Evaluation of rational use of antibiotics as surgical prophylaxis in a tertiary care teaching hospital

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Abstract

Background: Rational antibiotic prophylaxis reduces the incidence of surgical wound infection.
Aim: To evaluate the rational use of antibiotics as surgical prophylaxis in a tertiary care teaching hospital.
Methods: This was a prospective and observational study conducted at the S.N. Medical College and HSK Hospital, Bagalkot. All the in-patients subjected for surgical procedure of any age of either sex at HSK hospital, Bagalkot were included in the study. The study was begun with the approval by the H S K Hospital’s Institutional Ethics Committee, S.N.M.C and H.S.K Hospital and research Centre, Bagalkot. The study was conducted in accordance with the ethical principles of the ethics committee guidelines.
Results: In the present prospective study total 106 cases data were collected from surgery department during study period, out of which 43 were male and 63 were female patients found. During the study period 15 surgical site infections (SSI) were found and as per the ASHP guidelines out of 106 cases, 26 cases were received antibiotics at right time and right dose, while right selection of antibiotics was noted in 25 cases. Out of 106 cases of surgeries, 80 cases were not received any prophylactic antibiotics as per the ASPH guidelines.
Conclusion: The prophylactic antibiotics significantly reduce the incidence of post-operative wound infection.
Key words: Prophylactics, surgical site infection, rational use, right time, right dose

Introduction

The use of prophylactic antibiotic is one of the important factors in surgery and has been regularly used to eradicate endogenous microorganisms and to prevent postoperative infectious complications [1,2] manipulated during the procedure. The majority of SSI becomes apparent within 30 days of an operative procedure and most often between the 5th and 10th postoperative days. However, where a prosthetic implant is used, SSI affecting the deeper tissues may occur several months after the operation. Although the outcome measure for SSI used by many studies is based on standard definitions such as those described by the centers for disease control and prevention (CDC) or the surgical site infection surveillance service[3,4]. It remains a major cause of postoperative morbidity and mortality, prolong hospitalization and cost increase of medical care in the surgical unit. Appropriate prophylactic antibiotics administration before surgery can reduce the incidence of SSI. However, inappropriateness of antibiotic prophylaxis administration is still commonly found in various surgical procedures[5-8]. Approximately 30–50% of antibiotic use in hospital practice is now for surgical prophylaxis. However, between 30% and 90% of this prophylaxis is inappropriate. Most commonly, the antibiotic is either given at the wrong time or continued for too long[9]. Controversy remains as to duration of prophylaxis and also as to which specific surgical procedures should receive prophylaxis[10]. Various international guidelines and national
guideline are available for the use of antibiotic prophylaxis in surgery\textsuperscript{[11-12]}. However, adherence to the guidelines in choosing the type and timing of antibiotic prophylaxis administration is not always followed. This situation has led to high incidence of antibiotic resistance worldwide, which has a significant impact on public health issues, especially on treatment outcomes. Development of guidelines for the use of prophylactic antibiotics based on local microbial resistance patterns can improve the effectiveness of the use of prophylactic antibiotics\textsuperscript{[13]}. Surgeons often use a broad-spectrum antibiotic prophylaxis prior to surgery or that does not comply with the guidelines that have been recommended\textsuperscript{[14]}.

In India, research on the rational use of prophylactic antibiotics in surgery, is still rare, therefore the aim of this study was to evaluate the rational use of antibiotics as surgical prophylaxis in a S.N. Medical College and HSK Hospital, Bagalkot.

\textbf{Methods}

\textbf{Study Design}

This was a prospective and observational study of inpatients under going for surgery.

\textbf{Study Location}

This study was conducted at the SN Medical College and HSK Hospital, Bagalkot. It is a multispecialty tertiary care teaching hospital with different specialties and super specialties. HSK Hospital provides primary and specialized health care facilities to people in and around Bagalkot district.

