

FUNCTIONAL TESTS FOR OVERDENTURES

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ABSTRACT

The overdenture is a special type of prosthesis that covers the remaining teeth, roots or implants.

The purpose of this study is to present the functional aspects of overdentures with examination of the chewing efficiency in three different groups of patients with removable appliances.

The chewing efficiency was investigated by a scientific method (1) that really applies to two chewing gum with two different colours of the spectrum or colour wheel. In comparing the results, computer analysis were applied for the selection of colours in the program Colour Schemer Studio V2.1.0. The method of comparative analysis was applied in patients with overdentures with patients that have fixed - mobile prosthetic devices and patient's wearers of skeletal dentures.

The results of the examination of patients and the use of the two chewing gum dyed in the primary colours of the yellow and the blue spectrum, confirm the effectiveness and practical applicability of the test method. This shows that this method can be successfully used in everyday clinical practice. The hypotheses are confirmed about the degree of chewing efficiency of different types of prosthetic devices.

Through our results by computer processing and visually we found that the overdenture, properly planned and prepared, allows the patient to achieve chewing performance that approaches the performance that patients have with complex fixed - mobile prosthetic replacements.

INTRODUCTION

During their everyday practice clinicians routinely face many challenges, primarily regarding the correct application of biological, physiological and biophysical principles in the application of dental procedures, operating techniques, and prosthetic rehabilitation. The process of application of these principles have to be detailed, thoroughly and methodically planned the prosthetic devices and the same should be constructed in a way that the entire work and applied time and attention pays off in the terms of the benefits and long term use of the prosthetic construction.

In the existence of a state of subtotal toothless (2) in the lower jaw, all the above mentioned principles should be applied, because this condition is accompanied by changes that reflect every component of the orofacial system.

In this paper the situations in exactly certain indications were treated by making the overdentures after appropriate preparation of the remaining teeth in the lower jaw, for which the elements of the telescope system were applied. The problem which was elaborated in this paper is very specific and it has been independently studied by other authors in different countries. Recognizing the experiences and results it is evaluated that these studies bring to the practical way of explaining the function of the overdenture, at the same time enriching the scientific research activities and opportunities that are offered to patients to improve their quality of life.

PURPOSE

The aim of the research is to analyze the functional aspects of the overdentures by applying the method of examination of the chewing efficiency in different groups of patients.

MATERIALS AND METHODS

Our research included 60 patients divided into 3 groups of 20 patients, including:

- 1) 20 patients that wear complex fixed - mobile prosthetic devices;
- 2) 20 patients holders of skeletal partial dentures
- 3) 20 patients holders of overdentures.

In the group of 60 subjects the test method of chewing efficiency was applied (3). Tests were applied through the application of two chewing gum in two different colours of the spectrum (see Fig.1), that is from the colour wheel.

Both groups of patients were compared with our control group – the overdenture. The chewing gums were chewed at an interval of time of 5 minutes, after which they were observed out of the patient's mouth and an analysis was made.



Fig.1) View of the two chewing gum in two basic colours of the spectrum used as material for testing the chewing efficiency;

This paper uses the chewing gum in yellow colour and the chewing gum in blue colour (see the picture) (4). Both chewing gums were carefully chosen and it was watched out that they didn't contain any sugar and to be pleasant for the patient, when they are chewed together. The chewing gums are with relatively approximate dimensions, but are at the same weight and the difference is in their form. The yellow chewing gum tastes like lemon and orange with artificial sweeteners, while the blue with eucalyptus with menthol. Both chewing gums (5) are representative of the way the instructed patient applies the overdentures, and other types of prosthetic devices in function. Through these instructions it is indicated for the patients to divide the bite into two parts and to set one part on the left, while the other on the right side in the lower jaw.

With the beginning of the act of mastication the blue and the yellow colour slowly merge from two primary colours and with their mixing a number of shades are obtained, with crossings of different shades of green (or eventually into one new colour). In the colour wheel, colours that are situated next to each other are called analogous colours. For example: green, yellow- green and yellow or red, red - orange and orange. If the gradation and saturation of analogous colours is analyzed a harmonious colour (6) scheme can be created. In the paper analyzes were made of the homogeneity of the resulting colour shade of the chewing gum after the ending of the period of chewing.

