



RESEARCH ARTICLE

ROLE OF ASYMPTOMATIC BACTERURIA IN SURGICAL SITE INFECTION IN PATIENTS UNDERGOING CARDIOVASCULAR SURGICAL PROCEDURES

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Abstract

Introduction: Asymptomatic bacteriuria (ASB) is defined as the presence of significant bacteriuria [$>10^5$] in a clean voided midstream urine from a patient without fever or symptoms of UTI. ASB should be screened and treated only in pregnant patients and individuals prior to their urological procedures as recommended by Infectious disease society of America in 2005. ASB is common in healthy women, older women, men, diabetic patients, patients with Indwelling catheters and spinal cord injury, treatment is not recommended for such individuals. Surgeons all over the world perceive any undiagnosed infection in the pre-operative period as the source of SSI, so its prevention is necessary. It's not clear whether this is true for a ASB as well.

Aim: identify whether an association exists between the preoperative presence of asymptomatic bacteriuria or urinary tract infection and SSI in patients undergoing cardiovascular surgery.

Material and methods: The current study was conducted over a period of one year which included 3025 patients. Midstream urine was collected aseptically and semiquantitative culture was done on chromogenic media. Further identification and antibiotic sensitivity testing was done by Vitek 2 system.

Results: SSI was found more in Diabetic than non diabetic patients, more in females than males.

The infective organisms found in SSI were are not found the same as in the pre-operative ASB patients.

Conclusion: The presence of bacteriuria in asymptomatic patients is not a risk factor for presenting SSI in cardiovascular surgery. Pre-operative screening with urinalysis or urine culture would not be recommended for patients without clinical symptoms of UTI

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Introduction:-

Asymptomatic bacteriuria is the presence of bacteria in the properly collected urine of a patient who has no signs or symptoms of a urinary tract infection. Most patients with asymptomatic bacteriuria will never develop symptomatic urinary tract infections and will have no adverse consequences. [1]

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Asymptomatic bacteriuria is commonly detected in women aged up to 60 years at the rate of 3% to 5%. Asymptomatic bacteriuria is more common in patients with diabetes and the elderly. [2] As many as 25% to 50% of elderly women and 15% to 40% of elderly men in long-term care facilities are bacteriuric. The association of asymptomatic bacteriuria with symptomatic urinary tract infection (UTI) is likely attributable to host factors that promote both symptomatic and asymptomatic urinary infection, rather than symptomatic infection being attributable to asymptomatic bacteriuria. [3] Clinical studies of older residents in long-term care facilities have shown no benefits from screening or antimicrobial treatment for asymptomatic bacteriuria. [4, 5] Premenopausal, non-pregnant women with asymptomatic bacteriuria experience no adverse effects and usually clear bacteriuria spontaneously.

Escherichia coli (*E. coli*) remains the most common organism isolated from patients with asymptomatic bacteriuria; coagulase-negative staphylococci are common in men, as well as gram-negative bacilli and *Enterococcus* species. [6] Recent molecular studies demonstrate that some asymptomatic bacteriuria-causing *E. coli* strains are non-virulent commensal strains, whereas others were originally virulent strains that have evolved to commensalism. [7, 8]

A common dilemma in clinical practice is whether to treat asymptomatic patients who present with bacteria in their urine. The Infectious Diseases Society of America (IDSA) recommends screening and treatment of asymptomatic bacteriuria in adults for pregnant women, before urological procedures where mucosal bleeding is anticipated, and among women with catheter-acquired bacteriuria that persists 48 hours after removal of an indwelling catheter [9]

Despite absence of evidence, in practice, asymptomatic bacteriuria is perceived as a risk factor for surgical site infection (SSI) among patients with cardiac surgery. We aimed to identify whether an association exists between the preoperative presence of asymptomatic bacteriuria or urinary tract infection and SSI in patients undergoing cardiovascular surgery.

Materials And Methods:-

This was a prospective observational study conducted for a period of 1 year from November 2018 to October 2019 in a tertiary care multispecialty Hospital Medanta -The Medicity Gurgaon. In this study 3025 patients were included who underwent cardiovascular surgery. .

Inclusion criteria—

all the patients admitted for cardiovascular surgery.

Exclusion criteria –

patients with urinary tract infection.

Collection of specimen

Under all aseptic precautions, the first part of the voided urine was discarded and without interrupting the flow approximately 10 ml of urine was collected into a sterile leak-proof, screw cap, wide mouth container.