\textbf{Study Criteria}

\textbf{Inclusion criteria:} All the in patients subjected for surgical procedure of any age of either sex at HSK hospital, Bagalkot were included in the study

\textbf{Exclusion criteria:} The patient undergoing surgery of minor importance without (significant indication) and the patient with pre-existing infections.

\textbf{Study procedure}

The study was begun with the approval by the H S K Hospital's Institutional Ethics Committee [Ref: SNMC/PG/2012-13/3982, Date: 02-02-2013], S.N.M.C and H.S.K Hospital and research Centre, Bagalkot. The study was conducted in accordance with the ethical principles of the ethics committee guidelines. Data from the medical records of patients treated in the surgery unit, including patient demographics, type of surgical procedure, drug history, choice of antibiotic regimens, dose, time of administration, and dosage were collected retrospectively. The rational use of antibiotics was assessed by the guidelines of American Society of Health System Pharmacists (ASHP).

\textbf{Results}

\textbf{Demographic details of the patients}

In the present perspective study the total 106 cases data were collected from surgery department during study period, out of which 43 were male and 63 were female patients were found [Figure1]. From total surgery cases the 27 cases of abdominal and 12 cases of vaginal hysterectomy were the most of the chief complaints with abdominal pain, bleeding from vagina, mass per vagina etc. Appendectomy, 7 cases with abdominal pain and 8 cases of anal fissure were collected. Total 2 cases of Cholecystitis with complaints of abdominal pain and Hydrocele with chief complaints of swelling in the hemi scrotal area of total 7 cases were collected. Hernia of 17 cases was collected and 7 cases of excision were reported. Similarly a few cases with Orthopedic (diabetic foot), debridement, esophageal surgery, and gynacomastia, Thyroidectomy, Ileostomy, left gluteal abscess, Phimosis circumcision, splenectomy and thyrodectomy were collected.

\textbf{Surgical antibiotics and hospital stay in tertiary care hospital}

The hospital stay for the patients with abdominal hysterectomy was 7 to 10 days, vaginal hysterectomy 7 to 10 days, appendectomy 3 to 9 days, hemorrhoid was 5 to 6 days, cholecystitis 1 to 18 days, excision was 3 to 5 days, hydrocele was 3 to 5 days, hernia was 5 to 9 days and with thyrodectomy, goiter, phimosis, splenomegaly, left gluteal abscess, gynacomastia, diabetic foot, debridement and esophageal surgery was between 5 to 10 days. The most commonly used antibiotics for the above mentioned surgeries were cefotaxim, ceftriaxone, amoxicillin and clavulanic acid, metronidazole, cefoperazone, and ornidazole. Figure. 2 demonstrates the antibiotics given to them.

\textbf{Surgical site infections found during study}

During the hospital stay of the 106 surgical cases we found the quite good number of surgical site
infections and results were summarized in figure 3. During the study period 15 SSI were found out of which abdominal hysterectomy was 5, appendectomy 2, Anal fissure 2, Cholelithiasis 1, Hydrocele repair 1, Hernioplasty 1, and vaginal hysterectomy 3. Most of the other cases of surgeries SSI were not found.

**Use of appropriate prophylactic antibiotics as per the ASHP guidelines**

The selection of the prophylactic antibiotics is most important to reduce the SSI. In our study out of 106 cases only few cases were received antimicrobial agents as per the ASHP guidelines. In briefly, as per the ASHP guidelines out of 106 cases, 26 cases were received antibiotics at right time and right dose, while right selection of antibiotics was noted in 25 cases. [Results were summarized in Figure 4].

