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RESEARCH ARTICLE

MICROBIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERNS OF SURGICAL SITE INFECTIONS IN THE UROLOGY DEPARTMENT AT A TERTIARY CARE HOSPITAL, TIRUPATI

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ABSTRACT

Background: Surgical site infections are drawing more attention now a days. Even though there is a lot of advances in sterilization in operation theatres and advent of antimicrobial prophylaxis there is significant morbidity and mortality in health care settings. Which indulges our study on microbial spectrum and antibiotic sensitivity to various drugs.

Objective: Objective of our study was to determine the incidence of surgical site infections (SSI), microbiological profile and sensitivity to various antibiotics in urology wards at a tertiary care hospital.

Methods: This was a prospective study conducted in department of urology in SVIMS Hospital for a duration of 2 years. This study confined to the open surgical procedures in urology. Patient details like diagnosis, type of surgery, wound class, complete urine examination, nutritional status, post operative wound status, pus culture sensitivity for infected wounds were noted. In post operatively infected patients pus culture studied in aspects of isolated organisms, sensitivity to various antibiotics and results analyzed with excel spread sheet and spss software.

Results: Out of 1678 patients for duration of 2 years who underwent open surgical procedures in department of urology, 99 patients developed surgical site infections. Most common organism isolated was E.Coli(36.3%). Out of these 99 isolates 23.2%were gram positive, 57.5% gram negative bacteria,4% were fungal infections. Multidrug resistance strains were more with proteus group (100%) followed by enterococccus(66%) MDR least common in klebsiella as per our study.

Conclusion: This concludes that appropriate antibiotic usage and implementation of preventive measures combat surgical site infections.

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INTRODUCTION:

Healthcare associated infections not only harm patients but also affects medical and paramedical personnel and any one who come in contact with hospital(1). Recently there are many advances in infection control practices like improved operation theatre ventilation, sterilization methods, surgical technique, and antimicrobial prophylaxis. Even with these advances Surgical site infections still cause a substantial amount of morbidity and mortality among hospitalized patients (2).

Surveillance of these infections is a vital step as it provides an insight into the magnitude of problem . Surveillance of infections helps authorities to take radical measures and therefore curtail these infections (3). The aim of our study was to determine the incidence of surgical site infections (SSI),microbial spectrum and sensitivity to various antibiotics in the urology wards at a tertiary care hospital

MATERIALS AND METHODS:

Two-year prospective cohort study was conducted in the Urologic department, SVIMS hospital, Tirupati. The patients were daily examined and their diagnoses were made according to the definition of hospital infections using ASA score and surgical wound contamination class.

