Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.comdoi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

A CBCT based evaluation of bone losses in post treatment stage of osseointegrated implants positioned in mandibular arches: An Original Research Study

Uttkarsh Bhatt[1], Indu Bhushan Deshbakht[2], Neel Ratan Sinha[3], Akash A.M[4], Jishnu AP[5], Saurav Bhowmick[6]

[1]Post Graduate Student, Department of Prosthodontics and Crown & Bridge, Shree Bankey Bihari Dental College and Research Centre, Ghaziabad, UP, India
[2]Private Practitioner (MDS, Pedodontics & Preventive Dentistry) at Purnia, Bihar, India
[3]Private Practitioner (MDS, Oral Pathology) at Madhubani, Bihar, India
[4]Post Graduate Student, Department of Orthodontics and Dentofacial Orthopedics, Shree Bankey Bihari Dental College and Research Centre, Ghaziabad, UP, India
[5]Post Graduate Student, Department of Conservative Dentistry and Endodontics, Shree Bankey Bihari Dental College and Research Centre, Ghaziabad, UP, India
[6]Private Dental Practitioner, New Bongaigaon, Assam, India

ABSTRACT:
Background and Aim: Peri implant bone loss is one of the major reasons of implant failure in long run. Several clinical measures have been discussed and tried over the years to overcome this issue. Present study was intended to evaluate bone losses in post treatment stage of osseointegrated implants positioned in mandibular arches. The study was assisted by three dimensional radiography i.e.; cone beam computed tomography. **Materials & Methods:** This clinical study was completed in the department of Prosthodontics and oral implantology of the college. All twenty four patients were selected randomly in which solitary implant was positioned anteriorly in the lower arch. Informed consents were obtained from all participating patients. Cone beam computed tomography was attempted to see the existing bone in the vicinity of implant. The significance of the study was explained in detail to patients. Marginal bone loss was assessed after stage one surgery at different time intervals. **Statistical Analysis and Results:** Statistical analysis was attempted by software Statistical Package for Social Sciences. P values smaller than 0.05 was considered as significant. In 24subjects, males were 15 and females were 9 in the age range of 26 to 55 years. Mean values were identified from 0.069 to 0.075 for all three groups. In group II, p value was highly significant. All values were tabulated logically and processed suitably. 95% coefficient interval also revealed very significant inferences. **Conclusion:** In the studied time periods, recognized bone loss around implants was clinically insignificant. Authors concluded that in the first forty five days of implant positioning, peri implant bone loss is minimal and can be managed easily by routine plaque control measures.
Key words: Three Dimensional Radiography, Bone Loss, Dental Implants

Received: December 14, 2020 Accepted: January 17, 2021

Corresponding Author: Dr. Uttkarsh Bhatt, Post Graduate Student, Department of Prosthodontics and Crown & Bridge, Shree Bankey Bihari Dental College and Research Centre, Ghaziabad, UP, India

This article may be cited as: Bhatt U, Deshbakht IB, Sinha NR, AM Akash, AP Jishnu, Bhowmick S. A CBCT based evaluation of bone losses in post treatment stage of osseointegrated implants positioned in mandibular arches: An Original Research Study. J Adv Med Dent Sci Res 2021;9(3):45-48.

INTRODUCTION

As we all are aware that bone resorption is the devastation of hard alveolar tissue. Such alveolar tissue loss is frequently assisted by osteoclasts and circulating mononuclear cells. Osteoclasts are major cells accountable for the demineralization of the alveolar tissues. The preservation of peri implant bone tissue is necessary for the long-term success of implants retained prosthesis.[1-4] The most extensively used factors for calculating results in implantology are related to the implant, the peri implant soft tissue, prosthesis. These factors are associated to the tissue stability, which affects the development of marginal bone loss around healthy implants. Many on the

researchers have given the criteria to define success in implant dentistry. However, most of them are under continuous debate. Precisely, the attainment and maintenance of osseointegration are accepted as critical factors.[5,6,7] Few of the clinicians believe that the loss of 2 mm of bone around the implant neck during the first year after functional loading is normal. Interestingly, this criterion has even been believed a successful outcome in some classifications and agreement statements. In recent times, the investigation and significance of bone remodelling shows that rehabilitation happens from the moment of dental implant placement.[8,9,10] Present study was intended to evaluate bone losses in post treatment stage of osseointegrated implants positioned in mandibular arches. The study was assisted by three dimensional radiography i.e.; cone beam computed tomography.

