Section: General Surgery

Original Research Article

PROPHYLACTIC ANTIBIOTIC COMPLIANCE AND ITS IMPACT ON SSI - A PROSPECTIVE STUDY

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Abstract

Background: Surgical site infection is a leading cause of significant morbidity, increased health care cost and prolonged hospital stay duration in surgical patients. Timely surgical preoperative antibiotic administration is considered as an important measure in the reduction of surgical site infections. Guidelines recommend antibiotic administration within 30 to 60 min prior to surgical incision, reason being the time to reach adequate tissue and serum antibiotic concentration by the time of incision and during the surgical procedure. The aim of the study is to assess the compliance of antibiotic administration preoperatively one hour before surgical incision undergoing general surgical procedures in our Centre. **Materials and Methods:** This study is conducted among 52 patients who underwent general surgical procedures in the Department of General Surgery at KGMCH during the study period. **Result:** There was a total of 52 cases during our study period out of which 27 were males (51.9%) and 25(48.1%) were females. Compliance is achieved in 31 cases (59.6%) among those cases 2 patients developed SSI. Out of the 21 cases non-compliant to antibiotic prophylactic administration 4 cases developed SSI, among them 3 were females. Among the 31 compliant cases only 2 developed SSI and both were males. 44 cases underwent elective surgical procedure of which 5 developed SSI's, noncompliance of surgical preoperative antibiotic prophylaxis (SAP) was present in 3 cases. Among the 8 emergency cases, only 1 case presented with SSI, which belonged to the non-compliant group. **Conclusion:** A high rate of surgical site infections is observed in cases where the SAP is prescribed or administered in a non-compliant manner. Hence measures should be implemented for the timely administration of prophylactic antibiotics for the prevention of SSI. Also, it is recommended to administer a repeat dose when the duration of surgery is longer than the half-life of antibiotic given.

INTRODUCTION

Surgical site infection (SSI) is a proliferation of pathogenic microbes on the incision site within a month after surgery or after one year in case of implant placement. SSI may be superficial (within the subcutaneous fat) or deep (muscular facial layer). It may involve an organ or a cavity when it occurs after implant placement.[1,2] SSI is a common cause of postsurgical morbidity and mortality, and significantly adds to the length of hospitalisation and cost of treatment.[3-5] Timely surgical preoperative antibiotic administration is considered as an important measure in the reduction of surgical site infections. Guidelines recommend antibiotic administration within 30 to 60 minutes prior to surgical incision reason being time to reach adequate tissue and serum antibiotic concentration by the time of incision. In addition to measures such as appropriate skin antisepsis and reducing the duration of surgical procedures, international guidelines on SSI prevention also recommend timely administration of prophylactic antibiotics (taken 30–60 minutes before surgical incision), appropriate choice of antibiotics and supplemental dosing of antibiotics for prolonged cases.[6-8] These guidelines also encourage checklists to monitor adherence to perioperative antibiotic administration. The Surgical care improvement project (SCIP) also recommends the reporting of antibiotic timeliness (within one hour before surgical incision) as a quality indicator.[9]

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MATERIALS AND METHODS

During the month of November 2022, a total of 52 patients were admitted and operated in the General Surgery Department of Kanyakumari Government Medical College Hospital. All patients including elective and emergency cases were included in the study.

Inclusion Criteria

Patients who underwent elective and emergency surgical procedures during the month of November 2022.Patients within the age group of 18-80 years. Clean, clean contaminated and contaminated wounds were included.

Exclusion Criteria

Dirty wounds. Patients with immunocompromised state (HIV, prolonged corticosteroid therapy)

Patient less than 18 and more than 80 years of age were excluded.

Compliance

Antibiotic administration within 30-60 minutes before skin incision. Repeating the dose when the duration of surgery is more than 2 hours.

