

Original Article

Clinical outcome of one-piece implant used in premolar sites

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ABSTRACT

Background: The routine and frequent use of dental implants to replace missing teeth is accompanied by high expectations from patients. These expectations are not limited to function and esthetics but extends to patient comfort and time spent in receiving treatment. Replacement of an unrestorable maxillary premolar can be challenging when considering the concerns of patients. A one-piece implant (OPI) incorporates the trans-mucosal abutment facing the soft tissues as an integral part of the implant. Since no report specifically focused on OPIs inserted in premolar areas, a retrospective study was carried out.

Materials and Methods: Nineteen patients (10 females and 9 males) with a median age of 62 years (43-80) were enrolled and a total of 176 OPIs (Diamond, BIOIMPLANT, Milan, Italy) were inserted.

Results: In our series survival rate (SVR) and success rates (SCR) were 90.6% and 97.9%, respectively. Statistical analysis demonstrated that no studied variable had an impact on survival (i.e., lost implants) as well as on clinical success (i.e., crestal bone resorption).

Conclusion: OPIs are reliable devices for oral rehabilitation in the premolar areas.

Key Words: Bone, fixture, implant, immediate loading, one-piece, welding

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INTRODUCTION

Primary stability was always considered fundamental to acquire osseointegration. To facilitate the immediate loading protocol, the implant stability at the time of placement is essential^[1] and implant surface modifications have significant role in measuring the success of osseointegration.^[2]

The original Branemark concept of osseointegration^[3] advocated a two-stage surgical procedure. The implant was inserted into the bone after raising a soft tissue flap, which was subsequently repositioned to cover the implant during healing. Following a healing

period, a second surgical intervention took place. A new flap was raised and a trans-mucosal abutment was screwed onto the implant to allow the prosthesis to be connected.^[4]

Today it has, however, been demonstrated that the two-stage procedure with a submerged healing period may not be necessary. Implants can be placed with an immediate prosthetic loading protocol with high success rates (SCRs) without compromising osseointegration.^[5] Moreover, immediate implant placement in extraction sites may preserve alveolar bone height and width and allow for optimal soft tissue esthetics^[4] reducing the possibility of bacteria adhesion and so of peri-implantitis.^[6-8]

A one-piece implant (OPI), which incorporates the trans-mucosal abutment facing the soft tissues as an integral part of the implant, eliminates the structural weakness built into a two-piece implant system. The interface between the trans-mucosal component and the implant is generally located in the neighborhood of the alveolar bone level. However, in a OPI

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the implant immediately pierces the soft tissue's barrier (non-submerged fashion) according to a one-stage surgery, when a two-piece implant system is submerged under the soft tissues for a waiting period (two-stage surgery).^[9]

Previously, we reported the effectiveness on a new type of OPI (Diamond, BIOIMPLANT, Milan, Italy) used for oral rehabilitation.^[10-16] Moreover, we demonstrated that spiral family implants can be used successfully in low density bone.^[17] Since OPIs became more and more popular and no reports specifically focused on clinical outcome of OPIs inserted in premolar areas, a retrospective study was carried out.

MATERIALS AND METHODS

Study design and sample

To address the research purpose, the investigators designed a retrospective cohort study. The study population composed of patients admitted at the Dental Clinic, University of Chieti, Italy, for evaluation and implant treatment between January and December 2010, as reported.^[10-16]

Subjects were screened according to the following inclusion criteria: Controlled oral hygiene and absence of any lesions in the oral cavity; in addition, the patients had to agree to participate in a post-operative check-up program.

The exclusion criteria are as follows: Bruxists, smoking more than 20 cigarettes/day, consumption of alcohol higher than two glasses of wine per day, localized radiation therapy of the oral cavity, antitumor chemotherapy, liver, blood and kidney diseases, immunosuppressed patients, patients taking corticosteroids, pregnant women, inflammatory and autoimmune diseases of the oral cavity.

Variables

Several variables that were investigated are as follows: Demographic (age and gender), anatomic (tooth site, distance between implants), implant (length and diameter), and prosthetic (welding procedure) variables.

