International Journal of Research in Health and Allied Sciences

Journal home page: www.ijrhas.com

Official Publication of "Society for Scientific Research and Studies" [Regd.]

ISSN: 2455-7803

Original Research

A comparative evaluation of dental implants with different connection configuration

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ABSTRACT:
Background: The stability of hard and soft tissues around dental implants is one of the most decisive factors for long-term implant prognosis. The present study was conducted to compare dental implants with different connection configuration. **Materials & Methods:** 30 patients requiring dental implants of both genders were enrolled. Two groups were made containing 15 patients each. Group I patients were delivered implants with internal friction connection (test group) and group II implants with external hex connection (control group). Implant-supported crowns were delivered at 4 months after implant insertion. Distance from implant shoulder to first bone-to-implant contact (DIB) and peri-implant area were measured. **Results:** There were 8 males and 7 females in group I and 6 males and 9 females in group II. Smoking was seen among 10 in group I and 9 in group II. 4 in group I and 5 in group II were hypertensive and 3 in group I and 5 in group II were diabetics. Bone quality was 1 seen in 6 in group I and 7 in group II, 2 seen in 5 and 4, 3 in 2 and 3 and 4 in 2 and 1 in group I and II respectively. Gingival width <3mm was seen in 5 in group I and 7 in group II and >3 mm seen in 10 in group I and 8 in group II. The difference was non- significant (P> 0.05). **Conclusion:** There was chance of the internal friction connection structure for more effective preservation of marginal bone.
Key words: Dental implant, internal friction connection, bone-to-implant contact

Received: 24 June, 2021 Accepted: 29 July, 2021

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This article may be cited as: Chhabra P, KP Aysha N, Singh AK, Khan FA, Pandya MJ, Tejaswini MS. A comparative evaluation of dental implants with different connection configuration. Int J Res Health Allied Sci 2021; 7(5): 25-27.

INTRODUCTION

A dental implant is a biocompatible device surgically placed into mandibular or maxillary bone for supporting a prosthetic tooth crown, and thus allowing the replace of the teeth lost due to caries, periodontal disease, injuries, or other reasons. Worldwide statistics show that a high success rate of dental implants occurs if implants are properly designed and manufactured, and if they are inserted in a bone segment characterized by good quality and quantity.[1]

The stability of hard and soft tissues around dental implants is one of the most decisive factors for long-term implant prognosis. Marginal bone loss is a major factor in implant success or failure.[2] Peri-implant infection plays a role in the marginal bone resorption around a dental implant. Several factors that cause the marginal bone loss include surgical trauma, reformation of biologic width, implant-abutment connection structure, history of periodontitis, and occlusal overloading. Some studies have evaluated the

effects of implant-abutment connection structure on the marginal bone level change.[3] The implant-abutment connection structure is an important etiologic factor for peri-implant bone remodeling and crestal bone loss, as the highest number of inflammatory cells is infiltrated and the bacteria causing periodontitis are colonized at the microgap of implant-abutment connection.[4]

An occlusal overload could affect peri-implant marginal bone loss. Because of the biomechanics of the lever system of the mandible and jaw elevator muscles, the occlusal force is greater on the posterior than on the anterior region; hence, relative distribution of occlusal bite force in the posterior region is higher than that in the anterior region.[5] Therefore, it is necessary to limit implant sites to exclude the difference of occlusal force. A direct comparison between two different implant-abutment connection structures (external hex and internal friction connections) with identical implant design in the posterior region has been rare, especially in the same posterior region.[6] The present study was conducted to compare dental implants with different connection configuration.

MATERIALS & METHODS

This study comprised of 30 patients requiring dental implants of both genders. All were enrolled after they agreed to participate and gave written consent.

