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RESEARCH ARTICLE

SURGICAL SITE INFECTIONS- BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SUSCEPTIBILITY PATTERN IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: SSIs are responsible for 31% of all HAIs among all hospitalized patients with 3% mortality rate. In spite of improvement in the preventative aspects, surgical site infections still remain a major problem with high morbidity and mortality. **Aim and objectives:** To isolate and identify the aerobic bacterial pathogensfrom Surgical site infection cases and to determine the antibiotic susceptibility pattern of isolated pathogens. **Method:** A total of 100 clinical samples of suspected SSIs were studied from the Government Maternity Hospital, Tirupati from June 2018 to May 2019.The pus samples were collected from the infected surgical site after taking precautions to reduce contamination by the normal skin flora. The samples were processed in the Department of Microbiology, by conventional culture methods to identify the pathogen and to determine its antibiotic susceptibility pattern. **Result:** Out of 100 suspected samples, 58 of them were culture positive for pathogenic organisms. *Staphylococcus aureus* was the most common isolate followed by *Klebsiellapneumoniae*. **Conclusion:** Proper infection control practices, including sterilization and disinfection techniques, surgical attire and drapes, asepsis during surgical technique , microbiological sampling of OT, appropriate pre-operative preparation of the patient and antimicrobial prophylaxis can reduce SSIs.

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INTRODUCTION

Centers for Disease Control and Prevention (CDC) defines SSIs as those "Infections typically occurring within 30 days of an operation at the site or part of the body where the surgery took place or within an year if an implant is left in place and the infection is thought to be secondary to surgery". In spite of improvement in the preventative aspects, surgical site infections still remain a major problem with high morbidity and mortality. SSIs are responsible for 31% of all HAIs among all hospitalized patients with 3% mortality rate. The incidence of infection varies from surgeon to surgeon, from hospital to hospital, from one surgical procedure to another and most importantly from patient to patient. This study was under taken to determine the prevalence of surgical site infections and to formulate guidelines for therapy in our tertiarycare maternity hospital.

AIMS AND OBJECTIVES

- To isolate and identify the aerobic bacterial pathogens from Surgical site infection cases.
- To determine the antibiotic susceptibility pattern of isolated pathogens.

METHOD OF THE STUDY

The present study was conducted in the Department of Microbiology, S.V. Medical College, Tirupati, from the date of approval of the protocol by the Institutional Ethics Committee of S.V. Medical College.A total of 100 clinical samples of suspected SSIs were studied from the Government Maternity Hospital, Tirupati from June 2018 to May 2019.

Type of study: Cross-sectional study

Study period: 12 months from the approval of the Ethics committee

Inclusion criteria: Patients who have undergone major obstetric (LSCS, Family planning sterilization) and gynecological (Hysterectomy) surgeries with

- Serous or non-purulent discharge from surgical site with signs of inflammation.
- Pus discharge from surgical site.

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Exclusion criteria

- Surgical sites less than 48hours from the time of completion of surgery.
- Episiotomy wounds

Sample collection:The pus samples were collected from the infected surgical site after taking precautions to reduce contamination by the normal skin flora. The samples were processed in the Department of Microbiology, by conventional culture methods to identify the pathogen and to determine its antibiotic susceptibility pattern.Proper precautions were taken during specimen collection to reduce contamination by normal skin flora. Two pus swabs were collected.

The collected specimen brought to the laboratory without delay for further processing.

In the microbiology laboratory

- **Gram's staining:** for the presence of bacteria, pus cells.
- **Culture:** sample was streaked on Blood agar and Mac Conkey agar and incubated at 37^0C for 18-24 hours.
- Colony morphology on Blood agar and Mac Conkey agar were observed.
- Grams staining, Motility by Hanging drop, Catalasetest , Oxidase tests were done for
- the isolates. All necessary biochemical tests as per standards were done.
- Antibiogram on the Muller Hinton agar by Kirby-Bauer disc diffusion method by
- using appropriate antibiotic discs.
- Confirmation based on biochemical tests and antibiogram of organism was reported.

RESULTS

Out of 100 suspected samples, 58 of them were culture positive for pathogenic organisms. The rate of isolation of pathogenic organisms seen in emergency surgeries was 58.28% and the rate elective surgeries was 46.25%.Isolation rate of organisms observed in Lower Segment Caesarean Section (LSCS) was 60.46%, Hysterectomy 41.66%, and in Family planning Sterilization, it was 50%. The predominant pathogenic isolates were Gram negative bacilli which were 63.79%, and 36.2% were Gram positive cocci. The distribution of aerobic bacterial pathogens among the isolates was *Staphylococcus aureus*34.48% which was the most common organism isolated, followed by *Klebsiellapneumonia* (22.41%), *Pseudomonas aeruginosa* (17.24%), *Escherichia coli*(15.51%).Less common isolates were *Acinetobacterbaumanii* (3.44%), *Proteus mirabilis* (3.44%), *Citrobacterfreundii* (1.72%), *Enterococcusfecalis* (1.72%).

