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Antibiotic Prophylaxis in Head and Neck Oncologic Surgery at Örebro University Hospital (USÖ)

Version 2

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ABSTRACT

Background: Head and neck oncologic surgery brings a significant risk for postoperative infections, which motivates the use of antibiotic prophylaxis. The surgical wounds are frequently contaminated with the normal micro floras in mouth and oropharynx. However, the interests of correct and effective antibiotic strategies are of increasing concern, due to the risk of developing antibiotic resistance. Antibiotics covering relevant bacteria and a dosage schedule of 24 hours are, according to current guidelines, sufficient to provide effective protection for most head and neck procedures.

Methods: The study was designed as a retrospective study of medical records, in an attempt to investigate the routines of antibiotic prophylaxis at the department of Otolaryngology-Head and Neck Surgery at USÖ. 20 patients were included. A protocol including different parameters of interest for possible postoperative infections and antibiotic prophylaxis was completed with information from “Kliniska Portalen” and paper charts.

Results: An overall infection rate of 20% was observed. Noteworthy was that 16 patients received broad-spectrum antibiotic prophylaxis, as current guidelines are suggesting. 3 patients received cefuroxime alone and 1 patient was excluded due to the missing of a paper chart. In addition, 15 patients received their preoperative dosage in accordance with current recommendations. However, the duration of the antibiotic prophylaxis given varied widely among the patients, (from 4-17 days).

Conclusion: It would be preferable to develop more distinct guidelines at the department of Otolaryngology-Head and Neck Surgery at USÖ. Especially concerning the duration of the antibiotic prophylaxis and when the preoperative dosage is to be given.

Keywords: Antibiotic prophylaxis, clean-contaminated, head and neck cancer, surgery.

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INTRODUCTION

Head and neck cancer

Head and neck cancer is divided into malignant tumours originating from the lips, oral cavity, pharynx, larynx, nose, sinuses and the salivary glands [1]. Together with oesophageal cancer, these cancer forms represent 3% of all cancer diagnoses in Sweden. The majority of the patients are over 60 years old and there is a strong correlation between heavy alcoholic consumption and tobacco use, especially smoking. The incidence of head and neck cancer is relatively low in Sweden, in an international perspective [2]. On a yearly basis approximately 1000 patients are diagnosed with head and neck cancer in Sweden. Oral cavity cancer represents the greatest subgroup (> 50%), and larynx and pharynx cancer represent about 20-25% each [3]. The treatment of these patients is usually complicated and often consists of a combination of radiotherapy and surgery [2].

Head and neck tumours are graded according to the T-N-M-classification, standing for tumour size (T), nodular spread (N) and periphery metastasis (M). The prognosis for the patients depends on the T-N-M-classification. A low TNM stage indicates a good prognosis, while a higher TNM stage indicates a poorer prognosis [2].

Oral cavity cancer

Squamous cell carcinoma represents 80% of the of oral cavity cancer and is classified as low, intermediate or high differentiated cancer. Malignant salivary gland neoplasms represent approximately 10%. Oral cavity cancer is divided into buccal (the inside of the lips and cheeks), gingival, tongue (except the base of the tongue), hard palate and cancer in floor of the mouth, out of which tongue cancer represents 40% of the cancer cases [2]. The first choice treatment is surgery and tumours classified as TNM stage I or II often only requires surgery. Tumours in the more advanced stages, III or IV, are treated with surgery combined with radiotherapy [4]. Further reconstructive surgery with surgical flap placement may be considered depending on the tissue damage [2].

