



Imperative Clinical Assessment of Status of Osseointegration and Peri-Implantmucositis in Six Month Post Osteotomy Phase: An Original Research Study

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KEYWORDS

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ABSTRACT:

Background and Aim: Successful osseointegration and absence of peri-implantmucositis are the two most desirable success criteria for dental implants. However, in most of the clinical situation clinicians are unable to achieve perfect osseointegration with total absence of peri-implantmucositis. Eventually all these undesirable activities are ending with ultimate failure of implant and implant prosthesis. Hence this study was intended, planned and conducted to clinically assess the status of osseointegration and peri-implantmucositis in six month post osteotomy phase.

Materials and Methods: Total 18 patients with single maxillary central incisor were included in the study. All implants were placed by using similar armamentarium and method. Both male and female patients were included in the study in the age range of 30 years to 45 years. Osseointegration was evaluated an innovative system Osstell®. Peri-implantmucositis was checked by clinical signs like bleeding on probing, suppurations, recession, and radiographic bone losses. Osseointegration and peri-implantmucositis were assessed exactly after 6 month of osteotomy procedure. Osseointegration was noted as satisfactory or non-satisfactory and peri-implantmucositis was noted as present or absent. P value less than 0.05 was taken as significant.

Statistical Analysis and Results: Statistical analysis was completed by SPSS statistical package software. Results confirmed that out of 18 studied patients, 11 were males and 7 were females. Osseointegration was satisfactory in 12 patients non satisfactory in 4 patients. 13 patients confirmed presence of Peri-implantmucositis and 3 patients with absent Peri-implantmucositis. The inferences of ANOVA test revealed that level of significance (p value) was highly significant for the test conducted between groups. It was significantly 0.002.

Conclusion: It was concluded that non-satisfactory osseointegration and peri-implantmucositis happens and are actually unavoidable clinical phenomenon. Authors also identified presence of peri-implantmucositis in high proportion as compared to osseointegration. Also, other future long term studies are expected to authenticate and confirm our results.



Introduction

Peri-implant mucositis is defined as a reversible inflammatory reaction in the soft tissues surrounding an implant. Peri-implantitis is an inflammatory reaction with loss of supporting bone in the tissues surrounding an implant.¹⁻² Peri-implantmucositis is actually infection and inflammation of the soft tissue surrounding the dental implant after their placement into alveolar bone. Peri-implantmucositis is considered as area specific disease which augments loss of bone around the implants. Literature has well evidenced about several contributing prominent factors for peri-implantmucositis.³⁻⁴ They were primarily microbial activities, poor designing, excessive mechanical loads, wrong implant surface treatments, and patients hygiene habits. Many researchers have stated several treatment approaches for peri-implantmucositis. Most of these therapies are focused on minimization of microbial activities around implant soft tissues first. Failure of a dental implant is frequently related to failure in successful osseointegration. A dental implant is considered to be a failure if it is lost, mobile, or shows peri-implant bone loss of greater than 1.0 mm in the first year and greater than 0.2 mm a year after.⁵⁻⁸ Therefore this study was aimed, planned and performed to clinically assess the status of osseointegration and peri-implantmucositis in six month post osteotomy phase.

Materials and Methods

This study was conducted on total 18 patients those requiring rehabilitation of their missing teeth. Only single maxillary central incisor was considered for inclusion in the study. The study procedure was explained to all participating patients in details. Simple Systematic random procedure was utilized for sample selection with a jumping gap of 3. Inclusion criteria included; young patients, no underlying systemic disease, no ongoing heavy medication, absence of any critical disease, patients with no post operative follow up issue. All implants were placed single handily by employing similar armamentarium and operator. Both male and female patients were included in the study in the age range of 30 years to 45 years. Authors ensured to include the patients those treated by single and identical surgical methodology. Presence of satisfactory osseointegration was evaluated for individual implant site. This was completed by using new innovative system Osstell® (Osstell Inc., MD, USA). This method of checking osseointegration is supported by more than 1350 scientific research studies. Osstell® helps us to determine osseointegration objectively and non invisibly with more predictable outcomes. For evaluating peri-implantmucositis,

