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Crestal Bone Evaluation and Implant Success Rate In Type 2 Diabetic Patients after Immediate Loading of Dental Implants

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Abstract

Statement of problem : Diabetes was considered a contraindication for dental implants although recent research and clinical suggest a comparable success rate for diabetic patients as well but the current literature is lacking regarding the outcome of immediate implant loading in well controlled diabetic patients when compared to healthy individuals.

Purpose: Purpose of this study was the assess the difference in crestal bone loss in controlled type 2 diabetic patients and healthy patients after immediate loading of dental implants.

Methodology: A total of 20 implants were loaded in patients with 10 implants in each diabetic and non-diabetic group. A temporary crown was given on the same day of surgery which was kept out of occlusion. All the patients received their final restoration after 3 months. Crestal bone loss and pocket depth was assessed from baseline values at the interval of 3 and 6 months.

Results: Both the groups were treated for single missing teeth in the anterior first premolar to first premolar region. One implant failed in Group 2(non-diabetic). After a mean follow-up of 6 months, other 19 implants were stable with a 95% survival rate.

Introduction

Dentistry has evolved from removable prosthesis to fixed prosthesis to the current times where rehabilitation with dental implant is the most acceptable treatment modality. Dr Branemark is credited with the serendipitous discovery of bone growing in intimate contact with titanium leading to the concept of osseointegration and thereby, heralding a new era in dentistry. Since their introduction in the dental market, implants have undergone extensive evolution in terms of design, biomaterials and surface properties. Consequently, Branemark's original protocol of waiting for 3 to 6 months following implant placement prior to prosthetic rehabilitation is now being replaced by the more recent immediate loading protocols.

As the populations ages so does the incidence of missing teeth, the rehabilitation of which may be influenced by the numerous comorbid conditions, a more common one being Diabetes Melitus. It has recently become the most prevalent metabolic syndrome globally and the number of diabetic patients is constantly on the rise especially in the Middle Eastern region, sub-saharan region and the Indian subcontinent[1]. The highest absolute number of patients is projected to increase in india.

Although controlled diabetes mellitus is no longer a contra indication for dental implant placement, immediate loading in such cases is still seen with skepticism due to poor wound healing, microvascular and phagocytic disorders, which pose a high risk for implant failure.[2,3] Recent studies tend to disagree and show a variable success rate of 85 to 97 percent which is at par to the

success rate in normal individuals.[4,5,6]Decreased failure rates are positively correlated to degree of blood glucose control by the patients[7]. Thus this study was undertaken to assess the influence of Diabetes Melitus on immediately loaded implants in the aesthetic zone.

Methodology

Source of the Data

The study was conducted on 20 subjects of the aged between 40-65 years visiting the outpatient department of Prosthodontics in A.B Shetty Memorial institute of dental sciences (a constituent college of Nitte University), deralakatte, Mangalore. Informed written consent was obtained from each participant.

Inclusion Criteria

- Presence of well controlled diabetes with glycosylated haemoglobin less than 7 percent.
- Presence of at least 5 mm of bone width and at least 13 mm of bone height.
- All patients in good health with no other systemic diseases.
- Immediate loading of implants was done when the insertion torque was more than 35 Ncm.

Exclusion Criteria

- Uncontrolled diabetes, coagulation disorders or any other systemic disease.
- Type 1 diabetes
- Smoking more than 4 cigarettes per day, alcohol or drug abuse and bruxism.
- Pregnant or lactating woman.

All patients requiring replacement of teeth in the aesthetic zone e.i. from maxillary first premolar-premolar region were selected. Patients with a history of diabetes or a high random blood glucose level were further assessed for HbA1c levels.They were divided into two groups.

Group 1: patients with well controlled diabetes

Group 2: patients with normal metabolic control of blood glucose.

Radiograph Repositioning Index

Radiographic assessment to evaluate crestal bone level was done. Intra oral periapical radiograph was taken using the implant shoulder as a reference point. XCP Extension Cone System (RINN Dentsply) was used for positioning the radiographic sensor. Radiographs were taken at the time of loading (T0), and at the time interval of 3 months (T3) and 6 months (T6) after implant loading by using paralleling cone technique, mesial marginal bone loss (MMBL) and distal marginal bone loss (DMBL) around the implants were recorded.

Clinical Assessment

Implant site was checked for any pain or mobility. A caliberated plastic probe (Hu- fredy) was used to evaluate the presence of any deep pockets or bleeding on gentle probing.

