ASFA 2017 Annual Meeting
Apheresis Review Session

PATIENT CARE

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Disclosures

- No relevant disclosures
Summary

- Assessment / Monitoring
- Replacement Fluids
- Anticoagulation
- Medications / Drug Interactions
- Venous Access
- Fluid Balance
- Age-Related Considerations
- Adverse Reactions
Objectives

- Identify areas for pre-procedure assessment
- Understand the impact of fluid shift and fluid balance
- Consider the impact of medications, replacement fluids and anticoagulant
- Identify common adverse events
- List age-related issues
Although it has become almost routine clinically, it is an invasive procedure that can have significant physiologic consequences.”\(^3\)
Patient Care Principles: 1

Know basic science and patient care fundamentals

- ABO/HLA compatibility
- Coagulation
- Lab values
- Signs and symptoms of cardiopulmonary distress and electrolyte imbalances
- Responses to adverse reactions
Patient Care Principles: 2

Know disease pathology and treatment indications

- Disease and related therapy profiles
- Apheresis treatment efficacy
  - Guidelines on the Use of Therapeutic Apheresis in Clinical Practice¹
  - Risk / benefit ratio and priority
- Concurrent therapies

¹ Guidelines on the Use of Therapeutic Apheresis in Clinical Practice
Flow of Care

PRE
- Indication + Patient suitability
- Treatment Plan

DURING
- Patient Care

POST
- Patient Care
- Hand-off Communication
Pre-Procedure
Intake Patient Assessment

A thorough assessment allows for a safe treatment plan

- History & Physical
- Lab results
- Medications
- Vascular Access
Assessment: H & P

Comorbidities can create APH complications

- **Cardiopulmonary**
  - Risk of hypotension

- **Renal / Hepatic**
  - Poor citrate metabolism

- **Hematologic**
  - Risk of bleeding
  - Intolerance to fluid shifts
Assessment: Lab Results

Assess to determine disease progression, therapeutic response and the patient’s suitability for apheresis.

- **CBC** – ability to tolerate ECV, platelet loss
- **Renal / Liver** – ability to metabolize citrate
- **Electrolytes** – APH removes and chelates
Assessment: Medications

- Drugs with a low volume of distribution and high plasma protein binding are highly removed.²

- Drug Timing and Apheresis
  - Hold medication
    - Have extra dose on hand
  - Delay procedure
  - Concurrent IV meds – titrate

- ASFA Webinar: Medications and Apheresis – April 2013, Dr. Yanyun Wu
Assessment: Vascular Access

- **What is needed for optimal therapy?**
  - Procedure flow rate
  - Impact of flow interruptions
  - Sterility

- **What can the patient sustain?**
  - Length of therapy
  - Hx. venous thrombosis, immune status, skin integrity, physical limitations, life style, self-image, needle-phobia
Treatment Plan

- Frequency
- Total Blood + Extracorporeal Volume Limit
- Replacement Fluids
- Fluid Balance
- Anticoagulation
- Vascular Access
- Medications
- Blood Product Prime
Patient Preparation: Pre-Treatment

- **Informed Consent**
- **Education**
  - What to expect
    - How it feels, how long it takes, response
  - How to prepare
    - Hydration, medications, food
Patient Assessment: Day-Of

- **Current labs**
  - replacement needs

- **Changes in medications**

- **Changes in clinical status**

- **CVC inspection**
  - Perform PRIOR to loading procedural kit!!
  - Radiographic confirmation of correct placement
Intra-Procedure
Replacement Fluids

- Albumin
- Fresh Frozen Plasma
- Cryoprecipitate-poor Plasma
- Saline
- Red Blood Cells
Replacement Fluids

Advantages / disadvantages²

- Citrate reactions
- Risk of allergic reaction
- Risk of disease transmission
- Coagulation factors / plasma proteins
- Oncotic properties
- Cost
Fluid Balance

- **Project fluid balance pre-procedure!**
  - Net positive or Net Negative

- **Consider**
  - Orders to leave dry or wet
  - Impact to patient
  - Rinseback
  - Collect Pump speed
Anticoagulation: ACD-A

- **Monitor for electrolyte imbalances**
  - hypocalcemia, hypomagnesemia, hypokalemia, metabolic alkalosis

- **Citrate toxicity**
  - Easily managed when planned for
  - Consider anticoagulant in blood products

- **Can aggravate cardiac conditions**
  - Cardiac monitor
  - Frequent ionized calcium testing
Venous Access: peripheral

- Patient preparation
- Site selection
- Site preparation
- Arm immobilization
- Secure cannula
- Limit manipulation
- Apply pressure after removal
Venous Access: central

- **Use proper care and feeding of CVC device to diminish patient anxiety and deliver successful therapy**
  - Right device, patency, site condition
  - Before preparing instrument!

