CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

SJIF Impact Factor: 7.187
http://doi.org/10.5281/zenodo.4369370

Avalable online at: http://www.iajps.com *Research Article*

COMPARING THE STRESSES DEVELOPED IN THE PERI IMPLANT BONE IN TWO DIFFERENT TYPES OF SCREW-RETAINED RESTORATIONS, SEGMENTED VS. NON-SEGMENTED ABUTMENT, USING A FINITE ELEMENT MODEL

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Article Received: October 2020 **Accepted:** November 2020 **Published:** December 2020

Abstract:

Aim: *Screw-held reclamations supported in some clinical circumstances, for example, restricted between occlusal spaces. This study was intended to think about burdens created in the peri-embed bone in two distinct sorts of screw-held rebuilding efforts (portioned versus non-fragmented projection) utilizing a limited component model.*

Methods: *An embed, 6.3 mm in width and 14 mm long, was set in the main molar site of a mandibular model with 1 mm of cortical bone on the buccal and lingual sides. Our current research conducted at Sir Ganga Ram Hospital, Lahore from March 2019 to February 2020. Fragmented and non-sectioned screw projections with their crowns were set on the mimicked embed in each model. Subsequent to stacking (100 N, pivotal and 45° non-hub), von Mises stress was recorded utilizing ANSYS programming, variant 13.0.1.*

Results. *The greatest concerns with the fragmented projection screw were not exactly those of the fragmented projection (89 vs. 100, and 379 vs. 435 MPa under the pivot and non-pivot stacking, individually). The greatest loads in the peri-nesting bone for the fragmented projection model were not exactly those of the undivided (22 vs. 24 MPa, and 33 vs. 126 MPa under vertical and precise vertical stacking, individually). Similarly, the miniature stress of the peri-embedded bone for the recovery of the fragmented projection was not as great as that of the fragmented projection.*

Conclusion: *Under pivotal and non-hub loadings, non-portioned projection demonstrated less pressure fixation in the screw, while there was less anxiety in the peri-embed bone in the fragmented projection.*

Keywords: *Peri-Implant Bone, Screw-Retained, Finite Element Model.*

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Please cite this article in press Sundas Mahmood Dar et al., ***Comparing the stresses developed in the peri implant bone in two different types of screw-retained restorations, segmented vs. Non-segmented abutment, using a finite element model.,*** *Indo Am. J. P. Sci, 2020; 07(12).*

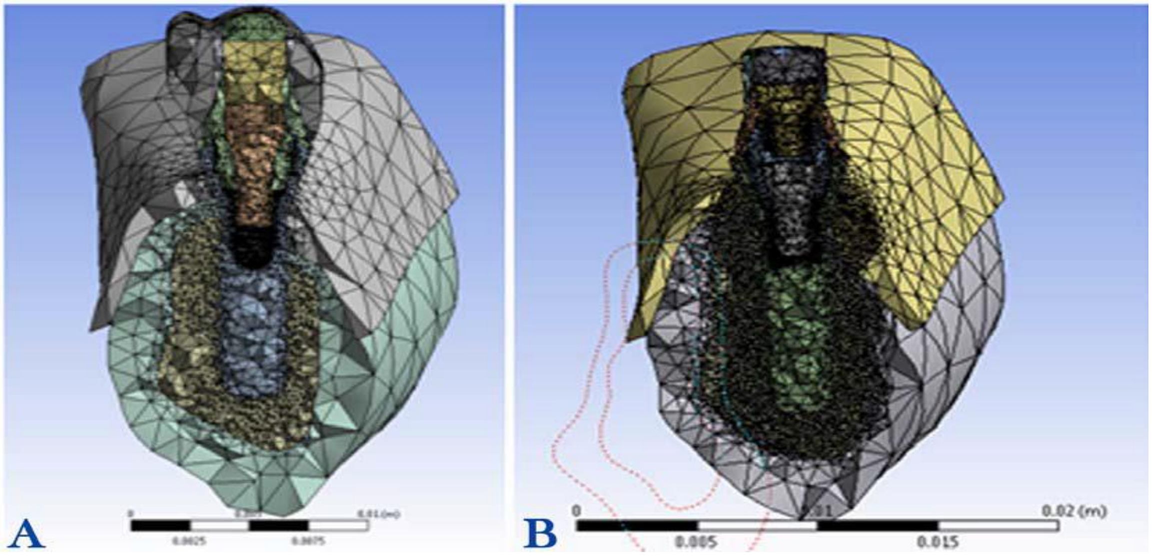
INTRODUCTION:

