

Acrylic Obturator Prosthesis in Maxillary Defects - Is an Improvement After Denture Adhesive Application?

MARIUS PRICOP¹, HORATIU URECHESCU¹, CRISTIANA PRICOP², SERBAN ROSU^{1*}, NICOLETA PRICOP³, ANCA JIVANESCU²

¹ Victor Babes University of Medicine and Pharmacy, Faculty of Dentistry, 2 Eftimie Murgu Sq., 300041, Timisoara, Romania, Department of Maxillofacial Surgery

² Victor Babes University of Medicine and Pharmacy, Faculty of Dentistry, 2 Eftimie Murgu Sq., 300041, Timisoara, Romania, Department of Prosthetic Dentistry

³ Dr. Pricop Private dental office, 7 Splaiul Nistrului, 300093, Timisoara, Romania

There are many studies in the literature regarding the effect of denture adhesives over acrylic classic prosthesis, but the literature lacks in comparative studies that investigate the effects and advantages of denture adhesives on obturator prosthesis performance. The hypothesis for this study was that the use of the denture adhesive would improve both wearing and efficiency on obturator prosthesis. We evaluated the clinical behaviour of six acrylic obturator prosthesis made on various maxillary defects, with and without a denture adhesive. The adhesive was applied on the prosthesis as recommended by the manufacturers. Patients used the adhesive for 24 hours and, through a questionnaire, they evaluated (comparative with and without adhesive) the following aspects: prosthesis retention, duration of retention, masticatory efficacy, cleansing of dentures, cleansing of gums. The clinical retention of the dentures was correlated to Modified Kapur Index Scale (MKIS) for denture supporting tissues.

Keywords: acrylic obturator prosthesis, maxillary defects, denture adhesive

Heat cured polymethylmethacrylate (PMMA) has been used as denture bases for more than 75 years (since 1937). PMMA is a vinyl polymer, made by free radical vinyl polymerization from the monomer methyl methacrylate [1].

The main qualities of heat cured polymethylmethacrylate in prosthetic stomatology are: excellent esthetics, low water solubility, lack of toxicity, reparability, simple processing technique.

PMMA have a wide range of applications nowadays and they are continuously improved in terms of physical, mechanical and esthetical properties, but they may cause some side effects regarding their biocompatibility [2].

Denture adhesives are cheap medical products, easy to buy, used very common among complete denture patients. Denture adhesives were introduced in practice since the 18th century, but the first scientific references on them occurred in the 19th century [1, 13, 15]. Denture adhesives as aids to denture retention are sold in many forms: powders, pastes, creams, semi-viscous liquids, thin sheets and wax impregnated adhesive cloths [3]. However, the powder, paste, and liquid form are most common used by denture wearer [4].

The main components of paste denture adhesive are carboxy methyl cellulose and polyvinyl group. The carboxy methyl cellulose start its action immediately after application of denture adhesive, and with time the long acting polyvinyl group hydrates and increase adherence and viscosity, also increasing the adhesive behavior of the prosthesis [5].

Along periods of time have been controversies regarding the denture adhesives role [13, 14]. Some authors believe that well-constructed dentures do not require adhesives, and the use of denture adhesive indicates professional deficiencies from those who made the prosthesis. Denture adhesives generally improved patient satisfaction and masticatory ability, especially in prosthesis with poor Kapur Index [5].

The main roles of denture adhesives in superior quality dentures are:

- improves retention
- decreases tissue discomfort
- prevents sharp pressure on the mucosal blood supply
- reduces the frequency of adjustments even in a well-fitting denture

In ill-fitting dentures, the roles of denture adhesives are:

- reduce mucosal irritation and inflammation
- improve the masticatory efficiency, resulting in a greater distribution of occlusal forces over the denture bearing tissues
- improve the prosthesis adhesion in patients with poor muscle control [6-8].

Experimental part

The aim of this study was to compare the obturator prosthesis efficiency, with and without denture adhesive. For this purpose, we used only one denture adhesive - Fixodent neutral. The study did not aim to compare the effect of different denture adhesives.