Surgical Procedure

Implant placement was done under local anaesthesia in aseptic conditions and with appropriate antibiotic coverage, following manufacturer's instructions for sequential osteotomy.

Intra oral view of missing | Osteotomy site prepared and parallelism Checked with parallel pin | Implant Placed

Abutment Placed | Temporization | Final restoration

Periodontal probing

radiograph at time of placement, 60 and 180 days

Prosthetic Procedure

After achieving adequate primary stability, the appropriate abutment was torqued to 25 Ncm and a non- functional provisional restoration was fabricated using a pre formed acrylic shell or with bis-acryl composite. Following the surgical procedure, implants were restored with provisional restoration. Three months after the placement and loading of implant, the temporary crown was removed. The implant level impression was made using addition silicone material and the cast was poured using Type IV die stone (Kalrock die stone). A metal-ceramic crown was fabricated which was autoclaved before cementing and was cemented using Zinc-phosphate cement (Dentsply). Radiographs were taken at interval of 3 and 6 months.

Results

20 patients had been scheduled from November 2015 to February 2017 for immediate loading of dental implants divided into controlled diabetic and non-diabetic groups. Out of these 14 were men and 6 were women (mean age of 47 with age range from 40- 65 years). A single operator took intraoral periapical radiographs with paralleling technique. The data obtained i.e. the crestal bone level changes on mesial and distal side of the implant and presence of pain, mobility or bleeding on probing.

In Group I,10 diabetic patients were treated for single missing teeth in the anterior first premolar to first premolar region. Two implants were placed in the central incisor region, two in lateral incisor region and 6 in first premolar region. All implants were immediately loaded.

In Group II, ten patients with normal metabolic control of blood glucose levels were treated for single missing teeth in maxillary first premolar to first premolar region with dental implant. Two implants were placed in the central incisor region, two were placed in lateral incisor region and 6 were placed in the first premolar region. All the implants were immediately loaded. One implant failed in Group II after 3 months.

After a mean follow-up of 6 months, other 19 implants were stable with a 95% survival rate.

Table no.1: Comparison of mean crestal bone loss (mm) at mesial side of implant between the test and control group at baseline, 3 months and 6 months

The first table shows the mean crestal bone loss on the mesial side for both the groups. For the diabetic group mean bone loss from baseline (T0) to 3 months and from baseline (T0) to 6 months was 1.54 and 1.83mm. For the control group it was 1.23 and 1.43.

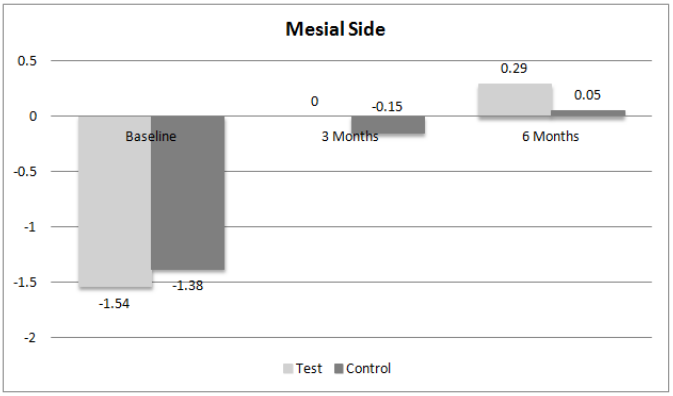


Table no.2: Comparison of mean crestal bone loss (mm) at distal side of implant between the test and control group at baseline, 3 months and 6 months

Table number 2 shows the comparison of mean bone loss at distal side of implant between the test and control group.

In the diabetic group of patients, the mean bone loss from the time of loading to about 3 months and baseline to

about 6 months was 1.64 and1.88 mm respectively. For control group it was 1.42 and 1.61 mm respectively.

