Original Research Article

A study of prevalence of surgical site infection in obstetrics and gynaecology department at tertiary health care center

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Abstract

Background: Surgical site infection (SSI) in obstetrics and gynecological surgeries increases maternal morbidity, medical costs and rising burden over health care system. **Aim:** To analyze the incidence of SSIs in obstetrics and gynecological surgeries and to identify associated risk factors. **Material and Methods:** A total of 450 patients were included in the study. Patients were grouped into elective and emergency group. Basic patient related parameters had been noted. postoperative day3 Hb were checked. Wound had been inspected on day 4 post operatively and day 14 follow-up day for various complications. **Results:** A total of 4300 patients underwent emergency cesarean section, 200 patients underwent elective cesarean section and 150 underwent gynecological surgeries. Prevalence of the surgical site infection was 28%. More wound complication on day 7 in Anemia (25%) followed by in Diabetes (15%) and Hypertension (10%). **Conclusion:** In gynecological surgeries we found that Anemia and Diabetes are the pre-operative factors which increase wound infection rate. Controlling Diabetes and correcting anemia prior to surgery would decrease the morbidity.
Keywords: Cesarean section, surgical site infection, anemia, diabetes

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INTRODUCTION

In modern Obstetrics and Gynecology, cesarean section (CS) is one of the most common operations performed.[1] Hysterectomy is one of the most common gynecological operations.[2] Morbidity associated with infection is a common complication with reported rates of 18-83%.[3] Surgical site complications especially surgical site infection (SSI) increases maternal morbidity, medical costs and rising burden over health care system. Approximately 2.5-16% of women who have CS will have wound complications.[4] Other complications include wound separation, wound dehiscence, stitch abscess, pelvic abscess, cellulites, seroma, hematoma and rarely burst abdomen. This is one of the devastating problems in developing nation even in developed nations. It is major public health problem as it contributes substantially to patient morbidity, mortality, prolonged hospitalization and therapy. The aim of our study was to analyze the incidence of SSIs in obstetrics and gynecological surgeries and to identify associated risk factors in various surgeries in obstetrics and gynecology at our tertiary care hospital. Data thus generated can be used to compare with different existing studies as well as to take necessary interventions to reduce morbidity and mortality associated with these surgeries.

MATERIAL AND METHODS

We conducted a prospective study at the Department of Obstetrics and Gynecology in our tertiary care centre. The study was carried out for a period of 2 years after approval from the institutional ethics committee. Informed written consent from the patients was taken before their participation in the study.

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Inclusion criteria

- All patients who are undergoing for abdominal surgical procedure
- Patients with no previous injury or infection in the area being operated.

Exclusion criteria

- Episiotomy wound infection, vaginal hysterectomy, all Laparoscopic surgeries and Tubal Ligation
- Patient with history of allergy to any antimicrobial agents.
- Patient who has any preoperative infectious disease at the time of admission.

A total of 450 patients were included in the study. Patients were grouped into elective and emergency group. Basic patient related parameters like age, gestational age, gravidity etc. had been noted. Patients Hb level, Random Blood Sugar (RBS), postoperative day3 Hb and total leukocyte count were checked. Wound had been inspected on day4 post operatively and day 14 follow-up day for various complications like subcutaneous hematoma, stitch abscess, wound infection, wound dehiscence or separation, wound infection required secondary suturing and burst abdomen.

Statistical analysis

Statistical analysis was done using chi-square test and binomial logistic regression.

RESULTS

In our study, after considering the inclusion and exclusion criteria, we selected a total of 4650 patients of which 4300 patients underwent emergency cesarean section, 200 patients underwent elective cesarean section and 150 underwent gynecological surgeries. Prevalence of the surgical site infection was 28%.

Table 1: Prevalence of surgical site infection in OBGY department

Total no. of patients operated during present study	Total no. of patients having no wound complication	No. of patients having Wound complication	Total
Gynecology	90	60	150
	60.0%	40.0%	100.0%
Obstetrics	3240	1260	4500
	72.0%	28.0%	100.0%
Total	**3330**	**1320**	**4650**
	72%	**28%**	**100%**