This is done for each group of patients, with which differences could be observed comparatively and they are presented in the paper with pictures, graphics and tables.

For this purpose the program Colour Schemer Studio V2.1.0 has been used, where within the computer program there is a harmonious colour wheel. With each picture put into this program the computer via the icon for determination of the colours of an image enabled us practicality in the methodology of determination of the colour of chewing gum.

The mechanism of production of these constructions should also be respected particularly with attention to the parallelism from clinical until the technical part of the process of making the prosthesis (7). It is necessary for the methods from biophysics to be applied, which suggest that the forces that are directed vertically along the longer axis of the tooth act favourably in terms of vertically transmitting the forces of the chewing pressure.

Clinical presentation of a patient with fixed - mobile complex constructions and the proper chewing gum





Fig. 2. Displaying of the frontal bridge (suited to the prosthesis) on which the matrix is incorporated from the system of AcryLock attachments and the skeletal prosthesis with a built- matrix

Fig.3. The chewed chewing gum out of the mouth of the patient shown in Figure 2. in one colour;

The monochrome structure of the chewed monochrome chewing gum.

Clinical presentation of a patient with skeletal prosthesis and the resulting image from the chewing gum



Fig.4 Display of the patient carrier of a total upper and lower partial skeletal denture;

Fig. 5 Displaying the chewing gum from the patient in Figure 4 recorded outside the patient's mouth where it is seen that is composed of several homogeneous, analog shades of green,

Fig. 6 Occlusal view of the lower skeletal denture at the patient with subtotal toothless;

From the images 4, 5 and 6 the prosthetic devices can be seen in and out of the mouth of the patient from Figure 4. It also recognizes that the chewing gum chewed from the same patient is composed of several analogous colours of the green colour.

Clinical presentation of a patient with over dentures





*Fig.7. Appearance of the patient after the complete prosthetic rehabilitation of the upper total denture and lower overdenture;
Fig.8 Displaying the chewing gum with monochromatic colour;*



Pic.9 View of the inner telescopic crowns in the mouth of the patient,

Fig..10 The overdenture, lingual view where the external telescopic crowns are perceived.

These patients are presented as representative of their group within which further investigations were carried out. Studies are in terms of understanding the chewing gum out of the patient's mouth and its analysis in the group of patients carries of

overdentures in comparative studies with other 2 groups of patients.

RESULTS AND DICUSSION

Results of the comparative investigations obtained by applying the test to determine the chewing efficiency

A comparative analysis (8) has been made of the chewing gum by a patient with an overdenture with a chewing gum from a patient with complex fixed - mobile prosthetic replacements (Figure 18). It is seen that the colour of both images analyzed is monochromatic.

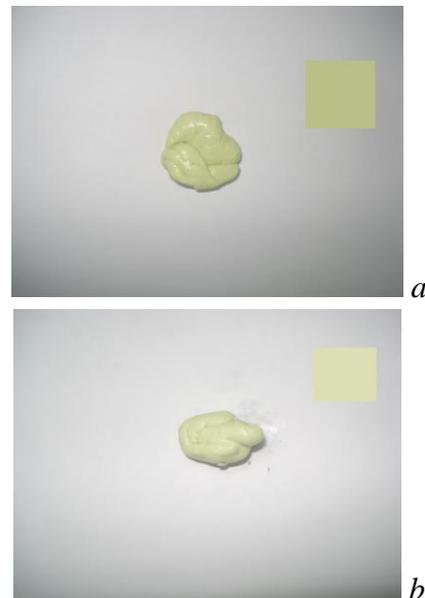


Fig . 11. Displaying the chewing gum from a patient with an overdenture (a), and the chewing gum of a patient with fixed - mobile prosthetic replacements (b). In the upper right portion of the image the colour of the chewing gum can be seen.

