Topical Intrawound Vancomycin Powder does not improve Surgical Site Infection (SSI) Rate in Posterior Lumbar Interbody Fusion

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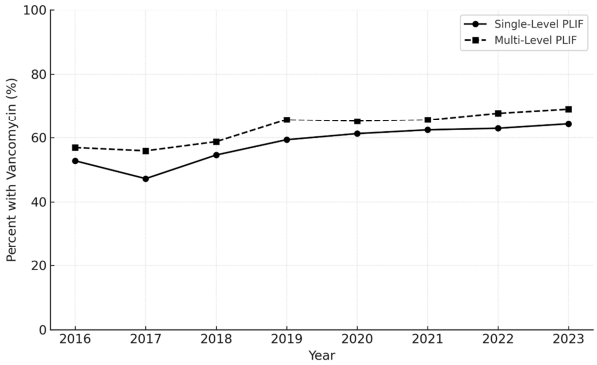
INTRODUCTION: Surgical site infections remain a significant problem with lumbar spinal fusion procedures. The use of topical intrawound vancomycin is becoming increasingly accepted as a prophylactic measure against SSIs in PLIF, but there is limited data supporting its efficacy. We aimed to evaluate the efficacy of surgical site vancomycin powder at preventing both deep tissue infection and wound complication following single and multi-level PLIF, accounting for comorbidities through a retroactive cohort study.

METHODS:

A retrospective review was performed utilizing the Epic Cosmos national database querying Current Procedural Terminology (CPT) codes identifying patients who received either cefazolin or clindamycin as their preoperative antibiotic. Patients were categorized into single or multi-level PLIF cohorts. The primary outcome variables were deep tissue infection and surgical wound complications assessed 90 days following surgery. Demographic data collected included: age, sex, obesity, diabetes, and renal disease. To compare SSI rates, PLIF patients were stratified into those receiving intrawound vancomycin and those who did not. The changing rate of vancomycin use over time was analyzed. Univariate chi-square tests were conducted to compare SSI rates between patients with and without vancomycin application, including subgroup analyses to identify if specific risk factors influenced the effectiveness of vancomycin. Logistic regression analysis was also performed using all independent variables.

RESULTS: We identified 74,393 single-level and 30,975 multi-level PLIF patients between January 2016 and December 2023. Supplemental intrawound vancomycin was used in 60.9% of single-level and 65.8% of multi-level cases. Both single and multi-level PLIF showed increased adoption of vancomycin use over the study period (2.20% $p = 0.002$, 1.97% $p < 0.001$). Female sex, diabetes, obesity, and renal disease were confirmed independent risk factors for SSI in both single and multi-level PLIF ($p < 0.005$). Intrawound vancomycin was not independently associated with deep tissue infection and superficial surgical-site infection/wound dehiscence rates in either single ($p = 0.299$, $p = 0.404$) or multi-level ($p = 0.147$, $p = 0.237$) PLIF after adjusting for comorbidities. In subgroup analysis, surgical site vancomycin use was linked to higher risk of deep tissue infection in patients with obesity (1.85% vs. 1.02%, $p = 0.009$) and renal disease (1.85% vs. 1.02%, $p = 0.021$), but not with diabetes for single-level PLIF. Application of vancomycin was associated with superficial wound complications for patients with obesity for the single-level PLIF subgroup (4.27% vs. 3.46%, $p = 0.004$). In multi-level PLIF, vancomycin use was associated with an increase in deep infection risk in patients with diabetes ($p = 0.046$) and renal disease ($p = 0.011$), but not with obesity. No difference was observed in rate of superficial complications in any multi-level PLIF demographic subgroup.

DISCUSSION AND CONCLUSION: Intrawound application of vancomycin powder did not reduce risk of post operative deep tissue infection nor wound complication rate with PLIF surgery when controlling for demographic risk factors in this retrospective analysis. These findings can help inform surgeons when developing SSI prevention strategies for posterior lumbar spinal fusion.



Characteristic	Coef	P-value	Odds Ratio	CI Low	CI High
Multi-Level					
Deep Infection					
Vancomycin vs No Vancomycin	0.148	0.1473	1.16	0.95	1.42
Diabetes: Yes vs No	0.238	0.0254	1.27	1.03	1.56
Obesity: Yes vs No	0.472	< 0.0001	1.6	1.32	1.95
Renal Disease: Yes vs No	0.629	< 0.0001	1.88	1.44	2.45
Female vs Male	0.335	0.0006	1.4	1.16	1.69
Wound Complication					
Vancomycin vs No Vancomycin	0.073	0.2373	1.08	0.95	1.22
Diabetes: Yes vs No	0.391	< 0.0001	1.48	1.31	1.67
Obesity: Yes vs No	0.849	< 0.0001	2.34	2.08	2.63
Renal Disease: Yes vs No	0.938	< 0.0001	2.56	2.21	2.96
Female vs Male	0.696	< 0.0001	2.0	1.78	2.26
Single-Level					
Deep Infection					
Vancomycin vs No Vancomycin	0.089	0.2986	1.09	0.92	1.29
Diabetes: Yes vs No	0.375	< 0.0001	1.45	1.21	1.75
Obesity: Yes vs No	0.493	< 0.0001	1.64	1.38	1.94
Renal Disease: Yes vs No	0.387	0.0026	1.47	1.14	1.9
Female vs Male	0.328	0.0001	1.39	1.18	1.64
Wound Complication					
Vancomycin vs No Vancomycin	0.04	0.4044	1.04	0.95	1.14
Diabetes: Yes vs No	0.482	< 0.0001	1.62	1.46	1.79
Obesity: Yes vs No	0.78	< 0.0001	2.18	1.98	2.4
Renal Disease: Yes vs No	0.664	< 0.0001	1.94	1.71	2.21
Female vs Male	0.657	< 0.0001	1.93	1.75	2.13