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Research article

A study of the pattern of antibiotic use in major head and neck cancer surgeries

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ABSTRACT

The aim of the present study is to the rationale behind the use of antibiotic in major head and neck cancer surgeries and also the effectiveness of antibiotics in the prevention and treatment of post-operative infections. The antibiotic use was studied in patients undergoing head and neck cancer surgeries for a period of 1 ½ years. This study was planned to evaluate the pattern of antibiotic use for major head and neck cancer surgeries, both pre-operatively as well as post-operatively and to assess the outcome. The settings and design of this study was tertiary care teaching hospital, prospective and open study. A prospective study was conducted which included 50 patients undergoing major head and neck cancer surgery admitted to the department of ENT and Head and Neck. Relevant information on each patient was collected according to the proforma designed for the study. The antibiotics used pre-operatively and post-operatively were noted down and also any change in the antibiotic administration, with reasons for the change. The percentage of patients with wound infection and response to any particular antibiotic and also the duration of hospital stay were noted. Data were analyzed statistically using mean and standard deviation. The 70% of the patients were females and 36% of them were middle aged with no predisposition factors like fungation, radiation, tracheostomy and fistula. 78% of the patients had carcinoma of the oral cavity while 2% presented with carcinoma of the paranasal sinus, nose and thyroid. The combination of cefazolin and metronidazole was effective in treating post-operative wound infection in 39% of the patients. *Staphylococcus aureus*, *pseudomonas*, *anaerobes* and *klebsiella* were the organisms isolated from the wound. In conclusion, today's major head and neck onco-surgery with reconstructive procedures is generally safe owing to improvement in surgical skills and better antibiotic use.

Key words: Head and neck cancer surgeries, Wound infection, Antibiotic use.

1. INTRODUCTION

Head and neck cancer is a world wide public health problem. It is especially troubling in developing countries where most patients are diagnosed at advanced clinical stages and need more aggressive treatment, which is usually associated with complications and poor survival. A combined modality with pharmacotherapy, surgery and radiotherapy is usually employed for treatment since it gives better prognosis.

Wound infection following head and neck onco-surgery is an important cause of post-operative morbidity as the upper aero digestive tract is an important source of contamination [1]. Definitive diagnosis of infection is made by the presence of purulent material draining from the wound. It can also be made from the number of bacteria per gram of wound tissue [2]. Quantitative cultures of tissue biopsies that reveal greater then 10^5 bacteria per gram of tissue suggest clinical infection [3].

Empirical therapy of infections is probably the most common reason for using a combination of antibiotics [4]. Knowledge of the type of infection, its microbiology and the spectrum of activity of the several potentially useful antimicrobial agents is essential for selection of a rational and effective regimen [5-7].

Successful antimicrobial prophylaxis requires antimicrobial activity against gm +ve, gm –ve and anaerobic activity. Also the usefulness of an antibiotic agent depends on

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its antimicrobial spectrum, its profile and cost [8,9]. In this study, we are evaluating the efficacy of various antibiotics, commonly used in antimicrobial control in head and neck onco-surgery and analyzing the factors and time taken for wound healing.

2. MATERIALS AND METHODS

2.1 Selection of Subjects

Fifty patients of either sex with head and neck cancer were selected for the study. They were admitted to the department of ENT and Head and Neck, Jalappa Hospital and Research Centre, and undergoing surgery from 1-7-2003 to 1-1-2005. The ethical clearance was obtained from the ethical committee of the college.

2.2. Treatment protocol

Pre-operative risk factors like HIV, Hbs'Ag' were recorded in each case. Informed consent for the performance of surgery was taken in every case. A detailed history was taken from the patients by interviews and documented in accordance with the proforma as well as physical examination was done at the time of admission for all the patients. Pre-operative oral swabs for culture and sensitivity was taken and daily examination of the operative wound site was done to look for any evidence of infection and also appearance of fever, stitch abscess, wound dehiscence, purulent discharge, oedema and swelling.

