

56579 Asymptomatic Bacteriuria and the Impact on Surgical Site Infections in

Coronary Artery Bypass Surgery Patients



Vata S. Hernandez, PharmD¹, Mary Beth Brinkman, PharmD, PhD, BCPS¹, Sarah Fraker, MS, CHDA², Elizabeth McNeely, PharmD, BCPS – AQ Cardiology³ and Seenu Reddy, MD, MBA⁴

(1)TriStar Centennial Medical Center, Nashville, TN, (2)Data and Analytics, Clinical Services Group, Hospital Corporation of America Healthcare, Nashville, TN, (3)Cardiovascular Services, Clinical Services Group, Hospital Corporation of America Healthcare, Nashville, TN, (4)Cardiovascular Surgery, TriStar Medical Group Cardiovascular Surgery, Nashville, TN



Hospital Corporation of America[®]
Contact information:
Vata.Hernandez@gmail.com

ABSTRACT

Background. Evidence for asymptomatic bacteriuria (ASB) treatment in the preoperative management of cardiac surgery is limited, resulting in uncertainty and variations within practice. The primary purpose of this study is to evaluate whether treatment of ASB has an impact on the occurrence of surgical site infections (SSIs) specifically in non-valvular coronary artery bypass grafting (CABG) patients.

Methods. A retrospective, single-center, non-inferiority study was conducted in adult patients with ASB prior to CABG surgery between January 2015 and August 2015. Clinical characteristics, microbiology and urinalysis results, treatment, documented urinary tract infection (UTI) symptoms, and SSIs were collected.

Results. A total of 3759 patients undergoing CABG without valve replacement were screened for ICD-9 codes indicating ASB or possible UTI; 325 were identified and 81 met inclusion criteria for ASB. SSIs occurred in 11 of 81 asymptomatic CABG patients with positive urine cultures: 10 patients (9 sternal wound SSI and 1 harvest wound SSI) received treatment for ASB and 1 patient with sternal wound SSI did not receive treatment for ASB. Among patients who received treatment for ASB and those who did not, there were no major differences in baseline characteristics, length of stay (12.3 vs. 11.9 days; p = 0.798) or SSI (14.3% treated ASB vs. 9.1% untreated ASB; p = 0.204). None of the microorganisms isolated in the urine culture prior to surgery corresponded to those found in the wound cultures from SSI.

BACKGROUND

- In cardiothoracic surgery, the potential hematogenous spread of genitourinary bacteria due to extracorporeal circulation is of particular concern.
- The potential risk of post-operative infection complications, in particular SSIs, leads to practice variation in the treatment of ASB prior to cardiothoracic surgery.^{1,2}
- The available evidence indicates that the unnecessary treatment of ASB may lead to the development of antibiotic resistance, potential side effects, and increased healthcare expenditure.³ Treatment of ASB may even delay procedures and thus extend hospitalizations. Despite this, screening for ASB is still a common practice before non-urologic procedures, and evidence to refute such screening and treatment prior to cardiac surgical procedures is limited.

METHODS

- Study Design:
 - Retrospective cohort, single-center, non-inferiority study
- Study Eligibility:
 - Inclusion criteria:
 - ≥18 year old patients with bacteriuria prior to CABG surgery
 - Positive urine cultures: ≥1 organism growth with bacterial count ≥10⁵ cfu/mL
 - Exclusion criteria:
 - Signs and symptoms of UTI prior to surgery
 - Pregnancy
 - Receipt of broad spectrum antibiotics prior to surgery (unless specifically stated for UTI)
 - Requiring urinary catheter placement prior to surgery
 - Incarceration
 - Status post-renal transplant
- Primary Endpoint:
 - SSI occurrences
- Secondary Endpoints:
 - Length of hospital stay
 - Mortality

RESULTS

Table 1. Demographics in Each Group of Patients

Characteristics	Patients, No. (%)		P value
	Treated ASB (n=70)	Untreated ASB (n=11)	
Age, mean (years)	68.1	66.9	0.68
Female sex, n (%)	50 (71)	8 (73)	0.93
Comorbid condition			
BMI, mean (kg/m ²)	30.4	31.1	0.47
Diabetes, n (%)	40 (57)	6 (55)	0.87
Chronic immunosuppressant use, n (%)	6 (9)	...	0.31

Table 2. Microorganisms Isolated from Patients with ASB

Isolated Microorganisms	Microorganism, No. (%)		
	Overall (n=87)	Treated ASB (n=75)	Untreated ASB (n=12)
Gram negative	55 (63.2)	48 (64)	7 (58.3)
Enterobacteriaceae			
<i>Escherichia coli</i>	32 (36.8)	27 (36)	5 (41.7)
<i>Klebsiella pneumoniae</i>	16 (18.4)	15 (20)	1 (8.3)
<i>Enterobacter cloacae</i>	1 (1.1)	1 (1.3)	...
<i>Proteus</i> spp.	3 (3.4)	3 (4)	...
<i>Pseudomonas</i> spp.	1 (1.1)	1 (1.3)	...
Others	2 (2.3)	1 (1.3)	1 (8.3)
Gram positive	24 (27.6)	20 (26.7)	4 (33.3)
<i>Enterococcus faecalis</i>	9 (10.3)	7 (9.3)	2 (16.7)
<i>Staphylococcus aureus</i>	4 (4.6)	4 (5.3)	...
Others	11 (12.6)	9 (12)	2 (16.7)
Polymicrobial	7 (8)	6 (8)	1 (8.3)
Mixed flora	6 (6.9)	5 (6.7)	1 (8.3)
Yeast	2 (2.3)	2 (2.7)	...

