# "You Did This To Me": a Case of Acute Gouty Attack During Acute **Decompensated Heart Failure** Treatment

Pamela Nankoole MSN, CNP<sup>1</sup>, Yun Li MD, MBA<sup>2</sup> Department of Medicine, Massachusetts General Hospital, Boston, MA 02114

# Learning Objectives

1) Recognize that aside from direct diuretics effect, clinical factors such as hypovolemia and acute kidney injury, can also lead to hyperuricemia.

2) Recognize that gout flare does not necessitate discontinuation of loop diuretics. Clinicians need to be aware the various considerations in selecting agents for treating gout flare, in patients with acute decompensated heart failure.

## **Case Presentation**

A Caucasian female in her 60s with a past medical history of paroxysmal atrial fibrillation, coronary artery disease and obesity, initially presented to the emergency department with palpitation, found to be in atrial fibrillation with rapid ventricular response. acute decompensated heart failure and acute kidney injury. She received amiodarone loading and intravenous furosemide. On hospital day five, she was referred to the home hospital (HaH) program. On admission, the patient was found to have pain, erythema and swelling involving the right MTP joint. Pain progressively worsened over the last 24 hours. Physical examination and review of system revealed no tophi nor history of urolithiasis.

"I was told this is gout. You (clinicians) did this to me because you picked Lasix", said the patient. Serum uric acid was 11.9 mg/dL (ref range 2.3- 6.6 mg/dL) on HaH admission and 12.6 mg/dL on repeat. HaH team continued intravenous furosemide and started the patient on renally dosed colchicine. Pain subsequently improved and finally subsided. On discharge, the patient was scheduled to follow up with PCP to consider urate-lowering therapy.

Hyperuricemia can result both from direct diuretics effect as well as other clinical processes such as volume depletion and acute renal injury

Clinicians also should astutely recognize gout flare and be thoughtful on treatment strategy given the patient's comorbidities, therapy side effects and interactions

Team-based non-pharmacological interventions including patient dietary education play important roles in both acute decompensated heart failure and gout management

