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STUDY OF RISK FACTORS AND MICROBIAL ETIOLOGY FOR SURGICAL SITE INFECTION AFTER LOWER SEGMENT CESAREAN SECTION

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ABSTRACT

BACKGROUND- To study of risk factors and microbial etiology for surgical site infection after lower segment cesarean section

METHODS-A prospective observational study was conducted in Smt. Hira Kunwar Ba Mahila Hospital, Jhalawar attached to Jhalawar Medical College over 48 pregnant women undergoing emergency cesarean section irrespective of the indication. Pregnant women with pre-existing skin infection at surgical site were excluded from study

RESULTS- In our study 62.5% cultures were positive for bacterial growth and 37.5% showed no growth in wound discharge sent for culture and sensitivity. Among the isolated organisms*staphylococcus aureus* was the most common isolated pathogen in 50% cases of SSIfollowed by *Escherichiacoli*(26.7%), *Klebsiella* species (9.9%), *Citrobacter freundii*(6.7%), *Enterococcus* species (3.3%) and *Pseudomonas aeruginosa* (3.3%).

CONCLUSION-To conclude a proper assessment of risk factors that predisposeto SSI and their modification may help in reduction of SSI rates. Also, frequent antimicrobial audit and qualitative research could give an insight into the current antibiotic prescription practices and the factors affecting these practices.

KEYWORDS : LSCS, SSI, Pregnancy

INTRODUCTION

Surgical site infection remains the most common complication of gynaecologic procedures. Surgical site infections generally are defined as infections that occur after surgery in the part of the body where the surgery took place. These infections are classified as incisional or organ/space. Incisional surgical site infections are further divided into those involving only skin and subcutaneous tissue (superficial incisional) and those involving the deeper soft tissues of the incision such as muscle or fascia[1].The rates of SSI after caesarean section reported in the literature range from 3% to 15%, depending on the surveillance methods used to identify infections, the patient population and the use of antibiotic prophylaxis[2]. In many SSIs, the responsible pathogens originate from the patient's endogenous flora. The causative pathogens depend on the type of surgery; the most commonly isolated organisms are Staphylococcus aureus, coagulase-negative staphylococci, Enterococcus spp. and Escherichia coli[3]. Many risk factors for SSI have been described. These include maternal factors (such astobacco use; limited prenatal care; obesity; corticosteroid use; nulliparity; twin gestations; and previous CD),intrapartum and operative factors (such as chorioamnionitis; premature rupture of membranes; prolongedrupture of membranes; prolonged labor, particularly prolonged second stage; large incision length;subcutaneous tissue thickness > 3 cm; subcutaneous hematoma; lack of antibiotic prophylaxis; emergency delivery; and excessive blood loss), and obstetrical care of an institution[4]. Postsurgical infection leads to increased length of postoperative hospital stay, drastically escalated expense, higher rates of hospital readmission, and jeopardized health outcomes.The prevention of surgical site infections encompasses meticulous operative technique, timely administration of appropriate preoperative antibiotics, and a variety of preventive measures aimed at neutralizing the threat of bacterial, viral, and fungal contamination posed by operative staff, the operating room environment, and the patient's endogenous skin flora[5].

MATERIAL AND METHODS

A prospective observational study was conducted in Smt. Hira Kunwar Ba Mahila Hospital, Jhalawar attached to Jhalawar Medical College over 48 pregnant women undergoing emergency cesarean section irrespective of the indication. Pregnant women with pre-existing skin infection at surgical site were excluded from study. Patient history, general physical and systemic examination, investigations and other details were taken into consideration. Antimicrobial prophylaxis included injection Ceftriaxone one gram I.V., 30 minutes before making skin incision. Preoperative skin preparation was done with chlorhexidene gluconate, five percent povidone iodine. Post operatively injectable anti-biotics were given for three days followed by oral medication, check dressing done on fourth post operative day. Diagnosis of SSI was made on basis of signs and symptomswhich included pain, fever, localized swelling, induration, dehiscence, overlying skin changes and exudative purulent discharge. Before initiating any treatment, the discharge (serous, bood mixed or purulent) from the surgical incision site were collected with sterile cotton swab and sent to our hospital's microbiology department for culture and drug sensitivity. Blood and urine samples were collected for culture as and when possibility of septicaemia was noted as per standard method.Certain risk factors like type of surgical wound, antibiotic prophylaxis, duration of surgery, underlying comorbidities and predisposing conditions were noted down.

