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The Effects of Disconnection and Reconnection of Implant Abutments on Peri-implant Bone Levels: A 1- year Prospective Study



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Statement of Problem

Evidence suggesting non-removal of a definitive abutment on an implant from the day of surgery helps to preserve the peri-implant marginal bone level. However, the limited current literatures available still has contradictory conclusions to this finding.

Introduction

Studies reported that repeated disconnections and reconnections of abutment components may compromise this mucosal barrier, resulting in peri-implant bone loss and additional soft tissue recession. One-abutment-one-time concept, which suggested placement of a definitive abutment at the time of implant surgery, thereby avoiding interchanging of components and disruption of the connective tissue adaptation during restorative procedures and preserving the level of marginal bone around dental implants. Several Studies showed that definitive abutments delivered at the time of surgery resulted in a statistically significant reduction of horizontal bone remodeling around subcrestally placed tapered implants. The evidence on this concept remained highly biased or controversial due to a wide variation in methodology among the studies and inevitable inclusions of confounding factors that might influence the interpretation of the results.

Purpose of the study

was to evaluate the effects of definitive abutment connection at the time of implant placement on peri-implant bone level and soft tissue changes in the areas of the posterior maxilla and mandible. The null hypothesis was there would be no significant difference in peri-implant bone levels for implants with definitive abutments delivered at the time of surgery using the one-abutment-one-time protocol, when compared to those subjected to multiple disconnections and reconnections.

Materials and Methods

This study was designed as a single center, prospective, randomized modified split-mouth clinical trial. It was conducted in the Center for Implant Dentistry, Loma Linda University School of Dentistry(IRB No.#5190024). A sample size of 38 implants was determined to achieve 80% power. A total of 19 male or female patients (38 implants) were included in this study. Implants were placed at maxillary or mandibular posterior healed sites that have adequate bone to accommodate at least a 4.3 mm diameter and 8mm length implant at each site.

Materials and Methods

Each patient received 2 implants in the posterior maxilla or mandible. At implant placement(T0) (Fig.1), one stage implant surgery protocol was carried out and the implants were placed 1mm subcrestally with a minimum insertion torque of 35 Ncm. One implant was randomly selected to connect with a definitive prefabricated abutment abutment (On1™ Base, Nobel Biocare, USA) (test group)and left undisturbed throughout the duration of the study. On the other implant, a healing abutment (control group) was connected to implant and subjected to go through three disconnections and reconnections at 3 months, 6 months, and 12 months (T12) after the implant surgery. The implants used in this study were 4.3 or 5.0 mm in diameter, at least 8mm in length, tapered, with TiUnite surface and symmetric-threads(NobelReplace Conical Connection, Nobel Biocare, USA). Rinn holders was used to create the custom jig for standardized radiograph. Baseline periapical radiographs at implant placement (T0) were taken.

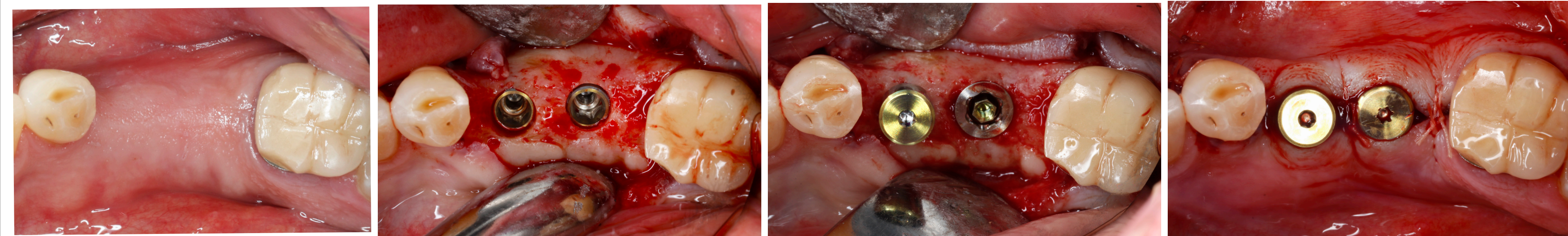


Figure 1. At Implant placement, one implant was connected to definitive abutment (Test). Another implant was connected to healing abutment(Control)

