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PRIKAZ SLUČAJA
CASE REPORT

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Dugotrajnost i mogućnost prilagođavanja kombinirane polimerno-silikonske nosne epiteze: prikaz slučaja

Combined Polymeric-Silicone Nasal Prosthesis Enhancing Longevity and Serviceability: A Case Report

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Sažetak
U ovom se radu opisuju neke tehnike u izradi adhezivno retinirajuće nazalne proteze kombinirane sa svjetlosno polimerizirajućom smolom (VIC-om) i silikonom. Klinička opažanja otkrivaju da pojedine prednosti svakog upotrijebljenog materijala poboljšavaju funkciju i trajnost proteze u usporedbi s konvencionalnom adhezivno retiniranom silikonskom protezom.

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Uvod

Nazalni defekti mogu biti rezultat traumatskih ozljeda, opeklina i resekcija tumora. Njihova rekonstrukcija ostaje jedan od najtežih zadataka u plastičnoj kirurgiji jer su kod nosa jednako važne i estetika i funkcija (1). Protetička rehabilitacija alternativa je u funkcionalnoj i estetskoj rekonstrukciji lica kada se kirurški ne može ništa učiniti zbog fiziološkog stanja pacijenta ili vrlo velikog gubitka tkiva. Među defektima lica oni nosni uzrokuju teško izobličenje i kozmetičko oštećenje zato što je nos najistaknutiji dio ljudskog lica (2).

Metode retencije važne su za zadovoljavajuću protetičku rehabilitaciju tih defekata i uključuju medicinske adhezive, anatomska podminirana mjesta i medicinske naprave poput stakla, pramenova kose, magneta i osteointegriranih implantata. Premda osteointegrirani implantati osiguravaju najpouzdaniju retenciju, dodatni operativni zahvati, visoki troškovi, neadekvatna kost i radioterapija mogu stvoriti kontraindikacije (3–5). U posljednjih nekoliko desetljeća primjenjivani su različiti biomaterijali i mnoge tehnike u izradi epiteza lica. Nedavna istraživanja otkrila su da većina kliničara preferira različite oblike šupljih silikona koji se stvrdnjavanju na sobnoj temperaturi (RTV) kako bi svojim pacijentima osigurali najbolju protetičku uslugu (6). No, iz ekonomskih

Introduction

Commonly encountered nasal defects may result from traumatic or burn injuries, and tumour resection. Reconstruction of nasal defects remains one of the most difficult tasks in plastic surgery because the nose combines aesthetics and function (1). Prosthetic rehabilitation is an alternative in functional and aesthetic facial reconstruction when surgery cannot be applied because of either the psychophysical conditions of the patient or excessive substance loss. Among the facial defects, nasal ones produce severe disfigurement and cosmetic impairment, since the nose is the most prominent feature of the human face (2).

Retentive methods constitute an important factor for the satisfactory prosthetic rehabilitation of these defects and include medical adhesives, anatomical undercuts, and mechanical devices such as glasses, hair bands, magnets and osseointegrated implants. Although osseointegrated implants may provide the most reliable retention, additional surgeries, high expenses, inadequate bone, and previous radiation to the area may contraindicate this treatment modality (3-5).

For several decades, a number of biomaterials and techniques have been used in the fabrication of facial prostheses. A recent survey revealed that the majority of clinicians are

se razloga i dalje koriste akrilatnom smolom, posebice u zemljama u razvoju (7–13). Svaki materijal ima prednosti i nedostatke. Silikoni su lakši te daju licu životniji izgled i teksturu, ali ih je teško ispolirati, slabo su otporni na trganje i potencijalni rast mikroorganizama, a i medicinski adhezivi s njima ne djeluju dobro. Akrilatne smole upotrebljavaju se za izradu proteza lica jer je s njima lako održavati higijenu, trajne su i jeftinije. Mogu se obojiti u nijansu kože koju zamjenjuju, ali im je korisnost ograničena zbog krutosti (14). Ponekad se proteze za lice mogu izraditi od kombinacije silikonskog elastomera i krutog polimernog materijala, kao primjerice akrilata, uretan-dimetakrilata (UDMA-e), celuloznog acetata oblikovanog u vakuumu ili kompozita pojačanog staklenim vlaknima (FRC-a) (15–19).