A sample of 6 patients (2 female and 4 male), which had postoperative maxillary defects, participated in the study. The mean age of patients was 63.16 years (range 56-71). The mean time of wearing maxillary dentures was 4.16 years (range 2-6) (table 1, fig. 1-4)

Inclusion criteria were: etiology of substance loss (maxillary resection), patients with maxillary obturator prosthesis; patients should not be denture adhesive user; patients show no known allergy to acrylic or denture adhesive.

Exclusion criteria were: uncontrolled medical problem, and any oral condition that might interfere with the study.

The clinical examination was made by a qualified prosthodontist

The adhesive paste (Fixodent neutral) was applied by the patients as recommended in the user guide. The denture must be thoroughly cleaned and completely dry, then

* email: serbanrosu@yahoo.com

Table 1
CHARACTERISTICS OF THE PATIENTS ENROLLED IN THE STUDY

Case	Age/Se x	Location	Shape	Dimension Transversal/axial	Area	Time of inset (years)	Marginal mucosal irritation
Case 1	60/M	Palatal right	Round	2X1.9 cm	2.9 cm ²	4 y	No irritation
Case 2	66/M	Palatal bilateral	Oval	1,6X2.1 cm	2.63 cm ²	3 y	No irritation
Case 3	58/M	Palatal right	Round	2.3X2.2 cm	4.15cm ²	2 y	No irritation
Case 4	56/F	Palatal bilateral	Oval	2X3.5 cm	5.49cm ²	5 y	No irritation
Case 5	68/F	Palatal middle	Oval	1.5X2.3 cm	2.7 cm ²	6 y	Middle irritation
Case 6	71/M	Palatal left	Oval	1.7X2.1 cm	2.8 cm ²	5 y	Middle irritation

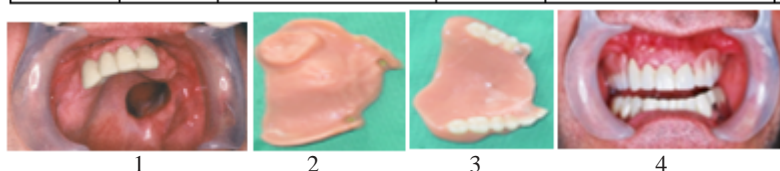


Fig. 1-4. Maxillary left palatal defect with an acrylic obturator prosthesis (clinical case)

denture adhesive was applied in a series of dots on the fitting surface of the maxillary prosthesis. The adhesive was not applied to the obturator surface, but only on its surrounding prosthetic base areas. After that the denture was inserted into the patient mouth, the patient closed firmly the mouth and hold it in place for few seconds, then waited 15 min before starting the masticatory efficacy test.

Masticatory efficacy of the patient was examined based on the consumption of a quarter of a peeled apple. The patient was instructed to consume the entire piece of apple and inform the examiner if dislodgement occurred during the process of chewing.

After 24 h of using the prosthesis with adhesive, the patients were instructed to clean their dentures with habitual cleaning methods (brushing), and to clean their gums from the sticky adhesive. The applied film of adhesive was taken out, in order to let the patients to wear the prosthesis for 24 h without adhesive. At the end of this time period, masticatory efficacy of the patient was examined again in the same previous method.

The patients could make such a comparison of the maxillary obturator prosthesis properties, with and without the use of an adhesive paste. The retention of the maxillary dentures was scored by Modified Kapur Index Scale. For the others examined parameters, the patients were asked to complete a score evaluation questionnaire. The masticatory efficacy, cleansing of dentures, cleansing of gums were rated between 0 and 3, from the most negative to positive effects of the prostheses. The patients wrote too their comments on any other aspects found important for their prostheses.

Result and discussions

Prosthetic treatment of the patient with an oral maxillary defect is among the most challenging in dentistry. Defects are highly individual and require an experienced clinician to fabricate a usable prosthesis.

Sufficient retention constitutes a basic and important requirement for the acceptance of complete dentures by the patient [11]. A number of studies have been conducted to evaluate the effectiveness of the denture adhesives on denture retention, and measured subjectively or by determining the force required to dislodge the denture [4, 7, 8, 11].

There are several factors influencing retention of maxillary prosthesis, including: adhesion, suction, surface tension, capillary action, atmospheric tension, oral or facial musculature. These factors, along with the appropriate fabrication of the complete denture, combine to retain the prosthesis [9, 10]. Not all of these factors act at the same time, some become effective only when need to resist a certain dislodgement force. Improving retention and stability of denture is of considerable interest in prosthetic dentistry [11].

