

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	ALBC	Non-ALBC	Total	Odds Ratio (95% CI)	P-Value
Gender					
Female	983 (70.9%)	5,339 (66.9%)	6,322 (67.4%)	1.00	
Male	403 (29.1%)	2,641 (33.1%)	3,044 (32.6%)	1.00	
BMI (kg/m ²)					
< 25	15 (1.1%)	184 (2.3%)	199 (2.1%)	1.00	
25 - 30	286 (20.6%)	4,528 (56.8%)	4,814 (51.5%)	1.00	
30 - 35	470 (34.0%)	3,126 (39.2%)	3,596 (38.6%)	1.00	
> 35	138 (9.9%)	135 (1.7%)	273 (2.9%)	1.00	
ASA Score					
1	15 (1.1%)	184 (2.3%)	199 (2.1%)	1.00	
2	586 (42.3%)	4,528 (56.8%)	5,114 (54.5%)	1.00	
3	747 (53.9%)	3,126 (39.2%)	1,073 (11.4%)	1.00	
4	38 (2.7%)	135 (1.7%)	173 (1.8%)	1.00	
Smoking Status					
Never Smoker	858 (61.9%)	4,668 (58.5%)	5,526 (59.1%)	1.00	
Former Smoker	418 (30.2%)	2,734 (34.3%)	3,152 (33.7%)	1.00	
Current Smoker	100 (7.2%)	520 (6.5%)	620 (6.6%)	1.00	
Unknown	10 (0.7%)	58 (0.7%)	68 (0.7%)	1.00	
CCI					
< 4	15 (1.1%)	184 (2.3%)	199 (2.1%)	1.00	
4 - 5	571 (41.2%)	4,344 (54.5%)	4,915 (52.4%)	1.00	
> 5	747 (53.9%)	3,126 (39.2%)	1,073 (11.4%)	1.00	
Diabetes					
Diabetic	516 (37.2%)	1,457 (18.3%)	1,973 (21.1%)	1.00	
Non-Diabetic	870 (62.8%)	6,523 (81.7%)	7,393 (78.9%)	1.00	