Amiodarone for new-onset atrial fibrillation in critical illness (NAFCI): Old phenomenon, new perspectives

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Objectives

Epidemiology

- Atrial Fibrillation (AF) is the most common arrhythmia encountered in the ICU
- Incident of NAFCI is 5-15%
- In a study investigating patients with sepsis, those who developed NOAF had a hospital mortality rate of 44% versus 22% for those who did not
- Associated with increased mortality and morbidity
- AF recurrence rates of ~50% within 1 year following hospital discharge

What is NAFCI?

- AF with a rapid ventricular response (RVR) of >100 beats per minute (bpm) in patients without a previous history of AF
- Triggered by accelerated atrial remodeling and arrhythmogenic triggers encountered during critical illness
- Characterized by acute loss of atrial systole and onset of rapid ventricular rates
- Marker of disease severity
- Associated with both short and long term increases in risk of stroke, HF, and death

Why NAFCI?

- Guidance on management of AF is based on the evidence obtained in the general population and does not include patients in intensive care
- Therapeutic strategies extrapolated from studies involving non-critically ill patients may not be generalizable
- Substantial practice variation in the choice of strategies for management of NAFCI

Patient Case

Patient case – Background

- 89 year-old female presenting with strangulated femoral hernia s/p femoral hernia repair with small bowel resection with primary anastomosis
- Post-op c/b aspiration and acute respiratory failure requiring reintubation in PACU
- PMH:
  - COPD
  - CKD III
  - HFpEF
- NKA

Patient Case - Medications

- Home medications:
  - Atorvastatin 40 daily
  - Furosemide 40 mg daily
Current medications:
- Albuterol 0.083% inhalation solution 2.5 mg 3 mL Neb every four hours
- Famotidine 20 mg IV daily
- Heparin 5000 units three times daily
- Norepinephrine 0.1 mcg/kg/min
- Fentanyl 25 mcg/hr
- LR 100 mL/hr
- Metronidazole 500 mg IV every 8 hours
- Cefazolin 1 g IV every 8 hours

Patient Case
- Cardiovascular
  - Irregularly irregular, tachycardic
- Respiratory
  - Bibasilar Crackles
  - Ventilation: PSV
- Abdomen/GI
  - Distended
  - Surgical wound dressing to the L inguinal area
- Extremities
  - Edema
- Neurologic
  - Glasgow Coma Scale 11T
  - Richmond Agitation-Sedation Scale
    - (RASS): Alert and calm 0

Patient Case – ICU Day One Labs
- WBC: 7.4
- Na = 147
- K = 3.9
- Mg = 1.9
- Scr = 1.1
- Lactate = 2.3

Patient Case – ICU Day One
- ECG 12-Lead
  - QTc 487
  - QRS 118
  - Atrial fibrillation with RVR
-
• ECHO
  • Left ventricle is normal in size
  • 65-70%

12 NAFCI

13 Patient Factors
  • Advanced age
  • Male sex
  • Obesity
  • Fluid overload
  • Hypoxemia
  • Hypotension
  • Anemia
  • Acid-base abnormalities
  • Electrolyte abnormalities
  • Disease severity

14 AF: Mechanisms

15 Critical Illness and Atrial Remodeling
  • Infection
  • Inflammation
    • Sepsis
    • Post-operative

16 AF Triggers during Critical Illness
  • Vasopressor agents
  • Electrolyte derangements
  • Greater disease severity
  • Volume overload

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18 Clinical Consequences of NAFCI
  • Coordinated depolarization and contraction of the heart is disrupted
    • Loss of “atrial kick”
      • Impaired cardiac output

19 Acute Management of NAFCI

20 Treatment Outline

21 Proposed NAFCI Treatment Algorithm

22 Address Modifiable Risk Factors
- Electrolyte abnormalities
- Hypoxemia
- Fluid overload
- Dehydration
- Underlying conditions
- Adrenergic overstimulation
- Hemodynamic instability

23 Rate versus Rhythm Control

1 Rate Control
2 - Persistent AF
   - Oligosymptomatic
   - Age ≥ 65
   - Hypertension
   - No history of HF
   - Previous failure of an antiarrhythmic drug
   - Patient preference

3 Rhythm Control
4 - Paroxysmal AF
   - NOAF
   - Ongoing symptoms
   - Age <65
   - HF exacerbated by AF
   - Tachycardia-mediated cardiomyopathy
   - Difficulty achieving rate control

25 NAFCI Antiarrhythmic Practice Variability

1 United States (2010-2013)
2 - CCB (36%)
   - BB (28%)
   - Digoxin (20%)
   - Amiodarone (16%)

3 United Kingdom (2017)
4 - Amiodarone (>80%)
   - BB (12%)

26 Anticoagulation in NAFCI

- CHADS2, CHA2DS2-VASc and HAS-BLED have not been validated in ICU populations
- Lack of clear benefit and the potential for harm
- In NAFCI during sepsis without planned cardioversion, we don’t currently recommend routinely initiating parenteral anticoagulation thromboembolism
prophylaxis during the acute phases of critical illness

27 Amiodarone in NAFCI
CHOICE OF AMIODARONE IN ICU PATIENTS IS CHALLENGING DUE TO INTERPATIENT HETEROGENEITY AND LIMITED KNOWLEDGE OF OPTIMAL DOSING IN THIS SETTING

28 Amiodarone

29 Amiodarone – 3 Compartment Model

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34 Patient Case
NAFCI WITH SEPTIC SHOCK

35 Patient Case – Afib with RVR

36 Patient Case – AF with RVR

37 Patient Case – Heart Rate

38 Conclusion
• Patients with NAFCI increases the risk of recurrent AF, which then increases the risk of long-term poor outcomes
• Lack of high-quality evidence to guide the management of critically ill patient with NOAF
• Prompt treatment of underlying medical conditions and correction of modifiable risk factors is the first step
• Currently unclear whether non-cardiac critically ill patients with new-onset AF should be anticoagulated to prevent arterial thromboembolic events

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