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ISPITIVANJE ADHERENTNOSTI STOMATOLOŠKIH AKRILATNIH POLIMERA IN VIVO

EXAMINATION OF ADHERENCE OF DENTAL ACRYLIC POLYMERS IN VIVO

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Sažetak

Uvod. *Neravna površina akrilatnih stomatoloških polimera predstavlja predilekciono mesto za akumulaciju plaka, pigmenata i ostataka oralnog tkiva.*
Cilj *rada bio je ispitivanje adherentnosti različitih stomatoloških akrilatnih polimera nakon njihove intramuskularne implantacije.*
Materijal i metode. *U istraživanju se pošlo od pretpostavke da vrsta i način polimerizacije akrilata utiču na adheziju okolnog tkiva za materijal. Struktura različitih akrilatnih uzoraka nakon* četvoronedeljne intramuskularne implantacije u odnosu na *kontrolu analizirana je primenom scanning elektronske mikroskopije.*
Rezultati*. Hladno polimerizovani akrilati su nakon intramuskularne implantacije pokazali znatnu adherentnost za okolno tkivo. Nasuprot njima, strukturni dizajn toplo polimerizovanih akrilata u odnosu na kontrolu nije bio promenjen, što govori u prilog njihove veće biokompatibilnosti.*
Zaključak. *S obzirom na intrastrukturalnu i ekstrastrukturalnu nehomogenost hladno polimerizovanih akrilatnih materijala, besprekorna higijena od njih izrađenih zubnih nadoknada je imperativ. Imajući u vidu bolje fizičke, mehaničke i biološke karakteristike toplopolimerizovanih akrilata, preporučuju se za trajno podlaganje zubnih proteza.*

Ključne reči: *akrilatni materijali, adherentnost*

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Summary

Introduction. *The acrylic polymers are mainly used in dentistry for making and relining dentures. Uneven surface of the acrylic material represents a predilection site for accumulation of plaque, pigment and the residue of oral tissue.*
The aim *of this study was to investigate the adherence of various acrylic polymers after intramuscular implantation.*
Material and Methods. *The study was based on the premise that the type and method of polymerization of acrylate affect the adhesion of the surrounding tissue in the structure of the resin. The structure of acrylic samples was analyzed after a four-week intramuscular implantation in relation to control by scanning electron microscope.*
Results. *Cold-polymerized acrylic resins after intramuscular implantation showed significant adherence to the surrounding tissue. In contrast, the structural design of heat-polymerized acrylic resins compared to control was not changed, which confirms their greater biocompatibility.*
Conclusion. *Due to the inhomogeneity of the external and internal structures of cold-polymerized acrylic resins, impeccable hygiene of padded dentures is imperative. Bearing in mind the better physical, mechanical and biological characteristics, permanent relining dentures by heat polymer resins is proposed.*

Key words:*: acrylic materials, adherence*

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Uvod

Akrilatni polimeri se u stomatologiji uglavnom koriste za izradu (toplo polimerizovani) i podlaganje mobilnih zubnih proteza (hladno polimerizovani). S obzirom na njihovu višedecenijsku ulogu morfološkog i funkcionalnog supstituenta u usnoj duplji, akrilati se mogu smatrati relativno biokompatibilnim. Ipak, postoje brojni dokazi njihovog štetnog delovanja na organizam, kako na lokalnom tako i na sistemskom nivou [1-4]. S tim u vezi, brojna istraživanja imaju za cilj unapređenje strukture ove vrste materijala kao i pravilan odabir tipa i načina polimerizacije akrilata za postavljenu indikaciju.

Da bi se materijal smatrao biokompatibilnim, neophodno je da, između ostalog, poseduje takav strukturni dizajn koji bi što manje reagovao sa tkivom i agensima iz okoline [5]. Neravna površina akrilatnih polimera predstavlja predilekciono mesto za akumulaciju plaka, pigmenata i ostataka oralnog tkiva [6-8].

