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SURGICAL SITE INFECTIONS;

CULTURE & SENSITIVITY PATTERN OF MICRO-ORGANISMS ISOLATED IN A TERTIARY CARE HOSPITAL

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ABSTRACT: Background: Wound infection has been a major problem in the surgical field since long time. Significant improvements in sterilization, preoperative preparation of patient for surgery, surgical techniques & prophylactic usage of preoperative antibiotics have not been able to eradicate wound infections. Development of wound infection increases the hospital stay, cost of treatment & increase morbidity & mortality associated with surgery. **Objectives:** To assess type of organism responsible for postoperative wound infection & its drug sensitivity patterns at Public & private sector hospitals of Hyderabad. **Study Design:** Prospective, descriptive study. **Setting:** Public & Private Sector Hospitals of Hyderabad, Pakistan. **Period:** June 2013 to May 2014. **Materials & Method:** All patients of either sex above the age of 13 years who underwent surgery & developed wound infection were included in the study. Samples to assess culture & sensitivity pattern of organism were taken from infected wounds. Subject's data was collected on preformed proforma for age, sex, diagnosis, co morbid illness, type of surgery, presence or absence of wound infection, grade of infection, and culture & sensitivity pattern of organism isolated. **Results**: During this 1 year period total of 424 patients of different pathologies related to General surgery were finally included in analysis. Mean age was 27.35 years with 61.08% were male and 38.91% female. Inguinoscrotal operations were the commonest procedures performed in 113(26.65%) patients followed by Appendicectomy in 102(24.06%) patients. Surgical site infection was noticed in 54(12.74%) patients with 47(13.27%) had this of grade II & above. It includes 23(22.55%) patients of Appendicectomy followed by 09(33.33%) patients of Laparotomy. 47(13.27%) samples were sent for Culture & sensitivity with 41(11.58%) of them showed positive yield. E. coli noticed as commonest organism isolated in 26(63.41%) patients followed by Staphylococcus Aureus in 08(19.51%). Most sensitive antibiotics against noted were Meropenem & Pipracillin with Tazobactum which showed sensitivity to E.coli in 25(96.15%) patients & 24(92.31%) patients respectively while their sensitivity against S. Aureus was 07(87.5%) & 06(75%) patients respectively. Vancomycin was found sensitive against Staphylococcus Aureus in 07(87.5%) patients. Sensitivity of Ampicillin to most of these organisms was found significantly low. **Conclusion:** Wound infection is responsible for significant morbidity in developing world with the frequency of 15.53% in this study. It puts up significant economic burden on the hospitals.

Key words: Wound infection, postoperative, Culture & sensitivity.

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INTRODUCTION

Skin acts as first line of defense against infections. It is breached either surgically or by trauma. Despite application of modern approaches of preoperative preparation of patient for surgery, antibiotic prophylaxis, and technological advances in infection control and operative techniques, wound infections after surgery still remains a major problem with its reported incidence varies from 2-20%.[1,2] It not only leads to patient discomfort and increasing morbidity but also responsible for prolong hospitalization thereby significantly increase the cost of treatment.[3]

One data from United States mention 2% of their patients developed wound infection among the 40 million inpatient surgeries and more than 31 million day case or outpatient surgeries performed every year.[4]

Source of wound infection is either by exogenous source or it can be of endogenous origin that enters into the operative wound either during the surgery or after the surgery. Primary infections are usually more serious, appearing within five to seven days of surgery.[5]

Most of the wound infections are of minor nature involving only skin and subcutaneous tissue However if untreated or not properly treated early & aggressively that it can lead to more serious form of wound infection. These patients usually present with increasing pain in the wound, fever or discharge of fluid material from wound. Examination may reveal raised temperature of wound area with erythema & tenderness.[6]

Postoperative wound infection is a multifactorial phenomenon ranging from factors related to the patient's ill health like old age, poor nutritional status, pre existing infection, co-morbid illness to factors related to the procedure which includes improper surgical technique, prolonged duration of surgery, poor preoperative preparation for surgery or inadequate sterilization of surgical instruments.[7] In addition to that virulence of the organism & procedure performed are also major determinants in the development of wound infection.[8] Many studies to determine type of bacteria involved in wound infection & its sensitivity pattern shows significant variation in wound infection pattern according to geography, between different procedures & surgeons operating upon. Also it varies from hospital to hospital & among different units within the same hospital.[7]