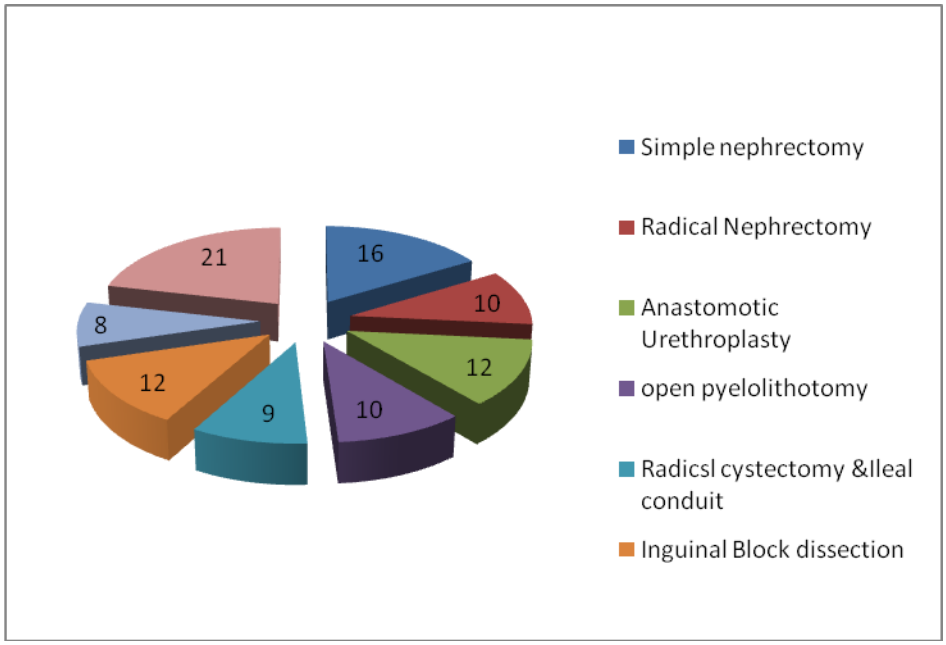
As per the institutional protocol, in elective surgeries, patients admitted a couple of days before surgery&shaving done at evening on a day prior to the operation. Our study confined to the open surgical procedures in urology. Pre-operative antibiotics were usually administered at 8 am on the day of surgery to all the patients selected for elective surgeries. Surgery usually starts at at 9am. In emergency surgeries, preparation of parts & administration of pre-operative antibiotics were done just before shifting the patient to the operation theatre. After surgery, the patients were monitored daily for any signs of SSIs as per the Centre for Disease Control& Prevention (CDC) definition (4). Patients were followed after discharge on OPD (Out Patient Department) . weekly check up for up to 30 days for any signs of SSIs. If SSI is suspected, pus and urine Samples were collected from these surgical site & immediately send to the Microbiology laboratory for culture. Wound class was defined by the surgeons using the CDC criteria as clean, clean contaminated, contaminated, or dirty infected (2,5).

RESULTS:

Out of 1678 patients for duration of 2 years who underwent open surgical procedures in department of urology, 99 patients developed surgical site infections. Pus culture sensitivity from surgical site of these patients studied with regard to isolated organism ,Multidrug resistance pattern, antibiotic sensitivity pattern.

Occurrence of SSIs in various surgeries:

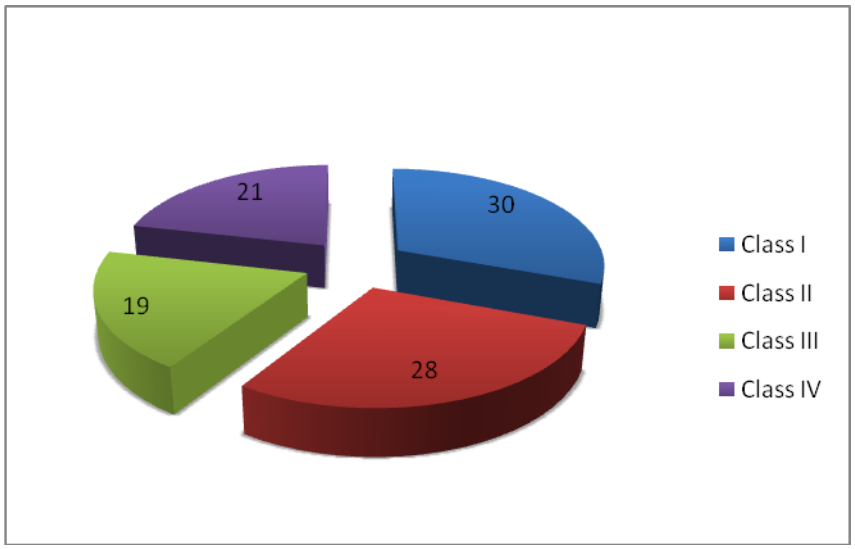
	Surgery	Total number	SSIs
1	Simple nephrectomy	253	16
2	Radical nephrectomy	115	10
3	Anastomotic urethroplasty	123	12
4	Open pyelolithotomy	98	10
5	Radical cystectomy &Ileal conduit	38	9
6	Inguinal block dissection	34	12
7	Orchidectomy/Hydrocoele	326	8
8	Miscellaneous	692	21



Post op surgical site infection rate is comparatively high for simple nephrectomy done for various causes.

