Original Research

Assessment of biological changes at the proximal contacts between single-tooth implant-supported prosthesis and the adjacent natural teeth

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ABSTRACT:
Background: The present study was conducted for assessing biological changes at the proximal contacts between single-tooth implant-supported prosthesis and the adjacent natural teeth. **Materials & methods:** A total of 80 patients who underwent implant supported prosthesis were enrolled. Only those subjects were enrolled who underwent implant procedure for prosthetic rehabilitation of missing mandibular first molar. All the subjects were divided into two study groups as follows: Group A: Those without an intervention of Essix retainer and, Group B: Those with the intervention of Essix retainer delivered immediately after the restoration of implant with the definitive prosthesis. Further; random subdivision of all the study groups was done as follows: Group A: Subgroup 1: Control group, Group A: Subgroup 2: study group, Group B: Subgroup 3: Control group and Group B: Subgroup 4: study group. Mesial and distal PCT values were recorded in each quadrant using the digital force gauge, and values obtained at the end of 1 year were subjected for statistical analysis. All the results were recorded and analysed using SPSS software. **Results:** Among the group A patients, while assessing the mesial and distal contact among the implant subgroup and healthy tooth subgroup, significant results were obtained. However; among the group B patients, while assessing the mesial and distal contact among the implant subgroup and healthy tooth subgroup, non- significant results were obtained. **Conclusion:** By engaging Essix retainer, a significant enhancement of PCT values occur.
Key words: Proximal Contact, Single tooth, Dental implant

INTRODUCTION
It is undeniable that the advent of osseointegration has had a fundamental impact on therapeutic approaches and strategies implemented today in the field of prosthetic rehabilitation. In fact, osseointegrated dental implants have been a successful treatment modality in partial and complete edentulism for more than 35 years. Although high survival rates were reported, 95% and 86.7% after 5- and 10-years respectively, a wide variety of biological, technical, and aesthetic complications have been extensively documented. Over the last decade, interproximal contact loss (ICL) between implant-supported fixed prostheses (IFPs) and adjacent teeth has been increasingly reported as a complication in daily clinical practice. While acknowledging the fact that implants lack the inherent physiological mobility of teeth, proximal contact tightness (PCT) becomes more critical in implant-supported prostheses.[1-3]

PCL between implant prostheses and natural teeth can have significant implications such as food impaction, pain, patient discomfort and dissatisfaction. Potentially, soft tissue inflammation, and loss of soft tissue and bone may develop. A progressive increase of PCL may eventually mandate interventions such as restoration of adjacent teeth, repairing the prosthesis or even replacement of the implant prosthesis. This can lead to major financial implications and inconvenience for the patients and the clinicians.[4-6] Hence; the present study was conducted for assessing biological changes at the proximal contacts between single-tooth implant-supported prosthesis and the adjacent natural teeth.

MATERIALS & METHODS
The present study was conducted for assessing biological changes at the proximal contacts between single-tooth implant-supported prosthesis and the adjacent natural teeth. A total of 80 patients who

underwent implant supported prosthesis were enrolled. Only those subjects were enrolled who underwent implant procedure for prosthetic rehabilitation of missing mandibular first molar. All the subjects were divided into two study groups as follows:

Group A: Those without an intervention of Essix retainer and

Group B: Those with the intervention of Essix retainer delivered immediately after the restoration of implant with the definitive prosthesis.

Further; random subdivision of all the study groups was done as follows:

Group A: Subgroup 1: Control group
Group A: Subgroup 2: study group
Group B: Subgroup 3: Control group
Group B: Subgroup 4: study group

All the patients were seated in the same upright position in the dental chair, by the Dental Unit's preset positioning system to measure the PCT. Measurements were done using the digital force gauge. Mesial and distal PCT values were recorded in each quadrant using the digital force gauge, and values obtained at the end of 1 year were subjected for statistical analysis. All the results were recorded and analysed using SPSS software.

RESULTS

Mean age of the patients was 43.5 years. Majority proportion of the patients were males.Among the group A patients, while assessing the mesial and distal contact among the implant subgroup and healthy tooth subgroup, significant results were obtained. However; among thegroup B patients, while assessing the mesial and distal contact among the implant subgroup and healthy tooth subgroup, non- significant results were obtained.

