Study of Bacteriological Profile of Post Operative Wound Infections In Obstetrics And Gynaecological Surgeries In A Tertiary Care Hospital

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Abstract: Background & objectives: Surgical site infections (SSI) are third most commonly reported nosocomial infections. For any given type of operation, development of a wound infection approximately doubles the cost of hospitalization. So the present study conducted to isolate different organisms from post-operative wound infections from Obstetrics and Gynaecology surgeries, to determine antibiotic sensitivity pattern of these isolates and to determine the rate of SSI. Methods: All the pus samples of clinically suspected SSI cases were immediately processed by standard bacteriological techniques. Antibiotic susceptibility testing was performed. Results: The incidence of SSI in our set up was 1.64 %.The most common organism isolated from SSI cases was staphylococcus aureus (41.42%). 31.03% MRSA were isolated from SSI cases. All the MRSA were sensitive to vancomycin and Linezolid. Gram negative bacilli showed maximum sensitivity towards piperacillin-tazobactam, imepenem & polymyxin B.The production of ESβL among Gram negative bacilli varies from 25% to 33% and Ampc β lactamase production varies from 12% to 25%. Interpretation & conclusion: Guidelines and protocols for basic infection control practices such as hand washing, written protocols of perioperative, intraoperative and post operative infection control practices should be widely available and adhered to. [S Kokate, Natl J Integr Res Med, 2018; 9(2):26-30]

Key Words: Surgical site infection, antibiotic resistance, MRSA

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Introduction: Wound infection has always been a major complication of surgery and trauma. Inspite of modern standards of preoperative preparation, antibiotic prophylaxis and operative technique, post-operative wound infections remain a serious problem [1-3].Surgical infections are the third most commonly reported nosocomial infections and they account for approximately a quarter of all nosocomial infections.They have been responsible for increasing cost, morbidity and mortality related to surgical operations and continue to be a major problem even in the hospitals with modern facilities [4].Various studies in India have shown that overall postoperative infection rate, following clean surgeries ranged from 3.03% to 4.04%, while in those following clean contaminated surgeries ranged from 10.06 to 22.47%. For any given type of operation, the development of a wound infection approximately doubles the cost of hospitalization [5, 6]. These infections are usually caused by the exogenous and endogenous microorganisms that enter the operative wound during the course of the surgery. The incidence of the infected surgical wounds may be influenced by factors such as pre-operative care, the theatre environment, postoperative care and the type of surgery [7]. So the present study was conducted with the following.

Aims & Objectives:

1. To isolate the different organisms from post-operative wound infections
2. To determine the antibiotic sensitivity pattern of these isolates
3. To determine the rate of SSI

Methods: The study was conducted in the Department of Microbiology, Government Medical College & Hospital, Nagpur from September 2015 to July 2016.The study population included the patients from the Department of Obstetrics and Gynaecology, Government Medical College & Hospital, Nagpur who had undergone operations and who developed signs/symptoms of postoperative wound infections. Surgical sites were considered to be infected according to the set of clinical criteria recommended by the surgical infection task force. The CDC criteria were used to define the type of surgical wound using the wound contamination class system [8] . The approval of Institutional Ethics committee, Government Medical College & Hospital, Nagpur was obtained.

Inclusion criteria: 113 randomly selected clinically suspected cases of postoperative wound infections from department of Obstetrics & Gynaecology of our hospital were included.

Exclusion criteria: All the wound infections other than postoperative wounds were excluded from the study.

All the pus samples or wound swabs of clinically suspected of SSI cases received in the Department of Microbiology, Government Medical College & Hospital, Nagpur were immediately inoculated and streaked onto nutrient agar, 5% sheep blood agar and MacConkey agar (Hi-Media, India). Plates were incubated aerobically at 37°C for 24 hours[9]. Isolated organisms were processed and identified according to standard bacteriological techniques[10]. Antibiotic susceptibility testing was performed by Kirby-Bauer disk diffusion technique [11].The drugs used were as per the CLSI 2013 guidelines[12].All the staphylococcal isolates were subjected to determination of methicillin resistance by cefoxitin disc diffusion method. All the Gram negative isolates were subjected to determination of β lactamase, AmpC β-lactamase and metallo β-lactmases[12].

