Clinico-epidemiological study of wound infection: A case series type of descriptive study

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Abstract*—Surgical site infections (SSIs) are a substantial problem for patients undergoing procedures in spite of advances in surgical techniques and medical care. So this case series of SSI were studied to know the clinico-epidemiological profile of these cases to better know the etiology for better prevention. This study was conducted on 100 cases of SSI admitted and operated in surgical wards of upgraded department of surgery in Sawai Man Singh Hospital Jaipur, chosen at random irrespective of age, sex undergoing emergency laparotomies. It was observed from this study that most common sign and symptom was discharge (38%) followed by pain and tenderness (33%), raised local temperature (23%) and suture under tension/cut though (11%). Most of the wound infection was detected on 3rd to 5th post operated day. Regarding collection in wound it was observed that 60% was with seropurulent collection 18% with serous and purulent collection and 5% with fecopurulent collection. Etiological agent was found E. coli in 27%* followed by Enterobactor (5%), Staphylococcus (2%) and Kleibsella (1%) and Pseudomonas (1%).

Keywords: Surgical Site Infections (SSI), Laparotomies.

I. INTRODUCTION

Surgical site infections (SSIs) are defined as wound infection following an invasive surgical procedure. SSIs have been shown to contribute up to 20% of nosocomial infections with an overall incidence around 5% across all invasive surgical procedures.[1] Laparotomies carry a higher risk of wound infection and a combined rate of 15% has been reported in upper and lower gastrointestinal surgery, over three times the average risk. Despite these activities SSI remains a substantial cause of morbidity and mortality among hospitalized patients.[2]

Furthermore, in large bowel surgery, an overall infection rate of 17.5% has been identified in the UK.[3, 4] Rates as high as 26% in colorectal procedures[5] and up to 57% in small bowel procedures[6] have also been described. Moreover post operative wound infection or surgical site infection (SSI) delays return to gainful employment and prolong hospital stay[7]& can weaken an abdominal closure and result in wound dehiscence and incisional hernia. Alongside increasing unnecessary patient suffering and a decreased quality of life (QoL).[8,9] Advances in infection control practices include improved operating room ventilation, sterilization methods, barriers, surgical techniques and availability of antimicrobial prophylaxis. Despite these activities SSI remains a substantial cause of morbidity and mortality among hospitalized patients. Thus to reduce the morbidity of SSI, systematic but a realistic approach must be

applied with the awareness that this risk is influenced by characteristics of the patient, operation, personnel and hospital.

So this case series of 100 SSI cases was conducted to know the clinico-epidemiological profile of these cases to better know the etiology and better prevention.

II. METHODOLOGY

This case series type of observational study was conducted in department of General Surgery, SMS Medical College, Jaipur (Rajasthan) India, on 100 operated emergency laparotomies with SSI attended and operated at surgery department this institute.

After getting approved from institutional ethical committee, this study was started in April 2016. For this study, study participants were chosen randomly irrespective of age, sex undergoing emergency laparotomies. Cases having any risk factpr for wound infection and who has not given written inform consent were excluded from study. After receiving patient in surgical ward detailed history was taken in all cases; systemic examination was then carried out and pre operative diagnosis was made by history and pre operative investigations. All patients of peritonitis (Primary and Secondary) undergoing emergency laparotomies were included in study. After making pre operative diagnosis cases were operated and thorough irrigation of peritoneal cavity and surgical wound site by normal saline and proper haemostasis was done.

If the patient was already receiving intravenous antibiotic according to primary pathology, the same antibiotic was continued. The patients who were not receiving any antibiotics were started on broad were available. Later on the antibiotic were changed according to sensitivity reports and degree of wound infection if needed. Amount of discharge was recorded daily. Drain was removed when it stopped draining or the output was 5ml. or less which ever falls earlier. The sutures were removed before discharge from hospital. Patient was followed up to 30 days post operatively follow up either in OPD or through correspondence. Consultant and senior resident under their direct supervision treated all patients. Subsequently clinically faculty and residents under clinical faculty were retained in the use of this procedure and assisted in the treatment and management of these patients.

Data regarding pre-operative, intra operation and post operative period were also collected. Data thus collected were compiled as master chart in MS EXCEL 2010 worksheet. Qualitative data were expressed in percentage and proportion. Quantitative data were expressed in mean and standard deviation.