In our study, after considering the inclusion and exclusion criteria, we selected a total of 150 patients of which 15 patients underwent emergency gynecological surgeries and 135 patients underwent elective Gynecological surgeries. Most common age undergoing surgery were child bearing age group between 31-50 years of age (76%) and postmenopausal age group 51-70 years of age (20%) while age group 18-30 years was least common i.e.4% Most of the women operated had no any co-morbidity. Among these Anemia 18 (12%) being most common co-morbid condition followed by diabetes 12 (8%), Hypertension (8%) and hypothyroidism 3 (2%). The commonest indication for surgery was Fibroid uterus 51 (34%) followed by AUB 45 (30%), Adnexal mass 24 (16%), adenomyosis 18 (12%). Ovarian carcinoma (4%) and ectopic pregnancy were least common indication for gynecological surgery. Majority of the surgeries performed were elective. Out of 150 cases, 15 cases were emergency and the rest (135) were elective surgeries. The emergency cases were mainly for Ectopic pregnancy (83.3%) while remaining two were due to torsion of ovarian cyst. No operative morbidity was seen in emergency group. The Most frequently performed surgery was Total Abdominal Hysterectomy 105 (70%). This was performed in combination with bilateral or unilateral salphingo-oopherectomy or salphingectomy according to individual cases. Exploratory laparotomy and open ovarian cystectomy were performed in 36 (24%) and 9 (6%) cases. Wound complication more in 31-50 yrs age group (60%) and then in 51-70 yrs age group (40%). It is seen that age influences postoperative wound complication. Also, increasing age increases the likelihood of women undergoing gynecological surgery. Despite this fact, we found that higher wound complications were seen in women below 60 years of age.

Table 2: Co-morbidity and Wound Complication on Day 7

Co-morbidity	Wound Complication on Day 7		Total
	No	Yes	
Nil	75(84%)	30(50%)	105
Hypertension	06(7%)	06(10%)	12
Diabetes	03(3%)	09(15%)	12
Hypothyroidism	03(3%)	00(00%)	03
Anemia	03(3%)	15(25%)	18
Total	**90**	**60**	**150**

More wound complication on day 7 in Anemia (25%) followed by in Diabetes (15%) and Hypertension (10%). Pre-existing anemia accounted for 25% of our patients. It was seen that out of 18 anemic patients 91.7% had wound complication. Its association with operative morbidity in the study was statistically significant with $p < 0.0001$.

Table 3: Co-morbidity and Wound Complication on Day 14

Co-morbidity	Wound Complication on Day 14				
	None	Hematoma	Stitch abscess	Wound infection	Wound requiring sec. re-suturing
Nil	78(84%)	06(67%)	03(33%)	12(50%)	06(33%)
Hypertension	06(7%)	00(00%)	00(0%)	03(12.5%)	03(17%)
Diabetes	03(3%)	00(00%)	3(33%)	03(12.5%)	03(17%)
Hypothyroidi sm	00(3%)	00(00%)	00(0%)	03(12.5%)	00(0%)
Anemia	03(3%)	03(33%)	03(34%)	03(12.5%)	06(33%)
Total	**90**	**09**	**09**	**24**	**18**

On day 14, among 60 wound complication pt in anemic group 3(33%) hematoma observed, 34% stitch abscess observed, 6(33%) pt requiring secondary re-suturing, in diabetes 17% and hypertension 17% requiring secondary re-suturing.

Table 4: Surgery performed and Wound Complication on Day 7

Surgery Performed	Wound Complication on Day 7		Total
	NO	YES	
Total Abdominal Hysterectomy	63(70%)	42(70%)	105
Exploratory Laparotomy	21(23%)	15(25%)	36
Open ovarian Cystectomy	06(7%)	03(5%)	09
Total	**90**	**60**	**150**

Out of 60 wound complication patient more wound complication on day 7 observed in Total Abdominal Hysterectomy (70%), (25%) in exploratory laparotomy and (25%) in open ovarian cystectomy.

Table 5: Surgery Performed and Wound Complication on Day 14

Surgery Performed	Wound Complication on Day 14				
	None	Hematoma	Stitch abscess	Wound infection	Wound requiring sec. re-suturing
Total Abdominal Hysterectomy	63(70%)	06(67%)	3(50%)	24(89%)	09(50%)
Exploratory Laparotomy	21(23%)	03(33%)	03(50%)	03(11%)	06(33%)
Open ovarian Cystectomy	06(7%)	00(00%)	00(0%)	00(0%)	03(17%)
Total	90	09	06	27	18