In the developing countries like Pakistan it is routine to prescribe antibiotics empirically to treat variety of wound infections. This trend has lead to the development of resistance of micro-organisms to variety of drugs. Also this prescription pattern has changed the type of organisms involved in wound infection with the growing tendency of gram negative organisms are now seen as a cause of serious infections in many hospitals.[3] This problem became more worsened due to improper practices to control infection & overcrowded hospitals in these countries.

Therefore, early recognition of wound infection and proper application of appropriate treatment modality which includes prescription of antimicrobial therapy are essential elements to avoid spread of infection thereby decreasing the morbidity related to surgery. Culture of wound organisms & assessing its sensitivity pattern is a necessary prerequisite for the management of infections which help to make better therapeutic choices.

Hence this study was planned to determine the frequency of SSIs in postoperative patients and to evaluate type of organism involved in infection & its sensitivity pattern at a tertiary care hospital.

PATIENTS & METHODS

This prospective, descriptive study was conducted at public & private sector hospitals of Hyderabad, Pakistan from June 2013 to May 2014. All patients of either sex above the age of 13 years who underwent surgery & developed wound infection were included in the study. Those patients who developed surgical field related complication like fecal/biliary/urinary fistula, presented in acute emergency conditions like perforated hollow viscus or gangrene of gut were excluded. Patients operated for perianal pathology or abscess was also excluded. Also who lost to follow up or unwilling to include in the study were excluded.

After clinical & laboratory evaluation & anesthesia fitness these patients were enrolled for surgery. Standard protocol of antibiotic prophylaxis was employed preoperatively. Also same protocol was followed postoperatively.

These patients were assessed postoperatively for any symptom & sign of wound infection which includes wound pain out of proportion, fever (when other causes of fever were excluded), erythma of wound margins, and soakage of dressing or discharge of fluid from wound.

Samples to assess culture & sensitivity pattern

of organism were taken from infected wounds. These samples from infected site were collected by doctors in the ward using commercially available swab on stick under aseptic technique to prevent colonization from surrounding area. Initial identification of organism was made with routine culture technique that was later confirmed by slide agglutination method. Antibiotic sensitivities were assessed by stokes or Kirby Bauer disc diffusion method. Antibiotics assessed for sensitivity after culture of the organism were: ampicillin, amoxycilin, augmentin, ceftriaxone, cefotaxime, ceftazidime, cefixime, cefipime, cefuroxime, amikacin, gentamicin, Ciprofloxacin, ofloxacin, levofloxacin, moxifloxacin, Meropenem, Piperacillin with Tazobactam, Vancomycin and Cefoperazone with Sulbactum. Results were compiled and compared to national and international literature. Data was analyzed using spss version 18.

Patients were briefed about the study and permission was obtained. They were assured that their participation is voluntary with no harms to them in terms of getting due treatment. They were also given right to withdraw from study without putting any reasons.

Subject's data was collected on preformed proforma for age, sex, diagnosis, co morbid illness, type of surgery, presence or absence of wound infection, grade of infection according to Southampton classification, culture & sensitivity pattern of organism isolated from infected wound.

RESULTS

During this 1 year period total of 424 patients of different pathologies related to General surgery were finally included in analysis. Mean age of patients was 27.35 years with standard deviation of ± 10.321 years. Amongst them 259(61.08%) were male and 165(38.92%) were female making the male to female ratio of 1.56: 1.57.

