Original Article

# Comprehensive Assessment Of Post Surgical Complication Related Successes In Patients Treated With Prefabricated And Custom Made Abutments At Different Timings: An Original Research Study

**Dr. Rohan Sikka[1], Dr. Vaishali[2], Dr. Tushyata Chandhok[3], Dr. Anil Sharma[4], Dr. Pankaj Bajaj[5], Dr. Kirti Dahiya[6]**

[1]Professor, Department of Prosthodontics and Crown & Bridge, PDM Dental College & Research Institute, Bahadurgarh, Haryana, India
[2]Senior Lecturer, Department of Prosthodontics and Crown & Bridge, PDM Dental College & Research Institute, Bahadurgarh, Haryana, India
[3]Reader, Department of Prosthodontics and Crown & Bridge, Divya Jyoti College of Dental Science & Research, Modinagar, India
[4]Professor & Head, Department of Prosthodontics and Crown & Bridge, Kalka Dental College, Meerut, India
[5]Professor & Head, Department of Prosthodontics and Crown & Bridge, PDM Dental College & Research Institute, Bahadurgarh, Haryana, India
[6]Reader, Department of Prosthodontics and Crown & Bridge, Kalka Dental College, Meerut, India

Corresponding Author: Dr. Rohan Sikka
Email: drrohansikka@gmail.com
**DOI:** 10.47750/pnr.2023.14.03.493

## Abstract

**Background & Aim:** Implant treatment is well accepted as prosthetic substitution option for different clinical circumstances. Nevertheless, clinical complications are also highly common with these therapies. This study was conducted to comprehensively assess the post surgical complication related successes in patients treated with prefabricated and custom made abutments at different timings.

**Materials and Methods:** Total 30 patients were included for complication based success rate of implant therapy. Patients were divided in to two study groups of 15 each based on the type of abutment used over them. Group 1 consisted of patient who received Prefabricated implant Abutments. Group 2 consisted of patient who received custom made implant abutments. Implant success were checked at different timings 2 months, 4 months and 6 months. Patients with any post operative loss of follow up were excluded from the study. Data was sent for statistical analysis using SPSS software. P value less than 0.05 was taken as significant.

**Statistical Analysis & Results:** Data analysis was done by SPSS software. All 30 subjects were studied with 18 male and 12 females in the age range of 40 to 60 years. In group 1, with increasing post operative follow up time, there was a clear decline in implant success rate. Also, in 6 months post operative time, the failure rate was highest. In group 2 also, there was a clear decline in implant success rate based upon the complications. P value was highly significant for 15 successful implants seen in 2 months post operative follow up time (with custom made abutments). Evaluation in the 2 study groups using one-way ANOVA showed significant p value (0.002).

**Conclusion:** Authors concluded that there was an obvious rise in implant related complications with increasing post operative time. In the 6 months post operative follow up period, lowest success rate was seen in both of the studied groups (prefabricated abutments, custom made abutments). Authors also anticipate other long term similar studies with wider parameters and larger samples.

**Keywords:** Prefabricated Abutments, Custom Made Abutments, Implant, Complications, Surgery, Osteotomy

## Introduction

Dental implant is routinely practiced in dentistry now days. In early nineties when implant was under apparent development, no data on its clinical performances was available. With the initiation of its clinical usage, reports have been notified about related complications and issues.[1,2] Presently clinicians prefer to use prefabricated abutments over custom made abutments. Additionally, this fact has also been confirmed by many pioneer researchers in the recent past. Implant success rate is therefore directly related with the complications type, its extent and severity, duration and location. Many clinical modifications have been tried by clinicians to minimize these post operative complications of implant therapy.[3,4] However, researchers have not succeeded in completely eradicating the post treatment issues. Therefore, one must focus on all the idea recommendations and guidelines while handling a implant case with prefabricated abutments and custom made abutments. Several studies in the literature also explored about these complication on different timings and their possible association with any other clinical parameters.[5,6] Literature has well evidenced about different post therapeutic complications with prefabricated abutments and custom made abutments.[3,5,7,8] So, this study was conducted to comprehensively assess the post surgical complication related successes in patients treated with prefabricated and custom made abutments at different timings.