Table 1: Comparison of PCT among group A

Side		Mean	p- value
Mesial contact	Subgroup 1	2.96	0.001*
	Subgroup 2	2.11	
Distal contact	Subgroup 1	2.39	0.002*
	Subgroup 2	2.01	

*: Significant

Table 2: Comparison of PCT among group B

Side		Mean	p- value
Mesial contact	Subgroup 3	2.91	0.968
	Subgroup 4	2.73	
Distal contact	Subgroup 3	2.96	0.885
	Subgroup 4	2.62	

*: Significant

DISCUSSION

Creating tight proximal contact is the goal of both natural tooth-supported and implantsupported restorations. Proximal contact tightness (PCT) plays an important role in protecting the periodontal structures against damage due to food impaction. However, as more and more partially edentulous patients choose osseointegrated dental implants to replace missing teeth, tight proximal contact in the long term may not be as easy to obtain in implant-supported prostheses as that in natural tooth-supported prostheses. In clinical practice, food impaction, although not considered a complication of implant-supported restoration, is a common complaint after delivery of such restorations. Recently, studies have reported frequent proximal contact loss between fixed implant prostheses and adjacent teeth (in as many as 43% of patients), which increased throughout the follow-up period. In addition, the rate of contact loss at the mesial aspect was significantly greater than that at the distal aspect.[6-9]Hence; the present study was conducted for assessing biological changes at the proximal contacts between single-tooth implant-supported prosthesis and the adjacent natural teeth.

Mean age of the patients was 43.5 years. Majority proportion of the patients were males.Among the group A patients, while assessing the mesial and distal contact among the implant subgroup and healthy tooth subgroup, significant results were obtained. Ren S et al investigated consecutive biological changes in PCT between fixed implant prostheses and adjacent teeth after placement. Eighteen participants who had been treated with a single first molar implant in the mandible were included. Mesial and distal PCT were measured using the custom-made contact pressure system at immediate crown delivery (T0), 3-month follow-up (T1), and 1-year follow-up (T2). The PCT of natural teeth in the mesial direction of the same quadrant was also measured at T2 as a control. At T0, the PCT between fixed implant prostheses and adjacent teeth was designed deliberately to be higher than the PCT between natural teeth. Using multivariate analyses, the PCT between fixed implant prostheses and adjacent teeth decreased between T0 and T1 (P<.001), while there was no significant difference

between T1 and T2 (P=.506). At T2, the distal PCT was tighter than the mesial PCT (P<.001); however, no statistical difference was found in the PCT between the implant-supported restoration and the natural teeth. PCT decreased significantly at both mesial and distal sites over time. The major changes occurred over the 3-month period after crown delivery.[10]

However; among thegroup B patients, while assessing the mesial and distal contact among the implant subgroup and healthy tooth subgroup, non-significant results were obtained. Chang M et al evaluated longitudinal changes in tooth/implant relationship and bone topography at single implants with a microthreaded, conical marginal portion (Astra Tech ST® implants, Astra Tech AB, Mölndal, Sweden). Thirty-one subjects with single implant-supported restorations in the esthetic zone were included. Radiographs obtained at crown installation and 1, 5, and 8 years of follow-up were analyzed with regard to changes in (1) bone level at the implant and adjacent teeth and (2) vertical position of adjacent teeth relative to the single implant. The mean marginal bone loss amounted to 0.1 mm at both implants and adjacent teeth during the 8 years of follow-up. Regression analysis failed to identify significant explanatory factors for observed variance in bone level change at the adjacent tooth surfaces. Vertical change in position of the teeth relative to the implants was more frequent and significantly greater in incisor compared with premolar tooth region but not associated with gender or age. The marginal bone level at teeth adjacent to single implants with a microthreaded conical marginal part was not influenced by horizontal and vertical tooth-implant distances.[11]

CONCLUSION

From the above results, the authors concluded that by engaging Essix retainer, a significant enhancement of PCT values occur. Hence; further studies are recommended.

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