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## Gradual Loss of Partial Denture Retentive Forces

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A partial denture can be appropriately accommodated physiologically on the denture base only with good understanding of the stomatognathic system biostatics. A force can either act as a physiological stimulus or can lead to pathological alterations in supporting tissue, which depends on a great number of factors.

The aim of the study was to determine the initial retentive force values of cast clasps, anchors and magnets as well as their gradual loss of force after a certain number of retentive elements, extraction and insertion cycles.

Measurements were carried out at the Materials Department, School Engineering and Naval Architecture, University of Zagreb. The examined specimens were made of materials and ready-made elements in accordance with the manufacturer's declaration. They satisfy the DIN 13912 and DIN 13906-1 criteria and comply with other international standards. The device for retentive force measurement can periodically both include and exclude retentive elements thus continually collecting measurement data.

Gradual loss of the examined retentive element forces was analysed by these measurements. The obtained values of the examined retentive elements qualitative analysis are presented in graphs and tables.

In the course of analysis it was discovered that the retentive force value of both clasps and anchors gradually decreases whereas the magnetic force of the alloys remains unchanged.

The key factors which have a great impact on the retentive force value are wear and material fatigue. A clasp in a wet environment (saliva) has less retentive force, but due to decreased wear the retentive force decrease will progress more slowly.

## Vertikalne frakture krune s amalgamskim ispunom

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Amalgam se kao restorativni materijal rabi već više od 150 godina. Mehaničko opterećenje može rezultirati dimenzijskim promjenama dovodeći do nastanka rubnih pukotina i fraktura tvrdoga zubnog tkiva.

Svrha rada bila je utvrditi čestoću i lokaciju takvih fraktura kod zuba s amalgamskim ispunom. Ispitano je 30 ispitanika (21 muškog i 9 ženskog spola) u dobi od 16. do 42. godine. Kliničkim pregledom u 23 od 30 ispitanika (159 zubi) ustanovljene su frakture.

Rezultati su pokazali da: 1. 48% fraktura postoji kod primarnih amalgamskih restauracija, 2. frakture su lokalizirane bukalno (31%) i disto-aproksimalno (26%), 3. gotovo polovica ispuna I. i II. razreda ima frakture, 4. najčešće su kod gornjih molara (75%), osobito kod prvoga molara (80%), 5. u 61% ispitanika frakture su locirane disto-aproksimalno, 6. nema statistički znatne razlike između muškoga i ženskoga spola po čestoći fraktura, 7. čestoća fraktura raste s godinama starosti. Frakture su uvjetovane svojstvima amalgama, utjecaju opterećenja na amalgamsku restauraciju i drugim čimbenicima.

Ovo ispitivanje navodi nas na zaključak da svaki drugi pacijent s amalgamskim ispunom ima frakturu te je potrebna točna dijagnoza i zamjena ispuna kako bi se spriječila daljnja napuknuća tvrdoga zubnog tkiva.

## Vertical Fractures of the Tooth Crown With Amalgam Filling

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Amalgam has been used as a restorative material for 150 years. Mechanical loading can lead to dimensional changes resulting in marginal gaps and cracking of the hard dental tissue.

The aim of this investigation was to locate and find out how often cracks happen with amalgam restorations. In order to determine this 30 examines were examined (21 male and 9 female), aged from 16 to 42 years. Clinical examination resulted in 23 out of 30 examined patients (159 teeth) had cracks. Cracks were drawn on formerly prepared schemes. Results showed that: 1. 48% of cracks were in primary amalgam restorations; 2. cracks were localized buccally (31%) and distally-proximally (26%); 3. nearly half of all Black Class I and II restorations had cracks; 4. cracks were found in upper molars (75%) and especially in first ones (80%); 5. 61% of examines with cracks were distally-proximally; 6. There were no statistically significant differences between male and female examines; 7. Frequency of cracking raises with age. Cracking is bound with properties of amalgam, influence of loading on amalgam restorations and other factors. This investigation lead us to conclude that every second patient with an amalgam restoration had a crack and better diagnosis and repairing is needed to prevent further cracking.

## Klinička uporaba vlaknima ojačanih kompozita

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Uporaba vlaknima ojačanih kompozita dobila je na važnosti tek posljednjih nekoliko godina, premda se o njezinoj vrijednosti u stručnim stomatološkim radovima pisalo već u ranim šezdesetim godinama prošloga stoljeća. Vlaknima ojačani kompoziti mogu se razvrstati prema vrsti vlakana, njihovu smjeru, te prema obradi organskom smolom. Polietilenska, staklena, kevlar i ugljična vlakna mogu biti u obliku pojedinačnih ravnih vlakana ili u pletenom obliku. Čimbenici o kojima ovisi čvrstoća vlaknima ojačanih kompozita jesu smjer vlakana, množina vlakana, obloženost vlakana organskom smolom, svezivanje vlakana s organskom smolom, te sama svojstva vlakana i organske smole. U restaurativnoj stomatologiji upotrebljavaju se vlakna s jednostrukom, dvostrukom i višestrukom usmjerenošću. Vlakna imaju ulogu učvrstne osnove samo u onim slučajevima u kojima se sila opterećenja prenosi s kompozitne osnove na vlakna. U slučaju nastanka pukotina i stvaranja praznoga prostora između vlakana i kompozitne osnove, smanjuje se sposobnost primanja opte-

rećenja. Nedostatna obloženost vlakana organskom smolom uzrokuje probleme povećanoga zadržavanja vode. To slabi mehanička svojstva i/ili stvara nakupine kisika što inhibira radikalnu polimerizaciju organske smole, a time i nastanak ostatnoga monomera od čega može nastati upalna reakcija na sluznici usne šupljine. Novi vlaknima ojačani kompoziti mogli bi biti sredstvo izbora za izradbu udloga, bezmetalnih i nekeramičkih nadomjestaka s izvrsnom estetikom i dugotrajnošću nadomjestka.

## The Clinical Use of Fiber-Reinforced Composite

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Fiber reinforcement has been discussed in the dental literature since the early 1960s, although the more recent availability of commercial products is only now leading to recognition and general clinical use. Fiber-reinforced composite can be described by fiber type and fiber orientation, in addition to the presence or absence of preimpregnation with a resin. Polyethylene, glass, kevlar and carbon fibers have all been used in either unidirectional or woven fiber orientations. The factors affecting the strength of fiber-reinforced composite are orientation of fibers, quantity of fibers, impregnation of fibers with the matrix polymer, adhesion of fiber to the matrix polymer, properties of fibers vs. properties of matrix polymer. In dental reconstructions, unidirectional and bi- or multidirectional fiber orientation is used. Fiber reinforcement is only successful if the loading force can be transferred from the matrix to the fiber. In the case of voids between the matrix and the fiber, the load-bearing capacity of fiber-reinforced composite decreases. Poorly impregnated fibers cause another problem: increase in water absorption, which reduces the mechanical properties, and oxygen reserves, which inhibits radical polymerization of the polymer matrix and increases the residual monomer content which can lead to irritant reactions in the oral mucosa. A new fiber-reinforced composite provides the potential for fabrication of splints, metal-free, ceramic-free prosthesis with potential for long-term durability and excellent esthetics.