Data Collection

Clinical and radiographic evaluations were made at T0 and T12. The following parameters were recorded at 1 year follow-up appointment: Keratinized mucosa width, thickness of lingual mucosa (Fig.2), marginal bone losses (MBL), and surgical complications. The MBL were assessed by measuring on the mesial and distal aspects of each implant at T0 and T12. The implant platform was used as the reference line (RL) (Fig. 3). The distance between the RL and the first bone-to-implant contact was measured on the mesial and distal aspect. The value zero was designated when the marginal bone was at the same level or coronal to the RL, and denoted as negative when the bone-to-implant contact was apical to the RL. The percentage of overall bone loss was calculated based on the known implant length. Statistical Analysis was performed using paired sample T-Test, and correlation matrix. Descriptive analysis were performed



Figure 2. Measurement of thickness of lingual mucosa at 1 year follow-up

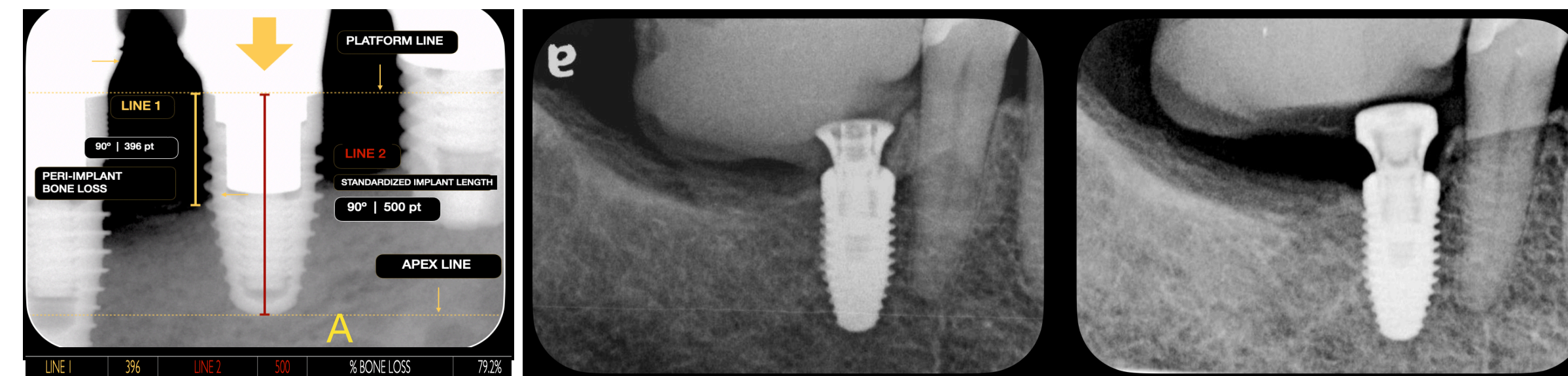


Figure 3. A,Measurement method of marginal bone loss and the percentage of overall bone loss; B, Periapical radiograph at implant placement (T0); C, Periapical radiograph at 1 year follow up (T12).

Results

No statistically significant differences in marginal bone losses, keratinized mucosa width, and thickness of lingual mucosa for implants with definitive abutments delivered at the time of surgery using the one-abutment-one-time protocol, when compared to those subjected to multiple disconnections and reconnections ($P>.05$) (Table 1)(Fig.4). Descriptive analysis presented each parameter(Table 2).

No correlation was found between marginal bone losses, keratinized mucosa width, and thickness of lingual mucosa between both groups ($P>.05$).No surgical complications was found.

