

Original Research

Evaluation of Longevity of Dental Implants Placed With or Without Surgical Template: An Original Research Study

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ABSTRACT:

Background & Aim: Dental implant failure is very common clinical dilemma in implantology. Most of the failures are related to technicalities and precautions during osteotomy procedures. So, placement of implant is highly subjective and must be performed ideally. This study was planned to evaluate the longevity of dental implants placed with or without surgical template. **Materials and Methods:** In this study, total 20 patients were selected in which single implant placements were required. This study was on prospective model. Group 1 has 10 patients in which implant Osteotomy was initiated by Surgical Template. Group 2 has 10 patients in which implant Osteotomy was not initiated by Surgical Template. Surgical Template was prepared with self cure acrylic clear resin Implant longevity was assessed in their post operative phases over a period of one year. Different implant longevity criteria presented in literature were used to segregate the cases. **Statistical Analysis & Results:** Total 20 subjects were studied with 12 male and 8 females in the age range of 28 to 39 years. In 28-30 years, total 2 patients were there. P value was highly significant for this group (0.02). Total 9 patients showed satisfactory survival of more than one year (>1 Year without any sign of failure). P value was significant for this parameter (0.02). In group 2, total 7 patients showed satisfactory survival of more than one year (>1 Year without any sign of failure). P value was significant for this parameter (0.01). **Conclusion:** Within the limitations of the study authors concluded that patients showed superior longevity in which Surgical Template was used. The findings were fairly significant also.

Keywords: Implant Failure, Longevity, Implant, Success, Surgical Template, Osteotomy

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INTRODUCTION

Implant surgical template is one of the important entities in the successful implant therapy. It was introduced with an idea of accurate initial placement of dental implants.¹⁻³ Many of the pioneer researchers have therefore addressed it as surgical guide. Surgical templates actually drive the first drill in the right direction and correct angulations.^{4,5} Since correct angulations are deemed necessary in oral implantology, surgical templates have emerged. Initially, surgical template were made by acrylic resin however with the latest advancements surgical templates are now made by computer assisted technology and software. Literature has well evidenced that implant success is usually higher in

cases where surgical template has been utilized during osteotomy.⁶⁻⁷ Therefore many clinicians follow this imperative initial stage of implant placement.^{8,9} Surgical template usage is technique sensitive also therefore it requires experience and expertise. This study was planned to evaluate the longevity of dental implants placed with or without surgical template.

MATERIALS AND METHODS

Usage of implant surgical template is highly recommended for successful implant therapy. In this study authors intended to check the longevity of dental implants placed with or without surgical template. For the same, total 20 patients were screened initially in which single implant placements were needed. The

patients with history of smoking, aggressive periodontitis, bony disorder, hormonal imbalance were immediately excluded from the study. Patients with any kind of follow up problems were also excluded from the study. Both male and female patients were included in the study without any selection bias. Patients have been explained about the study and informed consent was obtained from each of them. This study acquired prospective model so exactly it is prospective cohort clinical study. The planning of implant dimension was done with the help of CBCT software. All participating 20 patients were divided into two study groups of 10 each. Group 1 has 10 patients in which implant Osteotomy was initiated by Surgical Template. Group 2 has 10 patients in which implant Osteotomy was not initiated by Surgical Template. Surgical Template was prepared with self cure acrylic clear resin with controlled and measured barium content so that it can be seen over radiographs. Implant longevity was assessed in their post operative phases over a period of one year. Implants exfoliated within one year were considered. Various implant longevity criteria discussed in literature were used to sort out cases. All rights and privacy of patients was kept confidential. Data was sent for statistical analysis using SPSS software. P value less than 0.05 was considered as significant.

subjects were studied with 12 male and 8 females in the age range of 28 to 39 years. In 28-30 years, total 2 patients were there. P value was highly significant for this group (0.02). In the next age range of 31-33 years, total 5 patients were present. P value was not significant for this group (0.50). Likewise, in age group of 34-36 years, total 5 patients were found. P value was not significant for this group (0.80). Table 2 demonstrates about grouping details of participating patients. 10 patients were in each study groups. Table 3 demonstrates about critical statistical analysis and descriptions for complication related successes of Group 1 with Surgical Template. Total 9 patients showed satisfactory survival of more than one year (>1 Year without any sign of failure). P value was significant for this parameter (0.02). Statistical mean was 3.83 while standard deviation was 0.938. The measured standard error was 0.122 and 95% CI was 1.25. Moreover, only 1 patient showed unsatisfactory survival of less than one year (<1 Year with sign of failure). P value was not significant for this parameter (0.10). Statistical mean was 1.92 while standard deviation was 0.912. The measured standard error was 0.523 and 95% CI was 1.12. Table 4 demonstrates about critical statistical analysis and descriptions for complication related successes of Group 2 without Surgical Template. Total 7 patients showed satisfactory survival of more than one year (>1 Year without any sign of failure). P value was significant for this parameter (0.01). Table 5 showing about assessment amongst the 2 study groups using one-way ANOVA [for Group 1 & 2]. P value was significant for this parameter (0.003).