Integrated prostheses have been widely used in recent years because of their promising results in terms of style, utility and organicity. However, the design of dental inserts is influenced by a few components, in particular the biomechanics of the insert, the diffusion of the load at the bone-implant interface, and in addition, the displacement of stresses towards the bone [1]. Built-in prostheses are divided into two main categories: screw-retained prostheses and concrete prostheses. While each type of reconstruction has certain advantages, their selection is generally based on clinician preference. According to Hackman et al, there is no contrast between the attack accuracy of these two types of claims [2]. In addition, the pressure created in the peri-embedded bone supporting the screwed and cemented reconstruction efforts has been found to be similar. Screw-retained reconstruction forces have some preferences over those in concrete, including the recoverability, stability and safety of the implant-abutment connection. For this reason, it is enthusiastically suggested that these reconstruction forces be used in clinical circumstances, such as when the sub gingival edges of the reconstruction forces are deeper than 3 mm, when the occlusal space is restricted (less than 4 mm)15 and when natural or specialized confusions are anticipated [3]. In addition, because of their irrecoverable nature, screwed claims are also suggested for cantilevered claims. Screwed reconstruction efforts can be created with two types of projections: portioned and without segmented abutments. In the case of an unfragmented projection, the reconstruction is created directly and associated with the recess, which can result in a more attractive profile and elevation style when the available occlusal space is limited [4]. Another preferred position of unfragmented projections is to reduce the number of parts of the projection, which can reduce the complexity and cost of restoration. Since the stress appropriation in the embedded bone is a fundamental factor in the fabrication of embedded prostheses, some examinations were performed to explore the pressure dispersion in the embedded components and the surrounding bone using a limited study of the components. Given the conceivable function of the projection and the plane of the prosthesis in the distribution of pressure in recovery, and the anxieties transferred at depth, the similar impact of segmented and non-segmented projections on pressure displacement is unclear. Hypothetically, given the decrease in the number of screws and the miniature movement of the segments in the non-segmented projections, the measurement of depth-transferred stresses would crumble. There is no review exploring the design of pressure distribution in different kinds of projections and by embedded bone. Hence, the purpose of this review was to evaluate and reflect on the design of pressure flow in the crestal bone around the inserts supporting the reconstruction efforts of fragmented and non-sectioned screw projections, and furthermore on the design of stress distribution in the projection screws [5].

METHODOLOGY:

A balanced porcelain crown combined with metal (12 mm mesiodistally and 10 mm buccoline) was imitated using a highly respected amalgam for the structure and a uniform thickness of 1 mm porcelain on the metal system. A similar crown size was demonstrated for the unfractionated openwork, with the distinction that the system was presented as a piece of the projection, so that the crown and projection were demonstrated in one piece. Our current research was conducted at Sir Ganga Ram Hospital, Lahore from March 2019 to February 2020. The crowns were planned in such a way that the focal point of the crowns harmonizes with the long pivot of the inserts. The models were then exchanged for the ANSYS Workbench 12.0 adaptation. The contact between the screw and the insert and the projection was regarded as friction, with fortified surfaces on all the different surfaces. The finished models coincided with allegorical tetrahedral components (Figure 1 An and B). The model with the sectioned projection consolidated 235,058 elements and 375,099 hubs, and the model with the non-sectioned projection included 202,177 elements also, 327,084 hubs. All the hubs on which the 3D models were based were checked for boundary conditions. Inserts, projections, projection screws, crowns and cortical and cancellous bone were considered homogeneous, isotropic and directly elastic. The versatile properties of the materials used in the FE model are recorded in Table 1. Two 100 N stacking sets were reproduced and applied to the focal fossa of the crowns in two extraordinary steps, vertically34 and laterally (45°) with respect to the long hub of the inserts. Osseo's integration was considered complete. The contact between implant and bone was mimicked to introduce full Osseo integration. The design of the stress flow was further evaluated by shaded coded graphs as a quantitative examination, in which the highest and least distressed regions were shown in red and blue, individually.

Figure 1:



RESULTS:

The greatest concerns in bone per implant and in fragmented and non-fragmented projection screws were evaluated and examined (Table 2). In both models and in each stacking condition, the most extreme pressure fixation was recognized around the neck of the inserts. In addition, as the proper means of embedding developed, a reduction in bone pressure by embedding was observed. In addition, von Mises pressure estimates were also higher under rakish stacking conditions. Further examination of the pressure showed that the miniature deformation values created in the embedded bone with the unfractionated projection were higher (4400 and 9500 units under vertical and angular loads, individually) than those of the fractional projection (2300 and 2500 units under vertical and angular loads, separately).