All the necessary investigations were conducted in every patient, like complete haemogram, RBS, urine analysis, serum electrolytes, culture and sensitivity of wound discharge, if any, ECG and biopsy of the lesion.

The antibiotics used pre-operatively and post-operatively were noted down, and also any change in antibiotic administration, with reason for the same. The results were tabulated and percentage of patients developing wound infection following surgery was calculated.

In patients who developed wound infection, pus c/s was done by the department of microbiology. The c/s was done by pus culture using sheep blood agar, Mac conkey agar and Thioglycollate broth. Antibiotic sensitivity test was carried out using Kirbey-Bauer disc diffusion method [10,11].

2.3. Statistical analysis

In our study, a sample size of 50 patients was taken. After the data was collected, they were analyzed using descriptive and inferential statistics. Demographic variables like age, sex, nutritional status were analyzed using mean while the remaining data like antibiotics used for prophylaxis, post-operative infection, time taken for surgical wound healing were expressed as standard deviation values.

3. RESULTS

Females constituted a larger part of the study, up to 70%. The mean age of the patients was 50.30±10.40 years. The adverse factors predisposing for infection in the study were fungation, radiation tracheostomy and fistula. Most of the patients had no predisposing factors for infection and these patients constituted 82%. Among the rest of the patients, 8% had fungation and 2% came with fistula.

The site of primary tumour in 78% of the patients was oral cavity followed by carcinoma of the hypopharynx in 10%, carcinoma of the larynx in 6% and 2% of the patients had carcinoma of the thyroid, paranasal sinus and nose respectively. The mean wound infection control rate in days was 13.6±3 and the time taken for surgical wound healing was 18.2±5 days.

Table 1
Staging of tumors in patients

	T2	T3	T4
N_0		7	2
N_1	8	12	5
N_{2a}		2	2
N_{2b}	1	5	1
N_{2c}		1	3

Table 2
Antibiotics used for prophylaxis

Sl. No.	Antibiotics used	No. of patients	No. of patients in %
1	Cefazolin + Metronidazole	14	28
2	Clindamycin + Gentamicin	3	6
3	Ampicillin + Cloxacillin	2	4
4	Moxifloxacin + Metronidazole	2	4
5	Ciprofloxacin + Metronidazole	1	2
6	Cefprozil + Metronidazole	5	10
7	Cefazolin	13	26
8	Ciprofloxacin	5	10
9	Cefprozil	4	8
10	Clindamycin	1	2

Table 3
Antibiotics used for post-operative infection

Sl. No.	Antibiotics used	No. of patients	No. of patients in %
1	Cefprozil + Metronidazole	7	38.88
2	Moxifloxacin + Metronidazole	2	11.11
3	Moxifloxacin + Clindamycin	2	11.11
4	Amikacin + Clindamycin	3	16.66
5	Clindamycin + Gentamicin	1	5.55
6	Cefprozil	3	16.66

Table 1 depicts the diagnosis/staging of tumors in patients. It was found that majority of patients had T_3N_1 carcinoma i.e. 12 patients. This was followed by 8 patients who had T_2N_1 carcinoma. In this study, we had only single patient with T_2N_{2b}, T_3N_{2c} and T4N2b carcinoma respectively. As in Table 2, the combination of cefazolin and metronidazole was used in maximum number of patients i.e. 28% followed by cefazolin in 26%. The least frequently used antibiotics were clindamycin alone and the combination of ciprofloxacin and metronidazole each in 2% patients. In

38.88% of infected patients, cefprozil and metronidazole were used, all of which responded to therapy and in other patients, the change in anti-microbial therapy was-clindamycin and amikacin in 16.66%, moxifloxacin and metronidazole in 11.11%, clindamycin and moxifloxacin in 11.11% and clindamycin and gentamicin in 5.55% (Table 3).

As shown in Fig. 1, *beta haemolytic streptococci*, *H. influenza* and *Klebsiella* were isolated from the throat swab culture in 30% of the patients respectively. This was followed by anaerobes in 5%, pseudomonas in 8% and aerobic spore bearers in 4% patients. Most of the patients (16%) presented with purulent discharge. Edema and wound dehiscence developed in 12% and 8% of the patients respectively.

