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Study of Organism Causing SSI & Role of Prophylactic Antibiotic to Prevent SSI

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Abstract
Introduction-SSI previously called postoperative wound infections,result from bacterial contamination during/after a surgical procedure.SSI are the 3rd most common HAI, accounting for about 15% of all infections in hospitalized patients.
Material & Methods- Starting from 13feb.2019 to 12 june 2020 ,100 cases of emergency abdominal operations were selected non randomly from the dept. of surgery JLNMCH, Bihar & studied for SSI.
Results- SSI rate increased with degree of wound contamination. Staphylococcus aureus were found as the most common organism, causing 42.85% of SSI.E.coli were 2nd most common causing 33.33% of infections
Conclusion- it is necessary to use prophylactic antibiotics to encounter the various types of microorganisms responsible for SSI,particularly staph.aureus & E.coli.
Keywords- *SSI, Pus culture sensitivity, contamination*

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I. Introduction

SSI previously called postoperative wound infections result from bacterial contamination during/after a surgical procedure.SSI are the 3rd most common HAI, accounting for about 15% of all infections in hospitalized patients. According to degree of contamination, wounds can be classified into clean, clean contaminated, contaminated & dirty. The risk of wound infection is not entirely dependent on the degree of contamination. Wound infections usually appear between fifth and tenth postoperative days or even years later.SSI still causes considerable morbidity among emergency abdominal operations and high cost to health care system and is becoming increasingly important in Medicolegal aspects too. Wound infections usually appear between fifth and tenth postoperative day, but they may appear as early as first postoperative day or even years later. Fever is the first sign, and postoperative fever requires inspection of the wound. The wound rarely appear severely inflamed, but edema may be obvious because the skin sutures appear tight. The use of antibiotic prophylaxis before surgery is generally recommended in elective clean surgicalprocedures and in clean-contaminated procedures that a single dose of cephalosporin, such as cefazolin , be administered intravenously by anaesthesia personnel in the operative suit just before incision. Additional doses are generally recommended only when the operation lasts for longer than two to three hours (Nichols 2009). Surgical site infection is the most important cause of morbidity and mortality in the postoperative patients, but it is preventable in most of the cases if proper assessment and appropriate measures are taken in the perioperative period.

II. Material & Methods

This was a descriptive type of cross sectional study,done at department of surgery, JLNMCH Bhagalpur for a duration of one year and 4 month starting from13 feb 2019 to 12 june 2020.Total 100 cases were included in study.The method of sampling was purposive non-random. During the postoperative period all the patients were closely monitored everyday up to the discharge of the patient from the hospital. If any symptom or sign of infection appear during this period then proper investigation was instituted for the diagnosis of infection and to assess the type and severity of the infection. If any collection of pus identified it was drained out and sent for culture and sensitivity test. Proper antibiotic was given to every patient both preoperative and post-operative periods. Antibiotic was changed where necessary after getting the report of culture and sensitivity test.

Inclusion criteria-
(1) The patients having emergency abdominal operations.
(2) Operations carried out in surgery emergency at Jawaharlal Medical College & Hospital, Bhagalpur
Exclusion criteria: -
(1) Patients with other comorbidities like COPD, Diabetes etc. were excluded from the study.
(2) Surgery other than abdominal ones were excluded from study.
Variables studied:
Dependent variable: Abdominal surgical site infection (SSI).
Independent variables:-
a)Types of wounds according to level of contamination
b)Micro-organisms involved in SSI
c)Sensitivity of the micro-organisms to antibiotics

III. Results

100 patients with emergency abdominal operations were selected purposively from surgical emergency in JLNMCH Bhagalpur during the period of February2019 to June 2020.
Postoperatively swab was sent for Culture sensitivity in every case with discharge from the wound or collection of pus from anywhere in abdomen.

Table 1.