Akrilatni polimeri pokazuju određeni stepen površinske hrapavosti i poroznosti nakon vezivanja, što je, pre svega, uslovljeno načinom njegove polimerizacije. Dosadašnjim istraživanjima dokazane su veća poroznost i slabija mehanička svojstva hladno- u odnosu na toplopolimerizovane akrilate, što je posledica njihove brže polimerizacije pod slabo kontrolisanim uslovima. Površinska poroznost stomatoloških akrilatnih materijala uzrok je njihove veće adherentnosti za sadržaj iz usne duplje i spoljašnje sredine (hrane, napitaka i duvanskog dima) i nesumnjivo je češća kod hladno polimerizovanih akrilata [9]. Šupljine u materijalu, često nevidljive golim okom, kolektori su infektivnog sadržaja i pigmenata koji menjaju boju zubne nadoknade [6].

Problem protetskog stomatitisa (stomatitis protetica, denture stomatitis) javlja se kod 60 do 65% nosilaca akrilatnih zubnih proteza [10,11]. Njegova etiologija se u velikom broju slučajeva vezuje za akumulaciju gljiva roda Candida na površini akrilata i tada je praćen suvoćom, pečenjem i žarenjem u ustima [12]. Ubrzo nakon uvođenja akrilatnih polimera u stomatološku praksu, Lyon i Chick su kliničkom studijom dokazali da

Introduction

Acrylic polymers in dentistry are mainly used for the production (heat-polymerized) and relining mobile dentures (cold polymerized). Given the role of several decades of their morphological and functional substituents in the oral cavity, acrylic resins can be regarded as relatively biocompatible. However, there is ample evidence of their harmful effects on the organism, both at the local and systemic levels [1-4]. With this regard, numerous studies aim to improve the structure of this kind of material as well as the proper selection of the type and method of polymerization of acrylate for a given indication.

In order to consider material as biocompatible, it is necessary, among other things, to have such a structural design that reacts less with tissue and agents from around [5]. A rugged surfaces of acrylic polymer is a predilection site for the accumulation of plaque, pigment and debris of oral tissues [6-8].

Acrylic polymers after binding exhibit a certain degree of surface roughness and porosity, which is primarily conditioned by the manner of its polymerization. Previous research demonstrated the higher porosity and lower mechanical properties of cold- compared to the heat-polymerized acrylates, as a result of their rapid polymerization under poorly controlled conditions. The surface porosity of dental resin material is a cause of their greater adherence to the content from the oral cavity and the external environment (food, beverages and tobacco smoke) and undoubtedly is more common in cold-polymerized acrylate[9]. Cavities in the material, often invisible to the naked eye, are collectors of infectious content and pigments that change the color of denture [6].

The problem of denture stomatitis (stomatitis protetica, denture stomatitis) occurs in 60% to 65% of carriers of resin dentures [10.11]. In many cases, its etiology is linked to the accumulation of Candida species on the surface of the resin, and then is followed by dryness, burning and numbness in the mouth [12]. Shortly after the introduction of acrylic polymers in dental practice, Lyonand Chick have proven by clinical studies that there
is more Candida on the acrylic denture than

kandide ima više na akrilatnoj protezi nego na oralnoj sluzokoži pacijenta obolelog od protetskog stomatitisa [13.]

Cilj rada

Cilj rada bio je ispitivanje adherentnosti različitih stomatoloških akrilatnih polimera nakon intramuskularne implantacije. U istraživanju se krenulo od pretpostavke da tip i način polimerizacije akrilata utiču na adheziju okolnog tkiva u strukturu akrilata.

Materijali i metode

Ispitivani materijal

Sastav i tip ispitivanih akrilatnih polimera prikazan je u tabeli 1. Od svakog ispitivanog materijala napravljeno je po četiri eksperimentalna i četiri kontrolna uzorka (*n=48*) u obliku kvadra zaobljenih ivica, dimenzija 1×2×3 mm. Nakon polimerizacije, čvrsti uzorci akrilata su ispolirani standardnom procedurom (filcom i bimštajnom), kako bi se maksimalno izbegla mehanička iritacija tokom njihove implantacije u tkivo eksperimentalne životinje. Meki akrilati se u kliničkoj praksi ne poliraju, rezilijentni su i mehanički ne oštećuju okolna tkiva .

Svi ispitivani uzorci su dezinfikovani 70% etanolom i isprani sterilnim fiziološkim rastvorom (0,9% NaCl). Uzorci su do implantacije čuvani u sterilnim petrijevim šoljama na sobnoj temperaturi.

