Surgical site Infection after gastrointestinal and hepatobiliary surgeries- A retrospective evaluation from a single center of western India.

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Ethical clearence: obtained from hospital ethical committee.

Conflict of interest :none

Key words: laproscopic cholecystectomy,acute cholecystitis,gall stone,sepsis,surgical site infection.

Abbreviations: SSI (surgical site infections),HPB (hepato pacreaticobiliary)

Type of study: orignal article. Retrospective cohort study.

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Ethical clearence obtained

Abstract:

Aim of study:

Aim of our study to evaluate various factors responsible for surgical site infection after gastrointestinal and hepatobiliary surgeries..

Material and methods:

Patient who underwent gastrointestinal and hepatobiliary surgery in our department were evaluated retrospectively. Various factors associated with surgical site infection were evaluated using univariate and multivariate analysis. Surgical site infection was defined as any culture positive discharge from the wound within 30 days of surgery.Statistical analysis was done using SPSS version 23.

Results:

We evaluated total 331 patients operated between April 2018 to March 2020. 14 patients were lost to follow up after discharge and before completing post operative day 30. 18 patients expired before 30 days without developing SSI and were excluded from the study as per exclusion criteria. 299 patient included in the study. Total 20 patients developed surgical site infection. It showed SSI rate in our study population was 6.68%. On univariate analysis prolonged hospital stay, more blood product used, higher cdc grade of surgery, higher ASA grade, more operative time, open surgeries,colorectal and HPB surgeries were associated with surgical site infections. On multivariate analysis only prolonged hospital stay independently predicted

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Surgical Site Infectins. (p=0.014,0dds ratio 1.223, 95% confidence interal 1.042-1.435.).

Conclusion:

Prolonged hospital stay independently predicts surgical site infections after gastrointestinal and hepatobiliary surgery.

Background:

According to world health organisation (WHO) health care associated infections is the emerging health care problem. [1]Surgical site infections are one of the most common healthcare associated infection. [2] Surgical site infections increases hospital stay, cost and also some times they are associated with increase mortality. [3]

Various studies have evaluated epidemiology of surgical site infections india. [4,5], however very few studies evaluated SSI after gastrointestinal and hepatobiliary surgeries in India.

Aim of study:

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Material and methods:

Patient who underwent gastrointestinal and hepatobiliary surgery in our department were evaluated retrospectively. Various factors associated with surgical site infection were evaluated using univariate and multivariate analysis.

Surgical site infection defination:

Surgical site infection was defined as any culture positive discharge from the wound within 30 days of surgery. [6,7]

Inclusion Criteria:

- All patients who underwent gastrointestinal and hepatobiliary surgery.
- All the patient with preexisting abdominal infections were included in the study

Exclusion criteria:

- Patients lost to follow up before 30 days
- Patient expired before 30 days without developing Surgical site infection

Antibiotic protocol:

We give single dose pre operative antibiotic (preferably third generation cephalosporin with extended spectrum beta lactum coverage as per our hospital sensitivity data , at the time of induction all patient without pre existing sepsis and

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septic shock. [8]. We give antibiotics according to survival sepsis guidelines in patient with established sepsis using pre calcitonin level as the guide. [9]

Factors Evaluated:

We evaluated various factors associated with Surgical site infections:

- Age
- Sex
- Open or Laparoscopic Surgeries
- Emergency Surgeries
- Type of surgeries (Upper gastrointestinal, HPB, Small bowel, Colorectal ,Hernia andothers.
- Benign or malignant surgeries
- CDC grade of surgeries [10]
- American society of anesthesiology classification [11]
- Hospital stay
- Blood product requirement
- Operative Time

We also evaluated weather SSI is associated with other complications and mortality.

Statistical analysis:

Analysis of means or medians were selected according to skewness and standard error of skewness and kurtosis and standard error of kurtosis analysis.Catagorical variants were analysed using chi square test or fisher t test where ever appropriate. Continuous variable were analysed using Mann whitney u test.

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P value less than 0.05 was considered significant. Multivariate analysis was done using logistic regression method. SPSS (IBM) version 23 was used for statistical analysis. Ethical clearance obtained from hospital ethical committee. IRB 345/Shalby/2020

Results:

Study population:

We evaluated total 331 patients operated between April 2018 to March 2020. 14 patients were lost to follow up after discharge and before completing post operative day 30. 18 patients expired before 30 days without developing SSI and were excluded from the study as per exclusion criteria. 299 patient included in the study ,Total 20 patients developed surgical site infection. 12 patients were superfical SSI, 4 deep Ssi and 4 organ space infection It showed SSI rate in our study population was 6.68% .[Figure 1]. 14 Patients expired from the study population.

