Evaluation the mobility of the dental implant (comparison between the cemented and screw retained single fixed prosthesis)

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Key words
Screw and cemented retained single fixed prosthesis, \

Abstract
Aim of the study: To evaluate the mobility of the dental implant at the time of loading, after three months and six months from the loading of the implants in the patient's mouth of two types of retaining methods (cemented and screw type). **Materials and Methods:** A total of twenty dental implants were implanted in 20patients. These patients divided into 2 groups. The first group received screw retained prosthesis. The second group received cemented retained prosthesis. The stability of these implants was measured using periotest device at the time of loading, 3monthes and six months after loading. The data was analyzed using descriptive statistic, Analysis of variance (ANOVA), Duncan Multiple analysis range test and student t-test. **Result:** Among the two groups, the group receiving screw retaining prosthesis having a significant greater stability than that group receiving cemented type retaining prosthesis. **Conclusion**: the residual dental cement that remain after cementation of the cemented retaining prosthesis, affect directly on the perodontium health, and this subsequently affect on the stability of the dental implant.

Introduction

Implant-supported fixed prostheses may be either cement-or screw-retained, depending on interarch space, submucosal implant shoulder location, and the number of supporting implants [1].Although the advantages of cement-retention, such as improved occlusion, enhanced esthetics, reduced cost, clinical/laboratory simplicity, and less mechanical complications are appealing, the [2]. indications, as well as the benefits of screw retention cannot be underestimated. Screw retention is preferred when submucosal implant shoulder placement is greater than 3mm subgingivally, when interarch space is significantly increased or decreased, and for multiple misaligned implants supporting long-span restorations [3] .

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The mobility has been graded clinically by placing a tooth between two metallic instrument handles and moving the tooth in as many directions as possible[4].This is a subjective assessment of mobility. Several methods were devised for measuring tooth mobility more accurately[5-6].The Periotest is an electronic device that measures the dampening characteristics of the periodontium. The Periotest value is a biophysical parameter in its own right of the reaction of the periodontium to a percussive force [7]. The aim of this study is to evaluate the mobility of the dental implant at the time of loading, after three months and six months from the loading of the implants in the patient's mouth of two types of retaining methods (cemented and screw type).

Material and Methods

Twenty dental implants were used in this study in which upper premolar single implant supported prosthesis were selected (LEADER, Tixos laser made direct laser metal forming system, Italia). The study was derived from the population of male patients with healthy periodontium, had age from 25to 35years old with single implant supported prosthesis of two types of retaining methods(cemented and screw type), Several variables other than the age and the sex of the patient , such as anatomic form(included implant position, tooth type, proximity of the implant relative to other teeth or implants). occlusion, soft tissue health, and reconstructive procedures, were also recorded and be considered the standard selection for all the patients including in this study, since in this study we focus on the prosthetic part of the dental implant and so to identify the stability of two types of retaining methods (cemented and screw type).The identification of the stability was done at the time of loading, after three months and six months of the implants loading , the twenty patients including in this study were grouped in to two groups, The first group received screw retained prosthesis . The second group received cemented retained prosthesis. The stability of these two types of retaining methods were measured using periotest device as shown in figure (1),three monthes and six months after loading of their implants.

A periotest device (Medizintechnik gulden e.k. Eschenweg 3،64397 modautal, Germany) and this is done by holding the tip of the instrument's hand piece as horizontal as possible to the bone surface(8) as shown in Figure (1).According to the manufacture instructions, the value above (10) periotest units were associated with Osseo integration failure.

The data was analyzed using Descriptive statistic, analysis of variance (ANOVA) at $P \leq 0.05$. These data were analyzed by Duncan multiple analysis range test to locate the significant differences among the groups and student t-test was also used.

Results and Discussion

Twenty patients had received 20 dental implants (LEADER, Tixos laser made direct laser metal forming system, Italia),these patients were grouped into two groups, The first group received screw retained prosthesis. The second group received cemented retained prosthesis. These 20 patients had subsequent follow-up visits and were included in this study and all these patients were under control of there oral hygiene and check up their periodontium status. A supragingival plaque recognizable with aperiodontal probe (score, modified plaque index) (9).

