Do We Really Need Calcium Supplementation in Therapeutic Plasma Exchange?

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Speaker Disclosures

- TerumoBCT
  - One day conference registration fee
Introduction

- University of California – Davis Medical Center
  - 600+ bed, tertiary care hospital
  - Inland northern California’s only level I trauma center
  - Full service apheresis department
    - Approximately 600 apheresis procedures per year
    - ~200 TPE’s per year
Problem

- Standard TPE practice
  - 3 grams of calcium gluconate in 100 ml NS throughout TPE
  - 100-200 mg IV push PRN if patient exhibited signs of citrate toxicity

- Intravenous calcium gluconate shortage – 2013
  - Do we need to continue any calcium prophylaxis?
  - Will oral calcium prophylaxis be sufficient?
Problem

- Calcium supplementation in TPE is not standardized
- Spectra Optia® may need less calcium supplementation than other instruments

Pilot Study

- **Patient #1**
  - Adult female patient with CIDP
    - >20 asymptomatic treatments prior to the shortage
    - 1 symptomatic procedure with no prophylaxis
    - 2 asymptomatic procedures with oral prophylaxis

- **Patient #2**
  - Adult male patient with renal graft humoral rejection
    - Seven asymptomatic procedures prior to the shortage
    - Four asymptomatic procedures with oral prophylaxis
Pilot Study

- Cost analysis
  - Significant savings
    - Oral prophylaxis ~$0.04 (1500mg CaCO3)
    - Intravenous prophylaxis ~$5.71 (3g IV CG)

Study Questions

• How does citrate toxicity affect our TPE patients?
• Are we using hospital resources efficiently?
Study Design

- Retrospective chart review
- 127 total TPEs
  - January – June 2013
- Patients separated into three groups
  - Calcium gluconate 3g IV
    - Drip throughout procedure
  - Calcium Carbonate 1500mg oral
    - Pre-procedure
  - No calcium supplementation
Study Methods

• Observation of variables:
  • Pre-procedure ionized calcium
  • Self-reported symptoms of citrate toxicity
    • Peripheral tingling, numbness, nausea
    • Symptomatic patients received additional calcium supplementation

• Cost analysis
Study Results

Demographics:
- 8 females
- 10 males
- Average of 7 procedures per patient
- Mean age 44 (range 4-73 years)
Study Results

- Means, ionized calcium levels
  - Non-symptomatic procedures:
    - Pre-procedure: 1.15 ± 0.10 mmol/L
    - Post-procedure: 1.12 ± 0.12 mmol/L
  - Symptomatic procedures:
    - Pre-procedure: 1.22 ± 0.17 mmol/L
    - Post-procedure: 1.32 ± 0.16 mmol/L

- Symptomatic rates:
  - Overall: 6% (8/127)
  - IV CG: 3.5% (3/85)
  - PO CC: 0% (0/8)
  - No supplementation: 60% (3/5)
Study Results

- Cost analysis
  - 3g IV CG with IV set = $7.81
  - 1500mg PO CaCO3 = $0.04
  - Annual costs (~200 TPEs/yr):
    - $1562 for IV CG
    - $8 for PO CaCO3
Further Directions

- Ongoing prospective control study
  - Patients separated into two groups
    - Oral prophylaxis
    - Intravenous prophylaxis

- 2g CaCO3 oral prophylaxis, N = 12
  - All asymptomatic

- 2g IV CG prophylaxis, N = 25
  - Symptomatic rate 4% (1/25)
Conclusions

- Citrate toxicity is the predominant complication of TPE procedures
- PO CaCO3 may be equivalent to IV CG as a supplementation method
- Availability and cost of PO CaCO3 are superior to IV CG
- Oral supplementation should be considered as a standard in patients who can tolerate oral medications
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