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Assessment of the influence of soft tissue biotype on the marginal bone changes around dental implants

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***Abstract*---**Background: Changes in peri-implant hard and soft tissues, as well as restorative and patient-based subjective measures are the most widely used parameters for evaluating the outcomes of implant therapy. The present study was conducted to assess the influence of soft tissue biotype on the marginal bone changes around dental implants. Materials & Methods: 58 patients who received dental implants of both genders were included. In all patients, initial mucosal thickness, marginal bone levels on radiographs, pain, and exudation were evaluated. All these parameters were recorded at the time of implant placement, at the time of cementation of final restoration, 6 months and 12 months post cementation. Results: Out of 58 patients, males were 20 and females were 38. The mean mucosal thickness at baseline, second stage, at cementation, 6 months and 12

months was 2.82, 1.90, 1.54, 2.62 and 3.42 in thick mucosa and 1.65, 0.84, 0.69, 1.14 and 1.62 at thin mucosa. The difference was significant (P< 0.05). The mean pocket depth at cementation was 2.52, at 6 months was 3.20 and at 12 months was 3.24 in thick and 2.12 at cementation, 3.10 at 6 months and 3.16 at 12 months in thin biotype respectively. The difference was significant (P< 0.05). Conclusion: Sites with thicker tissues preoperatively have a lesser bone loss and better rebound as compared to thinner tissues.

***Keywords*---**cementation, dental implants, peri-implant.

Introduction

The survival and success of dental implants have been found to be influenced by various factors. Some factors influence osseointegration whereas some influence the long-term survival.[1] The factors such as bone quality and quantity, primary stability of implant, implant surface characteristics are few of the factors, which influence osseointegration of the implant. However, the long-term success of implants is determined by factors such as the bone quality, type of prosthesis, occlusal loading, oral hygiene, overlying soft tissue, and regularity of recall visits.[2] The maintenance of peri-implant tissues is essential for the longevity of dental implants. Changes in peri-implant hard and soft tissues, as well as restorative and patient-based subjective measures are the most widely used parameters for evaluating the outcomes of implant therapy.[3] Marginal bone levels are expected to become stable by the first year of functional loading and, after this, an annual crestal bone loss (CBL) of more than 0.2 mm is regarded as undesirable. However, 1.5-2 mm CBL in the first year might be an acceptable outcome according to several studies.[4,5]

Peri-implant soft tissue thickness, or soft tissue biotype, is mostly referred to as thin or thick, even though it has been reported that a majority of soft tissues might be mixed pattern with individual variations.[6] The present study was conducted to assess the influence of soft tissue biotype on the marginal bone changes around dental implants.

Materials and Methods

The present study comprised of 58 patients who received dental implants of both genders. The consent was obtained from all enrolled patients. Data such as name, age, gender etc. was recorded. The implants were placed with a conventional protocol, that is, submerged placement at the marginal level in well-healed sites at a minimum of 3 months after extraction. The second stage procedure was done at 3 months after implant placement and 15 days later the final impressions were made. In all patients, initial mucosal thickness, marginal bone levels on radiographs, pain, and exudation were evaluated. All these parameters were recorded at the time of implant placement, at the time of cementation of final restoration, 6 months and 12 months post cementation. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I
Distribution of patients