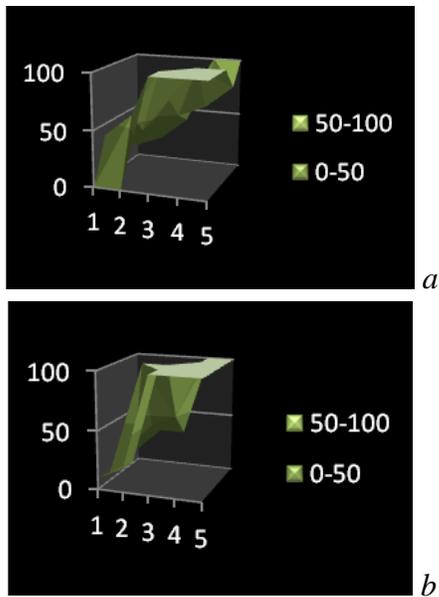


Chart 1. Graphic display of the chewing gum from patients with overdentures (a) and the patient with complex fixed - mobile prosthetic devices (b). The vertical axis expresses the chewing process in percentage while the horizontal axis expresses the interval of time of 5 minutes.

For emphasis is a comparative analysis of the chewing gum worn by a patient with overdenture and a patient carrier of a skeletal partial prosthesis (Figure 19). Both chewing gum are seen in terms of colour, where in the first image it is monochromatic, while in the second image 3 analogous colours from the colour wheel of shades of the chewing gum are seen, the chewing gum is consisted of several shades of green (three squares in the image 12 (b)).

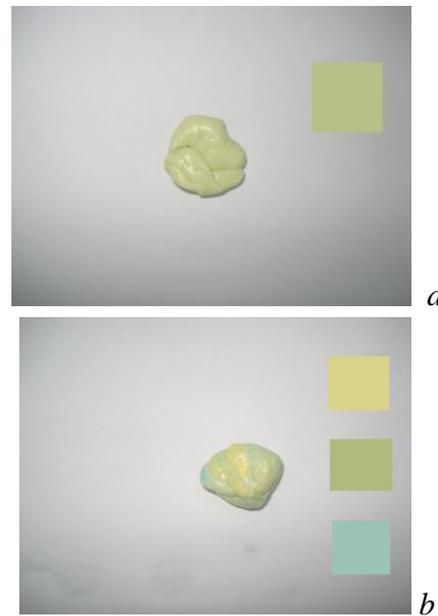


Fig. 12. Display of the chewing gum out of the mouth of the patient with overdenture (a) and a patient with a partial skeletal denture (b).

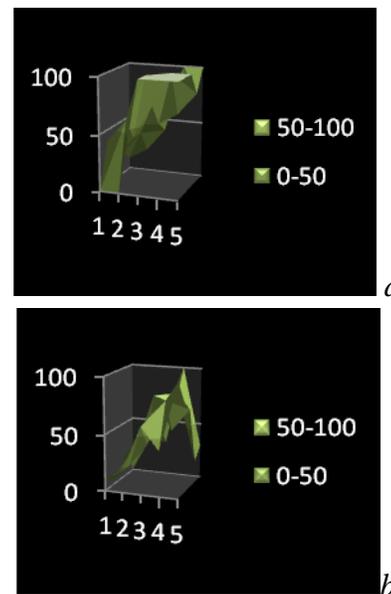


Chart 2. Graphic display of the chewing gum from a patient with overdenture (a) and the patient with skeletal partial denture (b). In the first picture we have greater

homogeneity and closeness to the monochrome colour as the time interval passes, compared with the second picture where in the whole period of time we have different shades of green and low chewiness of the chewing gum.

By analyzing the obtained results, acknowledgments can be obtained, that support that the overdenture allows patients a higher degree of chewiness of the of gum in a way that fixed - mobile complex prosthetic devices enable.

The difference was graphically presented. It is recognized that during the 5 minute interval the patients who have skeletal partial dentures, which are well adapted to their prosthetic devices, cannot by chewing the chewing gum in yellow and the chewing gum in blue colour, get the chewing gum in one colour. In fact, a lot of shades of green are obtained, from which the paper outlined three shades selected by a computer program and are included in each analyzed image.

CONCLUSION

The survey recognizes that patients with prosthetic devices such as overdentures achieve high chewing efficiency and aesthetic value, which confirms the importance of application of this kind of prosthesis that can and should be implemented more often in everyday clinical practice.

