Comparison of complications between splinted and nonsplinted implants installed in the posterior region

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INTRODUCTION

Bio-mechanical complications are crucial factors that determine the prognosis of osseointegrated dental implants. The aim of this study is in the aspect of their complications to analyze and compare the long term prognosis of two different types such as splinted and non-splinted prosthesis of implant supported restoration on the first and second molar regions.

METHODS & MATERIAL

A total 242 implants of 121 sites installed on the first and second molar region in 102 patients. Implants were divided into splinted group (i.e., 82 sites including 164 implants) and non-splinted group (i.e., 39 sites including 78 implants). For each group, patient information about gender, age, implant position, bone grafting, Functional Loading Periods (FLP), clinical Crown/Implant (C/I) ratio, Crown Height Space (CHS), Horizontal Distance (HD) between implants, restoration type of each implant, and occurrence of biological [i.e., peri-implant mucositis (PM) and peri-implantitis (PI)] and mechanical [i.e., screw loosening (SL), screw fracture, crown fracture, and repeated SL] complications were investigated by clinical and radiographic records. Student's t-test, chi-square test, fisher's exact test, Kruskal-Wallis test, Kaplan-Meier method were used in statistical analysis

Table 1. Charateristics of study population

Characteristics	Non-splinted group	Splinted group
Patients	36	66
Age (mean ± SD, years)	55.42±10.63	58.46±9.59
Implant location	39	82
FLP (mean ± SD, months)	45.94±21.83	49.12±31.12
Bone grafting	39	82
Operation	29 (74.4)	50 (61.0)
No operation	10 (25.6)	32 (39.0)
Mean clinical C/I ratio (mean ± SD)	0.97±0.21	0.97±0.23
Mean CHS (mean ± SD, mm)	9.91±1.95	10.18±2.27
HD (mean ± SD, mm)	5.51±1.94	5.39±1.98

RESULTS

In non-splinted group, they were observed on 5 and 2 sites, respectively. Also, in splinted group, biological and mechanical complications were observed on 16 and 9 sites, respectively. In non-splinted group, implants with mechanical complications showed statistical significance with lower CHS. In splinted group, implants with only biological complications showed statistically significant relationship with lower clinical C/I ratio and CHS, and longer FLP. I Especially for cumulative risk assessment of biological complication rate in non-splinted group using Kaplan-Meier method, cumulative risk of biological complication increased drastically from 90.33 months. All the other factors had no significant correlation with occurrence of both complications.

Table 2. Occurrence rate of mechanical and biological complication

Complication	Non-splinted group (n = 7 sites / 39 sites)	Splinted group (n = 25 sites / 82 sites)	P
Mechanical complications	2 (5.1)	9 (11.0)	0.296
Screw loosening	1 (2.6)	4 (4.9)	1.00
Repeated screw loosening	0 (0)	1 (1.2)	1.00
Screw fracture	1 (2.6)	0 (0)	0.322
Crown fracture	0 (0)	4 (4.9)	0.304
Fixture fracture	0 (0)	1 (1.2)	1.00
Biological complication	5 (12.8)	16 (19.5)	0.364
Peri-implant mucositis	2 (5.1)	4 (4.9)	0.165
Peri-implantitis	3 (7.7)	12 (14.6)	0.279

Table 3. Analysis of correlation between each factor and complications in non-splinted group

Non-splinted	Mechanical Complications	Mechanical success	P	Biological complications	Biological success	P
Patients	2	34		5	31	
Males	1	18	1.00	2	17	0.650
Females	1	16		3	14	
Age (mean ± SD, years)	46.5±5.5	55.94±10.33	0.22	62.4±6.34	55±10.82	0.12
Implant location	2	37	0.503	5	34	0.631
Maxilla	0	16		3	13	
Mandible	2	21		2	21	
FLP (mean ± SD, months)	60.12±5.5	45.18±22.15	0.36	51.34±31.64	44.21±20.10	0.72
Bone grafting operation			0.061			0.302
With bone grafting	0	29		5	24	
Without bone grafting	2	8		0	10	
Clinical C/I ratio (mean ± SD)	0.71±0.10	0.98±0.21	0.08	0.79±0.23	1.01±0.19	0.05
CHS (mean ± SD, mm)	6.62±0.54	10.09±1.84	< 0.05*	8.99±1.72	10.05±1.94	0.27
HD (mean ± SD, mm)	4.34±1.51	5.57±1.94	0.40	6.44±1.98	5.43±1.90	0.26

