# TRANSIENT CONGESTIVE HEART FAILURE DURING AN IV IRON INFUSION

RACHEL ALDER, M2

UNIVERSITY OF MANITOBA, MAX RADY FACULTY OF MEDICINE

SEPTEMBER 2, 2020

# BACKGROUND INFORMATION: ANEMIA AND CKD

- Anemia and iron deficiency anemia are common in patients with chronic kidney disease, especially those with an eGFR <60 mL/min
- CKD specific causes include
  - Deficient iron intake
  - Chronic blood loss
  - Chronic inflammatory state
  - Erythropoiesis stimulating therapy

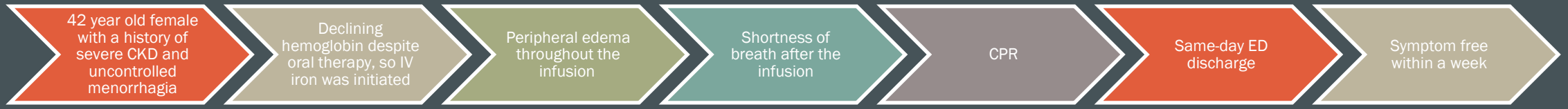
# BACKGROUND INFORMATION: IRON DEFICIENCY

- Iron deficiency can be linked to:
  - Left ventricle hypertrophy
  - Fatigue
  - Decreased cognitive ability
  - Altered DNA synthesis

# BACKGROUND INFORMATION: IRON SUPPLEMENTATION

- Target a hemoglobin concentration of 100-120, or lower, not normal physiologic levels.
- Consider lifestyle
- Oral iron can be done at home, but has GI side effects
- IV iron can be performed high-dose low-frequency, or during dialysis sessions
- IV iron is the standard of care for CKD patients

# CASE REPORT


42 year old female with a history of severe CKD and uncontrolled menorrhagia
Declining hemoglobin despite oral therapy, so IV iron was initiated
Peripheral edema throughout the infusion
Shortness of breath after the infusion
CPR
Same-day ED discharge
Symptom free within a week

# LITERATURE SEARCH

- “(intravenous iron) AND (acute cardiac failure) AND (chronic kidney disease)”: 145 results
- “(intravenous iron) AND (safety) AND (adverse events) AND (cardiovascular)”: 35 results
- “(rate related infusion reaction) AND (volume overload)”: 5 results

# ADVERSE EVENTS: ORAL IRON

- Black or tarry colored stools
- Constipation
- Abdominal discomfort
- Risk of infection
- Decreased patient tolerance
- Likely due to $Fe^{3+}$ precipitating in enterocytes and causing local toxicity via oxidative damage

# ADVERSE EVENTS: INTRAVENOUS IRON AND ANAPHYLAXIS

- Most commonly investigated reaction, but likely over-reported
- Can be anaphylactic, reacting to dextrans
- Anaphylactoid reactions include urticaria, palpitations, dizziness, and muscle spasms, and are not a hypersensitivity reaction
- Anaphylactoid reactions are more likely due to complement system activation
- Don’t pre-medicate patients without high risk factors

# ADVERSE EVENTS: INTRAVENOUS IRON AND INFECTIONS

- This is controversial
- One study had a risk ratio of 2.12 for infections (comparing IV and oral iron)
- Others found a link between increased immune function and iron supplementation
- This may be due to the effect of iron on neutrophils, the inflammatory response, and the requirement of infective substances to grow

# ADVERSE EVENTS: INTRAVENOUS IRON AND THE CARDIOVASCULAR SYSTEM

- More likely with non-dextran containing substances like iron sucrose or oral iron
- Includes peripheral edema, hypo- and hyper-tensive episodes
- Potential cardiac arrythmia
- Long term atherosclerosis
- Due to oxidative stress and reactive oxygen species that can damage cardiomyocytes and vessel walls.
- No reported events of acute cardiac failure

# CASE REPORT: TRANSIENT HEART FAILURE

- TACO: transfusion associated cardiovascular overload
- This patient experienced none of the hallmark symptoms of anaphylaxis, but rather symptoms of fluid overload and cardiac failure
- Risk factors for TACO include previous cardiac dysfunction, older patient age, established kidney disease, and positive fluid balance

# CASE REPORT: FUTURE MANAGEMENT

01

AVOID FURTHER INFUSIONS

02

Investigate the cause of this reaction and possible methods of managing a reaction

- Switching IV iron formulations
- Use furosemide during the infusion

03

Optimize oral iron intake

- Dietary intake like dark leafy green foods

04

Minimize blood loss

- Correct platelet dysfunction
- Prevent GI bleeding
- Treat menorrhagia

05

Consider blood transfusion