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Application of Screw-Retained and Cement-Retained Implant Supported Fixed Restorations – A Case Report

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SUMMARY

Implantology has become an important therapeutic procedure that allows complete aesthetic and functional rehabilitation of the oro-facial system in edentulous patients. Implant supported prosthetic restorations can be fixed in two ways, by cement or screws. Both techniques have advantages and disadvantages and their selection depend on situation in patient's mouth. The aim of this study was to describe complete process of prosthetic rehabilitation in an edentulous patient, from pre-implant preparation, through implant placement and fixation of final restoration on implants. In this case report, one ceramo-metal bridge was fixed by screws in the lower jaw while the other one was fixed using glass-ionomer cement in the upper jaw. After bone augmentation and time necessary for its osseointegration (6 to 8 months), 16 implants were placed in both jaws. Eight weeks after the implant placement, final prosthetic rehabilitation was achieved by cementation of one ceramo-metal bridge in the upper jaw using glass ionomer cement and fixation of the second bridge with screws in the lower jaw. To achieve successful implant supported prosthetic rehabilitation, the treatment protocol must be followed from the beginning to the end of the therapy.

Keywords: screw-retained; cement-retained; implant supported fixed restorations

INTRODUCTION

For a long time implantology has not been a controversial topic in dentistry. The skepticism about this therapeutic procedure has been overcome after decades of achieving positive results. Possibility to regain lost teeth, both aesthetically and functionally, has overwhelmed the economic aspect of implants which was pointed out at the beginning as their greatest drawback.

Long term success of implants is generally based on the quality of their osseointegration and parameters such as implant stability, inflammation or infection in the implant area, or bone loss in the peri-implant region [1-5]. Most studies typically have used quantitative and descriptive methodologies taking into account neither functional requirements of embedded implants nor aesthetics and condition of the soft tissue around implants. Currently, implant therapy is growing priority in solving problems of an edentulous patient and facing increasingly stringent aesthetic criteria.

Health condition of the peri-implant soft tissue is of great importance for the success of implants [6-13]. It influences both the implant osseointegration as well as its primary stability during time. To reduce failure rate all factors that facilitate plaque accumulation and bacterial retention in the space between the implant and soft tissue must be significantly reduced. Subgingival pockets, as result of periodontal tissue damage, serve as plaque retention area leading to inflammation and additional loss

of soft tissue [14-18]. It is therefore logical that different restorative solutions can affect soft tissue condition in the area around an implant [19, 20]. Thus, one of the factors that have impact on peri-implant soft tissue is the type of fixation of prosthetic restorations. The two dominant types of fixation are using screws and cement. *In vivo* studies have indicated that marginal discrepancy was significantly lower for structures fixed on implants by screws as compared to those fixed by cement [30, 31, 32]. Also, due to the presence of space for screws, these structures have shown lower fracture toughness than cemented structures in *in vitro* studies [21].

In this case report both types of fixation on implants were used in one patient. One ceramo-metal bridge was fixed on implants by screws in the mandible, while the other bridge was cemented using glass-ionomer cement in the maxilla. The aim of this study was to describe the process of prosthetic rehabilitation by implant supported restorations from the pre-implant preparation through the implant placement until complete prosthetic restoration.

CASE REPORT

A 46-year-old male, nonsmoker, showed up at the dental office seeking for prosthetic rehabilitation. Clinical examination revealed the presence of severe periodontal disease particularly intense in the mandible. This finding was



Figure 1. Ortopantomogram before the beginning of treatment
Slika 1. Ortopantomografski snimak zuba pacijenta pre početka terapije

confirmed by ortopantomography. Bone reduction as well as the presence of deep infrabony pockets with extensive bone defects was visible in the mandible, as the result of chronic inflammation (Figure 1).