revention of flare and disease progression world flare triggers Janage comorbid conditions Jrate lowering (cAt 2020 recommends serum unter concentration less in e mg/d, and less thus 3 mg/d, for + tephs; while ACP 2017 deemed diffuent endeme case to stages) letary changes (eight reduction cohol Intake reduction cohol Intake reduction uch as thiazide diuretics) //pertension pairty pertension pairty pertension solity (the syndrome tetabolic syndrome tetabolic syndrome letabolic syndrome letabolic syndrome tetabolic syndrome (Eight ToS's reduced colores and weight loss can lower the amount of post ade and reduce are at letabolic lesen stress on the just	Reduce symptoms Prevent disease progression Avoid complications Smoking cessation Alcohol intake reduction Sodium intake reduction Sodium intake reduction Weight reduction Weight reduction Cardiac Rehabilitation Ischemic heart disease Cardiomyopasthy Hypertension Desity Arrhythmis Others: Anemia & Iron deficiency Limited Sodium
Jrate Towering (JAE 2020 recommends sum urate concentration lass in english and lass in Bright, for 4 spakis, while ACP 2037 deemed uffisient volume for und targets) (eight reduction cohol Intake reduction cohol Intake reduction cohol intake reduction cohol intake reduction substitution uch as thiazide diuretics) //pertension setity setity babtes speripidemia heroscierosis me vronic kidney disease	Smoking cessation Alcohol intake reduction Sodium intake reduction Sodium intake reduction Activity & Exercise Cardiac Rehabilitation Ischemic heart disease Valvular disease Va
letary changes leight reduction cohol Intake reduction deficiation substitution uch as thiazide diuretics) pertension pertension pertension teabolic syndrome etabolic syndrome teabolic syndrome detabolic syndrome detabolic syndrome detabolic syndrome detabolic syndrome teabolic synd	Smoking cessation Alcohol intek reduction Sodium intake reduction Voidi illici frug (such as cosaine) Weight reduction Cardia: Rehabilitation Cardia: Rehabilitation Cardia: Rehabilitation Cardia: Rehabilitation Schemic heart disease Cardiomyopathy Hypertension Desity Arthythmis Others: Anemia & Iron deficiency Limited Sodium
leight reduction cohol intake reduction ledication substitution uch as thiazide duretics) //pertension babtes sates /perlipidemia heroscierosia heroscierosia ronic kidney disease leight 1055 reduced cators and weight loss can lower the amount of post ada and reduce wire aid levels, itsean stress on the joints	Alcohol intake reduction Sodium intake reduction Avoid illicit drug (such as cocaine) Weight reduction Cardiac Rehabilitation Ischamic heat disease Cardiomyopathy Hypertension Diabetes Obesity Arthythmis Others: Anemia & Iron deficiency Limited sodium
cohol Intake reduction dedication substitution uch as thiazide diuretics) //pertension osity //pertenjidemia heroscierosis etabolic syndrome tetabolic syndrome ronic kidney disease //ejiki LOSS reduced ciones and weght loss can lower the amount of gout ada and reduce are all beek, lessen stress on the joints	Sodium intake reduction Avoid Illick frug (Juch as cocaine) Marking (Juch as cocaine) Activity & Exercise Cardia: Rehabilitation Ischemic heart disease Valvular disease Cardiomyopathy Autoritistics Dates Desity Arthythmise Others: Anemia & Iron deficiency Limited Sodium
ledication substitution uch as thiazide diuretics) //pertension beity betes //perlipidemia herackierosia herackierosia romic kidney disease //bSF refueed calores and weight loss can lower the amount of gout ada and refueed wei cell fewsh, lessen stress on the jants	Avoid Illicit drug (such as cocaine) Weight reduction Activity & Esercise Gardiaz (Rehabilitation Ischemic Ineart disease Cardiomyopathy Hypertension Diabetes Obesity Arrhythmise Others: Anemia & Iron deficiency Ulmited sodium
uch as thiazide diuretics) //pertension //pe	Weight reduction Activity & Searcistion Ischemic heart disease Valvular disease Cardiomyopathy Hypertension Desity Arrhythmisa Others: Anemia & Iron deficiency Umited solutum
Uper transition assity assity apertiprision aborters aborters barbers tetabolic syndrome transitions kidney disease (feight 1055 rotoced cionics and weight loss can lower the amount of gout ada- and reduce and real fewah, lessen stress on the joints	Activity & Exercise Cardiac Rehabilitation Schemic heart disease Valvular disease Hypertension Diabetes Obesity Arrhythmis Others: Anemia & Iron deficiency Limited Sodium
rpertension pesity battes per lipidemia etabolic syndrome etabolic syndrome tronic kidney disease feight 1055 reduced calories and weight loss can lower the amount of gout ask and reduce unit ceil fewali, lessen stress on the joints	Cardiac Rehabilitation Ischemic heart disease Valvular disease Cardiomyopathy Hypertension Diabetes Obesity Obesity Obesity Others: Anemia & Iron deficiency Limited sodium
pertension besty pertipidemia heroscierosis etabolic syndrome ronic kidney disease (feight 1053 noticed cionics and weight loss can lower the amount of gout ada and reduce are call been, lessen stress on the joints	Ischemic heart disease Valvular disease Cardiomyopathy Hypertension Diabetes Obesity Arrhythmias Others: Anemia & Iron deficiency Limited sodium
pesity abotes per lipidemia etabolic syndrome tronic kidney disease feight 1035 reduced calories and weight loss can lower the amount of gout ada and reduce artic acid levels, lessen stress on the joints.	Valvular disease Cardiomyopathy Hypertension Diabetes Arthythnias Others: Anemia & Iron deficiency Limited sodium
abetes perlipidemia heroscierosis etabolic syndrome tronic kidney disease <mark>/eight IOSS</mark> reduced calories and weight loss can lower the amount of gout ack, and reduce wrie acid levels, lessen stress on the joints	Cardiomyopathy Hypertension Diabetes Obesity Arrhythmias Others: Anemia & Iron deficiency Limited sodium
per lipidemia heroscierosis etabolic syndrome nronic kidney disease <sup>1</sup> eight 1055 reduced calories and weight loss can lower the amount of gout acks and reduce unic acid levels, lessen stress on the joints	Hypertension Diabetes Obesity Arrhythmias Others: Anemia & Iron deficiency Limited sodium
herosclerosis etabolic syndrome tronic kidney disease / <mark>eight IOSS</mark> reduced calories and weight loss can lower the amount of gout ask and reduce unic acid levels, lessen stress on the joints	Diabetes Obesity Arrhythmias Others: Anemia & Iron deficiency Limited sodium
etabolic syndrome rronic kidney disease feight IOSS reduced calories and weight loss can lower the amount of gout acls and reduce unic acid levels, lessen stress on the joints	Obesity Arrhythmias Others: Anemia & Iron deficiency Limited sodium
rronic kidney disease <b>/eight loss</b> reduced calories and weight loss can lower the amount of gout acks and reduce uric acid levels, lessen stress on the joints	Arrhythmias Others: Anemia & Iron deficiency Limited sodium
eight loss reduced calories and weight loss can lower the amount of gout acks and reduce uric acid levels, lessen stress on the joints	Others: Anemia & Iron deficiency Limited sodium
eight loss reduced calories and weight loss can lower the amount of gout acks and reduce uric acid levels, lessen stress on the joints	Limited sodium
	- AHA/ACC 2022: < 2.3 e/day
	- European Society of Cardiology: avoid > 6 g/day
letary composition	
dequate protein intake, esp. that from low-fat dairy +/- plant sources	Restrict fluid intake in refractory H
ASH diet	symptomatic hyponatremia to 1.5-
uits, vegetables and whole grains	2L/day
ome studies have showed these may be beneficial offee: In moderation especially regular caffeinated tamin 6 (500 me daily)	Weight loss
verries mitted consumption of natural sweet fruit juice loderate consumption of wine	Dietary composition •Limit the saturated fats, avoid the trans fats •DASH diet
artain foods to use in moderation or to avoid	
man and elandular meats	Omega-3 polyunsaturated fatty ac
me seafood like anchovies, shelffish, sardines and tuna cohol, especially beer and distilled liquors oods and beverages with high fructose corn syrup	(PUFA) supplementation
e, Mayo Clinic patient education	
	Market and a sequence of the sector of the and exceedence and a sequence of the sector of the s