MATERIALS & METHODS

This clinical study was completed in the department of Prosthodontics and oral implantology of the college. Total twenty four patients were selected and asked to participate in this clinical study. Patients were counselled to take part in the repeated radiographic procedures. Patients were accurately selected by randomized sampling process. Authors studied total 15 male and 9 female patients. All twenty four patients were selected randomly in which solitary implant was positioned anteriorly in the lower arch. Informed consents were obtained from all participating patients. Cone beam computed tomography was attempted to see the existing bone in the close vicinity of implant. The significance of the study was explained in detail to patients. For classification of the bone loss according to timing, all the implants were divided in three groups. Bone loss was assessed after stage one surgery at three time intervals. Post treatment clinical appointments were adjusted as per their radiographic schedule. Patients have been instructed to follow these timelines to avoid any discrepancy in results. Included patients were treated by properly trained clinicians at the institute. All patients had to be systemically healthy. All patients who fulfilled the inclusion criteria were invited for re-examination by phone calls to visit the department. In group I, radiographs were made for all selected implants to check bone levels at fifteen days of implant positioning. In group II, radiographs were made for all selected implants to check bone levels at thirty days of implant positioning. In group III, radiographs were made for all selected implants to check bone levels at forty five days of implant positioning. All standard radiation protection protocols were ensured. All CBCT records were stored and analyzed in digital format. Data was subjected to two independent subject experts for bone level appraisal. Mean values were analyzed for interpretation of final outcomes. Results thus received was compiled in table and subjected to basic statistical analysis. P value less than 0.05 was considered significant ($p< 0.05$).

STATISTICAL ANALYSIS AND RESULTS

Implant dentistry, as a scientific discipline, has grown rapidly over the last four decades with the aim of facilitating early and effective osseointegration affording successful long-term outcomes. Over these years, the onset of complications has been neglected as representing only isolated events. Data were gathered for all patients on their age, gender, history of systemic disease and the presence or absence of infection at sites. Here, authors selected 15 male and 9 female subjects. The overall age range was 26 years to 55 years. Maximum 13 patients were found from age of 26 to 35 years. P value was significant for this section (graph 1 &table 1). It was 0.01.In the table 2, authors have discussed about detailed statistical analysis. P value was highly significant for group II. Standard deviation was also maximum for group II. Mean values was noticed in the range of 0.069 to 0.075. All values were tabulated rationally and processed properly. 95% coefficient interval also revealed very noteworthy inferences.

Table 1: AGE & GENDER WISE DISTRIBUTION OF PATIENTS

Age Group (Yrs)	Male	Female	Total	P value
26-35	8	5	13	0.01*
36-45	5	3	8	0.09
46-55	2	1	3	0.50
Total	15	9	24	*Significant

