particulate filler resin composite (PFC) to 5 PFC substrates, namely Targis (Ivoclar), Sinfony (3M ESPE), Tetric (Vivadent), Gradia (GC), Sculpture (Jeneric Pentron) in dry and thermocycled (TC) conditions. PFC substrates were fabricated according to each manufacturer's recommendations and the oxygen inhibition layer was removed by grinding. The substrates in each group (n=6) were randomly assigned to each of the following 3 treatment conditions: (1) Etching for 90 sec with 9.5% HF (Ultradent® Porcelain Etch, USA) (2) Sandblasting (50μm Al_2O_3), (3) Tribochemical silicacoating (CoJet, 30μm SiOx, 3M ESPE). Each surface treatment was followed by silanization and bonding agent application. The repair resin (Sinfony, 3M ESPE) was bonded to the conditioned substrates using teflon tubes (3.6 x 5 mm). TC was applied for 6000 cycles (5-55°C, 30 sec). The SBS were measured in a universal testing machine with a cross-head speed of 1mm/min. The ANOVA showed that SBS values before TC differed significantly ($P<0.001$) between the acid etched specimens (7.5-14.5 MPa) and those treated with either Al_2O_3 (15.9-20.8 MPa) or silicacoating (25.8-42.2 MPa). After TC, the silicacoating process resulted in the highest values in all material groups (17.3--30 MPa). The results indicate that composite resin repair strengths are dependent on the brand of the composite. This could be due to the differences in chemical composition of the polymer.

33.

The Problem of Solving Fracture of the Denture Base in Preedentulous States

Benke B, Szabó Gy.
Department of Prosthodontics, Dental School, University of Pécs, Hungary

The mechanical fatigue resistance of the denture base seems to be a neglected part of treatment planning. Extreme overload can occur, which is only evaluated in the case of fracture. In full or partial edentia the dental base can be exposed to an extreme stress concentration which may be coupled with the incidental source of failure during processing of the denture.

The aim of this lecture is to report cases, where we were able to overcome dental base fracture, which had not been foreseen earlier.

In the first case a history of several fractures of an upper complete denture is presented. Metal net, framework and incorporation of glass fibres and reline were stages of the instructive problem solving process.

In the second case a man wearing an overdenture with ball attachments under implant fixtures is presented. After multiple fractures of the dental base we used glass fibre reinforcement for repair. After this procedure there was an eventless period, which proves the mechanical resistance of the denture base.

In the third case presented both the denture base and the acrylic tooth were damaged. The multiple fracture could also be treated with glass fibre reinforcement, which was successful.

From these cases we concluded:

1. Careful case history and treatment plan could have helped to overcome the subsequent problems.
2. The clinical implication is that the glass fibre reinforcement can provide effective strength for the denture base. We could not neglect evaluation of the mucosa and bone support.

In the following period we reinforced new dentures preventively with fibres in 15 cases. At the same time we also continued the repair the broken dentures of 10 patients. The outcome exceeded our greatest expectations: no fracture was seen. However, further study is needed to extend the observation period.

34.

Investigation of the Fracture Surface of E Glass Fiber Reinforced PMMA Denture Base Resins

Özyegin LS[1], Sinmazisik G.[2]
[1]*Department of Prosthodontics, Faculty of Dentistry, University of Istanbul, Turkey*
[2]*Vocational School of Related Professions, Marmara University, Istanbul*

The interface between fibers and the acrylic resin matrix is considered to be an important factor in the reinforcement, and the microscopic surface structure may play a key role in the effectiveness of this reinforcement. Adequate adhesion of the fibers to the polymer matrix is one of the most important factors for strength. The optic microscope, although of limited resolution, is still a popular choice. The scanning electron microscope (SEM) provides measurements in 2 dimensions.

The aim of the study was to examine the interfacial region of PMMA reinforced with chopped glass fibers coated with two different silans using the scanning electron microscope.

E Glass fibers coupled with Silan 1 (silan + epoxy resin) and Silan 2 (silan + polyester resin) were used to reinforce denture base polymethyl metacrylate resin. Specimens were produced by two different methods in the first group, and the fibers were soaked with a mixture of polymer powder and monomer liquid. In the second group the fibers were soaked in the polymer liquid for 15 minutes and then blended with PMA polymers. All the samples were heat cured. Transverse strength of specimens was evaluated by a 3 point bending test. Fracture surfaces of the test specimens were examined with SEM to evaluate the degree of impregnation of fibers with the polymer matrix. SEM examination revealed well impregnated glass fibers with the polymer matrix. No difference was found between the test groups.

35.

The Effect of Two Different E Glass Fiber Reinforcements on Mechanical Properties of Polymethyl Metacrylate Denture Base Resins

Sinmazisik G[1], Özyegin LS[2], Akesi S.[2]

[1]Vocational School of Related Professions, Marmara University, Istanbul

[2]Department of Prosthodontics, School of Dentistry, University of Istanbul, Turkey

Denture base polymers were reinforced with various types of fibers, such as glass, carbon/graphite and ultra-high-modulus polyethylene fibers. These procedures were performed to take advantage of the good esthetic qualities of glass fibers and good bonding of glass fibers to polymers via silane coupling agents. The most common type of glass used in fiber production is the so-called E glass (electrical glass).

This study investigated the effect of chopped fibers with two different silane coupling agents on the strength of denture base polymethyl metacrylate resins. E Glass fibers coupled either with Silan 1 (silan + epoxy resin) or Silan 2 (silan + polyester resin) were used to reinforce denture base polymethyl metacrylate resin. Specimens were produced by two different methods. In the first group, the fibers were wetted with a mixture of polymer powder and monomer liquid and in the second group the fibers were soaked in the polymer liquid for 15 minutes and then blended with PMA polymers. All samples were heat cured. Control group specimens were not fiber reinforced. Half of the prepared specimens were stored in distilled water at 37°C for 48 hours. The others were tested immediately. Transverse strength of all specimens was evaluated by a 3 point bending test. No significant difference was found between the wetted and immediately tested specimens (p=0.755). When all specimens were compared for transfer stength there was statistically significant difference between the wetted and unwetted specimens (p=0). When silanated and control specimens were compared the ones processed with Silan 2 (silan + polyester resin) showed the lowest transfer strenght values.

36.

Numerical and Experimental Analysis of the Influence of Assembling Conditions and the Tolerance of Adapted Implantological Components on the Durability of the Prosthetic Construction

Hedzelek W[1], Zagalak R[1], Mroz B[2], Biskupski P[2], Lodygowski T[3], Wierszycki M.[3]

[1]Department of Propedeutics and Oral Rehabilitation, University of Medical Sciences, Poznan

[2]Faculty of Physics, Adam Mickiewicz University, Poznan

[3]Division of Computer Aided Design in Engineering, Institute of Structural Engineering, University of Technology, Poznan, Poland

Durable fastening of implant retained prosthetic restorations, consisting of a series of elements, is one of the main factors of successful prosthetic rehabilitation. Clinically observed mechanical problems concerning the above mentioned components are complications that occur most often in the loading phase.

The aim of this research was evaluation of the suppleness of the implant- -anti-rotary abutment construction to loosening under the influence of labile mechanical stress.

Numerical analysis of resistance based on the finite element analysis (FEA) was used in the initial phase of this research. The actual tests were done with the use of a dynamic mechanical analyser Netzsch DMA 242 and a polarisation microscope equipped with a CCD camera.