STUDY OF SURGICAL SITE INFECTIONS WITH WOUND DEHISCENCE FOLLOWING OBSTETRIC AND GYNAECOLOGICAL SURGERIES AT A TERITARY CARE CENTRE.

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1.INTRODUCTION

Surgical site infections (SSI) and wound dehiscence are one of the most frequently identified postoperative complications.

DFINITION: Surgical site infections are defined as infections occurring up to 30days after surgery and affecting either the incision or deep tissue at the operation site.

Surgical site infections are presented with,

A) Erythema or induration

B) Serous oozing

C) Presence of pus

D) Wound dehiscence(separation of edges of suture line by more than1cm superficial or deep).

Various risk factors are responsible for surgical site infections(SSI) and wound dehiscence such as emergency surgery,malnutrition, low socioeconomic status, previous major abdominal surgeries, less inter-pregnancy interval , systemic diseases,etc.

The progression of a wound to an infected state and then wound dehiscence , involves a multitude of microbial and host factors such as type, site, size and depth of found, the extent of nonviable exogenous contamination , level of blood perfusion to the wound , general health and the immune status of the host , obesity , advanced age, diabetes mellitus , malnutrition , prolonged surgery, prolonged preoperative stay, infection at a remote site, duration of surgery, surgical technique, inappropriate use of antimicrobial prophylaxis, perioperative ,temperature, stage of labor in which the patient was taken for surgery, duration of labour prior to surgery, poor postoperative glycemic control. All the factors pose a substantial risk with regard to prolonged

hospital stay, morbidity , mortality , costs and inappropriate usage of broad spectrum antibiotics leading to anti-microbial resistance.

2.MATERIALS AND METHODS

This was an observational study carried out in the department of Obstetrics and Gynecology at Gandhi hospital, a tertiary care centre in Telangana over a period of 18months.There were 3786 patients who underwent surgery in the department of Obstetrics and Gynecology over a period of 18months. Out of which 120 patients had wound dehiscence which constitutes for 3.16%.

SOURCE OF DATA:Gandhi Hospital

SAMPLE SIZE : 120

STUDY DESIGN : Prospective Observational Study

INCLUSION CRITERIA:

1)Females of age group between 16years and 55years .

2)Presenting with surgical site infections with wound dehiscence after undergoing caesarean section, abdominal hysterectomies, Laparotomies in Department of Obstetrics and Gynaecology in Gandhi Hospital.

3)Patients with wound dehiscence who are willing to stay in the hospital for investigations and treatment were included in the study.

EXCLUSION CRITERIA:

1)Females less than 16years and more than 55years.

2)Patients who refuse investigation and treatment.

3)Patients who were referred to Gandhi Hospital with a surgical site infection and wound dehiscence.

4)Patients leaving against medical will were excluded.

Women who fulfill the inclusion criteria are enrolled in to the study. Diagnostic criteria were (1)spontaneous parting of the wound, or (2)a purulent discharge from the wound with or without positive bacterial culture, or(3) local swelling, or redness of the wound that resulted in wound.

Demographic information, potential risk factors, operative findings were recorded. Host related variables i.e.,age,residence, gravidity, parity, gestational age, antenatal visits, BMI, pre-existing medical disorders,preoperative condition, preoperative hospital stay, duration of ruptured membranes were recorded.Surgery related variables i.e., emergency or elective surgery, type of surgery, indication for surgery,type of abdominal incision,type of organisms involved were recorded.

All women received a second generation cephalosporin regimen within an hour prior to surgery as a prophylactic antibiotic therapy. The amount of blood loss was estimated by subtracting the weight of dry mops from the weight of wet mops.

Pus samples were collected from the wound site with the help of two sterile swabs under aseptic precautions, of which one was used for smear preparation and the other was used for culture. The sample containers were labeled with the name and I.P. numbers of patients, date and the time of collection and immediately transported to the Microbiology Laboratory at Gandhi Hospital. The antibiotic was changed

according to the culture and sensitivity report. The women were followed for the outcome, resolution of the infection with aseptic dressing and healing by secondary suturing.

The data was registered in the computer by creating a spreadsheet. The data was analyzed accordingly and percentages for individual variables were calculated.