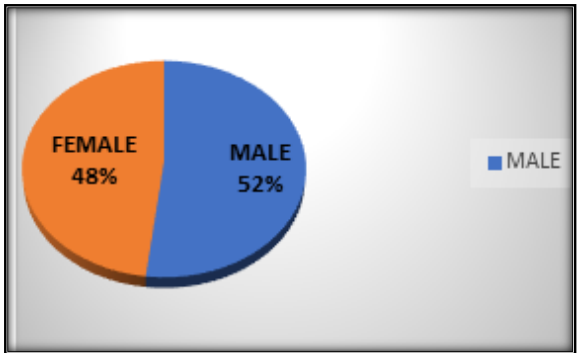
Parameters of Study

Sociodemographic data (age, sex), comorbidities (Type 2 Diabetes), type of surgery (elective or emergency), Altemeier wound classification, duration of surgery, prophylactic antibiotic received, time of administration relative to surgery (compliance), occurrence of postoperative wound infection (SSI).

RESULTS

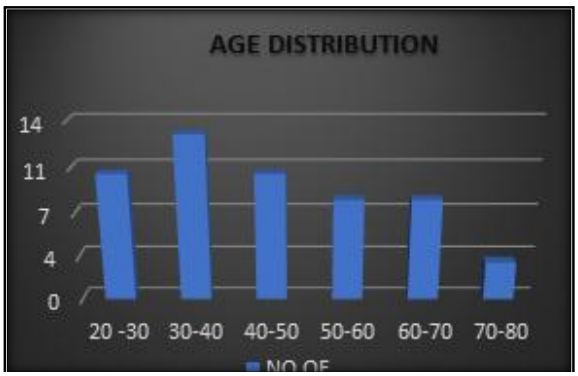
Sex Distribution

There was a total of 52 cases during our study period out of which 27 were male comprising 51.9% of the total cases. Remaining 48.1% comprising of females.



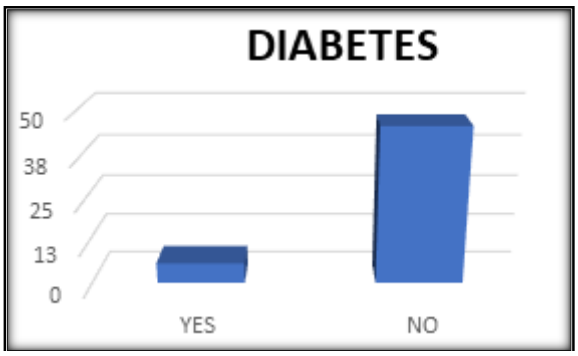
Age Distribution

Most of the patients in our study were in the age group of 30-40 years and the mean age of distribution of patients is 45.



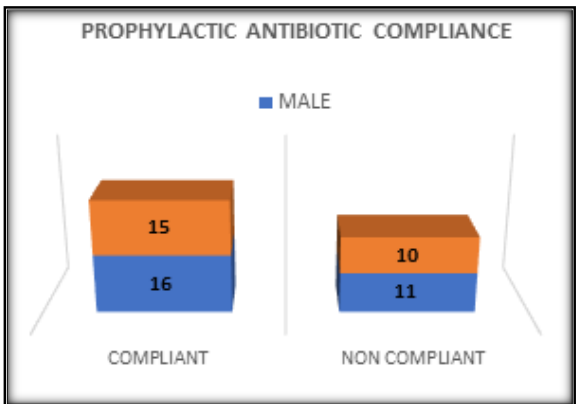
Diabetes Distribution

About 11.5% (6) of the study population had diabetes of which 16% (1 out of 6) developed SSI.



Compliance of antibiotics use

Compliance was defined as antibiotic administration within 60 minutes before surgical incision and repeating the dose whenever the duration of surgery is more than 2 hours. Noncompliance was classified into classes in which prophylactic antibiotic was administered too early or too late. Out of the total 52 cases, compliance is achieved in 31 cases among those cases 2 patients developed SSI's. Out of the 21 cases non-compliant to antibiotic prophylactic administration 4 cases developed SSI among them 3 were females. Among the 31 compliant cases only 2 developed SSI and both were males.



