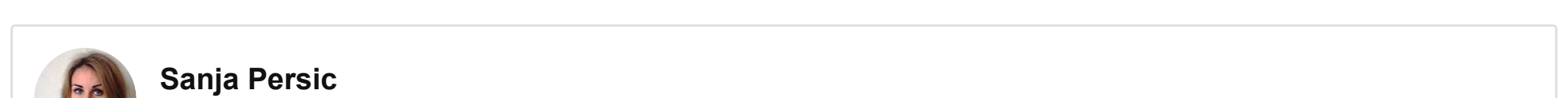
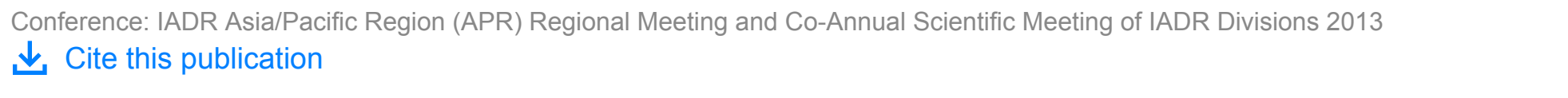


Fixed partial dentures supported on mini dental implants

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Abstract

Objective: Mini dental implants (MDIs) in dentistry are recommended for cases with adequate bone quality and height, but a lack of alveolar bone width. Some studies well documented successful usage of MDIs for a removable denture support, but studies of MDIs supporting fixed prosthodontic restorations are scarce. We aimed to study the effect of a fixed partial denture (FPD) therapy, supported by MDIs or by MDIs and natural teeth (NT), to the patients self perceived oral health related quality of life (OHRQoL), self perceived oral aesthetics¹ and self perceived chewing function. Method: A total of 23 patients (10 female and 13 men) were included and 61 MDIs were inserted, 10 in the maxilla and 51 in the mandible. In 14 patients FPDs were constructed only on MDIs and in 9 patients FPDs were made on both, MDIs and NT. FPDs on MDIs were replacing mostly mandibular incisors, the second maxillary incisors and the first maxillary premolars. Those FPDs supported by both, MDIs and NT had some MDIs inserted in frontal regions to allow a FPD construction. The three questionnaires: the OHIP-CRO14 for assessment of OHRQoL, the OES-CRO for assessment of oral aesthetics and the Chewing function questionnaire (CFQ) for assessment of chewing function have been administered twice: prior to the MDIs insertion and three months after the FPD treatment supported by MDIs had been finished. Result: The CFQ and the OHP summary scores significantly decreased revealing better OHRQoL and better chewing ability after treatment, and the OES scores significantly increased indicating increased self perceived oral aesthetics (p<0.01). Clinical examination revealed no periimplant inflammation and patients' data supplement the initially promising clinical findings. Conclusion: The FPDs supported by MDIs showed satisfactory results considering marginal bone loss, increased OHRQoL, chewing function and oral aesthetics over a period of one year.

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Coll. Antropol. 38 (2014) 1: 275-278 Original scientific paper

Initial Effects of a Treatment by Fixed Partial Dentures Supported by Mini Dental Implants from a Patient's Point of View

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ABSTRACT

Mini dental implants (MDIs) in dentistry are recommended for cases with adequate bone quality and height, but a lack of alveolar bone width. Some studies well documented successful usage of MDIs for a removable denture support, but studies of MDIs supporting fixed prosthodontic restorations are scarce. We aimed to study the effect of fixed partial dentures (FPD) therapy supported by MDIs or by MDIs and natural teeth, on patients self perceived oral health related quality of life (OHRQoL), self perceived oral aesthetics and self perceived chewing function. A total of 23 patients (10 female and 13 men, age range from 54 to 78 years) were included and 61 MDIs were inserted, 10 in the maxilla and 51 in the mandible. In 14 patients FPDs were constructed only on MDIs and in 9 patients FPDs were made on both, MDIs and natural teeth. FPDs on MDIs were replacing mostly mandibular incisors, the second maxillary incisors and the first maxillary premolars. Those FPDs supported by both, MDIs and natural teeth had some MDIs inserted in frontal regions to allow a FPD construction. The three questionnaires: the OHP-CRO14 for the assessment of OHRQoL, the OES-CRO for assessment of oral aesthetics and the Chewing function questionnaire (CFQ) for assessment of chewing function have been administered twice: prior to the MDIs insertion and three months after the FPD treatment supported by MDIs had been finished. The CFQ and the OHP summary scores significantly decreased revealing better OHRQoL and better chewing ability after treatment, and the OES scores significantly increased indicating increased self perceived oral aesthetics (p<0.01). Clinical examination revealed no periimplant inflammation and patients' data supplement the initially promising clinical findings. However, further follow ups will be necessary to finally confirm the long term clinical benefit of MDIs.