Laryngeal cancer

Cancer of the larynx has a male predominance [2] and the most significant risk factor for developing laryngeal cancer is smoking [4]. 90% of the malignant tumours in laryngeal cancer are squamous cell carcinoma [2]. Anatomically the larynx consists of 3 portions: supraglottic, glottic and the subglottic larynx [5]. 70-80% of the tumours originate from the vocal cords, the glottic larynx [2]. Full dose radiotherapy is used in the treatment of small glottic laryngeal tumours (T1N0M0) and irradiation of the surrounding lymph nodes is not included in the therapy [2,4]. However, laser extirpation is considered to be an equivalent therapy and is increasing internationally [4]. T2 and T3 glottic carcinomas receive radiotherapy of both larynx and the surrounding lymph nodes. The most advanced glottic tumours, T4 carcinomas, receive a combination of radiotherapy and total laryngectomy surgery. The same guidelines are used for supraglottic laryngeal cancer; however, the radiotherapy always includes the surrounding lymph nodes due to the greater risk of spread. There are no existing guidelines for the treatment of subglottic cancer due to the low quantity of cases [2,4].

Hypopharyngeal cancer

Cancer of the hypopharynx also has a male predominance. The most significant risk factors are alcohol and tobacco use. Hypopharynx is the bottom portion of pharynx and lies just behind larynx, partially enfolding it, and is classified into three regions: the postcricoid area, pyriform sinus and the posterior pharyngeal wall. Squamous cell carcinoma represents over 95% of the tumours arising in this region. T1-T2 tumours are mainly treated with irradiation. If the cancer is classified with a higher TNM stage, the treatment consists of preoperative radiotherapy both on the tumour and the surrounding lymph nodes, followed by laryngohypopharyngectomy and neck dissection [2].

The normal floras in the upper airways and the risk of postoperative infections

Surgical procedures within head and neck surgery range from clean to clean-contaminated procedures. Clean procedures do not involve contamination of the surgical wound. In clean-contaminated procedures the incision is made both through skin and mucosa, and exogenous and endogenous micro flora may contaminate the

wound [6,7]. The infection risk following clean-contaminated procedures in head and neck surgery is due to the normal micro floras in mouth and oropharynx [7]. Both gram-positive and gram-negative bacteria represent the upper airway micro flora, involving both aerobic and anaerobic organisms [6,7]. The organisms included are among others the oral streptococci, Haemophilus species, Neisseria species and staphylococci. Healthy adults colonised with pathogenic staphylococcus aureus and streptococcus pyogenes are also prevalent [6].

Head- and neck cancer surgery brings a significant risk for surgical site infection (SSI) and is often polymicrobial [7]. Certain patients have an increased risk for postoperative infections, especially smokers, obese patients, patients on cortisone medication and patients who suffer from malnutrition or diabetes mellitus. Patients who have received preoperative radiotherapy may have an increased risk as well [6].

Antibiotic prophylaxis

To avoid postoperative infections, antibiotic prophylaxis is used pre-, peri- and postoperatively. It is used in surgery where there is a significant risk for bacterial spread. Postoperative infections cause suffering for the patient and costs for the society. However, an increased antibiotic use also induces an increased risk for development of antibiotic resistance, and subsequently challenging problems for the health care system, the society and a threat to the remaining population as well [6]. Antibiotic therapy may also alter the individual's micro flora and predispose to Clostridium Difficile enterit [7]. However, if used effectively, antibiotic prophylaxis could improve the outcome of the surgical procedures, reduce the postoperative infection frequency, reduce the development of antibiotic resistance and reduce the total use of antibiotics, which further could lower the costs for the health care system [6].

There are strong scientific evidences for the use of antibiotic prophylaxis in clean-contaminated head and neck oncologic surgery. The prevention of postoperative infections is important to avoid expensive complications and further suffering for the patient [6]. The preoperative antibiotic prophylaxis doses are best to be given within 1 hour before surgery starts, depending on the half-life of the drug. The goal is to achieve the minimum inhibitory concentration (MIC) for the probable organisms at

