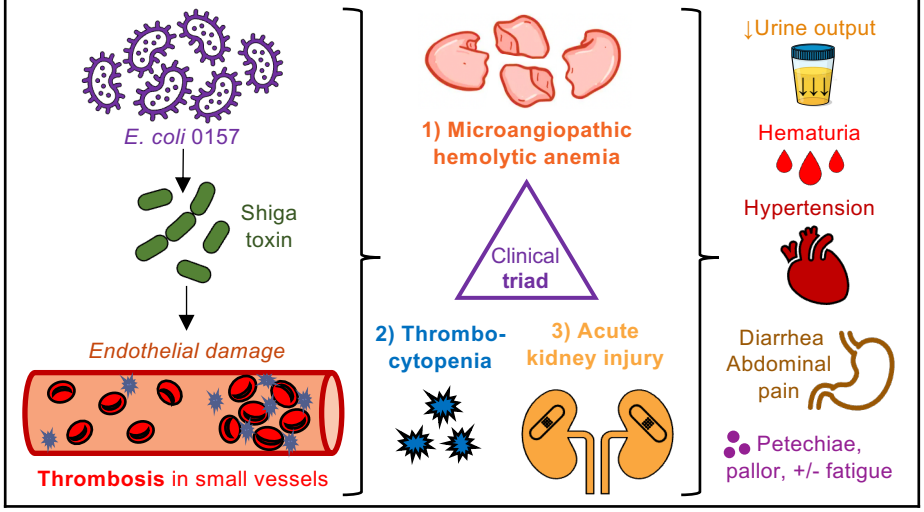
STEC Hemolytic Uremic Syndrome

BACKGROUND

- **Hemolytic uremic syndrome (HUS)** is one of the main causes of acute kidney injury (AKI) in children
- **Shiga toxin-producing *E. coli* (STEC)** accounts for 90% of pediatric HUS cases (classically *E. coli 0157.H7*)
- Primarily affects children **2 to 5 y.o.**
- HUS develops in 10-15% of children following **enteric infection with STEC**, most commonly from unpasteurized milk, raw or undercooked meat
- Generally, HUS is preceded by a prodromal gastrointestinal illness with **bloody diarrhea**
- STEC-HUS typically presents on median day 7 of illness, often as the gastrointestinal symptoms are improving
- The severity ranges from **mild biochemical abnormalities to persisting end-stage renal disease** with a mortality rate of 1-4% (higher risk of death if CNS complications)

PATHOPHYSIOLOGY



CLASSIFICATION

ACQUIRED HUS

- Infectious: **Shiga toxin-producing *Escherichia coli* (STEC)**, *Streptococcus pneumoniae, Shigella*
- Autoantibodies to complement
- Drugs: cisplatin, calcineurin inhibitors (cyclosporine, tacrolimus)
- Solid organ transplant and bone marrow transplant

INHERITED HUS

- Complement gene mutations
- Inborn errors of cobalamin C metabolism
- DGKE gene mutations

INVESTIGATIONS IF SUSPECTED STEC-HUS

- CBC with differential
- Hemolysis workup: LDH, haptoglobin, bilirubin, reticulocyte count, blood smear (schistocytes), direct antiglobulin test (negative)
- Creatinine, urea, electrolytes, extended electrolytes (Ca, Phos, Mg), albumin
- Coagulation studies (PT/INR and PTT) to rule out DIC
- Complement factors: C3 and C4
- Urinalysis: hematuria, proteinuria
- Stool testing for shiga-toxins

If atypical presentation or suspicion of other etiology, consider:

- ADAMTS13 to distinguish TTP from HUS (normal level in HUS)
- Complement-mediated HUS: functional and genetic testing
- In infants, consider screening for defective cobalamin metabolism

MANAGEMENT

- **Optimize supportive care**
- Discontinue, or adjust by GFR, any nephrotoxic agents
- Avoid use of antibiotics, as they may worsen the disease (due to massive release of the toxin when bacteria die)
- Red blood cell transfusion for anemia if clinically indicated
- Consider platelet transfusion if active bleeding. May worsen the disease by promoting platelet aggregation and thrombus formation.
- Fluid and electrolyte management:
  - Maintain adequate intravascular volume and avoid fluid overload in oligoanuric patients
  - Correct/avoid electrolyte abnormalities
  - Maintain adequate nutrition

Dialysis indications: symptomatic or worsening uremia, persistent oligoanuric AKI, severe fluid overload (respiratory or cardiac symptoms), medically refractory electrolyte abnormality

LONG-TERM OUTCOMES FOR CHILDREN WITH STEC-HUS

- Prognosis is usually favorable, but renal sequelae (proteinuria, hypertension, CKD) can persist in up to 30% of patients
- It is important that children have long-term follow up

Risk factors for renal sequelae:

- Longer duration of oliguria/anuria
- Need for renal replacement therapy

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