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Original Article

Risk factors for surgical site infection following cesarean section.

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Abstract:

Introduction: Post caesarean section (CS) wound infections represents a considerable load for health system; therefore, preventive measures should be a health care priority in developing world.1 The rate of surgical site infection (SSI) after caesarean section is reported between 3% -15%.

Objective: To determine risk factors responsible for surgical site infection following caesarean section.

Methodology: This cross-sectional study was conducted at Department of Obstetrics and Gynecology Unit II Civil Hospital Karachi during January 2017 to June 2017. Total 163 women with post cesarean wound infection, irrespective of any age and parity, were included in the study. Post-surgery, final assessment was made after 30 days. Informed consent was taken and patients were inquired about history of trial of labor from Dai or lady health visitor (LHV), history of leaking of amniotic fluid, presence of maternal fever ≥100 for 24 hours, maternal leukocytosis >15000/mm^3, uterine tenderness, foul odor of amniotic fluid and decreased Hemoglobin level. Women with history of diabetes and gestational diabetes, cesarean section performed in other settings and had undergone cesarean section via midline vertical incision were excluded. Findings were recorded in a self-designed questionnaire. SPSS Version 20 used to analyze the data.

Results: Mean age of women was 27.88±4.55 years. Most common factor for surgical site infection was personal hygiene (58.9%) followed by obesity (23.3%), history of LHV/Dai handling (20.2%), PROM (17.8%), anemia (13.5%) and chorioamnionitis (10.4%).

Conclusion: For surgical site infection, personal hygiene is more common risk factor.

Keywords: Risk actors, Surgical Site Infection (SSI), Caesarean Section.

Introduction:

Post caesarean section (CS) wound infections represents a considerable load for health system; therefore, preventive measures should be a health care priority in developing world.[1] The rate of surgical site infection (SSI) after caesarean section is reported between 3% -15%. It is reported 0.3% in Turkey, 17% in Australia, 11.6% in Brazil and 18.3% in Saudi Arabia.[2,3] In a retrospective study from Oman it is reported 2.6%; major predisposing factors found were premature rupture of membranes (17.5%) and diabetes (15.6%). Another study conducted at Hayatabad Medical Complex Peshawar, Pakistan concluded the incidence of SSI to be 12% with staph aureus (24%) and

staph epidermis (20%) to be the most frequent organisms.[4] Caesarean sections are performed as emergency or elective procedures depending upon the indication. Surgical site infection seen after cesarean section increases hospital stay which in turn lead to increased cost and burden to the woman and family.[5] Infectious complications occur 10 times more frequently following caesarean deliveries then vaginal deliveries.[6]

By level of contamination, Infection can be superficial, deep-incisional or organ/space related. Wound can be classified as clean, clean contaminated, contaminated, dirty or infected. It is seen from multiple studies that the occurrence of infection increases with degree of contamination.[7]

The American Society of Healthcare Pharmacists and Surgical Infection supports antibiotic prophylaxis for all caesarean section. Administrating antibiotics 2 hours prior to surgical incision or at the time of cord clamp has shown to be equally effective, all these measures have reduced but not eliminated serious postoperative infections.[6,7]

Post caesarean surgical site infections are greatly enhanced by a number of factors that vary among different settings. Several studies reveal factors such as emergency operations, extremes of maternal weight, poor nutritional status, personal hygiene, prolonged labor, rupture of membranes, anemia, handling by Dai / local health worker and diabetes to play a significant role in increased Infection rates.[5,6]

Pre cesarean section duration of labor is linked with incidence of wound infection. Certain other factors are also responsible, including prolonged period of rupture of membranes, hemoglobin status, surgeon's skills, duration of surgery and multiple vaginal examinations.[8,9] CS done in emergency situation, status of booking, internal fetal monitoring and patient age were reported by others.[10] Commonly cultured bacteria in sample of patients with wound infections following CS found to be Staphylococcus Aureus.[11] Not only serious implications has been seen by such organisms, but resistance also observed for commonly available antibiotics like penicillins[12] Other isolated organisms includes; gram negative organisms like E. coli, proteus mirabilis, pseudomonas and Klebsiella.[13] Such variation in occurrence of causative organisms could justify the failure in efficiency of prophylactic antibiotics whatever spectrum of antibiotics are used.[12] A developing country like Pakistan lacks the standard surveillance system for postoperative infections that in turn play a key role in mortality and morbidity among mothers.

Objective: To determine risk factors of SSI following caesarean section that might help in delivering high quality services with primary interventions in order to decreases SSIs in future.

Methodology: This cross-sectional study was conducted at Department of Obstetrics and Gynecology Unit II Civil Hospital Karachi during January 2017 to June 2017. During period of study 1500 women undergone caesarean section out of them 163 women developed post cesarean wound infection. All women irrespective of any age and parity were included in the study. Women with known case of diabetes, gestational diabetes, history of caesarean section performed in other settings and undergone cesarean section via midline vertical incision were excluded. Preoperative antibiotics and aseptic surgical technique had been provided to all patients. Majority of the operations was performed by postgraduate residents. Post-surgery patients were followed as per hospital ward protocol and final assessment was made after 30 days. Women presented with signs of inflammation on surgical site such as redness, pussy discharge from wound, hot and tender on palpation were taken as surgical site infection. After taking informed consents, patients developed SSI were assessed for personal hygiene. BMI was evaluated from antenatal card. Patients were inquired about history of trial of labor from Dai or LHW, history of leaking of amniotic fluid, presence of fever ≥100 for 24 hours, leukocytosis >15000/mm^3, uterine tenderness, foul odor of amniotic fluid and decreased hemoglobin level was recorded in a self- designed questionnaire. Data analyze by using SPSS version 20. Mean ±Standard Deviation measured for age, BMI and gestational age. Frequency and percentage calculated for risk factors (personal hygiene, obesity, anemia, history of LHW/DAI handling, chorioamnionitis, premature rupture of membranes (PROM) and parity.

