

Delayed Administration of Apixaban and Rivaroxaban Reduces the Risk of Postoperative Bleeding Without Increasing Thromboembolic Risk Following Elective Total Hip Arthroplasty

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INTRODUCTION: The optimal timing for initiation of anticoagulation using direct oral anticoagulants (DOACs) following total hip arthroplasty (THA) remains a subject of debate. While DOACs are effective prophylactic agents against venous thromboembolism (VTE), bleeding risks remain a concern. This study sought to compare the incidence of postoperative bleeding and thromboembolic complications following elective THA between patients receiving either apixaban or rivaroxaban on postoperative day (POD) 0 versus 1.

METHODS: The Premier Healthcare Database was used to identify all patients who underwent primary THA between 2016-2023. Patients receiving either apixaban or rivaroxaban on POD0 were compared to patients who received the same anticoagulant on POD1. Ninety-day postoperative bleeding complications (e.g. acute anemia, transfusion, hematoma, and hemorrhage) as well as thromboembolic complications (e.g. deep venous thrombosis (DVT) and pulmonary embolism (PE)) were compared between the POD0 and POD1 cohorts for each medication. Univariable analysis and multivariable regression were used to assess differences.

RESULTS: In total, 107,012 primary THA patients were identified. Of the 54,873 rivaroxaban patients, 17,105 (31.2%) received anticoagulation on POD0 compared to 37,768 (68.8%) on POD1. Of the 52,139 patients receiving apixaban, 14,840 (28.5%) received anticoagulation on POD0 compared to 37,299 (71.5%) on POD1. For both cohorts, patients receiving anticoagulation beginning on POD1 had a reduced risk of acute anemia (rivaroxaban: adjusted odds ratio [aOR] 0.91, 95%-CI: 0.88-0.96, p<0.001 | apixaban: aOR 0.81, 95%-CI: 0.77-0.85, p<0.001) and aggregate bleeding complications (rivaroxaban: aOR 0.91, 95%-CI: 0.88-0.96, p<0.001 | apixaban: aOR 0.81, 95%-CI: 0.77-0.85, p<0.001). Neither drug was associated with an increased risk of DVT or PE when administered on POD1 versus POD0.

DISCUSSION AND CONCLUSION: Delayed administration of apixaban and rivaroxaban until POD1 was associated with a reduced risk of postoperative anemia without an increased risk of thromboembolic complications in patients undergoing THA.

90-Day Postoperative Outcomes	Apixaban Day 0 (n=14,840)		Apixaban Day 1 (n=37,299)		OR	95%-CI	P-Value	aOR	95%-CI	P-Value
	N	%	N	%						
Aggregate Bleeding Complications	2,302	22.84%	7,024	18.79%	0.78	(0.74, 0.82)	<0.001	0.81	(0.77, 0.85)	<0.001
Transfusion	462	3.11%	1,141	3.06%	0.78	(0.74, 0.82)	<0.001	0.81	(0.77, 0.85)	<0.001
Acute Anemia	2,108	21.50%	6,208	17.60%	0.78	(0.74, 0.82)	<0.001	0.81	(0.77, 0.85)	<0.001
Hematoma	83	0.59%	159	0.43%	0.78	(0.59, 1.04)	0.25	0.84	(0.64, 1.10)	0.07
Hemorrhage	26	0.19%	31	0.14%	0.78	(0.25, 2.55)	0.80	1.20	(0.50, 3.30)	0.70

90-Day Postoperative Outcomes	Rivaroxaban Day 0 (n=17,105)		Rivaroxaban Day 1 (n=37,768)		OR	95%-CI	P-Value	aOR	95%-CI	P-Value
	N	%	N	%						
Aggregate Bleeding Complications	4,411	25.83%	8,772	23.37%	0.84	(0.80, 0.89)	<0.001	0.91	(0.88, 0.96)	<0.001
Transfusion	661	3.88%	1,263	3.35%	0.71	(0.67, 0.75)	<0.001	0.81	(0.77, 0.85)	<0.001
Acute Anemia	4,141	24.25%	8,178	21.63%	0.84	(0.80, 0.89)	<0.001	0.91	(0.88, 0.96)	<0.001
Hematoma	82	0.48%	161	0.43%	0.81	(0.61, 1.07)	0.15	0.89	(0.68, 1.17)	0.51
Hemorrhage	34	0.20%	97	0.26%	0.78	(0.51, 1.19)	0.18	1.21	(0.82, 1.82)	0.34

90-Day Postoperative Outcomes	Apixaban Day 0 (n=14,840)		Apixaban Day 1 (n=37,299)		OR	95%-CI	P-Value	aOR	95%-CI	P-Value
	N	%	N	%						
Deep Vein Thrombosis	111	0.75%	230	0.62%	0.76	(0.72, 0.80)	<0.001	0.81	(0.77, 0.85)	<0.001
Pulmonary Embolism	64	0.43%	152	0.41%	0.74	(0.67, 0.81)	<0.001	0.81	(0.77, 0.85)	<0.001
Stroke	26	0.18%	74	0.20%	0.78	(0.58, 1.03)	0.13	0.83	(0.61, 1.13)	0.24
Myocardial Infarction	65	0.44%	127	0.34%	0.78	(0.68, 0.89)	<0.001	0.78	(0.74, 0.84)	0.004

90-Day Postoperative Outcomes	Rivaroxaban Day 0 (n=17,105)		Rivaroxaban Day 1 (n=37,768)		OR	95%-CI	P-Value	aOR	95%-CI	P-Value
	N	%	N	%						
Deep Vein Thrombosis	109	0.63%	209	0.55%	0.81	(0.77, 0.85)	<0.001	0.81	(0.77, 0.85)	<0.001
Pulmonary Embolism	60	0.35%	117	0.31%	0.81	(0.74, 0.88)	<0.001	0.81	(0.77, 0.85)	<0.001
Stroke	18	0.11%	51	0.14%	0.78	(0.58, 1.03)	0.13	0.83	(0.61, 1.13)	0.24
Myocardial Infarction	39	0.23%	75	0.20%	0.87	(0.78, 0.97)	<0.001	0.84	(0.81, 0.87)	0.015