Out of 60 wound complication pt on day 14 In Total abdominal Hysterectomy 3(33%) hematoma observed, 50% stitch abscess observed, 9(50%) pt requiring secondary re-suturing, in Exploratory Laparotomy 33% and in open ovarian cystectomy 17% requiring secondary resuturing. In our study, after considering the inclusion and exclusion criteria, we selected a total of 4500 patients of which 4300 patients underwent emergency cesarean section and 200 patients underwent elective cesarean section. Maximum numbers of patients were in the age group of 21-25 yrs. (48%) i.e. 2160. Out of 4500 patients, 1710 patients (38%) were primigravida and 2790 patients (62%) were multi gravida (patients with 2 or more pregnancies). 80% (3600) were term gestation and 20% (900) were pre-term gestation. 495 (11%) were obese, 45 (1%) were diabetic including gestational diabetes mellitus, 900 (20%) were hypertensive and 2660 (59%) were anemic. Those patients with Hemoglobin level <10g % were considered as anemic. Various laboratory parameters studied were Hb level, total leucocyte count, and random blood sugar level. The mean values were 10.07 g % (SD 0.93g %), 8.329 x 1000 /cu mm (SD 1.273X1000/cumm), 78.9 mg % (SD 11.03mg %) respectively. In our study, women with viable pregnancies undergoing CS were randomized to elective and emergency groups. Emergency group included 4300 patients (96%) and elective group 200 patients (4%). Morbidity after cesarean section is greater when it is performed as an emergency rather than an elective procedure. Hemoglobin had mean of 10.07 gm% with standard deviation of 0.93. Total leukocyte count had mean value of 8.329x1000 cells/cumm with standard deviation of 1.273 x 1000cells/cumm. The mean random blood sugar level was 78.9 mg% with standard deviation of 11.03 mg%. Ethilon was used in 80 patients (40.0%) in elective group and in 516 patients (12.0%) in emergency group. 596 (13.0 %) cases used ethilon and 3904 (87%) used vicryl. With a p value <0.05 which is statistically significant.

Table 6: Comparison of type of CS and wound complication on day 7

Wound Complication (Day 7)	Type of CS		Total
	Elective	Emergency	
None	160	3080	3240
None	80.0%	71.0%	72.0%
Hematoma(H)	0	0	0
Hematoma(H)	0.0%	0.0%	0.0%
Wound infection(WI)	40	1220	1260
Wound infection(WI)	20.0%	29.0%	28.0%
Total	200	4300	4500
	100.0%	100.0%	100.0%

Among 4500 cases 160 patients (80.0%) in elective group and 3080 patients (71.0%) in emergency group had no complications On day 7 no subcutaneous hematoma formation had been found in elective and emergency group. Wound infection were 40 in elective and 1220 in emergency.

Table 7: Comparison of wound complications in elective and emergency CS on day 14

Wound Complications (Day 14)	Elective	Emergency	Total
None	160	3080	3240
	80.0%	71.0%	72.0%
Hematoma(H)	0	18	18
	0.0%	0.4%	0.4%
Sticth abscess(SA)	0	18	18
	0.0%	0.4%	0.4%
Wound dehiscence(WD)	0	0	0
	0.0%	0.0%	0.0%
Wound infection(WI)	20	157	177
	10.0%	4.0%	12%
Wound requiring Secondary suturing (WS)	20	1020	1040
	10.0%	24.0%	23%
Burst Abdomen (BA)	0	7	7
	0.0%	0.2%	0.2%
Total	**200**	**4300**	**4500**
	100.0%	**100.0%**	**100.0%**

Among 4500 cases 160 patients (80.0%) in elective group and 3080 patients (71.0%) in emergency group had no complications on day 14. Out of 40 wound complication cases in elective group and 1220 wound complication in emergency group on day 14, subcutaneous hematoma was not found in any patients with elective group and 18 patients in emergency group (0.4%). No stitch abscess in elective and 18 in emergency (0.4%).No wound dehiscence in elective and emergency, WI 40 (20.0%) in elective 1220 (24%) in emergency, wound required secondary suturing 20 (10.0%) in elective and 1020(24.0%) in emergency. No incidence of burst abdomen found in elective group and 7 (0.2%) in emergency CS group.

Table 8: Type of suture and wound complications on Day 7

Wound Complication (Day 7)	Type of Suture (Skin)		Total
	Ethilon	Vicryl	
None	470	2770	3240
	79.0%	71.0%	83.0%
Haematoma (H)	0	0	0
	0.0%	0.0%	0.0%
Wound Infection (WI)	126	1134	1260
	21.0%	29.0%	28.0%
Total	**596**	**3904**	**4500**
	100.0%	**100.0%**	**100.0%**

Wound complications on day 7 in ethilon group, and Vicryl were 21.0%, and 29.0% respectively.