## Materials and Methods

This study was exclusively conducted in the department of Prosthodontics of the institute. The ongoing fresh implant cases were targeted for data collection and processing. Total thirty patients were studied in detail for complication based success rate of implant therapy. Patients with single tooth implant were included in the study. Multiple implants and all on four/six/overdenture cases were excluded from the study. For the purpose of assessing the complication based implant success, we had divided the patients in to two study groups based on the type of abutment used over them. Group 1 consisted of patient who received Prefabricated implant Abutments. It consisted of 15 patients. Group 2 consisted of patient who received custom made implant abutments. It also consisted of 15 patients. Authors ensured to place all implants of same manufacturer. Also, standard osteotomy surgical protocols were utilized in all patients. Purposive sampling procedure was used in the study. Implant success were noticed at different timings. Total number of successful and failed implants were identified and tabulated for further analysis. This was performed in both the groups at 2 months, 4 months and 6 months time periods. Therefore follow up recall was highly imperative for the study. For determining successful and failed implants, authors used strict criterion of Albrektsson. All rights and privacy was kept confidential. Written and signed informed consent was also obtained from all participating patients. Patients with any post operative loss of follow up were excluded from the study. Patients with any potential medication were also not studied. All data recordings were attempted only after final placement of abutment (prefabricated/custom made). Data was sent for statistical analysis using SPSS software. P value less than 0.05 was taken as significant.

## Statistical Analysis and Results

All relevant data was entered into master spreadsheet and entered into SPSS software. Suitable tests were then applied to outline significant inferences. Table 1 & Graph 1 show about age & gender based distribution of all participating subjects. Total 30 subjects were studied with 18 male and 12 females in the age range of 40 to 60 years. Amongst 40-44 years, total 4 patients were noticed. P value was highly significant for this group (0.01). In the next age range of 45-50 years, total 9 patients were seen. P value was not significant for this group (0.40). Table 2 shows about essential statistical analysis and descriptions for complication related successes of Group 1: Prefabricated Abutments. This group consisted of total 15 patients. With the increasing post operative follow up time, there was a clear decline in implant success rate. This was actually based upon the simultaneous increase of related complications. In 6 months post operative time, the failure rate was quite high and it was more that general expectations. P value was highly significant for 14 successful implants seen in 2 months post operative follow up time (with prefabricated abutments). Table 3 shows about essential statistical analysis and descriptions for complication related successes of Group 2: custom made abutments. This group consisted of total 15 patients. With the increasing post operative follow up time, there was a obvious decline in implant success rate. This was truly based upon the concurrent increase of interrelated

complications. In 6 months post operative time, the failure rate was fairly elevated and it was more than usual anticipations. P value was highly significant for 15 successful implants seen in 2 months post operative follow up time (with custom made abutments). Table 4 shows about assessment amongst the 2 study groups using one-way ANOVA [for Group 1 & 2]. Assessments for between groups, within groups and cumulative were done. P value was significant here (0.002).

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

| Age Group (Yrs) | Male | Female | Total | P value |
|---|---|---|---|---|
| 40-44 | 3 | 1 | 4 | 0.01* |
| 45-50 | 5 | 4 | 9 | 0.40 |
| 51-55 | 6 | 2 | 8 | 0.50 |
| 56-60 | 4 | 5 | 9 | 0.10 |
| Total | 18 | 12 | 30 | *Significant |
| ***p<0.05 significant** | | | | |

**Table 2:** Essential statistical analysis and descriptions for complication related successes of Group 1: Prefabricated Abutments

| Timings | Status | n | Stat. Mean | Std. Deviation | Std. Error | 95% CI | Pearson Chi-Square Value | df | p value |
|---|---|---|---|---|---|---|---|---|---|
| 2 Months | Success | 14 | 2.92 | 0.329 | 0.235 | 1.02 | 1.239 | 2.0 | 0.02* |
| | Failed | 1 | 1.02 | 0.921 | 0.928 | 1.74 | 1.837 | 2.0 | 0.10 |
| 4 Months | Success | 13 | 2.82 | 0.653 | 0.532 | 1.37 | 1.532 | 1.0 | 0.18 |
| | Failed | 2 | 1.01 | 0.532 | 0.649 | 1.52 | 1.043 | 1.0 | 0.20 |
| 6 Months | Success | 9 | 2.72 | 0.035 | 0.026 | 1.03 | 1.734 | 1.0 | 0.80 |
| | Failed | 6 | 1.45 | 0.123 | 0.382 | 1.23 | 1.008 | 2.0 | 0.40 |

**Table 3:** Essential statistical analysis and descriptions for complication related successes of Group 2: Custom Made Abutments

