

Does Antibiotic Bone Cement Reduce Infection Rates in Primary Total Knee Arthroplasty?

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INTRODUCTION:

Infection after total knee arthroplasty (TKA) impacts the patient, surgeon, and healthcare system significantly. Surgeons routinely use antibiotic-loaded bone cement (ALBC) to mitigate infection; however, little evidence supports the efficacy of ALBC in reducing infection rates compared to non-antibiotic-loaded bone cement (non-ALBC) in primary TKA. Our study compares infection rates of patients receiving TKA with ALBC to those with non-ALBC to assess its efficacy in primary TKA.

METHODS:

A retrospective review of all primary, elective, cemented TKA patients over the age of 18 between 2011-2020 was conducted at an orthopedic specialty hospital. Patients were stratified into two cohorts based on cement type: ALBC (loaded with gentamicin or tobramycin) or non-ALBC. Baseline characteristics and infection rates, by MSIS criteria, were collected. Multilinear and multivariate logistic regressions were performed to limit significant differences in demographics. Independent samples t-test and chi-squared test were used to compare means and proportions, respectively, between the two cohorts.

RESULTS:

In total, 9,366 patients were included in this study, 7,980 (85.2%) of whom received non-ALBC and 1,386 (14.8%) of whom received ALBC. There were significant differences in five of the six demographic variables analyzed; patients with higher BMI (33.40±6.27 vs. 32.09±6.21; kg/m²) and CCI values (4.51±2.15 vs. 4.04±1.92) were more likely to receive ALBC. The rate of infection in the non-ALBC was 0.8% (63/7,980), while the rate in the ALBC was 0.5% (7/1,386). After adjusting for confounders, the difference in rates was not significant between the two groups (OR [95% CI]: 1.53 [0.69-3.38], p=0.298). Furthermore, a sub-analysis comparing the infection rates within various demographic categories also showed no significant differences between the two groups.

DISCUSSION AND CONCLUSION:

Compared to non-ALBC, the overall infection rate in primary TKA was slightly lower when using ALBC; however, the difference was not statistically significant. When stratifying by comorbidity, use of ALBC still showed no statistical significance in reducing the risk of PJI. Therefore, the advantage of antibiotics in bone cement to prevent infection in primary TKA is not yet elucidated. Further prospective multicenter studies regarding the clinical benefits of antibiotic use in bone cement for primary TKA are warranted.

	Non-ALBC	ALBC	P-Value
Age (yrs)	65.88 ± 9.78	65.81 ± 10.17	0.815
Gender			0.003
Female	5,339 (66.9%)	983 (70.9%)	
Male	2,641 (33.1%)	403 (29.1%)	
BMI (kg/m²)	32.09 ± 6.21	33.40 ± 6.27	<0.001
ASA Score			<0.001
1	184 (2.3%)	15 (1.1%)	
2	4,528 (56.8%)	586 (42.3%)	
3	3,126 (39.2%)	747 (53.9%)	
4	135 (1.7%)	38 (2.7%)	
Smoking Status			0.028
Never Smoker	4,668 (58.5%)	858 (61.9%)	
Former Smoker	2,734 (34.3%)	418 (30.2%)	
Current Smoker	520 (6.5%)	100 (7.2%)	
Unknown	58 (0.7%)	10 (0.7%)	
CCI	4.04 ± 1.92	4.51 ± 2.15	<0.001
Diabetes			<0.001
Diabetic	1,457 (18.3%)	516 (37.2%)	
Non-Diabetic	6,523 (81.7%)	870 (62.8%)	

Infection	Non-ALBC	ALBC	Total	Odds Ratio (95% CI)	P-Value
No	7,917 (99.2%)	1,379 (99.5%)	9,296 (99.3%)	1.53 (0.69 - 3.38)	0.298
Yes	63 (0.8%)	7 (0.5%)	70 (0.7%)		
Total	7,980	1,386	9,366		

Demographic	Non-ALBC	ALBC	Odds Ratio (95% CI)	P-Value
Gender				
Female	5,339	983	1.00 (0.69 - 1.45)	0.927
Male	1,641	403	1.16 (0.40 - 3.39)	0.790
BMI (kg/m ²)				
18-30	1,120	150	0.43 (0.02 - 8.99)	0.533
31-35	4,427	282	0.72 (0.02 - 26.00)	0.800
36-40	1,242	411	0.63 (0.19 - 2.07)	0.461
41-45	1,441	206	0.59 (0.21 - 1.67)	0.341
46-50	391	205	0.64 (0.28 - 1.47)	0.341
51-55	113	71	0.67 (0.20 - 2.17)	0.507
56-60	428	368	1.00 (0.45 - 2.29)	0.441
61-65	1,120	205	0.72 (0.20 - 2.60)	0.590
66-70	195	38	0.33 (0.01 - 9.10)	0.545
Smoking Status				
Never Smoker	4,668	858	1.00 (0.69 - 1.45)	0.814
Former Smoker	2,734	418	1.00 (0.69 - 1.45)	0.814
Current Smoker	520	100	1.00 (0.31 - 3.48)	0.946
Unknown	58	10	1.00 (0.11 - 9.48)	0.946
CCI				
1-2	36	3	0.64 (0.01 - 6.94)	0.804
3-4	1,587	105	1.00 (0.45 - 2.29)	0.441
5-6	4,341	478	1.00 (0.69 - 1.45)	0.814
7-8	1,046	104	1.00 (0.45 - 2.29)	0.441
9-10	1,046	104	1.00 (0.45 - 2.29)	0.441