IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 10 Ver. X (October. 2016), PP 57-60
www.iosrjournals.org

A Clinico Bacteriological Study of Post Operative Wound Infection

Samir Anand[1], Vikas Verma[2], Pushpender[3], BK Arora[4], RS Dahiya[5] ,Devender[6]
[1](Asst. Prof. Deptt Of General Surgery, Pt. B.D.Sharma Pgims Rohtak, India)
[2](Pg Student Deptt Of General Surgery, Pt. B.D.Sharma Pgims Rohtak, India)
[3](Former Pg Student Deptt Of General Surgery, Pt. B.D.Sharma Pgims Rohtak, India)
[4](Asso.Prof. Deptt Of General Surgery, Pt. B.D.Sharma Pgims Rohtak, India)
[5](Former Sr Prof. Deptt Of General Surgery, Pt. B.D.Sharma Pgims Rohtak, India)
[6](Pg Student Deptt Of General Surgery, Pt. B.D.Sharma Pgims Rohtak, India)

Abstract: *Post operative wound infection is considered as a surgeon's nightmare. Before the mid - 19th century, surgical patients commonly developed post operative purulent discharge from their incisions, followed by overwhelming sepsis, and often death. It was not until the late 1860s, after Joseph Lister introduced the principles of antisepsis that postoperative infections morbidity decreased substantially.*
Keyword: *Surgical Site Infection, Surgical Wound.*

I. Introduction

Post operative wound infection is one of the major causes for increased postoperative morbidity.[1] In 1992 the US CDC revised its definition of wound infection, creating the definition of surgical site infection to prevent confusion between the infection of surgical incision and infection of traumatic wound. Although SSIs are not associated with a high case fatality rate, they cause significant morbidity and huge economic burden in the form of prolonged hospital stay, readmission and procedures. Hence a septic surgical wound is considered a remarkable expensive luxury.[2] While the global estimate of SSI have varied from 0.5-15% [3], studies in India have consistent shown higher rates ranging from 20-38%.[4, 5] The variability in estimate is consistent with the difference in the characteristics of the hospital populations, the underlying diseases, difference in clinical procedures, the extent of infection control measures and in addition the hospital environment. Hence this observational study has been undertaken to estimate the incidence of SSI, the factors associated with the occurrence of SSI and their antibiotic sensitivities in general surgery hospital wards.

II. Material and method

The present study was conducted in the department of general surgery in collaboration with the department of microbiology. Patients for study were selected from among those admitted in the surgical wards and the surgical emergencies that underwent surgical procedure in this hospital. Each patient carefully assessed for the sign of surgical site infection till the day of discharge and followed up as an outpatient basis once a week for 30 days. The discharges from infected wounds were inoculated into blood agar and MacConkey's plate and also into a tube of brain heart infusion broth, which were incubated at 37°C overnight. If no growth was observed on plates, then subculture were made from BHI broth on solid media and processed as described above. Exclusion criteria were patients operated elsewhere and getting admitted, patients underwent surgery with SSI of previous operative procedure.

III. Results

Based on the type of setting in which the surgeries were done, there were 350 cases in elective setting out of which 26 got infected and 126 cases in emergency setting out of which 30 got infected. The overall rate of surgical site infection (SSI) was 11.7%.

The occurrence of SSI in emergency cases (23.8%) was found to be higher compared to elective cases (7.4%). Among the organism cultured gram negative organism predominate the picture (89%) and commonest was Escherchia coli (57.1%), followed by Klebsiella(18.9%), Pseudomonas(11.4%) and Staphylococcus aureus (8.6%). E.coli and Klebsiella from emergency cases showed resistance to ciprofloxacin (83%) and ceftraixone (83%) and elective cases showed resistance of 70 % to ciprofloxacin and 40% to ceftriaxone.On statistical analysis of the data it was found that occurrence of SSI is significantly more in emergency cases (p value <0.000001) which is highly significant.