After careful planning of complete prosthetic rehabilitation and making a study model, the plan for implant placement was performed and immediate dentures made. Surgical phase was aimed to prepare alveolar ridges (upper and lower) for implant placement. In surgical conditions, under sedation and local anesthesia, all teeth in the upper and the lower jaw were extracted. A crestal cut of the alveolar ridge was performed and flap lifted. Extensive bone destruction was removed and granulomatous tissue meticulously curetted. The crest of the ridge was augmented using deproteinized bovine bone (Biooss, Gestiglich) and collagen membrane (BioGuide, Gestiglich). Periosteum was removed; flap reposed and single sutures using silk thread 3.0 placed. The same procedure was performed in both jaws. Complete dentures were adapted and placed in the mouth.

Respecting the recommended procedure, implants were placed eight months after the ridge augmentation. Sixteen implants were placed in the region of 17, 13, 12, 11, 22, 23, 25, 27, 37, 35, 34, 33, 42, 43, 44, 47 (BlueSky, Bredent) and readapted dentures returned to the patient (Figure 2).

After six weeks gingiva formers were installed and eight weeks after the stability of implants was measured (Osstel,

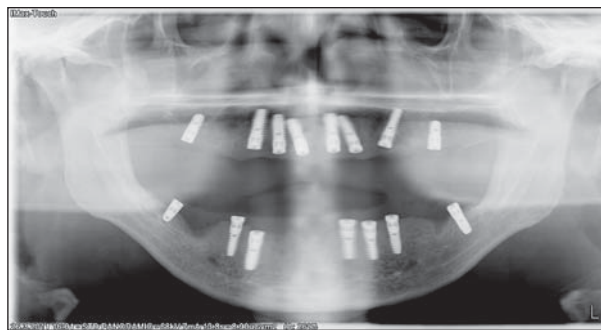


Figure 2. Ortopantomogram after implant placement in both jaws
Slika 2. Ortopantomografski snimak zuba pacijenta nakon ugrađivanja implantata u obe vilične kosti

Mentor). Transfer copings were placed on all implants (Figure 3) and impressions using additional silicon of both the maxilla and the mandible taken (Figure 4). Of all implants, 15 achieved primary stability while one (region 42) was unstable and therefore explanted. Definite prosthetic restoration was planned after consultation with the patient and a dental technician. In the maxilla, ceramo-metal bridge was planned for cement fixation while in mandible fixation by screw was chosen (UVE, Bredent) (Figure 5). Finally, ceramo-metal bridges both in the maxilla and the mandible were fixed on implant suprastructures (Figure 6).

DISCUSSION

Time for implant placement has been an interesting issue among implantologists. While some authors advocate immediate implant placement [22, 23, 24], others argue longer waiting time period after tooth extraction. However, technological progress and improved design of implants have made waiting period shorter. If the patient is in good health and without local signs of periodontal disease, inflammation or infection, immediate implant placement after tooth extraction is suggested (immediate implantation). It has been shown that by this method bone level and attached gingiva are well preserved. Aesthetic criteria are met as well.

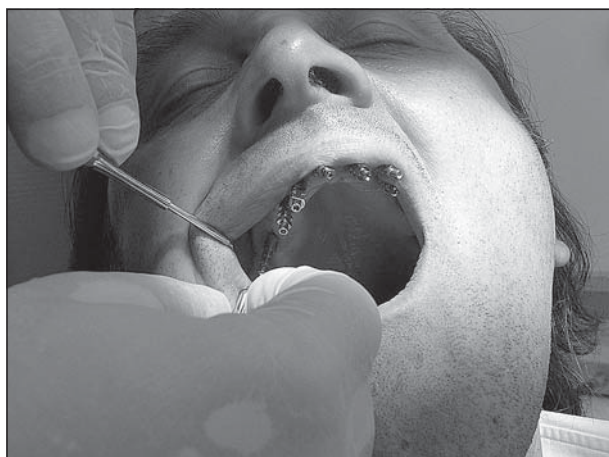


Figure 3. Transfer copings placed on implants
Slika 3. Postavljeni transferi na implantatima

