Tandem Procedures Associated With Therapeutic Apheresis: A Multidisciplinary Approach At A High Volume Pediatric Center

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DISCLOSURE
Rachel Sirignano

• Relevant Financial Relationships:
  • None

• Relevant Non-Financial Relationships:
  • None
BACKGROUND

• The epidemiology, safety, and efficacy of multiple extracorporeal therapies performed in tandem is not well described.
  • Dyer et al. reported single center experience with tandem procedures in 2014
  • 53 pediatric patients underwent 217 procedures
  • 77% received tandem therapy for TAMOF
  • Complications: 47% hypocalcemia and 22.1% hypotension

• Outstanding questions:
  • Type of team managing patients?
  • Impact of additional circuits?
  • Other clinical indications?
PURPOSE

• Goal: Describe use of tandem procedures in a high volume institution that utilizes a multidisciplinary approach to provide therapeutic apheresis (TA).

• TA is performed collaboratively with:
  • ECMO/Advanced Technologies
  • Critical Care
  • Transfusion medicine specialists
  • Various pediatric sub-specialists
METHODS

• Retrospective chart review of patients receiving multiple extracorporeal therapies in tandem from January 1, 2012 through October 31, 2015.

• Large pediatric hospital across multiple units (ICU, inpatient and OR).

• Data collected included: type of extracorporeal procedures, weight, age, admitting diagnosis, ASFA indication, procedural setting, procedure related complications, procedure related mortality and case mortality.
METHODS

• Procedure related complications were defined as any clinical issue that occurred to the patient as a direct result of the TA within 24 hours of the procedure.

• Procedure failure was defined as the inability to complete the TA procedure.
# RESULTS

## Table 1: Demographics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Patients</td>
<td>53</td>
</tr>
<tr>
<td>Total Procedures</td>
<td>180</td>
</tr>
<tr>
<td>Patient Age</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>2 months old</td>
</tr>
<tr>
<td>Mean</td>
<td>14 years 8 months old</td>
</tr>
<tr>
<td>Maximum</td>
<td>21 years 4 months old</td>
</tr>
<tr>
<td>Patient Weight (kg)</td>
<td>Total Procedures (#)</td>
</tr>
<tr>
<td>&lt;10</td>
<td>11</td>
</tr>
<tr>
<td>10-20</td>
<td>55</td>
</tr>
<tr>
<td>&gt;20</td>
<td>114</td>
</tr>
<tr>
<td>Case Mortality</td>
<td>11 patients (21%)</td>
</tr>
</tbody>
</table>
TANDEM PROCEDURES

hemofilter

IV pump/urometer based system

membrane oxygenator

roller pump

ECMO bladder

Commercial CRRT system

Optia Centrifuge
RESULTS

TA TANDEM PROCEDURES

- CVVH: 59%
- Multi Tandem: 21%
- CPB: 16%
- ECMO: 3%

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RESULTS

ASFA (6th Special Issue) INDICATIONS

25% Cat I

75% Cat III

Total Procedures

Renal Transplant
ANCA-Assoc RPGN
Leukostasis
Cardiac Transplant
Sepsis with MOF
AIHA
Acute Liver Failure

INDICATIONS

Renal Transplant
Cardiac Transplant
ANCA-Assoc RPGN
Sepsis with MOF
Leukostasis
AIHA
Acute Liver Failure
## RESULTS

### Table 2: Patient Complications

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total Procedures (#)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment Complications</strong></td>
<td></td>
</tr>
<tr>
<td>Air-in-Line</td>
<td>1</td>
</tr>
<tr>
<td>Clot</td>
<td>4</td>
</tr>
<tr>
<td>Pump Malfunction</td>
<td>3</td>
</tr>
<tr>
<td><strong>Patient Related Complications</strong></td>
<td></td>
</tr>
<tr>
<td>Hypocalcemia</td>
<td>1</td>
</tr>
<tr>
<td>Seizure</td>
<td>1</td>
</tr>
<tr>
<td>Hypotension</td>
<td>2</td>
</tr>
<tr>
<td>Hemorrhagic Stroke</td>
<td>2</td>
</tr>
<tr>
<td>Cardiac Arrest</td>
<td>2</td>
</tr>
</tbody>
</table>
RESULTS

• Procedure failure rate was 1% (2 procedures).

• Procedure related mortality was 0%.

• Case mortality rate was 21% (11 patients).
CONCLUSION

• Tandem procedures are being used in a variety of clinical conditions in pediatrics.

• The cohort of patients receiving these therapies is often quite ill, with at least single organ failure, and overall mortality is higher than typical TA patients.

• The high percentage of procedures outside of category I or II underscores the emerging nature of tandem extracorporeal therapies in pediatrics and emphasizes the need for further investigation of their use and expanding the guidelines to include this population.
• In our center, complications occur at a low rate, but with some severity. Additional investigation into these complications is necessary.

• A multidisciplinary team, focused on both the patient’s underlying condition, as well as the apheresis therapy works well at our center to provide these therapies to very sick children.

• Best practices in providing these tandem procedures should be developed from multiple centers in order to minimize morbidity and improve care.
QUESTIONS ?