It includes operations for inguinoscrotal area in 113(26.65%) patients, Appendicectomy in 102(24.06%) patients; Laparotomy in 27(6.37%) patients. Amongst the patients who underwent Laparotomy; 08 patients were operated for release of bands & adhesions, resection anastomosis of small or large gut for tumors in 06 patients, for Volvulus of sigmoid colon in 02 patients, resection of small bowel & ileocaecal area with covering loop ileostomy for TB intestine in 11 patients. Also it includes cholecystectomy in 58(13.68%) patients, Mastectomy in 23(5.42%) patients, skin & soft tissue swelling in 24(5.66%) patients, lymph node biopsy in 19(4.48%) patients, thyroid operations in 27(6.37%) patients, benign breast swelling in 31(7.31%) patients. (Table-I)

Co morbid illness was noted in 57(13.44%) patients. It includes Diabetes Mellitus in 28(6.60%) patients, COPD in 17(4.01%) patients, and Hypertension in 23 (5.42%) patients and IHD in 05(1.18%) patients.

Surgical site infection was noticed in 54(12.74%) patients. Amongst them Grade I infection was noticed in 08(2.25%) patients, grade II

Type of operation	Operations (N & %)	Infections (N & %)
Appendicectomy	102(24.05%)	23(22.54%)
Inguinoscrotal operation	113(26.65%)	05(4.42%)
Laparotomy	27(6.36%)	09(33.33%)
Cholecystectomy	58(13.67%)	08(13.79%)
Mastectomy	23(5.42%)	03(13.04%)
Thyroid surgery	27(6.36%)	02(7.40%)
Skin & soft tissue swelling	24(5.66%)	01(4.16%)
Benign Breast swelling	31(7.31%)	01(3.22%)
Lymph node biopsy	19(4.48%)	02(10.52%)
Total	424	54(12.73%)

Table-I. Type of operations performed & ratio of surgical site infection in each operation

in 41(11.58%) patients, grade III in 05(1.41%) patients & grade IV in 01(0.28%) patient.

It includes 23(22.55%) patients of Appendicectomy, 05(4.42%) patients of inguinoscrotal surgery, 09(33.33%) patients of Laparotomy for different indications, 08(13.79%) patients of cholecystectomy. (See Table-I)

Samples were taken from 47(13.27%) patients who developed grade II & above infection & sent for culture & sensitivity pattern of organisms isolated. Amongst them, 41(11.58%) samples showed positive yield for different organisms. Most common organism isolated from infected postoperative wound infection was E. coli noticed in 26(63.41%) patients & Staphylococcus Aureus in 08(19.51%) patients. (See Table-II)

The antibiotics sensitivity showed that most sensitive antibiotics against most of the organisms were Meropenem & Pipracillin with Tazobactem which showed sensitivity to E.coli in 25(96.15%) patients & 24(92.30%) patients respectively while their sensitivity against S. Aureus was 07(87.5%) & 06(75%) patients respectively. Vancomycin was found sensitive against Staphylococcus Aureus in 07(87.5%) patients & all 03(100%) patients with streptococci were found sensitive to Vancomycin. Sensitivity of Ampicillin to most of these organisms was found significantly low. (See Table-III)

Organism isolated	No & %
Escherichia Coli	24(58.53%)
Pseudomonas Aeruginosa	02(4.87%)
Staphylococcus Aureus	06(14.63%)
Klebsiella	01(2.43%)
Streptococci	03(7.31%)
Staphylococcus Epidermides	01(2.43%)
Protius	02(4.87%)
Polymicrobial (E.coli & S.Aureus)	02(4.87%)
Total	41

Table-II. Causative organisms isolated from wound infection (n=41)

