POSTER 43

Does the Addition of Perioperative Vancomycin to Cefazolin Decrease the Rate of Deep Infections in Lower Extremity Endoprosthesis Reconstruction?

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Title. Does the Addition of Perioperative Vancomycin to Cefazolin Decrease the Rate of Deep Infections in Lower Extremity Endoprosthesis Reconstruction?

Background.
Infection is a common mode of failure in lower extremity endoprostheses. The PARITY trial resulted that 5 days of cefazolin was no better at reducing surgical site infection compared to 24 hours of cefazolin. Arthroplasty literature has reported the addition of perioperative vancomycin to cefazolin can lower the prosthetic joint infection risk. The purpose of this study is to evaluate the deep infection rates at a single institution when comparing patients who received perioperative cefazolin alone compared to cefazolin and vancomycin.

Questions/Purposes. Does the addition of perioperative vancomycin to cefazolin decrease the rate of deep infection at 1 year in patients undergoing lower extremity endoprosthesis reconstruction?

Patients and Methods. A retrospective review of patients who underwent endoprosthetic reconstruction at Vanderbilt University Medical Center from 2000 to 2021 identified 651 endoprostheses. Inclusion criteria were patients receiving lower extremity endoprostheses, patients with reliable antibiotic data in the medical record (only post year 2008), patients receiving cefazolin (monotherapy) or cefazolin-vancomycin (dual therapy) antibiotics, and patients with >1 year follow up. A total of 204 patients met inclusion criteria for this study. There were 62 patients who received cefazolin monotherapy and 142 patients who received cefazolin-vancomycin dual therapy. Baseline clinical features collected included patient age, sex, race, BMI, ASA, operative time, comorbidities, adjuvant cancer treatments, diagnosis, anatomic location, wound closure, operative time, incisional wound vac, surgical drain, vancomycin powder, antibiotic bone cement, and perioperative antibiotic therapy. Outcomes collected included deep infection, superficial wound issue, reoperation for infection/wound within 1 year, time to reoperation, side effects to antibiotics, and microbial profile. The primary outcome, deep joint infection, was defined using the CDC definition which extends to one year post operatively if an implant is in place.

Results. The overall deep infection rate at 1 year was 8.3% (17/204). The deep infection rate in the cefazolin group was 11.3% (7/62) and 7% (10/142) in the dual therapy group (P=0.463). Fifteen percent (9/62) of patients in the cefazolin group underwent reoperation for infection or wound within one year compared to 11% (16/142) in the dual therapy group (P=0.647). The mean time to reoperation for infection or wound was 2-3 months postoperatively in both groups (P=0.577). There were no significant side effects to antibiotics in either group. There were 3 MRSA infections in the cefazolin group and none in the dual therapy group. There was one gram negative infection in the cefazolin group and 5 in the dual therapy group. There were no polymicrobial infections in the cefazolin group and 3 in the dual therapy group.

Conclusions. The addition of perioperative vancomycin to cefazolin in lower extremity endoprosthetic reconstructions resulted in a slightly improved deep infection rate and reoperation rate at 1 year, though findings did not reach statistical significance. Interestingly, the microbial spectrum differed, as cefazolin monotherapy patients had more MRSA infections while dual therapy patients had more gram negative and polymicrobial infections. Our plan is to collaborate with several other high volume orthopaedic oncology centers to collate data to increase statistical power.