Results: Out of total 113 pus specimens received in the Microbiology laboratory from 113 suspected post operative wounds which had clinical signs/symptoms of infection i.e. suspected SSI cases,73 (64.60 %) cases were culture positive and so were considered as definitive cases of SSI. Thus 73 cases (64.60%) were diagnosed as the SSI cases out of total 4255 surgeries conducted in Obstetrics and Gynaecology operation theatre giving a SSI rate of 1.71 %.

Out of these culture positive SSI cases, 14(19.17%) were clean contaminated wounds & 42 (57.53%) were clean wounds. Out of these 73 cases, thirteen cases (17.80 %) were re-admitted for resuturing. All those cases which were readmitted were clean contaminated wounds.

Table 1: Organisms isolated from SSI cases (n=73)

S.No	Organism isolated	Number (%)
1	Staphylococcus aureus	29 (39.72)
2	E.coli	16 (21.91)
3	Klebsiellae pneumonia	10 (13.69)
4	Proteus mirabilis	4 (5.47)
5	Citrobacter freundii	4 (5.47)
7	Psuedomonas aeruginosa	4 (5.47)
8	Acinetobacter baumanii	6 (8.21)
	Total	73

In those 14 clean contaminated cases, twelve cases(85.71%) were infected with staphylococcus aureus and remaining two(14.29%) were infected with acinetobacter baumanii.

Table 2: Antibiotic resistance pattern of staphylococcus aureus isolated from SSI cases

Organism	Antibiotics								
	E	Cn	Cz	Co	T	G	Cf	Va	Lz
Staphylococcus aureus (n=29)	04 (66.66)	04 (66.66)	04 (66.66)	05 (83.33)	05 (83.33)	04 (66.66)	04 (66.66)	01 (16.66)	01 (16.66)

E-Erythromycin, Cn-Cefoxitin, Cz-Cefazolin, Co-co-trimoxazole, T-Tetracycline, G-Gentamycin, Cf-Ciprofloxacin, Va-Vancomycin, Lz-Linezolid

Out of these 29 staphylococcal isolates, nine (31.03%) isolates were identified as Methicillin Resistant Staphylococcu aureus (MRSA).

Table 3: Resistance pattern of the Gram negative bacilli against β – lactam antibiotics isolated from SSI cases

Gram negative bacilli	Antibiotics								
	A (%)	Ac (%)	PIT (%)	Pc (%)	Cn (%)	Cfz (%)	Cpm (%)	Ip (%)	MRP (%)
E.coli (n=16)	16 (100)	14 (87.50)	02 (12.50)	5 (31.25)	16 (100)	13 (81.25)	5 (31.25)	02 (12.50)	03 (18.75)
Klebsiella pneumonia (n=10)	10 (100)	8 (80)	03 (30)	04 (40)	10 (100)	10 (100)	3 (30)	02 (20)	01 (10)
Proteus mirabilis (n=4)	4 (100)	4 (100)	00 (00)	01 (25)	4 (100)	4 (100)	02 (50)	00 (00)	00 (00)
Citrobacter freundii (n=04)	03 (75)	03 (75)	00 (00)	01 (25)	03 (75)	03 (75)	02 (50)	01 (25)	01 (25)
Pseudomonas aeruginosa(n=04)	04 (100)	03 (75)	01 (25)	01 (25)	04 (100)	04 (100)	02 (50)	02 (50)	01 (25)
Acinetobacter baumanii(n=06)	06 (100)	04 (66.66)	01 (16.66)	01 (16.66)	03 (50)	05 (83.33)	03 (50)	03 (50)	01 (16.66)

A-Ampicillin, Ac-Amoxycillin-clavulanic acid , PIT – Piperacillin-tazobactum, PC-Piperacillin, Cn-cefoxitin, Cfz-ceftazidime, Cpm- Cefepime , Ip- Imepenem, MRP-Meropenem.