Neposredno pre implantacije, uzorci su prebačeni u petrijevu šolju sa sterilnim fiziološkim rastvorom (ne duže od 60 min).

Kontrolni uzorci su analizirani neposredno nakon polimerizacionog postupka.

Eksperimentalne životinje

U eksperimentu su korišćeni laboratorijski pacovi Wistar soja, muškog pola, starosti 10 do 12 nedelja i prosečne težine 180-200 g. Za svaki od ispitivanih materijala korišćene su po četiri životinje (*N=24*).

Životinje su bile zdrave, aklimatizovane na laboratorijsku sredinu i standardnu laboratorijsku ishranu.

in the oral mucosa of a patient suffering from denture stomatitis[13.]

The aim

The aim of this study was to examine the adherence of various dental resin polymers after intramuscular implantation. The study started with the assumption that the type and method of polymerization of acrylate affect the adhesion of the surrounding tissue in the structure of the resin.

Materials and methods

The examined material

The composition and the type of the tested resin polymers are shown in Table 1. From every tested material four experimental and four control samples (n=48) were made in a rectangular shape with rounded edges, with dimensions 1×2×3mm. After polymerization, solid acrylic samples were polished with standard procedure (fleece and pumice), in order to maximally avoid the mechanical irritation during their implantation into tissues of experimental animals. Soft acrylics in clinical practice are not polished; they are resilient and do not mechanically damage the surrounding tissues .

All of the examined samples were disinfected with 70% ethanol and rinsed with sterile physiological saline (0.9% NaCl). The samples were stored until implantation in sterile Petri plate at room temperature. Just before implantation, the samples were transferred to Petri cup with sterile saline solution (no longer than 60 minutes).

Control samples were analyzed immediately after the polymerization process.

Experimental animals

In the experiment, we used laboratory rats (Wistar strain) of male sex, aged 10 to 12 weeks, mean weight of 180-200g. For each of the tested materials, four animals were used (N=24).

The animals were healthy, acclimatized to the laboratory environment and a standard laboratory diet.

Tabela 1. Ispitivani materijali / Tested materials

Ispitivani materijal/ ested material	Proizvođač / Manufacturer	Vrsta akrilata / Acrylic type	Sastav / Content	
			Prah / Powder	Tečnost / Liquid
Bosforth Trusoft	HG Bosworth Company SAD / USA	meki hladno polimerizovani akrilat /soft cold-polymerized acrylate	polietil metakrilat / polyethyl methacrylate	methacrylate
Lang Flexacryl	Lang Dental MFG.Co. SAD / USA	meki hladno polimerizovani akrilat / soft cold-polymerized acrylate	polietil metakrilat / polyethyl methacrylate	n-buthyl methacrylate
Lang Immediate	Lang Dental MFG.Co. SAD / USA	meki hladno polimerizovani akrilat /soft cold-polymerized acrylate	polietil metakrilat / polyethyl methacrylate	methyl methacrylate
Lucitone 199	Dentsply International Inc. SAD / USA	toplo polimerizovani akrilat / heat-polymerized acrylate	polimetil metakrilat / polymethyl methacrylate	methyl methacrylate
Triplex Hot	Ivoclar Vivadent, Lihtenštajn / Lichtenstein	toplo polimerizovani akrilat / heat-polymerized acrylate	polimetil metakrilat / polymethyl methacrylate	methyl methacrylate ethylene glycol dimethacrylate

Tokom eksperimenta praćene su eventualne promene u njihovom ponašanju, pojave bolesti ili gubitka telesne težine, kako se, ne bi odrazile na verodostojnost dobijenih rezultata.

Eksperimentalni dizajn

Testovi implantacije predviđeni su za ispitivanje biološkog odgovora okolnog tkiva na ispitivane materijale nakon njihove aplikacije (ISO 10994-6: 2007) [14].

Eksterimentalna istraživanja na životinjama obavljena su u skladu sa Helsinškom deklaracijom (Odobrenje Etičkog komiteta Medicinskog fakulteta u Nišu, broj 01-2066-1). Implantacija materijala obavljena je u opštoj anesteziji.