Type of surgery

44 cases underwent elective surgical procedure of which 5 developed SSI's, noncompliance of SAP was present in 3 cases. Among the 8 emergency

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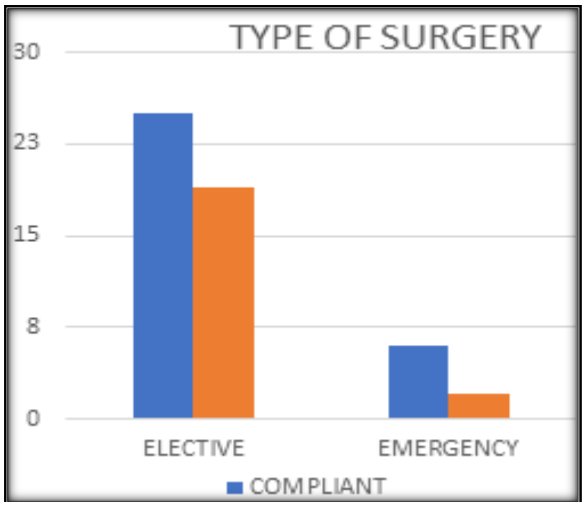
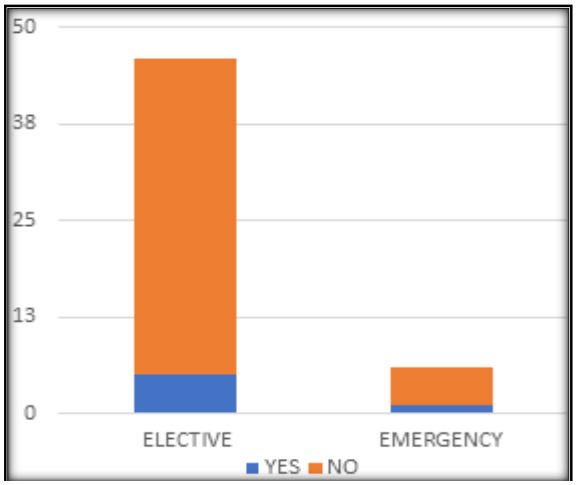
cases only 1 case presented with SSI, which belonged to the non-compliant group.

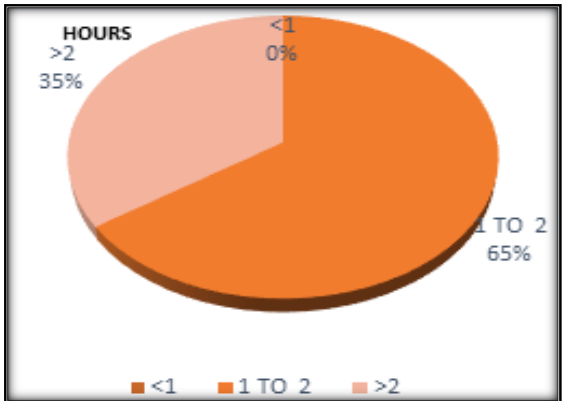


SSI Distribution



Duration of Surgery

Out of the total surgeries performed most of them about 34 cases were completed in the time limit of 1-2 hours.



Type of surgical procedures

Totally 15 different types of surgeries were performed during the study period. Hernioplasty is the most common surgical procedure performed comprising 19.2%.

Type of surgical procedure	No. Of cases
Hernioplasty	10
Total Thyroidectomy	6
Tredelenberg Procedure	6
Mastectomy	1
Excision Biopsy	2
Laparoscopic Appendicectomy	8
Open Appendicectomy	3
Hemicolectomy	2
Jaboulays Procedure	2
Emergency Herniotomy	1
Superficial Parotidectomy	1
MRM	1
RFA	1
Emergency Exploratory Laparotomy	4
Open Mesh Repair	4

Wound class and prophylactic antibiotics used

37 Patients had clean wound, 11 had clean contaminated, 5 belong to contaminated class of wound. All patients were administered one or more antibiotics. Overall the most commonly used antibiotic was cefotaxime (92.3%). The most commonly used combination therapy was cefotaxime and metronidazole.

Altemeier Wound Class

Of the totally operated cases 37 cases were clean cases, 11 were clean contsminated cases,5 cases were contaminated cases.

Type of wound class	No. Of cases
Clean	37
Clean contaminated	11
Contaminated	5

Antibiotic use patterns

Cefotaxime is the most common antibiotic used in the preoperative prophylaxis. Single antibiotic is used in about 37 cases and dual antibiotic is used in about 16 cases.