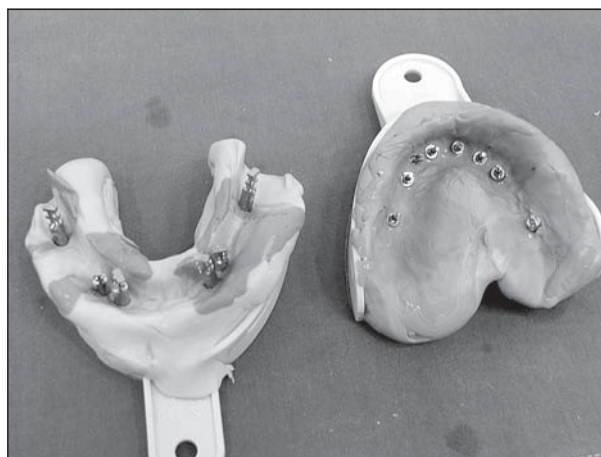


Figure 4. Impressions with removed transfer copings
Slika 4. Otisci sa transferima



Figure 5. Screw retention system on implants
Slika 5. Šraf-retencijski sistem na implantatima

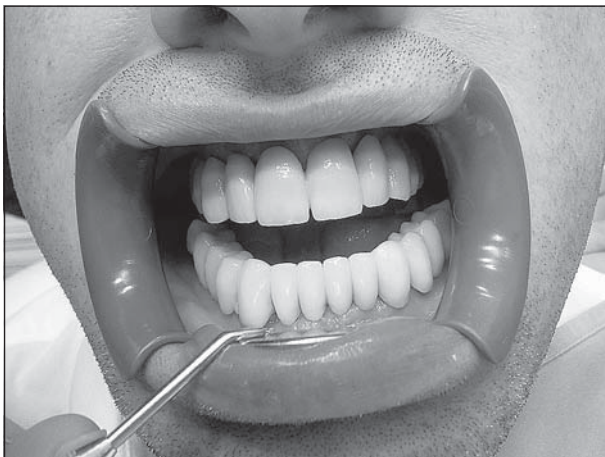


Figure 6. Ceramo-metal bridges fixed on suprastructures
Slika 6. Konačno postavljene metalkeramički mostovi na suprastrukturama

In the case of present periodontal disease and gingival inflammation it is necessary to wait for a period of two to three weeks to prepare alveolar ridge for implantation. Some exceptions are cases of significant bone defects or very thin bone plate close to other anatomical structures such as maxillary sinus, mandibular canal etc. The interval for implant placement is postponed for 6 to 8 months to allow osseointegration after bone augmentation [25].

Some authors have compared two types of prosthetic restoration fixation systems: by cementation or by screws in reference to the long term appearance of marginal gingiva. They used parameters such as gingival color, margin of restoration, signs of inflammation etc. In most studies, after 3 and more than 5 years and over, there was no statistically significant difference between these two systems. The advantages of cementation are stability, resistance to cracking and deformations, as well as the economic factor, where the possibility of cement remaining in marginal sulcus is serious drawback. Retention system by screws provides a precise contact with implant suprastructure and possibility for subsequent manipulations with the prosthetic restoration, while cited deficiencies were lower resistance to cracking, complex technical procedure and price [26-31].

The protocol that suggested bone augmentation using bone grafts and resorbable membranes in cases of vertical alveolar bone resorption greater than 2 mm and lack of buccal bone lamellae in some segments was followed. Six

to eight months period for osseointegration was provided. It was necessary to comply with the primary plan and to meet high functional and aesthetic criteria regardless of unequal bone quality and implant loss in the region 42.

Prosthetic rehabilitation of the lower jaw included the system that allowed removal of circular metal-ceramic bridge without damage. Metal-ceramic bridge was fixed for the suprastructure by horizontal retention screws that gave maximum stability, similar to cementation.

