Biologic Disease-Modifying Antirheumatic Drugs Do Not Increase Risk for Periprosthetic Joint Infection

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INTRODUCTION: Over 25% of patients who have rheumatoid arthritis (RA) are expected to undergo a joint arthroplasty during their lifetime. Given the immunosuppressive effects of biologic therapies, current practice guidelines recommend withholding these treatments for at least one week prior to total hip arthroplasty (THA). Most patients are on a regimen including biologic and non-biologic therapies; however, the effects of these therapies on THAs are not well understood. Therefore, we sought to compare RA patients who received biologic, nonbiologic, and combined therapy prior to undergoing THA. Specifically, we assessed: 1) periprosthetic joint infections (PJI); 2) other medical and surgical complications; as well as 3) independent risk factors for PJI.

METHODS: A retrospective review was conducted using a national, all-payer database for patients undergoing primary THA from January 1, 2010 to April 31, 2020. Patients diagnosed with RA were then separated into at least one-year users of biologic (n = 1,403), nonbiologic (n = 12,470), or both (n=5,315) therapies. Multivariate regression models were utilized to assess for independent risk factors.

RESULTS: No differences in rates of 90-days and one-year PJIs were found between all groups (p > 0.439). Additionally, the incidences and odds ratios (ORs) for other medical and surgical complications were equivocal among recipients of biologic, non-biologic, and both types of therapy (p > 0.05). Furthermore, no combination of therapies was identified as risk factors for infection (p > 0.080). However, diabetes mellitus and tobacco use were identified as additional risk factors for PJIs at all timepoints (all p = 0.001).

DISCUSSION AND CONCLUSION:

No differences in PJI rates as well as medical or surgical complications were associated with use of biologic, nonbiologic, or both therapies by patients who have RA. These results should factor into surgeon decision making for these patients.

Table 1. Demographics and Baseline Characteristics

	Biologics (n = 1,403)	Combination Therapy (n = 5,315)	Non-Biologics (n = 12,470)	*p-value*
Age (SD)	60 (11.87)	59 (11.29)	61 (10.19)	
Sex				<0.001
Female	1004 (71.56%)	4133 (77.38%)	9734 (78.00%)	
Male	399 (28.44%)	1202 (22.62%)	2736 (21.94%)	
CCI > 3	183 (13.04%)	781 (14.69%)	2197 (17.62%)	0.001
DM	550 (39.20%)	2139 (40.24%)	5093 (40.84%)	0.427
Obesity	601 (43.12%)	2316 (47.34%)	5226 (41.91%)	<0.001
Glucocorticoids Use	1229 (87.60%)	5087 (95.73%)	11688 (93.73%)	<0.001
Tobacco Use	604 (43.05%)	2344 (44.10%)	5440 (43.62%)	0.735

BMI: body mass index; mo.: months; yr. : year; SD: standard deviation; DM: diabetes mellitus; CCI: Charlson Comorbidity Index

Table 2. Bivariate analysis of post-operative outcomes

	Biologics (n = 1,403)	Combination Therapy (n = 5,315)	Non-Biologics (n = 12,470)	*p-value*
90-day Complications				
Blood Transfusion	12 (0.86%)	48 (0.90%)	135 (1.08%)	0.453
Cardiac Arrest	0 (0.00%)	*	16 (0.13%)	0.274
CVA	*	14 (0.26%)	35 (0.28%)	0.894
DVT	25 (1.78%)	98 (1.84%)	270 (2.17%)	0.293
MI	*	14 (0.26%)	43 (0.34%)	0.341
PE	*	36 (0.68%)	118 (0.95%)	0.103
PNA	23 (1.64%)	81 (1.52%)	242 (1.94%)	0.144
RF	11 (0.78%)	40 (0.75%)	137 (1.10%)	0.074
Pathological Fx	12 (0.86%)	56 (1.05%)	141 (1.13%)	0.614
PPFx	*	30 (0.56%)	78 (0.63%)	0.881
PJI	22 (1.57%)	109 (2.05%)	234 (1.88%)	0.469
SSI	37 (2.64%)	156 (2.94%)	331 (2.65%)	0.583
Aseptic Revision	41 (2.92%)	163 (3.07%)	339 (2.72%)	0.429
1-year Complications				
Pathological Fx	17 (1.21%)	70 (1.32%)	176 (1.41%)	0.768
PPFx	13 (0.93%)	40 (0.75%)	107 (0.86%)	0.719
PJI	30 (2.14%)	135 (2.54%)	280 (2.25%)	0.439
SSI	47 (3.35%)	200 (3.76%)	417 (3.34%)	0.366
Aseptic Revision	130 (9.27%)	499 (9.39%)	1049 (8.41%)	0.083