the time of incision, and during the whole procedure [7]. According to the SBU report [6] the use of antibiotic prophylaxis should be limited to a 24 hours dosage schedule. No further statistically significant results have been observed when using prophylaxis beyond 24 hours [8-12]. It is also important to have both aerobic and anaerobic coverage, due to the polymicrobial flora [6,13]. According to Robbins et al. [14] a combination of cefazolin and metronidazole was proved more effective in preventing SSI than cefazolin alone. The importance of broad-spectrum antimicrobial prophylaxis was observed in another study as well, carried out by Johnson, et al. [11]. This double-blinded study detected a statistically significant ($P < 0,05$) lower infection rate for a combination of gentamicin + clindamycin than cefazolin alone, due to the extended coverage of Gram-negative organisms and anaerobes. Recent guidelines for antimicrobial agents in clean-contaminated procedures following head and neck oncologic surgery are cefazolin + metronidazole, cefuroxime + metronidazole or ampicillin-sulbactam. In case of beta-lactam allergy clindamycin is an appropriate choice [7]. Cefazolin is a first-generation cephalosporin and cefuroxime is a second-generation cephalosporin. They are both falling into the category of beta-lactam antibiotics and inhibit the synthesis of bacterial cell walls. Cefuroxime is active against both gram-positive and gram-negative organisms, predominately aerobes. Metronidazole is a nitroimidazole derivate and is predominately active against anaerobes [15]. In addition to the importance of broad spectrum antibiotics, it is of further interest that the prophylaxis given not cause increased morbidity among the patients [16]. An example is the development of Clostridium Difficile enterit.

Aim of the study

Correct antibiotic strategy in today's society is of increasing importance, due to the growing problems with antibiotics resistance. There are many studies [8-12] investigating how to effectively use preoperative antibiotic prophylaxis. However, there is a deficiency of studies investigating the effectiveness of the antibiotic prophylaxis in the clinical work, according to the SBU report [6].

The aim of the study is therefore to investigate the use of antibiotic prophylaxis in head and neck oncologic surgery at the department of Otolaryngology-Head and Neck

Surgery at Örebro University Hospital (USÖ). The study will consider both advantages and disadvantages of antibiotic prophylaxis usage.

MATERIAL AND METHODS

Patient population and period of time

This study was designed as a retrospective study of medical records carried out at the department of Otolaryngology-Head and Neck Surgery at USÖ. Patients included in the study were the 10 most recent patients from 2013 undergoing laryngectomy and oral cavity resection with free flap surgery, respectively, giving a total of 20 patients. This was possible by searching on the operation code of these procedures. Patients undergoing the surgery procedures mentioned above do always receive antibiotic prophylaxis due to the great risk of infection. The mean age of the patients included was 67 years (range, 44 – 81 years), with 6 women (30%) and 14 men (70%).

What have been studied?

A protocol to investigate patient characteristics, antibiotic prophylaxis and the occurrence of possible SSI and possible adverse effects of the antibiotic dosage was developed. By using information from the database “Kliniska Portalen” (the software containing medical records) and paper charts, the protocol of all twenty patients was completed. One laryngectomy patient was excluded from the final evaluation of 2 parameters, (the duration of surgery and the antibiotic prophylaxis), due to the missing of a paper chart.

Parameters included in the protocol were sex, age, diagnosis, type of surgery, antibiotic medication, timing of the first dosage and the duration of the antibiotic prophylaxis given. Factors indicating a possible SSI such as body temperature, elevated B-LPK (white blood cell count) and CRP and possible positive culture results were also investigated. Potential risk factors for postoperative infections were parameters of interest as well. The following factors were investigated: diabetes mellitus, smoking, alcoholic consumption, cortisone therapy, preoperative radiotherapy and duration of surgery. Finally, parameters indicating possible adverse effects of the antibiotic prophylaxis were also included: gastrointestinal effects (diarrhoea, constipation and nausea), Clostridium Difficile enterit and rashes.

Definitions

In the current study the definition of SSI was based on a publication by The Centers for Disease Control and Prevention (CDC) [17]. However, in addition to the CDC definitions, the occurrence of possible fistulas or flap necrosis was considered as SSI in the study as well. Moreover the suspicion of SSI was supported through parameters as elevated CRP, B-LPK and body temperature and positive culture results from the wound.

Statistics

The statistical method used in the evaluation of the results was fisher's exact test. Values of $p < 0.05$ were considered statistically significant.

Ethics consideration

The head of the department of the Otolaryngology-Head and Neck Surgery at USÖ has approved of the study, including the analysis of medical records.