Table 4: Resistance pattern of the Gram negative bacilli against fluoroquinolones ,aminoglycoside and polypeptide isolated from SSI cases

Gram negative bacilli	Antibiotics		
	Of (%)	Ak (%)	Pb (%)
E.coli (n=16)	15 (48.38)	18 (58.06)	04(12.90)
Klebsiella pneumonia (n=10)	06 (31.75)	10 (52.63)	03(15.78)
Proteus mirabilis (n=04)	05 (38.46)	07(53.84)	02 (15.38)
Citrobacter freundii (n=04)	02(40)	02 (40)	02(40)
Pseudomonas aeruginosa(n=04)	02(40)	02(40)	02(40)
Acinetobacter baumanii(n=06)	03(50)	03(50)	02(33.33)

Of- Oflaxacin, Ak- amikacin, Pb- Polymyxin B

Table 5: β-lactamase production among Gram negative bacilli

S.no	Organism	Number of ESβL producer organisms (%)	Number of Ampcβ lactamase producer organisms (%)	Number of metallo-β-lacatmase producer organisms (%)
1	E.coli (n=16)	04 (25)	0 2 (12.50)	--
2	Klebsiellae pneumonia (n=10)		0 2 (20)	
3	Proteus mirabilis (n=04)			
5	Citrobacter freundii (n=04)	01(25)		
6	Psuedomonas aeruginosa (n=04)		01(25)	1 (25)
7	Acinetobacter baumanii(n=06)	02(33.33)		

Discussion: Surgical site infection has always been a major problem to the surgical team. In the present study, an attempt has been made to know the various bacterial floras responsible for surgical site infections and their antibacterial susceptibility pattern. The incidence of SSI in Obstetrics and Gynaecology surgeries at our set up was 1.71 % .This is in agreement with the SSI incidences in other studies[13, 14]. However, infection rates varying from 20% to as high as 76.9% have also been reported [15, 16,17,18,19]. Out of these 73 SSI cases, 13 cases (17.80%) were readmitted for resuturing thus ultimately indicating a financial burden to the hospital due to readmission and prolonged hospital stay. In our study, the most common organism isolated from SSI cases was staphylococcus aureus (39.72%) followed by E.coli (21.91 %). Some studies also revealed Staphylococcus aureus as the most common organism isolated from SSI [14.15] whereas Ramesh et al 2013 [20] reported E. coli (20.8%) as the most common organism isolated followed by S. aureus (16.1%) from SSI cases. The pattern of organisms isolated in wound types suggests that the organisms from exogenous environment or patients skin colonizers are the main source of clean Procedures. Among 14 clean contaminated cases, twelve cases (85.71%) were infected with staphylococcus aureus and remaining two (14.29%) were infected with Acinetobacter baumanii.

Our study also revealed that all the staphylococci showed maximum sensitivity towards Vancomycin & Linezolid which is again in accordance with Raza et al 2013 [21].In the present study we isolated 31.03% MRSA from SSI cases. All the MRSA were sensitive to vancomycin and Linezolid. Naik et al 2011[22] reported 9.6 % of MRSA whereas Ramesh et al 2013[20] reported isolation of 66.37 % MRSA from SSI cases. The sensitivity pattern of MRSA of present study coincides well with these workers [20, 22].

The present study also revealed that all the gram negative bacteria (GNBs) isolated have low susceptibility to β-lactam antibiotics and were showing a very high % of resistance to cephalosporins & aminoglycosides. Extensive use of inappropriate antibiotics in empirical therapy can cause emergence of such resistant bacterial strains, especially in healthcare centers. .These GNBs showed maximum

sensitivity towards piperacillin-tazobactam,imepenem & polymyxin B.This finding coincides well with Raza et al 2013 [21].

The present study observed the production of ESβL among Gram negative bacilli which varies from 25% to 33%, Ampc β lactamse production varies from 12% to 25%, one strain of Psuedomonas aeruginosa showed Metallo-β lactamse production which is a cause of concern as the infection caused by these resistant bugs are not only difficult to treat but also transmissible within their species which is a cause of concern.

Conclusion: The prevention of nosocomial infections is not only highly desirable for patients, but it is now seen as a major political priority in all the hospitals, irrespective of whether they are private or public .Guidelines and protocols for basic infection control practices such as hand washing, written protocols of perioperative, intraoperative and post operative infection control practices should be widely available and adhered to. Infection control measures such as the active surveillance of SSIs, the implementation of checklist, compliance observations and instruction/ training of healthcare worker as well as Staphylococcus aureus/ MRSA screening adherence to perioperative antibiotic are essential key elements for the prevention of SSIs in the hospitals.

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Conflict of interest: None
Funding: None
Cite this Article as: S Kokate, V Rahangdale, V. Katkar. Study of Bacteriological Profile of Post Operative Wound Infections In Obstetrics And Gynaecological Surgeries. Natl J Integr Res Med 2018; 9(2):26-30