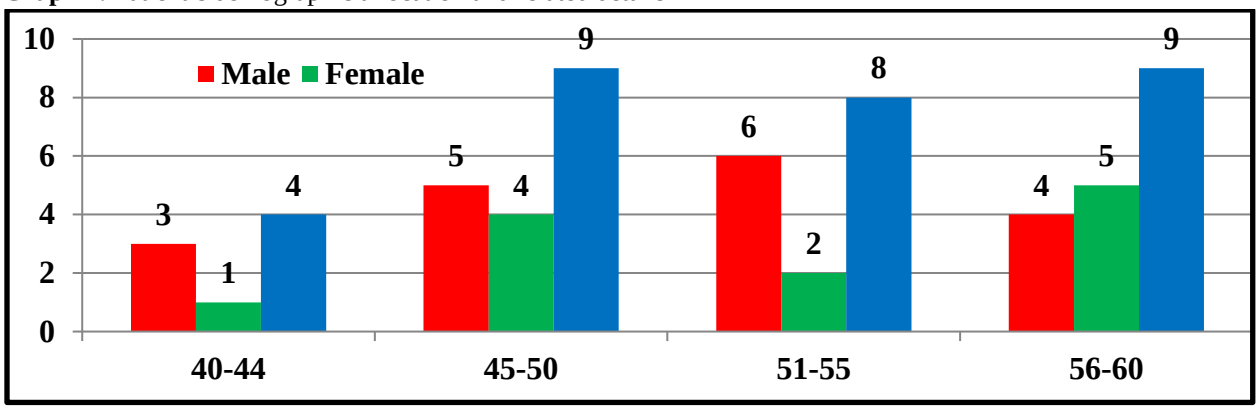
| Timings | Status | N | Stat. Mean | Std. Deviation | Std. Error | 95% CI | Pearson Chi-Square Value | df | p value |
|---|---|---|---|---|---|---|---|---|---|
| 2 Months | Success | 15 | 2.93 | 0.035 | 0.124 | 1.24 | 1.128 | 1.0 | 0.01* |
| | Failed | 0 | 0.21 | 0.368 | 0.237 | 1.02 | 1.733 | 2.0 | 0.90 |
| 4 Months | Success | 13 | 2.76 | 0.102 | 0.123 | 1.52 | 1.996 | 2.0 | 0.12 |
| | Failed | 2 | 1.34 | 0.231 | 0.036 | 1.43 | 1.126 | 2.0 | 0.34 |
| 6 Months | Success | 10 | 2.93 | 0.726 | 0.833 | 1.70 | 1.453 | 2.0 | 0.10 |
| | Failed | 5 | 1.57 | 0.023 | 0.302 | 1.12 | 1.782 | 1.0 | 0.90 |

**Table 4:** Evaluation amongst the 2 study groups using one-way ANOVA [for Group 1 & 2]

| Variables | Degree of Freedom | Sum of Squares ∑ | Mean Sum of Squares m∑ | F | Level of Significance (p) |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Between Groups | 2 | 3.035 | 1.827 | 1.8 | 0.002* |
| Within Groups | 19 | 6.039 | 0.314 | - | |
| Cumulative | 128.20 | 11.635 | ***p<0.05 significant** | | |

**Graph 1:** Patient's demographic allocation and related details




## Discussion

After loss of tooth, patient immediately seeks for the replacement if esthetics and function. Before invention of dental implant, these conditions were mostly managed by rehabilitating tooth by removable or fixed Prosthodontic treatment.[9,10] Later, dental implant was considered as a lucrative choice since it does not involve alteration of adjoining teeth and optimal esthetics. Dental implants have literally revolutionized all existing treatment options for tooth replacement. Several manufacturers have started incorporating improvement features and safely designs so as to maximize patients comfort and reduce cost.[11,12,13] Implants are now equally popular amongst completely edentulous patients for implant supported over-denture. Most of the completely edentulous denture wearing patients opts for implant supported therapy for their mandibular denture. However, clinical complications are still a greatest dilemma with implant dentistry.[14,15] Since it is an invasive procedure, clinicians must ensure about strict sterilization and disinfection as and when needed. Selection of right case is also highly crucial since wrongly selected patients can leads to failure of implant therapy. Literature has well evidenced that mechanical complications are mainly due to biomechanical overloading and peri-implant vertical bone loss. Târtea et al explored about the properties and behaviors of Custom CAD-CAM implant abutments and dental implant stock abutments. They also concluded that CAD-CAM implant abutments was superior in most of the tested fields.[16] Sagheb and others have studied the preload and friction in an implant-abutment-screw complex including a carbon-coated titanium alloy abutment screw. They have also recommended the importance of surface treatment of components.[17] Verma and associates have studied in detail about the Mechanical failures of dental implants and supported prostheses. They also agreed that failures in dental implants are fairly unavoidable however it can be minimized by certain procedural measures.[18] Therefore careful treatment planning, conceptualization of occlusal loads, accurateness of abutment selections, correctness of abutment angulations and mandatory follow-up appointments are required in order to minimize implant complications.

