The Clinical Impact of Initiating Anti-Osteoporosis Therapy Following a Distal Radius Fracture

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ABSTRACT INTRODUCTION:

The presence of osteoporosis and other bone density pathologies poses a significant risk for life-altering fragility fractures, particularly hip and vertebral fractures. Distal radius fractures (DRF) are often among the first injuries associated with osteoporosis, accounting for 18% of fractures in patients over 65 years old [1]. Notably, in patients with bone density pathology, a DRF can precede a devastating hip fracture by approximately 15 years. This underscores the critical importance of identifying bone pathology following a DRF as a significant opportunity for prevention [2].

As DRF often serves as the initial indication of bone mineral disease, it presents a glaring opportunity to prevent a future cascade of events [3]. There has been limited research on the effects of initiating anti-osteoporosis therapy following a DRF. This study aims to determine the extent to which the risk of subsequent fragility fractures can be reduced by initiating anti-osteoporotic therapy after an initial presentation of a DRF.

METHODS:

This study utilized TriNetX, an online database with de-identified patient data. We identified females above the age of 50 from 79 US healthcare organizations reporting DRF incidents. They were categorized based on receiving initial anti-osteoporotic treatment within a year of the DRF. Group characteristics, antiosteoporosis medications, and bone density evaluations were analyzed. After propensity matching, the risk of a subsequent DRF from 2003 to 2023 was explored, as well as the rates of subsequent DEXA scans.

RESULTS SECTION:

The Medication (M) group (n= 8.854) had a mean age of 70, while the No Medication (NM) group (n=260.076) had a mean age of 65 at the index of incidence. Baseline differences included higher rates of bone density disorders, inflammatory polyarthropathies, spondylopathies, metabolic disorders, obesity, malnutrition, and neoplasm in the M group. Notably, 38.9% of the M group had a prior DEXA scan compared to 7.2% of the NM group. The most frequently prescribed anti-osteoporotic medication in the M group was Alendronate (48.9%). After propensity matching each group (n=8,853), the risk analysis revealed the M group had a decreased risk of subsequent DRF (Risk Ratio= 0.817, CI= 0.766, 0.872) p < 0.0001 and a higher rate of bone density evaluations (Risk Ratio=1.436, (1.358, 1.519), p < 0.0001.

DISCUSSION:

The results showed the M group had 84.05% more DEXA scans and were 21.7% less likely to have a subsequent DRF fracture compared to the NM group. These findings demonstrate timely assessment and proper medical intervention can avert future DRF in women over 70. However, post-DRF bone density evaluations remain infrequent. Study limitations include the inability to analyze the individual DEXA scan results, and despite efforts to minimize confounding variables, the database's limitations hinder a comprehensive patient-specific analysis and rely on statistical trends.

SIGNIFICANCE/CLINICAL RELEVANCE:

This study is clinically relevant to orthopaedic surgeon's practice as they are often the first to recognize a patient with osteoporosis. This study reflects real-world patient data from 79 healthcare organizations that can inform treatment decisions and contribute to improving clinical outcomes in those with osteoporosis.

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IMAGES AND TABLES:

Table 1.

Characteristics

Characteristics: Medication Group (M) and No Medication Group (NM)						
Demographics						
Cohort		Mean ± SD	Patients	% Of Cohort	P-Value	Std diff.
M	Current Age	70.2 +/- 10.1	8,854	100%	<0.001	0.413
NM	Current Age	70.0 +/- 11.3	260,076	100%		
M	Age at Index	69.8 +/- 10.4	8,854	100%	<0.001	0.435
NM	Age at Index	64.8 +/- 12.5	260,076	100%		
Diagnosis						
Cohort		Mean ± SD	Patients	% Of Cohort	P-Value	Std diff.
M	M80-	Disorders of bone density	6,427	72.6%	<0.001	1.347
NM	M85	and structure	44,514	17.0%		
M	M45-	Spondylopathies	2,246	25.4%	<0.001	0.333
NM	M49		32,552	12.5%		
M	M05-	Inflammatory	1,658	18.7%	<0.001	0.279
NM	M14	polyarthropathies	24,523	9.4%		
M	E70-	Metabolic disorders	5,270	59.5%	<0.001	0.501
NM	E88		91,657	35.2%		
M	E65-	Overweight, obesity and	1,325	15.0%	<0.001	0.091
NM	E68	other hyperalimentation	30,822	11.9%		
M	E40-	Malnutrition	376	4.2%	<0.001	0.139
NM	E46		4,845	1.9%		
M	C00-	Neoplasm	3,415	38.5%	<0.001	0.380
NM	D49		55,738	21.4%		
Procedure						
Cohort		Mean ± SD	Patients	% Of Cohort	P-Value	Std diff.
M	10349	Dual-energy X-ray absorptiometry (DXA), bone density study; 1 or more sites	3,441	38.9%	<0.001	0.811
NM	08		18,822	7.2%		

Osteoporosis Therapy Distribution: Medication Group		
Treatment	Patients	% Of Cohort
alendronate	4,331	48.9%
risedronate	461	5.5%
ibandronate	429	4.8%
raloxifene	568	6.2%
zoledronic acid	890	10.1%
salmon calcitonin	351	4.0%
calcitonin	37	0.4%
teriparatide	489	6.6%
denosumab	1,103	12.5%
romosozumab	96	1.1%
abaloparatide	182	2.1%

Image 1. Group Outcomes

Distal Radius Fracture						
Risk analysis						
Cohort		Patients in cohort	Patients with outcome		Risk	
1	Medication	8,853	1,387		0.157	
2	No Medication	8,853	1,697		0.192	
			95% CI		z	p
Risk Difference	-0.035	(-0.046, -0.024)		-6.143	0.0001	
Risk Ratio	0.817	(0.766, 0.872)		N/A	N/A	
Odds Ratio	0.783	(0.725, 0.847)		N/A	N/A	

DEXA scan						
Risk analysis						
Cohort		Patients in cohort	Patients with outcome		Risk	
1	Medication	8,853	2,357		0.266	
2	No Medication	8,853	1,641		0.185	
			95% CI		z	p
Risk Difference	0.081	(0.069, 0.093)		12.870	0.0001	0.081
Risk Ratio	1.436	(1.358, 1.519)		N/A	N/A	1.436
Odds Ratio	1.595	(1.485, 1.713)		N/A	N/A	1.595