Two groups were made containing 15 patients each. Group I patients were delivered implants with internal friction connection (test group) and group II implants with external hex connection (control group). Implant-supported crowns were delivered at 4 months after implant insertion. Standardized periapical radiographs were taken at prosthesis delivery (baseline), and one year after delivery. Distance from implant shoulder to first bone-to-implant contact (DIB) and peri-implant area were measured on the radiographs. Results were noted and evaluated statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Patients characteristics

Parameters	Variables	Group I	Group II	P value
Gender	Male	8	6	0.81
	Female	7	9	
Smoking	Yes	10	9	0.34
	No	5	6	
Systemic disease	None	8	5	0.12
	Hypertension	4	5	
	Diabetes	3	5	
Bone quality	1	6	7	0.05
	2	5	4	
	3	2	3	
	4	2	1	
Gingival width	<3mm	5	7	0.72
	>3mm	10	8	

Table I shows that there were 8 males and 7 females in group I and 6 males and 9 females in group II. Smoking was seen among 10 in group I and 9 in group II. 4 in group I and 5 in group II were hypertensive and 3 in group I and 5 in group II were diabetics. Bone quality was 1 seen in 6 in group I and 7 in group II, 2 seen in 5 and 4, 3 in 2 and 3 and 4 in 2 and 1 in group I and II respectively. Gingival width <3mm was seen in 5 in group I and 7 in group II and >3 mm seen in 10 in group I and 8 in group II. The difference was non- significant (P> 0.05).

Table II Changes in distance from implant shoulder to first bone-to-implant contact (DIB) and peri-implant area (PA)

Parameters	Variables	Group I	Group II	P value
DIB	Baseline	0.24	-0.07	0.08
	At 1 year	0.28	0.54	
PA	Baseline	0.32	0.35	0.05
	At 1 year	0.42	0.45	

Table II shows that there was significant difference in implant shoulder to peri-implant area (PA) (P< 0.05).

DISCUSSION

A crucial aspect that determines the effectiveness of a dental implantation is identified by the proper development of the osseointegration process at the bone-implant interface.[7] This process is similar to the healing process in bone fracture and arises from remodeling mechanisms that involve a number of cellular and extracellular coupled biomechanical features.[8] After the implantation, the gap between the implant. and the host bone is rapidly filled by blood clots that are afterwards substituted by a trabecular network. The latter generally evolves towards the

formation of lamellar bone that, in turn, undergoes a maturation process that modifies density and mechanical properties of the tissue.[9] At the end of the healing process, the mature bone is directly in contact with the implant surface, leading to an interfacial binding that allows to enhance loading transfer mechanisms from prosthetic crown to the bone.[10] The present study was conducted to compare dental implants with different connection configuration.

In present study, there were 8 males and 7 females in group I and 6 males and 9 females in group II. Smoking was seen among 10 in group I and 9 in group II. 4 in group I and 5 in group II were hypertensive and 3 in group I and 5 in group II were diabetics. Bone quality was 1 seen in 6 in group I and 7 in group II, 2 seen in 5 and 4, 3 in 2 and 3 and 4 in 2 and 1 in group I and II respectively. Gingival width <3mm was seen in 5 in group I and 7 in group II and >3 mm seen in 10 in group I and 8 in group II. Kim et al[11] evaluated the effect of two different implant-abutment connection structures with identical implant design on peri-implant bone level. This trial was conducted in 24 patients recruited between March 2013 and July 2015. Implants with internal friction connection were compared to those with external hex connection. One implant for each patient was installed, replacing the second molar. Implant-supported crowns were delivered at four months after implant insertion. Standardized periapical radiographs were taken at prosthesis delivery (baseline), and one year after delivery. On the radiographs, distance from implant shoulder to first bone-to-implant contact (DIB) and peri-implant area were measured, which were the primary and secondary outcome, respectively. Eleven external and eleven internal implants were analysed. Mean changes of DIB from baseline to 1-year post-loading were 0.59 (0.95) mm for the external and 0.01 (0.68) mm for the internal connection. Although no significant differences were found between the two groups, medium effect size was found in DIB between the connections (Cohen's d = 0.67).

We observed that there was significant difference in implant shoulder to peri-implant area (PA) (P< 0.05). Caricasulo et al[12] in their study a total of 1649 articles were found, but only 14 studies met the pre-established inclusion criteria and were considered suitable for meta-analytic analysis. The network meta-analysis (NMA) suggested a significant difference between the external and the conical connections; this was less evident for the internal and conical ones. Platform-switching (PS) seemed to positively affect bone levels, non-regarding the implant-connection it was applied to. It was concluded that crestal bone levels are better maintained in the short-medium term when internal kinds of interface are adopted. In particular, conical connections seem to be more advantageous, showing lower peri-implant bone loss, but further studies are necessary to investigate the efficacy of implant-abutment connection on stability of crestal bone levels.

CONCLUSION

Authors found that there was possibility of the internal friction connection structure for more effective preservation of marginal bone.

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