# Discussion

#### Physiology of Urate Excretion & Hyperuricemia

- Physiologically, 75% of urate is excreted by the kidney while the rest by the GI tract. With renal excretion specifically, urate reabsorption and secretion take place at proximal tubules.

- Hyperuricemia can result from both under-excretion and overproduction of urate. In heart failure, under-excretion is mainly associated with impaired renal function. Alcohol consumption and obesity are associated with not only increased urate production but also reduced renal excretion.

- Interestingly, salt restriction, both short- and long-term, has also been related to hyperuricemia. Tissue hypoxia, common in heart failure, is a stimulus for urate production.

#### Diuretics-induced hyperuricemia mechanism

- Two mechanisms proposed: indirect and direct.

- Indirect effect: secondary to volume depletion by diuretics. Volume depletion results in an appropriate increase in proximal tubule urate reabsorption.

- Direct effect: a few mechanisms have been proposed. 1) Diuretics and urate compete for proximal tubule secretion 2) Diuretics inhibit secretion of urate at a luminal transporter protein 3) Thiazide selectively enhances urate reabsorption.

#### **Decision on Diuretics**

- Most clinicians do not discontinue diuretics because of gout flares during an ADHF hospitalization

- Clinically gout usually develops after 20-30 years of sustained hyperuricemia

#### Choice of therapy for acute gout flare

- Oral NSAID is almost always prohibited given its volume retention and renal injury effects, as well as its association with poor heart failure hospitalization outcomes. In this particular patient, NSAID use is also prohibited by concurrent DOAC medication.

- Colchicine can effectively reduce inflammation and pain. Oral formulation is associated with a high risk of diarrhea. Intravenous formulation has a high risk of side effect including bowel marrow suppression and CNS effects. The dose needs to be renally and hepatically adjusted.

- Intra-articular injection of glucocorticoids, if available, can be effective.
- Oral glucocorticoid can be used with caution, considering its heart failure-specific effects including fluid retention and pro-arrhythmia, as well as other side effects
- Controversies exist on the indications, timing, and whether to treat to target for

Allopurinol, the urate-lowering therapy (ULT). If to initiate, allopurinol can be started durin a gout flare. The practice of delaying the ULT start until after flare resolution is based on observations and common practice, but lacks concrete evidence. Allopurinol should be renally dosed. Flare prophylaxis, with the above-discussed agents, can be considered as co-therapy.

### Acknowledgement

RD

35

The authors would like to thank the HaH team at MGH of the clinical care to this patient Appreciation also extends to Dr. Qiyu Wang at Division of Nephrology at Brigham & Women's Hospital for critiques and feedbacks.