

Risk Factor Analysis, Bacteriological Study and Their Antibiotics Resistance Pattern of Surgical Site Infection Following Lower Segment Caesarean Section at Tertiary Care Hospitals in Western Rajasthan, India



Medical Science

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ABSTRACT

Lower segment caesarean section (LSCS) is a common mode of delivery now and surgical site infection is the second most common infectious complication in these patients. This study was planned with this background to have a comprehensive approach to surgical site infection (SSI) following LSCS. A total 100 consecutive patients undergoing LSCS were studied. A questionnaire was developed to assess the risk factors associated with development of SSI & their pre operative and post operative antibiotics pattern. SSI was identified in 78 (78%) out of 100 patients. In all age groups, Gram-negative bacilli were the commonest finding. The commonest isolate was Escherichia coli followed by Staphylococcus aureus and coagulase negative Staphylococcus. 88.3% of Staphylococcus aureus strains were Resistant to Methicillin. Increased duration of stay in the hospital was found to be significant. A proper assessment of risk factors that predispose to SSI and their modification may help in reduction of SSI rates. Also proper assessment of microbial pathogens that causes SSIs and assessment of their resistance pattern may helps in reduction of SSI rates. The Prudent uses of antibiotics are to prevent future development of resistance.

Introduction:

Surgical site infection is a common generic post operative event that causes considerable morbidity. Surveillance of surgical site infections is an important infection control activity. In spite of the availability of antibiotics SSIs are still responsible for much morbidity and for reaching socio economic consequences for both Patient as well as health care system. Reduction of surgical site infection while minimizing antibiotics resistance still remain challenge for many health care institution.1

Objectives:

Identifying Etiological microbes & their antibiotic resistance pattern in Surgical Site Infections in tertiary care Hospital.

Material & Method: Study Area and Study Population:

This Prospective Study was conducted in the department of Microbiology Umaid Hospital Lab, Dr. S. N. Medical College, Jodhpur Rajasthan from April 2014 to July 2014 (4 month period). A total of 100 female patients between 18 to 45 years of age undergoing emergency/elective Caesarean Section who were admitted in the Obstetrics & gynecology were department included in the study. Data was collected from every patient regarding the various risk factors and demographic details by means of a detailed questionnaire.2

Inclusion criteria: Patients between 18 to 45 yrs of age who developed SSI with in 15 post operative day was included in the study **Exclusion criteria:** Patients age less than 18 yrs and more than 45 years who developed SSI after 15 post operative days were excluded from the study.

Data collection: A detailed history was taken that included patients age, gender, residential status, date of admission, reason for admission, date & type(emergency/elective) of operation, date of development of SSIs, pre and post operative antibiotics status of the patient and associated risk factor like anemia, diabetes mellitus, cancer, H/o immunosuppressive therapy. Detail clinical complaint of patient like fever, discharge from suture site, Pain in abdomen and vomiting was noted.

Microbiological Methods: All patients sample were collected

and analyzed at microbiology laboratory Umaid hospital Dr. S. N. Medical College Jodhpur Rajasthan. After inspection of surgical wound site, physical characteristics of discharge as Color, Odour, consistency and amount were noted. Samples of purulent discharge were collected from surgical site infection with a sterile cotton swab. Two separate swabs were taken one for bacterial culture and another one for smear for Grams staining. Swabs collected were immediately transported to the laboratory and in case of delay inoculated into Thyoglycolate broth than transported to the lab. Each sample was plated onto blood agar & MacConkey agar and plates were incubated aerobically at 37 OC for 18 to 24 hours than examined for bacterial growth and colony characteristics.

Identification: The accurate identification of bacterial isolate was done by colony characteristics, Grams staining, motility testing (by hanging drop method) and biochemical testing (Catalase, Coagulase, Indole, Methyl red, Citrate, Urease, Triple sugar iron, PPA and Oxidase test).

Bacterial isolates obtained were identified as per standard microbiological identification

100 procedures.3 phenotypic method of identification was used. Antibiotics susceptibility of the incriminated organism was done by Kirby-Bauer disc diffusion method as per CLSI guidelines.4

Result:

Patients included in the study were in the age group 18 to 45 years. The Majority of the patients (54%) were in the age group 18–25 years, followed by those in the age group of 26–35 years (34%). No patient was found to be less than 18 years of age. The Majority from the patients 72% were in rural geographical area and 28% from urban area. 76 (76%) out of 100 women underwent emergency LSCS while only 24 (24%) women underwent elective surgery. Surgical site infections were identified in 78 (78%) women out from 100 who underwent LSCS. Pathogenic organism Isolated from SSIs in 78 (78%) patients as listed below in Table no.1 and Figure-1 along with 6% patient who had polymicrobial etiology. No organism grew in 22% specimen because

of pre operative administration of Antibiotics or probably the organism was anaerobes. Among Gram Positive bacteria Staph aureus was the Commonest whereas in Gram Negative bacteria Escherichia Coli was the commonest organism isolated from SSIs.

Resistance Pattern of Gram positive organism in percentage (%) is shown in Table no.2 and Gram negative organism in percentage (%) is shown in Table no.3. Staph aureus was commonest isolate in gram positive organism which was mainly (88.23%) resistant to Methicillin. Resistance pattern of Staph aureus is shown below in Figure-2.

Escherichia coli was the commonest isolate among gram negative organisms which was mainly (61.9%) resistant to Ceftriaxime. Resistance pattern of Escherichia coli is shown below in Figure-3.