Antibiotic sensitivity pattern of Gram positive cocci isolated from SSI cases.

Sl. No	Antibiotic	*Staphylococcus aureus*		*Enterococcus faecalis*	
		S%	R%	S%	R%
1	Penicillin G	0	100	0	100
2	Co-trimoxazole	47.36	52.63	0	100
3	Amoxicillin/ Clavulnate	31.57	68.42	0	100
4	Amikacin	68.42	31.57	100	0
5	Levofloxacin	36.84	63.15	100	0
6	Piperacillin/ Tazobactam	68.42	31.57	100	0
7	Oxacillin	42.10	57.89	0	100
8	Ceftriaxone	42.10	57.89	0	100
9	Vancomycin	100	0	100	0

Antibiogram of *Escherichia coli, Klebsiellapneumoniae, Pseudomonasaeruginosa* isolated from SSI cases:

Sl. No	Antibiotic	*Escherichia coli*		*Klebsiella pneumoniae*		*Pseudomonas aeruginosa*	
		S%	R%	S%	R%	S%	R%
1	Amoxicillin/ Clavulnate	28	72	8.33	91.67	5.27	94.73
2	Amikacin	84	16	66.66	33.34	78.94	21.06
3	Co-trimoxazole	56	44	50	50	52.63	47.37
4	Cefotaxime	12	88	16.67	83.33	63.15	36.85
5	Imipenem	96	04	87.5	12.5	94.73	5.27
6	Levofloxacin	48	52	58.33	41.67	73.68	26.32
7	Piperacillin/ Tazobactam	88	12	75	25	94.73	5.27
8	Carbenicillin	-	-	-	-	84.21	15.79

Antibiogram of *Proteus mirabilis, Acinetobacterbaumannii, Citrobacterfreundii*, isolated from SSI cases

Sl. No	Antibiotic	*Proteus mirabilis*		*Acinetobacter baumannii*		*Citrobacter freundii*	
		S%	R%	S%	R%	S%	R%
1	Amoxicillin/ Clavulnate	0	100	0	100	0	100
2	Amikacin	50	50	100	0	100	0
3	Co-trimoxazole	50	50	100	0	100	0
4	Cefotaxime	0	100	0	100	100	0
5	Imipenem	100	0	100	0	100	0
6	Levofloxacin	50	50	100	0	100	0
7	Piperacillin/ Tazobactam	50	50	50	50	100	0
8	Carbenicillin	-	-	-	-	-	-

DISCUSSION

Surgical Site Infections doubles the patient's risk of mortality after surgery. In the present study the SSI incidence rate is 58%. This is similar to other studies conducted by Ananthi B *et al* (59.80%), Gangadharan SS *et al* (73.5%). In the present study, the highest rate of isolation of pathogenic organisms is seen in emergency surgeries (58.28%) when compared to elective surgeries (46.25%). This is similar to other studies conducted by Gangadharan SS *et al* (51%).Isolation rate of organisms observed in Lower Segment Caesarean Section (LSCS) (60.46%), Hysterectomy (41.66%), Family planning sterilization (50%).In a study by Pathak A *et al*, the isolation rate of pathogenic organisms was LSCS(3.76%), Hysterectomy (14.79%), Family planning sterilization (0%). In the present study, Gram negative bacilli (63.79%) are predominant isolates than Gram positive cocci (36.2%).

This is similar to studies conducted by Custovic A *et al* (73.7%), Ananthi B *et al* (55%). This study is not similar to studies conducted by Preethishree P *et al* (26.54%), where Gram positive cocci were predominant isolates. In the present study, *Staphylococcus aureus* (34.48%) is the mostcommon isolated, followed by *Klebsiellapneumoniae* (22.41%), *Pseudomonas aeruginosa*(17.24%), *Escherichia coli*(15.51).Less common isolates were *Acinetobacterbaumanii (3.44%), Proteus mirabilis(3.44%), Citrobacterfreundii (1.72%) , Enterococcus fecalis*(1.72%). Similar trends were observed in studies conducted by Gangadharan SS *et al*, Custovic A *et al*., Anjum W *et al*. In the present study, MRSA isolation rate is 57.89%. This is similarto other studies conducted by Custovic A *et al*(80%), Amrutham R *et al* (65.7%). In the present study, *Escherichia coli, Klebsiellapneumoniae, Pseudomonas aeruginosa*showed highest susceptibility to Imipenem followed by Piperacillin / Tazobactam and Amikacin. *Proteus mirabilis, Acinetobacterbaumanii, Citrobacterfreundii,* showed 100% susceptibility to Imipenem followed by Amikacin and Piperacillin/Tazobactam. Similar trends were present in a study by Budhani D *et al*.Most of the commonly isolated organisms showed a greater resistancepattern to Amoxiciilin/clavulinate ,Cefotaxime and Co-trimoxazole.

