Impact of Hypercalcemia on Geriatric Syndromes in Elderly Patients with Multiple Myeloma

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Introduction

- Multiple Myeloma (MM) is diagnosed based on the presence of ≥ 10% clonal plasma cells in the bone marrow or a biopsy-proven plasmacytoma and ≥ 1 SLiM-CRAB criteria [1].
- MM causes hypercalcemia through the osteolytic hypercalcemia pathway.
- 10-15% of patients with MM have hypercalcemia at diagnosis, 25% develop hypercalcemia during their disease course [2].
- Hypercalcemia is a poor prognostic factor in patients with MM and has been "…associated with anemia, thrombocytopenia, lower estimated glomerular filtration rate (eGFR), advanced ISS stage, and the presence of lytic lesions." [3]
- According to the Endocrine Society, "…the severity of hypercalcemia correlates with symptom burden and risk of life-threatening complications, necessitating prompt recognition and intervention [4]
- Geriatric syndromes are highly prevalent, multifactorial, clinical conditions in older persons that do not fit into discrete disease categories but are associated with substantial morbidity and poor prognosis
- Multiple longitudinal studies have shown that geriatric syndromes are associated with reduced functional ability and quality of life, as well as increased risk of institutionalization and mortality [5]

Objectives

1. Add to the field of geriatric oncology
2. Explore the link between a potentially treatable condition and geriatric syndromes, which are associated with worse morbidity and mortality

Methods

Retrospective, propensity-matched, case-control, database study using the TriNetX platform

IRB exempt

Global Collaborative Network (146 of 152 HCOs returned data)

Patients age 65 – 90 were divided into two cohorts:

Study Cohort	Control Cohort
MM (C90.0) + Hypercalcemia (E83.52)	MM (C90.0) - Hypercalcemia (E83.52)

Propensity score matching based on age, sex, ethnicity, and presence of baseline dementia

Using ICD-10 codes, eight common geriatric syndromes were identified

Outcome	Corresponding Diagnoses	ICD-10 Code
1. Falls	Unspecified Falls	W19
2. Delirium	Delirium due to known physiological condition	F05
3. Dementia	Unspecified dementia	F03
	Unspecified dementia, unspecified severity, without behavioral disturbance, psychotic disturbance, mood disturbance, and anxiety	F03.90
	Dementia in other diseases classified elsewhere, unspecified severity, without behavioral disturbance, psychotic disturbance, mood disturbance, and anxiety	F02.80
4. Urinary Incontinence	Unspecified urinary incontinence	R32
5. Sleep Disorder	Sleep disorders	G47
	Primary Insomnia	F51.01
6. Fatigue	Other fatigue	R53.83
7. Frailty	Age-related physical disability	R54
8. Sarcopenia	Sarcopenia	M62.84

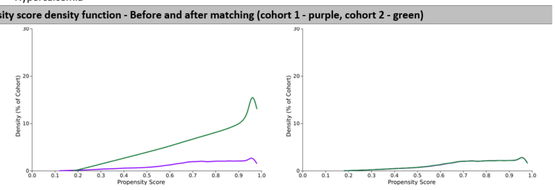
Generalized linear models were used to measure the association, and estimates were presented as risk ratios and 95% confidence intervals

Results

Cohort 1 and cohort 2 patient count before and after propensity score matching

Cohort	Patient count before matching	Patient count after matching
1 - Multiple Myeloma and Hypercalcemia	15,150	14,350
2 - Multiple Myeloma without Hypercalcemia	132,970	14,350

Propensity score density function - Before and after matching (cohort 1 - purple, cohort 2 - green)



Outcome	30 day follow up		1 year follow up		5 year follow up	
	RR and 95% CI	P Value	RR and 95% CI	P value	RR and 95% CI	P value
Falls	1.392 (0.999 - 1.940)	0.050	1.115 (0.981 - 1.268)	0.095	1.013 (0.932 - 1.101)	0.769
Delirium	2.562 (1.870 - 3.510)	<0.001	1.832 (1.544 - 2.172)	<0.001	1.499 (1.319 - 1.703)	<0.001
Dementia	1.371 (0.929 - 2.024)	0.111	1.204 (1.005 - 1.442)	0.044	1.006 (0.890 - 1.137)	0.923
Urinary Incontinence	1.760 (1.226 - 2.528)	0.002	1.306 (1.103 - 1.547)	0.002	1.100 (0.977 - 1.239)	0.113
Sleep Disorders/Primary Insomnia	1.333 (1.088 - 1.633)	0.005	1.208 (1.099 - 1.327)	<0.001	1.031 (0.962 - 1.104)	0.392
Fatigue	1.813 (1.519 - 2.163)	<0.001	1.316 (1.217 - 1.423)	<0.001	1.143 (1.077 - 1.213)	<0.001
Age-Related Physical Disability	1.431 (0.867 - 2.361)	0.159	1.312 (1.033 - 1.666)	0.025	1.174 (0.989 - 1.394)	0.066
Sarcopenia	1.001 (0.417 - 2.404)	0.998	0.906 (0.487 - 1.684)	0.754	1.030 (0.643 - 1.651)	0.901

Conclusions

Hypercalcemia is significantly associated with the development of geriatric syndromes in older patients with MM.

The degree of association appears to be time, and syndrome-dependent

The peak temporal association seams to be around 1 year

Falls and sarcopenia appear to be unrelated to hypercalcemia

Observational study, prospective research is required to prove causality

More prospective studies are needed to assess the impact of calcium-lowering therapy on rates of geriatric syndromes, particularly over the 30-day and one-year timeframes

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