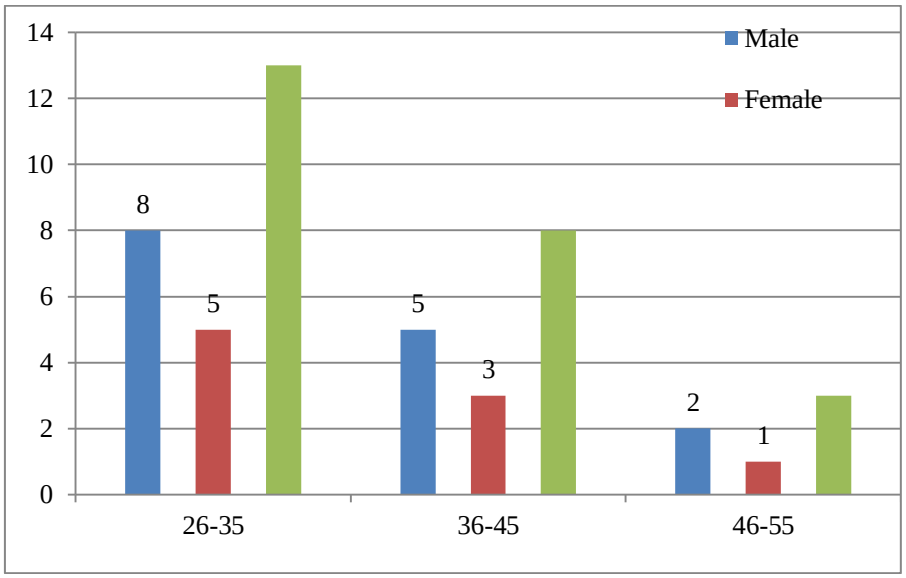
***p<0.05 significant**

Table 2: CRITICAL STATISTICAL EXPLANATION WITH LEVEL OF SIGNIFICANCE ASSESSMENT USING PEARSON CHI-SQUARE TEST [BONE LEVELS IN GROUP I TO III]

GROUPS	n	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
GROUP I	24	0.075	1.432	0.849	1.67	1.736	1.0	0.600
GROUP II	24	0.069	1.542	0.953	2.30	2.039	1.0	0.002*****
GROUP III	24	0.072	1.049	0.426	2.63	2.424	1.0	0.090

***p<0.05 significant**

Graph 1: AGE & GENDER WISE DISTRIBUTION OF PATIENTS



DISCUSSION

Literature has well demonstrated that bone tissue responds positively and negatively to masticatory forces. Any alteration in the skeletal framework and bony density are considered in terms of magnitude of chewing forces. Many of renowned researchers have shown these correlations in their studies.[11,12,13] Many studies have been conducted to reduce the highest forces by increasing the surface area of the peri-implant surface. The study of these parameters showed how remodelling of the bone adjoining the crestal area of the implant takes place during the first year after implant placement. The ultimate success criteria for osseointegrated implants include maintenance of satisfactory bone levels while mastication.[14,15] It is generally believed that crestal bone loss of roughly one mm during the first year after prosthetic loading and an annual bone loss thereafter not exceeding0.2 mm is reliable with successful implant treatment. However, bone loss of up to 2 mm of bone surrounding the neck has been taken to be normal. Nevertheless, the consequent remodelling of the nearby bone should continue be assessed, because it can eventually lead to the failure of the dental implant.[16,17,18] Peri-implantitis was originally discussed as a disease with pathological amendments in the peri-implant tissues. Consequently, various criteria have been explained for its diagnosis: bleeding, probing depth of higher than four mm. The crestal bone of dental implants is subjected to slight load alterations over time, conditioning implant survival.[19,20] Different clinical procedures for prevention and treatment of peri-implantitis have been recommended, including mechanical debridement, the use of antimicrobial agents local or systemic.[21,22]

CONCLUSION

In the studied time periods, identified bone loss around implants was clinically insignificant. Authors also concluded that in the first forty five days of implant positioning, peri implant bone loss is minimal and can be managed easily by routine plaque control measures. CBCT evaluation also confirms that these types of clinically inappreciable bone losses must not considered alarming for implant success. Also, such type of minute and precise detail can only be accurately captured by cone beam computed tomography. Therefore, only three dimensional radiographic aids like CBCT must be sensibly used to study such clinical circumstances. Our study inferences should be considered as indicative for presuming prognosis for similar clinical conditions.