Premedikacija životinja sastojala se iz aplikacije Atropin Sulfata (Verofarm, Rusija) i Bensendina (Galenika, Srbija) u dozi od 0,2 mg/100 g telesne težine. Opšta anestezija, u trajanju od 30 do 60 minuta, obezbeđena je davanjem 0,3 ml 10% Ketamidora (Richer Pharma AG, Austrija) intraperitonealno.

During the experiment, any changes in their behavior, appearance of illness or loss of body weight were monitored, as they should not affect the credibility of the results.

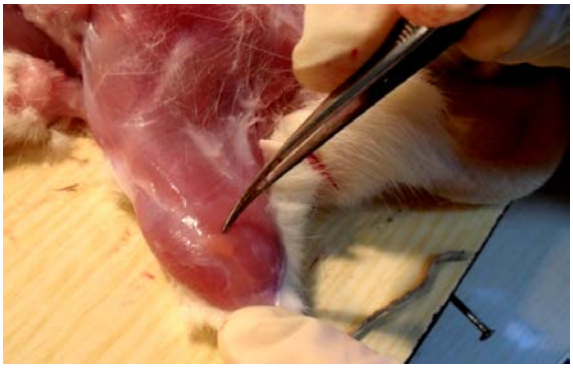
Experimental design

Implantation tests are intended for testing the biological response of the surrounding tissue to the tested materials after their applications (ISO 10994-6: 2007) [14].

Experimental animal studies were performed in accordance with the Declaration of Helsinki (Approval of the Ethics Committee of the Faculty of Medicine in Nis, No. 01-2066-1). Implantation of the material was performed under general anesthesia. Premedication of animals consisted of applications Atropine Sulphate (Verofarm, Russia) and bensedin (Galenika, Serbia) at a dose of 0.2 mg/100g of the body weight. General anaesthesia, lasting from 30 to 60 minutes, was provided through giving 0.3 ml of 10% Ketamidora (Richter Pharma AG, Austria) intraperitoneally.

Anestezirane životinje postavljene su u ležeći položaj na trbuhu, na specijalnom postolju od drveta za tu namenu. Operativno polje pripremano je brijanjem u predelu butine leve noge i ispiranjem povidon jodidom.

Materijal je sterilnom širokom iglom dužine 4/18 implantiran u *m. gastrocnemius* leve noge eksperimentalne životinje (Slika 1). Rane su isprane povidon jodidom i ostavljene su da spontano zarastu. Nije sprovedena antibiotska zaštita eksperimentalnih životinja. Postoperativni oporavak praćen je svakodnevno, a infekcija je izostala.



Slika 1. Mesto implantacije uzorka materijala u *m. gastrocnemius*
Figure 1. Site of material sample implantation into *m. gastrocnemius*

Nakon opservacionog perioda od četiri nedelje, eksperimentalne životinje su žrtvovane ekssangvinacijom leve srčane komore i vađenjem kompletne krvi. Posle pažljivog uklanjanja okolnog tkiva, uzorci su do obrade čuvani u sterilnim petrijevim šoljama, na sobnoj temperaturi.

Implantirani i kontrolni uzorci su sušeni na kritičnoj tački CO_2 i presvučeni slojem zlata u jonskom raspršivaču metodom spaterovanja. Analizirani su na *scanning* elektronskom mikroskopu JSM-5300 (JOEL, Japan).

Scanning elektronskom mikroskopijom (SEM) sagledavane su promene u strukturi implantiranih akrilatnih materijala, ocena njihove poroznosti i adherentnosti za okolno tkivo, kao i prisustvo ćelija unutar testiranih uzoraka. Svojstva strukture uzoraka akrilatnih materijala eksperimentalnih grupa sagledavane su u odnosu na neimplantirane kontrolne uzorke svake od ispitivanih grupa.

Anesthetized animals were placed in a supine position, on a special pedestal of wood for that purpose. Operational field was prepared by shaving the area of the upper thigh of the left leg and washing out with Povidone iodine.

Using wide sterile needle length 4/18, material was implanted in the gastrocnemius of the left leg of experimental animal (Figure 1). Wounds were washed with povidone iodine and allowed to heal spontaneously. Antibiotic protection was not given to experimental animals. Postoperative recovery was monitored daily, and the infection was absent.

After the observation period of four weeks, the experimental animals were sacrificed by exsanguination of the left ventricle and extraction of whole blood. After carefully removing the surrounding tissue, the samples until processing were stored in a sterile Petri salt at room temperature.