Key words: mini dental implants, fixed partial dentures, chewing, aesthetics, OHRQoL

Introduction

The selection of the implant's width has been widely speculated and the manufacturers have recently, in cases of limited bone anatomy, initiated a series of one piece mini implants of narrower diameter (1.8 to 2.9 mm). Mini dental implants (MDIs) are recommended for those cases with adequate bone quality and height, but a lack of alveolar bone width^{1,2}. The MDIs for a long term use have the same surface treatment as wider implants and are manufactured from the alloy with 4 parts of titanium to increase implants' strength. Histologically, the bone appears to be well integrated to the surface of the

MDIs and bone appears to be mature and healthy³. The MDIs with treated surface and with diameter ranging from 1.8 to 2.9 mm undergo osseointegration comparable to that of conventional larger-diameter implants⁴. However, MDIs do not pretend to substitute conventional implants, the MDIs are suitable for patients with narrow alveolar ridges for retention of complete or partial removable dentures, as well as for a single- or multi-tooth replacement in anterior regions where considerations for a larger diameter implant⁵. MDIs can be inserted only in places where occlusal forces have not been too high, such

as mandibular incisors⁶ replacements, the lateral maxillary incisor replacement or the first maxillary premolar replacement⁷⁻⁹.

The advantage of MDIs also lies in minimally invasive surgical methods (flaps, initial drilling only) required for insertion. Another advantage of MDIs is immediate loading possibility in cases of a good primary stability¹⁰. Moreover, MDIs allow reduced cost of a treatment, which is very important for the most patients with limited budget who cannot afford expensive conventional implants or cannot afford bone augmentation procedure due to high age and/or general health problems. Survival rates reported for MDIs have been satisfactory¹¹. The most MDIs studies reported a survival rate and a success of complete removable dentures retained by MDI^{12,13}. However, MDIs supporting fixed prosthodontic restorations have not been studied extensively.

The aim of this study was to evaluate patients treated with fixed partial dentures (FPDs) supported by MDIs or by both MDIs and natural teeth regarding the aesthetics, chewing function and a quality of life.

Materials and Methods

Subjects

A total of 23 partially edentulous patients received a fixed prosthodontic treatment (FPD) by means of mini dental implants (MDIs) or by MDIs and natural teeth during a period from April 2009 to March 2012 (10 female and 13 men, mean age 66, age range 54 to 78 years). All subjects gave the written informed consent. The study was approved by the Ethical Committee of the School of Dental Medicine, University of Zagreb, Croatia.

Mini dental implants

Most patients had inadequate bucco-lingual bone volume for normal width implants. Therefore, MDIs were inserted in the frontal region of the maxilla and the maxilla. In 14 patients FPDs were supported only by MDIs and in 9 patients FPDs were constructed both on MDIs and prepared natural teeth. In those cases MDIs enabled treatment with FPDs, otherwise removable denture would be made. The patients were thoroughly explained about implants of lesser width, the attendant risk and the possibility of augmentation procedure and the insertion of conventional width implants. Panoramic radiographs were obtained prior to the therapy to assess the bone quality and quantity, to locate important anatomical landmarks, and mark placement sites. Two types of MDIs were inserted: Straumann Classic Standard (IM-TEC) (6 patients) and Renew Biocare RE-Mark mini-implants (Swiss) (17 patients). The MDIs were inserted using a minimally invasive technique which was without reflecting the mucoperiosteal flap and with only initial drilling of cortical and cancellous bone up to a few millimeters. MDIs were loaded with early loading protocol (2-4 weeks after the insertion). The diameters of the MDIs were ranging from 1.9 to 2.5 mm and the lengths

were ranging from 10 to 15 mm, depending on the available height of the bone.

A total of 61 MDIs were inserted, 10 in the maxilla and 51 in the mandible. Fixed partial dentures (FPDs) on MDIs were replacing mostly mandibular incisors, and also the second maxillary incisors and the first maxillary premolars. Those FPDs supported by both, MDIs and natural teeth had some MDIs inserted in frontal regions to allow a FPD construction.

Questionnaires

All participants filled in three questionnaires: the Croatian version of the OHP14 questionnaire¹⁴ (Oral Health Impact Profile), the Croatian version of the OES questionnaire¹⁴ (Orofacial Esthetic Scale) and the Chewing Function Questionnaire¹⁴ (CFQ), which represents an instrument developed by the authors for patient's self-assessment of a chewing function. The participants filled in the questionnaires first before the treatment had begun and then three months after the treatment had been finished. At the three months follow-up the patients were also clinically examined for periimplant mucosal tissue status.

