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Assessment Of Dental Implant Thread Design On Marginal Bone Loss Running Title: Dental Implant Thread Design

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ABSTRACT

Background:Dental implant design determines the implant success. The present study was conducted to assess dental implant thread design on marginal bone loss.

Materials & Methods:This study was conducted on 104 dental implants. They were divided into 2 groups. Group I patients received spiral implants and group II patients received dual fit implants. Each group had 52 dental implants. Patients were recalled after 6 months to see marginal bone loss.

RESULTS: The mean marginal bone loss in group I was 2.04 mm and in group II was 2.26 mm. The difference was significant (P< 0.05). The mean survival rate in group I was 96.2% and in group II was 95.1%.

CONCLUSION:Spiral implants had less bone loss and higher survival rate as compared to dual fit implants.

KEY WORDS: Dental implant, Bone loss, Spiral implant

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1. INTRODUCTION

Dental implants are one of the most promising devices used currently for replacement of missing teeth. They have revolutionized oral rehabilitation for managing partially and fully edentulous patients, achieving success rates beyond 90% in long term. Osseo integration is the key for success of implant.[1] Initial cortical is a general recommendation and is very critical for obtaining good Osseo integration and designing of implant plays an important role in providing a "well- seated" implant. Poor primary stability of implant results in implant failure; other related causes include inflammation, bone loss, biomechanical overloading and osteonecrosis.[2] Primary stability influences the secondary stability and gradually the overall stability of the implant. There are four main components that help to achieve primary stability: Implant design, surface of implant, bone quality of the recipient site and the surgical procedure employed for placement of implant. Amongst these, implant design has been studied and associated often with shorter time for surgical procedure and even quick healing rate.[3]

Of the different implant thread design variables, pitch has the most significant influence on surface area. The importance of the thread pitch has been highlighted in an in vivo animal study showing improved anchorage of implants with a narrow pitch.[4] Thread lead influences the amount of revolutions required to insert an implant in reverse proportion. As the thread lead grows, the thread helix angle grows accordingly, resulting in a potential effect on the forces transmitted to the bone.[5] The present study was conducted to assess dental implant thread design on marginal bone loss.

2. MATERIALS & METHODS

This study was conducted in the department of Prosthodontics. It comprised of 104 dental implants inserted in 78 patients of both genders. All were informed regarding the study and their consent was obtained. Ethical clearance was obtained before starting the study.

Demographic profile such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Group I patients received spiral implants and group II patients received dual fit implants. Each group had 52 dental implants. Implants were inserted according tothe manufacturer's protocol. Theimplants were covered by soft tissue,then covered with a healing cap orrestored with a temporary restoration. Patients were recalled after 6 months and plaque,gingival recession, and probing depthindices were recorded to monitor the health of the peri-implant mucosa. Results were tabulated and subjected to statistics. P vale less than 0,.05 was considered significant.

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3. RESULTS

Table I

Distribution of implants

Groups	Group I	Group II
Design	Spiral	Dual fit
Number	52	52

Table I shows that group I patients received spiral implants and group II patients received dual fit implants. Each group had 52 dental implants.