STATISTICAL ANALYSIS AND RESULTS

All relevant data was gathered and sent to master excel sheet for analysis by SPSS software. Suitable tests were then used to check significant inferences. Table 1 & Graph 1 show about age & gender based distribution of all participating subjects. Total 20

Table 1: Age & gender based statistical details of participating patients

Age Group (Yrs)	Male	Female	Total	P value
28-30	1	1	2	0.02*
31-33	3	2	5	0.50
34-36	2	3	5	0.80
37-39	6	2	8	0.10
Total	12	8	20	*Significant
*p<0.05 significant				

Table 2: Grouping details of participating patients

Groups	Patients	Surgical Template
Group 1	10	Yes
Group 2	10	No

Table 3: Critical statistical analysis and descriptions for complication related successes of Group 1 with Surgical Template (n=10)

Group	Status	n	Stat. Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	p value
Group 1	>1 Year	9	3.83	0.938	0.122	1.25	1.951	2.0	0.02*
	<1 Year	1	1.92	0.912	0.523	1.12	1.543	1.0	0.10
*p<0.05 significant									

Table 4: Critical statistical analysis and descriptions for complication related successes of Group 2 without Surgical Template (n=10)

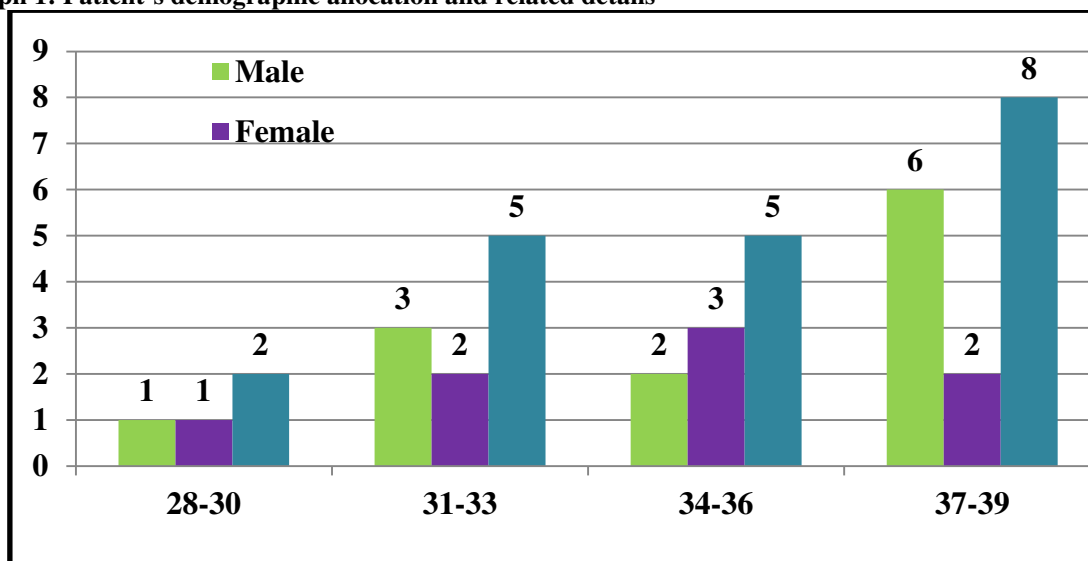
Group	Status	n	Stat. Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	p value
Group 2	>1 Year	7	2.43	0.736	0.845	1.29	1.741	2.0	0.01*
	<1 Year	3	1.02	0.953	0.238	1.03	1.323	2.0	0.10

***p<0.05 significant**

Table 5: Assessment amongst the 2 study groups using one-way ANOVA [for Group 1 & 2]

Variables	Degree of Freedom	Sum of Squares Σ	Mean Sum of Squares $m\Sigma$	F	Level of Significance (p)
Between Groups	2	2.627	1.536	1.8	0.003*
Within Groups	18	3.039	0.039		-
Cumulative	128.10	7.303			*p<0.05 significant

