Report of the ASFA Apheresis Registry Study on Neuromyelitis Optica
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- S. Morgan, American Red Cross; University of Minnesota
- Y. Wu, Yale, Puget Sound Blood Center
- H. P. Pham, Columbia University and NYBC; University of AL
- C. Yamada, University of Michigan
- L. Cooling, University of Michigan
- J. Hofmann, Pacific Medical Center
- Haewon C. Kim, Children’s Hospital of Philadelphia
- M. Pagano, Puget Sound Blood Center
- J. Schneiderman, NorthWestern University
- B. Sachais, University of Pennsylvania
- J. Schwartz, MD, Columbia University
- J L. Winters, MD, Mayo Clinic
- E. C.C. Wong, Children’s National Health System, DC
Introduction

- Neuromyelitis Optica: a rare inflammatory neurologic disease in which approximately 85% of patients have an identified antibody to aquaporin-4 (AQP4), also known as NMO-IgG.

- AQP4 is the principle water channel on astrocyte foot processes at the blood brain barrier and binding by IgG results in blood-brain barrier disruption, oligodendrocyte death, myelin loss and neuron death.
Introduction

- Symptoms include myelitis (paraparesis and sensory loss below the lesion, sphincter loss, abnormal sensations including burning pain/pins and needles) and optic neuritis (ocular pain, visual field deficits, and positive phenomena/distortions)

- 15% of patients also experience symptoms of hypothalamic and brainstem involvement (hiccups, intractable nausea, and respiratory failure)
The diagnostic criteria for NMO state that a patient must have the following:

1. optic neuritis
2. acute myelitis
3. at least two of the three following elements:
   a. MRI showing contiguous spinal cord lesions extending three or more vertebral segments
   b. nondiagnostic brain MRI for multiple sclerosis
   c. NMO-IgG seropositive status
Introduction

- NMO-IgG seropositivity is reported to have a sensitivity of 76% and a specificity of 94% and is a strong predictor of a relapsing course.

- It is postulated that the removal of NMO-IgG through therapeutic plasma exchange (TPE) is beneficial in NMO exacerbations.
Introduction

- Most of the studies applying TPE for NMO have been based on case reports or small case series

Here we report the collective experiences through the ASFA apheresis registry study on NMO
Methods

- The ASFA apheresis registry study on NMO is a multi-centered study.
- Both prospective and retrospective data with the latter involving data collection back to January 2000 are allowed in the registry.
- Study data were collected and managed using REDCap electronic data capture tools hosted at Children’s National Health System. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies.
Methods

- The registry includes patient demographic and clinical information, apheresis procedural information, treatment schedule, and treatment outcome/complications.

- All participating sites had obtained approval from the ASFA apheresis registry subcommittee of the ASFA Applications committee as well as from local IRBs.
Results

- To date, a total of one pediatric and four adult centers have enrolled patients in this study.
- Based on Census Bureau defined regions, 40% (2/5) and 60% (3/5) of the institutions are located in the Midwest and Northeast, respectively.
- 17 patients total; 94% (16/17) female, 6% (1/17) male.
- 94% (16/17) adult; 6% (1/17) pediatric.
### Results

<table>
<thead>
<tr>
<th></th>
<th>Subject No.</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
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</thead>
<tbody>
<tr>
<td>Age at diagnosis</td>
<td>17</td>
<td>45.6</td>
<td>13</td>
<td>66</td>
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<tr>
<td>Age at first study TPE*</td>
<td>17</td>
<td>46.4</td>
<td>19</td>
<td>67</td>
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</tbody>
</table>

*Three patients from one institution reported that they had received prior TPEs before the first study TPE. Other patients reported the first study TPE to be their first TPE.
Results

- The average time from diagnosis to first study TPE procedure was 0.8 years (range 0 to 12) with the trend for more recent diagnosis to have a shorter time to first TPE.
- The most common clinical symptom prior to initiation of TPE was blindness which occurred in 82% (14/17) of patients.
- Interestingly, two patients had “NMO-like symptoms” that did not meet “NMO criteria” several years before a NMO diagnosis.
Results

- A total of 30 courses of treatment (COT) were recorded.
- The average COT consists of 5 (range 3 to 7) TPE.
- Patients received a mean of 2.5 COT (range 1 to 6) for a total of 162 TPE in the database.
Results

- The most common TPE COT was every other day including weekends
  - one center reported one COT of daily TPE
  - one center reported one COT of three daily followed by four every other day
  - one center reported two COTs that were maintenance schedules of once per week for several months
Results

- All centers reported 1-1.25 plasma volume exchanges for each TPE procedure
- All of the TPEs used ACD-A as anticoagulant
- 67% (108/162) had Ca supplement (of some form); 33% (54/162) did not have Ca supplementation
- 0% had RBC priming performed
Results

- 99.4% (161/162) of TPEs were performed with 100% fluid balance; 0.6% (1/162) of TPE were performed with 110% fluid balance for pre-TPE hypotension.

- Interestingly, the average pre-procedural BP was 122 (range 93-186) systolic over 69 (range 62-81) diastolic, HR 78 (range 48-119)*

- The average post-procedural BP was 111 (range 53 to 155) systolic over 63 (range 40-95) diastolic, HR 83 (range 45-136)

* Two data points omitted due to possible wrong entry.
Results

- 99% (160/162) of TPEs used 5% albumin as the primary replacement fluid
  - Exception: plasma was used for two procedures after kidney biopsies

- 16% (26/162) of TPEs added normal saline as a secondary replacement fluid
Results

- 6% (1/17) patients had femoral access, 17.5% (3/17) had subclavian access, 17.5% (3/17) had peripheral access, 59% (10/17) had internal jugular access

- 15% (24/162) had an adverse event, most common category “other”, line-related: pain, bloody drainage, tPA, reversal
Results

- A clinical status assessment (from pre-TPE baseline to within ten days of last TPE in a series) showed:
  - no improvement in 3% (1/30)
  - mild improvement in 47% (14/30)
  - moderate improvement in 40% (12/30)
  - marked improvement in 10% (3/30)
- 43% (13/30) of COTs reported relapses with an average of ten months (range one to 36) since last TPE
Conclusion

- 94% (16/17) of patients with NMO who underwent therapeutic plasma exchange had a positive outcome in terms of from pre-TPE baseline to within ten days of last TPE in a series.

- As a first report of the ASFA apheresis registry study, we demonstrated the value of using this registry to collect apheresis related patient outcome from multiple centers.
Future Planning

- Continuation of data analysis (by what day of TPE did most patients show improvement, what possible factors dictate no improvement vs. mild vs. marked improvement)
- ASFA apheresis registry study on NMO will remain open for data collection through fall 2015
- Please contact the ASFA apheresis registry if you are interested in submitting your institution’s data on NMO patients
QUESTIONS?