Implanted and control samples were dried on critical points of CO2 and coated with a layer of gold using the ion spray sputtering method. Samples were analyzed on a scanning electron microscope JSM-5300 (JOEL, Japan).

Using scanning electron microscopy (SEM), the changes in the structure of implanted acrylic materials, evaluation of their porosity and adherence to surrounding tissue, as well as presence of cells within the tested samples were examined. The properties of the structure of samples of acrylic materials of the experimental groups were examined compared to the non-implanted control samples of each of the two groups.

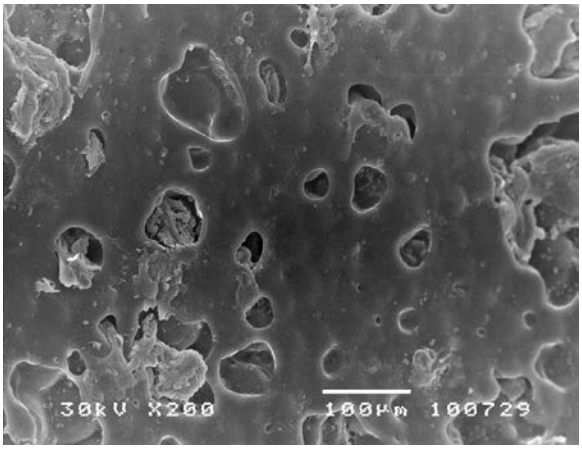
Rezultati

Primenom SEM metode analizirana je i struktura akrilatnih uzoraka nakon četvoronedeljne intramuskularne implantacije u odnosu na kontrolu.

Uzorci hladnopolimerizovanih akrilata pokazali su granularnu strukturu i mestimičnu poroznost. Na površinama ispitivanih uzoraka hladnopolimerizovanih akrilata nađeni su ostaci proliferisanog okolnog mekog tkiva (slika 2-5).

Uzorci toplopolimerizovanog *Lucitone 199* nisu promenili zrnastu strukturu u odnosu na kontrolne uzorke. Površina ovog materijala nije pokazala značajniju adherentnost za okolno tkivo (Slika 6).

Površina uzoraka *Triplex Hot* ostala je ravna i bez adhezije muskularnog tkiva. Implantirani uzorci materijala su tokom pripreme za SEM analizu ispucali, za razliku od kontrolnih, što nije uzimano u obzir prilikom analize dobijenih rezultata (Slika 7).



Slika 2. Pore na površini uzoraka *Bosworth Trusoft* bile su heterogenih oblika i veličina oko 50 µm. U nekim porama mogli su se uočiti ostaci tkiva

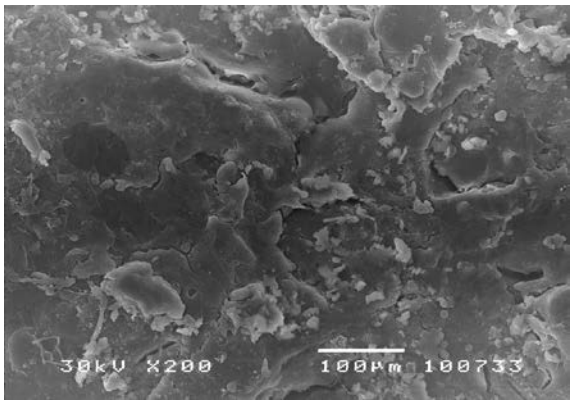
Figure 2. The pores on the surface of *Bosworth Trusoft* samples were of heterogeneous shape and size around 50µm. In some of the pores the tissue remains could be seen.

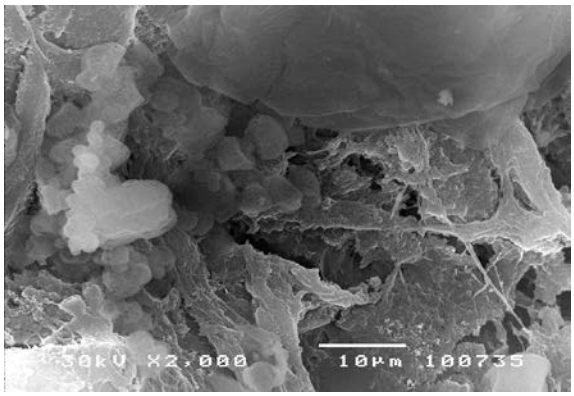
Results

By applying the SEM method, the structure of acrylic samples was analyzed after a four-week intramuscular implantation compared to the control.

