

STUDY ON THE OCCURRENCE OF MICROORGANISMS ON THE POST-SURGICAL MAXILLARY PROSTHESES WITH OBTURATORS AND IN THE POST-SURGICAL CAVITIES OF MAXILLA

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RESUME

Le milieu bactériologique de la cavité bucale peut subir des changements sous l'influence de différents facteurs comme: l'enlèvement chirurgical de la tumeur et l'utilisation des prothèses postopératoires avec les obturateurs. L'objectif de ce travail était la démonstration des différences dans l'apparition des types particuliers des microorganismes trouvés au bord de la mâchoire réséquée et sur les obturateurs de prothèses. Les examens microbiologiques exécutés ont montré que la flore bactériologique plus pathogène paraît sur les obturateurs que dans la cavité postopératoire. En conclusion nous trouvons que le médecin dirigeant et les patients postopératoires devraient faire plus attention à l'augmentation de l'hygiène de la cavité postopératoire et des prothèses.

ABSTRACT

The bacterial environment of the mouth cavity may be subjected to change under influence of various factors, such as surgical removal of neoplasm tumors and in consequence the wearing of post-surgical prostheses with obturators. The purpose of the paper was to study the conceivable differences in occurrence of particular types of microorganisms found on the margin of post-surgical cavities and on the prosthetic obturators. The performed microbiologic examinations revealed that more pathologic bacterial flora was found on the obturators than in the post-surgical cavities. The authors conclude that the post-surgical patients should pay more attention to the very accurate hygiene of their prostheses and the mouth cavity as well.

INTRODUCTION

The natural microflora of the mouth cavity is considered to exist in harmonious balance with the human host. The balance may be destroyed by exogenous disturbances, such as application of antibiotics, and by endogenous disturbances involving the immunological system of the host. Also an invasion of bacteria to the places usually inaccessible such as blood vessels opened during surgical procedures may disturb the balance. The

ecologic features of the mouth cavity are different from the other surfaces of human body, however the mouth cavity should not be regarded as the uniform or invariable environment for existing microorganisms, for example it may be changed in the presence of post-surgical cavities.

The factors influencing the growth of microorganisms are: temperature (35-36°C), oxydo-reducing potential (decreases with the diminishing the

pathologic bacteria in the mouth cavity), pH (6.75-7.25), quality of nourishment, adhesion, antibacterial agents and inhibitants. Moreover it is suggested that the growth of microorganisms in the mouth cavity may be influenced by the dynamics of neoplasm process, the kind of applied chemo-, radio- or pharmaco-therapy, as well as by the kind of post-surgical appliances with obturators and by the materials used for lining the obturators (Mc Andrew P.G. 1990, Sasaki H. et al. 1984, Taylor T.D et al. 1985, Wieckiewicz W. et al. 1999, Wieckiewicz W. et al. 1997, Darwazeh A.M et al. 2001, Tamamoto M. et al. 1986, Williams D.W et al. 2000). Also the hygiene of the mouth cavity and prosthetic appliances are stated to effect the growth of microorganisms.

The purpose of the paper was to study the conceivable differences in types of microorganisms living on the margins of postsurgical cavities and on obturators of prostheses made in the group of patients after surgical removal of neoplasm tumors in the maxilla.

MATERIAL AND METHODS

Material of the study consisted of 22 patients (7 female and 15 male) after surgical removal of various kind of neoplasm tumors in the maxilla. The age of the patients ranged from 31 to 80 years old. The diagnosis and surgical treatment of the patients were carried out in the Department of Maxillofacial Surgery, while the post-surgical appliances were made in the Department of Prosthodontics. The microbiologic investigations were performed in the Department of Microbiology, Medical University of Wrocław. The detail informations about patients and kind of neoplasm tumors are presented in Tab. I. The most frequent neoplasm was Carcinoma planoepitheliale: it was diagnosed in 11 patients. The other neoplasm such as: Melanoma malignum, Neurofibroblastoma, Adenocarcinoma and Tumor Malignum, were recognized in singular cases.

