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ORIGINAL ARTICLE

A survey of postoperative antibiotic prescription in gastrointestinal cancers in the Tehran-based Firoozgar Hospital in 2014

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Abstract

Introduction: This study aims to present the pattern of antibiotics administration in Firoozgar Hospital as an example of how antibiotics are administered in Iranian hospitals. The pattern is compared with the proposed model in the literature and relevant guidelines to determine the extent to which errors are committed in this regard.

Methods: In this cross-sectional study, 72 cancer patients were recruited who underwent surgical procedures in Firoozgar hospital in 2014. A survey was made the amount, type, and duration of antibiotics taken by the subjects. Data were analyzed using SPSS software version 16 (SPSS, Chicago, IL, USA). The results for quantitative variables are expressed as mean and standard deviation (mean±SD) and for the qualitative variables are expressed as percentage. The comparison between quantitative variables was performed by ANOVA. The significance level (P-value) is considered to be less than 0.05.

Results: In laparoscopic surgeries, patients on average received 4 days of Ceftriaxone and 3 days of Metronidazole. After Whipple procedure, patients took 8 days of Ceftriaxone and 7 days of Metronidazole and in the open gastrectomy, the mean Metronidazole and Ceftriaxone consumption was 4 days. These numbers increased about 5 days for gastrectomy and if they took esophagostomy, Ceftriaxone for 5 days and Metronidazole for 3 days. The average number of hospitalization in laparoscopic procedures was 6 days; in the Whipple procedure, it was 16 days, and in gastrectomy operations, it was 9 days.

Conclusions: Comparing the long duration of hospital stay with the national protocols and the different antibiotic doses for various surgical procedures, further investigations could be conducted to switch the form of national protocols.

Key Words: Anti-Bacterial Agents; Gastrointestinal neoplasm; Surgery

Introduction

Gastrointestinal cancer is of high prevalence. In the Western world and in the urban population, colon carcinoma is the second leading cause of death after lung cancer (1).

One of the major events in modern surgery is the discovery of antibiotics. Antibiotic use is increasing (2) whereby microbial resistant strains have also emerged. Therefore, the risk for the surgical profession would be the lack of antibiotics for resistant strains in the coming years (3). To

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slow down this process, an action plan has to be prepared, and everyone must be observed. Complications of surgical wound infections and complications of antibiotic resistance double the importance of precision in the administration of antibiotic prophylaxis. In spite of the fact that antibiotic administration improperly imposes an additional cost on the health system (1), the infection of the surgery site is a common cause of infections associated with health care (4, 5).

The United States Centers for Disease Control and Prevention have defined criteria by which a surgical infection is defined: an infection appearing in the site of a surgical procedure that occurs locally or in the vicinity of a local surgical invasion within 30 to 90 days after surgery (4).

Surgical site infections are the most common and costliest health care infections. Surgical infections account for 38% of hospital infections (9, 6).

To prevent the onset of surgical site infections in patients undergoing gastrointestinal surgery, guidelines for control and prevention have been published in 1999 (10).

A short period of chemical preparation after mechanical intestinal cleansing and limited use of intravenous antimicrobials (within 24 hours after surgery) is recommended for prophylaxis. The use of a limited dose of intravenous antimicrobials with a meta-analysis, which included 17 randomized controlled trials, has been suggested to prevent infection (7).

It is hoped that conducting such studies would be an effective step in administering correct antibiotics after surgical procedures. There are currently no significant national interventions in this regard. Here, we aimed to investigate the pattern of post-operative antibiotic administration in gastrointestinal cancers in the Firoozgar hospital in 2014.

Methods

This cross-sectional study was performed on files available in the surgery department of Firoozgar Hospital in 2014. Patients who underwent surgical procedures due to gastrointestinal cancers, and did not expire following surgery, were included in the study. Age, sex, and duration of hospitalization after surgery were extracted from each patient's file. A survey was made the amount, type, and duration of antibiotics taken by the subjects. Data were analyzed in the SPSS software version 16 (SPSS, Chicago, IL, USA). The results for quantitative variables are expressed as mean and standard deviation (mean±SD) and for the qualitative variables are expressed as percentage. The comparison between quantitative variables was performed by ANOVA and if there was an abnormal distribution, Kruskal-Wallis was performed. The significance level (*P*-value) is considered to be less than 0.05. Information about all individuals will be reserved for scholars. Researchers are committed to the principles of the Helsinki Treaty and the Ethics Committee of the Iran University of Medical Sciences at all stages (Code of Ethics: IR.IUMS.REC 1395.8911215298).

Results

In this study, 72 people were studied. The mean age of men under laparoscopy was 59.75±8.50 years (mean±SD) and women 57.77±9.74 years. The mean age of the men and women undergoing the whipple procedure were 63.50±9.43 and 59.13±12.28 years, respectively. The mean age of people with open colectomy was 60.83±9.90 in men and 60.05±11.59 years in women. The mean age of men and women who underwent esophagectomy were 63.86±6.65 and 65.55±6.50 years, respectively (Table 1).