Statistical analysis

The data analysis was made using the SPSS statistical package version 17.0, SPSS Inc., Chicago, IL, USA) Independent samples t-test was used to test the difference between gender. Paired samples t-test was used to test the differences between summary scores of the questionnaires before the treatment and three months after the treatment. P value of less than 0.05 was considered statistically significant.

Results

Clinical examination of the mucosal tissue surrounding MDIs showed no appreciable inflammation after three months. Independent samples t-test showed no significant differences between males and females for age and any of the observed variables obtained from the questionnaires (p>0.05).

Mean summary scores, standard deviations, mean differences between the two observation stages and a significance of the difference of the OES, the CFQ and the OHP14 questionnaires before treatment and three months after treatment are presented in Table 1. A statistically significant difference between OES, the CFQ and the OHP14 summary scores were obtained for all three questionnaires three months after treatment (p<0.01, Table 1). The CFQ and the OHP summary scores significantly decreased and the OES scores significantly increased (p<0.01).

Discussion

The availability of MDIs from 1.8 mm to 2.9 mm in diameter, and the US Food and Drug Administration ap-

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TABLE 1
SUMMARY SCORES OF THE OROFACIAL ESTHETIC SCALE (OES), ORAL HEALTH IMPACT PROFILE CONSISTING OF 14 QUESTIONS (OHP14) AND CHEWING FUNCTION QUESTIONNAIRE (CFQ) BEFORE AND THREE MONTHS AFTER TREATMENT AND A SIGNIFICANCE OF THE DIFFERENCE, DF=22

Questionnaire	Before treatment (X±SD)	Three months after treatment (X±SD)	Mean difference (X±SD)	t	p
OES	15.78±4.87	34.52±2.83	-18.74±4.49	-20.04	<0.01*
OHP14	30.74±3.12	4.17±1.62	26.57±3.70	34.41	<0.01*
CFQ	27.78±5.51	4.09±1.54	23.70±4.99	22.75	<0.01*

proved for removable denture support and retention, as well as for fixed prosthodontic restorations have opened new options in oral-implant rehabilitation. Clinical studies with FPDs supported by MDIs are lacking in the literature and are mostly based on case reports¹⁵. Therefore we studied a group of patients rehabilitated with FPDs supported only by MDIs or by both, MDIs and prepared natural teeth. Most of the implants were placed in the mandible. Our first patients received IM-TEC MDIs and other patients received Renew Biocare MDIs.

Improvement of oral health related quality of life (OHRQoL) has become the main goal of contemporary dentistry¹⁶. Eliminating problems with chewing, speech, as well as improving orofacial aesthetics contribute to the improvement of the oral health. Overall success of prosthodontic therapy can be assessed by patients relying on the described parameters¹⁷. Therefore the OHP14 was used to assess OHRQoL, the OES to assess orofacial aesthetics^{14,17} and the CFQ to assess self perceived chewing function¹⁴. Psychometric properties of all three questionnaires have been tested in the preliminary studies and were proven to be satisfactory¹³⁻¹⁵. The OHP14 questionnaire measures impact of several domains on the OHRQoL, such as functional, psychological and sociological factors. The OES and the CFQ represent multidimensional questionnaires measuring only aesthetic aspects^{14,17} or chewing function¹⁸. Summary scores of the three questionnaires enabled to monitor changes of patients' orofacial aesthetics, chewing ability and a quality of life caused by fixed prosthodontic restorations on MDIs or on MDIs splinted with natural teeth.

None of the inserted MDIs was lost during the observed period of three months. Clinical examination of the mucosal tissue surrounding MDIs showed no inflammation after three months. The three months post-treatment OHP14 and CFQ demonstrated a high and significant decrease of summary scores compared to pre-treatment period, which was due to a significant increase of patients' quality of life and chewing function after the treatment. Furthermore, the OES summary scores (higher scores describing better aesthetics) significantly increased as a result of the FPD therapy. Fixed dentures maintaining the individual's higher perception and increase of orofacial aesthetics, which was indeed expected, as of patients included in the present study suffered from anterior tooth loss prior the therapy. Considering that cost and necessity for a large augmentation are sometimes factors that discourage patients from implants, mini dental implants offer a more economical and definitely less invasive treatment option. The MDIs are more affordable compared to traditional implants.

The results of the present study obtained from the patients with MDIs supporting FPDs regarding improved aesthetics, masticatory function and OHRQoL supplement initial positive clinical results considering usage of MDIs for a FPD support.