Number of Patients (Total) according to Type of surgeries is described in Table 1 and Grade of surgeries in Table 2

Univariate analysis:

On univariate analysis prolonged hospital stay, more blood product used, higher cdc grade of surgery, higher ASA grade, more operative time, open surgeries,colorectal and HPB surgeries were associated with surgical site infections. (table 3) (table 1)

Multivariate analysis:

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On multivariate analysis only prolonged hospital stay independently predicted Surgical Site Infectins. (p=0.014,0dds ratio 1.223, 95% confidence interal 1.042-1.435.)

Relationship with other complications and mortality:

Ssi was associated with other complications (p=0.002) but not associated with mortality. (p=1.0) 14 patients expired in our study population mostly due to non surgical procedure related complications.

Discussion:

Surgical science has progressed to a great extent in last century.Despite such a great progress Surgical site infection remains a major challenge and its incidence rates still remains high due to prevalnce of wide range of procols and practices [12] Causes of Surgical site infection can be multifactorial and include variety of patient related, hospital related and procedural related factors and it includes use of variery of protocols and procedures to prevent them. [13]

We, In this prospective study evaluated our protocol of sinlge dose preoperative antibiotic prophylaxis in all GastroIntestinal and Hepatobiliary and pancreatic surgeries and also evaluated various procedure and disease related factors and their association with Surgical site Infections.

With our protocol of short course or single dose antibiotics over all SSI rates were 6.76 percent in our data. Multicenter study published showed over SSI rates after gastrointestinal surgeries were of 12.3 % which is significantly higher then our data. It showed SSI rates in middle and lower countries are much higher.(14 and 23.2% respectively). Although India is one of the middle to lower income countries, our SSI rates are significantly lower than published results world wide.[1]Lee et al in their systemic review of korean experience showed SSI rates of around 9.4%, which is

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almost identical to our data.[14]. Reason for lower SSI rates in our data may be due to short course single dose antibiotic protocols and evidence based management of preexisting abdominal infections by survival sepsis protocols.

On Univariate analysis Higher ASA grade,Higher CDC grade of surgery,prolonged surgical time ,higher blood products use ,Open surgeries and prolong hospital stay were associated with Surgical site Infections.Karol et al in their systemic review also showed that prolong duration of surgery and complexity of surgery were associated with Surgical Site Infections.[15] Carvalho et al showed that higher ASA grades, Higher grade of surgery, and prolonged surgical duration were associated with SSI rates, which was also shown in our data.[16] Varelo et al [17] also showed surgical site infections after laproscopic surgeries was minimal and which is the key benefit of laproscopic surgeries.

In our study multivariate analysis showed that prolonged hospital stay independently predicted surgical site infection. Mujagic et al [18] also showed similar findings.

In our series surgical site infections were also significantly associated with other complications but was not significantly associated with 90 day mortality. INSISO study group also showed that surgical site infections were signifcantly associated with increased mortality and morbidity.[19]

There are certain limitations of our study being prospectively study inherent limitations of prospective study also applies to our study. We feel with studies with more number of patients will provide more stronger evidences.

In conclusion, Prolonged hospital stay independently predicts surgical site infections after gastrointestinal and hepatobiliary surgery.

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Type of surgery	Number of patients	P value

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Upper GI (stomach and esophagus)	13	0.056
Small bowel	35	0.082
Hepato pancreatico biliary Surgery	177	0.001
Colorectal Surgery	42	0.016
Hernia and other surgeries	32	0.123

Table 1 Type of surgery

Grade of surgeries	Total Number of Patients
Clean (grade 1)	3
Clean contaminated (Grade 2)	158
Contaminated (Grade 3)	110
Dirty (Grade 4)	28

Table 2 CDC grade of surgeries.

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Table:3 Univariate analysis for SSI.

Factors	No SSI (n=279)	SSI (n= 20)	P Value
Age (median/range)	54 (7-83)	50 (34-65)	0.486
Sex (M/F)	180/99	12/8	0.156
Hospital stay(median/range)	2 (1-15)	5.5 (1-20)	P<0.0001
Blood products used(median/range)	0 (0-8)	0.5 (0-4)	P=0.001
Cdc grade of surgery(median/range)	2 (1-4)	3 (2-4)	P<0.0001
ASA score(median/range)	2 (1-4)	3 (2-4)	P<0.0001
Operative time (median/range) (minutes)	90 (15-600)	120 (45-420)	P=0.004
Emergency Surgery (n=45)	3	42	P=1.000
Open Surgeries (n=154)	19	135	P<0.0001
HPB (n=177)	173	4	P=0.001
Colorectal (n=42)	7	35	P=0.016