RESULTS

TABLE:1 Risk Factors For Surgical Site Infection(SSI)

Predisposing factors	No. of case (n=48)	Percent (%)
Overweight/obesity	12	25
Anaemia	22	45.8
Diabetes	3	6.3
Intra-operative Blood transfusion	3	6.3
PROM >24 Hrs.	4	8.3
Manual removal of placenta	2	4.2
Wound Hematoma	2	4.2

48 patients included in our study who underwent emergency LSCS and developed SSI.Obesity is an important predisposing factor to develop SSI. In our study 25% of SSI cases were overweight and obese.Patients with anaemia were seen to be more prone to SSI. In our study 45.8% of SSI cases had anaemia. Diabetes has been significantly associated with SSI secondary to gynaecological surgeries. In our study 6.3% of cases of SSI were found to have diabetes.Allogeneic blood products have immunomodulatoryeffects that may increase the risk of infection. In our study6.3% cases of SSI received intraoperative blood products.Premature rupture of membranes is associated with thelargest bacterial inoculum and liquor gets infected and infectionsupervenes. In our study 8.3% cases of SSI had premature rupture of membranes > 24 hours. Other risk factors for SSI included manual removal of placenta and wound hematoma comprises 4.2 % each of cases of SSI.

TABLE :2 Indications Of LSCS Among Surgical Site Infection(SSI)

Indications of LSCS	No. of cases (n=48)	Percent (%)
Previous caesarean delivery	21	43.7
Failure of induction	09	18.8
Obstructed labour	2	4.1
Severe pre-eclampsia/eclampsia	5	10.4
Antepartum haemorrhage	3	6.3
Others (Foetal distress,Primi-breech,Macrosomia)	8	16.7

our study most common indication of LSCS among SSI cases was previous caesarean section in 43.7% cases of SSI followed by failure of induction (18.8%), severe pre-eclampsia and eclampsia (10.4%), ante-partem haemorrhage (6.3%), obstructed labour (4.1%) and others (16.7%) including fetal distress, primi-breech and macrosomia.

TABLE:3 Various Pathogens Causing Surgical Site Infection (SSI)

Organisms isolated	No. of cases (n=48)	Percent (%)
Staphylococcus Aureus	15	31.3
Enterococcus	1	2.1
Escherichia coli	8	16.7
Klebsiella	3	6.6
Citrobacter	2	4.2
Pseudomonas aeruginosa	1	2.1
No pathogen	18	37.5

In our study 62.5% cultures were positive for bacterial growth and 37.5% showed no growth in wound discharge sent for culture and sensitivity. Among the isolated organis m*sstaphy lococcus aureus* was the most common isolated pathogen in 50% cases of SSIfollowed by *Escherichiacoli*(26.7%), *Klebsiella* species (9.9%), *Citrobacter freundii*(6.7%), *Enterococcus* species (3.3%) and *Pseudomonas aeruginosa* (3.3%).