Results:

The overall mean age of study participants was 27.88±4.55years. The detailed descriptive statistics of age, gestational age and BMI are presented in Table I. Majority of women were multiparous (37.4%). Predisposing factors for post caesarean SSI, in our study were personal hygiene in 58.9%, obesity in 23.3%, his-

tory of LHV/Dai handling in 20.2%, PROM in 17.8%, %, anemia in 13.5% and chorioamnionitis was observed in 10.4% of cases. The detailed frequency distributions of factors responsible for surgical site infection (SSI) are presented in Table II

Table No 1: Demographic details of the patients (n=163)

Variable	Mean	± SD	95 % Confidence	
			Lower bound	Upper Bound
Age (years)	27.88	4.55	20	35
Gestational age (weeks)	38.63	1.33	37	42
BMI (kg/m^2	25.82	5.29	17.80	35.10

Table II frequency distribution of risk factors responsible for surgical site infection (SSI).

Risk Factors	Yes (%)	No (%)
Personal Hygiene	96 (58.9)	67 (41.1)
Obesity	38 (23.3)	125 (76.7)
LHV / Dai Handling	33 (20.2)	130 (79.8)
PROM	29 (17.8)	134 (82.2)
Anemia	22 (13.5)	141 (86.5)
Chorioamnionitis	17 (10.4)	146 (89.6)

Discussion

Single independent factor causing post caesarean SSI may not be identified, instead multiple risk in combination appears responsible. It has been reported that women underwent abdominal delivery has 5-to-20-fold increased chance of acquiring infection.[14] After CS, despite improvement and advancement in surgical techniques, SSI is still a major problem. Certain factors favouring development of SSI includes pre-existing comorbidities in patient, type of caesarean sections whether emergency or elective and obstetrical factors.[15,16]

We observe 10.8% rate of SSI in our study, more than reported by Ward et al, (8.9%) after a multi-center co laborative study for post cesarean SSI in Britain.[14] While Ghuman M, et al documented a SSI rate of 5% after CS in their study.[17] The higher prevalence rate in our study might be due to smaller sample size, emergency caesarean section, poor personal hygiene and inadequate nutritional status of study population.

The process of development of SSI after caesarean section depends on a combination of factors and in any given case, SSI might be due to a sole factor or a result of interaction of multiple factors.[16] During current study, we observed personal hygiene, obesity, anemia, history of LHV/Dai handling, chorioamnionitis and PROM as risk factors of SSI.

In our study mean age of women observed 27.88 years. The study conducted by Anila A[18] mean age of the participants was 25 years. Another study conducted by Amenu D et al[7] showed similar results. In our study majority of SSI were seen in young age because most of the pregnant women fall within this age group.

In our study most common risk factor of SSI was poor personal hygiene (58.9%) because most of our patients were un-booked and all of caesarean section performed in emergency. Deficiency of time necessary for infection prevention measures seems to be probable explanation behind this poor personal hygiene making patient susceptible to infection. Identical findings reported by Anila A[18] and Lilani SP[19]. In our study second common risk factor of SSI was obesity which accounts for 23.3% of cases. Due to obesity, there is excessive avascular adipose tissue underlying skin, need of bigger skin incisions, less penetrative capability of antibiotics in avascular area of adipose tissue and defective defense mechanism.[17] The study conducted by MA Oslen et al[2] showed that obesity is an independent risk factor for SSI. Another study conducted by OC Ezechi[20] and RD Winfield et al[21]found that obese and morbidly obese patients had higher risk of SSI.

History of trial of labor by Dai (20.2%), pre-labor rupture of membranes (17.8%) and chorioamnionitis (10.4%) were also responsible for SSI in our study. The phenomenon leading to SSI due to PROM and multiple vaginal examinations is loss of protective barrier after rupture of membrane lead to ascending infection and dissemination of infection to systemic circulation. Study conducted by TCF farette et al[22] found PROM

(34%) responsible for SSI.

Anemia (13.4%) was also associated with SSI in our study. Increased rate of SSI is seen with low hemoglobin levels and delayed/poor wound healing. This association between wound infection and anemia is firmly related in literature[23,24]. Other contributing factors related post-caesarean SSI that depends upon hospital personnel are indeed preventable; includes strict aseptic technique and sterilization. Others includes to get euglycemia in patient with diabetes, optimize hemoglobin to correct anemia, judicious utilization of prophylactic antibiotics, using preoperative skin antisepsis and use of sterile dressings.[25]

Limitation of the Study

Non randomization, small sample size and single centred study were limitations of this study.

Conclusion

The study results showed that poor personal hygiene was the most common factor followed by obesity, history of LHV/Dai handling, PROM, chorioamnionitis and Anemia.

Conflicts Of Interest: None

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