

Antibiotic prophylaxis in the placement of totally implanted central venous access ports

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Abstract

BACKGROUND: Antibiotic prophylaxis during placement of implanted central venous access ports (CVAP) has not been studied. This retrospective review compared the rate of catheter-related infections (CRIs) with and without perioperative antibiotics.

METHODS: This was a single-center study that compared patients treated with and without a single dose of antibiotics during CVAP placement. CRIs were defined as a patient treated with antibiotics for port site induration, positive blood cultures, or suspicion of infection that led to port removal within 30 days of placement.

RESULTS: CVAP were placed in 459 patients, 103 of whom (22.4%) received antibiotic prophylaxis. Surgical technique and patient demographics were similar to those patients not receiving antibiotics (356). All 9 (2%) CRIs occurred in the non-prophylactic antibiotic group ($P = .218$), with 5 infections resulting in port removal.

CONCLUSIONS: Single-dose perioperative antibiotics may decrease CVAP infection rates and should be studied further in a prospective randomized trial.

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The use of antibiotics as prophylactic treatment against device and wound infections in clean surgical cases often is debated. Generally, if a non-biological device is to be implanted, periprocedural prophylactic antibiotics are used to prevent device infection. Although this practice generally is accepted for vascular, plastic, neurologic, and orthopedic surgery implant procedures, the current literature regarding antibiotic prophylaxis for tunneled central venous catheters (CVC) is debatable.^{1–3} Predominantly, antibiotic prophylaxis for CVCs is discouraged, reflecting the results of 4 randomized trials and a sys-

tematic Cochrane review, all of which showed no decrease in catheter-related infection rates when antibiotics were administered at the time of insertion.⁴ Many factors may confound the results of such studies because most of these trials evaluated infection rates of CVCs that had external exit sites and do not control for continual risk of skin flora exposure such as timing of the first access, dressing management, and flush protocols.

Many institutions more frequently are using completely subcutaneously implanted central venous access ports (CVAPs) over externally accessed tunneled CVCs, for patient convenience and comfort. The use of prophylactic antibiotics perioperatively, to prevent CVAP catheter-related infections, has not been studied. The hypothesis of this retrospective review was whether the use of perioperative prophylactic an-

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Table 1 Patient demographics and procedure details by treatment group

	Entire group (n = 459)	Antibiotics (n = 103)	No antibiotics (n = 356)	<i>P</i> value*
Female sex, %	66	55.3	69.1	.013
Procedure time, min	29.8 ± 12.6	43.4 ± 16.8	26.4 ± 8.4	<.0001
Age, y	55.7 ± 14.1	56.5 ± 14.2	55.6 ± 14.1	.49
BMI	27.4 ± 6.7	26.4 ± 5.5	27.7 ± 7.0	.22
Diabetes diagnosis rate, %†	11.8 (54/459)	6.8 (7/103)	13.2 (47/356)	.08
Preprocedure WBC, k/μL	7.2 ± 3.5	6.7 ± 3.6	7.3 ± 3.5	.09
Insertion site attempts	1.14 ± .5	1.16 ± .5	1.13 ± .4	.83
Subclavian placement rate, %	9.2	10.7	8.7	.56

*Chi-square analysis with the Fisher exact test and the Mann-Whitney *U* test.

†Both insulin and noninsulin diabetes diagnosis.

tibiotics for CVAP insertion would reduce the incidence of catheter-related infections.

Materials and Methods

Between January 2007 and September 2009, there were 459 consecutive patients who underwent surgical placement of implantable CVAPs to facilitate the administration of chemotherapy. All procedures were performed by 2 surgeons at a single, university-based center. Most catheter placements were performed in an outpatient setting. This retrospective review was performed under a Waiver of Authorization given by our Institutional Review Board. The data that were extracted included patient demographic, procedure-related, and outcome details, as indicated later.

The surgical technique for placement of the CVAP was similar between surgeons. Standard sterile techniques were used and skin was prepared with chlorhexidine. Internal jugular placement was the preferred venous cannulation site by both surgeons. Patients were given either a general anesthetic or monitored anesthesia care sedation. Intraoperative fluoroscopy was used in all cases to confirm correct anatomic catheter placement. One surgeon routinely treated patients with a single dose of antibiotic, directed against gram-positive skin flora, given by the anesthesiologist within 30 minutes before the procedure. The second surgeon did not routinely use prophylactic antibiotics.

Catheter-related infection (CRI) was defined as either induration in the surgical site that resulted in antibiotic treatment, positive blood cultures, or suspicion of infection that led to CVAP removal within 30 days of insertion. Patients were excluded from this study if they already were receiving antibiotics before the procedure.

Patient demographics and procedure-related details including age, body mass index (BMI), preprocedure white blood cell counts (WBCs), diabetes, surgical time, number of insertion attempts, and final site of placement were compared. Procedure-related complication data that were collected included carotid artery cannulation, pneumothorax, bleeding, and hemothorax.

Relevant data were collected in Microsoft Excel 2003 (Redmond, WA) and statistical analyses were performed using Predictive Analytics Software Statistics (Chicago, IL, version 18). Data are reported as the mean ± standard deviation. Data were analyzed using nonparametric testing (Mann-Whitney *U* test) and chi-square analyses, and reporting the Fisher exact *P* value and tied *P* values, with a *P* value of less than .05 reported as significant.

Results

In a 33-month period, a total of 459 patients underwent surgical placement of implantable CVAPs for chemotherapy for a wide variety of malignancies. Most of the patient population (33%) had breast cancer, 15% had colorectal cancer, 8% had gynecologic cancers, and the remaining 44% consisted of a wide variety of other malignancies. For the entire group, the mean age of patients was 55.7 ± 14.1 years, 66% were women, the mean BMI was 27.4 ± 6.7, and the mean preoperative WBC was 7.2 ± 3.5 k/μL (range, .85–29.9 k/μL; Table 1). Of the 103 treated patients, the following antibiotics were given: cefazolin (89), levofloxacin (6), cefoxitin (1), clindamycin (4), piperacillin and tazobactam (1), cefazolin and clindamycin (1), and cefazolin and gentamicin (1). A total of 356 patients (77.6%) did not receive antibiotics. The decision for treatment with a specific antibiotic was based on the patient's history of allergies and if the patient was undergoing a second procedure in conjunction with CVAP placement. There were no cases of antibiotic-related anaphylaxis. Procedure-related complications occurred in 9 patients (2%); all were arterial punctures that required no further treatment. There were no pneumothoraces, hemothoraces, or bleeding complications.

There was no significant difference between the antibiotic treatment or no-treatment groups, relative to age, BMI, diagnosis of diabetes (either noninsulin or insulin treatment types), preoperative WBC, number of site attempts, or subclavian placement position, as seen in Table 1. There were statistically more women (69.1% vs 55.3%; *P* = .013) and shorter

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