Kod nekih defekata nedostaju anatomska podminirana mjesta te proteze koje se retiniraju na implantatima nisu terapija izbora. Zato se, unatoč nedostacima, moramo služiti kožnim adhezivnim sredstvima. Poznato je da adhezivi mogu oštetiti nježne rubove silikonskih proteza, pa ih se često treba mijenjati ili izraditi nove (20). Kruti polimeri, poput akrilata ili smola koje se stvrdnjavaju vidljivim svjetlom (VLC-a), trajni su materijali kompatibilni s većinom adhezivnih sustava i jednostavno se čiste (14). U ovom članku opisuju se postupci pri rehabilitaciji pacijenta s pomoću adhezivno retinirane nosne proteze izrađene od kombinacije svjetlosno polimerizirajućeg smolastog materijala (VLC-a) i silikona, zapravo korištenje prednosti pojedinih materijala kako bi se poboljšala protetska funkcija.

Opis slučaja

U kliniku je primljena pacijentica u dobi od 70 godina radi zamjene nosne silikonske proteze. Deset godina prije bila joj je postavljena dijagnoza bazocelularnog karcinoma te je podvrgnuta rinektomiji. Nije bila ni na zračenju ni na kemoterapiji (slika 1.). Od tada je nosila mnogo silikonskih proteza. Njezina glavna pritužba bila je da se adhezivno retinirana silikonska proteza raspada, posebice na dodirnoj površini s tkivom te na tankim rubovima. Tako se skraćuje njezina trajnost te je često morala nabavljati nove, što joj je bio financijski problem (slika 2.).

U njezinu se slučaju razmatralo različite oblike retencije, poput implantata ili stakla, a pacijentica je izrazila želju za ekonomski isplativim rješenjem, ali bez nedostataka prijašnjih proteza. Smatralo se da će njezine zahtjeve zadovoljiti kombinirana proteza od polimera i silikona. Kako bi se replicirali oblik i veličina njezine dotadašnje proteze i olakšala izrada nove, primijenjena je jednostavna tehnika za izbjegavanje remodeliranja. Na vanjsku površinu proteze sprejem je bio nanesen sloj sredstva sličnog vosku (Medimould, Polymed Ltd, Cardiff, Vrlika Britanija) te je uzet alginatni otisak površine. Kad se proteza izvadila iz otiska, malim je kistom nanesen rastopljeni vosak za modeliranje hlađen dvije do tri minute na područje otiska koje odgovara obliku i veličini nosa. Vosak se nanosio dok nije postignuta debljina od dva do tri milimetra. Nakon toga je kopija proteze izvađena iz alginatnog otiska. Za izradu polimernog kostura (slika

using or have used a variety of room-temperature vulcanizing (RTV) silicones in their quest to provide the best possible prosthetic service (6), whereas acrylic resin is still in use for economic reasons, especially in developing countries (7-13). Each material has advantages and shortcomings. Silicones are lightweight with life-like appearance and texture, but are difficult to polish, have low tear resistance, the potential of microbial growth and medical adhesives do not work well with them. Acrylic resin has been used as facial material because it is easy to work with, hygienic, durable, and economical. Also, it can be satisfactorily coloured to match individual skin tone but its use is limited by its rigidity (14). Sometimes a facial prosthesis can be made by a combination of silicone elastomer and a rigid polymeric material e.g. acrylic, urethane dimethacrylate (UDMA), vacuum formed cellulose acetate or glass fiber-reinforced composite (FRC) (15-19).

Anatomic undercuts are sometimes lacking in various facial defects and implant retained prosthesis may not be the treatment of choice. Therefore, we have to resort to the use of skin adhesives despite their disadvantages. It is well known that adhesives tend to damage the feathered edges of silicone prostheses so that their replacement is required very often (20). Rigid polymers e.g. acrylic or visible light curing (VLC) resins are durable, compatible with most adhesive systems and easily cleaned (14). This paper describes the procedure for rehabilitating a patient with a combined visible light curing (VLC) resin- silicone adhesive-retained nasal prosthesis by exploiting distinct advantages of each material in order to improve the function of the prosthesis.

