Vitamin C Therapy in Sepsis

Controversies in Critical Care

Racquel Rivera, PharmD, BCPS
Clinical Pharmacy Specialist – Critical Care
Sentara Norfolk General Hospital
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Disclosures

• *Nothing to disclose*
Learning Objectives

• Review other therapies tried for Sepsis

• Review literature regarding Vitamin C in Sepsis
Therapies Used in Sepsis

Figure 1. Therapeutic efficacy of mediator-targeted therapy for sepsis. Pooled data

Learning Assessment Question

Which of the following therapies have been studied in sepsis?

A. Drotrecogin Alfa (Xigris)
B. Early goal directed therapy
C. Immune Globulin
D. All of the above
Reduction of Resuscitation Fluid Volumes in Severely Burned Patients Using Ascorbic Acid Administration

- Prospective, Randomized Single Center Study in Japan
- 37 consecutive patients with burns greater than 30% BSA
- No pre-existing coagulopathy, hepatic, respiratory, cardiac, or renal dysfunction
- Intervention: 66 mL/kg/hour of ascorbic acid for 24 hours (1.6 g/kg/day)

Figure 2. The 24-hour resuscitation fluid volume requirement and urine output in both groups. Data are given as mean ± SD. Fluid volume requirement in the control group was 5.5 ± 3.1 mL/kg per percentage of total body surface area (TBSA) burn, whereas the ascorbic acid group required only 3.0 ± 1.7 mL/kg per percentage of TBSA burn, representing a 45.5% reduction. Asterisk indicates P<.05 compared with the ascorbic acid group.

Phase I safety trial of intravenous ascorbic acid in patients with severe sepsis

Alpha A Fowler III, Aamer A Syed, Shelley Knowlson, Robin Sculthorpe, Don Farthing, Christine DeWilde, Christine A Farthing, Terri L Larus, Erika Martin, Donald F Brophy, Seema Gupta, Medical Respiratory Intensive Care Unit Nursing, Bernard J Fisher and Ramesh Natarajan

- Prospective, Randomized, Double-Blind Placebo controlled, Single Center Study in Virginia
- 24 patients randomized into 3 groups (8 – Placebo, 8 – Low dose ascorbic acid 50mg/kg/day, and 8 – high dose ascorbic acid 200 mg/kg/day)
- Intervention: ascorbic acid given IV in divided doses every 6 hours for 96 hours
- Primary Endpoints: Ascorbic Acid Safety and Tolerability
- Results: No patients withdrew due to study-related adverse effects
Procalcitonin Levels

Original Article

**Effect of high-dose Ascorbic acid on vasopressor’s requirement in septic shock**

Mohadeseh Hosseini Zabet¹, Mostafa Mohammadi², Masoud Ramezani², Hossein Khalili¹

- Prospective, Double-Blinded, Randomized, Single Center Study in Iran
- 28 surgical critically ill patients with septic shock requiring vasopressor therapy to maintain MAP > 65
- Intervention: Ascorbic Acid 25 mg/kg IV every 6 hours for 72 hours
- Primary Outcome: Vasopressor dose and duration

Effect of high-dose Ascorbic acid on vasopressor's requirement in septic shock

- **Vasopressors (hrs)**
  - **p=0.007**
  - **Vit-C**
  - **Placebo**

- **Mortality (%)**
  - **p=0.009**
  - **Vit-C**
  - **Placebo**
Now Available IV
Hydrocortisone, Vitamin C, and Thiamine for the Treatment of Severe Sepsis and Septic Shock
A Retrospective Before-After Study

Paul E. Marik, MD, FCCP; Vikramjit Khangoora, MD; Racquel Rivera, PharmD; Michael H. Hooper, MD; and John Catravas, PhD, FCCP
Patient Population

**Treatment Group**
- January 2016 to July 2016 (7 months)
- All consecutive pts adm. to MICU with primary diagnosis of sepsis
- Procalcitonin (PCT) > 2ng/ml
- Rx: Vitamin C protocol within 24 hours ICU admission

**Control Group**
- June 2015 to December 2015 (7 months)
- All consecutive pts adm. to MICU with primary diagnosis of sepsis
- Procalcitonin (PCT) > 2ng/ml
- Standard evidence based management strategy during both time periods
Management Strategy

• Broad spectrum antibiotics then deescalation
• Physiologic based conservative approach to fluids and vasopressors
• Lung protective ventilatory strategy
• Bolus feeding, whey-based nutritional formula after 24 hours
• Permissive hyperglycemia
• DVT prophylaxis with enoxaparin and SCD
• No stress ulcer prophylaxis
• Limited sedation, Early mobility
• Procalcitonin and lactate daily for 4 days
Learning Assessment Question

True or False

The dosing of vitamin C used in sepsis trial at Sentara was higher than doses used in severely burned patients.
How?
Hydrocortisone and Ascorbic Acid Synergistically Prevent and Repair Lipopolysaccharide-Induced Pulmonary Endothelial Barrier Dysfunction

Nektarios Barabutis, PhD; Vikramjit Khangoora, MD; Paul E. Marik, MD; and John D. Catravas, PhD
Future Directions

Vitamin C, Thiamine and Steroids in Sepsis:
A Randomized, Double-Blind, Parallel Group
Study
in Critically Ill Patients with Sepsis:
The VICTAS Study
Questions?

Racquel Rivera, PharmD, BCPS
Clinical Pharmacy Specialist – Critical Care
Sentara Norfolk General Hospital
rjrivera@sentara.com