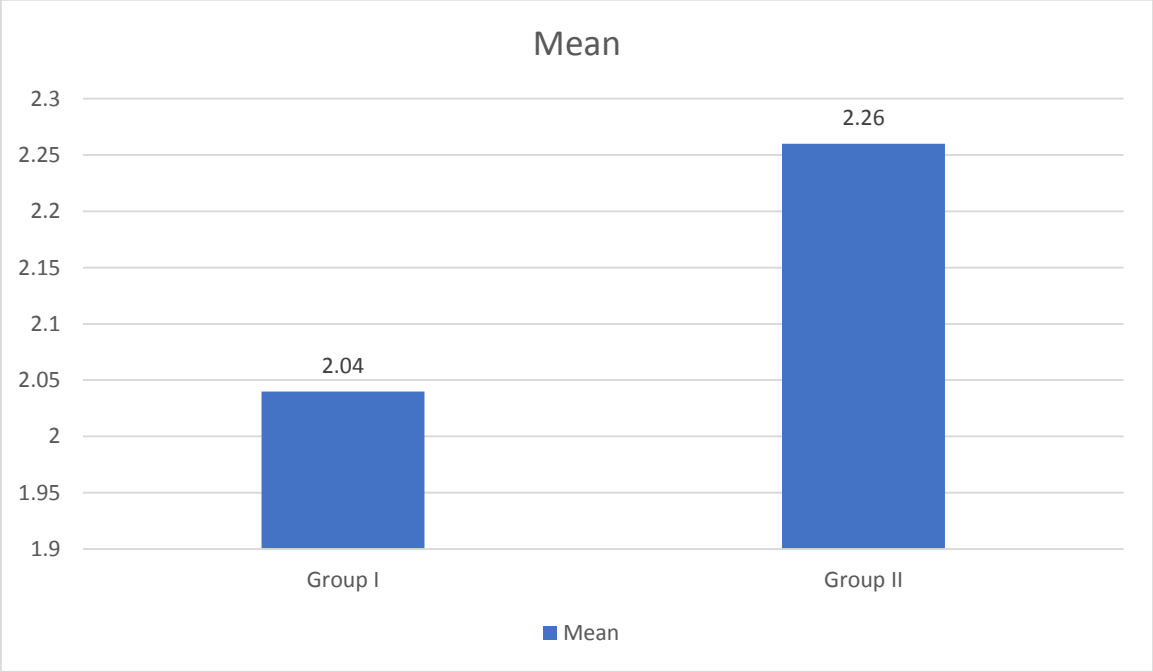
Table II

Assessment of marginal bone loss in both groups

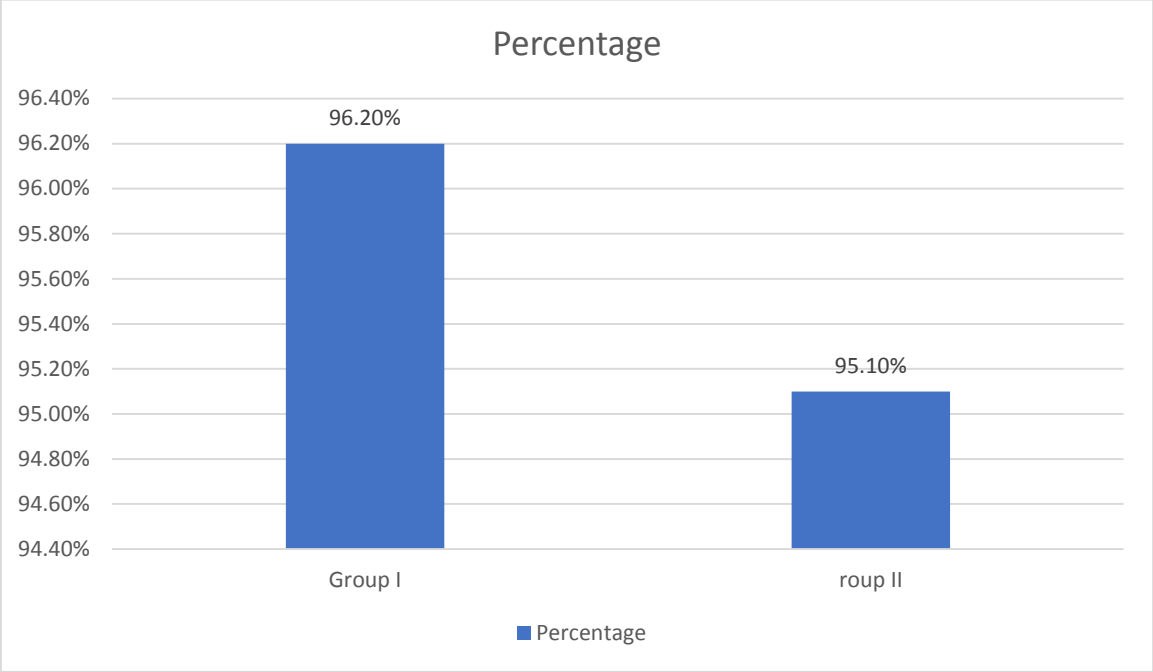
Groups	Mean	P value
Group I	2.04	0.04
Group II	2.26	

Table II, graph I shows that the mean marginal bone loss in group I was 2.04 mm and in group II was 2.26 mm. The difference was significant (P< 0.05).

Graph IAssessment of marginal bone loss in both groups



Graph II Survival rates of dental implants



Graph I shows that mean survival rate in group I was 96.2% and in group II was 95.1%.

4. DISCUSSION

Thread design includes thread shapes. Various thread shapes are designed for effective force insertion and transmission. Thread shape is determined by the thickness and thread face angle. Various shapes available include; V-shape, square shape, buttress and reverse buttress shape. Studies using Finite Element Analysis have shown how thread profile may affect stress concentration and distribution. Out of the different thread designs V-shape and broader square shape generated less stress compared with the thin and narrower square thread in cancellous bone.[6]The present study was conducted to assess dental implant thread design on marginal bone loss.

In present study, group I patients received spiral implants and group II patients received dual fit implants. Each group had 52 dental implants. Chang., et al[7] studied different thread designs and their influence on surrounding bone under immediate loading of 300 N axial loading. They found that square thread profile had more favourable micromotion values than rest of the thread shapes. Supporting this is a study by Chun., et al[8] suggesting superiority of square threads because of its maximum stress distribution.