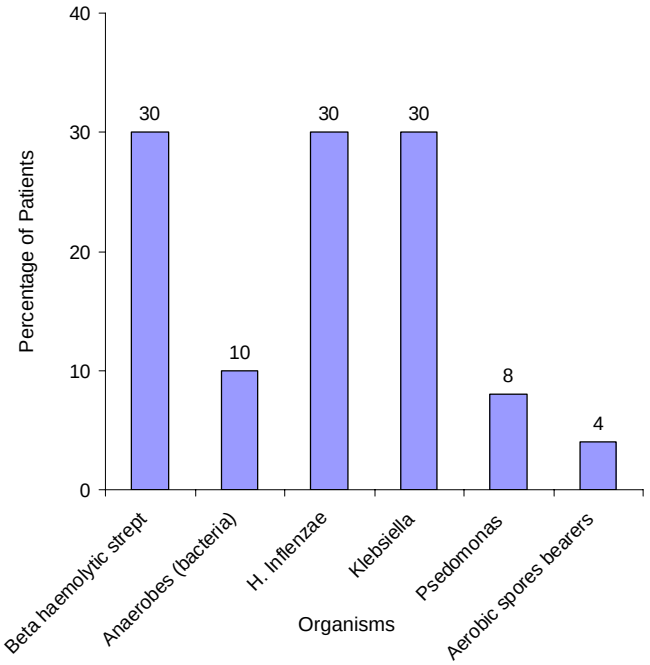

Fig.1. Organisms isolated from the throat swab

4. DISCUSSION

In the present study, 70% of the patients were females and most of them were middle aged in contrast to the study of Peter. D. Lacy *et al*, in which most of the head and neck SCC patients were elderly with very few patients less than 40 years of age [12]. Thawley, in his study, has stated that prior radiotherapy increases the post-operative wound infection rate [13]. In our study, prior radiotherapy was given only on 40% of the patients of which, one developed wound dehiscence with infection in the post-operative period. This subsided with clindamycin and amikacin therapy with delayed wound healing occurring in 18 days. Studies of Coskin *et al.* have shown that prior tracheostomy is another factor that may be responsible for higher post-operative wound infection rate [12,13], but in our study, prior tracheostomy as a predisposing factor for infection was seen in 4% patients leading to wound infection which was controlled with moxifloxacin and metronidazole.

Robinson, in his study, has reported that *staphylococcus aureus* was the most common pathogen isolated [14]. In contrast to our study, wherein, *beta haemolytic streptococci* (30%), *H. influenza* (30%) and *Klebsiella* (30%) were the common pathogens isolated from the patients throat swab followed by *anaerobes* (10%), *pseudomonas* (8%), *aerobic spore bearers* (4%).

It has been reported in a study that most of the head and neck onco-surgical infections are polymicrobial in nature [1,15,16]. The present study reveals that only 40% patients had polymicrobial in pre-operative throat swab which may be an indication of poor oral hygiene and poor immunity. In the above patients, change of antimicrobial therapy became necessary in 36% due to development of post-operative infection, with contributing factors being supra major surgical procedures and salivary contamination.

A number of studies have stated the reduction in infection rate from 28% to 16% with the usage of cefazolin and also reduction in the total incidence of wound infection with a combination therapy of cefazolin and metronidazole given for at least 7 days [9,17]. Accordingly, in our study too, the combination of cefazolin and metronidazole was used in maximum number of patients (28%), followed by cefazolin alone in 26% of patients while a combination of cefprozil plus metronidazole was used in 10% of patients.

In patients who developed surgical wound infection in spite of prophylactic antimicrobial cover, a change in the antimicrobial therapy was done depending on the c/s report of the pus swab from the wound. In 39% of the patients, a combination of cefprozil with metronidazole was used, all of whom responded to therapy. The other antibiotics used to treat post-operative infection were clindamycin, amikacin, moxifloxacin and gentamicin respectively. The present study is in concurrence with the study by Johnson who treated similar infected cases with short and long term courses of with short and long term courses of clindamycin and an amino glycoside (gentamicin) combination [18]. Regarding the time of clearance of wound infection, studies have pointed out that infection control occurred in 10-23 days with a mean of 12 days [19,20]. Our study also shows that in 78% of the patients, the response to antimicrobial therapy occurred in 10-14 days.