Polymicrobial refers to number of polymicrobial bacteriuria; specific microorganisms involved are reflected under their respective categories. Abbreviation: ASB, asymptomatic bacteriuria

Table 3. Primary and Secondary Outcomes

Characteristics	Patients		P value
	Treated ASB (n=70)	Untreated ASB (n=11)	
Primary outcome			
Surgical site infection, n (%)	10 (14.3)	1 (9.1)	0.2
Secondary outcome			
Length of stay, mean (days)	12.3	11.9	0.8
Mortality, n (%)	1 (1.4)	...	0.69

Abbreviation: ASB, asymptomatic bacteriuria

Table 4. Eleven Patients with Surgical Site Infections and the Urine Cultures Results

No.	ASB Microorganism	Antibiotic Use		Surgical Site Infections		LOS (days)	Outcome
		Antibiotic	Duration (days)	Location of SSI	SSI Microorganism		
1	<i>Enterococcus faecalis</i>	Ceftriaxone*	5	Harvest	<i>Staphylococcus epidermis</i>	18	Alive
2	<i>Escherichia coli</i>	Ceftriaxone	8	Sternal	<i>Serratia marcescens</i> , <i>Corynebacterium</i> sp., <i>Enterococcus faecalis</i>	25	Alive
3	<i>Escherichia coli</i> , Yeast	Ciprofloxacin*	4	Sternal	...	9	Alive
4	Mixed flora	Ciprofloxacin	2	Sternal	<i>Staphylococcus Epidermis</i>	14	Alive
5	Mixed flora	Levofloxacin	2	Sternal	...	9	Alive
6	<i>Proteus mirabilis</i>	Ceftriaxone	3	Sternal	<i>Pseudomonas</i> spp.	9	Alive
7	<i>Escherichia coli</i>	Piperacillin/Tazobactam	4	Sternal	...	14	Alive
8	<i>Escherichia coli</i>	Levofloxacin*	3	Sternal	...	5	Alive
9	<i>Klebsiella pneumoniae</i>	Ciprofloxacin	6	Sternal	Methicillin-resistant <i>Staphylococcus aureus</i> , <i>Escherichia coli</i>	5	Alive
10	<i>Klebsiella pneumoniae</i>	Levofloxacin	5	Sternal	...	21	Alive
11	<i>Staphylococcus epidermis</i>	Sternal	...	10	Alive

Abbreviation: ASB, asymptomatic bacteriuria; SSI, surgical site infection; LOS, length of stay
*Bacteria later found to be resistant to this antibiotic

DISCUSSION/CONCLUSIONS

- Whether the treatment for ASB prior to surgery has any impact on SSI post-operative cardiothoracic surgery ultimately remains unknown.
- SSI occurrence between both groups did not meet statistical significance. Data are insufficient to definitively prove that not receiving treatment is not worse in terms of SSI outcomes to receiving treatment for ASB prior to CABG surgery.
- Despite the similarity between the LOS in both groups (12.3 treated ASB vs. 11.9 days untreated ASB, respectively), 1 patient who received antibiotic therapy prior to surgery expired from sepsis post-operation from an unidentified source.
- None of the microorganisms isolated from the urine culture corresponded to the wound cultures from SSI. A possible explanation for the difference between the ASB and SSI microorganisms may be developing ASB places patients at risk for recurrence with another organism.
- No statistically significant difference in SSI occurrence between patients who received antimicrobial treatment for ASB and those who did not receive treatment. No trends towards harm in mortality or LOS were seen in the non-treatment group. Comparing this data collected with results from other surgical specialties, the authors recommend against routine pre-operative urine testing prior to non-valvular CABG surgery to prevent unnecessary treatment of ASB. Future studies with more controlled research designs are needed.

References:

- Soltanzadeh M, Ebadi A. Is presence of bacteria in preoperative microscopic urinalysis of the patients scheduled for cardiac surgery a reason for cancellation of elective operation? *Anesthesiology and pain medicine* 2013; 2(4): 174-7.
- Ollivier BJ, Eillahee N, Logan K, Miller-Jones JC, Allen PW. Asymptomatic urinary tract colonisation predisposes to superficial wound infection in elective orthopaedic surgery. *Int Orthop* 2009; 33(3): 847-50.
- Cai T, Nesi G, Mazzoli S, et al. Asymptomatic bacteriuria treatment is associated with a higher prevalence of antibiotic resistant strains in women with urinary tract infections. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America* 2015; 61(11): 1655-61.

Disclosure

- None of the authors have anything to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.