Table 9: Type of suture and Wound complication in day 14

Wound Complication (Day 14)	Type of Suture (Skin)		Total
	Ethilon	Vicryl	
None	470	2770	3240
	79.0%	71.0%	83.0%
Hematoma (H)	0	18	18
	0.0%	0.5%	0.4%
Stitch Abscess (SA)	0	18	18
	0.0%	0.5%	0.4%
Wound Dehiscence (WD)	0	0	0
	0.0%	0.0%	0.0%
Wound Infection (WI)	97	78	175
	16.0%	2.0%	4.0%
WS (Wound requiring secondary suturing)	29	1020	1049
	5.0%	34.0%	23.0%
Total	**596**	**3904**	**4500**
	100.0%	**100.0%**	**100.0%**

No Wound complications found on day 14 in 470(79.0%) in ethilon group, and 2770 (71%) in Vicryl. Out of 1260 wound complication on day 14, subcutaneous hematoma was not found in any patients with ethilon group and 18 patients in emergency group (0.4%). No stitch abscess in elective and 18 in vicryl (0.5%). No wound dehiscence in ethilon and vicryl, WI 97 (16.0%) in ethilon and 78 (2%) in emergency, wound required secondary suturing 29 (5.0%) in ethilon and 1020(26.0%) in vicryl. No incidence of burst abdomen found in ethilon group and 7 (0.2%) in vicryl.

Table 10: Day 3 Hb level and wound complications (on day 7)

Hemoglobin (Day 3)	Wound Complication (Day 7)		Total
	No	Yes	
< 10	1560	1100	2660
	48.0%	87.0%	59.0%
≥ 10	1680	160	1840
	52.0%	13.0%	41.0%
Total	**3240**	**1260**	**4500**
	100.0%	**100.0%**	**100.0%**

Out of 2660 patients with Hb level<10g%, 1100 patients developed wound complications. Out of 1840 patients with Hb level >10g%, 160 patients developed wound complications.

Table 11: Day 3 Hb level and wound outcome on day 14

Hemoglobin (Day 3)	Wound Complication (Day 14)		Total
	No	Yes	
< 10	1470	1190	2660
	45.0%	94.0%	59.0%
≥ 10	1770	70	1840
	52.0%	6.0%	41.0%
Total	**3240**	**1260**	**4500**
	100.0%	**100.0%**	**100.0%**

Out of 2660 patients with Hb level<10g%, 1190 patients developed wound complications and it was increased compared to day7 (1100). Out of 1840 patients with Hb level >10g%, 70 patients developed wound complications and it was decreased as compared to day7 i.e.160.

DISCUSSION

Wound complications more in 31-50 yrs age group (60%) followed by in 51-70 yrs age group (40%). It is seen that age influences postoperative wound complication. Also, increasing age increases the likelihood of women undergoing gynecological surgery. Despite this fact, we found that higher wound complications were seen in women below 60 years of age. When association of Diabetes mellitus with wound complication on day 7 was studied, we observed 15% wound complication in diabetic patients. Febrile morbidity was the most common operative morbidity found in diabetics. This may be avoided to the good control of glycemic levels prior to surgery as well as use of prophylactic antibiotics both pre-operatively and post-operatively. Similarly, Kamat *et al.*.[5] also did not find a significant association between diabetes

