



Clinical Research

Preoperative Antibiotics for Dialysis Access Surgery: Are They Necessary?

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Background: Current guidelines recommend preoperative antibiotics in all vascular surgery cases. However, we hypothesize that patients undergoing arteriovenous fistula (AVF) and arteriovenous graft (AVG) creation have low rates of postoperative surgical site infection (SSI) and that preoperative antibiotic prophylaxis in these patients may not be necessary.

Methods: This is a retrospective review of all patients who underwent AVF and AVG creation from November 2014 through July of 2016 at a single institution. At our institution, preoperative antibiotic use is surgeon dependent. Patients who received preoperative antibiotics were compared with those who did not. The primary outcome measured was the development of postoperative SSI.

Results: There were 304 patients identified and 294 patients with 30 day postoperative follow-up. Of the 294 patients, 23 (7.8%) received an AVG, and 271 (92.2%) received an AVF. There were 244 (83%) patients who received preoperative antibiotics and 50 (17%) who did not. Overall, there were 2 (0.68%) SSIs identified. Both patients with postoperative SSI underwent AVF creation and received preoperative antibiotics. There was no statistically significant difference in SSI rate between antibiotic and nonantibiotic groups ($P = 1.0$), and no difference when comparing patients that received AVG (0%) and AVF (0.73%) ($P = 1.0$).

Conclusions: The rate for postoperative SSI following hemodialysis access surgery is very low both for patients undergoing AVF and AVG. Furthermore, there was no difference in SSI rate between antibiotic and nonantibiotic groups. Given these findings, we conclude that preoperative antibiotics for AVF creation may not be necessary.

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INTRODUCTION

Antibiotic prophylaxis is recommended for patients undergoing all vascular surgery procedures although many vascular surgery cases are considered clean wound cases. The overall reported risk of surgical site infection (SSI) for clean wound cases is around 2%.¹ However, for patients undergoing vascular surgery procedures, specifically arterial intervention, the reported rate of SSI can be as high as 5–10%.² Preoperative administration of cefazolin as antibiotic prophylaxis for vascular surgery procedures has been shown to significantly reduce the rate of postoperative SSI, and current guidelines recommend its administration for all vascular surgery procedures.^{3–6} However, the exact procedure being performed and the rate of infection

associated with that procedure ought to be considered when determining the need for preoperative antibiotic administration.

Hemodialysis access surgery may have less certain indications for preoperative antibiotic prophylaxis than other vascular surgery cases. Although, patients undergoing dialysis access surgery are generally considered to be at an overall higher risk for infection due to a depressed immune system and frequent infectious exposures, this does not necessarily translate to high rates of postoperative SSI.⁷ In fact, the limited studies available suggest that arteriovenous fistula (AVF) or arteriovenous graft (AVG) creation may have lower rates of wound infection than other vascular surgeries.⁸ Avoidance of prophylactic antibiotics in this population would have numerous potential benefits. The use of antibiotics carries increased cost, risk of allergic reaction, and increased microbial resistance. In dialysis patients, there is already a high rate of antibiotic use and colonization by antibiotic resistant bacteria making antibiotic stewardship in these patients of the utmost importance.^{7,9}

The purpose of this study was to determine the rate of postoperative SSI in patients undergoing AVF and AVG and to evaluate whether preoperative antibiotic prophylaxis is necessary.

METHODS

A retrospective review was conducted of all patients who underwent AVF and AVG creation from November 2014 through July of 2016 at a single institution. Patients undergoing superficialization, transposition, or AVF with simultaneous superficialization (single-stage) were not included. At our institution, preoperative antibiotic use is surgeon dependent as some surgeons have started routinely forgoing preoperative prophylactic antibiotic administration for patients undergoing AVF creation. Patients who received preoperative antibiotics were compared with those who did not. For all patients who received antibiotics, cefazolin was administered preoperatively unless there was a documented allergy that precluded its use in which case vancomycin was used. The groups were compared based on age, gender, ethnicity, history of diabetes, history of smoking, and whether they were on dialysis at the time of surgery. The primary outcome measured was the overall rate of postoperative SSI and the rate of postoperative SSI for each group. Postoperative SSI was defined as any documented evidence of purulent drainage from the wound; positive wound culture; or evidence of

pain, warmth, erythema, or induration that lead to the diagnosis of the SSI within 30 days of the operation. This definition is congruent with the Center for Disease Control criteria for SSI.¹⁰ There were 10 patients in this cohort who were lost to follow-up before 30 days. A sensitivity analysis was conducted, in which all those lost to follow-up were presumed to have an SSI to determine whether they could be excluded from cohort without impacting the results.

RESULTS

There were 304 patients identified and 294 patients with 30 day postoperative follow-up. Of the 294 patients, 23 (7.8%) received an AVG, and 271 (92.2%) received an AVF. There were 244 (83%) patients who received preoperative antibiotics and 50 (17%) who did not. There was no statistically significant difference between the groups with respect to age, gender, ethnicity, smoking history, or whether they were on dialysis at the time of surgery. However, there were more patients with diabetes in the antibiotic group than the nonantibiotic group (70.8% vs. 54% $P = 0.02$). There were 271 AVF (92.2%), of which 221 (81.5%) received preoperative antibiotics and 23 AVG (7.6%) all of which received preoperative antibiotics (Table I).

Overall, there were 2 (0.68%) SSIs identified. Both patients with postoperative SSI underwent AVF creation and received preoperative antibiotics. In both cases, the patients had cellulitis at the incision site. This diagnosis was made at their initial postoperative clinic visit, and both patients had complete resolution of their infection after a course of outpatient oral antibiotics. There was no statistically significant difference in SSI rate between antibiotic and nonantibiotic groups ($P = 1.0$). There was also no statistically significant difference in rate of postoperative SSI when comparing patients who received AVG (0%) and AVF (0.73%) ($P = 1.0$).

A sensitivity analysis was conducted to evaluate the impact of the 10 patients who were lost to follow-up before 30 days. Assuming that all lost to follow-up had an SSI, there would have been 12 patients with an SSI. Of those who did not receive preoperative antibiotics, 1/51 (2%) would have had an infection, and for those who received preoperative antibiotics, 11/253 (4.4%) would have had an infection (odds ratio 2.3, 95% confidence interval 0.3–18, Fisher's $P = 0.7$). This still demonstrates no statistically significant difference between rate of postoperative SSI between the antibiotic and nonantibiotic groups. Therefore, these 10 patients

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