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Original Research Article

Surgical site infection in benign abdominal gynaecological surgeries

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ABSTRACT

Background: Surgical site infection is the commonest complication after gynecological surgeries. Limited studies have been done in India to know the magnitude of the problem. This study aims to know the incidence of surgical site infection, analyze the risk factors and identify the causative organisms.

Methods: A prospective observational study .All women who underwent abdominal surgeries for benign pathologies in department of obstetrics and gynecology, Government medical college, Thrissur from April 2016 to March 2017, were included in the study women more than 80 years old, evidence of infection preoperative or within 48 hours of surgery, laparoscopy procedures unless combined with open surgeries and emergency surgeries were excluded.

Results: The incidence of SSI was found to be 7.9%. Re suturing had to be done in 24 patients. The risk factors found to be significant were age more than 50 years ,patients with education <7th std, diabetes, BMI>30,pre hospital stay >10 days, ASA score >3, duration of surgery >2 hours and peri-operative blood transfusion. *Staphylococcus aureus* was the most common causative organism and was sensitive to amikacin, vancomycin, cloxacillin and its combinations.

Conclusions: SSI pose a significant problem in the post operative period that can affect recovery. It was associated with multiple predisposing factors which could be prevented if these risk factors are identified early and appropriate measures are adopted to support host defense system in the peri operative time.

Keywords: Surgical site infection, Risk factors, Benign gynecological surgeries, Antibiotic sensitivity

INTRODUCTION

Postoperative surgical site infections (SSI) are an important health care associated infection (HAI) and one of the most frequent causes of post-operative morbidity. SSI is an index of quality health care system. Nosocomial infections and multi drug resistance are one of the major problems in post operative period that prolongs hospital stay which results in loss of time and money.SSI are the third most commonly reported nosocomial infection and they account for a quarter of all nosocomial infections .The overall incidence of wound infection in India varies from 10-33%¹.Factors related to host, wound and surgery are the main culprit in the causation of SSI. SSI is a big

issue in the developing countries including India compared to other developed countries. This study is relevant in finding the incidence, causative organism and determinants of wound infection helps to reduce SSI by modifying risk factors to change the antibiotic policy.

METHODS

A prospective observational study conducted in department of obstetrics and gynaecology in Government medical college, Thrissur from April 2016 to March 2017. All women who underwent benign abdominal gynaecological surgeries during the study period were included in the study. Laparoscopic procedures unless

combined with open surgeries, women with evidence of infection pre operatively and those developing infection within 48 hours of surgeries, emergency/minor procedures and women >80 years were excluded. Surgical site was evaluated from third post operative day for any signs of infection till discharge. Patients who developed wound infection after discharge were identified from outpatient clinic, when they came to seek medical advice. Remaining cases were followed up with telephone for signs and symptoms of wound infection. Data was collected by questionnaire as per the proforma and the wounds were graded according to Southampton grading system. A wound is considered to be infected if there were any indurations and swelling discharge, organisms isolated from an aseptically obtained culture, or wound dehiscence within 30 days of operation.

Data analysis

Data was analyzed using SPSS. Values were expressed in percentage. Association between risk factors and incidence of SSI were assessed by univariate and multivariate logistic regression analysis, $p < 0.05$ was considered significant and < 0.001 as highly significant.

RESULTS

Among 453 patients studied the incidence of SSI was 7.9%. 52.9% of the sample were sterile. *Staphylococcus*

was the most common organism followed by *E. coli*. Routinely we were giving cefotaxime or cefuroxime and metronidazole as prophylaxis. In infected cases and high risk cases cefoperazone+sulbactam and piperacillin+tazobactam were used. Study showed that staphylococcus was more sensitive to amikacin, vancomycin and cloxacillin and its combinations. *E. coli* was more sensitive to amikacin and piperacillin. Data showed that, 88% of women were discharged within the first 7 days and the infection rate was 0.2%. Prolonged stay was due to due to infection. 24 patient had >15 days of post operative hospital stay. In this study only 2 cases readmitted for wound infection.