RESULTS

Table 1

Patient	Sex	Age	Type of surgery	Duration of surgery (minutes)	Preoperative radiotherapy	Antibiotic Prophylaxis		
						Preparation	Time prior incision	Total duration (days)
1	Male	62	Laryngectomy	310	No	Metronidazole + Cefuroxime	0,5h vs. 1h	16
2	Male	75	Laryngohypopharyngectomy	530	No	Metronidazole + Cefuroxime	0,5h	8
3	Male	68	Laryngectomy	440	Yes	Metronidazole + Cefuroxime	0,5h vs. 1h	> 43
4	Male	68	Laryngectomy	415	No	Metronidazole + Cefuroxime	0h	8
5	Male	50	Laryngectomy	485	No	Metronidazole + Cefuroxime	0,5h	6
6	Male	54	Laryngectomy	430	No	Metronidazole + Cefuroxime	0,5h	16
7	Male	44	Laryngectomy	615	Yes	Metronidazole + Cefuroxime	1h vs. 0,5h	17
8	Female	75	Laryngectomy	240	No	Cefuroxime	1h	4
9	Male	62	Laryngectomy	230	Yes	Metronidazole + Cefuroxime	0h vs. 0,5h	6
10	Male	64	Laryngectomy	x	No	x	x	x
11	Male	81	Resection of skin tumour + reconstructive flap surgery	425	Yes	Cefuroxime	0h	10

12	Male	63	Hemimaxillectomy + reconstructive flap surgery	880	No	Metronidazole + Cefuroxime	0,5h vs. 0h	11
13	Female	59	Oral cavity resection + reconstructive flap surgery	785	Yes	Metronidazole + Cefuroxime	0,5h	44
14	Female	77	Mandibular resection + reconstructive flap surgery	855	Yes	Metronidazole + Cefuroxime	1h	8
15	Male	71	Hemi mandibular resection + reconstructive flap surgery	1200	Yes	Metronidazole + Cefuroxime	0,5h	14
16	Female	79	Tumour extirpation, neck, parotidectomy, + reconstructive flap surgery	560	No	Cefuroxime	0,5h	7
17	Male	75	Tongue resection + reconstructive flap surgery	515	No	Metronidazole + Cefuroxime	0h	7
18	Female	67	Hemimaxillectomy + reconstructive flap surgery	900	No	Metronidazole + Cefuroxime	0h vs. 0,5h	17
19	Female	81	Mandibular resection + reconstructive flap surgery	715	No	Metronidazole + Cefuroxime	0h	10
20	Male	65	Glossectomy + reconstructive flap surgery	730	No	Metronidazole + Cefuroxime	0,5h	15

Table 2

Patient	Antibiotic preparation	Postoperative infection			Adverse effects (GI, C. Difficile, Rashes)	Patient characteristics				Secondary surgery due to a SSI
		SSI	Fistula, flap necrosis	Possible microbiology		Diabetes mellitus	Nicotinic usage (smoking)	Excessive alcoholic consumption	Cortisone treatment	
1	Metronidazole + Cefuroxime	No	No	No	No	No	Yes	No	No	No
2	Metronidazole + Cefuroxime	Yes	No	CoNS + Fungus	No	Yes	Yes	No	Yes	No
3	Metronidazole + Cefuroxime	Yes	Yes	Coliform bacteria + Enterococcus faecalis	No	No	Yes	No	Yes	No
4	Metronidazole + Cefuroxime	No	No	No	No	No	Yes	Yes	No	No
5	Metronidazole + Cefuroxime	No	No	No	Rashes	No	Yes	Yes	No	No
6	Metronidazole + Cefuroxime	No	No	No	GI	No	Yes	No	Yes	No
7	Metronidazole + Cefuroxime	No	No	No	No	No	No	No	No	No
8	Cefuroxime	No	No	No	No	No	Yes	No	Yes	No
9	Metronidazole + Cefuroxime	No	No	No	No	No	Yes	No	No	No
10	X	No	No	No	No	No	Yes	Yes	Yes	No
11	Cefuroxime	No	No	No	No	Yes	Yes	No	No	No
12	Metronidazole + Cefuroxime	No	No	No	GI	No	Yes	No	No	No
13	Metronidazole + Cefuroxime	Yes	Yes	Staphylococcus Aureus	GI + C. Difficile	No	Yes	Yes	No	Yes