We found that the mean marginal bone loss in group I was 2.04 mm and in group II was 2.26 mm. Arnhartet al[9] performed multicentre clinical trials using variable thread tapered implant and suggested that it can be used as a safe and effective treatment modality.

We found that mean survival rate in group I was 96.2% and in group II was 95.1%.Omianer et al[10] evaluated the implant macrostructure effect on marginal bone loss using 3 dental implant thread designs with differences in thread pitch, lead, and helix angle. In total, 1361 implants met the inclusion criteria representing the 3 types of implants macrostructure. Overall survival rate was 96.3% with 50 implants failing (3.7%) out of a total of 1361

implants. Survival rates for the 3 groups were: group A 96.6%, group B 95.9%, and in group C 100%. Average bone loss for groups A, B, and C were 2.02 (61.70) mm, 2.10 (61.73) mm, and 1.90 (61.40) mm, respectively. Pairwise comparisons revealed that less bone loss occurred in group A compared with group B (P ¼ 0.036).

Orsini et al[11] investigated the osseointegration process in animal cancellous bone. Two types of implants with the same surface treatment were tested: one with a narrow pitch and one with a wide pitch, demonstrating that implants with a narrow pitch had improved anchorage due to greater surface area and bone-to-implant contact (BIC). Park et al[12], the levels of bone loss after 1 year in the latter were 1.07 6 0.46 mm for the reverse buttress V-thread implant and 0.79 6 0.42 mm for the V-shape thread implant.

Thread pitch refers to the distance from the centre of the thread to the centre of the next thread, measured parallel to axis of screw and can be calculated by diving unit lengths with by number of threads. It has an inverse relation with the number of threads per unit area. It is different from Lead which is distance from centre of thread to the centre of same thread after one turn or more accurately the distance that screw would advance in axial direction if turned one complete revolution. Now for single-threaded implants lead is equal to pitch but as threads increase to double or triple, the lead increases by one.[13]

The shortcoming of the study is small sample size and short follow up.

5. CONCLUSION

Authors found that spiral implants had less bone loss and higher survival rate as compared to dual fit implants.

6. REFERENCES

[1] Schlegel KA, Kloss FR, Kessler P, et al. Bone conditioning to enhance implant osseointegration: An experimental study in pigs. Int J Oral Maxillofac Implants. 2003;18:505–511.

[2] Trisi P, Berardini M, Falco A, et al. Effect of implant thread geometry on secondary stability, bone density, and boneto-implant contact: a biomechanical and histological analysis. Implant Dent. 2015; 24:1–8.

[3] Finne K, Rompen E, Toljanic J. Three-year prospective multicenter study evaluating marginal bone levels and soft tissue health around a one-piece implant system. Int J Oral Maxillofac Implants. 2012;27:458–466.

[4] Sennerby L, Rocci A, Becker W, et al. Short-term clinical results of Nobel Direct implants: A retrospective multicentre analysis. Clin Oral Implants Res. 2008;19:219–226.

[5] Reddy MS, O'Neal SJ, Haigh S, et al. Initial clinical efficacy of 3-mm implants immediately placed into function in conditions of limited spacing. Int J Oral Maxillofac Implants. 2008;23:281–288.

[6] Dos Santos MV, Elias CN,Cavalcanti Lima JH. The effects of superficial roughness and design on the primarystability of dental implants.Clin ImplantDent Relat Res. 2011;13:215–223.

[7] Chang PK, Chen YC, Huang CC, et al. Distribution of micromotion in implants and alveolar bone with different thread profiles in immediate loading: A finite element study. Int J Oral Maxillofac Implants. 2012;27:e96–e101.

[8] Chun HJ, Cheong SY, Han JH, et al. Evaluation of design parameters of osseointegrated dental implants using finite element analysis. J Oral Rehabil.2002; 29:565–574.

[9] Arnhart C., et al. Comparison of variable-thread tapered implant designs to a standard tapered implant design after immediate loading. A 3-year multicentre randomised controlled trial". European Journal of Oral Implantology 2012; 123-136.

[10] Ormianer Z, Palti A, Demiralp B, et al. Implant-supported first molar restorations: Correlation of finite element analysis with clinical outcomes. Int J Oral Maxillofac Implants. 2012;27:e1–e12.

[11] Orsini E, Giavaresi G, Trire A, et al. Dental implant thread pitch and its influence on the osseointegration process: An in vivo comparison study. Int J Oral Maxillofac Implants. 2012;27:383–392.

[12] Park JC, Ha SR, Kim SM, et al. Arandomized clinical 1-year trial comparingtwo types of non-submerged dental implants. Clin Oral Implants Res. 2010;21:228–236.

[13] Morris HF, Winkler S, Ochi S, et al.A new implant designed to maximize contact with trabecular bone: Survival to18 months. J Oral Implantol. 2001;27:164–173.