Table 1. Baseline Characteristics of Study Groups

Characteristic	Ancef Monotherapy, n=62 (%)	Ancef Vancomycin, n=142 (%)	P value	Total, n=204
Patient Demographics and tumor details				
Age, mean (SD), y	46.33 (22.3)	49.3 (22.7)	0.347	48.4 (22.6)
Sex				
Female	38 (61)	80 (56)	0.614	118 (58)
Male	24 (39)	62 (44)		86 (42)
Race				
White	57 (92)	121 (86)	0.467	178 (88)
Black	5 (8)	11 (8)		16 (8)
Hispanic	0 (0)	3 (2)		3 (1)
Asian	0 (0)	3 (2)		3 (1)
Other	0 (0)	2 (1)		2 (1)
Not listed	0 (0)	2 (1)		2 (1)
Comorbities				
BMI, mean (SD)	29.9 (11)	28.9 (8)	0.841	29.2 (9)
Diabetes	10 (16)	21 (15)	0.973	31 (15)
Chronic kidney disease	3 (5)	11 (8)	0.649	14 (7)
Smoking				
yes	12 (19)	27 (19)	0.604	39 (19)
former	11 (18)	34 (24)		45 (22)
Other cancer treatment modalities				
Chemotherapy	37 (60)	59 (42)	0.0255	96 (47)
pre-op	5 (13)	7 (12)	0.844	12 (13)
post-op	11 (30)	15 (25)		26 (27)
both	21 (57)	37 (63)		58 (60)
Radiation	18 (29)	30 (21)	0.296	48 (24)
pre-op	8 (44)	15 (50)	0.903	23 (48)
post-op	9 (50)	13 (43)		22 (46)
both	1 (6)	2 (7)		3 (6)
Diagnosis				
Primary sarcoma	36 (58)	55 (39)	0.063	91 (45)
Metastatic disease	16 (25)	38 (27)		54 (27)
Revision arthroplasty	4 (7)	21 (15)		25 (12)
Trauma	2 (3)	13 (9)		15 (7)
Other	4 (7)	15 (10)		19 (9)
Location				
Proximal femur	27 (44)	60 (42)	0.318	87 (42)
Distal femur	28 (45)	59 (42)		87 (42)
Total femur	0 (0)	4 (3)		4 (2)
Proximal tibia	7 (11)	13 (9)		20 (11)
Combined femur/tibia	0 (0)	6 (4)		6 (3)
Surgical and perioperative management details				
ASA				
4	4 (7)	5 (4)	0.624	9 (4)
3	37 (60)	88 (62)		125 (61)
2	21 (34)	47 (33)		68 (33)
1	0 (0)	2 (1)		2 (1)
Operative time, mean (SD)	224.9 (76.6)	218.7 (72.4)	0.712	220.57 (73.6)
Wound closure				
Primary closure	55 (89)	126 (89)	1	181 (89)
Coverage procedure	7 (11)	16 (11)		23 (11)
Antibiotic duration				
24 hours	45 (73)	111 (78)	<0.001	156 (76)
>24 hours	13 (21)	31 (22)		44 (22)
Uncertain	4 (6)	0 (0)		4 (2)
Incisional wound vac	13 (21)	23 (16)	0.534	36 (18)
Surgical drain	24 (39)	65 (46)	0.434	113 (55)
Post-op oral antibiotics	3 (5)	21 (15)	0.073	24 (12)
Vancomycin powder	4 (7)	11 (8)	0.973	15 (7)
Antibiotic bone cement	36 (58)	90 (63)	0.574	126 (62)

Table 2. Outcomes

Study Endpoint	Ancef Monotherapy, n=62 (%)	Ancef Vancomycin, n=142 (%)	P value
Primary Outcome			
Deep Infection	7 (11)	10 (7)	0.463
Organism Isolated	6 (86)	9 (90)	
MRSA	3 (49)	0 (0)	
Pseudomonas	0 (0)	2 (23)	
Enterococcus	0 (0)	3 (33)	
S. Aureus	1 (17)	0 (0)	
S. Epidermidis	1 (17)	1 (11)	
E. Coli	1 (17)	0 (0)	
E. Coli + S. Aureus	0 (0)	1 (11)	
Pseudomonas + Klebsiella	0 (0)	1 (11)	
MRSE + ESBL E. Coli	0 (0)	1 (11)	
Secondary Outcome			
Superficial wound issue*	2 (3)	9 (6)	0.57
Re-Operation for infection/wound within 1 year	9 (15)	16 (11)	0.647
Time to re-operation for infection/wound within 1 year, mean (SD), mo	2.4 (4)	3.0 (4)	0.577

*Superficial wound issue was defined as delayed wound healing, wound dehiscence, cellulitis, or superficial hematoma.
ESBL=extended spectrum beta-lactamase