Evaluating the risk factors in postoperative infections following hysterectomy procedures: is antibiotic prophylaxis the issue?

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INTRODUCTION

- Post-hysterectomy surgical site infection (SSI) is a metric tied to hospital ranking and financial penalties
- Infectious complications are associated with an additional financial burden and length of stay for patients
- Appropriate antibiotic prophylaxis may reduce post-hysterectomy SSIs

STUDY OBJECTIVES

- To evaluate the appropriateness of antibiotic prophylaxis for hysterectomy procedures in patients with postoperative infections
- To identify risk factors associated with post-hysterectomy SSIs (i.e., steroid use, previous surgery, comorbidities, type of hysterectomy procedure)
- To evaluate patient outcomes (i.e., hospital length of stay, 90-day readmission)

METHODS

- Conducted an IRB-approved, single center 1:1 case-control study
- Matched infected with non-infected cases based on year of procedure and performing surgeon between 1/2013 to 7/2019
- Study arms
  - Cases: diagnosed with infection(s) attributable to hysterectomy procedure
  - Controls: not diagnosed with infection attributable to hysterectomy procedure
- Data was collected using electronic medical records (e.g., demographics, surgery length and approach, performing surgeon, antimicrobials selection, dosing, timing, and re-dosing, hospital length of stay (LOS), readmission, and mortality)

Inclusion criteria
- Subjects aged 18 years of age with performed hysterectomy at Long Island Jewish Medical Center

Exclusion criteria
- Subjects that did not receive any antimicrobial prophylaxis

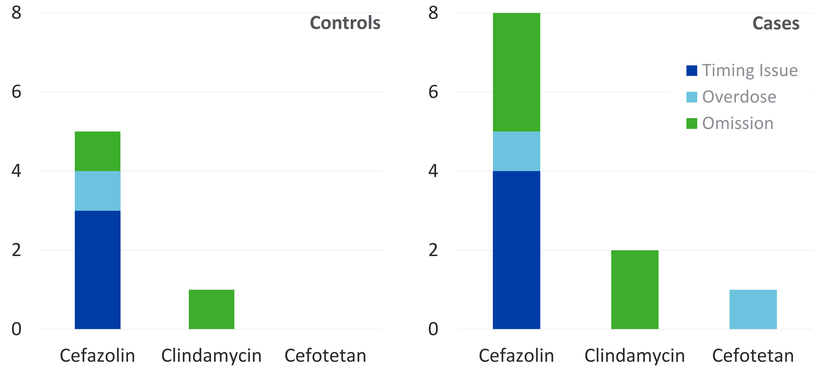
Statistical analysis
- Descriptive statistics were used to describe demographic and clinical factors
- Chi-square and/or Fisher's exact test, as appropriate, was used to compare categorical factors
- McNemar's test was used to test for differences in proportion of patients receiving inappropriate treatment within matched pairs
- The Wilcoxon signed-rank test was used to compared LOS

RESULTS

Baseline Characteristics N = 86	Controls, n = 43	Cases, n = 43
Age – years (mean ± SD)	56.0 ± 10.6	57.1 ± 14.4
BMI – kg/m^2 (mean)	33.0 ± 8.1	33.1 ±9.0
Race – n (%)		
Caucasian	24 (55.8)	19 (44.2)
African American	7 (16.3)	12 (27.9)
Comorbidities		
Diabetes	9 (20.9)	9 (20.9)
Malignancy	20 (46.5)	24 (55.8)
Anemia	4 (9.3)	10 (23.3)
Asthma	10 (23.3)	6 (14.0)
Allergies – n (%)	7 (16.3)	16 (37.2)
Penicillin	6 (14.0)	12 (27.9)

Procedural Characteristics	Controls, n = 43 n (%)	Cases, n = 43 n (%)
Type of hysterectomy		
Total hysterectomy	36 (83.7)	35 (81.4)
Supracervical hysterectomy	6 (14.0)	4 (9.3)
Radical hysterectomy	1 (2.3)	4 (9.3)
Perioperative blood transfusion	0 (0)	7 (16.3)
Duration in minutes (mean ± SD)	209.4 ± 75.4	225.1 ± 98.8
Inappropriate antibiotic prophylaxis	3 (6.9)	13 (30.2)
Cefazolin underdose	1 (2.3)	5 (11.6)
Gentamicin underdose	2 (4.7)	7 (16.3)
Clindamycin underdose	0 (0)	2 (4.7)
Cefotetan overdose	0 (0)	1 (2.3)

Inappropriate Intraoperative Re-dosing



Prophylaxis Stratified by Infection Type	Appropriate Prophylaxis	Inappropriate Prophylaxis	P-value
Type of Infection, n (%)			
Superficial wound	5 (22.7)	3 (14.3)	0.70
Intraabdominal/pelvic	18 (81.8)	17 (81.0)	1
Other	0 (0)	1 (4.8)	0.49

Outcome Measures	Controls, n = 43	Cases, n = 43	P-value
Mean LOS in days	2.29	2.35	0.375
Mortality – n (%)	0 (0)	0 (0)	NS
90-day hospital readmission	0 (0)	37 (86%)	< 0.0001

STUDY LIMITATIONS

- Retrospective chart review
- Small sample size
- Certain outcomes (e.g., glucose control, body temperature) not assessed
- Infections not entered in the reporting in the National Healthcare Safety Network (NSHN) were not evaluated

DISCUSSION

- Education regarding dosing of antibiotics is warranted
  - Cefazolin dosing in obesity
  - Use of weight-based gentamicin dosing
  - Need for re-dosing of antibiotics if procedure exceeds 2 half-lives of drug or if excessive blood loss (> 1500 mL) is present

CONCLUSIONS

- No statistical significant association between antibiotic prophylaxis and infection observed
- Incidence of inappropriate prophylaxis was higher in the cases
- Education of prescribers on antibiotic prophylaxis and re-dosing is needed