Hemostasis Management Associated with Therapeutic Plasma Exchange: Results of a Practice Survey

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Hemostasis in Patients

- Plasma components
  - Primary hemostasis - von Willebrand factor
  - Secondary hemostasis
    - Procoagulants - factor VII, factor X, fibrinogen
    - Anticoagulants - antithrombin, protein C, protein S

- Decreased baseline factor levels - liver disease, congenital deficiency

- Medications
  - Antiplatelet therapy - aspirin, clopidogrel
  - Anticoagulants - warfarin, heparin, rivaroxaban

- Acquired risk factors
  - Bleeding - surgery, injury, thrombocytopenia
  - Thrombosis - immobility, central venous catheter
Hemostasis and Therapeutic Plasma Exchange (TPE)

- Replacement with albumin and saline
  - ↓coagulation factor levels
  - ↑clotting times (INR, PTT, TT)
- ↓platelet count
- Activates fibrinolysis
- Removal of circulating anticoagulants
- Anticoagulation during procedure (heparin, citrate)

Hypotheses

1. Variation exists in the frequency and extent of hemostasis monitoring in patients undergoing TPE.
2. Variation exists in how TPE is managed, including replacement fluid, in patients with bleeding or thrombotic risks.

Goals

1. To examine different management approaches to hemostatic issues pertinent to TPE that may lead to improved practice.
2. To identify future research projects.
Methods

On line survey developed by Coagulation Subcommittee of Applications Committee
37 questions, multiple with subparts
Beta tested by selected members of ASFA
Survey Monkey
Sent to >5,000 on ASFA distribution lists
Initial release date 2/12/2016
One response/institution analyzed
THANK YOU FOR TAKING THE SURVEY!
Responses

167 Responses

40 duplicates removed

127 responses
1st question

Demographics and laboratory testing

112 responses
27th question

TPE methods and management of patients

74 responses
37th (last) question
Demographics

Type of Institution % (n=125)
- Academic medical center: 65.6%
- Blood collection facility: 6.4%
- Contract provider of apheresis: 8.8%
- Non-academic medical center: 12.8%
- Other: 6.4%

Number of Procedures/Year % (n=122)
- <100: 39.3%
- 100-500: 35.2%
- 500-700: 15.6%
- >700: 9.8%

Physician Specialty % (n=108)
- Pathology: 43.5%
- Hematology: 21.3%
- Nephrology: 14.8%
- Pediatrics: 12%
- Other: 3.7%
- I am not a physician: 4.63%

Perform TPE on Children % (n=124)
- Yes: 33.9%
- No: 66.1%
Method of TPE

Anticoagulant, % (n=110)
- ACD-A Anticoagulant citrate dextrose solution A: 93.6%
- ACD-A and heparin: 1.8%
- Heparin: 1.8%
- Other: 3.6%

Cell Separation Method, % (n=112)
- Centrifugation: 95.5%
- Membrane filtration: 2.7%
- Centrifugation and membrane filtration: 1.8%
- Other: 1.8%

Volume of TPE, % (n=111)
- 1: 63.1%
- 1.3: 10.8%
- 1.5: 12.6%
- 2: 11.7%
- Other: 1.8%
Do you obtain laboratory studies?

- No
- Yes, rarely
- Yes, some patients
- Yes, almost all

Outpatients (n=120)
Inpatients, (n=118)
When are laboratory tests obtained?

<table>
<thead>
<tr>
<th></th>
<th>Fibrinogen (n=105) (%)</th>
<th>INR (n=101) (%)</th>
<th>PTT (n=99) (%)</th>
<th>Hemoglobin or Hematocrit (n=109) (%)</th>
<th>Platelet Count (n=108) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not routinely obtained</td>
<td>29.5</td>
<td>34.7</td>
<td>37.4</td>
<td>1.8</td>
<td>9.3</td>
</tr>
<tr>
<td>Obtained only prior to the first procedure</td>
<td>1.9</td>
<td>11.9</td>
<td>10.1</td>
<td>8.3</td>
<td>9.3</td>
</tr>
<tr>
<td>Obtained prior to some but not all procedures</td>
<td>38.1</td>
<td>35.6</td>
<td>34.3</td>
<td>29.4</td>
<td>29.6</td>
</tr>
<tr>
<td>Obtained prior to all procedures</td>
<td>30.5</td>
<td>17.8</td>
<td>18.2</td>
<td>60.6</td>
<td>51.8</td>
</tr>
</tbody>
</table>
## Laboratory Threshold Values

<table>
<thead>
<tr>
<th>Threshold Level</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrinogen &lt;100 mg/dL</td>
<td>66.2</td>
</tr>
<tr>
<td>INR &gt;1.5</td>
<td>21.3</td>
</tr>
<tr>
<td>PTT &gt;reference range</td>
<td>26.7</td>
</tr>
<tr>
<td>PTT &gt;1.5 times reference range</td>
<td>(tied)</td>
</tr>
<tr>
<td>Hemoglobin or Hematocrit &lt;7g/dL or 21%</td>
<td>31.0</td>
</tr>
<tr>
<td>Platelet count Other &lt;50x10⁹/L</td>
<td>26.8</td>
</tr>
<tr>
<td></td>
<td>23.3</td>
</tr>
</tbody>
</table>
A patient presents for TPE and has the following associated situations present. A series of 5 TPE approximately every other day are scheduled.

- No history of bleeding or clotting disorder (n=98)
- Active bleeding (n=99)
- Bleeding due to coagulation factor deficiency (n=95)
- Platelet disorder (inherited or acquired) (n=95)
- Hypofibrinogenemia (<100mg/dL) due to recent TPE (n=95)
- Liver disease with mildly elevated INR (1.5-2.0) (n=92)
- No history of bleeding or clotting disorder (n=98)
A patient presents for TPE and has the following associated situations present. A series of 5 TPE approximately every other day are scheduled.
Conclusions

These survey results demonstrate there is wide variation in hemostasis management associated with TPE treatment among institutions.

There are differences in the frequency, type, and threshold laboratory values for necessitating intervention by apheresis personnel.

There are differences in the selection of replacement fluid.