14	Metronidazole + Cefuroxime	No	No	No	GI	No	No	No	No	No
15	Metronidazole + Cefuroxime	No	No	Bacillus cereus + Enterococcus faecalis	No	No	Yes	Yes	Yes	No
16	Cefuroxime	No	No	No	No	No	No	No	No	No
17	Metronidazole + Cefuroxime	No	No	No	No	No	Yes	No	No	No
18	Metronidazole + Cefuroxime	No	No	Enterococcus faecalis + Fungus	GI	No	Yes	No	No	No
19	Metronidazole + Cefuroxime	No	No	No	No	No	Yes	No	No	No
20	Metronidazole + Cefuroxime	Yes	No	No	GI	No	Yes	No	No	No

The overall infection rate of the 20 patients included was 20% (4 patients) (see table 2 and 5). Of those developing SSI 2 of the 4 patients developed a fistula or flap necrosis. All 4 patients who developed SSI received broad-spectrum antibiotic prophylaxis consisting of both metronidazole and cefuroxime. A total of 16 patients received both metronidazole and cefuroxime; however, there were 3 patients who only received prophylaxis consisting of cefuroxime alone. The majority (15 patients) received the complete preoperative dosage of antibiotic prophylaxis within 60 minutes prior the incision. Remaining 4 patients, (1 was excluded due to the missing of a paper chart), received the complete dosage at the time of incision. However, none of these patients developed SSI. The duration of the antibiotic prophylaxis varied widely among the patients, from 4 days up to 17 days (excluding the patients who developed SSI) (See table 1 and 3). No difference of SSI frequency was seen for patients receiving antibiotics for more than 7 days, compared to those receiving antibiotics for 7 days or less. The patients (patient number 2, 3, 13 and 20 in table 2) who developed SSI were considered to receive antibiotic therapy from the time of verified SSI. Patient number 2 continued with the same antibiotic therapy as the prophylaxis given, (metronidazole + cefuroxime). Remaining 3 patients received another antibiotic therapy than the previous antibiotic prophylaxis. They switched from metronidazole and cefuroxime to one or several antibiotics. Patient number 3 initially switched from metronidazole and cefuroxime to Tazocin (piperacillin/tazobactam), then from Tazocin to amoxicillin and ciprofloxacin. Patient number 13 continued with metronidazole during the whole treatment, but cefuroxime

was switched to Tienam (cilastatin/imipenem) + vancomycin and later to Eusaprim forte (trimethoprim and sulfamethoxazole). Patient number 20 switched from the antibiotic prophylaxis to flucloxacillin.

Table 3 Antibiotic Characteristics

Antibiotic Characteristic		No. (n=19*)	(%)	SSI - No. (%)	P Value
Preparation	Metronidazole + Cefuroxime	16 (84,2)		4 (25,0)	P = 1,0
	Cefuroxime	3 (15,8)		0	
Receiving Antibiotics within 60 minutes prior incision		15 (78,9)		4 (26,7)	P = 0,53
Receiving Antibiotics 0 h prior incision		4 (21,1)		0	
Mean duration of antibiotic prophylaxis (days) (n=15**)		10,5			
Receiving Antibiotics 7 days or less		5 (26,3)		0	P = 0,53
Receiving Antibiotics > 7 days		15 (78,9)		4 (26,7)	

*One patient was excluded due to the missing of a paper chart.

**The 4 patients with SSI were excluded from final calculation of mean duration of antibiotic prophylaxis, as described above. The remaining patient was excluded due to the missing of a paper chart.