Figure 2:

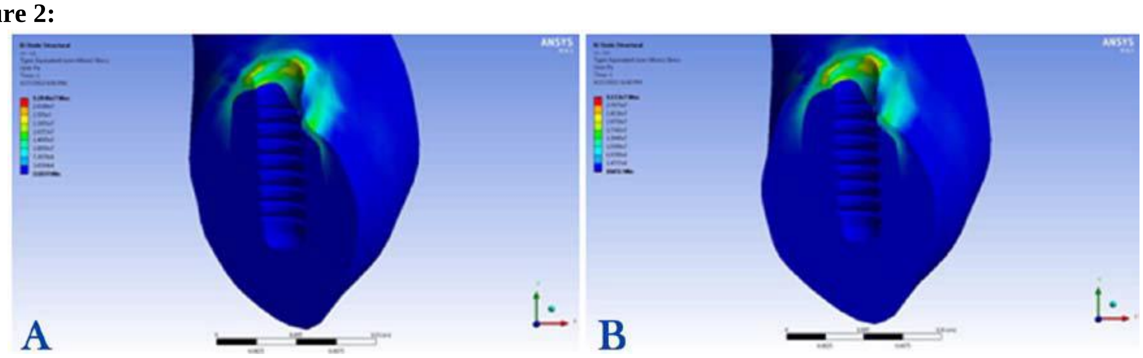


Figure 3:

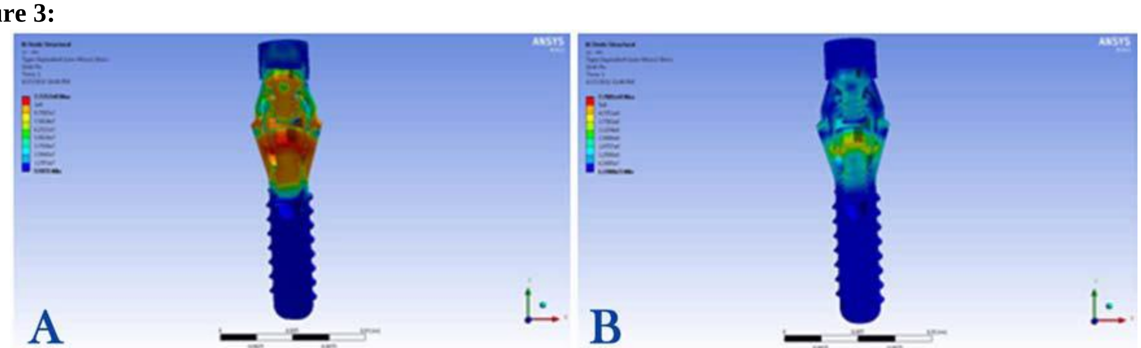


Table 1:

Model	Maximum von Mises stress in bone	Maximum von Mises stress in abutment screw	Maximum von Mises strain in bone
Segmented abutment, axial loading	21	100	4400
Segmented abutment, non-axial loading	31	430	9400
Non-segmented abutment, axial loading	24	87	2200
Non-segmented abutment, non-axial loading	126	375	2400

Table 2:

Material	Modulus of elasticity (Mpa)	Poisson's Ratio
Cancellous bone	1370	0.30
Cortical bone	13700	0.30
Porcelain	69000	0.28
High-noble alloy	100000	0.30
Titanium	103400	0.33

DISCUSSION:

The current investigation has been planned to compare the impact of using split and unfragmented projections on the pressure dispersion in embedded bone, and the projection reduces screw damage through limited three-dimensional examination of the components [6]. Von Mises pressure was used to assess bone pressure and decide whether bone damage would occur under unpredictable stacking conditions. The simulated nibbling power used in this investigation was 100 N.34, applied to the focal point of the occlusal surfaces of the crowns [7]. The examination showed that the pressure concentration and bone macro deformation by embedding in the model with fragmented projection was greater than that of the fragmented projection. The side effects of a photo-elastic concentrate from Ochiaiet al indicated that un-fragmented projections that are exposed to vertical stacking set more non-parallel pressure in the bone when contrasted with the fractured projections [8]. As indicated by Ranger et al, the adaptability of the implant segments may provide some opportunity for movement, and hence decrease the pressure [9]. This conclusion is consistent with the results of our study, which demonstrated a decrease in macro deformation in embedded bone with the sectioned projection [10].

CONCLUSION:

Within the limits of the current examination, it can very well be deduced that the projections of portioned screws offer biomechanical preferences with regard to the reduction of pressure fixation and macro deformation in the bone. The pressure focus in the projection screw was higher in the segmented projection than in the non-portioned projection.

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