In laparoscopic surgeries, the patients received on average 4 days of Ceftriaxone and 3 days of Metronidazole; in Whipple procedure, the patients took 8 days of Ceftriaxone and 7 days of Metronidazole; and in the open gastrectomy, the mean Metronidazole and Ceftriaxone consumption was 4 days (Table 2). Considering Ceftriaxone administration, there were statistically significant differences between laparoscopic and whipple surgery ($P<0.001$), laparoscopic surgeries and esophagectomy ($P=0.007$), whipple and open colectomy ($P<0.001$), whipple and esophagectomy ($P<0.001$), and whipple and gastrectomy ($P=0.001$). Administering Metronidazole, statistically significant differences between laparoscopic and whipple surgery ($P<0.001$), whipple and open colectomy ($P<0.001$), and whipple and esophagectomy ($P<0.001$) were observed.

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Table 1: Sex distribution in different types of surgery

Type of surgery		Frequency	Percent	Age, mean±SD (years)
Laparoscopy	Male	72	57	59.75±8.50
	Female	53	42	57.77±9.74
Whipple	Male	6	42	63.50±9.43
	Female	8	57	59.13±12.28
Open colectomy	Male	30	58	60.83±9.90
	Female	21	41	60.05±11.59
Esophagectomy	Male	21	65	63.86±6.65
	Female	11	34	65.55±6.50

Table 2: Mean days of Ceftriaxone and Metronidazole administration in different types of surgery

Type of surgery	Mean days±SD of Ceftriaxone administration	Mean days±SD of Metronidazole administration
Laparoscopy	4.46±1.28	3.82±1.12
Whipple	8.86±0.86	7.14±1.83
Colectomy	4.90±1.44	4.18±1.12
Esophagectomy	5.34±1.33	3.69±1.06
Gastrectomy	5.67±0.57	5.33±0.57

Discussion

Studies can be an effective step towards appropriate postoperative administration of antibiotics. At present, there have not been significant national interventions in this regard. In our study, the average age of the patients undergoing surgery was relatively high. This could be a reason for the weakness of the safety of people with a high age or background illness. Our results were as follows: The mean age of men under laparoscopy was 59 years and that of women was 57 years; the mean age of men undergoing Whipple was 63 and that of women was 59 years. The mean age of men and women with colectomy were 60 and 60.05 years, respectively.

The difference between intravenous antibiotics as prophylaxis and several intravenous antibiotics as prophylaxis in the incidence of post-operative infections has been shown not to be significant. The prevalence of SSIs in patients undergoing selective rectal surgery was not significantly different in the group treated with a single dose of antibiotics and the group treated by multi-drug antibiotics (8).

Most drugs used for prophylaxis in the digestive system surgeries are Cephalosporin of the first generation and second generation. No difference has been found in the efficacy of first and second generation cephalosporin. Amoxicillin-clavulanate and Ciprofloxacin have also been evaluated with similar results. Comparative studies have compared the efficacy of various antibiotics in reducing post-operative infections. Antimicrobial prophylaxis in gastrointestinal surgery should be considered for risky patients, including the cases of increased gastric pH (for example, patients with diarrhea), digestive perforation, gastric motility, stomach obstruction, gastric bleeding, obesity, and cancer (9).

In the sample we examined, antibiotic therapy was achieved by intravenous Ceftriaxone and Metronidazole. Our enquiry showed interesting results where the patients received Ceftriaxone for 4 days and Metronidazole for 3 days on average, according to the type of operation in laparoscopic surgeries. After the Whipple procedure, patients took 8 days of Ceftriaxone and 7 days of Metronidazole, and in the open gastrectomy, the mean Metronidazole and Ceftriaxone consumption was 4 days. These numbers increased about 5 days for gastrectomy if they took esophagectomy. These results change for Ceftriaxone and Metronidazole for 5 and 3 days, respectively.

In a study by Uludag et al. in Turkey, low risk patients undergoing laparoscopic cholecystectomy were randomly divided into two groups. A total of 68 patients (group one) received intravenous Cefazolin mg after induction of anesthesia and 76 patients (group 2) received no prophylactic antibiotics. In both groups, septic complications were recorded and compared with each other. In

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this study, there was no significant difference between the two groups in terms of surgery-associated infectious complications (10).

A single dose of Cefazolin is also used in clean surgeries, such as selective vagotomy, and SSIs are recommended only in patients at high risk of post-operative infection due to the presence of high risk factors. Alternative regimens are recommended for patients with allergy to b-lactam include Clindamycin or Vancomycin plus Gentamicin, Aztreonam, or Fluoroquinolone. Higher doses are used in obese patients. In most studies, the duration of a single dose of Cephalosporin or Penicillin has been evaluated. Available data suggest that single-dose regimens are effective (9).

Conclusions

Overall, the most important disagreements with the instructions are: over-the-counter antibiotic use even in cases where it is not needed, application of different types of antibiotics in cases where only one type should be used, the use of antibiotics that should not be basically used for prevention purposes, using antibiotics longer than the duration recommended by the instructions, the disproportionate time of starting the administration of preventive antibiotics, and the incomplete way of administering drugs. Therefore, according to the points mentioned above, comparing the long duration of hospital stays with the national protocols, and the different antibiotic doses for various surgical procedures, further investigations could be conducted to switch the form of national protocols.

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Authors' contributors

Mohammadreza Zeinadini: Contributed substantially to the acquisition of data, analyzed data, and co-wrote the paper

Seyede Fahmieh Shojaee: Co-wrote the paper

Mahdi Alemrajabi: Contributed substantially to the conception and design of the study, and provided final approval of the version to publish

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Conflict of Interests

There is no conflict of interests to declare.

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