Primary and secondary predictors of clinical outcome were used. The primary predictor was the presence/absence of the implant at the end of the observation period. It is defined as survival rate (SVR), i.e., the total number of implants still in place at the end of the follow-up period.

The second predictor of outcome was the peri-implant bone resorption. It is defined as implant SCR and was evaluated according to the absence of persisting peri-implant bone resorption greater than 1.5 mm during the 1st year of loading and 0.2 mm/year during the following years.^[18]

Data collection methods

Data were collected as reported.^[10-16]

Surgical protocol

All patients underwent the same surgical protocol.

Data analysis

Pearson Chi-squared test was used to detect if implant position had an impact both on failures (i.e., lost fixtures) and/or on success (i.e., crestal bone resorption around implants lower than 1.5 mm).

RESULTS

Nineteen patients (10 females and 9 males) with a median age of 62 years (43-80) were enrolled. The mean follow-up was 7 months. A total of 176 OPIs (Diamond, BIOIMPLANT) were inserted. Among them 53 fixtures were inserted in premolar areas. Implants 2, 30, and 21 had a narrower, equal, and wider diameter of 4 mm, respectively. Thirteen, 15 and 25 fixtures are shorter, equal, and longer of 13 mm, respectively. Twenty-seven fixtures were placed in mandible and 26 in maxilla; 25 in females and 28 in males; 43 were welded. The mean observation period, patient's age, inter-implant distance, and peri-implant bone resorption per implant was 7 ± 6 months (1-26 months), 63 ± 10 years (43-80 years), 3.8 ± 1.5 mm (1.4-9.2 mm), and -0.2 ± 0.6 (-1.7 to 1.1 mm), respectively. Pearson Chi-squared test was used to detect if implant site had an impact both on failures (SVR, i.e., lost fixtures) and/or on success (SCR, i.e., crestal bone resorption around implants lower than 1.5 mm).

Five implants were lost in the post-operative period (within 3 months) and one had a peri-implant bone resorption greater than 1.5 mm. Thus SVR and SCR were 90.6% and 97.9%, respectively. Statistical analysis demonstrated that no studied variable had an impact on survival (i.e., lost implants) as well as on clinical success (i.e., crestal bone resorption).

DISCUSSION

There are few specific reports which focus on incisors rehabilitation. In 2008, Swart and van

Niekerk^[19] reported a case of implant treatment for an unrestorable premolar with a OPI. In 2011, Kolhatkar, *et al.*^[20] described a new technique for maxillary premolar extraction and implant insertion into the alveolus with simultaneous abfraction of the sinus floor using two-piece implants. They presented five cases in which a maxillary premolar was extracted and an implant placed into the extraction site with simultaneous abfraction of the sinus floor using osteotomes. All teeth were extracted traumatically, and sockets carefully debrided and checked for integrity of the walls. After ideal osteotomy preparation, particulate bone graft was placed in the osteotomy and appropriately sized osteotomes were used for sinus floor elevation. After sufficient elevation, implant placement was completed and particulate bone was packed in the bone-implant gap when indicated. All implants were restored after a minimum healing period of 6 months. At the time of final restoration, the implants were surrounded by the bone from the apical portion to the most coronal thread. All five implants healed without complications and were in function for periods ranging from 6 to 12 months. Authors concluded that immediate implant placement with simultaneous osteotome sinus floor elevation was an advantageous combination of two successfully used techniques. This combined approach can significantly reduce the treatment time for implant therapy in teeth with close sinus proximity and provide the operator with the ability to place implants of desired length.

In our series, OPI were used. The routine and frequent use of dental implants to replace missing teeth is accompanied by high expectations from patients. These expectations are not limited to function and esthetics but extends to patient comfort and time spent in receiving the treatment. Replacement of an unrestorable maxillary premolar can be challenging when considering the concerns of patients. An OPI incorporates the trans-mucosal abutment facing the soft tissues as an integral part of the implant. Here, we demonstrated that SVR and SCR were 90.6% and 97.9%, respectively. Statistical analysis showed that no studied variable had an impact on survival (i.e., lost implants) as well as on clinical success (i.e., crestal bone resorption).

CONCLUSION

In conclusion, OPIs are reliable devices for oral rehabilitation in the premolar areas.

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