DISCUSSION

This study is one of the surveillance study on surgical site infection in benign gynecological disease in government medical college, Thrissur, Kerala from April 2016 to March 2017. Sample size was 453, among this 36 patients had wound infection and the incidence was 7.9%. The rate was found to be much less than the studies by Kamat et al and by Pathak et al and high compared to the study conducted by Mahdi et al.¹⁻⁴ The incidence of SSI was found to vary widely depending on the surveillance methods used to identify infections, criteria used to define SSI, and the patient population. All the wound infections were superficial infections which was comparable to the study by Amrita et al.¹

Table 1: Association between risk factors and wound infection.

Risk factor	Total no. of patients	N	Rate of wound infection (%)	Chi square	P value
Age (years)					
<50	350	25	7.1	9.89	0.007
50-70	95	8	8.4		
>70	8	3	37.5		
Socio economic status					
APL	73	2	5.55	0.18	0.92
BPL	378	34	94.45		
Tribal	2	0	0		
Education					
<7 standard	127	19	15	13.76	0.001
7-12	282	17	6		
>12 standard	44	0	0		
Parity					
Nulliparous	53	6	11.3	0.93	0.33
Multiparous	400	30	7.5		
BMI					
<25	223	6	2.7	93.14	<0.001
25-30	200	14	7		
>30	30	16	51.7		
Preoperative hospital stay (days)					
<6	317	13	4.1	22.51	<0.001
6-10	119	19	16.0		
>10	17	4	23.5		
Previous surgeries					
Yes	98	12	12.2%	3.16	0.08
No	355	24	6.8%		

Table 2: Surgical factors associated with infection.

Factors	Total no. of patients	N	Rate of wound infection (%)	Chi square	P value
Anesthesia					
GA	38	1	2.6	12.74	0.002
Spinal	335	21	6.3		
CSEB	80	14	17.5		
Surgeon					
Junior resident	21	2	9.5	2.13	0.34
Junior faculty	23	0	0		
Senior faculty	409	34	8.3		
Operative time (hours)					
<2	400	21	5.3	33.99	<0.001
>2	53	15	28.3		
Blood transfusion					
Pre operative	24	2	8.3	35.02	<0.001
Intra operative	1	1	100		
Post operative	2	2	100		
No transfusion	426	31	7.3		
Closure of incision					
Continuous transverse	344	28	8.1	0.11	0.95
Interrupted transverse	58	4	6.9		
Vertical	51	4	7.8		
Suture material					
Ethilon	19	1	5.26	2.13	0.34
polygalactin	421	34	8.07		
poliglicaprone	13	1	7.69		
Co morbidities					
Diabetes	99	23	23.2	40.66	<0.001
Hypertension	80	12	15	6.61	0.01
Anemia corrected	24	2	8.3	0.37	0.55
Thyroid	50	5	10	0.32	0.57
Others	15	6	40	21.79	<0.001
No co morbidities	220	32	14.5	25.46	<0.001
ASA score					
ASA1	252	4	1.6	62.42	<0.001
ASA2	186	24	12.9		
ASA3	15	8	53.3		

In this study group, all the wounds were superficial and 80.56% (29 patients) of the infected wounds were with clear serous discharge. 2 patients (5.55%) had induration and erythema, 5 had pus (13.89%). Among the infected cases, 32.91% cured with medical management and 67.08% underwent for resuturing which was converse to the study by Suwal et al.⁵ In this study 52.9% of infected cases were sterile. 29.4% of culture contains *Staphylococcus*, followed by *E. coli* (8.8%), MRSA (5.8%), *Klebsiella* (2.9%). Study by Amrita et al found that most of the discharges were sterile and most common organism was *E. coli* (36.62%) followed by mixed infection of *E. coli* and *Klebsiella* (6.57%), *Pseudomonas* (6.57%), *Klebsiella* (6.1%), *Staphylococcus* (4.69%).¹ This study showed *Staphylococcus* was more sensitive to vancomycin,

amikacin and cloxacillin and its combination whereas *E. coli* was more sensitive to amikacin. MRSA was more sensitive to amikacin and vancomycin. Study by Amrita et al amoxycylav was more sensitive in *E. coli* infection.