To achieve maximal therapeutic results, an implant protocol must be respected. It should not be influenced by patient's desire to get the restoration as soon as possible. The same applies to the choice of the fixation system because for the patients prone to inflammatory processes in the mouth, mobile bridges have no alternative. Although the system requires high precision during the manufacturing process, its mobility gives immeasurable benefits to the patient and therapist.

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Primena različitih sistema za fiksiranje protetičkih rešenja na implantatima – prikaz slučaja

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KRATAK SADRŽAJ

Ugradnja implantata je danas vrlo važna terapijska procedura u stomatološkom zbrinjavanju pacijenata bez zuba zbog mogućnosti potpune estetske i funkcionalne rehabilitacije orofacijalnog sistema. Protetičku restauraciju na ugrađenim implantatima moguće je fiksirati na dva načina: cementiranjem ili pomoću šrafova. Obe tehnike imaju prednosti i mane, a njihov izbor zavisi od stanja u ustima pacijenta. Cilj ovog rada bio da se prikaže celokupan postupak zbrinjavanja pacijenta bez zuba, počev od preimplantološke pripreme, preko ugradnje implantata, do fiksiranja završenog protetičkog rada na implantatima. Kod pacijenta je u donjoj vilici postavljen metalokeramički most na osnovi fiksiranog šrafom, dok je u gornjoj vilici most fiksiran glasjonomer-cementom. Nakon ugradnje veštačke kosti i vremena neophodnog za njenu oseointegraciju (od šest do osam meseci), postavljeno je 16 implantata u gornjoj i donjoj vilici. Osam nedelja od ugradnje implantata urađena je konačna protetička rehabilitacija pacijenta, koja je završena cementiranjem jednog metalokeramičkog mosta u gornjoj vilici glasjonomer-cementom, te fiksiranjem drugog mosta pomoću šrafova u donjoj vilici. Da bi se postigla uspešna protetička rehabilitacija pacijenta pomoću implantata, potrebno je pridržavati se protokola od početka do kraja terapije.

Cljučne reči: šraf-retencioni; cement-retencioni; fiksni radovi na implantatima

UVOD

Implantologija u stomatologiji već odavno ne predstavlja tabu. Skepticizam koji je vladao prema ovom terapijskom postupku protetičke sanacije zuba danas je prevaziđen višedecenijskim pozitivnim rezultatima. Mogućnost da pacijent povрати nešto što je mislio da je davno izgubljeno, kako estetski, tako i funkcionalno, potisnulo je u drugi plan ekonomski aspekt implantologije, koji se isticao kao njegov najveći nedostatak.

Uspeh i preživljavanje implantata u kosti uglavnom se zasniva na kvalitetu oseointegracije i parametrima kao što su stabilnost implantata, zapaljenje ili infekcija u zoni implantata i gubitak kosti u periimplantnoj regiji [1-5]. Većina studija obično koristi kvantitativnu i deskriptivnu metodologiju i ne uzima u obzir funkcionalne zahteve ugrađenih implantata, niti estetsku stranu i stanje mekih tkiva oko implantata. Danas implantna terapija ima sve veći primat u rešavanju bezubosti vilica, te se pred nju postavljaju i sve stroži estetski zahtevi.

Zdravlje periimplantnog mekog tkiva je, prema mišljenju mnogih istraživača, veoma značajno za uspeh implantne terapije [6-13]. Ono direktno utiče na oseointegraciju samog implantata, kao i na održavanje njegove primarne stabilnosti tokom vremena. Svi faktori koji utiču na akumulaciju plaka i zadržavanje bakterija u prostoru između implantata i mekog tkiva moraju se značajno redukovati, kako bi se smanjio procenat neuspeha. Postojanje subgingivalnog džepa, koji je i potvrda oštećenja, ujedno je i idealno mesto za nagomilavanje plaka i delovanje bakterija, što dovodi do zapaljenja i gubitka strukture mekih tkiva [14-18]. Stoga je i logično da različita restaurativna rešenja mogu uticati na stanje mekog tkiva oko implantata [19, 20]. Dakle, jedan od faktora koji utiče na stanje mekih tkiva oko implantata jeste i način fiksacije konačnih protetičkih rešenja. Danas su dominantna dva tipa fiksacije protetičkih konstrukcija: šrafljenje i cementiranje. Studije *in vivo* su pokazale da je marginalna diskrepancija statistički značajno manja kod implantatnih struktura fiksiranih šrafom, nego cementiranjem [30, 31,