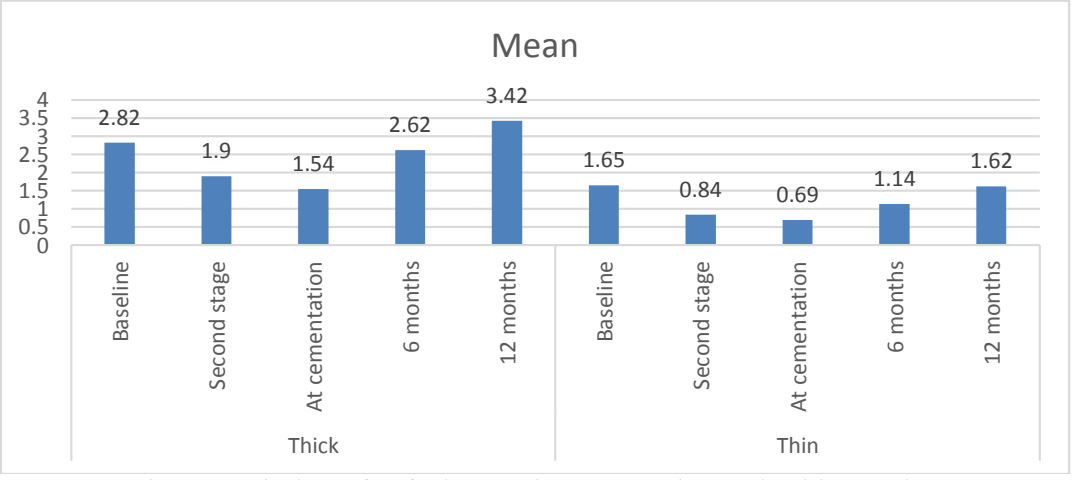
Total- 58		
Gender	Males	Females
Number	20	38

Table I, shows that out of 58 patients, males were 20 and females were 38.

Table II
Correlation of soft tissue changes and marginal bone changes

Mucosa	Time interval	Mean	P value	Bone level	P value
Thick	Baseline	2.82	0.01	0.00	0.04
	Second stage	1.90	0.02	0.18	0.01
	At cementation	1.54	0.04	0.32	0.02
	6 months	2.62	0.01	0.00	0.01
	12 months	3.42	0.03	0.74	0.04
Thin	Baseline	1.65	0.05	0.00	0.01
	Second stage	0.84	0.01	0.14	0.02
	At cementation	0.69	0.02	0.21	0.01
	6 months	1.14	0.01	0.94	0.03
	12 months	1.62	0.03	1.72	0.02

Table II, graph I shows that mean mucosal thickness at baseline, second stage, at cementation, 6 months and 12 months was 2.82, 1.90, 1.54, 2.62 and 3.42 in thick mucosa and 1.65, 0.84, 0.69, 1.14 and 1.62 at thin mucosa. The difference was significant (P< 0.05).

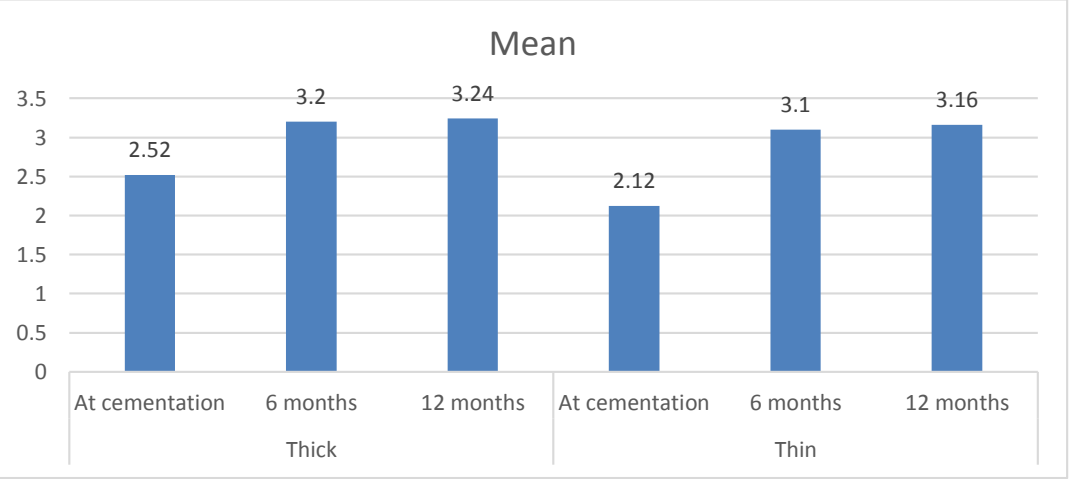


Graph I Correlation of soft tissue changes and marginal bone changes

Table III
Comparison of probing pocket depth in the thick and the thin biotypes

Mucosa	Time interval	Mean	P value
Thick	At cementation	2.52	0.04
	6 months	3.20	
	12 months	3.24	
Thin	At cementation	2.12	0.02
	6 months	3.10	
	12 months	3.16	

Table III, graph II shows that mean pocket depth at cementation was 2.52, at 6 months was 3.20 and at 12 months was 3.24 in thick and 2.12 at cementation, 3.10 at 6 months and 3.16 at 12 months in thin biotype respectively. The difference was significant (P< 0.05).