	E.Coli 26(63.41%)	Pseudomonas 02(4.87%)	Staph: Aureus 08(19.51%)	Klebsiella 01(2.43%)	Streptococci 03(7.31%)	Staph Epidermides 01(2.43%)	Proteus 02(4.87%)
Antibiotic	S	S	S	S	S	S	S
Ampicilin	09(34.61%)	00	02(25%)	00	01(33.3%)	00	00
Amoxicillin	11(42.30%)	00	03(37.5%)	00	01(33.3%)	01(100%)	01(50%)
Augmentin	17(65.38%)	01(50%)	05(62.5%)	00	02(66.6%)	01(100%)	01(50%)
Ceftriaxone	18(69.23%)	01(50%)	05(62.5%)	01(100%)	02(66.6%)	01(100%)	02(100%)
Cefotaxime	19(73.07%)	01(50%)	04(50%)	01(100%)	02(66.6%)	01(100%)	01(50%)
Ceftazidime	21(80.76%)	01(50%)	06(75%)	01(100%)	03(100%)	01(100%)	02(100%)
Cefixime	11(42.30%)	00	04(50%)	00	02(66.6%)	01(100%)	01(50%)
Cefipime	20((76.92%)	01(50%)	04(50%)	01(100%)	03(100%)	01(100%)	02(100%)
Cefuroxime	22(84.61%)	02(100%)	02(25%)	00	01(33.3%)	01(100%)	02(100%)
Amikacin	23(88.46%)	02(100%)	01(12.5%)	01(100%)	01(33.3%)	00	02(100%)
Gentimycin	17(65.38%)	00	00	01(100%)	00	00	01(50%)
Ciprofloxacin	21(80.76%)	01(50%)	02(25%)	01(100%)	02(66.6%)	01(100%)	01(50%)
Oflaxacin	18(69.23%)	00	01(12.5%)	00	01(33.3%)	00	01(50%)
Levofloxacin	17(65.38%)	00	01(12.5%)	01(100%)	01(33.3%)	00	01(50%)
Moxifloxacin	22(84.61%)	01(50%)	05(62.5%)	01(100%)	02(66.6%)	01(100%)	01(50%)
Piperacilin with Tazobactam	24(92.30%)	01(50%)	06(75%)	01(100%)	03(100%)	01(100%)	01(50%)
Meropenem	25(96.15%)	02(100%)	07(87.5%)	01(100%)	03(100%)	01(100%)	02(100%)
Vancomycin	18(69.23%)	00	07(87.5%)	00	03(100%)	01(100%)	00
Cefoprazone with Sulbactum	19(73.07%)	01(50%)	06(75%)	00	02(66.6%)	01(100%)	01(50%)

Table-III. Sensitivity pattern of Organisms isolated from wound (n=41)

DISCUSSION

Postoperative wound infections is one of the serious global problem in the field of surgery putting extra burden on patients economy through long hospital stay with increasing cost on treatment associated with higher morbidity and mortality. Additionally emergence of anti-microbial resistance among the common organisms to conventional antibiotics especially in developing countries due to their irrational practices made the treatment of this seemingly easy condition more difficult.[4,9] The inoculum size, virulence and invasive capability of the organisms have been reported to influence the risk of infection. Moreover, the physiological state of the tissue in the wound and immunological integrity of the host also has equal importance in determining occurrence of infection.[10,11]

The antibiotics sensitivity showed that most sensitive antibiotics against most of the organisms were Meropenem & Pipracillin with Tazobactem which showed sensitivity to E.coli in 25(96.15%) patients & 24(92.30%) patients respectively while their sensitivity against S. Aureus was 07(87.5%) & 06(75%) patients respectively. Vancomycin was found sensitive against Staphylococcus Aureus in 07(87.5%) patients & all 03(100%) patients with streptococci were found sensitive to Vancomycin.

In this study E. coli was found as the commonest organism in wound infection & it was noticed in 63.41% cases followed by Staphylococcus Aureus & Streptococci in 19.51% & 7.31% cases respectively. Meropenem was found as the most effective antibiotic found sensitive to 96.15% strains of E.coli & 87.5% strains of S. Aureus. 92.30% cases of E. Coli were sensitive to piperacillin with Tazobactam while its effectiveness to Staphylococcus Aureus & Streptococci was 75% & 100%. Only 34.61% & 42.30% isolates of E. Coli were found sensitive to Ampicillin, Amoxicillin. Among the derivatives of Cephalosporins, Cefixime was found as the least sensitive antibiotics for E.coli noticed in 42.30% isolates while Cefuroxime as the most sensitive Antibiotics to E. Coli noticed in 84.61% isolates. Among the derivatives of Quinolones, sensitivity of Levofloxacin to E.coli was seen in 65.38% isolates while Moxifloxacin was found sensitive to E.Coli in 84.61% isolates. Very low number of isolates of Pseudomonas Aeruginosa, Klebsiella & Proteus were found in culture of wound material.