3. OBSERVATIONS AND RESULTS

3.1 DISTRIBUTION OF AGE

Out of 96 obstetric cases 6 were under 20years, 34 were between 21-25 years, 38 were between 26-30 years, 18 were between 31-40 years. Out of 24 gynaecological cases with wound dehiscence 2 were between 16-20years,3 were between 21-30 years, 5 were 31-40 years, 10 were between 41-50 years, 4 were between 51-55 years.(TABLE-1)

3.2 DISTRIBUTION ACCORDING TO NATIVITY (URBAN/RURAL)

Out of 120 cases 93 belongs to rural areas and 27 belongs to urban areas.(TABLE-2)

3.3 DISTRIBUTION ACCORDING TO PARITY OF WOMEN

Out of 96 obstetric cases with wound dehiscence 34 were parity 1 , 25 2^{nd} parity, 22 with 3^{rd} parity, 12 cases were with 4^{th} parity, 3 were more than 5^{th} parity.Out of 24 cases with wound dehiscence 1 wasnulligrvida, 2 with para 1, 4 were para two, 8 were with para three, 6 cases were with para four, 3 were more than para four.(TABLE-3)

3.4 DISTRIBUTION ACCORDING TO TYPE OF SURGERY

Out of 120 cases with wound dehiscence, 96 underwent caesarean section, 16 underwent total abdominal hysterectomy, 6 underwent ovarian cystectomy, 2 tubal re-canalization.(TABLE-4)

3.5 DISTRIBUTION ACCORDING TO BOOKED/UNBOOKED IN OBSTETRIC CASES

Out of 96 obstetric cases presented with wound dehiscence 44 were booked cases and 52 were unbooked cases.(TABLE-5)

3.6 DISTRIBUTION ACCORDING TO EMERGENCY/ELECTIVE SURGERIES

Out of 120 cases 98 were operated in emergency and 22 were posted elective.(TABLE-6)

3.7 DISTRIBUTION ACCORDING TO TYPE OF INCISION

Out of 120 cases with wound dehiscence 96 were given Pfannensteil incision,16 cases were given supra-pubic transverse incision, 20 were given mid line vertical incision.(TABLE-7)

3.8DISTRIBUTION BASED ON PREEXISTING RISK FACTORS

Out of 96 obstetric cases with wound dehiscence 48 were anemic, 24 were with hypertensive disorders, 6 were with diabetes, 32 cases with hypothyroidism, 5 were with ascitis, 3 with HIV positive.Out of 24 gynaecological cases with wound dehiscence 15 were with obesity , 15 were with PID, 14 with diabetes, 8 were with anemia, 6 with hypertension, 6 with hypothyroidism.(TABLE-8)

3.9 DISTRIBUTION ACCORDING TO ASSOCIATED RISK FACTORS IN OBSTETRIC CASES

Out of 96 obstetric cases with wound dehiscence 23 was with 1 previous lscs, 7 was with 2 previous lscs, 8 were with 3 previous lscs,4 were with 4 previous lscs, 4 was with rupture uterus, 15 with failed induction, 5 with placenta previa, 2 was with placenta previa with accreta, 8 was with abruption, 6 were with DIC, 33 were with blood transfusions, 5 was with Rh Negative pregnancy, 40 were with PROM, 29 was with MSL.(TABLE-9)

3.10 DISTRIBUTION ACCORDING TO TYPE OF ORGANISMS ISOLATED

Out of 96 obstetric cases with wound dehiscence 8 were with no bacterial growth, 36 were Staphylococcus Aureus positive, 16 were E.coli positive, 23 were Klebsiella positive, 6 were pseudomonas positive, 3 were Coagulase negative Staphylococcus aureus positive, 2 were Citrobacter freundii positive, 1 was proteus mirabilis positive, 1 was Acinetobacter positive. Out of 24 Gynaecological cases with wound dehiscene in gynaecological cases 6 were with no bacterial growth, 4 were skin commensals,5 were E.coli positive,4 were staphylococcus aureus positive, 3 were Acinetobacter positive, 1 was Coagulase negative Staphylococcus aureus positive and 1 was Klebsiella positive.(TABLE-10)

4.DISCUSSION:

Surgical site infections are the second most common infectious complication after urinary tract infection following surgeries[1] . It isa surgical complication with a high morbidity rate, but is associated with predictable and preventable risk factors.