* Censored in accordance with the database confidentiality agreement
Fx: Fracture; PPFx: Periprosthetic Fracture; PJI: prosthetic joint infection; SSIs: surgical site infections; CVA: Cerebrovascular Accident; PE: Pulmonary Embolism; PNA: Pneumonia; MI: Myocardial Infarction; DVT: Deep Vein Thrombosis

Table 3. Odds Ratio of Complications

	Combination Therapy		Non-Biologics	
	OR	95% CI	OR	95% CI
90-day Complications				
Blood Transfusion	1.06	0.56-1.99	1.27	0.70-2.30
Cardiac Arrest	*	*	*	*
CVA	1.23	0.35-4.29	1.31	0.40-4.28
DVT	1.04	0.66-1.61	1.22	0.81-1.84
MI	1.85	0.42-8.15	2.42	0.59-10.02
PE	1.19	0.55-2.56	1.67	0.81-3.42
PNA	0.93	0.58-1.48	1.19	0.77-1.83
RF	0.96	0.49-1.88	1.41	0.76-2.60
Pathological Fx	1.23	0.66-2.31	1.33	0.73-2.40
PPFx	0.88	0.42-1.86	0.97	0.49-1.95
PJI	1.31	0.83-2.09	1.20	0.77-1.87
SSI	1.12	0.78-1.63	1.01	0.71-1.42
Aseptic Revision	1.03	0.74-1.49	0.93	0.67-1.28
1-year Complications				
Pathological Fx	1.09	0.64-1.85	1.17	0.71-1.93
PPFx	0.81	0.43-1.52	0.93	0.52-1.65
PJI	1.19	0.80-1.78	1.05	0.72-1.54
SSI	1.13	0.82-1.56	1.00	0.73-1.36
Aseptic Revision	1.01	0.83-1.24	0.90	0.74-1.09

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Table 4. Multivariate logistic regression for PJI

90-day PJI	OR*	95% CI	p-value
Male	0.82	0.61-1.09	*0.177*
Age < 60	1.68	1.05-2.57	*0.023*
Alcohol Abuse	2.17	0.90-4.45	*0.054*
Diabetes Mellitus	1.60	1.21-2.10	*0.001*
Glucocorticoid Use	0.92	0.72-1.17	*0.497*
Obesity	1.45	1.04-1.97	*0.023*
Tobacco Use	1.67	1.23-2.24	*0.001*
Biologics	0.41	0.13-0.98	*0.080*
Both Drugs	2.44	0.90-8.48	*0.110*
1-year PJI			
Male	0.83	0.64-1.07	*0.167*
Age < 60	1.57	1.01-2.33	*0.035*
Alcohol Abuse	2.04	0.90-4.02	*0.058*
Diabetes Mellitus	1.53	1.18-1.97	*0.001*
Glucocorticoid Use	0.91	0.74-1.14	*0.425*
Obesity	1.36	1.00-1.81	*0.043*
Tobacco Use	1.58	1.19-2.07	*0.001*
Biologics	0.59	0.25-1.18	*0.178*
Both Drugs	1.79	0.80-4.55	*0.182*

*Referent group: non-Biologic cohort
OR: odds ratio; 95% CI: 95% confidence intervals