Original Article

Bacteriology of Gynaecological Surgical Site Infection in A Medical University Hospital

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Abstract

Objective: In this paper we tried to find out those effective antibiotics which are sensitive to local bacteria.

Methodology: This was cross sectional study which was conducted among patients with post – operative wound infections in three wards of obstetrics and gynaecology in teaching hospital of Nishtar Medical University from June 2014 to June 2016. Five hundred swabs / pus specimens collected from different wards and were processed by standard method and by modified Kirby Baur disc diffusion technique for antibiotic susceptibility. Ethical approval for this article has been obtained from hospital ethical committee. The data was analysed using SPSS 17.0 and all statistical significance was established by using chi – square test. P <0.05 was chosen for overall statistical significance. Sample selection criteria was according to non – probability sampling.

Results: Out of 500 swabs there was no growth on 149 (29.8%) after 24 hours. The most common pathogen was Escherichia Coli 141 (28.2%), followed by Staphylococcus Aureus 121 (24.2%), Staphylococcus Epidermitis 40 (8.0%), Pseudomonas Aeruginosa 21 (4.2%), Enterococcus Faecalis 2 (0.4%). Most of the gram-negative bacilli and gram-positive cocci were resistant to routine prophylactic antibiotics. Ciprofloxacin used as prophylactic antibiotic, sensitive to only 66 isolates but Amikacin, Imipenem, and Vancomycin were sensitive to 126,281 and 161 isolates respectively. These antibiotics are very expensive and out of reach of poor people.

Conclusion: SSI represents a significant source of post – operative morbidity for gynaecological surgery patients. Gynaecologic surgery, particularly hysterectomies, exposes the surgical site to a variety of endogenous bacteria unique to our specialty. To prevent these happenings there is urgent need to adopt basic principles of asepsis and sterilization and to make judicious use of prophylactic and therapeutic antibiotics.

Key Words: Pathogens, Morbidity, Antibiotics, Asepsis, Sensitivity

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Introduction

Surgical site infection represents a significant source of surgical morbidity and mortality. SSIs complicate roughly 2 – 5% of all surgeries.[1,2] These estimates are most likely low because many infections occur after hospital discharge, and patients may present to other health care facilities for care.[1] These infections result in significant social and economic costs for the patient and the health care system; for example, each SSI related to hysterectomy is estimated to add $5000 in patient costs.[3,4]

Organizations developed several accountability measures including timing and selection of prophylactic antibiotics, pre – operative glucose control, and appropriate hair removal.[5] If after careful assessment, it is apparent that wound is infected, it is important to confirm this and identify the causative organism(s) and possible sensitivities to antibiotics. If we identify the causative organisms and sensitivities we can easily manage the infection and even we can treat infections in the future because we know that which bacteria is prevalent in our ward, so we decided to carry out this study, we can save the lives of many patients and there will be no delays in discharging the patient home as will put them on right antibiotics. Most of our patients are from poor section of the society, they cannot afford to stay longer in the ward and they cannot afford expensive antibiotics. If we know the bacterial sensitivities then we can order our pharmacy to keep those antibiotics which can readily eradicate the infection and patients can go home safely and on time after surgery.

Methodology

Five hundred swabs / pus specimens collected from patients developing surgical site infections. The age range between 14 – 70 years mean was 31.52. This study included all patients with post-operative wound infections in three obstetric and gynaecological wards. Inclusion criteria, patients of all age. Presence of post-operative SSTs, giving informed consent to participate. Exclusion criteria was infection occurring 30 days after operation if no implant is in place, burn injuries, procedure in which healthy skin was not incised such as opening abscess and those patients refused to give consent for participating in the study. 492 (98.4%) were married and 8 (1.6%) were single. Parity was from 0 – 12. Table I showed different kinds of gynaecological procedures which were done during this study period. Pus swabs / specimens were collected from patients who had surgical site infection. The specimens were immediately transported to Pakistan Medical Research Council Pathology Lab. Situated inside Nishtar Medical College. Specimens were immediately cultured upon arrival in the laboratory. As the specimens reached laboratory they were inoculated onto blood and MacConkey's agar. The agar plates were incubated at 37ºC aerobically and were examined for the presence of any growth after 24 hours. The isolates were identified by colonial morphology, gram stain and conventional biochemical tests, based upon methods of Cowan and Steel.[6] Antibiotic susceptibility pattern of the isolates was studied using Kirby Baur Method.[7] Ethical approval for this article has been obtained from hospital ethical committee. The data collected was analysed using SPSS 17.0 and all statistical significance was established by using chi – square test. P <0.05 was chosen for overall statistical significance.

Results

As far as ward location is concerned, in ward 18 there were 225 (45%) patients developed in surgical site infection, in ward 16, there were 168 (33.6%) developed SSI. In ward 17, 106 (21.2%) patients developed surgical site infection.

Out of 500 patients 304 (60.8%) had lower segment caesarean section for different indications. 145 (29.0%) had laparotomy due to different indications such as ruptured ectopic, ovarian cysts, myomectomy. Other surgical procedures are mentioned in table I.

