Types of Antibiotics Administered in Patients Having Head and Neck Carcinoma Treated in Private Dental Hospital - A Retrospective Study

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ABSTRACT

Background: Patients undergoing head and neck oncological surgery are at great risk of developing complications especially postoperative wound infection.

Objective: The purpose of the study was to analyze the type of prophylactic administration of antibiotics.

Methods: All the surgical and medical records of the patient from June 2019 to March 2020 was collected. Some patients had bacteriology data from wound swabs of patients were collected from the department of oncology and department oral and maxillofacial surgery.

Results: Total of 39 patients out of which 11 patients had single antibiotics and 28 patients had a combination of antibiotics given. It was found in our study that most of the patients were administered with cefixime and metronidazole. Patients undergoing head and neck oncology surgery are at great risk of developing complications especially post-operative wound infection. Antibiotherapy seems to have efficacy when administered prophylactic in head and neck surgical procedure.

Conclusion: To conclude our study, although we have other antibiotics used in head and neck cancer operated patients but Cefixime and Metronidazole, Ciprofloxacin were relatively more and commonly administered to patients affected with head and neck carcinoma.

Key Words: Head and neck surgery, Antibiotic prophylaxis, Surgical site, Infection control, Bacterial contamination, Immuno-compromised

INTRODUCTION

Squamous cell carcinoma also known as oral cancer which constitutes about 90% of malignant neoplasm surgery, radiotherapy, and chemotherapy are the election treatment. There are various treatment options, but the selection of only treatment or combination depends principally on the location of the tumor, its size histological subtype, stage, and the patient's general state of health. Surgery and radiotherapy tend to be used alone to treat cases of non-metastatic disease (stage-I stage-II), whereas more or advanced cancers (stage-III and stage-IV) are treated by surgery in combination with radiotherapy and or chemotherapy. It is important to bear in mind that the surgeries these patients undergo are aggressive. They provoke aesthetic and functional alterations that affects the patient's quality of life.¹⁻³

For past 20 years, the incidence of head and neck cancer has increased significantly. Over 57500 new oral cancer cases are annually diagnosed in the world.⁴ According to the data published in 1998 by Spanish National E epidemiology Center, in Spain country, the number of deaths by oral, pharyngeal, and labial cancer amounted to 1,891 of men and 374 of women. The disease mainly affected men over 40 years of age, with peak of maximum incidence in their 60's.^{5,6} The etiology of cancer has multiple factors. The main risk factors are smoking and alcohol. Despite showing synergistic effects, these are independent risk factor, as shown in a study by Cstellsague et al.^{7,8} In some cases of solar ultraviolet radiation in lip cancer, infections diet low in fruits and vegetable, immunosuppression, bad oral hygiene, and the presence of genetic factors can have a relevant effect. Prevention of in-

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fection after procedure involving the head and neck has been number of studies of extensive debates and number of studies. Many procedures in the head and neck involve a breach of mucosal surface and bacterial contamination of surgical wounds may lead to poor outcomes. High rate of surgical sites infections without the use of prophylactic antibiotics.⁸ The evidence generally supports using antibiotic prophylaxis in patients undergoing major head and neck clean contaminated procedure.^{8,9}

Guidelines published by the American Society of Health System Pharmacists, in conjunction with the infection disease society of America, Surgical infection society and society for healthcare. Epidemiology of America¹⁰, recommended consideration of single dose of prophylactic antibiotics only in clean procedure when prosthetic materials are placed. They generally recommended 24 hours of antibiotic prophylaxis for most major clean-contaminated procedure. There have been few studies that specifically address antibiotic prophylaxis in patients receiving free flap reconstruction in head and neck. Many patients receiving free flap have a number of characteristics considered possible risk factor for developing postoperative infections and other complicated including the use of tobacco and alcohol long procedure duration; Previous resection, radiation, and chemotherapy; Poor nutritional status, and multiple comorbidities.^{11,10} General dentist must have regarding the various head and cancer and their complication so that they can handle anxious patients carefully in this delicate issue.^{11,12} Immunocompromised patients affected with carcinoma tend to be more weaker.¹³ The aim of the study is the access the use of different types of antibiotics in head and neck cancer patients.

MATERIALS AND METHOD

Study design and study setting

The study was a retrospective study. The data was collected from the patient case sheet. Surgical and the medical history of the patients were collected from the department of oncology and department of oral and maxillofacial surgery from June 2019 - March 2020.