32]. Takođe, zbog postojanja prostora za šraf, šrafljene strukture su u uslovima *in vitro* pokazale manju otpornost na pucaanje od cementiranih struktura [21].

U ovom prikazu slučaja su kod jednog pacijenta postavljena oba tipa fiksacije na implantatima. U donjoj vilici metalokeramički most je postavljen na osnovi fiksiranog šrafom, dok je u gornjoj vilici most cementiran glasjonomer cementom (GJC). Cilj ovog rada bio je da se prikaže celokupan postupak zbrinjavanja pacijenta, počev od preimplantološke pripreme, preko ugradnje implantata, do fiksiranja završenog protetičkog rada na implantatima.

PRIKAZ SLUČAJA

Muškarac star 46 godina, nepušač, došao je u ordinaciju sa željom da sanira svoje zube. Pregledom usta uočeno je da su zubi i vilice značajno ugroženi procesom paradentoze, koja je naročito bila intenzivna u donjoj vilici. Ovaj nalaz potvrdila je i analiza ortopantomografskog snimka. Na njemu su uočeni redukcija kosti i duboki koštani džepovi, kao i velika oštećenja kosti u donjoj vilici (posledica hroničnih upalnih procesa) (Slika 1).

Nakon pažljivog planiranja celokupne protetičke rehabilitacije, izrađen je studijski model, označena su mesta za postavku implantata i urađene neodložne totalne proteze. Potom se pristupilo tzv. hirurškoj fazi. Njen cilj bio je da pripremi alveolarne grebene gornje i donje vilice za ugradnju implantata. U hirurškim uslovima, pod sedacijom i lokalnom anestezijom, pristupilo se vađenju svih zuba u gornjoj i donjoj vilici. Potom je urađen rez sredinom alveolarnog grebena i odignut mukoperiostalni režanj. Obimna oštećenja kosti su pedantno iskiretirana, a granulomatozno tkivo je uklonjeno. Alveolarni greben je nakon toga augmentiran primenom deproteinizovane govede kosti (*Biooss, Gestiglich*) i kolagene membrane (*BioGuide, Gestiglich*). Režanj je visoko deperiostiran i reponiran, te je pojedinačnim šavovima pomoću svilenog konca (3,0) ušiven. Ceo

postupak urađen je prvo u gornjoj, a potom i u donjoj vilici. Totalne proteze su zatim adaptirane i postavljene u usta.

Poštujući preporučeni protokol, s implantacijom se sačekalo do isteka osmog meseca od postavke augmentata. U alveolarne grebene je postavljeno 16 implantata, u regiji 17, 13, 12, 11, 22, 23, 25, 27, 37, 35, 34, 33, 42, 43, 44, 47 (*BlueSky, BREDDENT*), i pacijentu su vraćene preadaptirane totalne proteze (Slika 2).

Po isteku šeste nedelje postavljeni su formeri gingive, a nakon osam nedelja je izmerena stabilnost implantata (*Osstel, Mentor*). Postavljeni su transferi na implantatima u gornjoj i donjoj vilici (Slika 3) i uzeti otisci obe vilice adicijom silikonom (Slika 4). Od svih postavljenih implantata 15 je očuvalo primarnu stabilnost, dok je jedan (u regiji 42) bio nestabilan, pa je eksplantiran. Konačno protetičko rešenje je isplanirano u dogovoru s pacijentom i zubnim tehničarom. Odlučeno je da se u gornjoj vilici krunice cementiraju, a u donjoj je urađen mobilno-fiksni sistem (*UVE, BREDDENT*) (Slika 5). Nakon neophodnih proba metalne strukture u obe vilice, na postavljenim suprastruktura su urađeni metalokeramički mostovi (Slika 6).

