Diagnostic and Invasive Colonoscopy are not Risk Factors for Revision Surgery Due to Periprosthetic Joint Infection: A Retrospective Database Study

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INTRODUCTION:

Total hip arthroplasty (THA), total knee arthroplasty (TKA), and unicompartmental knee arthroplasty (UKA) are highly utilized surgical treatments for joint disease of the hip and knee in older adults. In the same population, colonoscopy is routinely performed for colorectal cancer screening. However, colonoscopy may provoke transient bacteremia, leading to concern for periprosthetic joint infection (PJI). This study aimed to investigate the risk of revision surgery due to PJI in patients who underwent diagnostic (DC) or invasive colonoscopy (IC) within one-year following TKA, UKA, or THA.

METHODS:

A retrospective cohort analysis was performed using the PearlDiver database. Patients were identified using Current Procedural Terminology (CPT). In total, 1,049,218 patients underwent TKA, 52,891 underwent UKA, and 526,296 underwent THA. CPT codes were then used to identify patients who underwent DC or IC within one-year of surgery. Data was analyzed with univariate and multivariate regression analysis to investigate the odds of all-cause revision and revision due to PJI at 18, 24, 30 and 36 months following the index procedure.

RESULTS:

In total, 526,296 patients underwent THA with 7,209 (1.37%) undergoing a DC 1-year after primary THA and 12,907 (2.45%) undergoing an IC 1-year after primary THA. Univariate analysis of patients who underwent DC found no statistically significant outcomes (Table 1) and were therefore not included in further analysis. Multivariable analysis of patients who underwent IC after THA had decreased odds of all-cause revision at all time points ($p<0.05$), and decreased revision due to PJI at 24, 30, and 36-months ($p<0.05$) (Table 3).

A total of 52,891 patients underwent UKA of which 889 (1.68%) had a DC 1-year after primary UKA and 1,520 (2.87%) had an IC 1-year after primary UKA. No significant differences in outcomes were found on univariate analysis for patients who underwent DC (Table 2). On multivariable analysis, patients who underwent IC after UKA had lower odds of all-cause revision at all time points ($p<0.05$), however, no significant differences were found in revision due to PJI (Table 3).

For TKA, a total of 1,049,218 patients underwent TKA. Of these, 15,969 (1.52%) had a DC 1-year after primary TKA and 28,145 (2.68%) had an IC 1-year after primary TKA. Multivariable analysis of patients who underwent DC found no statistically significant differences in odds of revision or revision due to PJI (Table 3). However, patients who underwent IC within a year following TKA had decreased odds of 18-month and 30-month all-cause revision ($p=0.002$) and revision due to PJI at all time points ($p<0.001$) (Table 3).

DISCUSSION AND CONCLUSION:

Our results show that diagnostic colonoscopy was not a significant risk factor for PJI following TKA, UKA, or THA. Paradoxically, invasive colonoscopy was protective against PJI. Future research can investigate the reasons for decreased odds of revision surgery in patients who underwent invasive colonoscopy, or for specific patient populations in which colonoscopy increases risk of PJI most. However, physicians should not deter any medically necessary colonoscopy procedures in patients with lower extremity prosthesis due to fear of increasing a patient's risk of PJI.

Table 1. Univariate Analysis of 18 moth, 24 month, 30 month, and 36 month All-Cause Revision and Revision due to PJI in Patients who had a Diagnostic Colonoscopy or Invasive Colonoscopy done within 1-Year Postop Following THA

	THA Diagnostic Colon			*THA Invasive Colon*			*THA No Colon*	
	n	**%**	**p-value**	**n**	**%**	**p-value**	**n**	**%**
Total	7209			12907			506179	
18mo Revision	88	1.22%	0.253	147	1.14%	**0.019**	7017	1.39%
24mo Revision	96	1.33%	0.228	164	1.27%	**0.028**	7659	1.51%
30mo Revision	104	1.44%	0.218	183	1.42%	0.059	8275	1.63%
36mo Revision	113	1.57%	0.310	193	1.50%	**0.045**	8765	1.73%
18mo PJI	16	0.22%	0.514	27	0.21%	0.225	1362	0.27%
24mo PJI	16	0.22%	0.319	28	0.22%	0.134	1482	0.29%
30mo PJI	18	0.25%	0.419	30	0.23%	0.136	1569	0.31%
36mo PJI	19	0.26%	0.411	32	0.25%	0.143	1651	0.33%

Table 2. Univariate Analysis of 18 moth, 24 month, 30 month, and 36 month All-Cause Revision and Revision due to PJI in Patients who had a Diagnostic Colonoscopy or Invasive Colonoscopy done within 1-Year Postop Following UKA

	UKA Diagnostic Colon			*UKA Invasive Colon*			*UKA No Colon*	
	n	**%**	**p-value**	**n**	**%**	**p-value**	**n**	**%**
Total	889			1520			50482	
18mo Revision	20	2.25%	0.855	18	1.18%	**0.017**	1062	2.10%
24mo Revision	23	2.59%	0.855	24	1.58%	**0.040**	1229	2.43%
30mo Revision	32	3.60%	0.222	30	1.97%	**0.050**	1440	2.85%
36mo Revision	33	3.71%	0.443	37	2.43%	0.110	1614	3.20%
18mo PJI	3***	0.34%	1.000	2***	0.13%	0.292	161	0.32%
24mo PJI	3***	0.34%	1.000	2***	0.13%	0.217	179	0.35%
30mo PJI	3***	0.34%	1.000	3***	0.20%	0.349	192	0.38%
36mo PJI	3***	0.34%	0.901	4***	0.26%	0.457	213	0.42%

Table 3. Multivariable Analysis of Significant All-Cause Revision and Revision due to PJI Outcomes in Patients who had a Diagnostic Colonoscopy or an Invasive Colonoscopy Done Within 1-Year Postop Following TKA, UKA, THA Compared to Patients who Did Not Undergo a Colonoscopy

	TKA Diagnostic Colon				*TKA Invasive Colon*				*UKA Invasive Colon*				*THA Invasive Colon*			
	Odds Ratios	25%	75%	p-value	Odds Ratios	25%	75%	p-value	Odds Ratios	25%	75%	p-value	Odds Ratios	25%	75%	p-value
18mo Revision					0.833	0.743	0.931	**0.002**	0.523	0.315	0.811	**0.007**	0.780	0.659	0.916	**0.003**
24mo Revision									0.606	0.392	0.891	**0.016**	0.798	0.680	0.929	**0.005**
30mo Revision	0.992	0.882	1.111	0.890	0.857	0.777	0.942	**0.002**	0.650	0.441	0.920	**0.021**	0.825	0.709	0.953	**0.011**
36mo Revision	0.994	0.888	1.107	0.908					0.716	0.505	0.983	**0.049**	0.821	0.709	0.946	**0.007**
18mo PJI					0.611	0.485	0.757	**<0.001**								
24mo PJI					0.646	0.523	0.788	**<0.001**					0.659	0.442	0.939	**0.029**
30mo PJI	0.964	0.776	1.181	0.730	0.660	0.539	0.798	**<0.001**					0.668	0.455	0.941	**0.029**
36mo PJI	1.000	0.814	1.213	0.998	0.664	0.547	0.798	**<0.001**					0.677	0.467	0.944	**0.029**