5. CONCLUSIONS

In conclusion, today's major head and neck onco-surgery with reconstructive procedures is generally safe owing to improvement in surgical skills and better antibiotic use, also improvement in anesthesia and transfusion medicine. In some patients, there is persistent risk of major complications with serious consequences. A major comprehensive understanding of the common pathogens and the antibiotics they respond to is necessary to formulate definite protocols to reduce the complications at the same being cost effective. An attempt has been made in the present study in the above direction and

more such studies may be needed for formulating better protocols.

REFERENCES

[1] Johnson, J.T., Brown, B.M., Wagner, R.L., *Laryngoscope* 1987, *97*, 587-590.

[2] Repanos, C., Singh, V., Rajkumar, K., Jaramillo, M., *J Laryngol Otol* 2005, *119*, 243-244.

[3] Veenu, G., Sunil, G., *Hospital Today* 2002, *12*, 630-638.

[4] Jonas, T., Johnson, M.D., Victor, L., *Ann of Surg* 1988, *207*, 108-111.

[5] Rubin, J., Johnson, J.T., Wagner, R.L., Yu, V.L., *Arch Otolaryngol Head Neck Surg* 1988, *114*, 969-972.

[6] Girish, M.B., Kumar, T.N., Srinivas, R., *Int J Pharm Biomed Res* 2010, *1*, 48-52.

[7] Heethal, J., Sarala, N., Kumar, T.N., Hemalatha, M., *Int J Pharm Biomed Res* 2010, *1*, 57-61

[8] Tandon, D.A., Bahadur, S., Laldina, H.C. Sundaram, K.R., *J Laryngol Otol* 1992, *106*, 621-624.

[9] Callender, D.L., *Int J Antimicrob Agents* 1992, *12 Suppl*, S21-25.

[10] Duguid, J.P., Collee, J.G., Frazer, A.G., in: Collee, J.G., Duguid, J.P., Frazer, A.G., Marmion, B.P., (Eds.), *Practical Medical Microbiology*, Churchill Livingstone, 1989, pp. 600-649.

[11] Scott, A.C., in: Collee, J.G., Durguid, J.P., Frazer, A.G., Marmion, B.P., (Eds.), *Practical Medical Microbiology*, Churchill Livingstone; 1989, pp. 161-181.

[12] Lacy, P.D., Piccirillo, J.F., Merritt, M.G., Zequeira, M.R., *Otolaryngol Head Neck Surg* 2000, *122*, 253-258.

[13] Fee, W.E.Jr., Glenn, M., Handen, C., Hope, M.L., *Laryngoscope* 1984, *94*, 612-614.

[14] Geyer, G., Borneff, M., Hartmetz, G., *Head and Neck Oncology* 1987, *35*, 355-359.

[15] Coskun, H., Erisen, L., Bagut O., *Otolaryngol Head Neck Surg* 2000, *123*, 328-33.

[16] Clayman, G.L., Raad, I., Hankins, P.D., Weber, R.S., *Head Neck* 1993, *15*, 526-31.

[17] Strauss, M., Saccogna, P.W., Allphin, A.L., *J Laryngol Otol* 1997, *111*, 631-34.

[18] Johnson, J.T., Wagner, R.L., Schuller, D.E., Gluckman, J., Suen, J.Y., Snyderman, N.L., *Arch Otolaryngol Head Neck Surg* 1992, *118*, 488-490.

[19] Mishriki, S.F., Law, D.J., Jeffery, P.J., *J Hosp Infect* 1990, *16*, 223-230.

[20] Cloke, D.J., Green, J.E., Khan, A.L., Hodgkinson, P.D., McLean, N.R., *Br J Plast Surg* 2004, *57*, 556-560.