Samples of cold-polymerized acrylate showed a granular structure and porosity sporadically. On the surface of tested samples of cold-polymerized acrylate, the remains of the proliferated surrounding soft tissue were found (Figure 2-5).

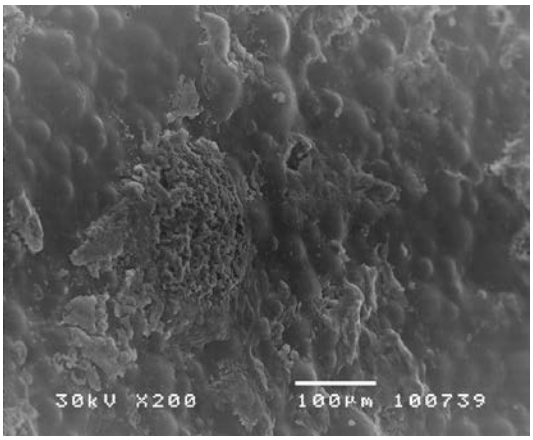
Samples of heat-polymerized Lucitone 199 did not change the grain structure compared to the control samples. The surface of this material showed no significant adherence to the surrounding tissue (Figure 6).





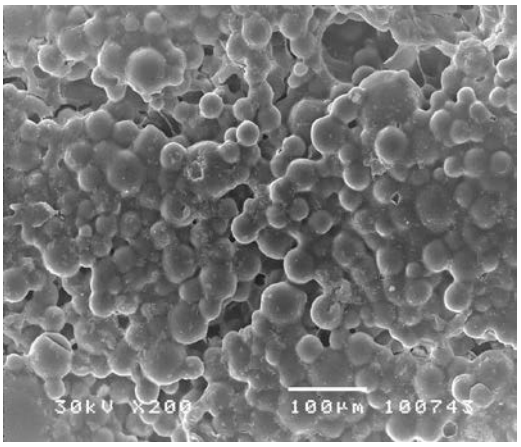
Slika 3. Površina uzoraka *Lang Flexacryl* bila je talasasta i ispucala, sa mestimičnim sitnim granulama i ostacima tkiva (a). Na većem uveličanju uočavale su se ćelije i vlakna vezivnog tkiva na materijalu (b)

Figure 3. Surface *Lang Flexacryl* samples was wavy and cracked, with periodic small granules and remains of the tissue (a). At higher magnification the cells and connective tissue fibers were noticed on the material (b).



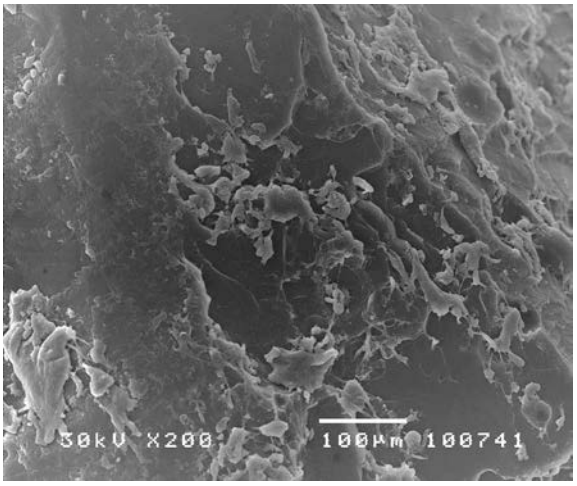
Slika 4. Zaravnjena površina *Lang Immediate* je mestimično nosila adherirane delove tkiva

Figure 4. Partially flattened surface of *Lang Immediate* was covered with adherent tissue sections



