International Poster Journal IPJ of Dentistry and Oral Medicine

Int Poster J Dent Oral Med 2000, Vol 2 No 3, Poster 49

Survival of different acrylate based veneer materials in telescopic crowns

Language: English

Authors: Ulrich Lammert*, A. Riebeling, Paul Ferger, Bernd Wöstmann
Dept. of Prosthodontics, Justus-Liebig-University, Giessen, Germany

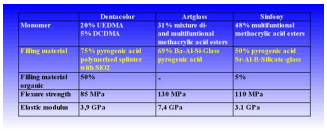
Date/Event/Venue:
08.05.2000
78th general session & exhibition of the IADR
Washington

Introduction

Acrylic veneers are still commonly used. They are especially useful in removable partial dentures because of the flexibility of the resins that is needed due to the inevitable minor deformation of the metallic framework. The resin-metal interface has turned out to be the weak point. In the recent years different bonding systems (i.e. Rocatec, *Espe*, Seefeld and Silicoater, *Heraeus Kulzer*, Dormagen) have been introduced to enhance the durability of the metal-resin interface and to improve shear bond and flexure strength. When the Silicoater-System was introduced in 1984 it was finally possible to create a chemical bond between metal surface and acrylic resins resembling the metallo-ceramic bond. So the bonding systems help to effectively prevent marginal corrosion and hydrolysis and to increasie the lifespan of the interface. On the other hand mechanical retentions are still obligatory to resist the intraoral stress. It was the aim of this in-vivo-study to analyse three acrylic systems in a prospective randomised clinical trial.

Material and Methods

Since 1997 95 not selected patients were provided with removable partial dentures retained by a total of 323 resin veneered telescopic crowns. Every single metal framework was done using only one alloy (Degulor M, *Degussa-Hüls*); the veneers were completed using the following three resins and their appropriate bonding systems at random: 1. Dentacolor / Siloc (*Heraus Kulzer*), 2. Artglass / Siloc (*Heraeus Kulzer*) und 3. Sinfony / Rocatec (*Espe*). Table 1 shows the composition as well as the flexure strength and the e-modulus of these materials. Not only the manufactures' instructions were followed precisely while processing, but also additional retentions were positioned at all metal surfaces getting a veneer. In semiannual recall intervals follow-up checks were done focusing on a change in color compared to neighboring teeth (*fig. 4*) and the complete or partial loss of veneers. On this occasion the observed defects were assigned to three groups: defects up to one third (group 1, *fig.2*), defects up to two third (group 2) and total loss of the veneers (group 3, *fig 3*). The evaluated data were checked statistically with the survival analysis according to Kaplan-Meyer.



	Dentacolor	Artglass	Sinfony
Monomer	20% UEDMA 5% DCDMA	31% mixture di- and multifunktional methacrylic acid esters	48% multifunktionel methacrylic acid esters
Filling material	75% pyrogenic acid polymerized splinter with SiO2	69% Ba-Al-Si-Glas pyrogenic acid	50% pyrogenic acid Sr-Al-B-Silicate-glass
Filling material organic	50%	-	5%
Flexure strength	85 MPa	130 MPa	110 MPa
Elastic modulus	3,9 GPa	7,4 GPa	5,1 GPa

Tab. 1: Composition and characteristic of materials

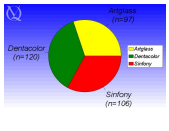


Fig. 1: Materials

Fig. 2: Partial loss (group 1)

Fig. 3: Complete loss (group 3)

Fig. 4: Change in color (group 4)

Results

The results of the study are represented in Fig. 5-7. After 18 months in use the combination Dentacolor / Siloc showed defects according to group 1 (*fig.5*) in 5% of all cases. Similar defects were found in 14% of all cases with the combination Artglass / Siloc. Telescopic crowns with the combination Sinfony / Rocatec showed defects in a frequency of 9%. The differences between the materials proved to be statistically significant ($p<0,05$, log-rank-test).

Losses which amounted up to two thirds of the veneer were only to be found in 1% for the combination Dentacolor / Siloc. No losses of that extent were seen for the other materials. Since the tested materials showed no significant differences with respect to group 2 defects, the corresponding diagram is omitted.

For the combination Sinfony / Rocatec no complete loss of the veneer was recorded during the period of the study (*fig. 6*). Dentacolor / Siloc came up in 7% of the cases with a total loss of the veneer. For crowns veneered with Artglass / Siloc a total loss of the veneer was registered in 28%. The frequency of total loss proved to be significant with regard to the different materials ($p<0,05$). With reference to color stability no significant differences were evaluated between the systems. 2% of the combination Dentacolor / Siloc and 4% of the combination Artglass / Siloc as well as 9% of all telescopic crowns with Sinfony / Rocatec showed discolorations (*fig.7*).

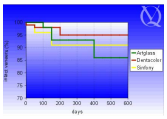


Fig. 5: Partial loss (group 1)

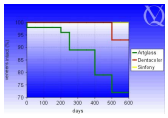


Fig. 6: Complete loss (group 3)

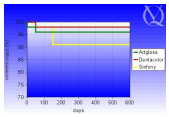


Fig. 7: Change in color (group 4)

Discussion and Conclusions

Within the limits of this study it can be concluded that though considerable efforts have been made to improve the metal-resin-bond the risk of partial or complete loss of veneers still exists. There is an additional risk of discoloration in the first two years after integration as well that may be due to improper handling or finishing. The combination Artglass / Siloc showed a significant higher loss rate. These findings may be explained possibly by the higher brittleness of this material which in turn is reflected by its comparably high elastic modulus (*tab. 1*). Therefore special attention should be payed to an adequate rigidity of the metallic framework to minimize elastic deformation of the construction. Inspite of all physico-chemical improvements of the metal-resin-bond it still is strongly advisable to apply additional mechanical retentions. The study is to be continued.

Bibliography

1. Janda, R.: Verblendkunststoffe - Materialien und Leistungsfähigkeit. Quintessenz der Zahntechnik (1996), 22
2. Ludwig, K.: Keramik- oder Kunstoffverblendung. Dt. Ärzte-Verlag 89 (1999)
3. Abiden, A., Gangnus. B.: Tribchemical Silica- Coating: Influence of Different Silanes on Bond strength, IADR Nizza, (1998) Abstract 370
4. A. Buhlmann, I., Schinker, A., Wöstmann, B., Ferger, P.: Vergleich der Verbundfestigkeit unterschiedlicher Verblendkunststoffe auf verschiedenen Legierungen. DGZPW. (1998)
5. Geis-Gerstorfer, J.: Untersuchung des Verbundes silanisierter Kunststoffverblendungen, Silicoater-Symposium, Hüthig, Heidelberg (1990)
6. Kappert, H.F.: Prüfung von Metall-Kunststoff-Verbundsystemen durch Scher-, Biege- und Axialen Zugversuch. Dtsch Zahnärztl (1989) Z 44, S. 879 - 881
7. Fiedler, A., Sauer, G.: Experimentelle und klinische Untersuchungen zum Silicoater-Verfahren. Dtsch Zahnärztl (1988) Z 43, S. 1045 - 1047

This Poster was submitted on 03.08.00 by ZA Ulrich Lammert.

Correspondence address:
ZA Ulrich Lammert
Schlangenzahl 14
D-35492 Gießen

Poster Faksimile: