Evaluation of 2 Different Types of Extra-Coronal Frictional Attachments with Plastic Matrices in Contemporary Dental Prosthodontics

SUMMARY
Nowadays, due to fast dental progress, planning of partial dentures is continuously improving, permitting application of contemporary and modern retention systems. Because of the presence of many different dental attachments on the market, the decision which one to use for each particular case is a big challenge for the dentist. The purpose of this paper is to examine the advantages and disadvantages of extra-coronal frictional attachments with plastic matrices and to present a critical review for 2 types of retention systems.

We used 2 types of extra-coronal frictional attachments with plastic matrices: the AcryLock attachments and the Vario-Soft 3 attachments. The results confirm that AcryLock and Vario-Soft 3 represent similar systems. They insure good retention, with an additional option for dosed retention by using different plastic matrices depending on each particular case. Although these attachments with plastic parts are not newest innovation, they have a big value due to their characteristics - durability, affordable price and possibility for easy and simple maintenance, offering a chance to replace the plastic part if necessary. They insure high quality and long lasting dental prosthodontic appliances that can be used in many different situations.

Keywords: Extra-Coronal Attachments; AcryLock; Vario-Soft 3

INTRODUCTION
Nowadays, planning complex fixed-removable constructions is very common. But, due to fast dental progress, planning of partial dentures is continuously improving, permitting application of contemporary and modern retention systems. The need to discover an alternative solution for inferior dental clasps that would satisfy functionality and aesthetics, led to rapid development of attachments. Today, the attachments represent an optimal biological, functional and aesthetic solution for retention. If correctly planned, designed and constructed, the attachments, as elements for direct retention, allow the denture to resist forces that tend to move it out of position, limiting the transfer of damaging forces on the abutment teeth and supportive tissues, simultaneously making proper aesthetic effect of “invisibility” of their structural elements. Because of presence many different dental attachments on the market, the decision which one to be used for each particular case is a big challenge for the dentist.

Selection of the attachment must be made as a result of studious assessment of the oral conditions. In patient treatment, when planning complex fixed-removable constructions, successful selection of an attachment depends on many factors, such as available space, vertical dimension, condition of remaining teeth (their length, periodontal condition). Another very important factor is the patient, his demands, behaviour, habits and his prior experience with dentures (if any), as well as needs for aesthetics, comfort and psychological profile.

The retention systems with plastic matrices are present for a relatively short period of time on our market. Because of the growing trend for their application,
there was a need for studying their characteristics. The purpose of this paper is to examine the advantages and disadvantages of extra-coronal frictional attachments with plastic matrices and to present a critical review for 2 types of retention systems.

Material and Method

We used 2 types of extra-coronal frictional attachments with plastic matrices: the AcryLock and the Vario-Soft 3 attachments.

AcryLock is a plastic rod attachment, composed of a stress-breaker, patrrix and plastic matrix. The patrrix is placed extra-coronal. It can be placed separately or coupled up to a double groove stress-breaker called IS (Integrated Stress-breaker). The stress-breaker is placed on the proximal surface of the wax model of the abutment crown. It provides sufficient distance of the patrrix from the interdental papilla. The stress-breaker is then coupled with the patrrix, which is placed on the stress-breaker in respect to the position and shape of the alveolar ridge. The stress-breaker and the patrrix are made of plastic, which volatilizes completely during the heating up of the muffle. The whole construction, the wax crown with the plastic stress-breaker and the patrrix, is than casted from stable alloys. The plastic patrrix which volatilizes completely is oversized with 0.04 mm in order to get its proper size after processing and polishing of the metal. The matrix of the AcryLock attachment is made of hard plastic. It is inserted into the matrix-housing of the metal partial denture, using a special instrument for that purpose. The matrices are available in 3 different dimensions to adjust friction (regulation of the retentive force) - the green matrix allows normal friction, the yellow one allows medium, and the red matrix causes high friction. As a result, the retentive force of the attachment can be adjusted appropriately. Should the need arise; the change of the matrix in the metal matrix-housing is performed very fast and simple. Based on shaping of the matrix with a retention point, changing of the friction inserts is very simple without spending a lot of time for shortening and fitting in. This extends the durability of the prosthetic construction as a whole (Figs. 1-4). Besides Microdent, similar systems are produced by Heraus, Interdent etc…6
Vario-soft 3 is an attachment designed and manufactured by Bredent. This attachment is made of plastic matrix, which burns without residue and is casted in 1 part with the rest of the construction on the abutment teeth. After producing metal construction, duplicating matrix that is included in the kit is placed on the matrix and the rest of the model is prepared for duplicating. On the model obtained from fireproof investment material, a matrix-housing made of wax is placed on the matrix. The wax matrix-housing is included in the kit. Then, wax moulding can be continued. After manufacturing the denture skeleton from cast alloys, a plastic matrix is placed in the casing using an appropriate instrument set. This system provides 6 levels of retention. The 3 basic matrices are: red matrix - provides great friction, yellow matrix - allows normal friction and green matrix-reduced friction. Besides the basic, there are particularly soft matrices made of soft plastic that can compensate for small divergences and minor processing imperfections (Figs. 5-8). The softer matrices are marked with brighter colours: light red - with greater friction, light yellow - normal friction and light green - the slightest friction.