REFERENCES

1. Papakoca K, Dimova C, Zlatanovska K, Zarkova J. Dental implantology- script, University Goce Delcev, School of medical studies, Republic of Macedonia.
2. Misch CE. Dental implant prosthetics. St Louis: Mosby. 2005.
3. Krhen J, Canjuga I, Jerolimov V, Krhen T. Implant stability measurement six weeks after implantation. Acta Stomatol Croat. 2009;43(1):45-51.
4. Živko-Babić J, Jakovac M, Carek A, Lovrić Ž. Implant prosthetic therapy of a missing front tooth. Acta Stomatol Croat. 2009;43(3):234-241.
5. Nickenig HJ, Wichmann M, Schlegel KA, Nkenke E, Eitner S. Radiographic evaluation of marginal bone levels adjacent to parallel- screw cylinder machined-neck implants and rough-surfaced microthreaded implants using digitized panoramic radiographs. Clin Oral Implants Res. 2009;20(6):550-554.
6. Piao CM, Lee JE, Koak JY, et al. Marginal bone loss around three different implant systems: radiographic evaluation after 1 year. J Oral Rehabil. 2009;36(10):748-754.
7. Lee SY, Piao CM, Koak JY, et al. A 3-year prospective radiographic evaluation of marginal bone level around different implant systems. J Oral Rehabil.2010;37(7):538-544.
8. Testori T, Robiony M, Parenti A, Luongo G, et al. Evaluation of accuracy and precision of a new guided

surgery system: a multicenter clinical study. Int J Periodontics Restorative Dent. 2013;33(4):483-489.
9. Nevins M, Heinemann F, Janke UW, et al. Equine-derived bone mineral matrix for maxillary sinus floor augmentation: a clinical, radiographic, histologic, and histomorphometric case series. Int J Periodontics Restorative Dent. 2013;33(4):483-489.
10. Kao DW, Kubota A. Nevins M, Fiorellini JP. The negative effect of combining rhBMP-2 and Bio-Oss on bone formation for maxillary sinus augmentation. Int J Periodontics Restorative Dent. 2012;32(1):61-67.
11. Khammissa RAG, Feller L, Meyerov R, Lemmer J. Peri-implant mucositis and peri-implantitis: clinical and histopathological characteristics and treatment. SADJ. 2012;67(3):124-126.
12. Rocchietta I, Nisand D. A review assessing the quality of reporting of risk factor research in implant dentistry using smoking, diabetes and periodontitis and implant loss as an outcome: Critical aspects in design and outcome assessment. J Clin Periodontol. 2012;39:114-121.
13. Klokkevold PR, Han TJ. How do smoking, diabetes, and periodontitis affect outcomes of implant treatment?. Int J Oral Maxillofac Implants. 2007;22:173-202.
14. Hinode D, Tanabe S, Yokoyama M, Fujisawa K, Yamauchi E, Miyamoto Y. Influence of smoking on osseointegrated implant failure: A meta-analysis. Clin Oral Implants Res. 2006;17(4):473-478.
15. Bornstein MM, Cionca N, Mombelli A. Systemic conditions and treatments as risks for implant therapy. Int J Oral Maxillofac Implants. 2009;24:12-27.
16. Khammissa RA, Feller L, Meyerov R, Lemmer J. Peri-implant mucositis and peri-implantitis: bacterial infection. SADJ. 2012;67(2):72-74.
17. Paul Rosen, Donald Clem, David Cochran, et al. Academy Report: Peri-Implant Mucositis and Peri-Implantitis: A Current Understanding of Their Diagnoses and Clinical Implications. J Periodontol. 2013;84(4):436-443.
18. Sugiura T, Yamamoto K, Horita S, Murakami K, Tsutsumi S, KiritaT. The effects of bone density and crestal cortical bone thickness on micromotion and peri-implant bone strain distribution in an immediately loaded implant: A nonlinear finite element analysis. J Periodontal Implant Sci. 2016;46(3):136-151.
19. Renvert S, Aghazadeh A, Hallström H, Persson GR. Factors related to peri-implantitis - a retrospective study. Clin Oral Implants Res. 2014;25(4):522-529.
20. Lagervall M, Jansson LE. Treatment outcome in patients with peri-implantitis in a periodontal clinic: a retrospective study. J Periodontol. 2013;84(10):1365-1373.
21. Chen S, Darby I. Dental implants: Maintenance, care and treatment of peri-implant infection. Aust Dent J. 2003;48(4):212-220.
22. Romeo E, Ghisolfi M, Murgolo N, Chiapasco M, Lops D, Vogel G. Therapy of peri-implantitis with resective surgery. A 3-year clinical trial on rough screw-shaped oral implants. Part I: Clinical outcome. Clin Oral Implants Res. 2005;16(1):9-18.