The majority of obstetric patients in our study group belonged to the age group of by 21-30years , which is consistent with the study by Patil, Kamal et al [2]. This could be because most pregnant women fall within this age distribution. The majority of gynecological patients in our study group belonged to the age group of by 41-50years because most of the hysterectomies were done in this age group.

In our study, 77.5% were from rural area and the rest were from urban area. This is consistent with the Amenu D et al[3] study which was 72.7%. Rural women may have irregular antenatal attendance, lower socioeconomic status, myths and social taboos, delay in referrals and lack of transportation facilities. Proper antenatal follow up should be strengthened in the rural areas so as to detect problems early and apply the basic emergency obstetric & gynecological care Emergency obstetric care services should be increased to increase access for care and decrease delay[3].

35 % of the patients in our study were primigravida which is similar to that of the study in Patil, Kamal et al[2] . Nulliparity was reported to be independently associated with increased risk of post caesarean SSI[4]. The precise mechanism by which nulliparity increases the risk of infection is not fully understood. Tran et al reported that the risk of surgical site infection was shown to be reduced by 39% and 60% when women had one or more children, respectively[5] .

Majority of cases present with wound dehiscence were post-caesarean section which was 80%.This could be because caesarean section is the most commonly performed

surgery in obstetrics. The reason for SSI in women with hysterectomy could be due to the prolonged operating time, increased blood loss & other co-morbidities.

Majority of the cases (54.16%)in our study were un-booked which correlates with the Amenu D et al[3] study which was 51%.

Emergency Surgeries predisposes more to SSI as compared to elective surgery[6,7,8]. In emergency surgeries, the membranes may have ruptured or there might be any preexisting condition or complication or increased exogenous bacterial contamination or breaks in sterile technique or lack of timely antibiotic prophylaxis[9]. Similar findings have been reported by Martens et al. also[10]. These factors could have resulted in higher rates of infection. The incidence of emergency surgery in our study was 81.6% which correlates with the incidence in the Mrityunjay C Metgud[2] study of Karnataka 81.44%.

A transverse incision has less chance of wound dehiscence[11]. 70% of the cases in our study had Pfannensteil incision which is consistent with the 65% of the Devjani De et al[9] study of New Delhi. This could be because Pfannensteil incision was the most commonly used skin incision in our hospital.

In obstetric cases: women with anemia were seen to be more prone to SSI as it 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 studies[12,13,14] . In the present study, 50% of the patients had anemia, which is consistent with the Devjani De et al[9] study. Patients with preexisting illnesses like diabetes mellitus, jaundice or immuno-compromised status were seen to be more prone to infection in the present study. Poor glycemic control in the perioperative period increases the risk of infection and worsens outcome from sepsis[9]. 6.25% of the patients were diabetic similar to that of the Olsen MA et al[15] study. Hypertension, preexisting or pregnancy induced, HIV, and other comorbid states have been associated with SSI in several studies[6,16,17,18]. They are associated with low vitality and thus predispose to infection[16]which can be explained by the chronic alteration of peripheral blood supply due to the increased vascular resistance. They were all seen to influence the outcome in the present study[6] . Hypertensive disorders were seen in 25.92% of the women in our study which correlates with the incidence seen in Schneid-Kofman et al[6]study.

In Gynecological cases: About 62.5% of people were with obesity.Decreased tissue perfusion and oxygenation to adipose tissue is usually compromised, which diminishes the oxygen and nutrients necessary to prevent breakdown and promote healing.PID was seen in 62.5% of operated cases. There might be any positive correlation between PID and post operative wound healing.30% of the cases in our study had a repeat CS which correlates with the Olsen MA et al[15] study. Similar rates were also observed in the Schneid Kofman et al[6] study.