The period of time passed after surgical removal of the neoplasms in the patients ranged from 1 to 17 years and was as follows: 1 to 3 years -13 patients, 4 to 6 years - 3 patients, 7 to 9 years - 3 patients, 13 years - 1 patient, 16 years - 1 patient and 17 years - 1 patient. In all patients there were made the post-surgical prostheses immediately after surgical procedures; the prostheses were afterwards periodically modified or exchanged. During performing the microbiologic investigations 7

patients were wearing the obturator plates (6 made of acrylic resin and 1 made of thermoplastic material). The other 7 patients were wearing the upper partial prostheses with obturator (one of them made on the metal frame work). The further 8 patients had the upper complete prostheses with obturator. 17 obturators were lined with soft materials: the Ivoseal (Ivoclar) was used for lining 7 obturators Ufi Gel C (Voco) - for 7 cases, Ufi Gel P (Voco) - for 1 case, and Palasiv (Hereus-Kulzer) - for 2 cases. 5 obturators were not lined with soft material.

For the microbiologic investigations there were taken the swabs from prosthetic obturators and from the epithelium lining the post-surgical cavities (Figg. 1- 3). Samples of the microbiologic materials were placed in the sterile transfer base manufactured by Copan-Bovezzo Co. and afterwards sent to the Department of Microbiology. The further microbiologic investigations of the samples were performed according to the standard diagnostic methods (Isemberg HD, 1992). In order to colonize the aerobacteria the samples were placed on the agar base with cow blood and Mac Conkey's base. For colonization of anaerobacteria the Wilkins-Chalgren (Oxoid) base with cow blood and tioglicolan base (Difo) were used. The growing of anaerobacteria was carried out in anaerostats using the Anaer-Gen 2,5 L (Oxoid) for depriving the air from the oxygen. The colonies of aerobacteria were incubated in the temperature of 37°C during the period of 24 hours, while the colonies of anaerobacteria were incubated in the longer time of 72 hours. The type of bacteria was identified on the base of the following characteristics: morphological (Gram method), physiological (an ability of bacteria to grow on the selected bases) and methabolic (test for presence of catalasis and coagulasis, test API 20E, API 20NE and API 20A).

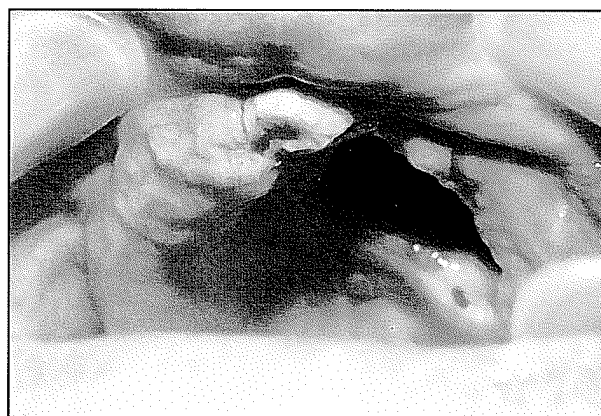


Fig. 1: The patient's mouth. The prosthetic foundation of the maxilla after surgical procedures.