Except customary Vario-Soft 3 attachments, there are the Vario-Soft 3 sv attachments that contain integrated shear distributor. The shear distributor provides protection of periodontal structures of the remaining teeth, making the milling of the crown unnecessary. This results in a better aesthetic effect, reduces costs and reduces time required for processing of the construction. In cases of limited space, the Vario-Soft 3 attachments are available with reduced dimensions as Vario-Soft 3 mini and Vario-Soft 3 mini sv. In Vario-Soft 3 mini sv attachment, its prefabricated component is only 3.5 mm wide and 4 mm long, and includes matrix and shear distributor.

We used 2 types of attachments, AcryLock and Vario-Soft 3 for partial edentulous patients with shortened dental arches. We followed clinical procedures for manufacturing the complex fixed-removable prosthetic solutions retained by AcryLock and Vario-Soft 3 systems, with preparation of the remaining natural dentition. First, we made the tooth crowns containing the matrix of the attachment. After trying the fixed structure in the patient’s
mouth, we continued with the procedures of making removable part of the prosthetic construction - cast denture that contains the plastic matrix. We monitored our patients with the complex fixed-removable prosthesis for 4 years through regular check-ups every 3 months.

Results and Discussion

In all the patients we had accomplished adequate functional and aesthetic values with our prosthodontics treatment. Within monitoring our patients for 4 years, we noticed that condition of the remaining natural teeth did not change, which verifies the preventive effect that the dentures with AcryLock and Vario-Soft 3 attachments have on oral tissues.

The results confirm that AcryLock and Vario-Soft 3 represent similar systems. They insure good retention, with an additional option for dosed retention by using different plastic matrices, depending on each particular case. Although these attachments with plastic parts are not newest innovation, they have a big value due to their characteristics - durability, affordable price and possibility for easy and simple maintenance, offering a chance to replace the plastic part if necessary. They insure high quality and long lasting prosthetic appliances that can be used in many different situations. Besides, the AcryLock system provides 3 levels of retention - normal (green matrix), medium (yellow matrix) and high (red matrix) and the Vario-Soft 3 systems, moreover the above-mentioned 3 possible retention levels, provide additional 3 (6 in total) levels of retention. Thus, the Vario-Soft 3 systems provide particularly soft matrices made of soft plastic that can compensate for small divergences and minor processing imperfections.

While locating the extra-coronal attachments, depending of the attachment distance from the vertical axis of the abutment tooth, the possible detrimental forces should be neutralized. To prevent overloading, it is recommended that at least 2 abutment teeth should be connected in 1 block with milled surfaces (double abutments). So planned construction will help denture stabilization and correct distribution of the load. The forces that are harmful to the remaining dentition and periodontal ligament are significantly reduced by reciprocal arm and the precise path of insertion of the denture. The milled surface must have a minimum height of 2.5 to 4 mm. The reciprocal arm, the shoulders and the interlock contribute to the prevention of negative impacts of forces. The chamfered margin provides hygienic advantages over butt or square shoulders. The cervical milled ledges should be positioned approximately 1 mm above the gingival margin. If the abutment crown is naturally short, it is recommended to provide a ledge with a square edge. Occlusal shoulders can be made at 90° right angels or can be chamfered. Shoulders positioned at right angles to the path of insertion are best suited for the transmission of loads; however chamfered shoulders are easier to produce. The Interlock must be positioned 180° opposite to the attachment.

The Vario-Soft 3 sv systems include integrated share distributors. The shear distributor provides protection of periodontal structures of the remaining teeth, making the milling of the crown unnecessary. This results in a better aesthetic effect, reduces costs and reduces time required for processing of the construction. In addition, this simplifies the technical procedures necessary for denture manufacturing.

In terms of longevity and maintenance of constructions that are retained with attachments with plastic matrices, unlike most metal attachments, which are adjustable (they can improve their power of retention with simple activation), the non-metal (plastic) attachments need to be replaced (as a whole or only a certain element). If significant decline in value of retention of the attachment occurs as a result of wear and plastic deformation of the matrix, it is necessary to replace it with new one (new matrix). The procedure of changing the plastic matrix is carried out very simply and quickly. It requires no additional laboratory procedures. The old matrix is removed from its metal housing in the denture, and is replaced with new one using a special instrument. This extends durability of the prosthetic construction as a whole. Moreover, the same metal housing of the denture can hold all the plastic matrices which have different retention capability. This makes the adjustment of the prosthetic construction to the current oral conditions possible. For example, reducing or increasing retentive force of the attachment is made possible by placing matrices that allow more or less friction if the circumstances require so.

Among our patients, during the regular checkups every 3 months, a need to change the plastic matrices occurred several times, but the denture behaved quite normal afterwards - we managed to re-establish the desired retention value of the attachment.

It should be noted that the wear of metal matrix when using frictional attachments with plastic matrices is considerably smaller compared to frictional attachments made entirely of metal. This is due to the greater softness of plastics compared to metal. Thus, it is considered that if regularly controlled and maintained, dentures with plastic attachments have a potential for greater longevity compared to dentures with metal attachments. Moreover, economic viability of the attachments with plastic matrices should not be neglected. Namely, due to its simple structural design and materials of manufacturing, the plastic attachments have relatively low price, making them accessible to a wider circle of patients.
Conclusion

Although these attachments with plastic parts are not newest innovation, they have a big value due to their characteristics - durability, affordable price and possibility for easy and simple maintenance, offering a chance to replace the plastic part if necessary. They insure good retention, with an additional option for dosed retention by using different plastic matrices depending on each particular case. Thus, they insure high quality and a long lasting dental prosthetics that can be used in many different situations.

References

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