Case report

A 70-year-old female patient was referred to the clinic for replacement of her silicone nasal prosthesis. The patient had been diagnosed with a basal cell carcinoma ten years ago and had undergone a total rhinectomy. No follow-up radiation or chemotherapy was given (Figure 1).

Since then, the patient has worn a number of silicone prostheses. The patient's chief complaint was the deterioration of the silicone adhesive-retained prosthesis, especially the tissue surface and thin edges, shortening its life span and finally rendering to multiple remakes with economic implications for her (Figure 2). Various retention modalities were discussed e.g. implants or glasses and she expressed the desire for an economical solution without the shortcomings of the previous ones. Hence, combined polymeric-silicone prosthesis was planned to fulfill her requirements. In order to replicate the shape and size of the existing prosthesis thus facilitating the fabrication of a new one, a simple technique has been employed to avoid remodeling.

The external surface of the existing prosthesis was sprayed with a wax release agent (Medimould, Polymed Ltd, Cardiff, UK) and an alginate impression of the surface was taken. After the removal of the prosthesis from the impression, molten wax, which had been allowed to cool for 3-5 min, was applied with a small paintbrush to the area of the impression which recorded the existing nose shape and size. The wax was painted until a thickness of 2-3 mm was achieved. This wax

3.) može se uporabiti smola Triad VLC (Dentsply International, Inc.,York, PA, SAD) u obliku prozirnih plahtica (Triad VLC TransSheet) ili bezbojnog gela (Triad VLC Gel) kojima se obloži unutarnja površina voštane kopije. Plahtice od VLC-a moraju se pažljivo stavljati i nježno prislanjati na voštanu kopiju kako bi se izbjegle distorzije. Osnova od VLC-a polimerizira se u skladu s uputama proizvođača u uređaju Triad 2000 curing unit (Dentsply International, Inc.,York, PA, SAD).

Kako bi se oblikovao model nosnog defekta, postavljen je najprije rijetki otisni materijal „light body" vinil-polisiloksan (Genie VPS, Sultan Dental Products, Hackensack, NJ SAD), a zatim drugi sloj čvršćeg vinil-polisiloksana (Monopren Transfer, Kettenbach GmbH & Co.KG, Eschenburg, Nejmačka) s utisnutom drvenom špatulom radi pojačanja i potpore (slika 4.). Kako bi se dobio glavni model, otisak je utisnut u gips tip III (Yellow Stone, Whip Mix Corp, Louisville, KY, SAD). Rubovi proteze na glavnom modelu, koji prekrivaju periferne rubove na mjestu defekta, ocrtani su te je nanesen tanak sloj Triad Model Release Agensa (Dentsply International, Inc.,York, PA, SAD) (slika 5.). Voštana osnova kopije adaptirana je na ocrtane rubove s pomoću malih komadića polimerizirane VLC-smole, a višak materijala je izbrušen. Na kraju je dodan vanjski vosak za završetak rubova proteze i usavršavanje adaptacije na model (slika 6.). Provjereno je koliko dobro voštana osnova prianja uz pacijentovo lice uz pomoć male količine adhezivne kreme za retenciju. Nakon pacijentova pristanka slijedio je uobičajeni postupak kivetiranja, osim male modifikacije za olakšanje uklanjanja kombinirane proteze iz kivete. Strana proteze okrenuta tkivu napunjena je do rubova ljepljivim (putty) silikonskim materijalom (Silaplast Futur, Detax GmbH & Co. KG, Ettlingen, Njemačka) na mjestu gdje su na modelu bila postavljena dva sigurnosna retentivna navoja (slika 7.). Kada se vosak uklonio, površine modela klasično su očišćene i podmazane sredstvom za odvajanje. Nakon što je osnova uklonjena i očišćena acetonom, nanesen je primer (A-330-Gold, Factor II, Lakeside, AZ, SAD) na VLC-smolasti materijal radi poboljšanja retencije silikonskog elastomera, te je zatim pravilno postavljen u model (slika 8.). Silikonski elastomer (Multisil, Bredent GmbH & Co. KG, Senden, Njemačka) zamiješan je te je u mješavinu dodano sredstvo za bojenje i držano 30 minuta na 60°C, prema uputama proizvođača. Nakon procesiranja silikonskog elastomera proteza je oslobođena, višak materijala je uklonjen i nanesena je vanjska boja (prema potrebi). Pacijentu je demonstrirano kako se nanosi medicinski adheziv (G601 Original Adhesive, Principality Medical Ltd, Newport, Velika Britanija) i postavlja proteza, te je istaknuto da se adheziv stavlja samo na VLC-osnovu i na onu stranu proteze koja je u kontaktu s tkivom. Na kraju je proteza predana pacijentu uz upute o korištenju i održavanju (slika 9.). Pacijent se vratio nakon 48 sati kako bi se provjerilo ima li iritacija na okolnom tkivu. Kontrola je određena za tri mjeseca radi procjene i nadzora tkiva i nazalne proteze. Na toj kontroli proteza je dobro funkcionirala.

