
OBTURATOR TREATMENT- BACTERIAL INFECTION RISK ASSESSMENT

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Abstract: Background: Consequences after oncological operations of the upper jaw are varying degrees of eating, swallowing and breathing disorders, from which the patient suffers biologically. Speaking is also affected in varying degrees, which makes the patient socially inferior as well. Often the newly formed communication between the oral and nasal cavity takes away the possibility of normal nasal breathing, food residue pass through the resulting opening, its decomposition result in chronic inflammation of the nose and paranasal sinuses. Patients maxillary resection post-surgery stage require maintaining of good oral hygiene and appropriate materials usage for laboratory development of obturators.

Objective: The purpose of this study is to review the literature data assessing the risk of bacterial infection in the treatment of patients with maxillary defects treated by different types of obturators.

Discussion: Surgical treatment of cancer and other pathological conditions in the maxillofacial area lead to different size, location and type of defects of soft and hard tissues that impair appearance and aesthetic look of the face of the operated patients. Changes that occur in appearance and functional disorders are directly dependent on the size and type of defect after the operation. The problems after maxillary resection are often exacerbated by concomitant radiotherapy, and leads to dry mouth, difficulty swallowing and impaired speech intelligibility.

The prosthetic treatment of patients after maxillary resection is accompanied by many difficulties and problems. Patients maxillary obturators after the bone resection can cause risk of bacterial infection. This is more commonly observed because of silicone materials and buccal flange sealers application. The acrylic and light-curing plastics usage significantly reduces the risk of infection. Nevertheless, disinfectant solutions irrigation and good oral hygiene maintenance are mandatory. Their use is considered to significantly reduce the risk of bacterial infection during all stages of prosthetic treatment

Conclusion: Prosthetic rehabilitation of patients with maximal resection requires the specific treatment modalities usage. The type and shape of prosthetic structures, as well as the choice of materials for their construction, must ensure good oral hygiene. The use of disinfectants significantly reduces the risk of bacterial infection, especially when silicone materials are applied.

Keywords: bacterial infection, maxillary resection, obturators.

1. INTRODUCTION

The prosthetic treatment of patients with cancer in the oral cavity is associated with a number of functional and aesthetic disorders that impair quality of life (Mihaylova, Z. et al., 2019; Videnova, L. et al., 2019). A major problem for patients with upper jaw resection is maintaining optimal oral hygiene and preventing the possibility of bacterial infection (Wieckiewicz, W. et al., 2004).

Numerous studies have been reported in the literature on bacterial findings in the obturator and defect during the various stages of prosthetic treatment (Abd El Aziz, A. N., 2012; Depprich, R. A. et al., 2008; Mattos, B. S. et al., 2009; Takeuchi, Y et al., 2012). According to some of them (Aslan, Y., Avci M., 1990), the defect retention creates prerequisites for the retention of food residues and bacterial invasions, necessitating special treatment on the surface of the obturator. The degree of infection depends mainly on the shape of the obturator and the material used to make it (King, G. E., Martin, J. W., 1983; Wieckiewicz, W. et al., 2004). This, according to some authors (Depprich, R. A. et al., 2008; Dholam, K. P., Bachher, G., Gurav, S. V., 2019), requires the use of specific methods of prosthetics. Their application is particularly important during the first stages of treatment with a surgical and temporary obturator (Churkin, A., 2010; Huryn, J. M., Piro, J., 1989). An important role is played by the choice of the appropriate material for the prosthesis, which must be tailored to the individual characteristics of the patient (King, G. E., Martin, J. W., 1983).

Most authors (Wieckiewicz, W. et al., 2003) have accepted that the main means of preventing the risk of bacterial infection is the use of different types of disinfectant solutions. Their use is considered to significantly reduce the risk of bacterial infection during all stages of prosthetic treatment (Davenport J. C., 1984).

2. OBJECTIVE

The purpose of this study is to review the literature data assessing the risk of bacterial infection in the treatment of patients with maxillary defects treated by different types of obturators.

3. LITERATURE SURVEY

Surgical treatment of upper jaw tumors causes different size and localization defects. This creates the precondition for the creation of retention sites difficult to clean and the development of bacterial infection. There are various studies on the microbiological finding of this type of defect. Stoyanova, O., Pasheva, M., Thai, C.U., Stoev, B. (1983) found a limited number of microorganisms in the first few days after resection. Within a few weeks after the prosthetics, significant quantitative and qualitative changes in the microflora were detected, which resulted in an increase in coccyx microorganisms and the appearance of filamentous microorganisms in the Leptotrichia and Fusobacterium group. The authors believe that prosthetic structures create a prerequisite for alteration of the oral microflora and the development of bacterial infection. Such data are complemented by studies by Davenport, J. C. (1970) when examining different sections of the oral mucosa around the defect. According to Mattos et al. (2009) the most common causative agent is *Candida albicans*, which occurs in 70% of obturator patients. Fungal adhesion has been found to be stronger at the base of the obturator as well as in the mucous membrane around this area, which is significantly more susceptible to infection. Studies have shown considerable adhesion of *Candida* to the use of silicone materials for the manufacture of prostheses (Gardner, L. K., Parr, G. R., 2012; Ohyama, T., Gold, H.O., Pruzansky, S., 1975; Rainer, H., Rasse, M., Chiari, F. M., 1986; Wang, R. R., 1997). The *Candida* various species are firmly attached to the surface of the silicone, making cleaning difficult and causing infection in 90% of prosthetic patients (Wieckiewicz, W. et al., 2004). Methods that reduce the porosity of silicone material (Gardner, L. K., Parr, G. R., 2012) are applied to address this problem. Rainer, H., Rasse, M., Chiari, F. M. (1986) considers that optimal sealing of silicone sealers is only possible by using a silicone manufacturer's lacquer coating, which significantly reduces the risk of fungal infection. Davenport, J. C. (1984) believes that maintaining good hygiene and the use of disinfectant solutions protect the silicone material from microbial invasion. The author recommends dipping the silicone plugs in hypochloride daily for 10 minutes, despite the change in color of the silicone. Gardner, L. K., Parr, G. R. (2012) describe a method using a mixture of powder and liquid of heat-curable methyl methacrylate plastic in a one to ten ratio for three times the silicone coating, which provides a smooth surface and reduces the possibility of fungal infection. The authors recommend this method as a universal tool when using silicone liners.

