Elucidation of the key factors that influence ISQ measurements in clinical practice: a retrospective analysis

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Abstract

Objectives:

Elucidation of the key factors influencing the clinical implant stability quotient values (ISQs) in a retrospective study

Materials and methods:

In 177 patients (329 implants) resonance frequency analysis (RFA) was performed using T1 (measured immediately at the time of implant placement) and T2 (measured before dental restoration). The following 11 candidate parameters were considered: gender of patient, age, implant position (maxillary or mandibular), bone type, immediate/ delayed implantation, bone graft (presence or absence), insertion torque, I stage or II stage healing, diameter and length of the implant, T1-T2 time period . A statistical analysis was performed using a multivariant linear regression model.

Result

Multivariate linear regression analysis to analyze the weight coefficient of each influencing factor for the values of Implant Stability Quotient (ISQ) that were measured immediately after implantation T1.

Constant and Influencing factors (X)	Unstand. Coef.		Stand. Coef. Beta	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
Constant	57.263	4.226	-	13.551	.000	48.942	65.585
Gender	1.317	.622	.111	2.116	.035	.091	2.542
Maxillary/mandibular	1.471	.652	.121	2.257	.025	.188	2.755
Immediate/delayed	1.836	.664	.148	2.763	.006	.527	3.144
Bone graft	-4.990	1.135	-.235	-4.395	.000	-7.226	-2.754
Implant diameter	1.669	.754	.119	2.212	.028	.183	3.154
I/II stage implantation	2.961	.657	.241	4.504	.000	1.666	4.255
Insertion torque	.131	.025	.286	5.313	.000	.082	.180

Result

Multivariate linear regression analysis to analyze the weight coefficient of each influencing factor for the values of Implant Stability Quotient (ISQ) that were measured right before loading T2.

Constant and Influencing factors (X)	Unstand. Coef.		Stand. Coef. Beta	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
Constant	56.988	3.043	-	18.726	.000	50.977	63.000
Implant diameter	4.080	.698	.414	5.848	.000	2.702	5.459
Insertion torque	.048	.023	.150	2.115	.036	.003	.093
T1-T2 time interval	.014	.005	.191	2.715	.007	.004	.025

Conclusions:

Among the 11 candidate parameters, 7 key factorswere found to influence the T1-ISQ values, and only 3 key factors the T2 measurements. Both T1 and T2 data were found to be influenced by the diameter of the implant and the insertion torque. T1 was influenced specifically by the gender of the patient, the topographical location (maxillary or mandibular), by the implantation mode (immediate /delayed implantation), by the healing stage and by the absence or presence of bone graft materials.