5 patients were encountered with positive culture results from their surgical wounds (see table 2). However, 2 of these patients were considered not to have a SSI, due to that no further signs of infection were observed. The most common wound culture result was Enterococcus Faecalis. The majority of the positive culture results were of mixed flora. Only 1 of the 5 patients was infected with a Gram-negative bacterium (coliform bacterium).

When investigating adverse effects of the antibiotic prophylaxis, GI effects were the most common discovered (6 patients, 20%). Clostridium Difficile enterit was developed in 1 patient, and 1 patient suffered from rashes (which disappeared when terminating the antibiotic therapy) (see table 2). Only the patients receiving metronidazole and cefuroxime suffered from adverse effects (see table 4). This was not statistically significant when compared to those receiving cefuroxime alone.

Table 4 Adverse Effects

Adverse effects	Adverse effects - No. (%)	P value
Metronidazole + Cefuroxime	7 (43,8)	P = 0,26
Cefuroxime	0	

A total of 17 patients were smokers and they were the only ones who developed postoperative infections. It is also notable that 2 of the 6 patients with cortisone treatment developed SSI. Of those receiving preoperative irradiation 2 patients developed SSI and both developed fistula or flap necrosis, P = 0,59 when compared to the rest of the group who did not receive preoperative radiotherapy. Noteworthy is also that 3 of the 11 surgical procedures exceeding a duration of 500 minutes developed SSI. (See table 5).

Table 5 Patient Characteristics

Patient Characteristic	No. (%) (n=20)	SSI - No. (%)	P Value
Diabetes	2 (10)	1 (50)	P = 0,37
Smoking	17 (85)	4 (24)	P = 1,0
Excessive alcoholic consumption	5 (25)	1 (25)	P = 1,0
Cortisone treatment	6 (30)	2 (33)	P = 0,55
Previous radiotherapy	7 (35)	2 (29)	P = 0,59
Exceeding 500 min of surgery (n=19*)	11 (56)	3 (27)	P = 0,60
Total patients included	20 (100)	4 (20)	-

* One patient was excluded due to the missing of a paper chart.

When investigating surgery characteristics the mean duration of a procedure was 592,6 minutes, (see table 6). An overall infection rate of 20% (2 patients) was observed in those undergoing laryngectomy and reconstructive surgery, respectively. No statistically significance was found when comparing these two groups.

Table 6 Surgery Characteristics

Surgery Characteristic	No. (%) (n=20)	SSI - No. (%)	P Value
Mean duration (minutes) (n=19)	592,632		
Reconstructive flap surgery	10 (50)	2 (20)	P = 1,0
Laryngectomy	10 (50)	2 (20)	

DISCUSSION

Antibiotic prophylaxis: 16 of 19 patients received the antibiotic combination of metronidazole and cefuroxime, as recommended by Bratzler, et al. [7]. A total of 15 patients received full preoperative antibiotic dosage within 60 minutes before the surgical incision, which also is in accordance with the guidelines by Bratzler, et al. [7]. However, there were 4 of 19 patients who received their full preoperative antibiotic dosage at the time of incision, in contrast to the recommendations in the report by Bratzler et al. [7]. In addition, no prophylaxis therapy was limited to a 24 hours dosage schedule, as recommended in several studies [6,8-12], and the duration varied widely. It is also worth to consider that no advantage regarding the frequency of SSI was seen when the duration of antibiotic prophylaxis was exceeding 7 days.

Adverse effects were only detected in patients receiving metronidazole + cefuroxime, 2 of these patients switched antibiotic due to the developing of SSI. Thereby it is not possible to conclude that the combination metronidazole + cefuroxime is of greater risk to develop adverse effects.

Risk factors: None of the investigated potential risk factors in the study for SSI showed a statistically significant relationship with the occurrence of postoperative infections. However, the group of 7 patients receiving preoperative radiotherapy deserves further evaluation. There were 2 of these patients who developed SSI. These 2 postoperative infections showed a greater severity, due to the complication of fistulas or flap necrosis. These 2 complications occurred relatively late. Similar results were observed in the SBU report [6]. In a report by Righi, et al. [10], it was detected that "... preoperative radiotherapy was associated with a greater severity of infections and higher risk of late wound complications." These results confirm the observations made in this study. However, the observation in Righi et al was not statistically significant when compared with the infection rate of patients who did not receive preoperative irradiation.

