



## Evaluation of Implant Prosthetic Treatment with One-piece versus Two-piece Dental Implants: An Original Research Study

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### KEYWORDS

One-Piece Implants, Two-Piece Implants, Prosthetic Treatment

### ABSTRACT:

**Background:** One-piece implant was originally created to eliminate structural weakness in two-piece design. This study was conducted for the Evaluation of Implant Prosthetic Treatment with One-piece versus Two-piece Dental Implants.

**Material and Methods:** A detailed medical as well as dental history, as well as the patient's current general and oral health state, were obtained prior to the clinical and radiographic evaluation. 30 patients between the ages of 15 and 50 were chosen and administered One-piece Implants and Two-Piece Implants bilaterally in the arch. The study included partially edentulous subjects suggested for dental implants, subjects with good oral hygiene and adequate mouth opening, and the subjects who accepted to participate in the trial. Both OPI and TPI implants were placed in the posterior area of the mandible.

**Results:** Table 1 demonstrates a little rise in OPI crestal bone loss in comparison with TPI after 3 months. However, at 6 months, TPI had somewhat more crestal bone loss than OPI, and at 9 months, bone loss was slightly higher in the TPI group. On the contrary, the statistical analysis revealed that the P values were more than 0.05, indicating no substantial variation between the groups. So, there was no significant variation in crestal bone loss between OPI and TPI at 3, 6, and 9 months. Table 2 demonstrates a little increase in the gingival index for the OPI at 9 months and the TPI at 3 months. However, the statistical analysis revealed P values greater than 0.05. As a result, there is no significant difference in gingival index between OPI and TPI after 3, 6, and 9 months.

**Conclusion:** There was no significant difference between the OPI and TPI in terms of gingival index and crestal bone loss. On the contrary, there was a statistical significance when comparing the same measures after three, six, and nine months.

### Introduction

One-piece implant was originally created to eliminate structural weakness in two-piece design. This is unique because it incorporates prosthetic component and surgical unit. There is elimination of the microgap and always has transmucosal presence.<sup>1</sup> A one-piece implant advantages are fast functional, rehabilitation with reduced operating time, less armamentarium, no damage to surrounding tissues, and better use of space limitations. Patient

compliance is better with one-piece implants than two-stage procedures: less inflammation, pain, and stress because of few prosthetic appointments. Other advantages are better osseointegration, lesser micro-movements, and good soft tissue healing.<sup>2,3</sup> The replacement of mandibular incisors needs special consideration. The challenges associated are limited space, complex surrounding anatomy, and potentially tough aesthetic requirements. This study was conducted for the Evaluation of Implant Prosthetic



Treatment with One-piece versus Two-piece Dental Implants.

**Material and Methods**

Participants were informed about the study's objectives and impact. Patients provided informed permission in both English and regional languages, and the nature of the treatment and related risks were discussed. A detailed medical as well as dental history, as well as the patient's current general and oral health state, were obtained prior to the clinical and radiographic evaluation. 30 patients between the ages of 15 and 50 were chosen and administered One-piece Implants and Two- Piece Implants bilaterally in the arch. The study included partially edentulous subjects suggested for dental implants, subjects with good oral hygiene and adequate mouth opening, and the subjects who accepted to participate in the trial. Both OPI and TPI implants were placed in the

posterior area of the mandible. The initial pilot drill of 2 mm diameter had been used to drill through the surgical stent with a gear reduction contra- angled hand piece at a low speed of 800 RPM, little pressure, and intermittently to avoid bone scorching. The pilot channel was increased to 2.5, 3.2, and 3.6 mm for a 3.75 mm implant. The independent sample t-test was performed to contrast means between the OPI and TPI groups. The total mean comparison of the variables in the two categories was performed using ANOVA. SPSS version 20 was used to perform the statistics, and a P value of 0.05 was considered significant.

**Results**

The study's goal is to correlate radiographic changes in crestal bone levels with clinical changes in gingival index in OPI and TPI after 3, 6, and 9 months.