The descriptive statistic, mean and standard deviation for the stability of the cemented retaining single dental implant at the time of loading,3months after loading and 6months after loading were presented in Table.(1).The results showed that the mean value of the stability of the cemented retaining single dental implant at the time of loading was (0.6370), and with time follow-up , the results showed that there is increased in the mobility rate, that is mean there was decrease in the stability of the dental implant (0.6980)after three months of loading ,and the mean value of the stability measured by periotest device after 6 months of loading was (0.9020)which was the highest value.

The results of ANOVA and Duncan multiple analysis range test and F-value for the stability of the cemented retaining single dental implant were presented in Table(2,3) in which these results showed that there was a significant difference between groups of different types of the retaining methods (screw and cemented types).

Table (4) showed the mean and standard deviation of the stability of the screw retaining single dental implant at the time of loading was (0.6460), and with time follow-up , the results showed that there is increased in the mobility rate, that is mean there was decrease in the stability of the dental implant (0.6810)after three months

of loading ,and the mean value of the stability measured by periotest device after 6 months of loading was (0.7270)which was the highest value, but still had lower mean value when compared with the cemented type which had higher value after 3 and 6 months of loading ,that is mean that the stability of the screw retaining single dental implant was better than the stability of the cemented retaining single dental implant in this study.

The results of ANOVA and Duncan multiple analysis range test and F-value for the stability of the screw retaining single dental implant were presented in Table(5,6) in which these results showed that there was a significant difference between groups of different types of the retaining methods (screw and cemented types).

Table (6,7,8) show T-test for both the two groups of the retaining methods (screw and cemented types). At the time of loading, there was no significant difference between the two types of the retaining methods (screw and cemented types),since the correct treatment planning were selected and depended on at the first, It involves designing and selecting patient utilizing biological and mechanical principles so that will provide the patient with long term function, while maintaining healthy oral structures (10) .

In Table(7) although there was no significant differences between the two groups, but the screw type stay had higher stability than the other type of the retaining method, no significant changes in the mobility
were observed during the 3-months follow-up, the results of this study are in accord with those of Manz et al(11).

With the follow-up in this study, after 6 months of loading, the results in Table(8) showed that there was a significant differences between the two groups. There was a significant decrease in the stability value of the cemented type in compared with the other screw type, The surface texture of the cemented retaining prosthesis type near the gingival margin become slightly granular surface appearance, because of the effect of residual cement material used in the cementation of this type of retaining prosthesis. Past research has shown that the access materials present, achieve higher roughness values than all-ceramic materials(12-13), and the supragingival plaque accumulation observed around this type of prosthesis (cemented type) was expected, because it has been consistently shown that cement materials accumulate plaque at a higher rate than tooth structure and all-ceramic restorations (14-15), and this will lead to that the mean sulcular depth around it will increase and pathological pocket may occurred lead to this increasing in their mobility(16-17).

The most common materials used for the restoration of both teeth and implants are ceramo-metal and all-ceramic crowns(18).

According to Paul and Pietrobon30, a single implant-retained metal–ceramic crown cemented on a metal abutment may be considered the standard selection(19).

To overcome the unwanted effect of the residual dental cement material used for cementation of the cement retaining single implant, which affect directly on the perodontium health and subsequently on the prognosis of the procedure (20), a cementless technique for restoration of single tooth implant. In this way ,the implant restorations is differ from cemented metal–ceramic crowns in that the metal abutments and the crown material were chemo-mechanically bonded in the laboratory; therefore, there was no need for cement(21). Also, the abutments were connected to the implants with a screwless locking taper(22),.

Conclusion

The use of the cemented retained single dental implant had some problem related to the access materials used in the cementation process, so we recommended to perfectly remove the access or residual dental cement all around the crown especially near the gingival margin as possible to decrease the roughness that may occurred due to this residual cement, and so the supragingival and subgingival plaque accumulation will happened which affect directly on the surrounding supporting structure, in which may lead to implant loss.