Procedure: No difference was detected when comparing the overall infection rate between laryngectomy patients and the flap reconstructive patients. Righi, et al. [10], observed similar results. However, Johnson, et al. [11], observed a difference in the

infection rate. 37% of their flap reconstructive patients developed postoperative infections, which was statistically significant ($P < 0,05$) when compared to their entire group.

Bacteriology: The most frequently encountered bacteria were Gram-positive aerobes (5/20 or 25%). This observation was in accordance with Rodrigo et al. [18]. The most common single bacterium was *Enterococcus Faecalis*. Only one of the postoperative infection patients was encountered with a Gram-negative bacterium. This was in contrast with a report by Skitarelic, et al. [13], where Gram-negative aerobes were the most frequently encountered bacteria. The controversy may be explained by the small number of patients included in the current study and thereby also a small number of infected patients. In accordance with Brand, et al. [8], the positive culture results were of mixed flora.

Head and neck cancer surgery has long been recognized as having a risk of postoperative infections and the evidence for using antibiotic prophylaxis is obvious. Possible complications from a postoperative infection have been evaluated as difficult and expensive. These affect the healing process, quality of life and may result in secondary surgery procedures. This has been able to motivate the use of antibiotic prophylaxis. However, it is important to follow the recommendations concerning the antibiotic prophylaxis to not increase the risk of antibiotic resistance.

The antibiotic resistance is an increasing problem worldwide and the downside of antibiotic therapy, which today has become a natural part of the health care system. The only way to reduce this problem is through more effective guidelines and restrictions. However, it is a difficult dilemma when the interests of the patients and the society sometimes diverge. On one hand it is of interest for both the patient and the society to avoid possible SSI. For the patient it is essential to evade further suffering and for the society to evade further costs of hospital days and medication. On the other hand, it is of interest for the society to reduce the risk of antibiotic resistance, which increases with the use of antibiotics. Antibiotic resistance brings even greater costs, risks and problems than one SSI alone. It is also relevant for the patient to reduce the antibiotic therapy to decrease the risk of possible adverse effects and morbidity.

Several notes in the medical charts were indistinct, which in some cases made it difficult to determine the occurrence of SSI or not. The documentation by the physicians was more or less detailed. In some cases there were incomplete information concerning the antibiotic therapy as well, especially in cases when the patients returned to their local hospitals. For example it was difficult to determine the duration of some antibiotic prophylaxis. Theoretically, patients who returned to their local hospitals also could have developed SSI without the knowledge of department of Otolaryngology-Head and Neck Surgery at USÖ, thereby possibly bypassing this study.

One parameter that by mistake was not included in the study was the possible occurrence of pus, which could have made it easier to decide the incidence of postoperative infections. Another limitation was the small number of patients included in the study, which made it difficult to reach any statistical significant results.

It would be desirable to carry out a prospective randomised study concerning antibiotic prophylaxis durations and the frequencies of SSI. One group receiving prophylaxis in accordance with the current routines at the department of Otolaryngology-Head and Neck Surgery at USÖ and one group who only receives prophylaxis for 24 hours. In a prospective study, an independent person would determine the occurrence of SSI in accordance with the definition of SSI from CDC.

CONCLUSION

The great risk of postoperative infections in head and neck oncologic surgery is a fact and motivates the use of antibiotic prophylaxis. However, it is important to follow the guidelines and restrictions to reduce the risk of developing antibiotic resistance and adverse effects.

The department of Otolaryngology-Head and Neck Surgery at USÖ follows the existing guidelines, concerning the type of antibiotic medication to use in head and neck oncologic surgery. However, the duration of the antibiotic prophylaxis given is longer than recommended, without any benefits achieved. The importance of giving the first dose within 60 minutes before the start of the operation is also worth

considering. It is therefore desirable to develop more clear guidelines at the department and encourage surgeons to follow them.

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