NICU Management of Hydrops Fetalis

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Objectives

- Definition
- Etiologies
- Resuscitation of the hydropic infant
- Management in the NICU
Hydrops: Definition

- Excessive accumulation of extracellular fluid in a fetus
- Subcutaneous edema (skin thickness > 5mm) plus two of the following:
  - Ascites
  - Pleural effusion
  - Pericardial effusion
  - Placental enlargement
Incidence

- 1 in 2500 to 3700 pregnancies
- May be as high as 1 in 800 pregnancies in referral centers
- Rare, but contributes to 3% of perinatal mortality
Pathophysiology

Sum of hydrostatic and osmotic forces determines net flow of fluid

Many different systemic disorders can affect these pressures and result in the clinical picture of hydrops
Etiology: Why Does It Matter?

- Determines prognosis
- Determines management of infant
- Helps predict future recurrence
## Etiology

<table>
<thead>
<tr>
<th>Immune</th>
<th>Nonimmune</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anemia from red cell alloimmunization</td>
<td>No evidence of red cell alloimmunization</td>
</tr>
<tr>
<td>10-20% hydrops</td>
<td>80-90% hydrops</td>
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</tbody>
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Immune Hydrops

Antigen incompatibility between mother and fetus ➔
Maternal sensitization ➔
Fetal hemolysis and anemia ➔
  ➢ cardiac failure
  ➢ decreased serum oncotic pressure ➔
Fetal hydrops
Immune Hydrops

- Well-defined cause
- Established diagnostic and therapeutic approach
- Good prognosis
- Decreased incidence since introduction of Rho (D) immune globulin
Nonimmune Hydrops

- Cardiovascular
- Chromosomal
- Syndromic
- Infection
- Hematologic
- Thoracic/Pulmonary
- GU
- Tumors
- TTTS
- GI
- Metabolic
- Idiopathic
Inborn Errors of Metabolism
Hematologic Disorders
Infections

Cardiovascular Disorders
Hematologic Disorders
Obstructed Venous Return

Placental Disorders
Urinary Flow Disorders

Lymphatic Dysplasia

Liver Failure

Heart Failure

Low Plasma Oncotic Pressure

High Central Venous Pressure

Volume Overload

Reduced Lymph Flow

High Interstitial Fluid

Nonimmune Hydrops Fetalis

Clinical Consequences

- Respiratory compromise
- Cardiac dysfunction
- Significant edema
- Intravascular volume depletion
- Very low reserve
Management of the Hydropic Infant

- Preparation for delivery
- Resuscitation
- Management in the NICU
Preparation for Delivery: Family Counseling

- Resuscitation procedures
- Prognosis
- Comfort care
Preparation for Delivery: Appropriate Equipment

- Intubation
- Umbilical Lines
- Resuscitation medications
- Paracentesis
- Thoracentesis and chest tube placement
Preparation for Delivery: Appropriate Personnel

- Nursing and respiratory staff
- Neonatologist
- Other pediatric subspecialists
The ABCs of Resuscitation: Airway

- Soft tissue edema
- Airway malformation
The ABCs of Resuscitation: Breathing

- Increased ventilatory pressures necessary
- Paracentesis to relieve pressure on diaphragm
- Thoracentesis and chest tube placement for pleural effusion
The ABCs of Resuscitation: Circulation

- Myocardial dysfunction
- Intravascular volume depletion
- Hypotension and poor perfusion
- Anemia
Resuscitation: Other Considerations

- Temperature control
- Hypoglycemia
- Acidosis
- Assessment of oxygenation
Management in the NICU

- Management of symptoms
- Search for etiology
- Counseling families
Supportive Care

- Respiratory
- Cardiovascular
- Fluids and electrolytes
- Hematologic
- Infectious disease
Diagnostic Evaluation

- Thorough physical exam
- Imaging studies
- Laboratory studies
- Infectious work-up
- Autopsy
Hemolytic Disease of the Newborn

- Antenatal management
  - Prevention is key
  - MCA dopplers
  - Intrauterine transfusion
  - Maternal plasma exchange/IVIG
Hemolytic Disease of the Newborn

- Postnatal management
  - Transfusion
  - Aggressive treatment of hyperbilirubinemia
  - Treatment of late anemia
Hyperbilirubinemia

- Adequate hydration
- Phototherapy
- IVIG
- Exchange transfusion
- Metalloporphyrins
Risk Nomogram for Hyperbilirubinemia

AAP Clinical Practice Guidelines 2004

UAMS
archildrens.org
ardeiatrics.org
arpediatrics.org
uams.edu
Guidelines for Phototherapy

AAP Clinical Practice Guidelines 2004

AAP
Clinical
Practice
Guidelines
2004

Graph showing the total serum bilirubin levels over age for different risk categories of infants.
Prognosis of Hydrops Fetalis

- Mortality for NIH ranges from 50% to 90% depending on underlying etiology.
- Best prognosis associated with HDN, fetal tachyarrhythmias.
- Poor prognosis with structural heart malformations, chromosomal abnormalities, syndromes.
Summary

- Hydrops fetalis is a rare but serious disorder with multiple possible etiologies.
- Significant planning and preparation is necessary prior to delivery.
- Resuscitation and NICU management present unique challenges.
- Important to search for and treat underlying cause.
References


References