There are several risk factors associated with wound infection. In our study the wound infection in <50 years was 7.1% and >70 years it was raised to 37.5% and showed age was an important risk factor for wound infection. Result was comparable with the study by Razavi et al the SSI rate of >65 years was 33% whereas <25 years the rate was decreased to 4%.⁶ Increased age is associated with co morbidities and poor nutritional status may be the reason for this association. There is a non significant increase in SSI in BPL patient, but 83% of the study subject belonged to BPL category and the result was comparable with the study by sathyasheela.⁷

Table 3: Association between micro organism and antibiotic sensitivity.

Antibiotic	Staphylococcus	%	E. coli	%	MRSA	%	Klebsiella	%
Vancomycin	4	40	-	-	1	50	-	-
Amikacin	5	50	2	66.6	1	50	-	-
Cloxacillin+combi	6	60	-	-	-	-	-	-
Clindamycin	3	30	-	-	-	-	1	100
Gentamycin	2	20	1	33.3	-	-	1	100
Cefaperazone+sulbactam	-	-	1	33.3	-	-	-	-
Doxycycline	1	10	-	-	-	-	-	-
Piperacillin	-	-	2	66.6	-	-	-	-
Ciprofloxacin	1	10	-	-	-	-	1	100
Clindamycin	-	-	-	-	-	-	1	100

SSI have an inverse relation with education. In the current study showed that there was a linear relation with increasing BMI. Study by Suwal et al, wound infection in patients with BMI <20 was 13.5%, whereas BMI >25 was 62.2%. Current study showed ASA 1 had 1.6% of infection whereas in ASA 3 infection increased to 53.3%. Similar result was found in study by Dhamecha et al.⁸ In the present study there was a non significant increase in wound infection among nulliparous women. Conversely Study by Amrita et al, occurrence of post-operative wound infection was more in multiparous women than in nulliparous and they have attributed it to malnutrition and anaemia due to repeated childbirth.

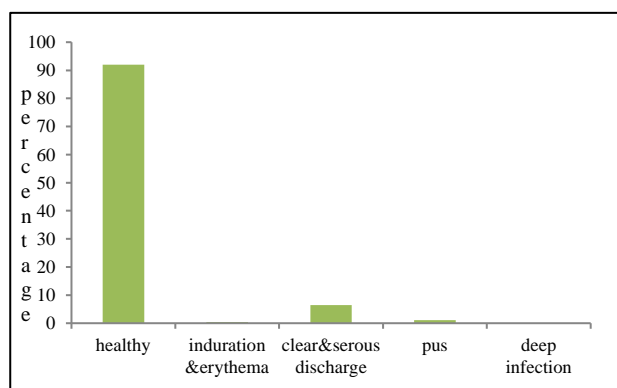


Figure 1: Southampton grading of wound.

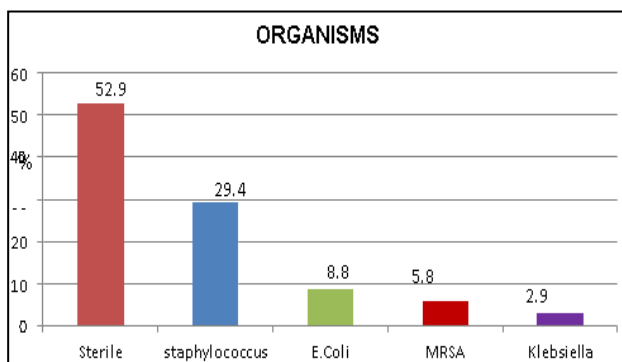


Figure 2: Distribution of micro-organism in pus culture.