Table 1: Distribution of cases based on the case scenario

Type Of Class	No. Of Cases	No. Of Ssi	%
Emergency	126	30	23.8
Elective	350	26	7.4
Total	476	56	11.7

Table 2: SSI in different class of wounds

S No	Class Of The Wound	No Of Cases (Emergency +Elective)	No Of Ssi	%
1.	Clean	125 (0+125)	7	5.6
2.	Clean Contaminated	228(15+213)	18	7.9
3.	Contaminated	62(54+8)	13	21.3
4.	Dirty	61(57+4)	18	29.5

Out of all cases in which SSI occurred 35 were deep SSI and 21 were superficial SSI. The incidence of deep SSI was more in contaminated dirty groups than in the clean and clean contaminated groups. (p value of < 0.000002 which is highly significant). The incidence of superficial SSI was found not to be significant.

Table 3: Distribution of infected cases based on degree of SSI

Cases	Superficial SSI	Deep SSI	Total
Clean	4	3	7
Clean Contaminated	8	10	18
Contaminated	3	10	13
Dirty	6	12	18
Total	21	35	56

The presence of diabetes increased the occurrence of wound infections. The percentages of surgical wound in diabetic getting infected were 42.3% and non diabetic were 9.4% which is statically highly significant.

Table No 4: Distribution of SSI among diabetics and non diabetics

		No of cases	No of SSI	% of infection
Diabetic	Elective	28	5	17.8
	Emergency	8	6	75
Non diabetic	Elective	322	21	6.5
	Emergency	118	24	20.3

The number of SSI increased as the duration of surgery also increased. The surgeries in the abdominal and perineal regions show more infections rate. Also surgeries on limbs show increased infection rate due to decreased blood supply. The cleaner and well perfuse area of head, neck and thorax show decreased infection rate. It was observed that when procedure wise risk of SSI was analyzed, the risk was found to be higher in the contaminated cases and emergency surgeries.

Among the organisms cultured from various swabs taken the gram negative bacteria were 86% and gram positive were 14%.Among them the individual organism cultured were Escherichia Coli (57.1%), Pseudomonas (11.4%), Klebsiella (18.9%) and Staphylococcus aureus (8.6%). On Gram staning in emergency cases out of total 22 , 3 were Gram positive and 19 were Gram negative and in elective cases out of 13 cases 1 was Gram positive and 12 were Gram negative.

The organism isolated from infected cases in Elective cases showing positive culture the type bacteria isolated were E.coli 8,Pseudomonas 2, Klebsiella 2, Staphylococcua aureus 3 and in 11 cases no growth was seen. In Emergency cases showing positive culture the type bacteria isolated were E.coli 12,Pseudomonas 2, Klebsiella 5, Staphylococcua aureus 1 and in 10 cases no growth was seen.

Table 5: Distribution of bacterial isolate among emergency and elective cases

S.No.	Class of wound	No. of cases (emergency)	No. of cases (elective)	No. of SSI (emergency)	No. of SSI (elective)	Organisms	No. of SSI (emergency)	No. of SSI (elective)
1	Clean	0	125	0	7	E.coli	0	1
						Pseudomonas	0	0
						Staph. aureus	0	3
						Klebsiella	0	1
						Sterile	0	2

2	Clean Contaminated	15	213	5	13	E.coli	0	2
						Pseudomonas	1	1
						Staph. aureus	1	0
						Klebsiella	1	2
						Sterile	2	8
3	Contaminated	54	8	9	4	E.coli	5	3
						Pseudomonas	0	
						Staph. aureus	0	
						Klebsiella	2	1
						Sterile	2	
4	Dirty	57	4	16	2	E.coli	7	2
						Pseudomonas	1	
						Staph. aureus		
						Klebsiella	2	
						Sterile	6	

IV. Discussion

Aging have been reported to increase the like hood of SSI owing to the decreased immune competence and increase risk of SSI with increasing age in our study and various previous studies. In developing nations like Middle East countries, Latin America and the Indian subcontinent, rate of infections are much higher than western countries. A recent study in Tehran[6] estimated an infection rate of 8.4 % while the Indian studies showed higher infection rates like a study done by Subramanian et al estimated an infection rate of 24.8 %.[7] Similar study in a teaching hospital in Goa showed infection rate of 24%.[5] In present study overall infection rate is 11.7% and individual distribution of SSI occurrence based on wound class was clean (5.6%), clean contaminated (7.9%), contaminated (21.3%) dirty cases (29.5%) which showed the similar increasing trend of infection as the degree of contamination increased. Difference in patient's characteristics, distribution of surgical procedures and hospital setting may explain this, but high incidence of SSI after clean procedure was striking.

