Incidence and characterization of gout attacks in heart failure patients receiving aggressive diuresis

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Background

- Diuretics have been associated with a 5 to 7% increased risk for gout attacks in hypertensive patients. However, the incidence of gout attacks in heart failure (HF) patients is unknown.[1]
- It has been speculated that acutely decompensated heart failure patients who often receive more aggressive diuresis, relative to their baseline diuretic dose, may be at a higher risk of developing acute gout attacks that may negatively impact patients' quality of life, mobility, as well as unnecessarily prolong their length of hospital stay.

Objectives

- To determine the incidence of gout attacks in a cohort of HF patients at Surrey Memorial Hospital (SMH) receiving aggressive diuretic therapy.
- To characterize HF patients who developed gout attacks relative to those who did not.

Methods

- **Study Design**: Retrospective chart review study
- **Inclusion Criteria:** Aged >18 years; decompensated HF patients admitted into SMH from July 15, 2013 to July 15, 2018; received at least one documented dose of aggressive diuresis (defined as intravenous diuresis or oral diuresis above the patient's baseline diuretic equivalent) during hospitalization
- **Exclusion Criteria:** No confirmed diagnosis of HF or gout attack; undocumented furosemide, colchicine, prednisone doses in medication administration record; received furosemide for non-HF conditions; received colchicine or prednisone for non-gout conditions (e.g. pericarditis, asthma, COPD exacerbation, adrenal insufficiency, ulcerative colitis, polymyalgia rheumatica, rheumatologic disorders, autoimmune-related disorders, etc.)
- **Primary Outcome**: Incidence rate of gout attacks
- **Secondary Outcome**: Gout risk factors/ characteristics, time to gout resolution, length of hospital stay
- **Statistical Analysis:** Fisher Exact Test, Student T Test

Table 1. Characteristics

Baseline characteristics	Gout Attack Patients (N=27)	Non-Gout Attack Patients (N=81)	Odds Ratio (95% CI)	P-value
Body Weight, kg (mean ± SD)	84.9 ± 32.9	81.2 ± 19.9	-	0.49
Smokers, n (%)	1 (3.7%)	8 (9.9%)	0.35 (0.04 – 2.94)	0.44
Alcohol intake, n (%)	9 (33.3%)	14 (17.3%)	2.39 (0.89 – 6.41)	0.10
LVEF, % (mean ± SD)	45.5 ± 13.8	40.7 ± 16.5	-	0.18
NT-pro-BNP, pg/mL, median (IQR)	4023 (2755 – 9668)	5784 (2045 – 14136)	-	0.51
Uric Acid, umol/L (mean ± SD)	605.5 ± 120.4	-	-	-
GFR, mL/min (mean ± SD)	48.6 ± 20.1	47.8 ± 25.7	-	0.88
Comorbidities, n (%)				
HTN	25 (92.6)	58 (71.6)	5.0 (1.1-22.6)	**0.03**
DM	14 (51.9)	45 (55.6)	0.86 (0.40 – 2.06)	0.82
Dyslipidemia	20 (74.1)	40 (49.4)	2.93 (1.12 – 7.68)	**0.04**
CKD	15 (55.6)	40 (49.4)	1.28 (0.53 – 3.07)	0.66
IHD/MI	14 (51.9)	39 (48.1)	1.16 (0.49 – 2.77)	0.83
CVA/TIA	5 (18.5)	18 (22.2)	0.80 (0.26 – 2.40)	0.79
Gout	8 (29.6)	10 (12.3)	2.99 (1.04 – 8.62)	0.07
Organ Transplant	2 (7.4)	1 (1.2)	6.4 (0.56 – 73.6)	0.15
Medications, n (%)				
ACEI	13 (48.1)	22 (27.2)	2.49 (1.01 – 6.12)	0.06
ARB	4 (14.8)	15 (18.5)	0.77 (0.23 – 2.54)	0.77
BB	24 (88.9)	61 (75.3)	2.62 (0.71 – 9.65)	0.18
CCB	12 (44.4)	30 (37.0)	1.36 (0.56 – 3.29)	0.65
Nitrates	11 (40.7)	19 (23.5)	2.24 (0.89 – 5.65)	0.13
ASA	12 (44.4)	24 (29.6)	1.9 (0.78 – 4.66)	0.23
Gout Prophylaxis	6 (22.2)	10 (12.3)	2.03 (0.66 – 6.24)	0.35
Chemotherapy	2 (7.4)	0 (0)	-	0.06
Nicotinic Acid	0 (0)	0 (0)	-	1.00
Cyclosporine	0 (0)	0 (0)	-	1.00
Levodopa	1 (3.7)	3 (3.7)	-	1.00
Interferon + Ribaviron	0 (0)	0 (0)	-	1.00
Tacrolimus	2 (7.4)	2 (2.5)	3.16 (0.42 – 23.6)	0.57
Pre-hospital Diuretic, n (%)	22 (81.5)	50 (61.7)	2.73 (0.94 – 7.95)	0.10
Loop Diuretic	21 (77.8)	50 (61.7)	2.17 (0.79 – 5.97)	0.16
Thiazide Diuretic	1 (3.7)	0 (0)	-	0.25
Thiazide-like Diuretic	0 (0)	4 (4.9)	-	0.57
Potassium-sparing Diuretic	5 (18.5)	11 (13.6)	1.45 (0.45 – 4.62)	0.75
In-hospital Diuretic, n (%)				
Loop Diuretic	27 (100)	80 (98.8)	-	1.00
Thiazide Diuretic	1 (3.7)	0 (0)	-	0.25
Thiazide-like Diuretic	1 (3.7)	5 (6.2)	0.58 (0.07 – 5.24)	1.00
Potassium-sparing Diuretic	5 (18.5)	15 (18.5)	1.00 (0.33 – 3.07)	1.00
Oral Furosemide Dose Equivalency, mg/day, median (IQR)	160 (120 – 240)	130 (60 – 160)	-	**0.03**