The results obtained from the present study obtained from the MDIs reveal the high effect size of the therapy considering better self-perceived aesthetics, increased chewing function and overall quality of life at the three months clinical follow up. Initial patient self perceived results are promising, as well as clinical findings. However, further prospective follow ups will be necessary to finally confirm the long term benefit of MDIs supported by MDIs.

Conclusions

Effect of the Fixed partial denture therapy supported by mini dental implants showed satisfactory results considering increased OHRQoL, increased chewing function and a better self perceived oral aesthetics at the 3-month observation stage.

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EFEKAT TERAPIJE FIKSNIH PROTETSKIM RADOM NA MINI DENTALNIM IMPLANTIMA PREMA PROCJENI PACIJENATA

S A Ž E T A K

Mini dentalni implantati (MDI) preporučuju se u stomatologiji za slučajeva s odgovarajućom kvalitetom kosti i visinom prebrva, ali sa nedostatkom širine. Neke radove o dobro su dokumentirani uspješno korištenje MDI za rješavanje mobilne proteze, ali nema mnogo istraživanja o MDI kao nosačima za fiksne protetske radove. Cilj ovog istraživanja je istražiti učinak terapije fiksnom djelomičnom protezom (FPD) na mini dentalnim implantatima ili na MDI u kombinaciji s brusjenim prirodnim zubima, na kvalitetu života ovisno o orofarnom zdravlju (OHRQoL), orala estetik i žvačnu funkciju prema procjeni samih pacijenata. Sudjelovalo je ukupno 23 pacijenata (10 žena i 13 muškaraca, u dobi od 54 do 78 godina) koji su dobili 61 MDI. Daset MDI inserirano je u gornji i 51 u donji željčnja. U 14 pacijenata nosivoj krunice napravljeni su samo na mini implantatima, a u devet pacijenata mostovi su napravljeni u kombinaciji na implantatima i prirodnim zubima. Fiksni radovi na MDI zamjenili su uglavnom donje sjekutiće, ili drugi gornji sjekutić i prvi gornji pretoknjak. Kod mostova u kombinaciji mini implantata i prirodnih zuba, MDI su inserirani u frontalnim regionima otkazali kako bi se omogućila izrada fiksnog rada umjesto mobilne proteze. Pacijenti su pravnjavali tri upitnika: OHP-CRO14 za procjenu OHRQoL, OES-CRO za procjenu oralne estetike i CFQ za samoprocjenu žvačne funkcije. Procjene su rađene dva puta: prvi put prije MDI insercije i drugi put tri mjeseca nakon završene terapije. Zbog bodova CFQ i OHP upitnika ukazuje na značajno poboljšano OHRQoL i na značajno poboljšano izraženo funkcion nakon tretmana, a zbog bodova OES upitnika pokazuje značajno poboljšanje oralne estetike (p<0.01). Klinički pregled nije pokazao postojanje upale mukozne oko MDI nakon 3 mjeseca. Podaci dobiveni od strane samih pacijenata dopunjuju početne obećavajuće rezultate kliničkih nalaza. Međutim, potrebno je dugoročno klinički kontrolirati pacijente kako bi se konačno potvrdila dugotrajna korist fiksnе terapije na mini implantatima.

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March 2014 · Collegium anthropologicum

Sanja Persic · Denis Vojvodic · Asja Celebic · Antonija Palac

Mini dental implants (MDIs) in dentistry are recommended for cases with adequate bone quality and height, but a lack of alveolar bone width. Some studies well documented successful usage of MDIs for a removable denture support, but studies of MDIs supporting fixed prosthodontic restorations are scarce. We aimed to study the effect of fixed partial dentures (FPDs) therapy supported by MDIs or by ... [Show full abstract]

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Sanja Persic · Asja Celebic

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August 2015 · BMC Oral Health

Asja Celebic · Nikola Petricevic · Venera Bimbashi · [...] · Gloria Staka

The aim was to adapt the Orofacial Esthetic Scale (OES) and to test psychometric properties of the Albanian language version in the cultural environment of the Republic of Kosovo. The OES questionnaire was translated from the original English version according to the accepted techniques. The reliability (internal consistency), and validity (construct, convergent and discriminative) were tested in ... [Show full abstract]

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Conference Paper

Psychometric properties of a newly developed chewing function questionnaire (CFQ)

September 2012

Sanja Persic · Asja Celebic · Antonija Palac · [...] · Removable Prosthodontics

Objectives: To test the psychometric properties of the newly developed chewing function questionnaire (CFQ). Methods: The 10-item CFQ was administered to 200 patients divided into two groups: 100 removable denture wearers (RDWs) and 100 individuals with natural teeth (NT group). Discriminative validity was tested between RDWs and NT group. Convergent and internal consistency were ... [Show full abstract]

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