

ANTIBIOPROPHYLAXIS IN DIGESTIVE ONCOLOGY: EXPERIENCE OF THE GENERAL SURGERY DEPARTMENT AT EPH DJILLALI RAHMOUNI EL MOURADIA OVER A PERIOD OF TWO YEARS: 2017 AND 2018

F. ILIMI

Public Hospital Establishment Djillali Rahmouni.

G. BRAHIMI

Department of Epidemiology and Preventive Medicine, BeniMessous University Hospital Centre.

H. GUENDOZ

Public Hospital Establishment Djillali Rahmouni.

L. RAHAL

Public Hospital Establishment Djillali Rahmouni.

Abstract

The healthcare-associated infections' Problem is global (IAS), the patients are affected by these infections during their hospitalization in a treatment establishment, because of the population augmentation and the patients' vulnerability associated to age, to illness and treatment, the increasing rise of the bacterial resistance to antibiotics and the emergence of new microorganisms. These healthcare-associated infections generally and surgical site infections especially, are the most frequent digestive surgical complications. In order to fight the rise of these infections, the prophylactic antibiotic treatment is one of the preventive measures we have to respect. We have achieved a descriptive and a prospective (6) study related to 167 patients who have faced a surgical procedure in digestive cancers at the service of general surgery in the year 2018. This study analyses the implementation of the prophylactic antibiotic (5) prepared and introduced in our service in the same year. During this study, the prophylactic antibiotic protocol has been respected for more than 90% of our patients in 2018.

Index Terms: Antibiotic Prophylaxis, Digestive Cancers, Surgical Site Infection.

1. INTRODUCTION

The problem of healthcare-associated infections is global, and the percentage of patients infected during surgical procedures increases year by year. Each year, Surgical Site Infections (SSIs) threaten the lives of millions of patients and contribute to the spread of antibiotic resistance. This phenomenon compromises the successes of modern medicine¹, leading to prolonged hospital stays, increased medical expenses, and higher mortality rates.

In response to this issue, the World Health Organization (WHO) published global guidelines for the prevention of SSIs in 2016, emphasizing that preventive measures should be implemented before, during, and after surgical procedures². Antibiotic prophylaxis (ATBP) is among these preventive measures recommended by the WHO,

which advises using antibiotics only before and during surgery, ideally within 60 to 120 minutes before incision, to limit the occurrence of postoperative infectious complications. Although ATBP has always been used in our service, mainly at induction, without fully complying with international recommendations, an ATBP³ protocol was implemented in 2018 to ensure adherence to these guidelines. The objective of our study is to evaluate the application rate of the ATBP protocol during the year 2018.

2. MATERIAL AND METHODS

This is a descriptive and prospective study⁴ involving 334 patients undergoing elective surgery for digestive cancers at the General Surgery Department of the Djillali Rahmouni Public Hospital (EPH), with 167 patients from January 1st to December 31st, 2017, and another 167 patients from January 1st to December 31st, 2018. The study compares the results of ATBP prescription before and after the implementation of the protocol.

Statistical analysis: Data entry and analysis were performed using Epi Data Entry 3.02 and Epi Data Analysis software.

Percentages were compared using the chi-square test or Fisher's exact test. For comparing two means, an ANOVA test was used for normally distributed data with homogeneous variances at a 95% confidence level. The significance level was set at 5%. An ATBP protocol was implemented in our department in 2018. It includes: Timing of prescription, which is the preoperative consultation.

Application to specific surgeries categorized as "clean" or "clean-contaminated" according to Altmeier's classification.

Prescription rules: Antibiotics should only be used for infection prevention before and during surgery, not after.

ATBP (usually administered intravenously) should always precede the surgical procedure within a maximum of 1 hour. Prescription duration should not exceed 48 hours, except in cases of infectious complications. The type of antibiotic and the doses to be administered according to the organ are summarized in the following table:

Organ / Procedure	Product	Initial dose	Reinjection and duration
Esophagus Stomach Duodenum Colon Rectum Biliary tract	Cefacidal Flagyl Gentalline In case of allergy	2 g every 6 hours 500 g every 8 hours 3 to 5 mg/kg/once daily by intravenous infusion for a maximum of 72 hours Flagyl + Gentalline for up to 4 days	(If duration > 6 hours, reinject 1 g)
Pancreas Liver If associated procedure (Digestive tract)	Cefacidal Cefacidal + Flagyl	1 g every 6 hours 1 g every 6 hours + 500 mg every 8 hours	(if duration > 6 hours, reinject 1 g)
In case of allergy	Vancomycin	Intravenous infusion 2 g	

3. RESULTS

In 2017:

All patients undergoing digestive cancer surgery received perioperative antibiotic prophylaxis parenterally at incision.

More than half of the patients (50.9%) received triple antibiotic therapy (Cefacidal + gentamicin + Flagyl), and 46% of them received dual antibiotic therapy (Cefacidal + Flagyl or gentamicin + Flagyl or Cefacidal + Gentamicin).