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Table:4 multivariate analysis:

Factors	P value	Odds ratio	95% confidence interval
Open surgery	0.996	4.83	0.48-48.48
Blood products	0.135	0.683	0.42-1.12
Asa grade	0.590	1.30	0.494-3.46
Operative time	0.342	1.004	0.996-1.012
Grade of surgery	0.200	2.095	0.677-6.48
Colorectal surgery	0.260	2.075	0.583-7.38
HPB surgery	0.466	0.563	0.120-2.64
Hospital stay	0.014	1.223	1.042-1.435

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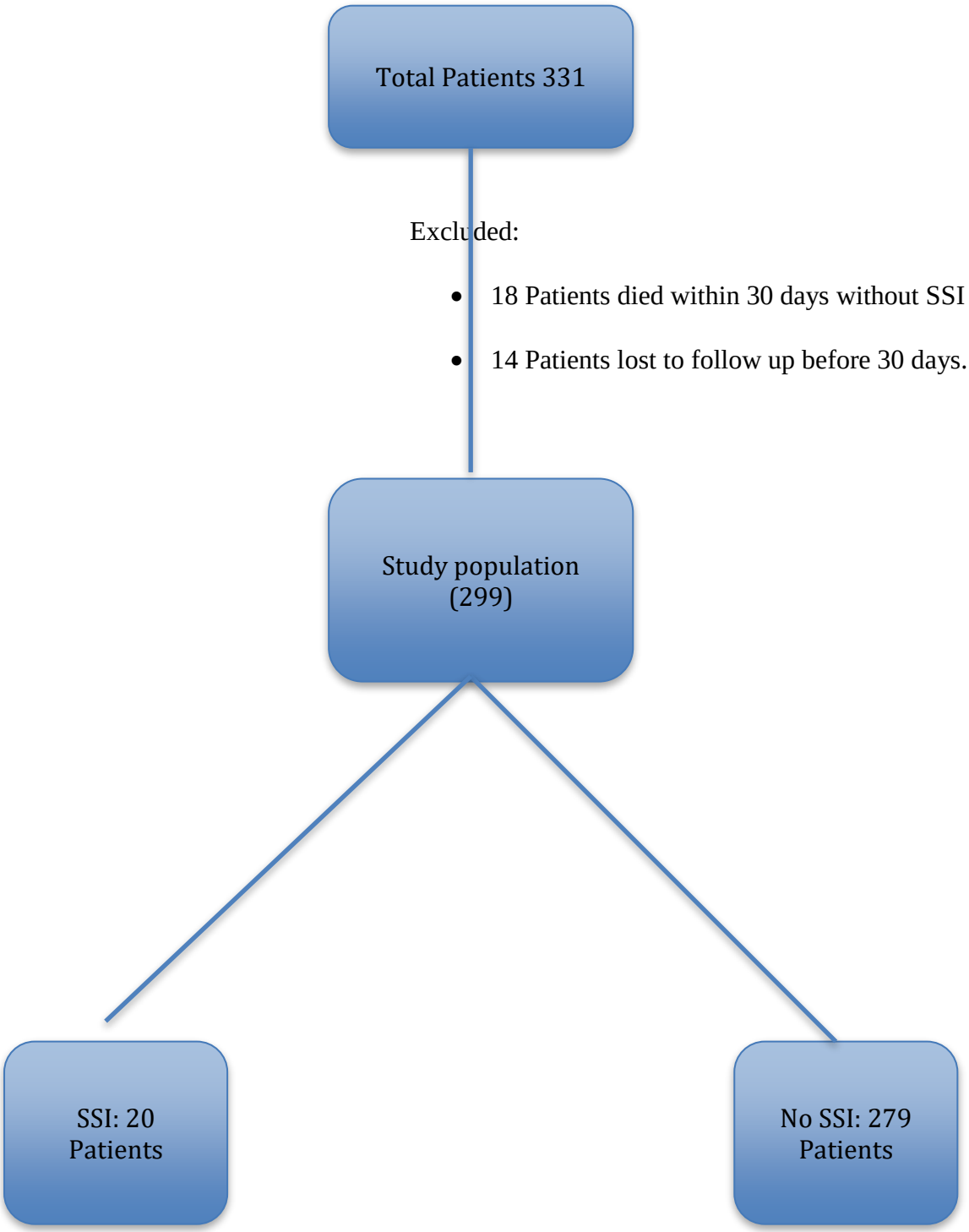

Figure : 1 Study Population:

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