Conclusion

Practicing proper infection control practices, including sterilization and disinfection techniques, surgical attire and drapes, asepsis during surgical technique, microbiological sampling of OT, appropriate pre-operative preparation of the patient and antimicrobial prophylaxis can reduce SSIs.

Limitations of study

- The collection of sample by using swab is low sensitive than soft tissue specimen.
- Genotypic confirmation is not done.
- No anaerobic study and no fungal study.

ABBREVIATIONS

- CDC- Centre for Disease Control
- HAIs- Healthcare Associated Infections
- LSCS- Lower Segment Caesarean Section
- MRSA- Methicillin Resistant *Staphylococcus aureus*
- SSI- Surgical Site Infection
- WHO- World Health Organization

REFERENCES

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Amrutham R, Reddy MMB, Pyadala N. 2017. A prospective study of surgical site infections and related risk factors in a teaching hospital. *Int Surg J.*, 4:237-41.entions 2017;4(2):2702-2706.

Ananthi B, Ramakumar M, Kalpanadevi V, Abigail RS, Karthiga L, *et al*. Aerobic Bacteriological Profile and Antimicrobial Susceptibility Pattern in Postoperative Wound Infections at a Tertiary Care Hospital International Journal of Medical Science and Clinical Inv

Anjum W, Mudaraddi RT, Chandrashekhar B M, Fathima A, Abrar N. 2017. A Study on Surgical Site Infections (SSI) and associated factors in a Tertiary care Hospital in Tumkur, Karnataka. *National Journal of Research in Community Medicine.* 6(3):206-212.

Berríos-Torres SI, Umscheid CA, Bratzler DW, Leas B, Stone EC, Kelz RR, Reinke CE, Morgan S, Solomkin JS, Mazuski JE, Dellinger EP. 2017. Centers for Disease Control and Prevention guideline for the prevention of surgical site infection, 2017. JAMA surgery. Aug 1;152(8):784-91.

Bowler PG, Duerden BI, Armstrong DG. 2001. Wound microbiology and associated approaches to wound management. *Clin Microbiol Rev.*, 14(2):244-269.

Budhani D, Kumar S, Sayal P, Singh S. 2016. Bacteriological profile and antibiogram of surgical site infection/ post-operative wound infection. *Int J Med Res Rev.,* 4(11):1994-1999.

Centers for Disease Control and Prevention. Guideline for prevention of surgical site infection. Infect Control Hosp Epidemiol 1999;20(4):247-278.

Centers for Disease Control and Prevention. Surgical site infection (SSI) event. Available at: http://www.cdc.gov/ nhsn/pdfs/ps-analysis-resources/ Importing Procedure Data.pdf (accessed January 2018).

Chollom SC, Agada GO, Gotep JG, Gbise DS, Mwankon SE, Okwori AJ. 2012. Bacteriological profile of infected surgical sites in Jos, Nigeria. *Malaysian J Of Microbiology.,* 8(4):285-288.

Čustović A, Zulčić-Nakić V, Aščerić M, Hadžić S. 2009. Surveillance of intrahospital infections at the clinic for gynaecology and obstetrics. Bosnian journal of basic medical sciences. Feb;9(1):66.

Gangadharan SS. 2018. A study on Post-Operative Wound Infections. *Int J Curr Microbiol App Sci.,* 7(2):1504-11.

Pathak A, Mahadik K, Swami MB, Roy PK, Sharma M, Mahadik VK, Lundborg CS. 2017. Incidence and risk factors for surgical site infections in obstetric and gynecological surgeries from a teaching hospital in rural India. *Antimicrobial Resistance & Infection Control.* Dec;6(1):66.

Preethishree P, Rai R, Kumar KV. 2017. Aerobic Bacterial Profile of Post-Operative Wound Infections and their Antibiotic Susceptibility Pattern. *Int J Curr Microbiol App Sci.,* 6(9):396-411.

Suchitra JB, Lakshmidevi N. 2009. Surgical site infections: Assessing risk factors, outcomes and antimicrobial sensitivity patterns. *African J of Microbiology Research.,* 3(4):175-179.

Tenorio AR, Badri SM, Sahgal NB, *et al.,* 2001. Effectiveness of gloves in the prevention of hand carriage of vancomycin-resistant Enterococcus species by health care workers after patient care. *Clin Infect Dis.,* 32:826-829.

World Health Organization 2106: Global guidelines on the prevention ofsurgical site infection. http://www.who.int/gpsc/ssi-prevention-guidelines/en/Google Scholar

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