About 42% of patients received antibiotics for 7 days postoperatively, 25% received them for 3 days, and 12% received them for 1 or 5 days respectively. Nearly 9% of patients received antibiotics for a duration ranging from 10 to 15 days (totaling 63% beyond 3 days).

The average duration of this antibiotic prophylaxis was 3.85 days +/- 0.79.

The incidence rate of surgical site infection is 8.4% (14/167). We observed that 57.15% of surgical site infections were deep and 42.85% were superficial. Other healthcare-associated infections observed included central line-associated bloodstream infections, followed by pneumonia and bacteremia. Escherichia coli was the most commonly implicated pathogen.

In 2018:

Nearly 96% (95.8%) of patients undergoing digestive cancer surgery received antibiotic prophylaxis; This prescription was administered preoperatively within 60 minutes before incision. Only 4.20% received it during incision.

The most common combination consisted of Cefazoline, Metronidazole, and Gentamicin, with a rate of 45%. Dual therapy was prescribed in 40.12% of patients. A new single-dose molecule (Ertapenem) was used in 13.17% of cases.

One-quarter of patients received antibiotics on the day following surgery, and 46% of them within 3 days. Antibiotic use extended beyond 3 days for 28% of patients.

The average duration of postoperative antibiotic therapy was 3.68 days +/- 0.21.

The incidence rate of surgical site infection is 6.6% (11/167).

4. DISCUSSION

It is important to emphasize that surgical antibiotic prophylaxis (SAP) is one of the cornerstones in preventing surgical site infections (SSIs). It should target bacteria that are most frequently implicated in SSIs. A systematic review based on the results of numerous randomized comparative trials focused on "antibiotic prophylaxis" concluded a significant protective effect⁵ and benefits in cases of clean or clean-contaminated surgery. The Cochrane review concluded a two-thirds reduction in wound infections (superficial and deep)⁶. The timing of the first injection relative to surgical incision also significantly

influences the risk of postoperative infection. This risk is minimal if the injection occurs within one hour before the incision⁷. In 2017, SAP was administered intraoperatively at induction in 100% of patients operated on, compared to 96% within 60 minutes before incision in 2018, in accordance with prescription rules and protocol indications. However, in the study by S. Lallemand and *al.*⁵, the timing was optimal in only a little over one-third of teams. Classen DC et al. reported in their study on the risk of surgical wound infection and the timing of SAP that delayed antibiotic injection corresponds to a much greater risk than overly early injection. Lizon J. and *al.*⁸ reported non-compliant timing between injection and incision in 83% of cases (too late). According to several studies, patients who receive prolonged prophylactic treatment are more likely to harbor antibiotic-resistant organisms^{9,10,11,12}. The administration of antibiotics for more than 3 days was observed in 63% of cases in 2017, a percentage similar to the findings of BRAHIMI G. and *al.*¹³ study, where 76.5% of patients received antibiotic prescriptions beyond 48 hours. In 2018, the administration of antibiotics for more than 3 days decreased to 28%, indicating a significant improvement in procedural adherence.

The use of broad-spectrum molecules (third-generation cephalosporins) leads to an increased risk of emergence of resistant bacteria, not compensated by better coverage of SSI risk¹⁴. In our study, the molecule selection was protocol-compliant in 82% of cases for two molecules (cefazolin, metronidazole) and in 39.5% for three molecules (cefazolin, metronidazole, gentamicin). A new molecule, intravenous ertapenem as a single dose, has been newly introduced. In BRAHIMI G. and *al.*¹³ study, the molecule was compliant in 74% (77/104) of cases in digestive surgery. The incidence rate of surgical site infections decreased from 8.4% in 2017 to 6.6% in 2018, without significant difference. However, we consider this reduction noteworthy and a good indicator to sustain both the ATBP protocol and other measures for preventing healthcare-associated infections.

5. CONCLUSION

Prescribing surgical antibiotic prophylaxis is an integral part of preoperative consultation. It should be administered 30 to 60 minutes before the surgical procedure so that the antibiotic is present before bacterial contamination occurs. It should use an antibiotic suitable for both the bacterial target and the specific intervention, renewed according to the antibiotic's half-life to ensure long-lasting intervention coverage and achieve effective tissue concentrations at the potential infection site¹⁵. The duration of the prescription should be brief to minimize the development of resistance by germs caused by any antibiotic therapy¹⁶.

A single preoperative injection has proven effective in many surgical specialties. The anesthesiologist and surgeon have all the necessary information to make the best decision: planned surgical procedure, patient history (allergies, infectious diseases, etc.). Given equal efficacy, the practitioner should opt for the least expensive product.

Our department aims to improve the study results by adhering to and perpetuating the established protocol. However, as part of an overall policy to prevent healthcare-

associated infections (HAIs), other preventive measures must also be applied concurrently.

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