Declining Rates of Orthopedic Surgery Among Patients With Multiple Myeloma-Associated Skeletal Lesions

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INTRODUCTION: Multiple myeloma (MM) is a hematologic malignancy often complicated by osteolytic skeletal lesions and pathologic fractures, historically requiring orthopedic surgical intervention. However, the emergence and refinement of systemic therapies, including proteasome inhibitors, immunomodulators, and monoclonal antibodies, may be reducing the need for surgical management. This study investigates national trends in orthopedic surgical intervention for MM-related bone disease, with the hypothesis that the rate of orthopedic surgery for treating MM–associated skeletal lesions has decreased over time.

METHODS: A retrospective observational cohort study was conducted using the national Veterans Affairs (VA) Cancer Registry and Centers for Medicare and Medicaid Services (CMS) databases. Patients newly diagnosed with MM between 2008 and 2022 (n=10,171) were grouped into successive 3-year diagnosis intervals to assess trends in surgical intervention risk. Orthopedic surgical interventions, including external fixation, open reduction and internal fixation (ORIF), spine stabilization, and arthroplasty, were identified using CPT codes. The primary outcome was the rate of any orthopedic surgery within three years of MM diagnosis by year group. Secondary outcomes included rates for individual surgical categories, as well as comorbidity burden (Charlson Comorbidity Index, CCI) and frailty status (VA Frailty Index, VAFI) at the time of diagnosis. Temporal trends were evaluated descriptively, and multivariable Cox proportional hazards models were used to evaluate changes in the risk of surgery over time, expressed as hazard ratios (HR), across successive 3-year diagnosis intervals, adjusting for age, sex, CCI, and VAFI.

RESULTS SECTION: This study analyzed 9,844 male and 327 female patients. From 2008 to 2022, the proportion of MM patients undergoing orthopedic surgery within 3 years of diagnosis declined significantly. Any surgery decreased from 10.6% to 4.3%, extremity fixation from 6.0% to 2.3%, spine surgery from 5.1% to 2.3%, external fixation from 4.0% to 1.8%, internal fixation from 3.3% to 1.6%, and arthroplasty from 2.2% to 0.5%. Each successive 3-year diagnosis interval was associated with a significantly reduced likelihood of undergoing surgery: any surgery [HR 0.80, 95% CI: 0.76–0.84], extremity fixation [HR 0.78, 0.73–0.84], spine surgery [HR 0.81, 0.76–0.87], external fixation [HR 0.80, 0.74–0.87], internal fixation [HR 0.80, 0.74–0.87], and arthroplasty [HR 0.77, 0.69–0.87]. During the same time period, the proportion of patients with a severe VAFI rating increased from 3.3% to 9.1% ($p < 0.01$), and those with high CCI scores rose from 7.8% to 13.8% ($p < 0.01$).

DISCUSSION: Despite rising frailty and comorbidity burden among MM patients at diagnosis, orthopedic surgical intervention rates have declined across all anatomical and procedural categories. These findings suggest that evolving systemic therapies may effectively prevent skeletal-related events that historically warranted surgical treatment. Understanding these shifts in surgical utilization can inform multidisciplinary treatment planning, optimize patient selection, and reduce morbidity in the modern era of MM care.

SIGNIFICANCE/CLINICAL RELEVANCE: These results demonstrate that advances in systemic therapy are reducing the need for orthopedic procedures in multiple myeloma patients, shifting the role of surgery toward select cases with clear functional benefit. This trend can help clinicians tailor treatment plans, minimize surgical morbidity, and better allocate resources in multidisciplinary care.

IMAGES AND TABLES:

Figure 1: Decline in Orthopedic Surgery Rates for Multiple Myeloma (2008-2022)

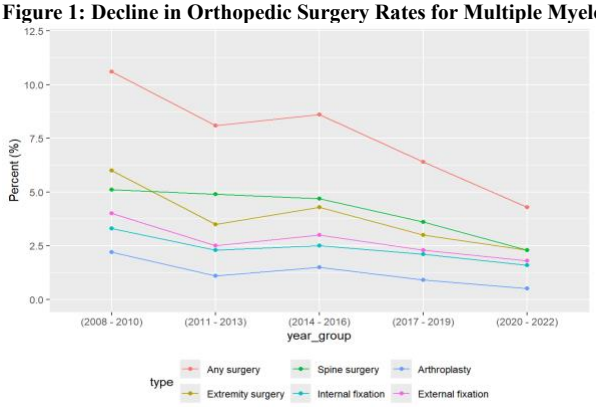

Table 1: Rates and HR of Orthopedic Surgical Procedures for Multiple Myeloma by Year Group (%)*

	(2008 - 2010)	(2011 - 2013)	(2014 - 2016)	(2017 - 2019)	(2020 - 2022)	HR (95% CI)
Any surgery (%)	10.6	8.1	8.6	6.4	4.3	0.80 (0.76, 0.84)
Extremity surgery (%)	6	3.5	4.3	3	2.3	0.78 (0.73, 0.84)
Spine surgery (%)	5.1	4.9	4.7	3.6	2.3	0.81 (0.76, 0.87)
External Fixation (%)	4	2.5	3	2.3	1.8	0.80 (0.74, 0.87)
Internal Fixation (%)	3.3	2.3	2.5	2.1	1.6	0.80 (0.74, 0.87)
Arthroplasty (%)	2.2	1.1	1.5	0.9	0.5	0.77 (0.69, 0.87)

*Within 3 years of diagnosis.