The retention of the maxillary obturator prosthesis was scored by Modified Kapur Index Scale [12] (table 2).

The dislodging forces in obturator prosthesis were compared with and without the use of denture adhesive for all participating subjects (table 3).

Duration of retention. Chew (1990) demonstrated that denture adhesives paste and powders lost up 30-50% of their effectiveness in the first 1-3 h of use [4]. These findings

Kapur scale	Group
0	Prosthesis displaces itself
1	Slight resistance to vertical pull and little or no resistance to lateral force
2	Moderate resistance to vertical pull and little or no resistance to lateral force
3	Moderate resistance to vertical pull and lateral force
4	Very good resistance to vertical pull and lateral force
5	Excellent resistance to vertical pull and lateral force

Table 2
MODIFIED KAPUR INDEX SCALE SCORE

Kapur scale	Nr. of patients without the use of denture adhesive	Nr. of patients with the use of denture adhesive
0	0	0
1	0	0
2	1	0
3	2	2
4	2	3
5	1	1

Table 3
DISTRIBUTION OF PATIENTS BASED ON MODIFIED KAPUR INDEX SCALE WITH AND WITHOUT THE USE OF DENTURE ADHESIVE

Table 4
EFFECTS ON MASTICATORY EFFICACY

Kapur scale	Dislodgement during consumption of the apple without denture adhesive	Dislodgement during consumption of the apple with denture adhesive	Time for dislodgement without denture adhesive application (s.)	Time for dislodgement with denture adhesive application (s.)
2	Yes		15	
3	Yes, No	No, Yes	18	33
4	No, No	No, No, No		
5	No	No		

are due to decrease of salivary flow in the partially edentulous patients with increase of the experiment time. The oily medium of the paste delaying the rapid activation of paste denture adhesive, prolongs its duration of action, and maintains the higher level of dislodging forces achieved [11]. The patients enrolled in the study don't report an increasing in the duration of retention.

Effects on masticatory efficacy. Neill & Roberts (1972) observed that the use of denture adhesive provided a significant improvement in masticatory performance in subjects with poor dentures, but not in those with good dentures [4]. Perez (1985) sustained that the chewing performance is not influenced by the use of a denture adhesive [4]. With an increased retention and stability of obturator prosthesis provided by adhesive, the ability to chew of our patients was slight higher.

Among 6 patients, 2 patients claimed maxillary complete denture dislodgement during consumption of the apple without denture adhesive application. With denture adhesive only 1 patient claimed maxillary complete denture dislodgement. The number of chews until the first denture dislodgement for maxillary obturator prosthesis increased after denture adhesive application, but the difference was not statistically significant.

Overall the time for maxillary complete denture dislodgement increased after denture adhesive application. Furthermore, the total number of dislodgements through the course of apple consumption decreased after denture adhesive application. All patients felt more comfortable chewing with the application of denture adhesive (table 4).

Cleansing of dentures lasted between 2 and 4 min, the highest value being registered to a man who presented light shaking of hands.

Cleansing of gums was not generally difficult for our patients. Two patients reported some difficulties in removing the adhesive, generated by the penetration of adhesive substance in the maxillary defect.

Conclusions

The ultimate goal of acrylic obturator prosthesis is to pursue a better quality of life and appropriate psychological support for patients. Our patients obturator prostheses at 2-6 years after surgery were technical favorable, only two requiring small and no significant adjustments.

When evaluating the effect of denture adhesive subjectively, all of the patients agreed that the denture adhesive increase the retention (levels and duration). Our patients masticatory activity improved using prosthesis adhesive. However, regarding both parameters, the improvement was no statistically significant.

The results of the study come in agreement with other authors who made studies on classic total prosthesis and concluded that the denture adhesives improved the

retention and mastication specially for dentures made in difficult conditions. In case of obturator prostheses this difficult conditions are represented by large and atypical palatal deficiencies.

With the increased stability and retention provided by denture adhesives, denture wearers can apply more force during mastication, needing less chewing till deglutition. This lead to improve mastication.

Cleansing of gums and prosthesis was not difficult for the patients enrolled in the study.

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