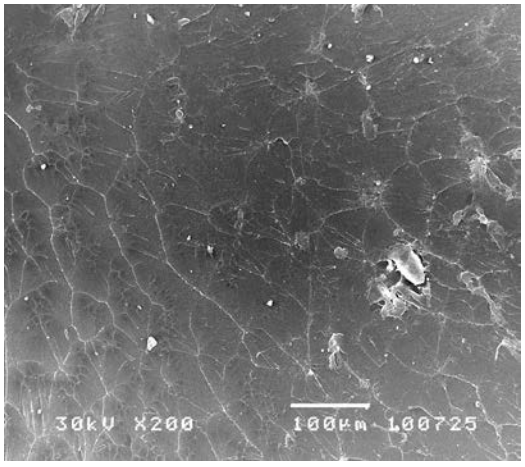
Slika 5. Površina uzoraka *Triplex Cold* pokazala se neravnom i sa znatnom adhezijom ćelija i tkivnog matriksa

Figure 5. Surface of *Triplex Cold* samples was uneven and with the considerable adhesion of the cells and tissue matrices



Slika 6. *Lucitone 199.* Struktura materijala bila je mestimično zaprljana ostacima tkivnog matriksa

Figure 6. *Lucitone* 199 The structure of the material was sporadically altered by the remains of the tissue matrix



Slika 7. Površina *Triplex Hot* bila je ispucala i na njoj nije bilo ostataka tkiva

Slika 7. Surface of *Triplex Hot* was cracked and there was no residual tissue

Surface of samples of Triplex Hot remained flat and without adhesion of the muscular tissue. Implanted samples of material were cracked during preparation for SEM analysis, unlike the control, which was not taken into account during the analysis of the results (Figure 7).

Diskusija

Nehomogena struktura implantiranih akrilatnih polimera učinila ih je adherentnim za okolne tkivne strukture. Na površinama implantiranih uzoraka uočavali su se ostaci proliferisanog okolnog mekog tkiva.

Elektromikrografije mekih akrilata (*Lang Flexacryl*, *Lang Immediate* i *Bosworth Trusoft*) pokazale su poroznost materijala sa implementiranim ćelijama i vezivnim vlaknima. Zaravnjena površina *Lang Immediate* mestimično je nosila adherirane delove tkiva. Ipak, Nevzatoglu i sar. su utvrdili manju adherentnost akrilatnih u odnosu na alternativne silikonske kondicionere, koji se u kliničkoj praksi, kao i meki akrilati, koriste za podlaganje zubnih proteza[15].

Neravna površina uzoraka hladnopolimerizovanog akrilata *Triplex Cold* pokazala je značajnu adheziju ćelija i tkivnog matriksa. Uzorci dobijeni hladnom polimerizacijom ispoljili su značajno niži stepen biokompatibilnosti u odnosu na toplopolimerizovane akrilate. Da bi se materijal smatrao biološki prihvatljivim, neophodna je njegova inertnost u odnosu na tkiva sa kojima je u kontaktu. Dobijene mikrografije, sa druge strane, pokazuju da tkivo urasta u porozni materijal i da se u njemu, nakon određenog perioda, raspada. Na taj način, materijal postaje kolektor infektivnog sadržaja i stalni izvor inflamatornih reakcija u ustima pacijenta. Struktura uzoraka toplopolimerizovanih akrilata (*Triplex Hot* i *Lucitone 199*) nije se promenila u odnosu na kontrolnu grupu. U slučaju toplopolimerizovanih akrilata potpuno je izostala adhezija okolnog tkiva za materijal. Veća biokopatibilnost toplo- u poređenju sa hladnopolimerizovanim akrilatima dokazana je i u brojnim *in vitro* studijama [16-18]. U samom ispitivanju uzet je u obzir pozitivan doprinos poliranja i glaziranja površine akrilatnog polimera pre predaje nadoknade[19,20]. Vitalariu je pokazala prednost konvencionalnog načina poliranja toplih- i tvrdih hladnopolimerizo-vanih akrilata (bimštajnom, filcom, četkom i jelenskom kožom) u odnosu na glaziranje

Discussion

Inhomogeneous structure of implanted acrylic polymers made them adherent to the surrounding tissue structures. On the surface of tested samples of cold-polymerized acrylate, the remains of the proliferated surrounding soft tissue were found.

Electromicrography of soft acrylic (Lang Flexacryl, Lang Immediate and Bosworth Trusoft) showed the porosity of the material with the implemented cells and connective fibers. The flat surface of Lang Immediate sporadically wore adherent tissue sections. However, Nevzatoglu et al. determined a lower adherence of acrylate in comparison to alternative silicone conditioners, which were used in the clinical practice, as well as soft acrylates, used for relining of dentures [15].