We conclude that the results obtained by the two chewing gum in the two basic colours of the spectrum (yellow and blue) are an effective and practical method applicable in everyday clinical practice, as well as a

scientific research applied in many countries.

Through our results and computer processing programs, and visually we came to acknowledgements indicating that the overdenture, if properly planned and prepared, allows the patient to achieve chewing efficiency that approaches the efficiency in patients who have complex fixed - mobile prosthetic replacements (9).

Paramount importance is the prevention of the remaining few teeth in subtotal edentulousness, as a condition of a last possibility before crossing to a total toothless (2), which justifies any effort that would result in their longer preservation.

Of great importance is the choice of prosthesis in subtotal toothless (4), with which the overdenture according to the results of our research, and according to results from the literature where indications are in addition to its production, confirming its superiority over the classical therapy with skeletal partial denture in this situation. This should be taken in consideration in designing the most appropriate treatment plan, taking into account all the advantages and disadvantages that various types of prosthetic devices have. Thus the situation should be made bail with the best choice in terms of preserving the state of subtotal toothless in the lower jaw through the functionality of the prosthetic aid, especially to the long term of a well planned therapy.

REFERENCES

1. Yasutaka Ishikawa, Ikki Watanabe, Iwao Hayakawa, Shunsuke Minakuchi and Tatsuro Uchida Complete Denture Prosthodontics, Evaluations of Masticatory Performance of Complete Denture Wearers Using Colour-Changeable Chewing Gum and Other Evaluating Methods Department of Masticatory Function Rehabilitation, Division of Oral Health Sciences, Graduate School , Tokyo Medical and Dental University, Tokyo, Japan 2006th
2. Veleski D., Evaluacija na vrednosta na dzvakopritisokot I rakcijata na potpornite tkiva kaj suptotalni protezi (Doktorska disertacija), Stomatoloski fakultet, Skopje, 1988
3. Hayakawa I., Watanabe I., Hirani S., et al, A simple method for evaluating masticatory performance using a colour-changeable chewing-gum. Into J Prosthodont 1998 , 11 (2) : 173-6 .
4. Pejkovska B., Funkcionalno-estetski aspekti na primena na pokrovni protezi vo sovremenata stomatoloska protetika (magisterski trud), Stomatoloski fakultet-Skopje, 2012
5. Kessler S., DDS, Bethel's Family Dentist, Chewing gum, 2011 , office@dockessler.com
6. Cohen-Or D. etal., Color Harmonization, ACM Transactions on Graphics (TOG), Volume 25:3. July 2006th Proceedings of ACM SIGGRAPH 2006, pp. 624-630 © 2006 ACM, Inc. Reprinted by permission
7. Veleski D., Pejkovska B., Antanasova M.: Biophysical Principles of the AcryLock Attachments Use in Contemporary Prosthetic Dentistry; Balkan Journal of Stomatology, 2012; 16: 98-102
8. F. A. Fontijn-Tekamp^{4*}, A.P. Slagter^{1,4}, A. Van Der BiMO, M.A. Van 'T Hof³, D.J. Witter¹, W. Kalk^{1,5}, and J.A. Jansen² Unit of Oral Function and Prosthetic Dentistry, Departments of 'Occlusal Reconstruction and Oral Function and 2Biomaterials, 3Department of Medical Statistics, University of Nijmegen; 2000, *Biting and Chewing in Overdentures, Full Dentures, and Natural Dentitions*, Research Reports
9. Veleski D.: Klinika i tehnika na parcijalnite protezi. Kniga vtora. Metalni kompleksni protezi; Stomatoloski fakultet, Skopje 2012: 247-311
10. Hirano K., Takahashi Y., Hirano S., et al. A study of masticatory ability using a color-changeable chewing gum with a new coloring reaction. J Jpn Prosthodont Soc. 2002, 46:103-9 .
11. Veleski D., M Antanasova., B Pejkovska, Review of the application of magnetic systems in retention overdentures, Macedonian Dental Review, year XXXIV, number 5-6 , p. 319-327,
12. 43. Prinz J.F. Quantative evaluation of the effect of bolus size and number of chewing strokes on the intra-oral mixing of a two-colour chewing gum. Journal of Oral Rehabilitation, 1999,26, 243-7.