replica was then removed from the alginate impression.

Triad VLC resin (Dentsply International, Inc.,York, PA, USA) in the form of transparent sheet (Triad VLC TransSheet) or colorless gel (Triad VLC Gel) can be applied to fit the internal contours of a wax replica fabricating a polymeric framework/scaffolding (Figure 3). Attention was given, especially when the sheet VLC material was adapted to the wax replica in order to avoid its distortion. The VLC framework was polymerized according to the manufacturer's instructions in the Triad 2000 curing unit (Dentsply International, Inc.,York, PA, USA).

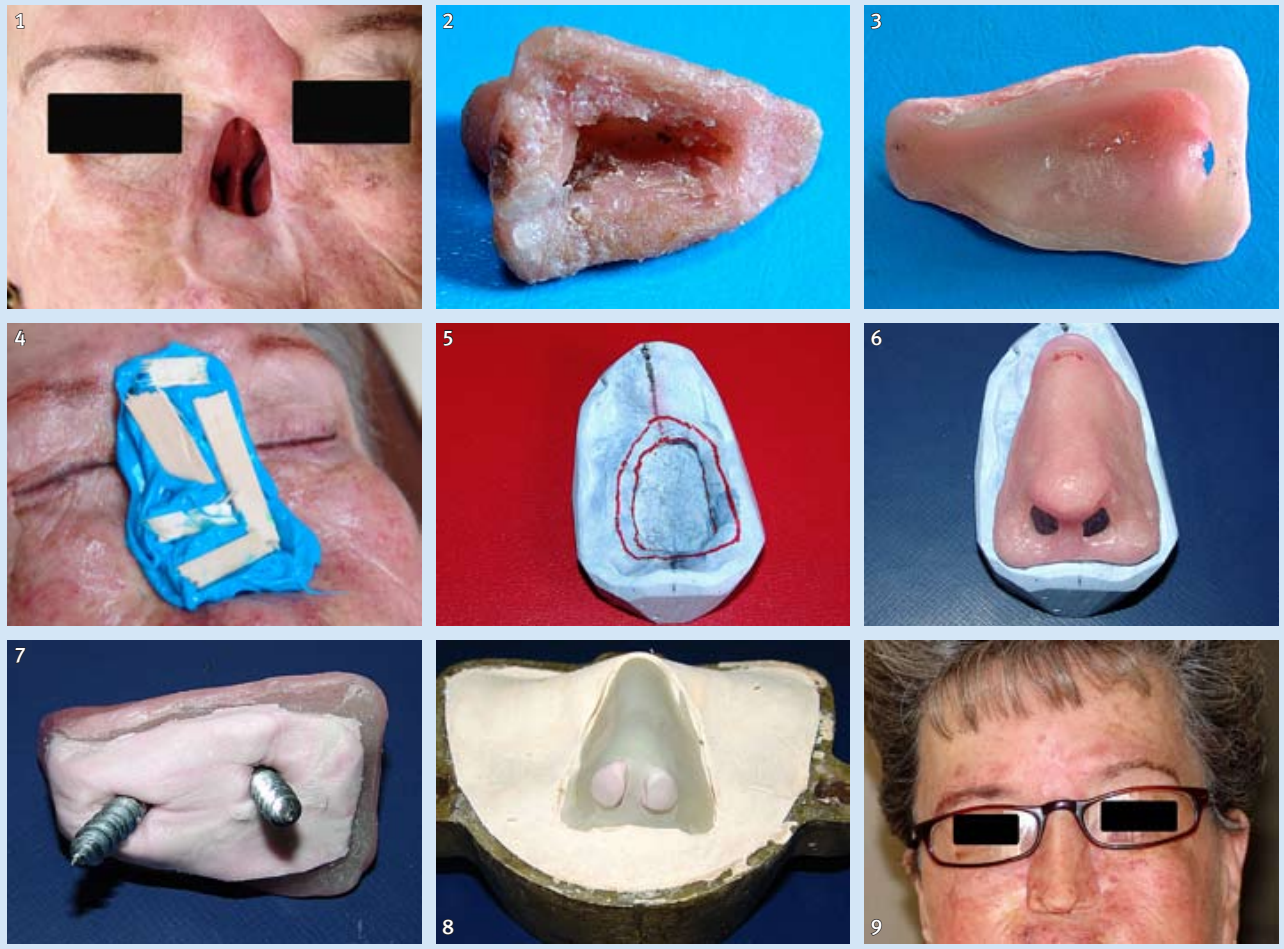
Then, in order to make a moulage of the nasal defect, a layer of light body vinyl polysiloxane (Genie VPS, Sultan Dental Products, Hackensack, NJ USA) was used followed by a second layer of a firmer vinyl polysiloxane (Monopren Transfer, Kettenbach GmbH & Co.KG, Eschenburg, Germany), impression material into which parts of wooden spatula were placed to provide support and reinforce it (Figure 4). In order to obtain a master cast, the impression material was poured into Type III stone (Yellow Stone, Whip Mix Corp, Louisville, KY, USA).