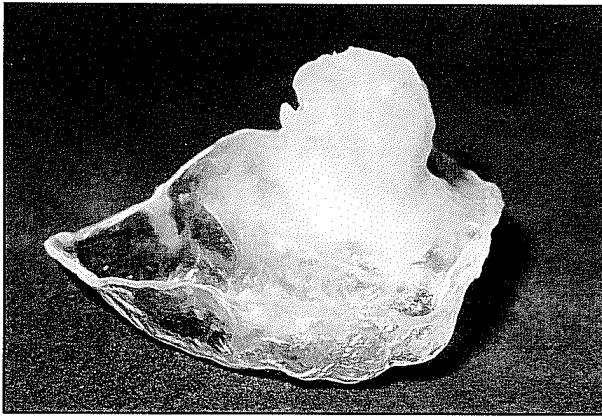


Fig. 2: The template with obturator lined with elastomer UfiGelC



Fig. 3: The patient's mouth. The template with obturator in situ

No	Name	Sex	Age	Number of years after surgical procedure	Diagnosis	Tab. 1: The main informations about examined patients
1.	S.J.	M	69	1	Ca planoepitheliale keratodes gingivae sups.	
2.	M.M.	M	70	1	Ameloblastoma basaloides	
3.	L.C.	M	56	1	Ca planoepitheliale	
4.	M.P.	M	65	1	Ca planoepitheliale keratoblasticum	
5.	Z.M.	M	79	1	Adenocarcinoma maxillae lat.sin.	
6.	S.M.	F	66	1	Ca planoepitheliale maxillae	
7.	Z.M.	F	49	1	Ca planoepitheliale keratodes G - Z	
8.	S.M.	F	31	1	Ca planoepitheliale	
9.	D.Z.	M	62	2	Ca planoepitheliale keratodes	
10.	Z.R.	M	49	2	Ca sinanasale Gll necroticans	
11.	W.G.	F	55	2	Ca gingivae superioris palate duri et buccae sin.	
12.	B.M.	M	52	3	Ca planoepitheliale maxillae sin. cum met.ad lymphonodes colli sin.	
13.	D.W.	M	73	3	Melanoma malignum	
14.	L.J.	M	57	4	Ca maxillae et nasi lat dextri T-3, N-1, M-0	
15.	W.A.	M	55	5	Ca planoepitheliale maxillae	
16.	F.M.	F	73	5	Ca planoepitheliale metastaticum	
17.	D.A.	F	41	7	Adenoma monomorphiam salivaris typus tubulatis	
18.	L.Z.	M	54	8	Ca planoepitheliale	
19.	R.H.	F	69	9	Ca gingivae superioris maxillae lat.dextr.	
20.	M.J.	M	54	13	Neurofibrosarcoma	
21.	C.J.	M	64	16	Tumor mixtus maxillae lat.sin.	
22.	T.R.	M	32	17	Epulis gigantocellularis maxillae	

M – male
F – female

RESULTS

On the obturators of post-surgical prostheses there were found Gram (+) and Gram (-) bacteria (Tab. 2). Among the pathologic Gram (+) bacteria the *Staphylococcus aureus* was recognized in 63,63%, *Streptococcus pyogenes* in 4,54% and *Streptococcus agalactiae* in 18,18% of cases.

The pathologic Gram (-) bacteria found on the obturators were as follow: *Klebsiella oxytoca* in 18,18%, *Klebsiella pneumoniae* in 13,63%, *Citrobacter freundii* in 13,63%, *Enterobacter cloacae* in 9,09%, *Enterobacter agglomerans* in 4,54%, *Escherichia coli* in 4,54%, *Pseudomonas aeruginosa* in 18,18%, *Pseudomonas* species in 4,54%, *bacilli nonfermentative* in 27,27% and rough strains in 9,09% of examined cases. The rest of microbes found on the obturators were recognized as physiologic (Marsh P et al. 1994).

Tab. 2: The occurrence of particular types of bacteria on the obturators of post-surgical prostheses

Bacteria	Gram (+)	%	Gram (-)	%
I <i>Staphylococcus</i>			I <i>Klebsiella</i>	
A 1. <i>aureus</i>	63,63%		1. <i>oxytoca</i>	18,18%
2. <i>epidermidis</i>	9,09%		2. <i>pneumoniae</i>	13,63%
3. <i>haemolyticus</i>	9,09%		II <i>Citrobacter freundii</i>	13,63%
II <i>Micrococcus</i>	4,54%		III <i>Enterobacter</i>	
III <i>Streptococcus</i>			1. <i>cloacae</i>	9,09%
1. <i>orale</i>	9,09%		2. <i>agglomerans</i>	4,54%
2. <i>pyogenes</i>	4,54%		IV <i>Escherichia coli</i>	4,54%
3. <i>agalactiae</i>	18,18%		V <i>Pseudomonas</i>	
IV <i>Candida</i>	18,18%		1. <i>aeruginosa</i>	18,18%
			2. <i>species</i>	4,54%
			VII <i>Bacillus nonfermentative</i>	27,27%
			VIII Rough strains	9,09%
			IX <i>Neisseria species</i>	54,54%
A 1. <i>Peptostreptococcus</i>	63,63%		I <i>Veillonella</i>	4,54%
II <i>Lactobacillus</i>	31,81%		II <i>Fusobacterium</i>	4,54%
III <i>Lactobacillus acidophilus</i>	4,54%			
IV <i>Actinomyces israeli</i>	4,54%			
V <i>Actinomyces odontolyticus</i>	4,54%			
VI <i>Bifidobacterium adolescentis</i>	4,54%			
VII <i>Propionibacterium acnes</i>	4,54%			