and wound infection. Pre-existing anemia accounted for 25% of our patients. It was seen that out of 18 anemic patients 91.7% had wound complication. Its association with operative morbidity in the study was statistically significant with p <0.0001. This association was also studied by Saxena *et al.*.[6] where the wound infection rate in anemic patients were 21.73% compared to 13.71% in normal individuals that is similar to present study. Out of 60 wound complication patient more wound complication on day 7 observed in Total Abdominal Hysterectomy (70%), (25%) in exploratory laparotomy and (25%) in open ovarian cystectomy. This was also shown by Aniulene R *et al.*.[7] in which a total of 602 hysterectomies were performed: 51 (8.5%) laparoscopic, 203 (33.7%) vaginal, and 348 (57.8%) abdominal. The lowest complication rate occurred in patients who underwent laparoscopic hysterectomy (9.8%) and the highest with abdominal hysterectomy (25.2%) (p<0.05). More complications occurred after abdominal as compared to vaginal hysterectomy (25.2% vs. 9.9%, respectively; p <0.05). Similarly, in present study highest wound complication rate observed in abdominal hysterectomy. On the contrary, Kamat *et al.*.[5] found no difference in postoperative infection rate with different route of surgery. Cesarean section is the most common surgery performed in the field of obstetrics. As the incidence of CS increases morbidity and complications also increases. Surgical site infection after CS increases maternal morbidity and medical costs. In India, where an estimated 72% of healthcare expense is out-of-pocket, the additional cost associated with SSI (e.g. additional treatment, loss of ability to work) represents a potentially significant burden to patients and their families. SSI were associated with an increase in postoperative hospital stay of between 5 to 18 days. Expanding the knowledge of risk factors associated with surgical site complications is essential to develop prevention strategies. Even though several studies were conducted worldwide to determine the risk factors there is wide disagreement about the risk factors for surgical site infection after cesarean delivery and the prevalence of SSI are quite high. Many factors affect infection rates in different settings. Confounding factors were not satisfactorily controlled in many of these studies. The different parameters that were included in various studies were age, parity, body mass index, existing co morbidities, labor induction, rupture of membrane duration, nature of surgery, type of incision, surgical duration, experience of surgeon, volume of blood loss, timing of prophylactic antibiotic given etc. Ethilon, and Vicryl were used for the closure of skin. 596 (13%) cases used ethilon and 3904 (87%) used vicryl with a p value <0.05 which is statistically significant. Among 4500 cases 160 patients (80%) in elective group and 3080 patients (71%) in emergency group had no complications on day 7. No subcutaneous hematoma formation had been found in elective and emergency group. Wound infection were 40 in elective and 1220 in emergency. Pelle *et al.*.[8] in his study the overall wound infection rate was 6.6%, 3.8% in elective cases and 7.5% in emergency cases which was not consistent with observation of this study. Wound complications on day 7 in ethilon group, and Vicryl were 21.0%, and 29.0% respectively. Figueroa *et al.*.[9] observed that 398 patients, 198 were randomized to staples and 200 to sutures the risk of wound disruption at hospital discharge was 7.1% for staples and 0.5% for suture. (p value <0.001). Staples closure compared with suture is associated with significantly increased composite wound morbidity after cesarean delivery. As observed on day 14, diabetes, obesity and Hb level were found to be dependent risk factors for the development of wound complication. In obesity decreased immune function, slower collagen synthesis, decreased angiogenesis and poorer tensile strength of wound leads to high risk of infection and dehiscence. There was no statistically significant relation of age, blood sugar level, and anemia, cadre of surgeon and duration of surgery with wound complication on day 14 of observation.

CONCLUSION

In obstetrics cases, surgical wound site complications are common in cesarean section. In gynecological surgeries we found that Anemia and Diabetes are the pre-operative factors which increase wound infection rate. Controlling Diabetes and correcting anemia prior to surgery would decrease the morbidity.

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REFERENCES

1. Kausar R, Yasmeen L. Elective cesarean section; short antibiotic prophylaxis Vs prolonged antibiotic therapy. Professional Med J 2010;17(2):304-307.
2. Chen B, Ren DP, Li JX, Li CD. Comparison of vaginal and abdominal hysterectomy:A prospective non-randomized trial. Pak J Med Sci. 2014;30(4):875–879.
3. Tevis SE, Kennedy GD. Postoperative complications and implications on patient-centered outcomes. J Surg Res. 2013;181(1):106–113.
4. Kawakita T, Landy HJ. Surgical site infections after cesarean delivery: epidemiology, prevention and treatment. Matern Health Neonatol Perinatol. 2017;3:12.
5. Kamat AA, Brancazio L, Gibson M. Wound infection in gynecologic surgery. Infectious Diseases in Obstetrics and Gynecology 2000;8:230-234.
6. Saxena A, Singh MP, Brahmchari S, Banerjee M. Surgical site Infection among postoperative patients of tertiary care centre in Central India -A prospective study. Asian Journal

of Biomedical and Pharmaceutical Sciences 2013; 3: 41-44.
7. Aniuliene R, Varzgaliene L, Varzgalis M. A comparative analysis of hysterectomies. Medicina (Kaunas) 2007; 43(2): 118-24.
8. Pelle H, Jepsen O, Larsen S, Bo J, Christensen F, Dreisler A, *et al.* Wound Infection After Cesarean Section. Infection Control 1986;7(9):456-461.
9. Figueroa D, Jauk VC, Szychowski JM, *et al.* Surgical staples compared with subcuticular suture for skin closure after cesarean delivery: a randomized controlled trial [published correction appears in Obstet Gynecol. 2013 May;121(5):1113]. *Obstet Gynecol*. 2013;121(1):33–38.

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