Participants

All patients who have undergone head and neck surgery were added to the study.

Study size

The sample size of the study was 34.

Ethical clearance

The ethical clearance (SDC/SIHEC/2020/DIASDA-TA/0619-0320) was given by the institutional ethics com-

mittee, Saveetha Institute of medical and Technical Science, Saveetha University.

Statistical analysis

The data was collected from patient reports in hospitals. The obtained data was entered in Microsoft excel 2012. Then exported to statistical package for social science for windows (version 20.0 SPSS Inc., Chicago III,USA) and all subjected to statistical analysis. Chi-square test was employed with a level of significance set at P 0.05.

RESULTS AND DISCUSSION

Distribution of age of patients affected with head and neck carcinoma

20 to 30 years-5.1%, 31 to 41 years old-7.7%, 41 to 50 years old 23.1%, 51 to 60 years old-30.8%, 61 to 70 years old 33.3%, 61 and above aged group patients are affected more (Figure 1).

Distribution of Gender of patients affected with head and neck carcinoma

Female patients affected with head and neck cancer accounts for 10.3% and male patients affected with head and neck cancer accounts for 89.7%. Male population seems to be affected more than the female population (Figure 2).

Distribution of types of antibiotics used in head and neck carcinoma patients

Cefuroxime-7.7%, Cefixime-5.1%, Magnex-2.6%, Metronidazole-2.6%, Clindamycin-10.3%, Amoxicillin and Clavulanic acid-2.6%, Cefixime and metronidazole-33.3%, Ciprofloxacin and Metronidazole 2.6%, Amoxicillin, Clavulanic acid and Gentamicin 5.1%, Nitrofurantoin and vancomycin-2.6%, Cefuroxime and Linezolid-2.6%, ciprofloxacin, Metronidazole, Gentamycin-2.6% (Figure 3).

Association of age to antibiotics used in head and neck cancer patients

20-30- 2 patients-cefixime and metronidazole, 31-40- 1 patient - Amoxicillin and clavulanic acid ; 1 patient - ciprofloxacin and metronidazole 1 patient -Cefuroxime,41-50-1 patient-metronidazole;3 patients-Clindamycin;1 patient-cefixime and metronidazole; 2 patients-ciprofloxacin and metronidazole; 1 patient-amoxicillin, clavulanic acid, and metronidazole; 1 patient -cefixime and metronidazole, 51-60-1 patient-Cefuroxime; 1 patient -Magnex;1 patient-Clindamycin; 4 patients-cefixime and metronidazole; 1 patient -ciprofloxacin and metronidazole;1 patient -Amoxicillin, clavulanic acid, and gentamicin;1 patient-nitrofurantoin and vancomycin; 1 patient-Cefuroxime and linezolid;1 patient-Clindamycin and metronidazole;1

patient-ciprofloxacin, metronidazole and gentamicin, 61-70-1 patient-Cefuroxime; 2 patient-cefixime; 6 patients-cefixime and metronidazole; 1 patient-ciprofloxacin and metronidazole; 1 patient-amoxicillin, clavulanic acid, and metronidazole; 1 patient-Amoxicillin, clavulanic acid, and gentamicin; 1 patient-ciprofloxacin, metronidazole, and gentamicin. Hence, not significant. However, no statistically significant differences between the groups were observed. (Pearson Chi-square test; $P = 0.536$, $P > 0.05$) (Figure 4).

Antibiotics used in neck and neck cancer patients according to gender

Cefuroxime- Female- 0 Male-3; cefixime - Female- 1 Male-1, magnex- Female- 0 Male-1, metronidazole - Female-0 Male-1, clindamycin - Female- 0 Male-4, amoxicillin and Clavulanic Acid- Female- 1 Male-0, cefixime and Metronidazole - Female-2 Male-11, ciprofloxacin and Metronidazole - Female- 0 Male-5, amoxicillin, Clavulanic Acid And Metronidazole - Female- 0 Male-2, cefixime and Metronidazole - Female-0 Male-1, amoxicillin, Clavulanic Acid, and Gentamicin- Female- 0 Male-2, nitrofurantoin and Vancomycin - Female-0 Male-1, cefuroxime and Linezolid- Female- 0 Male-1, clindamycin and Metronidazole - Female-0 Male-1, ciprofloxacin, metronidazole Gentamicin- Female-0 Male-1. However, no statistically significant differences between both the groups were observed (Pearson Chi-square test; $P = 0.366$, $P > 0.05$) (Figure 5).