III. RESULTS

Among all 100 SSI cases, majority of the case were in the age group 40-50 years. The youngest patient was 25 years and the oldest patient was 75 years old and the mean age of patients was 48.4 years. Majority were females i.e. 98% only 2% were male. Among females 57.14% of the patients were postmenopausal. A total of 66% of cases were from rural background and 34 (34%) were from urban background with the ratio of 1.9:1. (Table 1)

Table 1
Bio-socio-demographic distribution of SSI cases (N=100)

S. No.	Variable		Number	%
1	**Age (in Years)**	20-30	10	10
		31-40	16	16
		41-50	32	32
		51-60	20	20
		61-70	14	14
		71-80	8	8
2	**Sex**	Male	2	2
		Female	98	98
3	**Menopausal Status**	Pre-Menopausal	42	42.85
		Post-Menopausal	56	57.15
4	**Residence**	Rural	66	66
		Urban	34	34

Most common sign and symptom was discharge (38%) followed by pain and tenderness (33%), raised local temperature (23%) and suture under tension/cut through (11%) and majority (60%) had seropurulent type of collection followed by Serous and purulent and Fecopurulent. (Table 2)

Table 2
Clinical profile of SSI cases (N=100)

S. No.	Variable		Number	%
1	**Signs & Symptom**	Discharge	38	38
		Pain and Tenderness	33	33
		Raised local Temperature/Fever	23	23
		Suture under tension/Cut through	11	11
5	**Type of Collection**	Seropurulent	60	60
		Serous and purulent	18	18
		Fecopurulent	5	5

Out of the 100 operated cases, a majority 80 (80%) underwent classical modified radical mastectomy (MRM). Six (6%) toilet mastectomies or palliative mastectomies were done, all these cases had fungating masses. Simple mastectomy was done in 14 (14%) patient. Out of 100 operated cases, 56 (56%) were operated by surgical oncologists while the remaining 44 (44%) were operated by general surgeons. (Table 3)

Table 3
Distribution of SSI cases according to type of operation done (N=100)

S. No.	Type of Operation	Number	%
1	**Simple mastectomy**	14	14
2	**Classical modified radical mastectomy (MRM)**	80	80
3	**Toilet mastectomies or palliative mastectomies**	6	6

Out of total SSI, 27% caused by E.coli, 5% by Enterobactor, 2% by Staphylococcus and 1% by Kleibsella and Pseudomonas each. (Table 4).

Table 4
Distribution of SSI cases according to etiological agent (N=100)

S. No.	Type of etiological agent	Number	%
1	**E Coli**	27	27
2	**Enterobactor**	5	5
3	**Staphylococcus**	2	2
4	**Kleibsella**	1	1
5	**Pseudomonas**	1	1

IV. DISCUSSION

Surgical wound infection continues to be a major cause of morbidity and mortality in surgical practice despite per operative broad – spectrum antibiotic coverage. Even though complete elimination of wound infection is not possible, a reduction of the wound infection rate to a minimum level could have marked benefits in terms of both patient comfort and resources used.

Conventional methods of treating purulent wound collection remain open drainage followed by repeated dressings for weeks. Followed by secondary intention.[10] This method of treatment increases the time spent by the patient in the hospital staff for the care of the wound. Wound healing is the continuum of complex interrelated biological process at the molecular level. Healing is divided into the following phases for descriptive purposes; inflammatory phase, proliferative phase and maturation phase. The wound continuously undergoes remodeling to try to achieve a state similar to that prior to injury. The wound has 70 -80% of its original tensile strength at 3-4 months postoperative. For this methodical process of wound healing to take place, the local environment of the wound should be healthy. Evidence indicates that if a wound is not allowed to drain freely blood body fluids put and necrotic material will collect in the wound providing a growth medium for microorganisms. Surgical wound drainage is recognized as a key element in facilitating the healing process. Since time immemorial this surgical drainage was followed by daily dressings and healing by secondary intention. So prevention of surgical site wound infection is far more practical than treating them once they have become established.

In this study, majority of the SSI case were in the age group 40-50 years with mean age of patients was 48.4 years with clearcutt female preponderence 98% v/s 2%. A total of 66% of cases were from rural background and 34 (34%) were from urban background with the ratio of 1.9:1. Well comparable findings were of Masood A etall[11] who reported that patients in the age group 51-60 years were infected more than those in the younger age groups. Other authors like Scott etall[12] and Perl TM[13] also made almost similar observations and found that increased age was associated with an increased probability of an post-operative wound infection.

In present study, majority 80 (80%) underwent classical modified radical mastectomy (MRM). Six (6%) toilet mastectomies or palliative mastectomies were done, all these cases had fungating masses. Simple mastectomy was done in 14 (14%) patient. Out of 100 operated cases, 56 (56%) were operated by surgical oncologists while the remaining 44 (44%) were operated by general surgeons.

In a study conducted by Rajendra etall[14] reported that Prostatectomy cases had post-operative wound infection followed by Intestinal surgery (42.11%), Cholecystectomy (33.33%) but the difference distribution of proportion of these cases as per type of operation was not significant ($p>0.05$). In contrast to this many authors[11,13] found that proportion of cases with post-operative infected wound depend upon the type of surgery.

Simultaneously it was observed in the present study that all the cases operated in emergency so having post operative wound infection. This observation was supported by Rajendra etall[14] who also reported that operation done in emergency have significantly more infection in post-operated wound. It is also well supported by Michalopoulos A etall[15] who reported that emergency surgical procedures were more susceptible to infection (p = 0.08) than scheduled procedures.