This may be explained by the existence of bacteria resistant to the prophylaxis used. In comparison of various studies on wound infection conducted in different countries like Horsan et al USA[8], Kaya et al Turkey[9],Sangrasiet al Pakistan[10], Kamat et al India[5] the rate of SSI was 4.75%,12.8%,13%,30.7% respectively. In present study the rate of SSI was 11.7% which closely resemble to studies conducted in Turkey and Pakistan. The occurrence of SSI in emergency cases (23.8%) was found to be higher compared to elective cases (7.4%). This is due to higher number of contaminated and dirty cases and inadequate pre op preparation in emergency setting. Similar higher incidence of infection in emergency cases found in other studies by Sorensen et al[11] and study conducted in Goa.[5] Compared to head and neck region (nil cases), the inguinal region has2.2%infection rate, thorax 4%, abdomen 13% while limbs (28%) and perianal region (62%) had highest infection rate. A similar finding recoded by Subramanian et al [7]and is attributed to rich blood supply to the tissue of head, face and neck enabling early mobilization of body's defense mechanism and lower infection rate.

In our study gram negative bacteria accounted for about 89% of isolated organisms with commonest being Escherichia coli (57.1%), Klebseilla (18.9%), Pseudomonas (11.4%), while there were only 4 cases of gram positive bacteria (Staphylococcus aureus8.6%, recovered out of 56 infected patients). In a study in Pakistan of 150 bacteria, isolated from surgical site infection Staphylococcus was 43%, Klebsiella 23%, E. coli (18%) and Pseudomonas (13%).[10] In a study by Anbumani et al[12] in India, among bacterial isolates 559 (49.6%) were gram positive cocci and 558 (49.5%) gram negative bacilli while negligible number 9 (0.8%) were gram positive bacilli. The most frequent organism isolated were Staphylococcus aureus (37%), Pseudomonas aeruginosa (15%) and Escherichia coli (12%). Though earlier study showed staphylococcus as the most common organism, the increasing role of gram negative bacilli in etiology of nosocomial infection has been emphasized in the researches throughout the world. Studies in India by Kamet et al[5], seventy nine percent (79.33%) of the isolates were gram negative bacteria; pseudomonas being the commonest one, followed by staphylococcus pyogenes.

The bacteria isolates in our study showed a strong resistance pattern to many antibiotics. The E coli and Klebsiella isolated from emergency cases showed resistance to pre op antibiotics ciprofloxacin (83%), ceftriaxone (70%) and sensitive to antibiotics like carbepanum , Amikacin and netilmicin while elective isolates showed a resistance of 70% to ciprofloxacin and 40% to ceftriaxone. The proportion of bacteria resistant to the third generation cephalosporin used preoperatively was high as 63. 93% in the study conducted at Goa. In a study by Anbumani et al[12] in India , among the bacteria isolates 559 (49.6% were gram positive cocci 558

(49.5%) gram negative bacilli while a very negligible number 9 (0.8%) were gram positive bacilli. Forty percent of staphylococcus aureus showed resistance to oxacillin but reained a consistent susceptibility to vancomycin. Among the gram negative isolate, 75.6 % were multi drug resistance. In India study by SA Khan et al[13] E. coli was the commonest pathogen found (25%), followed by Psedomonas aerugenosa (20.83%) and cougulase positive staphylococci (19.04%) in surgical set up. Of the anti microbial commonly used, impressive results of susceptibility pattern were observed with an aminoglycoside, Amikacin (61.30%), followed by third generation cephalosporins, cefotaxime (40.47%) and amoxicillin clavulanic acid (33. 92%). In our study incidence of MRSA among the isolate was 50% (2 out of 4 S. Aureus). Patients with MRSA SSIs have worse clinical outcomes, increasing length of hospital stay and greater health care cost than patients with SSIs caused by methicillin sensitive S. aureus (MRSA).