Types of wounds	SSI	Status	Total
	yes	No	
Clean	1(4.35)	22(95.65)	23(100)
Clean contaminated	4(10.00)	36(90.00)	40(100)
Contaminated	3(27.27)	8(72.73)	11(100)
Dirty	13(50.00)	13(50.00)	26(100)
Total	21(21%)	79(79%)	100(100%)

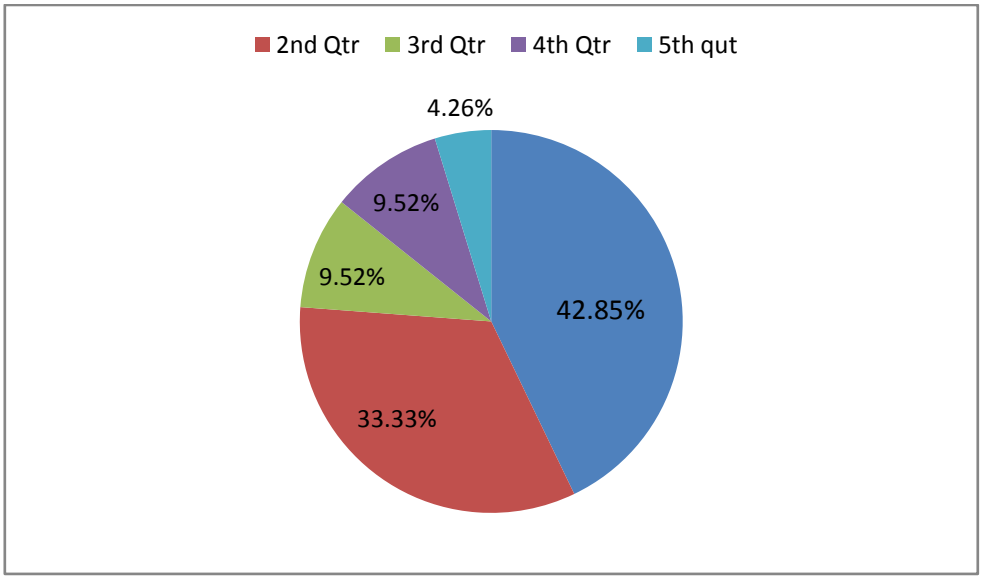

Fig1: - Frequency of different types of discharge/pus from 21 wounds

Table 2-

Character of discharge/pus	frequency	Organism isolated
Thick creamy pus	9	Staphylococcus aureus
Thin muddy odourless pus	7	Escherischia coli
Yellow fishy odoured pus	2	Klebsiella pneumonia
Blue green pus	2	Pseudomonas aeruginosa
serosanguinous	1	No growth
total	21	