The edges of the prosthesis on the master cast, which cover the peripheral ridge of the defect site were outlined and a thin coat of the Triad Model Release Agent (Dentsply International, Inc.,York, PA, USA) (Figure 5) was applied. The wax/framework replica was adapted to the outlined edges with the help of small quantities of the VLC resin used; cured and any excess material was trimmed. External wax was then added to finalize the peripheral edges of the prosthesis and refine its adaption to the cast (Figure 6).

The wax/framework replica was checked for accuracy of fit on the patient's face with application of small quantity of denture adhesive cream for retentive purposes. After the patient's approval, a conventional flasking procedure was followed, except a minor modification to facilitate the removal of the combined prosthesis from the flask. The tissue side of the replica was filled to the edges with a putty silicone material (Silaplast Futur, Detax GmbH & Co. KG, Ettlingen, Germany) where two retentive screws were embedded to secure retention into the stone mould (Figure 7).

After dewaxing, the surfaces of the mould were cleaned and lubricated with separating medium in the conventional manner. The framework was removed and a primer applied (A-330-Gold, Factor II, Lakeside, AZ, USA) on the VLC resin after cleaning with acetone, for enhancing retention of the silicone elastomer and then it was repositioned properly in the mould (Figure 8). The silicone elastomer (Multisil, Bredent GmbH & Co. KG, Senden, Germany) was mixed, and intrinsic coloration was applied and processed for 30 min at 60°C according to the manufacturer's instructions. After processing of the silicone elastomer, the prosthesis was recovered and the excess material trimmed, whereas extrinsic coloration was applied where necessary. The application of medical adhesive (G601 Original Adhesive, Principality Medical Ltd, Newport,UK) and placement of the prosthesis was demonstrated to the patient, pointing out that adhesive application should be restricted only to the tissue side of the VLC framework. Finally, the prosthesis was given to the pa-

tient along with the instructions on home care and prosthesis maintenance (Figure 9). The patient returned after 48 h and was checked for any discomfort or irritation of the surrounding tissues. Finally, she was placed on a 3-month recall for evaluation and observation of tissues and nasal prosthesis. At the follow-up appointments, the prosthesis was noted to be functioning well.