## Conclusion

Outcomes of this study were highly predictable and significant. Authors concluded that there was a clear rise in implant related complications with increasing post operative time. These complications directly affect the success rate. In the 6 months post operative follow up period, lowest success rate was perceived. This was noticed in both of the studied groups (prefabricated abutments, custom made abutments). However, implant with custom made abutments showed slightly higher post operative success rate. Our study inferences must be clinically correlated before applying them directly on patient. Authors also expect other long term similar studies with wider parameters and larger samples.

## References


1. Rangert B, Krogh PH, Langer B, Van Roekel N. Bending overload and implant fracture: A retrospective clinical analysis. Int J Oral Maxillofac Implants. 1995;10:326–34.
2. Goodacre CJ, Kan JY, Rungcharassaeng K. Clinical complications of osseointegrated implants. J Prosthet Dent. 1999;81:537–52.
3. Kronström M, Svenson B, Hellman M, Persson GR. Early implant failures in patients treated with Brånemarksystem titanium dental implants: A retrospective study. Int J Oral Maxillofac Implants. 2001;16:201–7.
4. Flanagan D. External and occlusal trauma to dental implants and a case report. Dent Traumatol. 2003;19:160–4.
5. Sánchez-Gárces MA, Gay-Escoda C. Periimplantitis. Med Oral Patol Oral Cir Bucal. 2004;9(Suppl):63–74.
6. Uribe R, Peñarrocha M, Sanchis JM, García O. Marginal peri-implantitis due to occlusal overload. A case report. Med Oral. 2004;9:159–62.
7. Balshi TJ. An analysis and management of fractured implants: A clinical report. Int J Oral Maxillofac Implants. 1996;11:660–6.
8. Eckert SE, Meraw SJ, Cal E, Ow RK. Analysis of incidence and associated factors with fractured implants: A retrospective study. Int J Oral Maxillofac Implants. 2000;15:662–7.
9. Jemt T, Lekholm U. Oral implant treatment in posterior partially edentulous jaws: A 5-year follow-up report. Int J Oral Maxillofac Implants. 1993;8:635–40.
10. Naert I, Quirynen M, van Steenberghe D, Darius P. A study of 589 consecutive implants supporting complete fixed prostheses. Part II: Prosthetic aspects. J Prosthet Dent. 1992;68:949–56.
11. Gunne J, Jemt T, Lindén B. Implant treatment in partially edentulous patients: A report on prostheses after 3 years. Int J Prosthodont. 1994;7:143–8.
12. Gupta S, Gupta H, Tandan A. Technical complications of implant-causes and management: A comprehensive review. Natl J Maxillofac Surg. 2015 Jan-Jun;6(1):3-8. Huang Y, Wang J. Mechanism of and factors associated with the loosening of the implant abutment screw: A review. J Esthet Restor Dent. 2019 Jul;31(4):338-345.
13. Katsavochristou A, Koumoulis D. Incidence of abutment screw failure of single or splinted implant prostheses: A review and update on current clinical status. J Oral Rehabil. 2019 Aug;46(8):776-786.
14. Wittneben JG, Buser D, Salvi GE, Bürgin W, Hicklin S, Brägger U. Complication and failure rates with implant-supported fixed dental prostheses and single crowns: a 10-year retrospective study. Clin Implant Dent Relat Res. 2014 Jun;16(3):356-64.
15. Fan YM, Di P, Jiang X, Luo J, Zhang Y, Lin Y. [Immediate rehabilitation of the edentulous and potential edentulous jaws with implant-supported full-arch prostheses: a retrospective analysis of 225 cases]. Zhonghua Kou Qiang Yi Xue Za Zhi. 2020 Aug 9;55(8):555-564.
16. Târtea DA, Ionescu M, Manolea HO, Mercuț V, Obădan E, Amărăscu MO, Mărășescu PC, Dăguci L, Popescu SM. Comparative Study of Dental Custom CAD-CAM Implant Abutments and Dental Implant Stock Abutments. J Clin Med. 2023 Mar 8;12(6):2128.
17. Sagheb K, Görgen CI, Döll S, Schmidtmann I, Wentaschek S. Preload and friction in an implant-abutment-screw complex including a carbon-coated titanium alloy abutment screw: an in vitro study. Int J Implant Dent. 2023 Mar 22;9(1):8.
18. Verma A, Singh SV, Arya D, Shivakumar S, Chand P. Mechanical failures of dental implants and supported prostheses: A systematic review. J Oral Biol Craniofac Res. 2023 Mar-Apr;13(2):306-314.