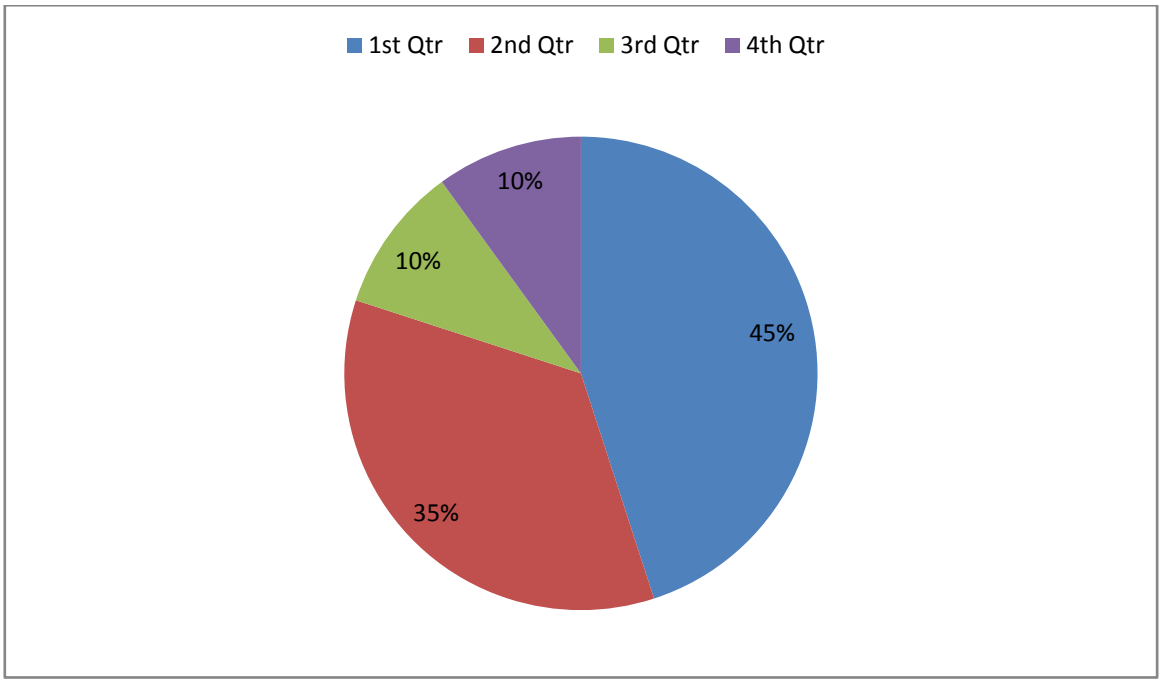

Fig 2:-Pie diagram showing bacteria isolated from 20 surgical site infections.

Staphylococcus aureus were found as the most common organism(9 among 21 cases) causing 42.85% of SSI.E.coli were 2nd most common (7 among 21 cases)causing 33.33% of infections,each of klebsiella & pseudomonas were causing 9.52% of the SSI found in 2 among 21 cases.

IV. Discussion

In relation to different types of wounds, by the degree of contamination it was observed that among 100 cases, 23 were clean. SSI developed in 1(4.35%) of these clean wounds. Out of 40 clean contaminated, SSI developed in 4(10%) wounds, whereas SSI occurred in 3 among 11(27.27%) of 11 contaminated wounds. SSI rate was as high as 13 among 26 (50%) of dirty cases. This difference had high statistical significance (p<o.o1). it can be assumed that SSI rate increased with degree of wound contamination. Among 100 patients, 21 developed some type of discharge from the wounds / collectionof pus anywhere in the abdominal area. In nine (42.85%) cases there were thick creamy pus, in seven (33.33%) cases there were muddy thin odourless pus, in two (9.52%) cases there were bluish green pus, in another two (9.52%) cases there were yellow fishy odoured pus and in one (4.76%) case there was serosanguinous discharge.

In our study overall rate of SSI was 21%.in relation to different types of wounds,it was observed that infection rate increased with that of degree of contamination.These findings were consistent with study by karim et al where SSI rates were 4.35%,,8.33%,27.27%,32.61% in clean,clean contaminated &contaminated and dirty wounds respectively.Renvall et al in 1980 in a prospective study on 696 patients estimated SSI rates were 4.2%,9.1%,and 14.4% in clean, clean contaminated and dirty wounds respectively.In our study 4.35%,10%,27.27%,&50% for clean ,clean contaminated, contaminated &dirty wounds respectively.

Among 100 patients 22 developed some type of dischargefrom wound.in 7 cases there were muddy thin odourless pus,in 9 cases thick creamy pus,in another 2 cases there were yellow fleshy odoured pus,&1 case was with serosanguinous discharge.

Sample of discharge from wound were sent for C/S in these 21 cases one of them with serosanguinous dischargeshowed no growth, but remaining 20 showed growth of different microorganisms.

Staph.aureus weremost common & found in 9(42.85%cases) and E.coli were second most common causing 33.33 %cases. Staph.aureus is most commonly identified in cultured organism of SSIin 300 patients over 2 years of prospective study (saxena et al).

Regarding sensitivity of microorganisms it was observed that staph.aureus were sensitive to ciprofloxacin 44.85% ,cephaloridin 44.45%, fliucloxacillin 55.55%,ceftriaxone88.90%,& imipenem 100.00%cases but in all cases they were resistant to tetracycline, amikacin,cotrimoxazole.

V. Conclusion

It can be concluded that microorganisms that are normal inhabitants of our body are mainly responsible for SSI.it is also revealed that in absence of highly advanced surgical amenities,preoperative resuscitative units,modern operation theatre facilities& sophisticated sterilization procedure it is necessary to use prophylactic antibiotics to encounter the various types of microorganisms responsible for SSI, particularly Staph.aureus& E.coli. It can be also recommended that further research is necessary in large scale for guidance regarding prevention of SSI in our country. As this study has been carried out over a limited period of time with a limited number ofpatients and there was lack of financial and infrastructural support, it could not have beenlarge enough to be of reasonable precision. All the facts and figures mentioned here mayconsiderably vary from those of large series covering wide range of time, but still then, asthe cases of this study were collected from a tertiary level hospital in our country, thisstudy has some credentials in reflecting the facts regarding factors responsible forsurgical site infection following emergency abdominal operations.

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