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

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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].

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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.

### Table 1
CHARACTERISTICS OF THE PATIENTS ENROLLED IN THE STUDY

<table>
<thead>
<tr>
<th>Case</th>
<th>Age/Sex</th>
<th>Location</th>
<th>Shape</th>
<th>Dimension Transversal/axial</th>
<th>Area</th>
<th>Time of inset (years)</th>
<th>Marginal mucosal irritation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60/M</td>
<td>Palatal right</td>
<td>Round</td>
<td>2.1X1.9 cm</td>
<td>2.9 cm²</td>
<td>4 y</td>
<td>No irritation</td>
</tr>
<tr>
<td>2</td>
<td>66/M</td>
<td>Palatal bilateral</td>
<td>Oval</td>
<td>1.6X2.1 cm</td>
<td>2.63 cm²</td>
<td>5 y</td>
<td>No irritation</td>
</tr>
<tr>
<td>3</td>
<td>58/M</td>
<td>Palatal right</td>
<td>Round</td>
<td>2.3X2.2 cm</td>
<td>4.15 cm²</td>
<td>2 y</td>
<td>No irritation</td>
</tr>
<tr>
<td>4</td>
<td>56/F</td>
<td>Palatal bilateral</td>
<td>Oval</td>
<td>2X3.5 cm</td>
<td>5.49 cm²</td>
<td>5 y</td>
<td>No irritation</td>
</tr>
<tr>
<td>5</td>
<td>68/F</td>
<td>Palatal middle</td>
<td>Oval</td>
<td>1.5X2.3 cm</td>
<td>2.7 cm²</td>
<td>6 y</td>
<td>Middle irritation</td>
</tr>
<tr>
<td>6</td>
<td>71/M</td>
<td>Palatal left</td>
<td>Oval</td>
<td>1.7X2.1 cm</td>
<td>2.8 cm²</td>
<td>5 y</td>
<td>Middle irritation</td>
</tr>
</tbody>
</table>

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

### 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).

### Table 2
MODIFIED KAPUR INDEX SCALE SCORE

<table>
<thead>
<tr>
<th>Kapur scale</th>
<th>Group</th>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Prosthesis displaces itself</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Slight resistance to vertical pull and little or no resistance to lateral force</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Moderate resistance to vertical pull and little or no resistance to lateral force</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Moderate resistance to vertical pull and lateral force</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Very good resistance to vertical pull and lateral force</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Excellent resistance to vertical pull and lateral force</td>
<td></td>
</tr>
</tbody>
</table>

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 | 0 | 0 |
3 | 2 | 2 |
4 | 3 | 3 |
5 | 1 | 1 |

### Table 3
DISTRIBUTION OF PATIENTS BASED ON MODIFIED KAPUR INDEX SCALE WITH AND WITHOUT THE USE OF DENTURE ADHESIVE
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 prostheses 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 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 not 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.

References


Table 4

<table>
<thead>
<tr>
<th>Kapur scale</th>
<th>Dislodgement during consumption of the apple without denture adhesive</th>
<th>Dislodgement during consumption of the apple with denture adhesive</th>
<th>Time for dislodgement with denture adhesive application (s.)</th>
<th>Time for dislodgement with denture adhesive application (s.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Yes</td>
<td>15</td>
<td>No, Yes</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>Yes, No</td>
<td>No, Yes</td>
<td>No, Yes</td>
<td>No, No, No</td>
</tr>
<tr>
<td>4</td>
<td>No, No</td>
<td>No</td>
<td>No, No, No</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

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