Uneven surface of samples of cold-polymerized acrylate Triplex Cold showed significant adhesion of cells and tissue matrix. Samples obtained by cold polymerization exhibited a significantly lower level of biocompatibility in comparison with hot-polymerized acrylate. In order to be considered a biologically acceptable material, it has to be inert relative to the tissues with which it is in contact. The obtained electron micrographs, on the other hand, show that the tissue ingrows into the porous material, where it, over time, disintegrates. In this way, material becomes a collector of infectious content and permanent source of inflammatory reactions in the mouth of patient.

The structure of samples of heat-polymerized acrylate (Triplex Hot and Lucitone 199) has not changed compared to the control group. In the case of heat-polymerized acrylate adhesion of the surrounding tissue to the material was completely missing. Greater biocompatibility of heat- compared to the cold-polymerized acrylates has been demonstrated in numerous in vitro studies [16-18]. In the test, the positive contribution of polishing and glazing of the surfaces of acrylic polymer is taken into account before handover of compensation to the patient [19,20]

njihove površine specijalnim akrilatima i silikonskim materijalima koji se nalaze na tržištu [21]. Meki akrilati se ne mogu polirati i glazirati, što smanjuje njihovu biološku vrednost.

Pljuvačka svojim protokom, puferskim kapacitetom i promenom sastava omogućava dinamičnu interakciju sa akrilatom zubne proteze, čime utiče na karakteristike materijala, uključujući i adherentnost [22,23]. Akrilatne nadoknade su u ustima pacijenta obložene salivarnom pelikulom, omotačem koji nastaje međusobnom interakcijom materijala i sastojaka pljuvačke. Ključnu ulogu u njenom formiranju igra precipitacija mucina i glikoproteina pljuvačke [24,25]. Izostanak dejstva pljuvačke u dizajnu eksperimenta omogućio je objektivnu analizu uticaja strukture ispitivanih akrilata na adheziju okolnog tkiva, istovremeno postavljajući pitanje adherentnosti ovih materijala u kliničkim uslovima, što će biti predmet budućih istraživanja.

Zaključak

Hladnopolimerizovani akrilati su nakon intramuskularne implantacije pokazali znatnu adherentnost za okolno tkivo. Nasuprot njima, strukturni dizajn toplopolimerizovanih akrilata u odnosu na kontrolu nije bio promenjen, što govori u prilog njihove veće biokompatibilnosti.

S obzirom na nehomogenost spoljašnje i unutrašnje strukture hladnopolimerizovanih akrilata, besprekorna higijena podloženih zubnih proteza je imperativ. Imajući u vidu njihove bolje fizičke, mehaničke i biološke karakteristike, predlaže se trajno podlaganje zubnih proteza toplopolimerizovanim akrilatima.

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Vitalariu showed the advantage of the conventional polishing method of hot and hard cold-polymerized acrylate (pumice, fleece, brush and chamois) in relation to their surface glazing by special acrylates and silicone materials that are on the market [21]. Soft acrylates cannot be polished and glazed, which reduces their biological value.

Saliva with its flow, buffer capacity, and changes in the composition allows dynamic interaction with the acrylate of dentures, which influences the characteristics of the material, including adherence [22.23]. Acrylic restorations remain in the patient's mouth coated with salivary pellicle, a layer formed by mutual interaction of materials and components of saliva. A key role in its formation is played by precipitation of mucin and glycoproteins of the saliva [24.25]. The lack of the effect of saliva in the design of the experiment allowed the objective analysis of the effects of structure of examined acrylic on adhesion of the surrounding tissues, questioning at the same time the adherence of these materials in clinical conditions, which will be the subject of future research.

Conclusion

Cold-polymerized acrylates after intramuscular implantation showed significant adherence to the surrounding tissue. In contrast, the structural design of heat-polymerized acrylate compared to the control was not changed, which speaks in favor of their greater biocompatibility.

Due to the inhomogeneity of the external and internal structure of cold-polymerized acrylates, impeccable hygiene of relined dentures is imperative. Bearing in mind their better physical, mechanical and biological characteristics, permanent relining of dental prosthesis with heat-polymerized acrylates is proposed.

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