In Obstetric cases: There is wide variation in the incidence of premature rupture of membranes among different studies. In the present study, PROM was seen in 41.6% of the cases. This is higher than the incidence observed in the Schneid Kofman et al[6] study of Soroka. The study by Al Jama FE[19]reported much higher rate of

57%.Following membrane rupture, the amniotic fluid is no longer sterile and may act as a transport medium by which bacteria come into contact with the uterine and skin incisions[20]. The length of time that the membranes are ruptured prior to caesarean section is an important risk factor.Research has identified an association between prolonged rupture of the membranes and an increased risk of SSI[23] .Out of 40 cases 22 cases in our study had rupture of membranes for more than 8 hours. The increased incidence of SSI in cases with intact membranes may be due to multiple vaginal examinations. In our study, 34.3% of the women received blood products. This correlates with the observations of the Amenu D et al[3] study of Ethiopia. Allogenic blood products have immuno-modulatory effects that may increase the risk of nosocomial infections[21,22]. The patients who had received blood transfusion in our study were also seen to be more predisposed to SSI.

In obstetric cases: The most common pathogenic organisms causing SSI in our study was found to be Staphylococcus aureus (37.5%%) followed by Gram negative rods of which Klebsiella species (23.9%), Escherichia coli (16.6%%).Staphylococcus aureus was the most common cause of SSI in several studies.The role of these indigenous micro-flora as contaminants causing SSI may be as important as that of external contamination during or after surgery[24].In Gynecological cases: Around 25% cases had no bacterial growth. The most common organism found is Escherichia coli 20.8% followed by 16.6%were contaminated with skin commensal.

5.CONCLUSION

A proper assessment of risk factors that predispose to SSI is critical for the development of strategies for reducing the incidence of SSI and for identifying high-risk patients requiring intensive postoperative surveillance. Also, frequent antimicrobial audit and qualitative research could give an insight into the current antibiotic prescription practices and the factors affecting these practices.

Subcutaneous fat should possibly be sutured intraoperatively,which may put off creation of dead space for secretions to get stockpiled that may prompt the wound dehiscence or cause wound infection.

Regular dressings should be carried out & wound discharge and signs of infection should be identified early and antibiotics should be administered according to sensitivity. Besides, patient elements incorporating hypertension and diabetes could be supervised efficiently to put a stop to wound dehiscence .Convention of pre- and postoperative antibiotics, timing of preoperative antibiotics, reducing second stage of labor, proper handling of sterile instruments, intra-op suturing techniques and materials, postoperative proper wound care practices by doctors and the allied staff, and usage of clean linen in wards are crucial in bringing down the overall number of wound dehiscence.

6.REFRENCES

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AGE (Obstetrics)	Number & Percentage (N=96)	AGE(Gynecological)	Number & Percentage (N=24)
≤20 YEARS	6 (6.25%)	16-20 YEARS	2 (8.3%)
21-25 YEARS	34 (35.41%)	21-30 YEARS	3 (12.5%)
25-30 YEARS	38(39.58%)	31-40 YEARS	5 (20.83%)
31-40 YEARS	18(18.75%)	41-50YEARS	10 (41.66%)
		51-55YEARS	4 (16.66%)

TABLE 1 : DISTRIBUTION ACCORDING TO AGE

TABLE 2 : NUMBER ACCORDING TO NATIVITY

NATIVITY	NUMBER OF CASES(N=120)	PERCENTAGE (%)
RURAL	93	77.5%
URBAN	27	22.5%

TABLE 3 : DISTRIBUTION ACCORDING TO PARITY

PARITY OF OBSTETRIC CASES	Number & Percentage (N=96)	PARITY OF GYNECOLOCIGAL CASES	Number & Percentage (N=24)
P1	34 (35.41%)	Nulligravida	1 (4.1%)
P2	25 (26.04%)	P1	2 (8.3%)
P3	22 (22.91%)	P2	4 (16.6%)
P4	12 (12.51%)	P3	8 (33.33%)
>P5	3 (3.12%)	P4	6 (25%)
		>P4	3 (12.5%)

TABLE 4 :DISTRIBUTION ACCORDING TO TYPE OF SURGERY(N=120)