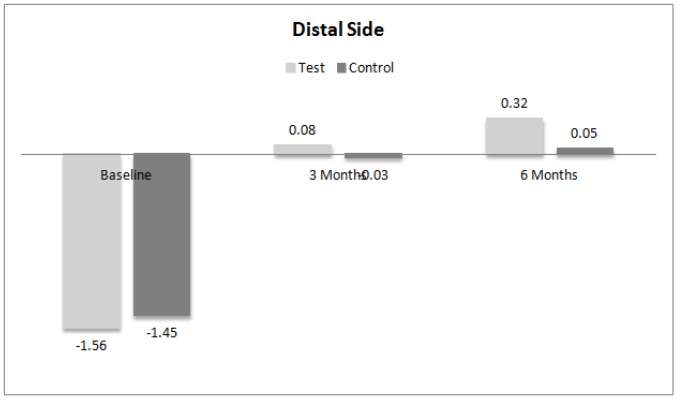
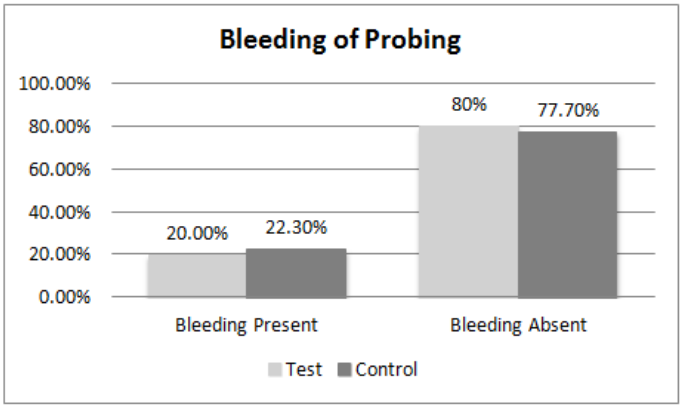


Table 3: Comparison of bleeding on probing between the test and control group

Table 3 shows the comparison of bleeding on probing between test and control group and or presence of pain, mobility or presence of deep pockets. Chi square test was used for the qualitative analysis of the result. P value of 0.587 suggest no significant difference between both the groups.



Discussion

Dental implant is now a predictable treatment modality for the replacement of single missing tooth. Immediate loading of the dental implant in the anterior aesthetic region offers benefits of reduced treatment time, avoidance of additional surgical procedure and a tooth, albeit temporary on the day of surgery[8.] Although implant therapy is considered a predictable treatment option with a high success rate, the outcome may be compromised in patients with increased blood glucose. This is due to the particular characteristics of the disease such as vascular complications, impaired phagocytosis and impaired tissue healing. Various animal studies have shown an impaired bone healing around osseointegrated implants compared to control group although majority of clinical studies tend to differ and suggest that diabetes is not a contraindication for implants.[9,10]

The present study was conducted to evaluate difference in implant success rate between diabetics with a well-controlled blood glucose compared with non-diabetic population. Glycosylated haemoglobin levels were measured for the patients showing a previous history of diabetes and level of 7 percent was taken as threshold[11,12.] Patients with a good bone width and a bone height were selected to facilitate immediate loading of implants.

All the implants placed were non-funtionally loaded in the same appointment. The temporary crowns were kept out of occlusion in centric and eccentric contacts to prevent overloading of implants through lateral forces. SLA coated implants were used[13,14.]

After a follow up period of 6 months all the patients were evaluated radigraphically for crestal bone loss on the mesial and distal side. Radiographic evaluation done using intraoral periapical radiograph showed bone level changes which occurred on the proximal surfaces of the implants in both the groups.

Results showed a mean bone loss of 1.54 mm and 1.83 mm at interval of 3 months and 6 months. Control group patients showed a bone loss of about 1.23 mm and 1.43 mm at an interval of 3 and 6 months. A higher bone loss was seen in diabetics but the difference was not statistically significant. Majority of the implants were stable during the 6 month follow up period. Although one implant in the group II failed. Failure can be attributed to

periapical infection in the adjacent teeth. Overall survival rate of the implants in group II was 90%.

We went further ahead in our study, along with the radiographic examination the implants were also examined clinically. We not only checked for checked for presence of any pain or mobility but also the presence of deep pocket and even bleeding on gentle probing.

We used the gingival index given by loe and sillness, modified by Mombelli et al. for application in oral implants. Probing around the implants was done using a plastic probe (Hu- fredy) with a pressure not exceeding 0.25 N.[15,16] None of the patients complained of any pain or mobility. There was absence of any deep pockets while probing although 2 patients in each group showed bleeding on gentle probing. Qualitative analysis was done using Fisher's exact test. There was no statistically significant difference between both the groups.

Summary And Conclusion

All implants were successfully osseointegrated , suggestive of the fact that Immediate loading of dental implants is a viable treatment option for controlled diabetics. Although a slight increase in crestal bone loss may indicate impaired bone healing in these patients, the difference was not statistically significant. Within the limitation of this study it can be concluded that diabetes is not a major confounding factor for implant success. A shortcoming of the study was the sample size and a short follow up period, further studies are necessary to assess the long term outcome.

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