Graph II Comparison of probing pocket depth in the thick and the thin biotypes

Discussion

The peri-implant phenotype encompasses a soft tissue component, constituted by the peri-implant keratinized mucosa width, the mucosa thickness and the supracrestal tissue height, and an osseous component, characterized by the peri-implant bone thickness.[7] This definition does not only apply to buccal and facial sites, but also to lingual and palatal peri-implant locations. Like the periodontal phenotype, the peri-implant phenotype is site-specific and may change over time in response to environmental factors.[8] Peri-implant mucosal thickness (MT) is the horizontal dimension of the peri-implant soft tissue, which may or may not be keratinized. Peri-implant MT may vary at different locations (e.g., buccal versus lingual) and apico-coronal heights respective to the mucosal margin around a given implant.[9] The present study was conducted to assess the influence of soft tissue biotype on the marginal bone changes around dental implants.

We found that out of 58 patients, males were 20 and females were 38. We observed that mean mucosal thickness at baseline, second stage, at cementation, 6 months and 12 months was 2.82, 1.90, 1.54, 2.62 and 3.42 in thick mucosa and 1.65, 0.84, 0.69, 1.14 and 1.62 at thin mucosa. Bhat et al[10] evaluated the change in the peri-implant mucosal thickness and its effect on the marginal bone levels around dental implants treated in a conventional two-stage implant therapy. A total of 36 implants were placed in 22 subjects. Two subjects dropped out. Thirty-three implants in 20 subjects were then evaluated. Initial mucosal thickness, marginal bone levels on radiographs, pain, and exudation were evaluated. All these parameters were recorded at the time of implant placement, at the time of cementation of final restoration, 6 months and 12 months post cementation/restoration. The peri-implant mucosal thickness reduced from implant placement to second stage and till restorations and was statistically significant, in both the thick and thin biotypes, however, at 12 months there was a rebound of the tissue thickness, which was more in the thick biotype ($P< 0.05$). At 1-year follow-up, there was a reduction in the marginal bone levels, which was more in the thick biotype as compared to the thin biotype ($P< 0.05$).

We found that mean pocket depth at cementation was 2.52, at 6 months was 3.20 and at 12 months was 3.24 in thick and 2.12 at cementation, 3.10 at 6 months and 3.16 at 12 months in thin biotype respectively. In a study was done by Sharma et al[11] on the population had a soft tissue thickness around natural teeth ranged from 0.56 mm to 1.02 mm. As the edentulous ridges were evaluated in the study, mucosal thickness measured was thicker than around natural teeth. Brisman[12] suggested that the reduction in thickness till cementation and the concomitant increase later is attributable to the surgical intervention at implant placement as well at implant uncovering at second stage and to the formation and organization of the supramarginal connective tissue, morphology of the peri-implant mucosa, and establishment of the biologic width around the implants, respectively.

The thickness of the peri-implant soft tissue, particularly at the most coronal segment, may play a critical role on the functional and esthetic outcomes of implant therapy, as well as on the maintenance of peri-implant health.[13] The most frequent indication of surgical interventions aimed at augmenting the MT around implants is to enhance the esthetic results following the delivery of the final implant supported prosthesis. This is commonly performed in an attempt to attenuate or eliminate the effect of the shade of the abutment (e.g., titanium alloy, gold, or zirconia) on the buccal aspect of the mucosa and/or to compensate for possible underlying bone deficiencies resulting from unfavorable osseous remodeling patterns, prior to or after functional loading.[14]

Conclusion

Authors found that sites with thicker tissues preoperatively have a lesser bone loss and better rebound as compared to thinner tissues.

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