Transportation of urine—

The urine specimen bottles were transported to the microbiology laboratory without delay for processing, in case of delay the urine culture specimen were put in the refrigerator at 2-8°C. The urine sample was divided into two parts, one part was sent for urinalysis to look for nitrite production, Leukocyte esterase (LE) level and WBCs by automated method system and second part was sent for urine culture. Urine culture was carried out only in patients with nitrituria and leucocyturia as per the policy of cardiovascular department of institute.

Processing of urine specimen

was done in the containment level 2 done within 4 hours on chromogenic medium using semi quantitative screening culture method and was incubated overnight. Further identification and antibiotic susceptibility testing was done by Vitek-2 system. [10]

Statistical analysis:

The analysis included profiling of patients on different demographic (Age and gender), site of infection with microorganism isolates. Descriptive analysis of quantitative parameters was expressed as means and standard deviation. Categorical data were expressed as absolute number and percentage.

Observations and Results:-

A total number of 3025 patients were included in this study of which 2353 (77.8%) were males and 672 (22.2%) were females. The mean age group was 55.4 ± 15.44 yrs (range=1-91 yrs, median =58 yrs).

Of 3025 patients, 1095 patients (36.2%) were diabetics and 1930 patients (63.8%) were non-diabetics. Urine culture was done in 79.4% of patients with Diabetes and 70.8% of patients without diabetes

Urine analysis was done by automated system in all patients, out of which 787 patients revealed no nitrituria, no leucocyturia (no pus cells in urine) and negative Leucocyte esterase (LE) .On the basis of negative urinalysis report, urine culture was not done in 787 patients as per institutional policy.

Urine culture was positive in 394/2353 patients in which significant growth was seen in 144 and insignificant growth of micro-organisms in 250 patients.

The males with significant growth were 102 out of 1731 urine cultures which is 5.8% ,while in females significant growth were seen in 42/506(8.3%) indicating that ASB is more in females

The most common pathogen isolated was *E.coli* (2.55%) followed by *Enterococcus faecalis*(1.03%) and *Kleb.pneumoniae*(1.03%). The remaining isolates were *Pseudomonas aeruginosa*(0.63%), *Citrobacter*(0.22%), *Enterococcus faecium*(0.40%), and least was *Proteus mirabilis* and *Serratia marcescens*(0.04%). Surgical prophylaxis was given to all patients prior to surgery as per institutional policy. (Figure 1)

There were 49/1945 (2.5%) cases of CABG who developed SSI in their post operative period which included 18 females and 31 males. Out of 49 CABG cases, 22 patients had sterile urine culture, 6 had insignificant growth, 14 were not subjected to urine culture, 7 had significant growth in their preoperative period which were different from the isolates recovered at surgical site.

Out of 649, valvular surgeries 4 patients developed SSI who had sterile preoperative urine. Patients who underwent double cardiac surgery in single sitting like (CABG +VALVE repair/replacement or CABG +ASD closure) were more susceptible to SSI than those who had undergone single surgical procedure. There were 3 double cardiac surgery cases of SSI

The commonest isolate recovered from SSI was *Klebsiella pneumonia* (0.43%) , followed by *Staphylococcus aureus* and *Staphylococcus epidermidis* (0.3%) , *Escherichia coli*, (0.23%), and so on least was *Enterococcus cloacae* spp.(0.03%) Figure 2

Discussion:-

In the current study, 77.8% [2353/3025] were males and [672/3025] 22.2% were females.

Overall bacteriuria was detected in 13% (394/2237) which included both significant as well as insignificant counts. The prevalence of significant bacteriuria was 6.4% (144/2237) in our study population which was consistent with many studies [11, 12]

ASB was found more in women (8.3%) than in men (5.9%) undergoing cardiovascular surgery. This is in concordance with the majority of epidemiological studies of ASB across different populations due to anatomy of female genitourinary system. [11, 12]

Risk factors:-

In our study out Of 3025 patients, 1095 patients (36.2%) were diabetics and 1930 patients (63.8%) were non-diabetics.

ASB was found more in female diabetics (8.3%) than male diabetics (5.2%) . Our finding was in concordance with other studies which too showed that diabetic women have an increased prevalence of bacteriuria, compared with non-diabetic although it is not associated with adverse outcomes Increased prevalence of ASB in patients with

diabetes mellitus among women is usually correlated with duration and presence of long-term complications of diabetes, rather than with metabolic parameters of diabetes control. [13, 3]

Etiology:-

In the current study, the most common pathogen isolated in preoperative urine sample was *E.coli*, followed by *Enterococcus faecalis*, *Kleb.pneumoniae*, *Pseudomonas aeruginosa*, *Enter.faecium*, *Enterobacter cloacae*, *Citrobacter koseri*, *Morganella morganii*, *Serratia*, *Proteus mirabilis* and *Serratia marcescens*, *Enterococcus gallinarum* and *Proteus mirabilis* [Figure 1] This is similar to the majority of epidemiological studies of ASB across different populations. [14, 15]