**Prophylactic antibiotic used in various surgical procedures**

ASHP provided the revised clinical practice guidelines for antimicrobial prophylaxis in surgery to reduce the surgical site infection and optimum post-operative patient care. In present study out of 106 cases of surgeries, 80 cases were not received any prophylactic antibiotics as per the ASPH guidelines. The details of the each type of surgeries and prophylactic antibiotics selection were given in the Figure. 5. In briefly, prophylactic antibiotics were not used in surgeries like abdominal hysterectomy 23 cases (82.14%), vaginal hysterectomy 7 cases (58.3%), appendectomy 6 cases (85.7 %), anal fistula 5 cases (62.5%), choleystectomy 1 case (50%). Similarly, surgical excision 7 cases (100%), gynacomestia 1 case (100%), hydrocele repair 6(85.7%), Hernioplasty 14 cases (82.3 %), Hemorrhoidectomy 6 cases (100%), left gluteal abscess 1 case (100%) and splenectomy 1 case (100%).

**Discussion**

With the advent of antibiotics and their widespread use, the incidence of wound infection has come down remarkably. Pre-operative administration of antibiotics to prevent post-operative infection represents a cornerstone in modern medicine, controlled clinical trial have shown that antimicrobial prophylaxis can lower the incidence of infection after certain operations thus reducing morbidity, hospital stay, antibiotic usage and mortality due to sepsis. An effective prophylactic regimen should be directed against the most likely infecting organisms. Infections can be prevented when
Vaginal hysterectomy: 41.66% given, 58.4% not given.
Thyroidectomy: 100% given.
Splenectomy: 100% given.
Circumcision (Phimosis): 100% given.
Left gluteal abscess: 100% given.
Ileostomy: 100% given.
Hemorroidectomy: 17.64% given, 82.3% not given.
Hernioplasty: 14.28% given, 85.7% not given.
Hydrocele repair: 100% given.
Thyroidectomy (Goiter): 100% given.
Gynaecomastia: 100% given.
Surgical Excision: 100% given.
Oesophagus surgery: 100% given.
Surgical debridement: 33.3% given, 66.6% not given.
Orthopedic (Diabetic foot): 100% given.
Choleystectomy: 50% given.
Annal fistula: 24.24% given, 75.76% not given.
Appendectomy: 14.28% given, 85.7% not given.
Abdominal hystectomy: 17.8% given, 82.14% not given.

Figure 2: Surgical antibiotics given for patients in tertiary care hospital.
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effective concentrations of the drugs are present in the blood and the tissue during and shortly after the procedure. Therefore antibiotic prophylaxis should begin just before the operation (60 mins). Beginning earlier was found to be unnecessary and potentially dangerous, while beginning later was found to be less effective[15]. A single dose of prophylaxis before the surgery was found to be sufficient. If surgery is delayed or prolonged, often a second dose is advisable if an antimicrobial agent with short life is used. Post-operative administration is unnecessary and harmful.

For our study, we have adopted American society of health-system pharmacist (ASHP) guidelines as reference. These guidelines are intended to provide practitioners with a standardized approach to the rational, safe, and effective use of antimicrobial agents for the prevention of surgical-site infections (SSIs) based on currently available clinical evidence and emerging issues[16].

In our study, out of 106 patients, 43 were male and 63 were female. Post-operative wound infection was found to be more common within the age group of 40 to 50 years old in our study. Hence, age also plays an important role in developing infection. The post-operative wound infection reflects the hospital stay, in our study the average hospital stay was between 7 to 10 days. There are several factors which affect the frequency of post-operative wound infection[17]. Our study shows wound infection was developed in 15 patients out of 106 patients without prophylactic antibiotic and no cases of wound infection was reported with prophylactic antibiotics.

As we have adopted American Society of Health-system Pharmacist (ASHP) guidelines as reference for our study. Out of 106 cases of surgery, 26 cases were in concordance with the ASHP guidelines for the manner of giving prophylactic antibiotics, and no post-operative wound infection was developed.

**Conclusion**

We conclude that, the prophylactic antibiotics significantly reduce the incidence of post-operative wound infection. Results of our study suggest that use of prophylactic antibiotics as per our adopted guidelines (ASHP) has proven to be effective in reducing the SSI which reflects rational use of antibiotics.

**References**


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**Conflict of Interest:** None Declared