In one Study from India by Negi1 V et al[12] isolated E-coli in 32% and staphylococcus Aureus in 31.50% cases of postoperative wound infection. Similar study by Power K[13] mentioned 86.1% of wound swabs were infected with bacteria with Pseudomonas Aeruginosa as the most common organism which was sensitive to Amoxicillin-Clavulinic acid in 94.9% cases, to Cloxacillin in 100% cases and to Cefuroxime in 92.3% cases.

Mohammad et[14] al in their study at Nigeria found Staphylococcus Aureus, Escherichia Coli, Pseudomonas Aeruginosa and Klebsiella species as the commonest species responsible for wound infection. They noticed Aminoglycosides and Quinolones as the most effective antibiotics to these organisms.

Staphylococcus Aureus was isolated from 41.8% patients of wound infections by Zafar A et al[15] in their study at Lahore. Imran M et al[16] in their study at Peshawar also found the same organism in 25% patients with wound infection followed by Pseudomonas in 21% patients.

In our study Staphylococcus Aureus was found sensitive to Vancomycin in 100% cases. Same findings were noticed in studies from Nepal[17] and West Ethiopia.[18] Another study from Ethopia mentioned 66.7% strains of Staphylococcus Aureus were resistant to Vancomycin.[19]

Polymicrobial Wound infection was seen in 02 patients where S. Aureus and E.coli were responsible for wound infection. It includes 01 case of Appendicectomy & another case of Laparotomy.

High prevalence rate of E. coli responsible for wound infection in this study is related to the type of procedure performed as infection with this organism was commonly noticed in operations of

the viscera's where E. coli has been the part of normal flora.

The possible justification for the S. Aureus as the next most common organism responsible for wound infection is due to the fact that S.aureus is a normal flora of the skin which enters into the deep tissues during surgery.

No organism was isolated in 06/47(12.77%) patients with postoperative wound infections. Possible reasons for this could be normal healing process of the wound bounded by immune system, use of antimicrobial during collection of specimen for culture. Also culture for fungi was not specified on appropriate culture medium. [20]

In this study all those patients who were operated for contaminated or dirty operations like cases of perforated Appendix, acute cholecystitis, or for Laparotomy developed more serious type or higher grade of surgical site infection according to Southampton classification. Also patients who were operated for emergency pathology developed more infections than patients who were operated for elective pathology. This is probably related to less effective preparation for surgery.

CONCLUSION

This study concludes that wound infection is responsible for significant morbidity in developing world with the frequency of 15.53% in this study. It puts up significant economic burden on the hospitals. At the same time there is an increasing resistant trend of organisms responsible for wound infection to conventional antibiotics. Therefore it is necessary to avoid developing wound infection by creating as much optimal conditions as possible. Also use of newer antibiotics to eradicate wound infections should be kept minimal & used only culture reports confirms their sensitivity & there are signs of systemic infection.