In this literature, out of 99 patients with diabetes 23 (23.3%) patients got wound infection and it was a significant risk factor of wound infection. Study Amrita et al there is an 8% risk of wound infection and study by Pathak the rate was 38% among diabetic patient. Patients with anemia were seemed to be highly susceptible to SSI. Anemia diminishes resistance to infection and is associated with sepsis. In this study 8.3% of patients with anemia had wound infection, showed minimal non significant increase compared to general population contrary to the study by Nwankwo et al which showed anemia patients have three and half times increased risk for post operative infection compared with patients without anemia and the rate was 30%.⁹ This study showed a highly significant association between peri operative blood transfusion and wound infection (18.51% vs. 7.9%). We found that women who had hospital stay of 11 days or more before surgery had high risk of SSI. 23% of patients with prolonged pre operative stay developed SSI. This may be due to multidrug resistance and increased susceptibility to the hospital acquired infection. Study by Mansour et al showed the wound infection was 18.6% if the stay was <15 days, raised to 25.9% in patients who had hospital stay >15 days.¹⁰ The rate of infection was high (17.5%) with CSEB (combined spinal epidural block). CSEB was used in surgeries which require prolonged operative time. This may be attributed to the increased rate of wound infection among CSEB. General anaesthesia (GA) has least rate of infection (2.6%) and spinal anaesthesia (SA) it was 6.3%. Study by Dhamecha et al found that SSI was 16.67% in GA, which was very high compared to SA where it was only 3.94%. There was a non significant increase in SSI done by the senior faculties compared to junior faculties. This may be because; most of the complicated and high risk cases were done by senior faculty. Study by Dhamecha et al incidence of wound infection was 4.25%. Duration of operation >2 hours was associated with increased rate of SSI (28.3%) compared to <2 hours (5.3%). It was not clear whether the risk associated with longer operations is truly due to the length of the operation, or if longer duration is at least in part of the complexity of the operation or operative skill. Study by Seyd et al the SSI rate was 5.4% when the operation time was <1.5 hours and the rate raised to 64% when the duration of surgery

was >4 hours.⁶ Study by Mahdi et al found operative time >180 minutes has a significant effect on wound infection.⁴ In this survey, wound infection in patients with previous history of surgeries was 12.2% compared to 6.6% in patients without which is statistically non significant. 402 patients had transverse incision. Out of these 32 got wound infection (7.9%) whereas the incidence was 7.8% in vertical incision which was converse to the study by Vidyadhar et al where the incidence of SSI was highest with vertical midline incision.¹¹ In this study 344 cases with transverse incision were closed with continuous sutures, 28 patient had wound infection (8.1%) and 4 patients infected in interrupted transverse suture (6.9%) among the 58 cases. Study by Suwal et al found that 81.1% of wound infection with subcuticular suture was 5.4% with mattress sutures and 13.5% with staples.⁵ Regarding suture materials, polyglactin was used in 421 surgeries for skin closure (92.93%), 8.07% got wound infection, poliglecaprone (7.69%) and ethilon (5.26%) but the difference was not statistically significant. Study by Buresch poliglecaprone 25 has decreased wound infection compared with polyglactin.¹⁰ Increased wound infection associated with polyglactin may be due to its braiding property. SSI was the most common cause for prolonged hospital stay (>15days). In this study 83.3% of subjects with prolonged stay had wound infection. Only 2 cases (5.55%) readmitted for wound infection. Study by Aparna et al fifty percent of the patients with infection required repeat hospitalization compared to only 1.98% patients without infection. Study by Suwal et al the mean post operative wound infection was 11.73 days and the mean post operative hospital stay was 8.57%, 38.0% had 8-14 days of additional hospital stay due to wound infection.

CONCLUSION

The incidence of SSI was found to be 7.9%. SSI can pose a significant problem in the post operative period and affect the recovery. Multiple factors were found to be predisposing factors for SSI. Increased age more than 50 years, patients with education <7th std, diabetes, BMI >30, pre hospital stay >10 days, ASA score >3, duration of surgery >2 hours and peri operative blood transfusion. *Staphylococcus* was the most common pathogen isolated. Doctors should strive to identify risk factors which are amenable to correction, to minimize the risk of wound contamination and to support host defence system in the peri-operative time.

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