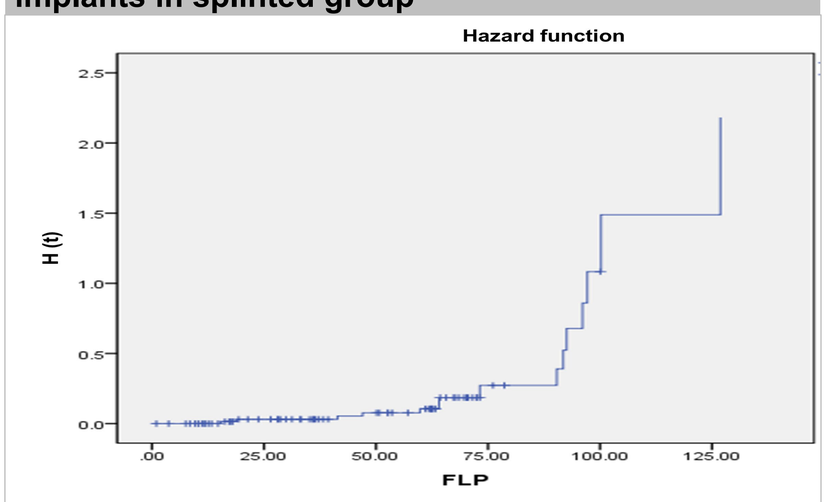
Table 4. Analysis of correlation between each factor and complications in splinted group

Splinted	Mechanical Complications	Mechanical success	P	Biological complications	Biological success	P
Patients	8	58		15	51	
Males	6	33	0.455	7	32	0.27
Females	2	25		8	19	
Age (mean ± SD, years)	54.38±8.00	58.15±9.42	0.29	58.53±12.81	56.47±10.71	0.33
Implant location	9	73		16	66	
Maxilla	7	39	0.286	9	37	0.99
Mandible	2	34		7	29	
FLP (mean ± SD, months)	47.51±30.66	49.32±30.80	0.87	80.42±36.25	41.53±24.28	< 0.05*
Bone grafting operation			0.083			0.777
With bone grafting	8	42		9	41	
Without bone grafting	1	31		7	25	
Clinical C/I ratio (mean ± SD)	1.10±0.28	0.95±0.21	0.05	0.79±0.18	0.99±0.25	< 0.05*
CHS (mean ± SD, mm)	11.38±2.83	10.03±2.14	0.09	8.16±1.94	10.67±2.06	< 0.05*
HD (mean ± SD, mm)	5.33±1.49	5.40±2.05	0.92	5.52±2.02	5.28±2.06	0.78

DISCUSSION & CONCLUSION

Lower CHS of both groups is the most important factor in the occurrence of biological complication in splinted implants and mechanical complication among non-splinted implants. It seems that insufficient CHS can worsen hygienic vulnerability in splinted group due to failure of proper biologic width around implant and reduce sufficient embrasure space under connector area of splinted prosthesis. In case of non-splinted group, lower CHS can aggravate biomechanical stress. Also, lower clinical C/I ratio and longer FLP are related to the occurrence of biological complication in splinted implants. Due to the similar length of implants on the posterior region, CHS and clinical C/I ratio seem to have identical tendency. Splinted implants with longer FLP had significantly higher occurrence rate of biological complication. According to Kaplan-Meier method, cumulative risk of biologic complication drastically increases from 90.33 months after loading, which means that it is recommended to have follow-up visit before 90.33 months to prevent biological complication in splinted implants

Figure 1. Cumulative biological complication rate of implants in splinted group



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