Slika 1. Nazalni defekt nakon potpune rinektomije
Figure 1 Nasal defect after total rhinectomy
Slika 2. Oštećena površina silikonske nazalne proteze
Figure 2 Deteriorated tissue surface of silicone nasal prosthesis
Slika 3. VLC-baza prilagođena voštanoj replici nosa
Figure 3 VLC framework adapted to wax nasal replica
Slika 4. Model lica dobiven otisnim materijalom vinil-polisiloksanom
Figure 4 Facial moulage with vinyl polysiloxane impression materials
Slika 5. Obilježeni rubovi proteze na glavnom modelu
Figure 5 Margins of the prosthesis outlined on the master cast
Slika 6. Konačna adaptacija voštanog modela na glavni model
Figure 6 Final adaption of the wax-resin replica on the master cast
Slika 7. Silikonski ljepljivi ("putty") materijal i retentivni navoji prije postavljanja
Figure 7 Silicone putty and retentive screws before investment
Slika 8. VLC-baza u gipsanom modelu nakon uklanjanja voska
Figure 8 VLC framework in the stone mould after dewaxing
Slika 9. Završena nazalna proteza
Figure 9 Completed nasal prosthesis

Rasprava

Protetička rehabilitacija defekata lica s protezama poboljšava funkciju i samopouzdanje pacijenta (21). U nedavnom istraživanju u Velikoj Britaniji u kojem je sudjelovalo 220 maksilofacijalnih protetičara (MPT-a) dobiveni su zanimljivi rezultati u vezi sa silikonskim protezama lica (22). Trideset i dva posto stručnjaka tvrdi da je prosječna trajnost adhezivno retiniranih proteza od sedam do dvanaest mjeseci jer su se do tada nosne proteze adhezivno retinirale (45 %). Najčešći ra-

Discussion

Prosthetic rehabilitation to restore facial defects with prosthetic devices improves the function and self-esteem of the patients (21). A recent survey among 220 maxillofacial prosthodontists (MPT) in the UK revealed interesting findings related to silicone facial prostheses (22). Thirty-two percent of MPTs stated that the average longevity of adhesive-retained prosthesis was 7–12 months, nasal prostheses were retained by adhesives (45%) and the most common causes

zlozi za zamjenu silikonskih proteza bili su promjena boje (71 %), loše održavanje (41 %), trganje silikona (37 %), loše prianjanje proteze (27 %), oštećenja od adheziva (16 %), raslojavanje silikona (12 %) i nezadovoljstvo pomagalom (6 %). U jednoj drugoj studiji rađenoj u SAD-u istražila se mogućnost popravljanja maksilofacijalnih proteza (23). Pacijenti su izrazili želju da im one dulje traju, da boja bude stabilna i da bolje prianjaju, a htjeli su izbjeći i korištenje kožnih adheziva. Šezdeset i dva pacijenta (82 %) koristila su se adhezivom u poboljšanju retencije proteze. Adhezivno retinirane proteze kraće traju i ne mogu se često popravljati zbog redovitog korištenja adheziva i održavanja koje može uzrokovati trganje silikona na rubovima, a omogućuje i promjenu boje. Navedena opažanja slažu se s nalazima Hauga i suradnika (24, 25) koji su izvijestili o promjeni u optičkim (boji, gustoći) i fizičkim (zateznoj snazi i snazi trganja, tvrdoći) svojstvima silikonskih elastomera nakon primjene različitih kožnih adheziva i sredstva za čišćenje. Triad VLC-smolasti materijal (urethane dimethacrylate) pojavio se na tržištu 1983. godine i od tada se rabi u izradi različitih vrsta proteza te ortodontskih i drugih naprava. U maksilofacijalnoj protetici posebno se primjenjivao u izradi različitih intraoralnih proteza, npr. obturatora, i zamijenio je toplinski polimerizirajuće (HP) i autopolimerizirajuće (AP) akrilatne smole (26–28). Neke od prednosti Triad VLC- smole, u usporedbi s HP- i AP-akrilatima, jesu odsutnost slobodnih metilmetakrilatnih čestica, viša zatezna čvrstoća, modul elastičnosti, točnost prianjanja i manje ili jednako polimerizacijsko kontrahiranje te jednostavnost izrade i manipulacije (29, 30). RTV-silikonski elastomeri također pokazuju primjerenu snagu veze s Triad VLC-smolastim materijalom jer se primjenjuju silani i primeri te izbjegava raslojavanje u kliničkoj praksi, a produžuje se i trajnost proteza (31).

