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A Clinical Study of Post Operative Abdominal Wound Infection

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Abstract

Introduction: Despite the advances in surgical sciences post operative wound infection remains one of the common complication which surgeons encounter. This problem if not evaluated and treated in a timely manner can have significant sequel. Infection is encountered by all surgeons by nature of their crafts; they invariably impaired the first line of host defence *Methodology*: The material for the present study was obtained from patient's undergone surgery in Department of General Surgery, BMC & RI, BANGALORE, from 1st Jan 2012 to 30th June 2013. Surgical site were considered to be infected according to the definition by NNIS. The wounds were classified according to the wound contamination class system proposed by U.S. National Research Council. *Results:* Incidence of infection among Emergency surgery is 26% where as among Elective is 3.33%.25 Cases (69.44%) of total infected cases had superficial SSI, 8 cases (22.22%) deep SSI and 3 cases (8.33%) had organ space infection. *Conclusion:* As expected the rate of infection increased from clean wounds to contaminated wounds.

Keywords: Post Operative; Wound Infection; Complication.

Introduction

Surgical infections are those that occur as a result of a surgical procedure or those that require surgical intervention as part of their treatment. They are characterized by a breach of mechanical/anatomic defense mechanisms (barriers) and are associated with greater morbidity, significant mortality, and increased cost of care [1].

The 16th century French surgeon Ambroise Pare is famous for saying, "I dressed the wound, God healed it". The implication was that wounds heal by a mysterious incomprehensible force as long as local care is adequate. This attitude, unfortunately, has endured. In truth, it is only a quaint remainder of the ignorance that has lasted well into the present century.

Despite the advances in surgical sciences post operative wound infection remains one of the common complication which surgeons encounter. This problem if not evaluated and treated in a timely manner can have significant sequel. Infection is encountered by all surgeons by nature of their crafts; they invariably impaired the first line of host defence. The cutaneous or mucosal barrier, the entrance of microbes into the host tissue is the initial requirement for infection [2].

During the years there has been considerable progress in both the prevention and treatment of infection. Since Pasteur, Cohn, Lister, Koch and Klebs, man has constantly strove to combat infection. The discovery and confirmation of the link between microbes and diseases led ultimately to the use of arsenic, mercury and of 2 sulphonamides and following the discovery of penicillin to the steady development of antibiotics [3,4].

Remarkable life saving discoveries have been made but infection causing organisms have also been successful in combating antibiotics and the search continues. The cost of an infected operation to the

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patient and the community cannot be simply measured in rupees and dollars. Surgeon should understand the real cost by analysing it in terms of morbidity and monetary. Everything that is done to reduce the infection rate costs money, so that it is important that the effectiveness of any new procedures introduced must be evaluated [5].

SSI can double the length of time a patient stays in hospital and thereby increase the costs of health care. The main additional costs are related to re-operation, extra nursing care and interventions, and drug treatment costs. The indirect costs, due to loss of productivity, patient dissatisfaction and litigation, and reduced quality of life, have been studied less extensively.

Methodology

The material for the present study was obtained from patient's undergone surgery in Department of General Surgery, BMC & RI, Bangalore, from 1st Jan 2012 to 30th June 2013. Surgical site were considered to be infected according to the definition by NNIS. The wounds were classified according to the wound contamination class system proposed by U.S. National Research Council.

An elaborate study of these cases with regard to date of admission, history, clinical features date of surgery, type of surgery, emergency or elective, preoperative preparation and postoperative management is done till patient is discharged from hospital, and then followed up the patient on OPD basis for any signs of wound infection.

The wounds were examined for suggestive Signs/ Symptoms of infection in the post operative period, during wound dressing or when the dressings were soaked. In history, presenting complaints, duration, associated diseases, coexistent infections at a remote body site, personal history including diet, smoking, and alcoholism were noted.

Operative findings which include, type of incision, wound contamination, drain used and its type, and duration of operation were studied. Postoperative findings which included, day of wound infection, day of 1st dressing and frequency of change of dressing.

Findings on the day of diagnosis of wound infection were noted which included fever, erythema, discharge, type and colour and the exudates was collected from the depth of the wound using sterile cotton swab and was sent to microbiology department for culture and sensitivity.

Procedure in Laboratory

In the microbiology department, the swabs were inoculated onto blood agar plate, McConkey's agar plates and nutrient broth. Inoculated media were incubated aerobically at 37°C for 24-48 hrs. Nutrient broth was sub cultured if the original plates did not yield organisms. The bacteria isolated were identified by their morphological and cultural characteristics.

The samples collected were processed as follows:

a. Direct microscopic examination of gram stained smear.
b. Inoculation of the samples onto different culture media for aerobic and anaerobic organisms.
c. Preliminary identification.
d. Bio-chemical tests.
e. Antibiotic sensitivity.

Results

A study of 400 operated cases was carried out of which 36 were diagnosed to be having surgical site infection as per the CDC criteria. Thus the incidence of SSI in this study is 9 %.

Incidence of infection among Emergency surgery is 26% where as among Elective is 3.33%.

270 patients had a pre-op hospitalization of 1 to 5 days with infection rate of 8.52%. 88 patients with hospitalization for 6 to 10 days had 2.27% infection. But infection was more among patients who had pre op stay of 11 to 15 days with incidence of 11.90%.

Acute/recurrent appendicitis and inguinal hernia were the most common operations performed. Surgical site infection was more among ileal perforation (42.86%), intestinal obstruction (40%), malignancies (21.43%) , gastric outlet obstruction (20%) duodenal perforation (17.65%),ventral hernias (13.33%) and cholecystectomy (12%) patients.

25 Cases (69.44%) of total infected cases had superficial SSI, 8 cases (22.22%) deep SSI and 3 cases (8.33%) had organ space infection.