- **Limit manipulation**
  - Infection risk
Monitoring

- **Vitals Signs**
  - BP, HR, R, T
  - Typically every 15-30"
  - More frequently with blood products

- **Oxygen saturation**

- **Cardiac monitoring**
  - IV calcium, unable to communicate

- **Visual and verbal assessment**
Adverse Events – Top 5

**Overall Rate 4-5%[^3]**
- Transfusion reactions
- Citrate-related nausea/vomiting
- Hypotension
- Vasovagal
- Pallor
<table>
<thead>
<tr>
<th>Adverse Events¹</th>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parasthesia, pallor, dizziness, sweating, n/v, transient hypotension</td>
<td>Hives, hypocalcemia, wheezing, tongue/facial swelling, SOB</td>
<td>Convulsions, tetany, laryngeal edema, cardiopulmonary arrest</td>
</tr>
<tr>
<td></td>
<td>Responds to nursing intervention</td>
<td>Mild reactions that don’t respond to nursing intervention, Required Physician Presence</td>
<td>Requires significant medical intervention</td>
</tr>
<tr>
<td></td>
<td>Medication, pause procedure, resume</td>
<td>Medication, pause or stop procedure, may or may not resume</td>
<td>Medication + Rapid Response, terminate procedure</td>
</tr>
</tbody>
</table>

¹ Adverse events are categorized based on severity and response to intervention.
Adverse Events

Allergic Reactions

- **Blood products**
  - Transfusion reaction (acute or delayed)
  - TRALI
  - TACO

- Hydroxyethyl Starch (HES)

- Ethyleneoxide (ETO)
Citrate Toxicity

- **Signs and Symptoms**
  - Parasthesias (perioral and systemic)
  - Light-headedness
  - Shivering
  - Pallor
  - Twitching, muscle cramps, tetany
Citrate Toxicity: Management

- **Calcium replacement**
  - Prophylactic or as needed
  - Oral or IV

- **Routine or as needed iCa testing**

- **Use slower flow rates**

- **Combination anticoagulant**
  - Heparin + ACD-A
Adverse Reactions: Volume

- **Hypotension**
  - ↑ HR, ↓ BP

- **Vasovagal**
  - ↓ HR, ↓ BP

- **Consider**
  - Use slow initial flow rate
  - Use slower rates with fragile populations
  - Pregnant – left side positioning
Fluid Shift: Photopheresis

![Graph showing fluid shift during photopheresis with labeled stages: Start Collect, Start Buffy, Start Photo, and End Buffy.]
Fluid Shift: Photopheresis

BLOOD PRIME

Start Patient Processing → End Buffy → Start Reinfusion

Fluid Shift: Photopheresis
Disease-Related Issues

- GCSF / chemo mobilization
- Pathologic pain
- Emotional State
- Electrolyte imbalance
- Blood Product dependency
- Immune system status
- Temperature regulation: CAD
Pediatric Considerations

Wee people are not small adults!

- Vital signs vary by age and sex\textsuperscript{4,5}
- ECV is relative to size:
  - kit volume is static
  - total blood volume varies
- Blood volume calculations vary with age\textsuperscript{2}
- Developmental stage
- Vascular access is challenging
Older Adults

How will the older adult tolerate ECV, fluid shifts, citrate toxicity and adverse events?

- Diminished renal function and metabolism
- Poor vascular access
- Increased comorbidities
- Diminished reserve
Instrument / Kit Malfunction

- **Instrument Malfunction**
- **Loss of kit integrity**
- **Prime concern is the patient!**
  - Minimize patient impact
  - Provide reassurance

**Consider**
- Infection risk, blood loss
- Sub-optimal treatment or no treatment
Post-Procedure
Final Assessment

- Vital Signs
- Final Fluid Balance
- Post Labs: CBC, fibrinogen, INR,
- Concise hand-off
  - May need to explain implication of final assessment to receiving provider!
Patient Education

- **Call for immediate and delayed reactions**
- **Self-assess for**
  - Bleeding
  - Syncope
  - Respiratory + cardiac symptoms
- **What to expect**
  - Fatigue, photosensitivity, bone pain, cytopenia
  - Improved clinical status (hopefully!)
Be Prepared!

Know what to expect
Know your response plan
Know your exit strategy
Citations


Thank You!