Role of ASB in SSI

Incidence of SSI in the current study was found to be 1.85%(56/3025) which is similar to a study conducted by Ricardo Sousa et al, on arthroplasty patients reported prosthetic joint infection(PJI) rate was 1.7%. [16] In another study, in which (3.9%) patients had asymptomatic bacteriuria, incidence of SSI was 9.5%. [17] Incidence of SSI in our study centre was low because of absolute aseptic precautions and antibiotic stewardship program implementation.

A higher rate of SSI (95.2%) was found in non -ASB group (who had sterile urine culture in their preoperative period) - than ASB group [7/144 ,4.8%](those patients who had positive urine culture in preoperative period). This finding was in contrast with findings found in two classic studies conducted on arthroplasty patients. [18, 19] Although both studies found a non-significantly higher infection rate in the bacteriuria group, neither set of microorganisms isolated from surgical site infections and urine cultures were the same. This was true for the current study also where isolates of preoperative urine culture were different from those recovered from surgical site.

The lack of association between ASB and SSI microorganisms could be explained by the fact that patients with ASB are at risk for recurrence with a different organism' [16]

Figure 1:- Micro-organisms from pre-operative urine cultures.

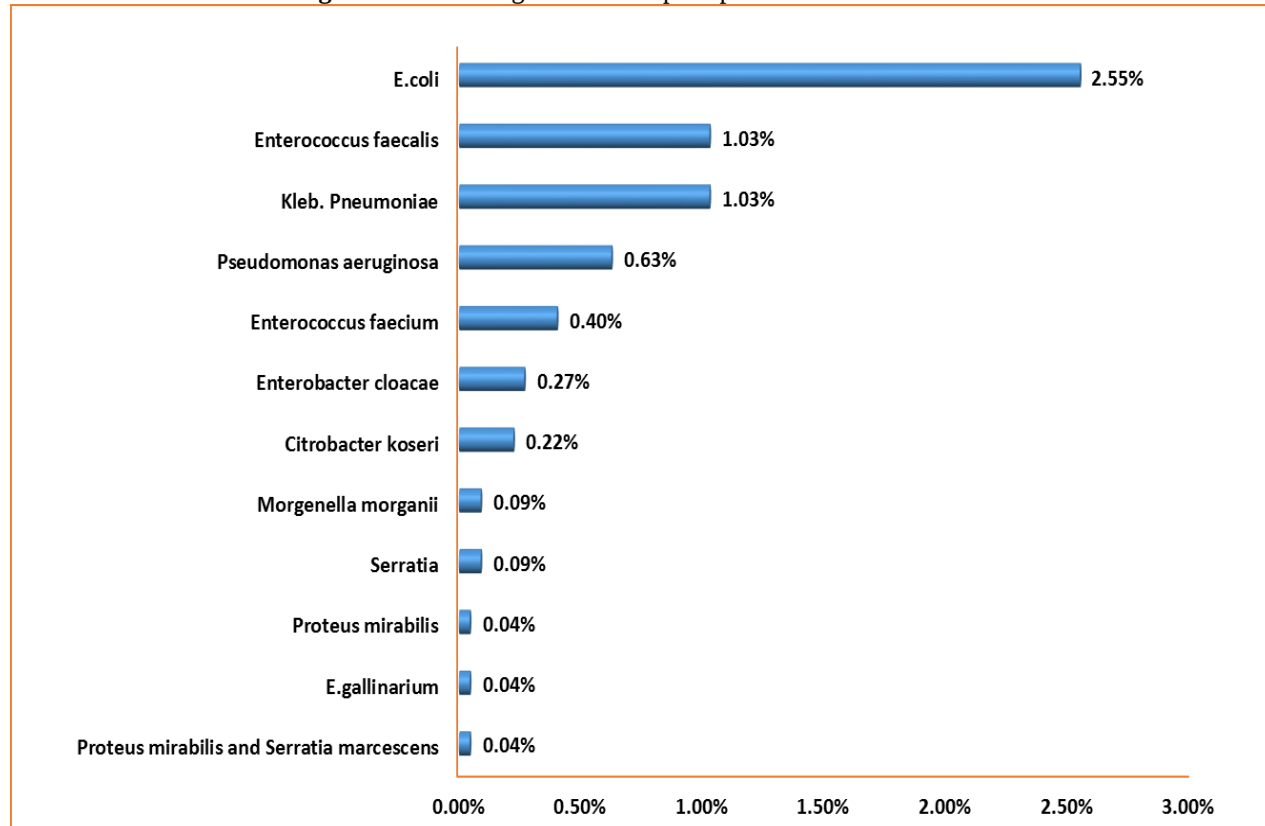
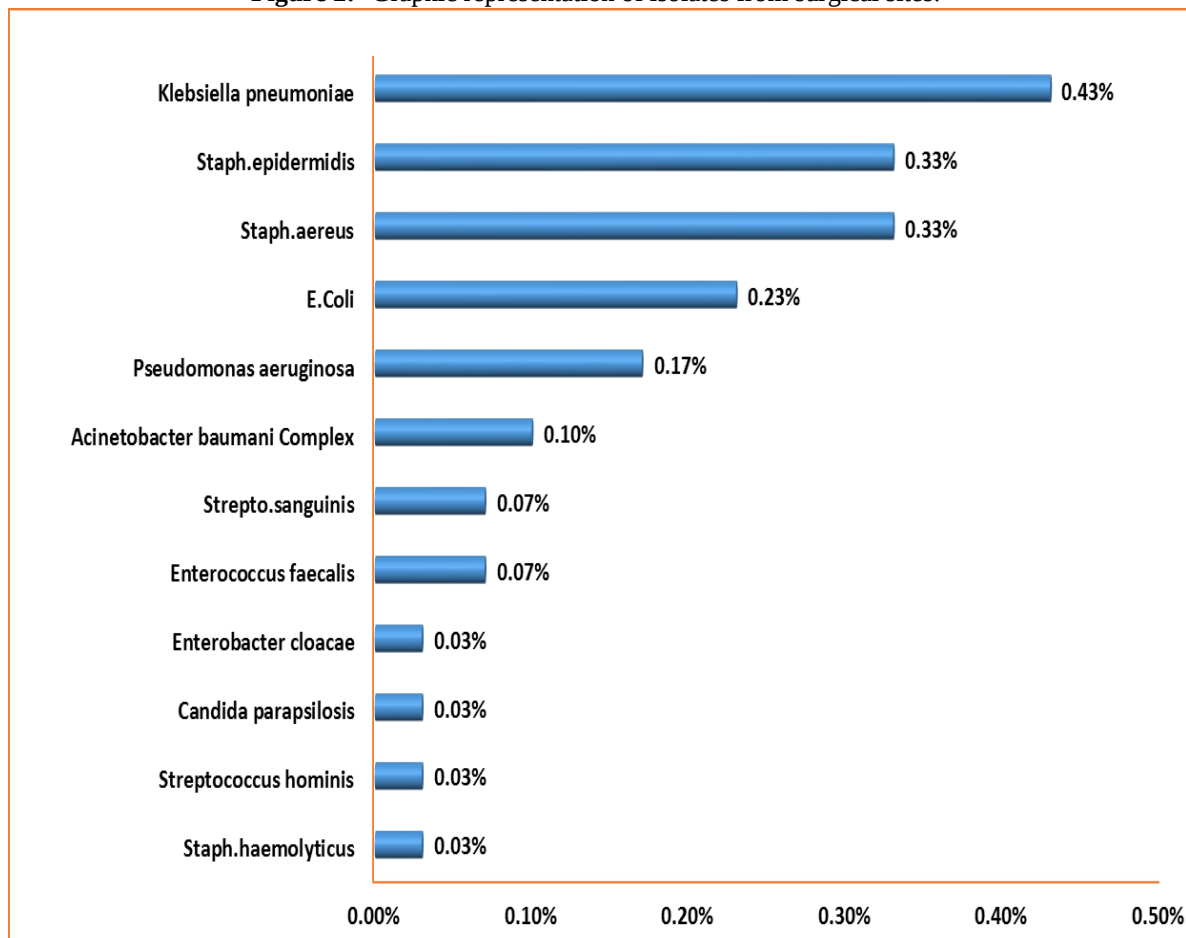


Figure 2:- Graphic representation of isolates from surgical sites.**Conclusion:-**

The presence of bacteriuria in asymptomatic patients is not a risk factor for presenting SSI in cardiovascular surgery. Our results indicate that there is no direct seeding of urine microorganisms onto the surgical site. Pre-operative screening with urinalysis or urine culture would not be recommended for patients without clinical symptoms of UTI. Preoperative antibiotic treatment for ASB did not show benefit in our study as well as in other reported literatures. Unnecessary use of antibiotics results in adverse effects like prolonged hospital stay, economical loss, side effects and antimicrobial resistance which is a global concern at the current moment.

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