The Importance of Oral Hygiene: Does Prior Dental Implant Placement or Dental Caries Within 1 Year of Primary Total Knee Arthroplasty Increase Medical Complications and Peri-Prosthetic Joint Infections?

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INTRODUCTION:

One of the leading causes of TKA failure and reoperation includes periprosthetic joint infection (PJI). Historically, poor dental health and dental pathology have been considered a risk factor for development of PJIs. With few large comparative studies, there is a lack of consensus among orthopedic surgeons and dentists regarding the influence of prior dental history and need for antibiotic prophylaxis in primary total knee arthroplasty (TKA) patients. Therefore, the objectives were to determine the association of dental caries or dental implant placement prior to TKA on: 1) medical complications; 2) healthcare utilization including lengths of stay (LOS) and readmission rates; and 3) implant-related complications including PJIs and healthcare expenditures.

METHODS:

A retrospective analysis was performed using a nationwide insurance claims database for primary TKAs from 2010 to 2020. Patients and complications were identified using International Classification of Disease, Ninth/Tenth Revision (ICD-9/10) and Current Procedural Terminology (CPT) codes. Patients undergoing primary TKA with a history of dental caries or dental implant placement within 1 year of TKA represented the study group (n= 1466). Patients without prior history of dental implant placement or caries represented the comparison cohort (n=7328). Study group patients were case-matched in a 1:5 ratio by age and comorbidities. Primary outcomes of the study were to compare 90-day medical complications, healthcare utilization parameters (LOS, readmission rates), 2-year implant-related complications, and healthcare expenditures. Pearson's chi-square analyses were used to compare patient demographics of the two cohorts. Welch's t-tests were used to compare LOS and costs. Multivariate logistic regression models were used to calculate odds (OR) and 95% confidence intervals (95%CI) of developing medical complications and being readmitted within 90-days following TKA adjusting for age, sex, geographic region, and matched comorbidities. Following a Bonferroni-correction, a p-value less than 0.005 was considered statistically significant.

RESULTS:

Patients with a history of dental implant placement or dental caries within 12 months of primary TKA had higher frequency of medical complications compared to case-matched patients (20.05 vs. 13.11%; OR: 1.66, $p<0.0001$), including myocardial infarctions (2.52 vs. 1.23%; OR:2.08, $p=0.0002$) and pneumoniae (2.52 vs. 1.24%; OR:2.06, $p=0.0002$). LOS (3.28 vs. 2.98 days; $p=0.255$), readmission rates (4.71 vs. 4.28%; $p=0.470$), and incidence of PJIs within 2 years of surgery (3.14 vs. 2.63%; OR: 1.20, $p=0.279$) were similar between groups. Within the 90-day episode of care interval, healthcare expenditures were significantly higher in patients with recent dental history ($19,363 vs 17,980; $p<0.001$).

DISCUSSION AND CONCLUSION: Patients with dental caries or dental implant placement have higher 90-day medical complications, greater healthcare expenditures, and similar 2-year implant-related complications. Poor dental hygiene did not lead to increased implant infections, however this comorbidity may be reflective of overall poorer medical condition in these patients resulting in greater postoperative complications and increased healthcare expenditures. Addressing dental history in the preoperative period may assist orthopedic arthroplasty surgeons in minimizing complications in this group of patients.

	Prior Dental Work		Controls		
DEMOGRAPHICS	n	%	n	%	*p*-value[Δ]
Age (Years)					
15-19	*	N/A	*	N/A	0.99
20-24	*	N/A	*	N/A	
25-29	*	N/A	*	N/A	
30-34	*	N/A	*	N/A	
35-39	16	1.1	80	1.1	
40-44	60	4.1	300	4.1	
45-49	116	7.9	580	7.9	
50-54	240	16.4	1200	16.4	
55-59	259	17.7	1295	17.7	
60-64	269	18.3	1345	18.4	
65-69	205	14.0	1025	14.0	
70-74	157	10.7	785	10.7	
75-79	106	7.2	530	7.2	
80+	23	1.6	115	1.6	
Sex					
Female	898	61.3	4488	61.2	0.99
Male	568	38.7	2840	38.8	
Comorbidities					
COPD	756	51.6	3780	51.6	0.99
Depression	900	61.4	4500	61.4	0.99
Diabetes Mellitus	845	57.6	4222	57.6	0.99
Hypertension	1316	89.8	6580	89.8	0.99
Obesity (BMI >30kg/m^2)	1013	69.1	5065	69.1	0.99
Tobacco Use	873	59.5	4366	59.6	0.98

Table 1. Demographics of Patients With and Without a History of dental caries or dental implant placement within 1 Year of Undergoing Primary Total Knee Arthroplasty. COPD = Chronic Obstructive Pulmonary Disease; BMI = Body Mass Index; * = <11 Patients; N/A = Not Applicable; [Δ] = Assessed by Pearson's χ^2

	Prior Dental Work N (%)	Control N (%)	OR	95% CI	*p*-value
Urinary Tract Infection	83 (5.66)	253 (3.45)	1.68	1.30 - 2.16	**0.0001**
Pneumoniae	37 (2.52)	91 (1.24)	2.06	1.40 - 3.03	**0.0002**
Myocardial Infarctions	37 (2.52)	90 (1.23)	2.08	1.41 - 3.07	**0.0002**
Transfusions	32 (2.18	100 (1.36)	1.61	1.08 - 2.41	0.020
Surgical Site Infections	29 (1.98)	96 (1.31)	1.52	1.00 – 2.31	0.049
PJIs	46 (3.14)	193 (2.63)	1.20	0.86 - 1.66	0.279
Venous Thromboemboli	19 (1.30)	85 (1.16)	1.12	0.68 – 1.85	0.660
Pulmonary Emboli	11 (0.75)	53 (0.72)	1.04	0.54 – 1.99	0.911
Deep Venous Thrombosis	*	36 (0.49)	-	-	-
Cerebrovascular Accident	*	30 (0.41)	-	-	-
Total	294 (20.05)	961 (13.11)	1.66	1.44 – 1.92	**<0.0001**

Table 2. Comparison of Incidence and Odds of Ninety-Day Medical Complications and 2 Year PJIs Among Patients With and Without a History of dental caries or dental implant placement within 1 Year of Undergoing Primary Total Knee Arthroplasty.

PJIs = Peri-Prosthetic Joint Infections; OR = Odds-Ratio; 95% CI = 95% Confidence Interval
Total Complications Do not include DVT or CVA.
*Indicates < 11 patients.