Single antibiotic	No of cases
Cefotaxime	37
Dual antibiotic	16
Cefotaxime +metronidazole	11
Piperacillin tazobactam +metronidazole	5

Southampton Wound Grading of SSI

Grade	Appearance
0 Normal healing	
I Normal healing with mild bruising or erythema	A—some bruising
	B—considerable bruising
	C—mild erythema
II Erythema plus other signs of inflammation	A—at one point
	B—around sutures
	C—along wound
	D—around wound
III Clear or haemoserous discharge	A—at one point only (<2 cm)
	B—along wound (>2 cm)
	C—large volume
	D—prolonged (>3 days)
IV Pus/purulent discharge	A—at one point only (<2 cm)
	B—along wound (>2 cm)
V Deep or severe wound infection with or without tissue breakdown	

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Grading of wound	Number of cases
2	2
3	4

DISCUSSION

This study reported the compliance of surgical antibiotic prophylaxis based on the current guidelines to provide inputs as recommendations for the future guidelines that may help to improve the healthcare of the patients undergoing surgery at Kanyakumari Medical College.

Jayalal et al in their study has shown the prophylactic antibiotic use instead of the conventional use of antibiotics for 5-7 days is a fruitful method to reduce the SSI.[10] However, if the perioperative doses are not given as per the protocol, the desired results shall not be obtained.

This study showed that the compliance of SAP in majority of the patients were poor compared to guidelines and evidence-based practise for SSI prevention. Most of the patients in our study were in the age range of 30–40 years, and the mean age of the distribution of patients is 45. Our study has demonstrated noncompliance with SAP practice in 21 cases out of a total of 52. Only 31 patients received SAP in compliance with the guidelines. This study might have underestimated or overestimated the problem of inadequate SAP because of the inclusion and exclusion criteria. However, the findings remain alarming, and further actions should be implemented to increase SAP compliance in practise. These results are similar to those reported by Jalil et al., who found a low level of compliance with hospital-adapted SAP guidelines in Jordan.[11] Despite the availability of evidence for optimising patient care and the development of therapeutic guidelines on antibiotic prophylaxis in surgery, several studies have demonstrated non-compliance and poor adherence to these guidelines.[12,13] It is noted the non-availability of the recommended antibiotics is a peculiar challenge in the choice of an antibiotic in a public health hospitals. Regarding the measure of non-compliance, other studies reported inadequate prescriptions, inappropriate timings, dosages, and durations of SAP.[14,15] In our study, the non-compliance was more likely to be due to the inappropriate administration duration of antibiotics. The significant non-compliance with SAP guidelines in the surgery department may be explained by the lack of a surgical safety programme in the past and now with the introduction of NABH accreditation in the hospital, this difficulty will be overcome. Recent studies have demonstrated that implementation of a surgical unit-based safety programme (including policy and pharmacy interventions, infection prevention and control, and antibiotic stewardship) may inspire global strategies for SSI prevention in resource-limited settings.[16,17] The rate of SSI in our study was 11.5%, of which 7.6% were observed among the non-compliant SAP. This rate was lower than the finding of a similar study conducted by D. Misganaw et al in Ethiopia.[18] It is also lower than other studies carried out in India by M.P. Singh et al. and B. Mawalla et al., where the infection rates were 16% and 20%, respectively.[19,20] Findings of this study demonstrated that SAP non-compliance was significantly associated with elective surgeries compared to emergency surgeries. This is in contrast with other studies where non-compliance rates are higher in emergency surgeries. The reason might be an undue delay in the duration of surgery in the patients posted on the elective list, which in turn leads to suboptimal antibiotic concentrations before the incision and during the surgical procedure, whereas emergency cases are taken for surgery within the stipulated time without delay. In our study, cephalosporins were the most commonly used antibiotics.[21]

CONCLUSION

SSI is considered an important complication that may cause morbidity and mortality and lead to increased healthcare costs. A high rate of surgical site infections is observed in cases where the SAP is prescribed or administered in a non-compliant manner. Hence, measures should be implemented for the timely administration of prophylactic antibiotics for the prevention of SSI. Also, it is recommended to administer a repeat dose when the duration of surgery is longer than the half-life of the antibiotic given.

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