Prednosti opisane tehnike su sljedeće:

1) repliciraju se veličina i oblik postojeće proteze te je izrada nove jednostavnija;
2) nema slobodnih monomera;
3) skraćeno je laboratorijsko vrijeme i smanjeni su troškovi;
4) postupak je brži;
5) jednostavno se podlaže, popravlja ili prilagođava VLC-osnova;
6) može se izraditi više kopija ako se sačuva osnovna konstrukcija i ukloni kožni silikonski dio u istom odljevu;
7) veća je trajnost i mogućnost popravljanja zbog integriteta rubova jer je silikon zaštićen od kožnih adheziva i njihovih uklanjivača;
8) tehnika se alternativno može primijeniti u izradi nove proteze umjesto zamjenske i to eliminacijom dupliranja i izradom najprije VLC-osnove na glavnom modelu, a zatim nanošenjem voska na primjerene konture lica.

Zaključak

U ovom prikazu kliničkog slučaja opisana je tehnika izrade kombinirane VLC akrilatno-silikonske nazalne proteze koja se retinira ahdezivno. Klinička opažanja pokazuju da korištenje pojedinih prednosti svakog materijala pridonosi korisnosti i trajnosti proteze, za razliku od konvencionalne adhezivno retinirane silikonske proteze.

of replacing silicone prostheses were the following: colour change (71%); poor prosthesis maintenance (41%); silicone tearing (37%); poor prosthesis fitting (27%); adhesive deterioration (16%); silicone delamination (12%); patient dissatisfaction with the prosthesis (6%). In another survey in the USA, the serviceability of maxillofacial prostheses was investigated (23). Patients reported that they wanted their prostheses to last longer, be colour stable, fit better and they also wished to eliminate the use of skin adhesives. Sixty-two patients (82%) used an adhesive to assist in retaining their prostheses.

Reduced adhesive-retained prosthesis serviceability is due to the regular adhesion and maintenance which can cause silicone tearing at the margin and facilitate colour changes. The above findings are consistent with those of Haug et al (24, 25) who reported changes in optical (colour, density) and physical (tensile and tear strength, hardness) properties of silicone elastomers after application of various skin adhesives and cleaning agents.

The Triad VLC resin (urethane dimethacrylate) was introduced to the dental market in 1983 and has been used for the fabrication of different types of prosthetic, orthodontic and other devices. In maxillofacial prosthetics, the material has been used especially for fabricating a variety of intraoral prostheses, e.g. obturators replacing heat (HP) and autopolymerized (AP) acrylic resins (26-28). Some of the advantages ascribed to the Triad VLC resin, compared to HP and AP acrylic resins, are the absence of free methyl methacrylate, higher tensile strength, elastic modulus, accuracy of fit and less or equal volumetric shrinkage and ease of fabrication and manipulation (29, 30). Also, RTV silicone elastomers showed adequate bond strengths with Triad VLC resin by using silane primers and avoiding delamination in clinical practice and enhancing longevity of the prostheses (31).

The benefits of the described technique are as follows: 1) the size and shape of an existing prosthesis can be replicated and the fabrication of the new one is facilitated, 2) absence of free monomer, 3) decreased lab time and cost, 4) expedited care, 5) easy relining, repair or modification of the VLC framework, 6) multiple remakes can be made by keeping the framework and removing the skin silicone layer of the prosthesis in the same mould, 7) enhanced longevity and serviceability due to the marginal integrity, since silicone is protected from skin adhesive or remover contact, 8) alternatively, the technique can be applied also to fabricate a new prosthesis instead of a replacement one, by eliminating the step of replication and building first the VLC framework on the master cast, then carving the wax to the appropriate facial contour.

Conclusion

This clinical report describes a technique for fabricating a combined VLC resin- silicone adhesive-retained nasal prosthesis. Clinical observations revealed that exploiting distinct advantages of each material has improved the serviceability and longevity of the prosthesis compared to the conventional silicone adhesive-retained one.

Zahvale

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Abstract

This clinical report describes a technique for fabricating a combined visible light-curing (VIC) resin- silicone adhesive-retained nasal prosthesis. Clinical observations revealed that by exploiting distinct advantages of each material, the improved function and longevity of the prosthesis can be achieved compared to the conventional silicone adhesive-retained one.

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