several clinical signs were taken into considerations like bleeding on probing around the implant, presence of suppurations, increased probing depth around implant, notable recession on gingival surrounding the implant, presence of evident radiographic bone losses. Both of the intended objective (osseointegration and peri-implantmucositis) were checked after 6 month of osteotomy procedure. Osseointegration was noted as satisfactory or non-satisfactory and peri-implantmucositis was noted as present or absent. Informed consent was obtained from all participating patients. All unrecognizable entities were categorized as Questionable and their data was not taken into consideration. Statistical analysis was conducted to outline the inferences and results. P value less than 0.05 was taken as significant.

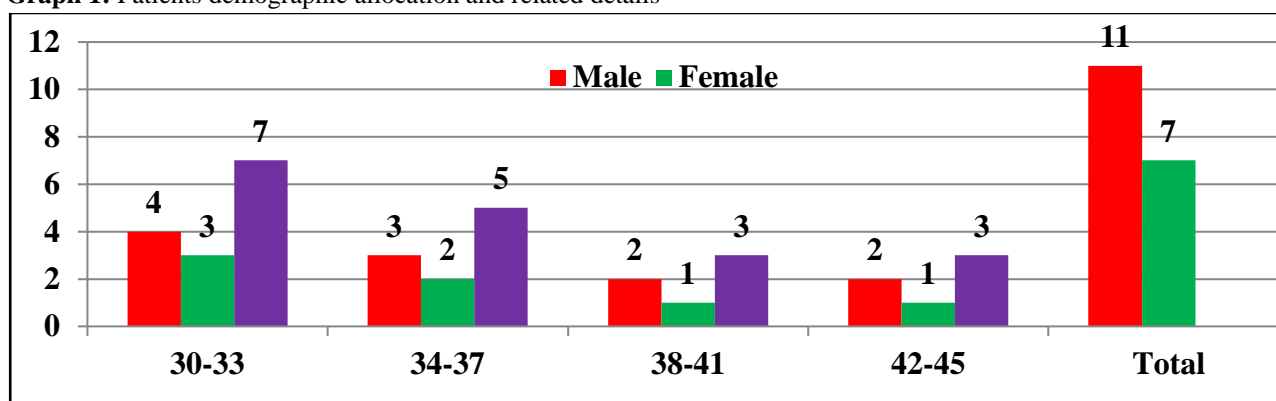
Statistical Analysis and Results

All the recorded data were inspected for any apparent integrated inaccuracy. Thereafter data was subjected to basic statistical analysis with SPSS statistical package for the Social Sciences version 22 for Windows. Nonparametric test, namely, chi-square test, was used for further data analysis; p-value. Out of 18 studied patients, 11 were males and 7 were females [Table 1, Graph 1]. P-value was highly significant for age group 30-33 years. Age group other than first showed non significant p values for their statistics. Table 2 depicts about the original statistical explanation with level of significance evaluation using "Pearson Chi-Square" test. Here osseointegration factor was noted as satisfactory or non-satisfactory during 6 month post-osteotomy phases. Author noted total 12 patients with satisfactory status and 4 patients with non satisfactory status. Osseointegration status of 2 patients was not noticeable so categorized as questionable. P value was highly significant for 4 patients with non satisfactory status. Table 3 demonstrated about the basic statistical description with level of significance evaluation using "Pearson Chi-Square" test (Peri-implantmucositis: noted as present or absent during 6 month post-osteotomy phases). Here Peri-implantmucositis factor was noted as present or absent during 6 month post-osteotomy phases. Author noted total 13 patients with present status and 3 patients with absent status. Peri-implantmucositis status of 2 patients was not clear so categorized as questionable. P value was highly significant for 3 patients with absent status. Table 4 illustrated about the basic evaluation conducted amongst all studied questions using one-way ANOVA test. The inferences revealed that level of significance (p value) was highly significant for ANOVA test conducted between groups. It was appreciably 0.002.