The Table 3 presents the aero- and anaerobacteria, Gram (+) and Gram (-), found in the post-surgical cavities of the maxilla. In the most cases the Gram (+) aero and anaerobacteria growing in the cavities were recognized as physiologic microorganisms. The exceptions were the *Staphylococcus aureus* found in 54,54%, *Streptococcus pyogenes* – in 9,09% and *Streptococcus agalactiae* in 18,18% of the cases.

The Gram (-) aerobacteria were mainly pathological, while the all anaerobacteria were physiological. Among the pathological Gram (-) aerobacteria there were found: *Klebsiella pneumoniae* in 13,63%, *Citrobacter freundii* in 13,63%, *Enterobacter cloacae* and *agglomerans* appropriately in 4,54%, *Escherichia coli* in 9,09%, *Pseudomonas aeruginosa* in 13,63%, *Pseudomonas* species in 4,54%, *Proteus mirabilis* in 4,54%, *Bacillus nonfermentative* in 22,72% and rough strains in 9,09% of the examined cases.

Tab. 3: The occurrence of particular types of bacteria in the post-surgical cavities of the mouth

Bacteria	Gram (+)	%	Gram (-)	%
I <i>Staphylococcus</i>			I <i>Klebsiella</i>	
A 1. <i>aureus</i>	54,54%		1. <i>pneumoniae</i>	13,63%
2. <i>epidermidis</i>	27,27%		II <i>Citrobacter freundii</i>	13,63%
3. <i>haemolyticus</i>	4,54%		III <i>Enterobacter</i>	
II <i>Micrococcus</i>	4,54%		1. <i>cloacae</i>	4,54%
III <i>Streptococcus</i>			2. <i>agglomerans</i>	4,54%
1. <i>orale</i>	81,81%		IV <i>Escherichia coli</i>	9,09%
2. <i>pyogenes</i>	9,09%		V <i>Pseudomonas</i>	
3. <i>agalactiae</i>	18,18%		1. <i>aeruginosa</i>	13,63%
IV <i>Corynebacterium</i>	9,09%		2. <i>species</i>	4,54%
V <i>Candida</i>	18,18%		VI <i>Proteus mirabilis</i>	4,54%
			VII <i>Bacillus nonfermentative</i>	22,72%
			VIII Rough strains	9,09%
			IX <i>Neisseria species</i>	36,36%
A 1. <i>Peptostreptococcus</i>	63,63%		I <i>Veillonella</i>	13,63%
II <i>Lactobacillus</i>	18,18%			
III <i>Actinomyces meyeri</i>	4,54%			
IV <i>Bifidobacterium</i>	4,54%			
V <i>Propionibacterium acnes</i>	9,09%			
VI <i>Eubacterium lentum</i>	4,54%			

DISCUSSION

The results of our investigating on the presence of the pathological flora may be summarized as follow:

- *Klebsiella oxytoca* was found only on the obturators of post-surgical prostheses,
- *Proteus mirabilis* was recognized only in the post-surgical cavities,
- Swabs taken from the obturators revealed the frequent occurrence of: *Staphylococcus aureus*, *Enterobacter cloacae*, *Pseudomonas aeruginosa* and many nonidentified nonfermentive bacilli,
- *Escherichia Coli* and *Streptococcus pyogenes* were more frequent found in the post-surgical cavities than on the obturators.

CONCLUSIONS

1. In the patients after surgical removal of the neoplasm tumor in the region of the maxilla the nonphysiological flora may be recognized both in the post-surgical cavities and on the obturator of post-surgical prostheses.
2. The nonphysiological bacterial flora should be treated with the pharmacological methods.
3. More pathological flora was found on the obturators of post-surgical prostheses than in the post-surgical cavities and therefore it may be said that the post-surgical cavities are infected by the flora living in the prosthetic obturators.
4. The post-surgical patients should be given the appropriate instruction on the accurate hygiene of their mouth cavity and prosthetic appliances.

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