The Selection of Surgical Antibiotics in Patients with a Reported Penicillin Allergy

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Introduction

Surgical site infections (SSIs) are the most prevalent healthcare-associated infections. A patient who develops an SSI can have an elevated risk of mortality, with SSI producing 77% of the deaths in patients with an infection (1). One step to decrease the risk of SSI is to administer a surgical antibiotic within one hour of the first incision. In many cases, surgical prophylaxis with a first-generation cephalosporin, like cefazolin, is recommended. Patients with a reported penicillin allergy are regularly omitted from receiving it due to the potential of an allergic cross-reactivity (2). Instead, they are regularly administered an alternative antibiotic, such as vancomycin or clindamycin. It is reported that penicillin allergies are the most documented drug allergy and are found in 5-16% of patients (3). These patients are more likely to be prescribed an alternative non-beta-lactam antibiotic, however, there is concern that the use of broad-spectrum antibiotics like vancomycin can lead to the development of drug resistant bacteria and SSI development. This development can lead to prolonged hospital stays, increased cost of care, and increased mortality.
This review will be used to discuss the efficacy of beta-lactam alternative antibiotics and the safety of using first-generation cephalosporins for surgical prophylaxis when presented with penicillin allergic patients. We will also be looking into the implementation of risk stratification and evaluation of a previously reported allergy in informing the decision to use cefazolin.

Significance

Showing that it is safe to use first-generation cephalosporins in penicillin allergic patients along with a decreased efficacy of alternative antibiotics in preventing SSIs, then it can change the standard of care in surgical prophylaxis.

Review of Literature

In a population based matched cohort study conducted by Blumenthal et. al. in 2018, it was found that the greater use of alternative antibiotics in penicillin allergic patients resulted in an increased risk of development of MRSA and *C difficile* (3). Similar conclusions were made in a 2016 study that examined length of hospital stay, antibiotic exposure, and prevalence of SSI in patient with penicillin allergies. Like the 2018 study, this evaluated MRSA and *C difficile* infections, along with vancomycin-resistant *Enterococcus* (VRE). Those with a reported penicillin allergy were found to be treated more often with alternative antibiotics and averaged a longer hospital stay with an increased risk of developing an SSI (6). Both studies were performed as a retrospective, matched cohort using data from medical databases.

In another retrospective study conducted by Blumenthal et. al. it was determined that the risk of SSI was increased by 50% with a documented penicillin allergy as these patients were more likely to receive a beta-lactam alternative (4). It has been suggested that fewer of the patients included in the cohort would have required an alternative antibiotic, should their allergy have been properly evaluated. Previous studies have shown that of the patients that have a penicillin allergy, 90-99% of them do not have an immediate hypersensitivity and are not truly allergic. It was also concluded that there is a low allergic cross-reactivity between cefazolin and penicillin allergies, with less than 3% having an adverse reaction (4). This suggests that it could be more efficacious to use cefazolin, despite a penicillin allergy, to prevent SSI. While this is promising, with any retrospective study there are limitations to what data was recorded as some information may be missing or be subject to recall or misclassification biases. It is also not easy to determine causation, but merely association.

To accommodate for these limitations an interventional study can be conducted. One such study was performed from 2017 through 2019, where an institution-wide policy change at Vancouver General Hospital, a tertiary-care hospital, was evaluated. The policy change transitioned to the routine use of cefazolin prophylaxis for penicillin-allergic patients, including those that had anaphylactic histories. They collected data before, during and after the implementation of the new policy. After implementation, usage of cefazolin went up 18.2% and the use of vancomycin and clindamycin decreased by 11.4% and 62.0%, respectively (5). It was determined that there were no statistically significant differences were reported in allergic reactions, SSIs, or adverse events with cefazolin compared to alternative antibiotics (5). Once the change was in effect and cefazolin use increased, no anaphylaxis was documented in penicillin-allergic patients. They determined that administration of cefazolin as surgical prophylaxis to patients with a reported penicillin allergy was a safe practice (5).

Discussion & Conclusion

Penicillin allergies are commonly reported, however the cross-reactivity between that and cephalosporins is very low, about 1% (5). While this is known, alternative antibiotics are routinely prescribed to penicillin allergic patients. This is associated with an increased risk of developing an SSI, and therefore, an extended hospital stay. The research conducted by Blumenthal et. al. and Macy et. al. both indicated that beta-lactam alternatives do not provide the same protection as cefazolin does. However, as stated before, these studies do have their limitations. Since they are retrospective studies accuracy is dependent on the completeness of patient documentation. Despite their limitations, the data provides insight into the efficacy of alternative antibiotics in preventing SSIs. The interventional study conducted by Grant et. al. presents that it is safe to use cefazolin in penicillin-allergic patients. In conclusion, beta-lactam alternative antibiotics do not provide the same surgical prophylaxis as cefazolin, and it is safe to administer cefazolin to those with a previous penicillin allergy.

References

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