**Table 1:** Age & gender based statistical description of contributing patients

Age Group (Yrs)	Male	Female	Total	P value
30-33	4	3	7	0.02*
34-37	3	2	5	0.20
38-41	2	1	3	0.60
42-45	2	1	3	0.10
Total	11	7	18	*Significant

*p<0.05 Significant

Graph 1: Patients demographic allocation and related details**Table 2:** Original statistical description with level of significance evaluation using “Pearson Chi-Square” test (Osseointegration: noted as satisfactory or non-satisfactory during 6 month post-osteotomy phases)

Status	n	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Chi-Square	df	p value
Satisfactory	12	1.32	0.032	0.045	1.96	1.849	1.0	0.06
Non-satisfactory	4	1.38	0.312	0.058	1.22	1.747	2.0	0.01*
Questionable	2	1.01	0.604	0.642	1.58	1.103	1.0	0.07

*p<0.05 significant

Table 3: Original statistical description with level of significance evaluation using “Pearson Chi-Square” test (Peri-implantmucositis: noted as present or absent during 6 month post-osteotomy phases)

Status	n	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Chi-Square	df	p value
Present	13	1.41	0.940	0.355	1.16	1.539	1.0	0.26
Absent	3	1.24	0.236	0.348	1.62	1.947	2.0	0.01*
Questionable	2	1.01	0.633	0.242	1.08	1.343	1.0	0.08

*p<0.05 significant

Table 4: Evaluation amongst all studied questions using one-way ANOVA

Variables	Degree of Freedom	Sum of Squares Σ	Mean Sum of Squares $m\Sigma$	F	Level of Sig. (p)
Between Groups	3	2.377	1.938	1.3	0.002*
Within Groups	19	2.425	0.435	-	-
Cumulative	138.10	12.049	-	-	*p<0.05 significant



Discussion

Unsatisfactory osseointegration and presence of peri-implantmucositis are two most prominent factors which determine the ultimate success of any implant prosthesis. Researchers have confirmed that both of these phenomena are directly or indirectly related to the bacterial infections and bacterial mediated deleterious processes.⁹⁻¹² Many of the researchers have shown that the microbial flora of periodontitis and peri-implantmucositis are somewhat similar. They predominantly contains Gram-negative anaerobes, like *Prevotella intermedia*, *Porphyromonas gingivalis*, *Aggregatibacter actinomycetemcomitans*, *Bacterioides forsythus*, *Treponema denticola*, *Prevotella nigrescens*, *Peptostreptococcus micros*, and *Fusobacterium Nucleatum*. In case of healthy periodontium, the gingival acts as a potent barrier for bacterial encroachment.¹³⁻¹⁵ Few of the systemic underlying factors are also responsible for increased bacterial activities and unsatisfactory osseointegration. These primarily includes diabetes mellitus, osteoporosis, smoking, long-term treatment with corticoids, radiation, and chemotherapy. Prosthetic design should also be checked and personalized if needed, in order to improve the design defects that impede proper hygiene. If the microbial activities are at an early stage, treatment will be identical to that prescribed for normal soft tissue infection and inflammation. It characteristically employs the decontamination of the prosthetic abutments and antibiotics coverage as per the intensity and extent of infection.¹⁶⁻¹⁷

Conclusion

Within the limitations of the study authors outlined highly significant inferences. That non-satisfactory osseointegration and peri-implantmucositis do occur in post operative stages of implant osteotomy. They are apparently unavoidable even after several protective measures during and after implant placement. For both studied parameters (osseointegration and peri-implantmucositis), authors noted significant findings and outcomes. In our study, peri-implantmucositis was noted in high proportion of studied patients which confirms the unavoidable encroachment of microbial in and around implant soft tissues. Such activates needs to be minimized so as to enhance the longevity and durability of implant and implant prosthesis. Authors also expect some other future studies to be conducted to substantiate and validate our results.

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