Class of surgical wound:

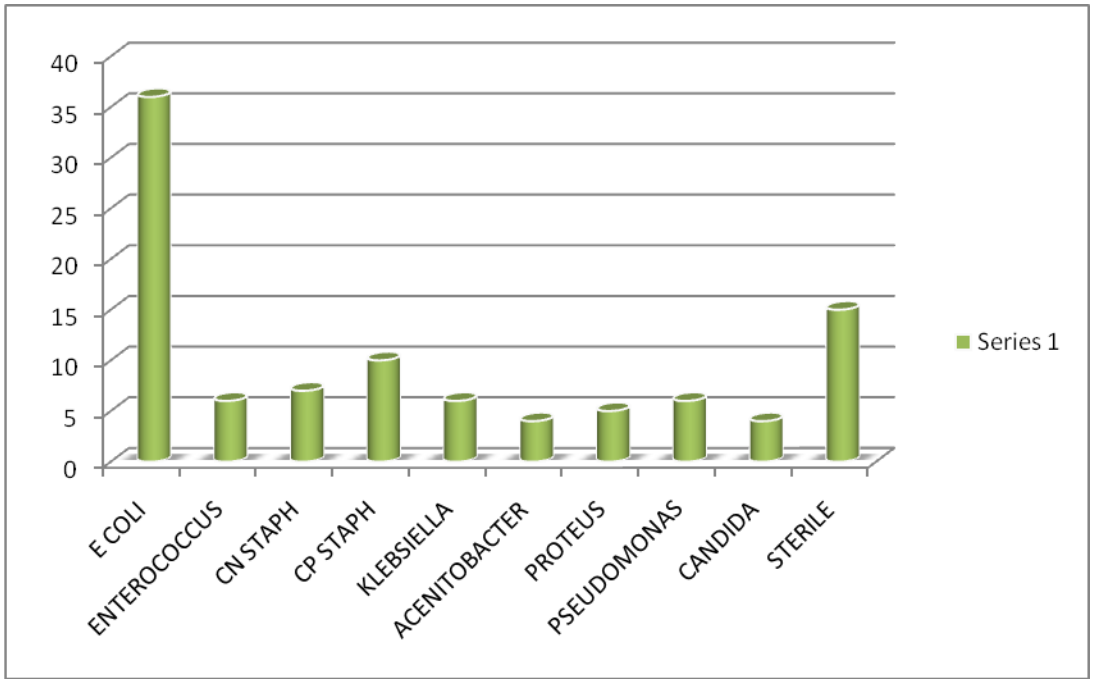
S.No	Wound class	No of SSIs
1	Class I	30
2	Class II	28
3	Class III	19
4	Class IV	21



In our study SSIs in clean wounds(class I) is 30.3%,clean contaminated wounds (class II) 28.2%,contaminated wounds(class III) 21.2 and in dirty wounds (class IV) 19.19% . Most of the urological surgeries were clean wounds so SSIs were more in Class I.

Organisms associated with SSI :

S.NO	ORGANISM	NUMBER OF ISOLATES
1	E.COLI	36
2	ENTEROCOCCUS	6
3	CN STAPH	7
4	CP STAPH	10
5	KLEBSIELLA	6
6	ACINETOBACTER	4
7	PROTEUS MIRABILIS	5
8	PSEUDOMONAS	6
9	CANDIDA	4
10	STERILE	15
	TOTAL	99