Table I: Surgical Procedures

Valid	Frequency	Percent	Valid %	Cumulative percent
Laparotomy	145	29.0	29.0	29.0
LSCS	304	60.8	60.8	89.8
Laparoscopy	4	0.8	0.8	90.6
Total abdominal hysterectomy	44	8.8	8.8	99.4
Sacrohystero pexy	1	0.2	0.2	99.6
Gaped episiotomy	1	0.2	0.2	99.8
Hysterectomy	1	0.2	0.2	100.0
Total	500	100.0	100	

Out of 500 swabs, there were growth on 351 (70.2%) and no growth on 149 (29.8%) after 24 hours. Growth of organisms were aerobic growth on 339 (67.8%) and 12 (2.4%) no aerobic growth were seen.

Gram stain was done 179 (35.8%) were gram negative bacilli and 169 (33.8%) were gram positive cocci and 3 (0.6%) were gram positive bacilli as shown in table II.

Table II: **Gram Stain**

Valid	Frequency	Percent	Valid %	Cumulative percent
Gram positive cocci	169	33.8	33.8	33.8
Gram positive bacilli	3	0.6	0.6	34.4
Gram negative bacilli	179	35.8	35.8	70.2
Na	149	29.8	29.8	100.0
Total	500	100.0	100.0	

The most common pathogen was Escherichia Coli 141 (28.2%), followed by Staphylococcus Aureus 121 (24.2%), Staphylococcus Epidermitis 40 (8.0%), Pseudomonas Aeruginosa 21 (4.2%), Acinetobacter Baunammii 8 (1.6%). 149 (29.8%) had no growth. List of other organisms as shown in table III.

Table II: Pathogens Isolates from Surgical Site Infections

Organism	Number	Percent
Escherichia coli	141	28.2
Staphylococcus aureus	121	24.2
Staphylococcus epidermitis	40	8.0
Pseudomonas aeruginosa	21	4.2
Acinetobacter baunammii	8	1.6
Enterobacter aerogenes	7	1.4
Micrococcus	6	1.2
Enterococcus faecium	2	0.4
Enterococcus faecalis	2	0.4
Bacillus	2	0.4
Enterococcus	1	0.2
Na	149	29.8

Different antibiotic susceptibility are: Ampicillin was resistant in 331 patients, intermediate sensitive to 13 and sensitive to only 7 patients. Cephalosporins group such as Ceftriaxone, Ceforoxime, Ceftazidine were resistant to 306, 316, and 301, intermediate sensitive to 14, 11, 21 and sensitive to 31, 24, 29 respectively. Amikacin were resistant to 150, intermediate sensitive to 75 and sensitive to 126. Only imipenem which is very costly antibiotic was resistant to 33, intermediate to 36 and sensitive to 281. Other susceptibility of isolates shown in table IV.

Table IV: Different antibiotic susceptibility

Pattern			
Antibiotic	**Resistant**	**Intermediate**	**Sensitive**
Ampicillin	331	13	7
Amikacin	150	75	126
Amoxycillin	294	23	34
Ceftriaxone	306	14	31
Cefuroxime	316	11	24
Ceftazidine	301	21	29
Cefpirome	293	23	35
Cefoperazone	115	66	170
Cephradine	329	9	13
Chloramphenicol	274	13	64
Ciprofloxacin	258	27	66
Imipenem	33	36	281
Methicillin	146	4	19
Vancomycin	8	1	161

Discussion

Surgical site infection can be defined as the presence of pus along with signs of inflammation in the surgical wound margins.[8] Many gynaecological surgeries including hysterectomies and laparotomies are categorized as “clean procedures, implying that the genital tract is entered in a regulated manner and without unusual contamination. A vast majority of endogenous flora, including common bacteria of skin, gastrointestinal tract, and vaginal tract are introduced into the surgical site during a gynecological operation. Selection of prophylactic antibiotics must consider the need to cover a variety of gram positive, gram negative, and anaerobic organisms.[9]

In the current study 339 bacterial isolates were investigated to determine their types and antimicrobial susceptibility pattern. Our findings demonstrates the predominance of gram negative bacterial isolates in SSIs, Escherichia Coli being the commonest isolated organism followed by Staphylococcus Aureus, Staphylococcus Epidermitis, Pseudomonas Aeruginosa, Acinebacter Baunammii. This pattern of organisms causing SSIs in the current study is in contrast with other studies which reported Staphylococcus Aureus was the second most common pathogen. The possible reason for discrepancy in the publications could be due to differences in the populations investigated : and the timing of specimen collections performed on the study participants.

In our study, E.Coli was the commonest isolates followed by Staphylococcus Aureus. This finding is in contrast to that from another study[12] which reported aerobic positive including S.aureus. This difference could be attributed by differences in geographical locations and standards of hygiene. Our investigations found that majority of isolates were highly resistant to Ampicillin and Penicillin. These findings concur with previous studies[13,14] in developing countries which reported high resistance to these antibiotics. Ciprofloxacin used as prophylactic antibiotics were also highly resistant to these pathogens. This matter is of grave concern because treatment of such infections warrants newer and expensive antibiotics such as Amikacin or Vancomycin.[15] To achieve this goal we will have to return to preventive measures including fundamental principles of asepsis and prevention of surgical site infections. Individual patient risk factors such as obesity, poor nutritional status, longer operating time, decreased oxygenation of tissues, longer operating time has consistently been associated with increased rates of SSI.[16,17] These factors should be identified and modified whenever possible. In addition to the skin asepsis and peri – operative prophylactic antibiotics, care and attention to the theatre environment is also very important.[18]

Conclusion

We should construct a system to track, analyze, and monitor the SSI as a problem. To prevent SSI there is urgent need to select basic principles of asepsis and sterilization and to make logical use of prophylactic and therapeutic antibiotics.

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