body Na)

    - Evaluate Chronicity
      - Acute (Onset <48 hours)
      - Chronic (Onset >48 hours)

    - Evaluate Symptoms
      - Asymptomatic/mild (headache, nausea, weakness)
      - Severe (seizures, coma, respiratory distress)

  - Clinical Examination for Volume Status

Serum Osmolality 280-295 mosmol/kg (Normotonic)

- Pseudo Hyponatremia (Hyperlipidemia, Hyperproteinemia)

Serum Osmolality <280 mosmol/kg (Hypotonic)

- Hypervolemic Hyponatremia (Increased TBW, Increased total body Na)

- Euvolemic (Slightly increased TBW & Normal total body Na)

- Differential Diagnosis
  - Cirrhosis
  - Heart Failure
  - Renal Failure
  - Combination of above

- No signs of heart failure
- No proteinuria/renal failure

Alukal, John, & Thuluvath. 2020.
Signs and Symptoms

- Frequently asymptomatic
- Mild – nausea, anorexia, mild cognitive impairment, headache, gait disturbance, and fall
- Moderate – confusion, muscle weakness, spasms
- Severe – seizures, coma
  - Osmotic demyelination syndrome (ODS)
Hyponatremia and Cirrhosis

- Swift fall in sodium is associated with worse clinical outcomes in this patient population
- Reduced quality of life
- Frequent hospitalizations
- Higher incidence of liver-related complications
Morbidity and Mortality – Hyponatremia

- Independent risk factor for:
  - In-hospital mortality + 6-month mortality
  - Acute on chronic liver failure (ACLF)
  - 90-day survival
  - Bacterial infection (SBP, UTI, pneumonia)
What Is the MELD Score?

- Model for End-stage Liver Disease (MELD)
  - Developed by Russell H. Wiesner, MD in 2001
  - Total bilirubin, INR, creatinine
  - Used by UNOS to prioritize the waiting list for transplant
  - Range from 6–40
  - $< 9 = \text{too early for transplant}$
  - $40 = \text{in urgent need of transplant}$
  - Sodium (Na) added in calculation (MELD-Na)

Wiesner et al. 2003; Biggins et al. 2006.
MELD-Na

- Changed in January 2016
- MELD-Na better predicts waitlist mortality
- Conflicts regarding post-LT survival and pre-LT hyponatremia
Hyponatremia Management
Classify Hyponatremia

• Hypovolemic
• Euvolemic (SIADH)
• Hypervolemic
Hypovolemic Hyponatremia

- 10% prevalence
- Etiology
  - Over diuresis
  - GI fluid losses (N/V/D, lactulose)
- Exam
  - Appear dehydrated
    - Dry mucous membranes, hypotensive, tachycardic, etc…
Hypovolemic Hyponatremia Treatment

- Replete fluid (crystalloids)
- Treat the underlying cause
- Hold diuretics
Hypervolemic Hyponatremia

• 90% prevalence

• Etiology
  – ↓ effective arterial blood volume 2/2 ↑ production of NO, endotoxins and other vasodilators.
  – Activation of RAA system
  – Impairment of free water excretion 2/2 excessive ADH

• Exam
  – LE edema
  – Ascites
Hypervolemic Hyponatremia Treatment

- General Measures
  - Low Na diet <2,000 mg/day
  - Fluid restriction 1.5L/day for Na <130
  - Hold/decrease diuretics
  - Correct hypokalemia
Hypervolemic Hyponatremia Treatment

• **Advanced Measures**
  – Increase arterial blood volume
    • Albumin
    • Midodrine/Octreotide
  – **Vaptans**
    • Effective in raising Na to >135 in 4 days in 41% of pts
    • Mobilizes ascites
    • Short term, peri-transplant
    • Black box warning
    • Elevated LFTs
    • BUN predicts benefit
  – OLT eval
References