REFERENCES

1. Cruse P, Foord R. **The epidemiology of wound infection.** Surg Clin North Am 1980; 60:27-40.
2. Hohmann C, Eickhoff C, Radziwill R, Schulz M. **Adherence to guidelines for antibiotic prophylaxis in surgery patients in German hospitals: a multicenter evaluation involving pharmacy interns.** Infection. 2012; 40(2):131-37.
3. Astagneau P, Rioux C, Golliot F, Brucker G. **Morbidity and mortality associated with surgical-site infections: results from the 1997–1999 INCISO surveillance.** J Hosp Infect. 2001; 48:267–274. [PubMed: 11461127].
4. Nathens AB, Cook CH, Machiedo G, Moore EE, Namias N, Nwariaku F. **Defining the research agenda for surgical infection: a consensus of experts using the Delphi approach.** Surg Infect (Larchmt) 2006; 7(2):101-110.
5. Pradhan GB, Agrawal J. **Comparative study of post-operative wound infection following emergency lower segment caesarean section with and without the topical use of fusidic acid.** Nepal Med Coll J. 2009; 11 (3):189-91.
6. Ahmed MI. **Prevalence of nosocomial wound infection among postoperative patients and antibiotics patterns at teaching hospital in Sudan.** N Am J Med Sci .2012; 4(1):29-34.
7. Owens CD, Stoessel K. **Surgical site infections: epidemiology, microbiology and prevention.** J Hosp Infect. 2008; 70 (Suppl 2): 3-10.
8. Masaadeh HA, Jaran AS. **Incident of Pseudomonas aeruginosa in post-operative wound infection.** Am J Infect Dis. 2009; 5:1–6.
9. Swenson BR, Hedrick TL, Metzger R, Bonatti H, Timothy L. Pruett TL, Sawyer RG. **Effects of Preoperative Skin Preparation on Postoperative Wound Infection Rates: A Prospective Study of 3 Skin Preparation Protocols.** Infect Control Hosp Epidemiol. 2009 October; 30(10): 964–971. Doi: 10.1086/605926.
10. G.S. Banashankari1, H.K. Rudresh2 and A.H. Harsha. **Prevalence of Gram Negative Bacteria in Diabetic Foot-A Clinico-Microbiological Study.** Al Ame en J Med Sci. 2012; 5 (3): 224-232, 2012.
11. Rutala WA, Weber DJ. **Cleaning, Disinfection, and Sterilization in Healthcare Facilities. APIC Text of Infection Control and Epidemiology.** 2nd ed. 2005 p. 21-1-21-12.
12. Negi1 V, Pal S, Juyal D, Sharma MK, Sharma N. **Bacteriological Profile of Surgical Site Infections and Their Antibiogram: A Study From Resource Constrained Rural Setting of Uttarakhand State, India.** Journal of Clinical and Diagnostic Research. 2015 Oct, Vol-9(10): 17 – 20 DC17-DC20.

13. Power K, Davies MM, Hargest R, Phillips S, Torkington J, Morris J. **A case-control study of risk factors for wound infection in a colorectal unit.** Ann R Coll Surg Engl 2014; 96: 37–40. doi 10.1308/003588414X138245 11650137.

14. Mohammed A, Adeshina GO, Ibrahim, YKE. **Retrospective incidence of wound infections and antibiotic sensitivity pattern: A study conducted at the Aminu Kano Teaching Hospital, Kano, Nigeria.** Int J Med MedicalSci. 2013 5:60-66.)

15. Zafar A, Anwar N, Ejaz H. **Bacteriology of infected wounds- A study conducted at Children's Hospital, Lahore.** Biomedica. 2007; 8:103-8.

16. Imran M, Faheem M, Aslam V, Hakeem A, Rehman I, Shah A. **Wound infection and culture sensitivity pattern in pediatric burn patients.** J Postgraduate Med Ins. 2009; 23: 304-8.

17. Raza MS, Chander A, Ranabhat A: **Antimicrobial susceptibility patterns of the bacterial isolates in post-operative wound infections in a tertiary care hospital, Kathmandu, Nepal.** OJMM. 2013, 3 (3): 159-163. 10.4236/ojmm.2013.33024.

18. Mulu W, Kibru G, Damtie M: **Postoperative nosocomial infections and antimicrobial resistance pattern of bacteria isolates among patients admitted at felege hiwot referral hospital, bahirdar, Ethiopia.** Ethiop J Health Sci. 2012, 22 (10): 7-18.

19. Guta M, Aragaw K, Merid Y: **Bacteria from infected surgical wounds and their antimicrobial resistance in Hawassa University Referral Teaching Hospital, Southern Ethiopia.** AJMR. 2014, 8 (11): 1118-1124.

20. Pondei K, Fente BG, Oladapo O: **Current microbial isolates from wound swabs, their culture and sensitivity pattern at the Niger delta university teaching hospital, Okolobiri, Nigeria.** Trop Med Health. 2013, 41 (2): 49-53. 10.2149/tmh.2012-14.

PREVIOUS RELATED STUDY

Farkhunda Akhter, Maliha Khawar, Tooba Hamid, Moazzam Ali. Surgical site infections (SSI); Postcaesarean rate and factors (Original) Professional Med J 2016;23(11): 1328-1333.

AUTHORSHIP AND CONTRIBUTION DECLARATION

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