TYPE OF SURGERY IN OBSTETRIC CASES	Number & Percentage (N=96)	TYPE OF SURGERY IN GYNECOLOCIGAL CASES	Number & Percentage (N=24)
Caesarean Section	96(80%)	TAH	16 (13.33%)
		Ovarian Cystectomy	6 (5%)
		Tubal Recanalisation	2(1.6%)

TABLE 5 : DISTRIBUTION ACCORDING TO BOOKED/UNBOOKED STATUS IN OBSTETRIC CASES(N=96)

ANTENATAL VISITS	NUMBER OF CASES	PERCENTAGE
BOOKED	44	45.83%
UNBOOKED	52	54.16%

TABLE 6 :DISRTIBUTION ACCORDING TO EMERGENCY/ELECTIVE CASES(N=120)

SURGERY	NUMBER OF CASES	PERCENTAGE
EMERGENCY	98	81.6%
ELECTIVE	22	18.3%

TABLE 7 :DISTRIBUTION ACCORDING TO TYPE OF SKIN INCISION (N=120)

SKIN INCISION	NUMBER OF CASES	PERCENTAGE (%)
PFANNENSTEILINCISION	84	70%
SUPRAPUBIC TRANSVERSE INCISION	16	13.33%
MIDLINE VERTICAL INCISION	20	16.6%

TABLE 8 :DISTRIBUTION ACCORDING TO PREEXISTING RISK FACTORS

RISK FACTORS IN OBSTETRIC CASES	Number & Percentage (N=96)	RISK FACTORS IN GYNECOLOGICAL CASES	Number & Percentage (N=24)
ANEMIA	48 (50%)	OBESITY	15 (62.5%)
HYPERTENSIVE DISORDERS	24(25.92%)	PID	15(62.5%)
DIABETES	6 (6.25%)	DIABETES	14 (58.3%)
JANUDICE	4 (4.16%)	ANEMIA	8 (33.33%)
HYPOTHYROIDISM	32 (33.33%)	HYPERTENSIVE DISORDERS	6 (25%)
HIV POSITIVE	3 (3.12%)	HYPOTHYROIDISM	6 (25%)
ASCITES	5 (4.8%)		

TABLE 9:DISTRIBUTION ACCORDING TO ASSOCIATED RISK FACTORS IN OBSTETRIC CASES(N=96)

RISK FACTOR	NUMBER OF CASES (n=96)	PERCENTAGE (%)
1 PREVIOUS CS	23	23.9%
2 PREVIOUS CS	7	7.2%
3 PREVIOUS CS	8	8.33%
4 PREVIOUS CS	3	3.125%
RUPTURE UTERUS	4	4.1%
PRETERM	17	17.7%
FAILED INDUCTION	15	15.6%
PLACENTA PREVIA	5	5.2%
PLACENTA PREVIA ACCRETA	2	2.08%
ABRUPTION	8	8.33%
DIC	6	6.25%
BLOOD TRANSFUSIONS	33	34.3%

RH-NEGATIVE	5	5.2%
PROM	40	41.6%
MSL	29	30.20%

TABLE 10 : DISTRUBUTION ACCORDING TO TYPE OF ORGANISM

ORGANISM ISOLATED IN OBSTETRIC CASES	Number & Percentage (N=96)	ORGANISM ISOLATED IN GYNECOLOGICAL CASES	Number & Percentage (N=24)
NO BACTERIAL GROWTH	8 (8.3%)	NO BACTERIAL GROWTH	6(25%)
STAPHYLOCOCCUS AUREUS	36 (37.5%)	SKIN COMMENSALS	4 (16.6%)
KLEBSIELLA	23 (23.9%)	STAPHYLOCOCCUS AUREUS	4 (16.6%)
ESCHERICHIA COLI	16 (16.6%)	ESCHERICHIA COLI	5 (20.83%)
PSUEDOMONAS	6 (6.25%)	ACINETOBACTER	3 (12.5)
CONS	3 (3.125%)	CONS	1 (4.16%)
CITROBACTER FREUNDII	2 (2.08%)	KLEBSIELLA	1 (4.16%)
PROTEUS MIRABILIS	1 (1.04%)		
ACINETOBACTER	1 (1.04%)		