Vancomycin powder reduces risk of wound complication in orthopaedic tumor surgery

Christina Gutowski MD[1], Kirsten Ross BS[1], Kristin Strogus PA-C[1], Bridget Lydon NP[1], John A. Abraham MD[2]
[1]Thomas Jefferson University Hospital; Philadelphia, PA
[2]Rothman Institute Orthopaedics; Philadelphia, PA

Level of evidence: III; retrospective case control study investigating the results of treatment

Background: Vancomycin powder applied topically during wound closure has been shown to reduce surgical site infections in patients undergoing spine surgery. This application has been given a U.S. Preventive Services Task Force Level B recommendation in recent literature. Current data are in favor of local vancomycin utilization as additional wound infection prophylaxis in high-risk cases, such as in procedures involving large-scale endoprosthetic implants. No specific study, however, has investigated the use of vancomycin powder in orthopedic oncology operations.

Purpose: The purpose of this study is to retrospectively review a series of 54 patients (60 separate incisions) who underwent orthopaedic oncologic surgery at one institution, who received vancomycin powder applied to their wound during closure. The rate of surgical site infection in these patients was recorded and compared to the previous consecutive 43 patients who underwent similar procedures for orthopaedic oncological diagnoses, who did not receive vancomycin powder.

Patients and methods: This is a retrospective case-control study examining a series of 54 patients who underwent surgery for a known orthopaedic oncologic diagnosis between February 2014 and March 2015. All surgeries were performed by one fellowship-trained orthopaedic oncologic surgeon, who began using vancomycin powder in all primary oncology wounds in February 2014. Patients received 750mg – 2g of vancomycin powder, depending on wound length, applied topically to the soft tissues during layered wound closure. Wound size, utilization of a surgical drain, and details of the procedure performed were recorded. The rates of developing deep or superficial surgical site infection and return to surgery for irrigation and debridement were recorded. These rates were compared to a cohort of 43 patients who underwent similar oncologic-based procedures by the same surgeon in the months prior to February 2014, not receiving the vancomycin powder.

Results: There were 54 patients, with 60 separate incisions, beginning in February 2014 who underwent removal of neoplastic soft tissue or bony mass who received on average 0.094 gm/cm vancomycin powder in the surgical wound at the time of closure. Average follow-up is 242 days (over 8 months, range 63-487 days.) All patients received appropriate prophylactic IV antibiotics at the start of surgery. Two of these patients (3.7%) developed surgical site infection, both of which required return to the operating room for surgical debridement. Infecting organisms were Pseudomonas species and E.Coli/Candida, respectively, and were treated with appropriate antibiotics. In comparison, a cohort of historic controls who underwent similar procedures in the 5-month time interval prior to February 2014 suffered a 9% rate of surgical site infection. Average follow-up for this group is 561 days (over 18 months, range 525-637 days.) We were unable to find statistically significant differences between the two groups in terms of demographic characteristics, average tumor size or incision length, surgical time, and utilization rates of chemotherapy or radiation that could have contributed to this difference in infection rate (see Table 1).

Conclusions: The utilization of topical vancomycin powder applied into the wound during routine closure appears to have a beneficial effect on lowering rates of surgical site infection during musculoskeletal oncologic surgery. Limitations of this study include small sample size, heterogeneous tumor population, and variable dosage used, and retrospective design. However, the results of this initial study suggest that a larger scale prospective study in the orthopedic oncology population may be warranted to investigate the precise role of this treatment in decreasing the rates of surgical site infection.

Table 1:

	Vanco (n=60)	SE	No vanco (n=43)	SE	Net diff (Vanco - no Vanco)	95% CI	p-value
Gender:							
Female	53.33%	6.44%	53.49%	7.61%	-0.16%	-19.84% to + 19.53%	1
Male	46.67%		46.51%				
Mean age	50.4 (14.4-89.7)		47.6 (14.2-88.5)		-2.8	-10.6 to + 5.0	0.5381
Type of lesion:							
Bone lesion	26.67%	5.71%	32.56%	7.15%	-5.89%	-25.81% to + 14.03%	0.6679
Soft tissue lesion	73.33%	5.71%	67.44%	7.15%			
Malignancy:							
Malignant	36.67%	6.22%	27.91%	6.84%	8.76%	-11.36% to + 28.88%	0.4716
Benign	63.33%	6.22%	72.09%	6.84%			
Radiation	13.56%	4.42%	16.28%	5.63%	-2.72%	-18.93% to + 13.04%	0.8928
Chemotherapy	13.56%	4.42%	13.95%	5.28%	-0.39%	-14.70% to + 13.46%	1
Tumor size:							
<5 cm	30.00%	5.92%	34.88%	7.27%	-4.88%	-25.25% to + 15.48%	0.7568
5-10 cm	35.00%	6.16%	39.53%	7.46%	-4.53%	-25.48% to + 16.41%	0.7923
>10 cm	35.00%	6.16%	25.58%	6.65%	9.42%	-10.35% to +29.18%	0.4221
Incision length: (n=53)	9.4 (1.5-32.5)		7.8 (0.6-22)		1.6	-4.2 to +0.90	0.3594
<10 cm	33.96%	6.51%	not available				
10-20 cm	39.62%	6.72%				N/A	
>20 cm	26.42%	6.06%					
Location:							
Upper extremity	26.67%	5.71%	27.91%	6.84%	-1.24%	-19.94% to + 17.46%	1
Lower extremity	73.33%	5.71%	72.09%	6.84%			
OR duration:							
0-120 mins	15.00%	4.61%	11.63%	4.89%	3.37%	-11.79% to + 18.53%	0.8407
120-240 mins	56.67%	6.40%	62.79%	7.37%	-6.12%	-27.25% to + 15.00%	0.6742
>240 mins	28.33%	5.82%	25.58%	6.65%	2.75%	16.57% to +22.07%	0.9322
	225.5 (41-840)		239.6 (98-1148)		-14.1	-67.3 to + 95.67	

Table 2:

	Vanco (n=60)	**No vanco (n=43)**
Follow-up, days (range)	242 (63-487)	561 (525-637)
Infection rate	3.70%	9%
Return to OR	3.70%	2.30%
Infectious organisms	*Pseudomonas*	*Morganella*
		Vancomycin-resistant
	E. Coli	*Enterococcus*
	Candida	Uncultured species