In our study about 48% of the enterobacteriaceae beta lactemase producing Escherichia coli and Klebsiella spp are emerging as threats worldwide. Carbepanum are considered antibiotic of choice to treat ESBL producing Enterobacteriaceae.

V. Conclusion

The overall rate of surgical site infection (SSI) was 11.7%. The occurrence of SSI in emergency cases (23.8%) was found to be higher compared to elective cases (7.4%). Among the organism cultured gram negative organism predominate the picture (89%) and commonest was Escherchia coli (57.1%), followed by Klebsilla(18.9%), Pseudomonas(11.4%) and Staphylococcus aureus (8.6%). E.coli and Klebsiella from emergency cases showed resistance to ciprofloxacin (83%) and ceftrixone (83%) and elective cases showed resistance of 70 % to ciprofloxacin and 40% to ceftrixone. Hence we recommended the antibiotic to which gram negative organism are sensitive, should be considered for antibiotic prophylaxis.

Refrences

[1]. Leaper DJ, Vangoor H, Reilly J, Petrosillo N, Geiss HK, Torres AJ et al. Surgical site infection – a European perspective of incidence and economical burden. Int Wound J 2004; 1: 247-73.
[2]. Sampson P. Postoperative wound sepsis rate can be cut by simple measure. JAMA. 1998; 239:9-10.
[3]. Oslon M, Lee JT Jr. Continuous 10 year wound infection surveillance. Arch Surg. 1990; 125: 749-803.
[4]. Ganguly PS, Khan Y, Malik A, Nosocomial infection and hospital procedures. Indian J Commun Med.2000; 25: 39-43
[5]. Kamat US, Fereirra AMA, Kulkarni MS, Motghare DD. A prospective study of surgical site infection in a teaching hospital in Goa. Indian J Surg.2008; 70:120-4.
[6]. Razavi SM, Ibrahimpor M,Kashani AS, Jafarian A, Abdominal surgical site infections: incidence and risk factors at an Iranian teaching hospital. BMC Surg. 2005; 5:2.
[7]. Subramanian KA, Prakash A, Shriniwas, Bhujwala RA. Postoperative wound infection. Ind J Surg. 1973; 57-64.
[8]. Culver DH, Horan TC, Gaynes RP. Surgical wound infection rate by wound class, operative procedure and patient risk index. National Nosocomial infections surveillance system. Am J Med 1991; 91:152-7.
[9]. Kaya E, Yetim I, Dervisoglu A, Sunbul M, Bek Y. Risk factors for and effect of a one year surveillance program on surgical site infection at a university hospital in Turkey. J Surg Infect 2006; 7: 519-26.
[10]. Sangrasi AK, Leghari AA, Memon A, Talpur AK, Quereshi GA, Memon JM. Sl surgical site infection rate and associated risk factors in elective general surgery at public sector medical medical university in Pakistan. Int Wound J. 2008;5:74-8
[11]. Sorensen LT, Hemmingsen RN, Kallehave F, Jargensen PW, Kjaergaard J, Lisbeth N , Moller LN. Risk factor for tissue and wound complications in gastrointestinal surgery. Ann Surg. 2005; 24:645-8.
[12]. Anbumani N, Kalyan J, Mallika M. Epidemiology and microbiology of wound infections. Indian J Prac Doc. 2006; 3: 11-2.
[13]. Khan SA, Rao PGM, Rao A, Rodrigues G, Survey and evaluation of antibiotic prophylaxis usage in surgery wards of tertiary level institution before and after the implementation of clinical guidelines. Indian J Surg. 2006; 68:150-6.