Table 2. Clinical Outcomes

	Gout Attack Patients (N=27)	Non-Gout Attack Patients (N=81)	P-value
Time to gout resolution, days Median (IQR)	5 (4 – 7.5)	-	-
Hospital length of stay, days Median (IQR)	14 (8.5 – 20.5)	7.5 (4 – 13.3)	**0.0001**

Results

- In a cohort of 271 patients admitted for HF, 9 incidences of acute gout attacks were found (incidence rate of 3.3%) in a 6-month timeframe.
- Larger proportion of HF patients who developed an acute gout attack had hypertension, dyslipidemia & received higher diuretic doses. More patients with gout attacks had CKD, CAD/MI, history of gout, organ transplant, ACEI, BB, CCB, nitrates, ASA, gout prophylaxis, chemotherapy, tacrolimus, loop diuretics, thiazide diuretics, and thiazide-like diuretics compared to patients without gout attacks but these differences were not statistically significant.
- Gout attacks were associated with a 6.5-day longer hospital stay.

Discussion

- These associations between risk factors and hyperuricemia/gout align with published literature.[2] However, this study suggests that hypertension, dyslipidemia & higher diuretic doses appear to be more prominent risk factors in acute HF patients receiving aggressive diuresis.
- Gout attacks may prolong hospital stay & early diagnosis is associated with reduced length of hospitalization.[3]

Limitations

- Retrospective chart review design
- Missing and/or incomplete data in scanned patient charts and EMR
- Varying threshold for diagnosing gout attacks by different physicians
- Screening for colchicine/prednisone to identify patients with gout attacks; convenience sampling and small sample size

Conclusions

- Gout attacks are correlated with risk factors and increased length of stay in patients admitted with HF.
- It is important to identify patients at risk of gout attacks when managing HF exacerbations. Gout attack prevention/treatment may reduce length of stay and hospital costs. However, prospective studies would be warranted to further explore the role of early detection and treatment of gout attacks.

References

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