In this study, out of total SSI, 27% caused by E.coli, 5% by Enterobactor, 2% by Staphylococcus and 1% by Kleibsella and Pseudomonas each. Almost similar observations were made by Rajendra etall[14] who also found maximum proportion of causative agent found in post-operative infected wound was Staphylococci (90.48%) followed with Streptococci, E. Coli, Klebsella and Pseudomonas. Masood etall[11] also observed the common organisms involved in the SSI were Staphylococcus aureus, E. coli, Streptococcus pyogenes and Pseudomonas group. Arora etall[16] also have reported *Staphylococcus aureus* has been described as the most common single pathogen involved in postoperative wound infections.

V. CONCLUSION

This study concludes that sign of inflammation were marked in post operative wound collection. In this series only 23% patients have raised local temperature, while 11% of patients have stitch line cut through. Most of the patients have discharge and local tenderness, which made the surgeon suspect, wound collection. The post operative wound collections may vary from simple serous to seropurulent/purulent/fecopurulent collection. In this series, 60% have seropurulent collection. 18% have purulent and 5% serous collection. E.coli and Enterobactor were the major organism in post operative wound infections following infective laparotomies.

CONFLICT OF INTEREST

None declared till now.

REFERENCES

[1] NICE. Clinical Guideline 74—prevention and treatment of surgical site infection. NICE, October 2008, http://www.nice.org.uk/nicemedia/ pdf/CG74NICEguideline.pdf.

[2] Watanabe A., Kohnoe S., Shimabukuro R., et al. Risk factors associated with surgical site infection in upper and lower gastrointestinal surgery. Surgery Today. 2008;38(5):404–412. doi: 10.1007/s00595-007-3637-y. [PubMed] [Cross Ref]

[3] HPS. Surveillance of Surgical Site Infection. Annual Report for Procedures Carried out from: January 2003–December 2011. Glasgow City, UK: Health Protection Scotland; 2012. http://www.documents.hps. scot.nhs.uk/hai/sshaip/publications/ssi/ssi-2011.pdf.

[4] Health Protection Agency. Surveillance of Surgical Site Infections in NHS Hospitals in England, 2010/2011. Health Protection Agency; 2011.

[5] Smith R. L., Bohl J. K., McElearney S. T., et al. Wound infection after elective colorectal resection. Annals of Surgery. 2004;239(5):599–607. doi: 10.1097/01.sla.0000124292.21605.99. [PMC free article] [PubMed] [Cross Ref]

[6] Satyanarayana V., Prashanth H. V., Bhandare B., Kavyashree A. N. Study of surgical site infections in abdominal surgeries. Journal of Clinical and Diagnostic Research. 2011;5(5):935–939.

[7] Astagneau P., Rioux C., Golliot F., Brücker G. Morbidity and mortality associated with surgical site infections: results from the 1997–1999 INCISO surveillance. The Journal of Hospital Infection. 2001;48(4):267–274.

[8] Sharma A., Sharp D. M., Walker L. G., Monson J. R. T. Predictors of early postoperative quality of life after elective resection for colorectal cancer. Annals of Surgical Oncology. 2007;14(12):3435–3442. doi: 10.1245/s10434-007-9554-x. [PubMed] [Cross Ref]

[9] Reichman D. E., Greenberg J. A. Reducing surgical site infections: a review. Reviews in Obstetrics and Gynecology. 2009;2(4):212–221. [PMC free article] [PubMed]

[10] Robson MC Heggers JP surgical infection I single bacterial species of polymicrobic in origin surgery 1969,65;608

[11] Masood A, Shams NA, Obaidullah K and Manzar S.: Post-operative wound Infection: A Surgeon's Dilemma. Pak. J. of Surg.2007;23 (1):41-47

[12] Scott JD, Forrest A, Feuerstein S, Fitzpatrick P, Schentag JJ. Factors associated with post-operative infections. Infect. Control Hosp Epidemiol 2001June; 22(6): 347-51

[13] Perl TM and Roy MC. Post-operative infections: Risk factors and role of Staphylococcus aureus nasal carriage. J. Chemother 1995 July; 7(3) Suppl: 29-35

[14] Dr. Rajendra Krishna [1], Dr. Gayitri Tyagi,[2] Dr. Pratibha Vyas [3] and Dr. Mahesh Sharma. Post-operative Wound Infection in Cases operated in a Tertiary Level Hospital Jaipur (Rajasthan) India**.** IMJH. 2015;1 (2):1-7 www.imjhealth.org

[15] Michalopoulos A and Sparos L.: Post-operative wound infection. Nurs. Stand. 2003 July16-22 Vol 17 (44) p53-56, 58, 60

[16] Arora S, Prabhakar H, Garg BB, Jindal N. Anaerobic bacterial flora of Wound Sepsis. J Indian Med Assoc 1990 Jun; 88: 154-6.