Out of 400 cases 47% were clean cases, 37.5% were clean contaminated, and 15.5% were contaminated. Out of which clean cases had 3.72% of infection rate, clean contaminated had incidence of 10% and contaminated cases had 22.58% of infection rate. Infection rate increased with increasing contamination.

10 cases (27.78%) had infection detected on 3rd postoperative day, followed by 8 cases (22.22%) detected on 5th postoperative day.

Table 1: Incidence of surgical site infection

Total No. of Cases	No. of Cases Infected	Percentage
400	36	9%

Table 2: Incidence in relation to type of operation

Type	No. of Cases	Infected	Percentage
Elective	300	10	3.33%
Emergency	100	26	26%
Total	400	36	9%

Table 3: Incidence in relation to the preop Hospitalization

No. of Days	No. of Cases	Infected	Percentage
1 to 5	270	23	8.52%
6 to 10	88	8	9.09%
11 to 15	42	5	11.90%
Total	400	36	

Table 4: Incidence in relation to diagnosis

Diagnosis	No. of Cases	Incidence	Percentage
Duodenal perforation	34	6	17.65%
Ileal perforation	7	3	42.86%
Intestinal obstruction	10	4	40%
Acute/ recurrent appendicitis	102	4	3.92%
Inguinal hernia	86	4	4.65%
Gastric outlet obstruction	5	1	20%
Cholelithiasis	25	3	12%
Malignancy	14	3	21.43%
Ventral hernias	15	2	13.33%
Others	102	6	5.88%

Table 5: Incidence in relation to type of SSI

Type of SSI	No. of Cases	Percentage
Superficial	25	69.45%
Deep	8	22.22%
Organ space	3	8.33%
Total	36	-

Table 6: Incidence in relation to wound class

Type	No. of Cases	Incidence	Percentage
Clean	188	7	3.72%
Clean contaminated	150	15	10%
Contaminated	62	14	22.58%
Total	400	36	-

Table 7: Incidence of infection noted on post operative day

Day	No. of Infected Cases	Percentage
2nd	2	5.56%
3rd	10	27.78%
4th	4	11.11%
5th	8	22.22%
6th	4	11.11%
>6 Days	8	22.22%
Total	36	-

Discussion

The overall infection rate for a total of 400 cases was 9%. The incidence rate in this study is well within the infection rates of 2.8% to 17% seen in other studies. Different studies from India at different places have shown the SSI rate to vary from 6.09% to 38.7% [6]. The infection rate in Indian hospitals is much higher than that in other countries; for instance in the USA, it is 2.8% and it is 2-5% in European countries. The higher infection rate in Indian hospitals may be due to the poor set up of our hospitals and also due to the lack of attention towards the basic infection control measures. The following Table shows incidence in various other studies.

Author	Year	Country	No. of Operations	Infection
Cruse and Foord[7]	1980	Canada	62939	4.7%
Edwards[8]	1984	U.S	20,193	2.8%
Anvikar et al[9]	1999	India	3280	6.09%
Mahesh c b et al[6]	2010	India	418	20.9%
Present study	2011	India	400	9.75%

The rates of SSIs in male patients were 9.44% and in female patients, they were 8.22%. The significance of this observation is not well understood.

Pre operative preparation was done with shaving in all the cases. All elective cases undergone shaving within 24 hours prior to surgery and all emergency cases a few hours before surgery. Still SSI rate was more among emergency cases. But most of the studies compared the shaving and non shaving or other types of hair removal. Court Brown 1981 and Rojanapirom 1992 compared shaving with no hair removal.

Both trials were conducted in abdominal surgery and used observations and swabs to determine infection. 9.6 %(17/177) of people who were shaved developed an SSI compared with 6% (11/181) who were not shaved (pooling these two trials using a random effects model gave an RR 1.59.

Most of the SSI s were superficial type constituting 69.44% of infected cases.

In this study incidence in relation to the type of surgery, clean cases had infection rate of 3.72%, clean contaminated had incidence of 10% and contaminated cases had 22.58%.

Lul Raka et al in 2006 at Kosovo Teaching Hospital had the incidence rate of SSI differed by wound classification: 3.1% for clean (n=64), 9.8% for clean-contaminated (n=143), 46.1% for Contaminated (n=13), and 100% for dirty infected wounds (n=5). The relative risk of development SSI for contaminated wounds was 5.4-fold higher than for clean wounds.

Seyd Mansour Razavi 2005 at an Iranian teaching hospital found clean wounds in 109 cases (13.6%); clean-contaminated wounds in 214 cases (26.7%); contaminated wounds in 307 cases (45.8%); and dirty infected wounds in 112 cases (14%).

Mahesh C B et al [96] in 2010 at Bagalkot had SSI rate of 11.53% in clean surgeries, 23.33% in clean contaminated ones, 38.10% in contaminated ones and 57.14% in dirty surgeries.

Our study correlates with most series, incidence among contaminated cases are more due to the fact most of the cases were bowel perforation cases.

The difference in the rates of SSIs between the clean and the clean contaminated wounds showed the effect of endogenous contamination and the difference in the rates of SSIs between the clean contaminated and the contaminated wounds showed the effect of exogenous contamination. The endogenous or the exogenous contamination of the wounds by the organisms had a profound influence on the SSIs.

Abdominal surgical site infection was noted most commonly on 3rd post op day in our study.

Similar results were obtained in other studies at Irani Hospital 2005.

Conclusion

- Incidence of surgical site infection in this study is 9%.
- Elective had an incidence of 3.33% and emergency cases had more incidences of 26%.
- Longer duration of surgery and use of drain was associated with increased rate of SSI.

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