DISKUSIJA

Stalna tačka razmimoilaženja među implantolozima jeste vreme implantacije. Dok jedni autori propagiraju neodložnu implantaciju [22, 23, 24], drugi smatraju da treba sačekati izvesno vreme. Ipak, svi su saglasni da se tehnološkim napretkom i poboljšanjem površinskog dizajna implantata ovaj vremenski period može znatno smanjiti. Ukoliko je pacijent dobrog zdravstvenog stanja i lokalno bez znakova paradentoze, zapaljenja ili infekcije, predlaže se ugradnja implantata odmah po vađenju zuba (neodložna implantacija). Dokazano je da se ovim postupkom zadržava postojeći nivo kosti i pripojne gingive. Time su i estetski kriterijumi potpuno zadovoljeni.

U slučaju postojanja paradentoze i zapaljenja desni, potrebno je sačekati period od dve do tri nedelje, kako bi se alveolarni greben pripremio za implantaciju. Izuzetak su slučajevi gde postoje značajna oštećenja kosti alveolarnog grebena ili izrazito tanak segment kosti prema drugim anatomskim struktura-

ma, poput maksilarnog sinusa, alveolarnog kanala itd. Tada je interval za ugradnju implantata pomećen na 6-8 meseci, da bi se omogućila oseintegracija augmentata [25].

Baveći se izgledom marginalne gingive tokom dužeg vremenskog perioda, autori su poredili dva tipa fiksacije fiksnih protetičkih sistema: onih koji se cementiraju i onih koji se ušrafuju. Tom prilikom koristili su se parametri poput boje gingive, dubine marginalnih prostora, znakova zapaljenja oko implantata itd. U većini studija, kako onih posle tri godine, tako i onih posle više od pet godina, nisu uočene statistički značajne razlike. Prednosti cementiranja bili su faktor stabilnosti, otpornost na pucanje i deformaciju, kao i ekonomski faktor, dok je mogućnost zaostajanja cementa u marginalnom sulku su ozbiljan nedostatak. Kod šraf-retencionog sistema ističu se precizniji kontakt s implantnom suprastrukturuom i mogućnost naknadne manipulacije sa protezom, dok se kao nedostaci navode manja otpornost na pucanje, komplikovan tehnički postupak i cena [26-31].

Poštovan je protokol gde se postojanje veće vertikalne resorpcije alveolarnog grebena od 2 mm i nedostatak bukalnih lamela kosti u pojedinim segmentima mora nadoknaditi zamenikom kosti i upotrebom resorptivne membrane. Ispoštovan je i neophodan vremenski period (6-8 meseci) za njihovu oseintegraciju. Neophodno je bilo dosledno primeniti primarni plan i time zadovoljiti visoke funkcionalne i estetske kriterijume, bez obzira na neujednačen kvalitet kosti i gubitak implantata u regiji 42.

Pri protetičkoj sanaciji donje vilice postavljen je sistem koji omogućava da se metalokeramički cirkularni most može ukloniti bez oštećenja. Most je za suprastrukturu bio fiksiran horizontalnim retencionim šrafovim, koji mu daju maksimalnu stabilnost, poput cementiranog rada.

Za što bolji terapijski rezultat neophodno je pridržavati se protokola implantacije. Na to nikako ne sme uticati želja pacijenta da što pre dođe do protetičkog rešenja. To se isto odnosi i na izbor protetičkog sistema, jer kod pacijenata sklonih upalnim procesima u ustima uslovno mobilni mostovi nemaju alternativu. Iako sistem zahteva veliku preciznost prilikom izrade i postavke, njegova mobilnost daje pacijentu i terapeutu nemerljive prednosti.