DISCUSSION

Besides increase in morbidity and mortality, nosoco mialin fections prolong the hospital stay of patients and increasebed occupancy rate.obesity is associated with or causes impaired immune function hence there is increasing risk of nosocomial infection in surgical patients with increasing degrees of obesity. In our study 25% of SSI cases were overweight and obese.In a study by Bangal VB et al, 46% of SSI cases were obese,[6]while in a study by Devjani De et al, 17.3% of SSI cases had BMI > 25[7]. Anaemia diminishes resistance to infection and is frequentlyassociated with puerperal sepsis. Preoperative anaemia is an important predictor of infection.In our study 45.8% of SSI cases had anaemia. In the studies conducted by John et al and waqar et al, 40% and 17% of SSI cases had anaemia respectively[8,9].Hyperglycaemia has several deleterious effectsupon host immune function, most notably on neutrophilfunction. Poor control of glucose during surgery and inthe perioperative period increases the risk of infection andworsens outcome from sepsis thus diabetes is an important risk factor for SSI.In our study 6.3% of cases of SSI were found to have diabetes while in the studies by Bangal VB et al and B Sudhakar Babu et al 2% and 40% of SSI cases had diabetes respectively[6,10]. Excessive intraoperative blood loss and perioperative transfusion could induce immuno suppression in postoperative patients by reducing the natural killer cell and cytotoxic T-cell populations thus perioperative blood transfusion is a significant factor in the development of SSI[11].In our study6.3% cases of SSI received intraoperative blood products. In a study conducted by Pathak et al, 20% of cases of SSI had history of perioperative blood transfusion[12].In our study 8.3% cases of SSI had premature rupture of membranes > 24 hours,while in a study by Devjani De et al, 25.6% of SSI cases had premature rupture of membrane[7]. In one meta-analysis, manual removal of the placenta was associated with a higher riskof endometritis compared with traction of umbilicalcord (RR 1.64, 95% CI 1.42, 1.90)[13].

In our study 4.2% cases of SSI associated with intraoperative manual removal removal of placenta. Small hematomas may resorb without surgical interventions,although they increase the incidence of SSI[14]. In our study 4.2% cases of SSI developed wound hematoma during surgeryandAstudy conducted by Bangal VB et al, had similar incidence of wound hematoma (6%) in SSI cases.

SSIs had a polymicrobial etiology. In our study 62.5% cultures were positive for bacterial growth and 37.5% showed no growth in wound discharge sent for culture and sensitivity. Among the pathogenic organisms, *staphylococcus aureus* was the most common isolated pathogen in 50% cases of SSI followed by *Escherichiacoli*(26.7%), *Klebsiella* species (9.9%), *Citrobacter freundii*(6.7%), *Enterococcus* species (3.3%) and *Pseudomonas aeruginosa* (3.3%).

In a study by Chia *et al*,22.8% showed no bacterial growth in wound discharge sent for culture and sensitivity and 77.2% cultures were positive for bacterial growth. Among which *staphylococcus aureus* was isolated in 58.1% ofcasesfollowed by streptococcus species (10.5%) and klebseilla (9.5%)[15]. While in a study conducted by Shittu et al, Staphylococcus was the predominant organism isolated in 25% cases, followed by *E.coli*in 12%, *pseudomonas aeruginosa* in 9% and staphylococcus epidermidis in 9% cases[16].

In our study most common indication of LSCS among SSI cases was previous caesarean section in 43.7% cases of SSI followed by failure of induction (18.8%), severe pre-eclampsia and eclampsia (10.4%), ante-partem haemorrhage (6.3%), obstructed labour (4.1%) and others (16.7%) including fetal distress, primi-breech and macrosomia. In a study by Pathak A et al, indications of LSCS among SSI cases included previous caesarean delivery (31%), fetal distress (16%), prolonged labour (14%), hypertensive disorder of pregnancy (9%), obstructed labour (8%) and ante-partem haemorrhage (3%)[11].

CONCLUSION:

To conclude a proper assessment of risk factors that predisposeto SSI and their modification may help in reduction of SSI rates. Also, frequent antimicrobial audit and qualitative research could give an insight into the current antibiotic prescription practices and the factors affecting these practices. Our study strongly recommend each hospital to consider the evidence-based information presented in creating its own surgical bundle to decrease the rates of SSIs after caesarean deliveries.

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