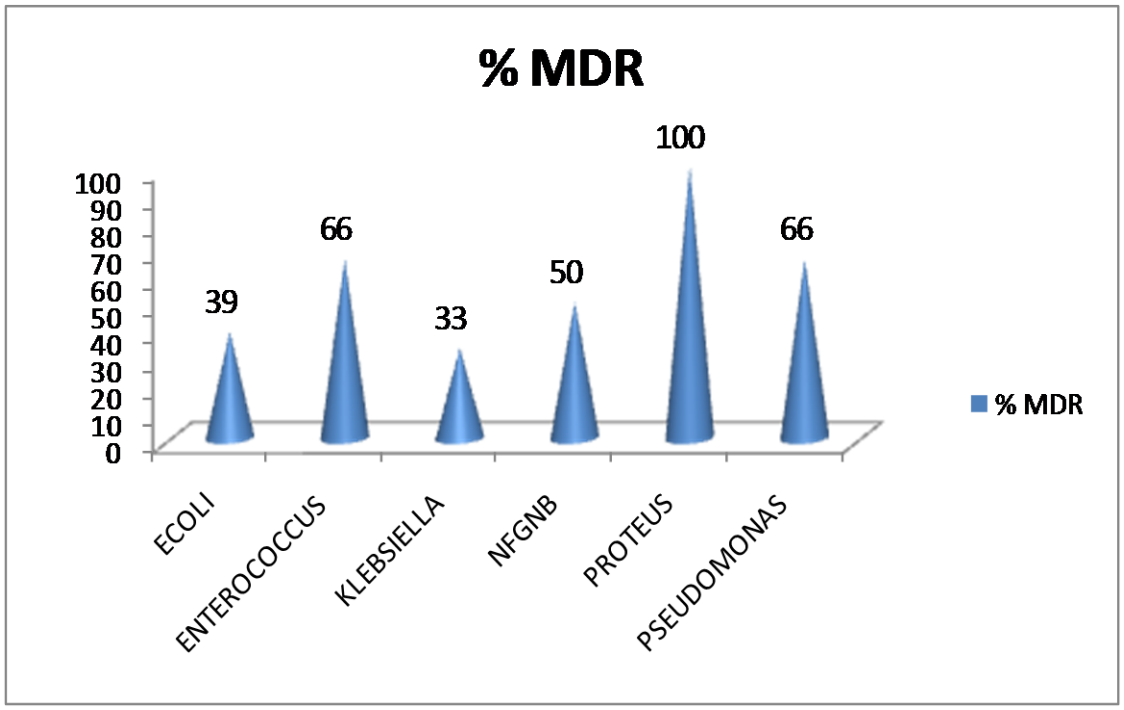


Isolated organisms were Eschericia coli, Staphylococcus aureus, Klebsiellae and Enterococci. Other organisms isolated commonly were CONS, pseudomonas, Acinetobacter, Proteus species and Candida.

Most common organism isolated was E.Coli(36.3%)followed by Coagulase Positive staphylococcus. Out of these 99 isolates 23.2%were gram positive, 57.5% gram negative bacteria,4% were fungal infections. 15% were sterile. In 84.8% of cases positivity for culture contributing to SSI.

Multi Drug Resistant bacteria (%) :

S.NO	ORGANISM	% MDR
1	ECOLI	39
2	ENTEROCOCCUS	66
3	KLEBSIELLA	33
4	ACINETOBACTER	50
5	PROTEUS	100
6	PSEUDOMONAS	66



Multidrug resistance strains were more with proteus group (100%) followed by enterococccus(66%) MDR least common in klebsiella as per our study

Antiboitic Sensitivity Pattern :

S. NO	Organsm	Amikacin	Ampicillin	Amoxyclav	Cefaperazone+Sulbactum	Cefotaxime	Ciprofloxacin	Cotrimaxazole	Gentamicin	Imipenem	Piperacillin +Tazobactum
1	E COLI	66.6	2.7	61.1	22.2	13.8	22.2	61.1	66.6	47.2	
2	ENTEROCOCCUS	16.6	66.6	16.6	16.6	-	-	-	16.6	16.6	16.6
3	KLEBSIELLA	66.6	-	-	66.6	16.6	33.3	16.6	50	83.3	33.3
4	AINETOBACTER	50	-	-	50	25	25	25	25	50	25
5	PROTEUS	100	100	80	100	60	80	20	60	40	20

6	PSEUDOMONAS	66.6	-	-	83.3	66.6	83.3	-	66.6	100	83.3

Gram negative bacteria like E Coli,Klebsiella,Proteus and Pseudomonas were highly sensitive to Amikacin followed by Gentamicin, while gram positive bacteria were sensitive to cephalosporins group(Eg:Sulbactum+cefoperazone,cefotaxime). Proteus mirabilus isolated from surgical wounds are was sentive to all antibiotic groups tested with culture sensitivity.