A cementless technique for restoration of single tooth implant were recommended in addition of the screw type, although both of them has some of unwanted or poor properties.

Table (1): Mean and standard deviation for the stability of the cemented retained single fixed prosthesis, in three different periods

	N	Mean	Std. Deviation	Std. Error
0	**10**	**0.6370**	**0.02869**	**0.00907**
3 Months	**10**	**0.6980**	**0.03553**	**0.01123**
6 Months	**10**	**0.9020**	**0.04917**	**0.01555**

Table(2): ANOVA analysis for the stability of the cemented retained single fixed prosthesis, in three different periods.

	Sum of Squares	df	Mean square	f	p-value.
Between Groups	**0.385**	**2**	**0.193**	**128.307**	**0.000***
Without Groups	**0.041**	**27**	**0.002**		
Total	**0.426**	**29**			

Table (3): Duncan's Multiple Range Test for the stability of the cemented retained single fixed prosthesis, in three different periods(0,3 months an d 6 months)

Time	N	Duncan's Grouping		
		A	B	C
0	**10**	**0.6370**		
3 Months	**10**		**0.6980**	
6 Months	**10**			**0.9020**

.*0= immediately after loading, 3= 3 months after loading , 6 = 6 months after loading. **= significant at P≤0.05.

Table (4): Mean and standard deviation for the stability of the screw retained single fixed prosthesis, in three different periods.

	N	Mean	Std. Deviation	Std. Error
0	10	0.6460	0.02914	0.00921
3 Months	10	0.6810	0.03929	0.01242
6 Months	10	0.7270	0.04423	0.01399

Table (5): ANOVA analysis for the stability of the screw retained single fixed prosthesis, in three different periods.

	Sum of Squares	df	Mean Square	F	p-value
Between Groups	0.033	2	0.017	11.385	0.000*
Within Groups	0.039	27	0.001		
Total	0.072	29			

*0 = immediately after loading, 3=3 months after loading , 6 = 6 months after loading.
**= significant at P≤0.05.
DF: degree of freedom

Table (6) : Duncan's Multiple Range Test for the stability of the screw retained single fixed prosthesis, in three different periods(0,3 months and 6 months).

Time	N	Duncan's Grouping		
		A	B	C
0	10	0.6460		
3 Months	10		0.6810	
6 Months	10			0.7270

*0= immediately after loading, 3= 3 months after loading , 6 = 6 months after loading. **Mean with different letters are statistically different at P≤0.05.

Table (7) : Descriptive statistic and student t-test for the stability of two groups cemented and screw retained single fixed prosthesis at the time of loading .

group	N	Mean	Std. Deviation	Std. Error Mean	t	df	p-value
Cement	**10**	**0.6370**	**0.02869**	**0.00907**	**-0.696**	**18**	**0.495**
Screw	**10**	**0.6460**	**0.02914**	**0.00921**			

N= number of patients
DF= degree of freedom
St= standard Deviation

Table (8) : Descriptive statistic and student t-test for the stability of two groups cemented and screw retained single fixed prosthesis three months after loading .

group	N	Mean	Std. Deviation	Std. Error Mean	t	df	p-value
Cement	**10**	**0.6980**	**0.03553**	**0.01123**	**1.015**	**18**	**0.324**
Screw	**10**	**0.6810**	**0.03929**	**0.01242**			

N= number of patients
DF= degree of freedom
St= standard Deviation

Table (9): Descriptive statistic and student t-test for the stability of two groups cemented and screw retained single fixed prosthesis six months after loading**.**

group	N	Mean	Std. Deviation	Std. Error Mean	t	df	p-value
Cement	10	0.9020	0.04917	0.01555	8.367	18	0.000*
Screw	10	0.7270	0.04423	0.01399			

N= number of patients
DF= degree of freedom
St= standard Deviation

Figure (1) periotest device

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