According to Wieckiewicz, W. et al. (2003) the bacterial environment in the oral cavity changes significantly after maxillary resection, and the use of bulk obturators creates a prerequisite for the occurrence of chronic infection. The authors find that the bacterial flora on the surface of the obturator is more pathological than that of the defect, which requires daily cleaning and disinfection of the obturator as well as maintaining excellent hygiene. Other authors (Hahn, T. R., Krüskemper, G., 2007; King, G. E., Martin, J. W., 1983; Mihaylova, Z., Aleksiev, E., Ugrinov R. , 2018) report a change in the bacterial environment of the oral cavity as a result of surgery, radiation and chemotherapy, as well as prosthetics with bulk obturators. Changes are also reported in the saliva of these patients after surgery and radiation (Krasteva, A. et al., 2008).

There are also some studies showing that the presence of oronasal communication does not affect bacterial infection similar to that of whole prosthesis treatment (Mattos, B. S. et al., 2009). Takeuchi et al. (2012) examine the microbiological finding in acrylic plastic prostheses and obturators after two weeks of use. The results showed microbial invasion in 38.5% of patients with prostheses and 54.5% of those with obturators, but with a greater diversity of bacterial species.

To reduce the risk of bacterial infection, it is recommended to use different materials and methods for making obturators. Comparative studies of polymethyl methacrylate and titanium obturators show a significantly higher quantitative and qualitative presence of microorganisms in the polymer base (Depprich, R. A. et al., 2008). Denture prostheses made of titanium significantly reduce the risk of infection. The way of polymerization plays an important role in reducing bacterial infection.

The studies of Abd El Aziz, A. N. (2012) prove the advantages of microwave polymerization over thermal, which are most pronounced after about 6 months after prosthetics. Other authors (Benington, I.C., Lappin, C., Linden, G.J., Thompson R., 1996; Ogle, R. E., Sorensen, S. E., Lewis, E. A., 1986) have highlighted the advantages of light-curing plastics, which are characterized by low porosity and impede bacterial retention, thus ensuring the hygiene of the obturator.

The type and shape of the obturator plays an important role in maintaining good oral hygiene (Shrestha, B. et al., 2015). According to some authors (King, G. E., Martin, J. W., 1983; Wieckiewicz, W. et al., 2004), prosthetics with

an open obturator create a prerequisite for bacterial infection due to the inability to clean the inner surface. This requires perfect polishing of the obturator, which improves oral hygiene and reduces the risk of infection. For this purpose, Aslan, Y., Avci M. (1990) use a monopoly coating for the inner surface of the obturator, which significantly reduces E. coli colonies compared to uncoated acrylic surfaces.

4. DISCUSSION

There is unanimous agreement that the construction of prosthetic structures in patients with maxillary resection is always accompanied by the risk of bacterial infection (Takeuchi, Y et al., 2012; Wieckiewicz, W. et al., 2003). This requires a specific methods and materials usage for the design of the shutters. Most authors recommend the use of heat-curing plastics, as the use of microwave polymerization significantly reduces the risk of oral infection. Such positive results are also observed with the use of light-curing plastic. It is unanimous opinion that the use of silicone materials significantly increases the risk of bacterial infection (Wieckiewicz, W. et al., 2003, 2004). It is recommended to use them for smaller defects and for a shorter period of time.

Most studies show that the most commonly used buccal flange obturators create a prerequisite for oral infection. The reason for this is their difficult cleaning. This is the reason why some authors recommend the use of closed shutters. Regardless of the method used, it is unanimous that maintaining good hygiene of the obturator and the use of disinfectant solutions reduces bacterial infection (Davenport J. C., 1984; King, G. E., Martin, J. W., 1983; Mattos, B. S. et al., 2009). This is considered to be especially important during the surgical obturator treatment phase.

5. CONCLUSIONS

Prosthetic rehabilitation of patients with maximal resection requires the specific treatment modalities usage. The type and shape of prosthetic structures, as well as the choice of materials for their construction, must ensure good oral hygiene. The use of disinfectants significantly reduces the risk of bacterial infection, especially when silicone materials are applied.

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