Analyzing the Risk of Complications after Total Hip Arthroplasty in Patients Taking Bone-Density-Reducing Medications

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INTRODUCTION: Many oral medications to treat various medical conditions are known to have adverse effects on bone mineral density (BMD). There is a paucity of literature investigating the various BMD reducing drug classes and risk for implant-related complications following total hip arthroplasty (THA). Therefore, the purpose of this study was to observe the impact of various BMD reducing medications on 2-year implant related complications following THA.

METHODS: A retrospective analysis of patients undergoing primary elective THA was conducted using a national administrative claims database. Patients were identified if they were taking any of these known BMD reducing medications in the perioperative period (at least one prescription within 6 months preoperative or postoperative): proton pump inhibitors (PPIs), thiazolidinediones (TZDs), loop diuretics, systemic corticosteroids, aromatase inhibitors (AIs), calcineurin inhibitors, selective serotonin reuptake inhibitors (SSRIs), antiepileptic drugs (AEDs), first-generation antipsychotics (FGAs), and second-generation antipsychotics (SGAs). The 2-year incidence of all-cause revision and aseptic indications for revision (aseptic loosening and periprosthetic fracture [PPF] were compared using chi-squared analysis for each drug class when compared to a control of those not taking any of these identified medications. To control for demographics/comorbidities and confounders associated with taking multiple agents (Table 1), multivariable logistic regression analyses were conducted for each 2-year outcome with the output recorded as odds ratios (OR).

RESULTS: Of the 658,481 THA patients identified, 253,725 (38.5%) were taking BMD reducing drugs perioperatively. Patients on BMD reducing drugs were less likely to be male (37.9% versus 47.3%; p-value <0.001) and to have greater comorbidities (all with a p-value <0.001). On multivariable analysis, medications associated with a higher likelihood of 2-year all-cause revision included PPIs (OR: 1.59), TZDs (OR: 1.13), systemic corticosteroids (1.12), AEDs (OR: 1.14), SSRIs (OR: 1.37), and SGAs (OR: 1.43) (p<0.05 for all). Medications associated with a higher likelihood of 2-year aseptic loosening indication revision included PPIs (OR: 1.33), systemic corticosteroids (OR: 1.32), and SSRIs (OR: 1.29) (p<0.05 for all). Medications associated with a higher likelihood of 2-year PPF indicated revision include PPIs (OR: 1.51), calcineurin inhibitors (OR: 1.34), AEDs (OR: 1.23), SSRIs (OR: 1.51), and SGAs (1.60) (p<0.05 for all).

DISCUSSION AND CONCLUSION: Patients who are prescribed PPIs, glucocorticoids, SSRIs, AEDS, and SGAs were found to be at independently elevated risk for all-cause revision and aseptic indicated revisions following THA. As almost half of patients studied were taking at least one of these medications, this study emphasizes the importance of further investigation to determine the risk-benefit of continuing BMD-reducing medications in patients undergoing THA.

Figure 1: Multivariate logistic regression analysis of 2-year all-cause revision for patients taking BMD reducing medications versus controls (*PPIs = proton pump inhibitors, TZD = thiazolidinediones, AIs = aromatase inhibitors, AEDs = antiepileptic inhibitors, SSRIs = selective serotonin reuptake inhibitors, FGAs = first-generation antipsychotics, SGAs = second-generation antipsychotics*)

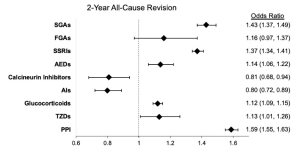

Figure 2: Multivariate logistic regression analysis of 2-year PPF-indicated revision for patients taking BMD reducing medications versus controls (*PPIs = proton pump inhibitors, TZD = thiazolidinediones, AIs = aromatase inhibitors, AEDs = antiepileptic inhibitors, SSRIs = selective serotonin reuptake inhibitors, FGAs = first-generation antipsychotics, SGAs = second-generation antipsychotics*)

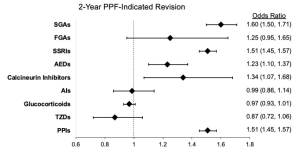

Figure 3: Multivariate logistic regression analysis of 2-year loosening-indicated revision for patients taking BMD reducing medications versus controls (*PPIs = proton pump inhibitors, TZD = thiazolidinediones, AIs = aromatase inhibitors (AIs), AEDs = antiepileptic inhibitors, SSRIs = selective serotonin reuptake inhibitors, FGAs = first-generation antipsychotics, SGAs = second-generation antipsychotics*)

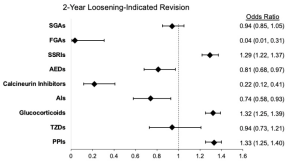

Table 1: Demographic and comorbidity characteristics of primary THA patients taking at least 1 BMD reducing medication versus controls

	BMD Reducing Drugs		Control		
	N	%	N	%	p-value
Total	253,725	-	404,756	-	-
Demographic and Comorbidity Characteristics					
Age (Mean±SD)	65.3 ± 10.3	-	65.1 ± 10.2	-	**<0.001**
Sex	-	-	-	-	-
Men	96,191	37.91	191,618	47.34	-
Women	157,534	62.09	213,138	52.66	**<0.001**
Diabetes Mellitus	17,201	6.78	21,135	5.22	**<0.001**
Tobacco Use	10,793	4.25	12,500	3.09	**<0.001**
Chronic Kidney Disease	10,153	4.00	10,939	2.70	**<0.001**
Obesity	17,229	6.79	20,978	5.18	**<0.001**
Depression	23,686	9.34	23,686	4.83	**<0.001**
Anemia	9,890	3.90	11,030	2.73	**<0.001**
Congestive Heart Failure	9,820	3.87	8,736	2.16	**<0.001**
Hypertension	37,402	14.74	51,170	12.64	**<0.001**
Arrhythmia	21,593	8.51	27,530	6.80	**<0.001**
Neurological Disorder	4,647	1.83	4,886	1.21	**<0.001**
Psychosis	2,373	0.94	1,979	0.49	**<0.001**
Peptic Ulcer Disease	1,201	0.47	1,322	0.33	**<0.001**
Rheumatoid Arthritis	11,648	4.59	11,652	2.88	**<0.001**