Graph 1: Patient’s demographic allocation and related details



DISCUSSION

Lal and colleagues have studied about the use of stereolithographic templates for surgical and prosthodontic implant planning and placement. They emphasized the intricate use of templates for surgical and prosthodontic implant planning.¹⁰ Basten used radiopaque templates for predictable implant placement in 1995 & 1996.¹¹⁻¹² They also emphasized the importance of surgical templates in implant planning. All these recommendations were in accordance with our study’s outcomes. Almog and coworkers studied the fabrication of imaging and surgical guides for dental implants in 2001.¹³ Their fabrication method became highly popular and adopted by several researchers worldwide. Becker and associates studied about the use and importance of surgical guide for dental implant placement.¹⁴ They stated that surgical guides or template is key to long term implant success and longevity. Our study results were similar to their findings. Akça and others assessed the surgical guide for accurate mesiodistal paralleling of implants in the posterior edentulous mandible.¹⁵ Kopp and colleagues have also conducted a study on predictable implant placement with a diagnostic/surgical template and advanced

radiographic imaging.¹⁶ Schwarz and other researchers have studied about the mandible for endosseous implant surgery. They also stressed the significance of surgical templates in implant planning. All these recommendations were in accordance with our study’s outcomes.¹⁷⁻¹⁸ Elliott and other pioneer workers have demonstrated the additively Manufactured Surgical Implant Guides.¹⁹ Tallarico and others have studied the accuracy of surgical templates with and without metallic sleeves in case of partial arch restorations.²⁰ Their recommendations were in accordance with our study’s outcomes.

CONCLUSION

Within the limitations of the study authors concluded that implant Surgical Template has critical role in overall longevity and performance of implants. Patients showed superior longevity in which Surgical Template was used for osteotomy procedure. This could be possibly related to the accurateness of implant placement with Surgical Template usage. The findings were fairly significant also. Authors also expect few other future long term studies to be performed so as to establish other imperative guidelines.

REFERENCES

1. Takeshita F, Suetsugu T. Accurate presurgical determination for implant placement by using computerized tomography scan. *J Prosthet Dent.* 1996;76:590–1.
2. Pesun IJ, Gardner FM. Fabrication of a guide for radiographic evaluation and surgical placement of implants. *J Prosthet Dent.* 1995;73:548–52.
3. Marchack CB, Moy PK. The use of a custom template for immediate loading with the definitive prosthesis: A clinical report. *J Calif Dent Assoc.* 2003;31:925–9.
4. Chiu WK, Luk WK, Cheung LK. Three-dimensional accuracy of implant placement in a computer-assisted navigation system. *Int J Oral Maxillofac Implants.* 2006;21:465–70.
5. The glossary of prosthodontic terms. *J Prosthet Dent.* 2005;94:10–92.
6. Brief J, Edinger D, Hassfeld S, Eggers G. Accuracy of image-guided implantology. *Clin Oral Implants Res.* 2005;16:495–501.
7. Arfai NK, Kiat-Amnuay S. Radiographic and surgical guide for placement of multiple implants. *J Prosthet Dent.* 2007;97:310–2.
8. Meitner SW, Tallents RH. Surgical templates for prosthetically guided implant placement. *J Prosthet Dent.* 2004;92:569–74.
9. Solow RA. Simplified radiographic-surgical template for placement of multiple, parallel implants. *J Prosthet Dent.* 2001;85:26–9.
10. Lal K, White GS, Morea DN, Wright RF. Use of stereolithographic templates for surgical and prosthodontic implant planning and placement. Part I. The concept. *J Prosthodont.* 2006;15:51–8.
11. Basten CH, Kois JC. The use of barium sulfate for implant templates. *J Prosthet Dent.* 1996;76:451–4.
12. Basten CH. The use of radiopaque templates for predictable implant placement. *Quintessence Int.* 1995;26:609–12.
13. Almog DM, Torrado E, Meitner SW. Fabrication of imaging and surgical guides for dental implants. *J Prosthet Dent.* 2001;85:504–8.
14. Becker CM, Kaiser DA. Surgical guide for dental implant placement. *J Prosthet Dent.* 2000;83:248–51.
15. Akça K, İplikçiođlu H, Cehreli MC. A surgical guide for accurate mesiodistal paralleling of implants in the posterior edentulous mandible. *J Prosthet Dent.* 2002;87:233–5.
16. Kopp KC, Koslow AH, Abdo OS. Predictable implant placement with a diagnostic/surgical template and advanced radiographic imaging. *J Prosthet Dent.* 2003;89:611–5.
17. Schwarz MS, Rothman SL, Rhodes ML, Chafetz N. Computed tomography: Part I. Preoperative assessment of the mandible for endosseous implant surgery. *Int J Oral Maxillofac Implants.* 1987;2:137–41.
18. Schwarz MS, Rothman SL, Rhodes ML, Chafetz N. Computed tomography: Part II. Preoperative assessment of the maxilla for endosseous implant surgery. *Int J Oral Maxillofac Implants.* 1987;2:143–8.
19. Elliott T, Hamilton A, Griseto N, Gallucci GO. Additively Manufactured Surgical Implant Guides: A Review. *J Prosthodont.* 2022 Mar;31(S1):38–46.
20. Tallarico M, Czajkowska M, Ciccìu M, Giardina F, Minciarelli A, Zadrożny Ł, Park CJ, Meloni SM. Accuracy of surgical templates with and without metallic sleeves in case of partial arch restorations: A systematic review. *J Dent.* 2021 Dec;115:103852.