Paired Samples T-Test				N	Mean	Median	SD		
		Statistic	df	p					
Bone loss Mesial- Ctrl	Bone loss Mesial- Test	-0.2520	18.0	0.804	Bone loss Mesial- Ctrl	19	0.343	0.000	0.565
		26.0 ^a		0.563	Bone loss Mesial- Test	19	0.386	0.000	0.592
Bone loss Distal-Ctrl	Bone loss Distal- Test	0.3804	18.0	0.708	Bone loss Distal-Ctrl	19	0.545	0.000	0.877
		45.0 ^b		0.666	Bone loss Distal- Test	19	0.463	0.000	0.633
Overall Bone loss (MM)- Ctrl	Overall Bone loss (MM)- Test	-0.0295	18.0	0.977	Overall Bone loss (MM)- Ctrl	19	0.584	0.530	0.868
		50.0 ^d		0.900	Overall Bone loss (MM)- Test	19	0.591	0.490	0.706
KT- change Ctrl (MM)	KT-change Test (MM)	2.0513	18.0	0.055	KT- change Ctrl (MM)	19	-0.553	-0.500	0.956
		72.0 ^a		0.065	KT-change Test (MM)	19	-1.026	-1.000	0.874
Li thickness-change Ctrl (MM)	Li Thickness -change-test(MM)	1.8735	18.0	0.077	Li thickness-change Ctrl (MM)	19	0.237	0.000	0.933
		138.5		0.082	Li Thickness -change-test(MM)	19	-0.237	-0.250	0.907
Overall Bone loss (%) - Ctrl	Overall Bone loss (%) - Test	-0.1069	18.0	0.916	Overall Bone loss (%) - Ctrl	19	5.689	5.200	8.448
		51.0 ^d		0.950	Overall Bone loss (%) - Test	19	5.942	4.900	7.031

Table 1. Comparison of marginal bone losses, keratinized mucosa width, and thickness of lingual mucosa between groups using paired sample T-Test

Table 2. Descriptive analysis presented mean, median and standard deviation in both groups

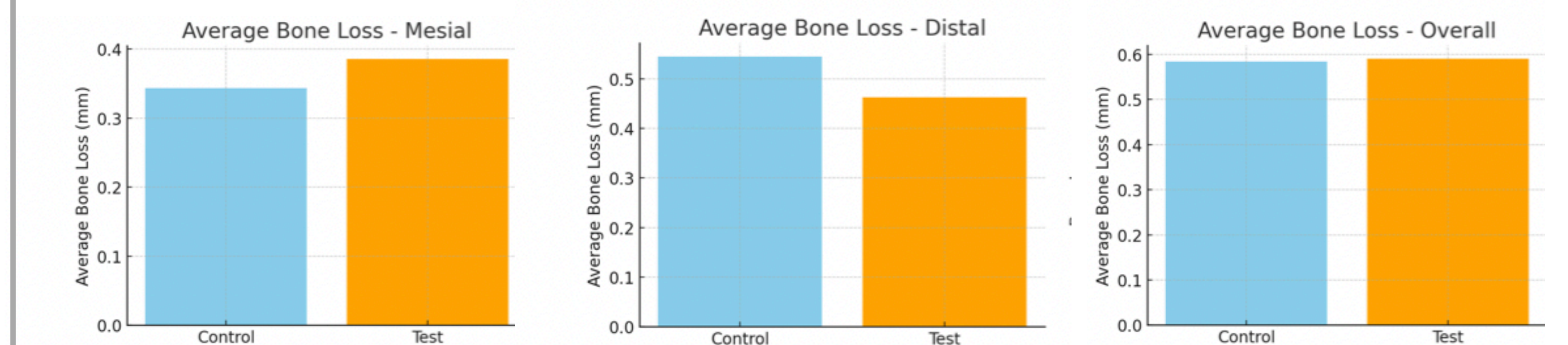


Figure 4. Graph showed comparison of marginal bone losses at medial, distal and overall (maximum)

Conclusions

Within the limitation of this study, it can be concluded that there is no significant impact on peri-implant bone levels around subcrestally placed tapered implants when definitive abutments are delivered at the time of surgery using the one-abutment-one-time protocol, compared to conventional healing abutments. One-abutment-one-time protocol may offer comparable outcomes to the traditional approach without increasing the risk of complications.