Table no.1: Organism isolated from SSIs

Organism isolated	Number (%)
Staph aureus	17 (21.7%)
Coagulase negative staph	10 (12.8%)
Enterococcus spp.	4 (5.1%)
Escherichia coli	21 (26.9%)
Klebsiella spp.	9 (11.5%)
Pseudomonas aeruginosa	7 (8.9%)
Citrobacter freundii	5 (6.4%)
Proteus vulgaris	3 (3.8%)
Acinetobacter spp.	2 (2.5%)
Total isolate	78

Figure-1 Percentage of Pathogenic organism isolated from SSIs

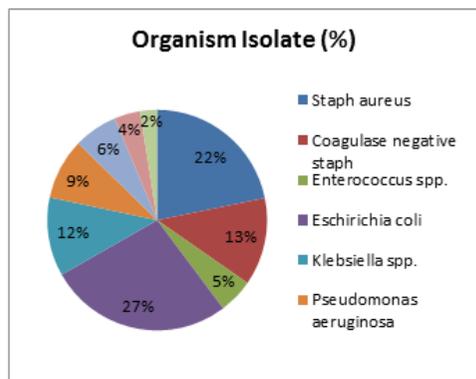


Table no.2 Resistance pattern of gram positive organism in percentage (%)

Organism	Lz	Va	Azm	Cip	Cfm	Amx	Met
Staph aureus	5.8	29.4	17.6	23.5	41.1	52.9	88.23
CONS	10	20	10	20	30	60	80
Enterococcus	0	50	75	25	75	50	100

Lz:Linazolid,Va:Vancomycin,Azm:Azithromycin,Cip:Ciprofloxacin,Cfm:Cefixime, Amx: Amoxycilin, Met: Methicillin



Figure-2: Resistance pattern of Staph aureus in percentage (%)

Table no.3 Resistance pattern of gram negative organism in percentage (%)

Organism	Ipm	Ak	Caz	Ctr	Cip	Of	Amc
Escherichia Coli	0	33.3	61.9	38.1	42.8	47.6	57.14
Klebsiella spp.	0	22.2	55.5	33.3	44.4	11.2	22.2
Pseudomonas aeruginosa	14.2	42.8	—	28.5	57.1	42.8	—
Citrobacter freundii	0	40	20	20	40	20	20
Proteus vulgaris	0	33.3	—	0	33.3	66.6	0
Acinetobacter spp.	0	50	0	—	0	50	0

Ipm:Imipenam,Ak:Amikacin,Caz:Ceftazidime,Ctr:Ceftriaxone,Cip:Ciprofloxacin,Of:Ofloxacin, Amc: Amoxycilin-clavulanic acid.

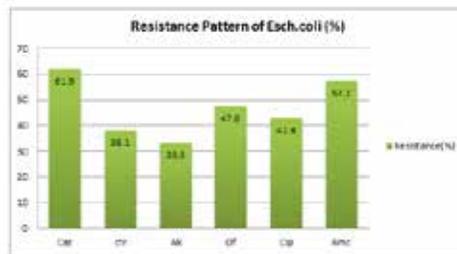


Figure-3: Resistance pattern of Escherichia coli in percentage

Risk Factor Analysis:

Risk factors showing a significant association (P<0.05) were increasing age, emergency procedure, anemia, prolonged preoperative & post operative hospital stay, prolonged total duration of surgery, failure of timely antibiotic prophylaxis (within 30 minutes of skin incision) and preexisting medical illness In all such conditions there was increase chance of SSIs.1

Discussion:

Besides increase in morbidity and mortality, Nosocomial infections prolong the hospital stay of patients and increase bed occupancy rate. Also, 7–12% of hospitalized patients end up with hospital acquired infections globally with more than 1.4 million people suffering from infectious complications acquired in the hospital5. Surgical site infection is an important outcome indicator after surgery. The situation is worsened by the emergence of polymicrobial resistant strains of nosocomial pathogens6

The infection rate in the present study was 78%, Majority of these infections (58%) were identified in the age group 18–25 years. All SSIs were found to be superficial and limited to stitch line. No deep infections were found. The incidence of caesarean section has dramatically increased in modern medicine and is attributed to many maternal and fetal factors. Emergency LSCS predisposes more to SSI as compared to elective surgery7,8,9.

Patients with anemia were seen to be more prone to SSI. Anemia diminishes resistance to infection and is frequently associated with puerperal sepsis. Preoperative anemia is an important predictor of infection and has been proved by several other studies9,10,11. In our study anemia was found to be significantly associated with SSI.

Antibiotic prophylaxis in surgical patients has always been a matter of debate. For prophylactic antibiotic the current recommendation states that the parenteral antibiotic must be given within 2 hours of incision so as to attain high tissue and serum levels during surgery 12.

It has been reported that SSI develop after prolonged preoperative & postoperative stay with exposure to hospital environment, its ubiquitous diagnostic procedures, therapies, and micro flora, including multidrug resistant organisms¹³. In the present study, significant correlation was found between the duration of preoperative & postoperative hospital stay and development of SSIs.

Patients with preexisting illnesses like diabetes mellitus, bronchial asthma, and jaundice or immunocompromised status were seen to be more prone to infection in the present study. Poor control of glucose during surgery and in the preoperative period increases the risk of infection and worsens outcome from sepsis. Hypertension, HIV, and other co morbid states have been associated with SSI in several studies^{14, 15}.

Common causative organisms leading to post-LSCS SSI include Gram-negative bacteria, anaerobes, and *Staphylococcus aureus*¹⁶. In our study, the most frequently isolated organism was *Escherichia coli* (26.8%) followed by *Staphylococcus aureus* second most frequently isolated group of organisms.

Conclusion:

To conclude, a proper assessment of risk factors that predispose to SSI and their modification may help in reduction of SSI rates, also proper assessment of microbial pathogens that causes SSIs and assessment of their resistance pattern may helps in reduction of SSI rates. The Prudent uses of antibiotics are to prevent future development of resistance.

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