DISCUSSION:

Out of 1678 operated patients, 99 patients were diagnosed with SSI. The overall incidence rate of patients with SSI in our study was 5.9% while incidence rate of SSI was 6.1%. There was no difference in the incidence rates according to the ASA score of patients ($p > 0.05$). The incidence of SSI was 5.0% in the clean wounds, 11.2% in the clean-contaminated, and 20.7% in the contaminated wounds ($Chi2 = 8.2$ $DF = 2$ $p < 0.016$).

In a study conducted by Rakić V1 et al showed that One hospital infection was recorded in 64 of those included in the research, whereas two and three infections were recorded in 26 and 2 patients, respectively. The incidence rate of the patients with hospital infections was 17.3%, and the rate of the incidence of the infections 22.4%(6)

Naveen Kikkeri et al showed that 180 patients who underwent surgery 39 developed surgical site infections giving a cumulative incidence of 21.66(7) . Manisha Dhamecha et al showed that Out of 494 patients, 21 patients (4.25%) developed SSI. The highest rate of SSI (50%) was found in age group 51-60 years(8)

Most common isolates were Eschericia coli followed by Staphylococcus aureus, Klebsiellae and Enterococci. Other organisms isolated commonly were CONS, pseudomonas, Acinetobacter, Proteus species and Candida.

More than 50% MDR patterns are observed in case of proteus (100%), psedomonas(66%), acinetobacter(50%). VISA, VRSA and VRE were nil.

The National Surgical infection Prevention project stated that the first anti microbial dose should be begin within 60 minutes before the initiation of surgery and importantly prophylactic medications of anti microbials should be discontinued with in 24 hours after the end of surgery.(9.10). In our institute we also followed the same protocol for preoperative antibiotic.

In our study Gram negative bacteria like E Coli,Klebsiella,Proteus and Pseudomonas were highly sensitive to Amikacin followed by

Gentamicin, while gram positive bacteria were sensitive to cephalosporins group(Eg:Sulbactum+cefoperazone,cefotaxime).

Factors that increase the incidence of SSI are presence of diabetes, obesity, renal disease (end-stage), pulmonary disease (chronic obstructive pulmonary disease), high ASA grades, and prolonged duration of surgery and use of inappropriate preoperative antibiotics.

The incidence of SSI amongst elective procedures is modest, at about a quarter of all the SSIs. This can be improved upon further by adhering to established guidelines and protocols. Even though the study has documented the incidence of SSI, type of organisms and the incidence of culture-negative SSI, there is a need for improved monitoring. The limitations of this retrospective study was that the data collection of this surveillance sys-tems was limited to recording the growth or absence of organism(s), while the other significant issues like co-mobbed conditions, appropriateness of antibiot-ics, length of hospital stay, costs incurred were not captured. With the on-going prospective SSI data collection at our institute, based on Centers for Dis-ease Control and Prevention (of SSIs) bundles, there is a good potential to enhance our data collec-tion and to reduce the overall incidence of SSI.

Prevention of a SSI requires a multipronged approach, with emphasis on optimizing preoperative issues, adhering religiously to strict protocols during the intraoperative period and addressing and optimizing metabolic and nutritional status in the post-operative period.

CONCLUSION:

This concludes that appropriate antibiotic usage and implementation of preventive measures combat surgical site infections. This study suggests that it is necessary to maintain continuous surveillance of surgicical site infections and to implement the preventive measures, especially for clean and clean-contaminated surgery.

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