In our study population of 39 patients, out of which 4 female patients and 35 male patients. Only 11 patients had single antibiotics, 28 patients had a combination of antibiotics. Male population is affected more than the female. 60-70 years old range people are affected more. The most commonly used antibiotics prophylaxis is cefixime and metronidazole.

The administration of perioperative antibiotics helps in reducing the incidence of post-operative wound infection. In a landmark study, Bruke et al demonstrated that the administration of antibiotics is maximally effective preventing bacterial invasion when the antibiotics are administered prior to bacterial contamination.¹⁴ Administration of antibiotics 3 or more hours after bacterial contamination was ineffective in preventing bacterial invasion. This principle has been confirmed in human studies and accepted today.¹⁵⁻¹⁸ Whenever a major head and neck surgical procedure are contaminated by exposure to oropharyngeal secretion, the risk of postoperative wound infection significantly increase wound infection rates of 28-87% have been reported.^{8,19}

In clean contaminated head and neck oncologic surgery amoxicillin-clavulanate prophylaxis was at least as efficient as cefazolin. However, when because beta-lactamase containing strains have recently been spreading amoxicillin-clavulanate.²⁰ Methicillin-resistant *Staphylococcus aureus*

(MRSA) infection is still a major global healthcare problem. *S. aureus* bacteremia can cause metastatic or complicated infections such as infective endocarditis or sepsis and which exhibits high rates of morbidity and mortality. MRSA is responsible for most global *S. aureus* bacteremia cases, and compared with methicillin-sensitive *S. aureus*, MRSA infection has caused poorer clinical outcomes and its virulence is affected by the unique combination of toxin and immunomodulatory gene products, which may differ according to the geographical location and healthcare- or community-associated acquisition. Management of *S. aureus* bacteremia involves timely identification of the infecting strain and source of infection, proper choice of antibiotic treatment is at most important. Resistance and nonsusceptibility to first-line antimicrobials combined with a lack of equally effective alternatives complicates MRSA bacteremia treatment.²¹

In metastatic cases where there is an involvement of the bone, the bone tends to be very weak than the normal condition so, when any trauma is occurred they tend to fracture more easily.²²⁻²⁴ Antibiotics are also used in infective endocarditis, post extraction and other surgical procedures.²⁵⁻²⁷ As, it is very important to give antibiotics in any surgical procedure to administer antibiotics to prevent infection.²⁸⁻³¹ Post-surgery the patient is asked to maintain a good oral hygiene with the help of mouthwash and other such products.³²

CONCLUSION

To conclude our study, although we have other antibiotics used in head and neck cancer operated patients but Cefixime, Metronidazole and Ciprofloxacin were relatively more and commonly administered to patients affected with head and neck carcinoma. Antibiotic administration plays a vital role in post-operative management of cancer cases, proper selection by sensitivity testing and administration will help in better prognosis of the patient. Further research should be done particularly on the sensitivity of microbes, improved form of antibiotics and inadvertent usage of antibiotics to prevent MRSA.

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Figure 1: Pie chart showing age of the patients affected with head and neck carcinoma. Blue represents patients aged between 20-30, Red color denotes patients aged between 31-40, Green shows patients aged between 41-50 years old. Orange denotes patients aged between 51-60 years old. Yellow color shows patients affected from the age group of 61-70 years old.

Figure 2: Gender of the patients affected with head and neck carcinoma. X-axis denotes gender of the patients and Y-axis shows total number of patients. Males (89.7%) patients were more when compared to female (10.26%) patients.

Figure 3: Distribution of antibiotics used in head and neck carcinoma patients. Cefixime and Metronidazole (33.3%) were commonly prescribed antibiotics when compared to other drugs.

Figure 4: Shows association between antibiotics used in neck and neck cancer patients according to age. X-axis denotes the age of the patients and antibiotics and Y-axis denotes the number of patients affected with head and neck carcinoma. Patient aged between in 61-70 years old were given cefixime and metronidazole (15.38%) compared to other age groups. However, no statistically significant differences between the age groups were observed. (Pearson Chi-square test; $P = 0.536$, $P > 0.05$).

Figure 5: Shows patients affected with head and neck carcinoma according to their gender and types of antibiotics used. Where X-axis reveals the gender of the patients and Y-axis shows total number of patients. In males cefixime and metronidazole were given more commonly when compared to females. However, no statistically significant differences between both the groups were observed (Pearson Chi-square test; $P = 0.366$, $P > 0.05$).