**Table 1:** Comparison of crestal bone loss radiographically between one-piece and two-piece implants using the t-test at 3, 6, and 9 months

Side	Variable	Groups	N	Mean
Mesial	Crestal bone loss 3 months	One piece	30	0.94
		Two piece	30	0.92
	Crestal bone loss 6 months	One piece	30	1.20
		Two piece	30	1.21
	Crestal bone loss 9 months	One piece	30	1.43
		Two piece	30	1.53
Distal	Crestal bone loss 3 months	One piece	30	1.07
		Two piece	30	1.09
	Crestal bone loss 6 months	One piece	30	1.36
		Two piece	30	1.42
	Crestal bone loss 9 months	One piece	30	1.65
		Two piece	30	1.68

Table 1 demonstrates a little rise in OPI crestal bone loss in comparison with TPI after 3 months. However, at 6 months, TPI had somewhat more crestal bone loss than OPI, and at 9 months, bone loss was slightly higher in the TPI group. On the contrary,

the statistical analysis revealed that the P values were more than 0.05, indicating no substantial variation between the groups. So, there was no significant variation in crestal bone loss between OPI and TPI at 3, 6, and 9 months.

**Table 2:** Comparison of Gingival index clinically between one-piece and two-piece implants using t-test at 3, 6, and 9 months

Variable	Groups	N	Mean
Gingival index 3 months	One piece	30	0.19
	Two piece	30	0.21
Gingival index 6 months	One piece	30	0.33
	Two piece	30	0.34
Gingival index 9 months	One piece	30	0.57
	Two piece	30	0.52



Table 2 demonstrates a little increase in the gingival index for the OPI at 9 months and the TPI at 3 months. However, the statistical analysis revealed P values greater than 0.05. As a result, there is no significant difference in gingival index between OPI and TPI after 3, 6, and 9 months.

## Discussion

A two-stage surgical approach is recommended by the original Branemark concept of osseointegration. The TPI concept is a pioneer in leading modern dental implantology and is backed up with scientific documentation with a survival rate of 94.6%, according to Fanali et al.<sup>3</sup> However, it is also possible to accomplish and sustain osseointegration with a OPI with improved implant design, evaluation of the factors impacting osseointegration, simplification of surgical procedure, and loading of implants. These implants have also demonstrated a long-term survival rate. In addition, they are designed to reduce complications compared with TPIs.<sup>4</sup> OPIs do not experience the typical screw-loosening concerns and are fail-resistant against microleakage and micromovements between abutment and fixture.<sup>5</sup> A predictable alternative for the replacement of teeth in the said area in some cases is implant-retained restoration. Loss of teeth brings resorption and remodeling of surrounding tissues with time. Several approaches like guided bone regeneration with autogenous bone, bone replacement materials in combination with membranes, cortical bone plate method and distraction technique have been described in literature for the defect.<sup>6</sup> This study was conducted for the Evaluation of Implant Prosthetic Treatment with One-piece versus Two-piece Dental Implants. In this study, table 1 demonstrates a little rise in OPI crestal bone loss in comparison with TPI after 3 months. However, at 6 months, TPI had somewhat more crestal bone loss than OPI, and at 9 months, bone loss was slightly higher in the TPI group. On the contrary, the statistical analysis revealed that the P values were more than 0.05, indicating no substantial variation between the groups. So, there was no significant variation in crestal bone loss between OPI and TPI at 3, 6, and 9 months. Table 2 demonstrates a little increase in the gingival index for the OPI at 9 months and the TPI at 3 months. However, the statistical analysis revealed P values greater than 0.05. As a result, there was no significant difference in gingival index between OPI and TPI after 3, 6, and 9 months. Liji B et al<sup>7</sup> compared one-piece implant (OPI) and two-piece implant (TPI) to determine the success rate over the TPI. This study was conducted on 15 patients selected with the age range of 20–60 years to place OPI and TPI. The

surgical consent form duly signed by the patients was procured. The implants used were of Adin Implant System, and a follow-up examination was done at 3, 6, and 9 months after implant loading and various clinical and radiographic parameters were noted for both OPI and TPI. The clinical parameters measured were Silness, and Loe gingival index and probing depth and the radiographic parameters included crestal marginal bone loss. Independent Sample t-test and ANOVA were used for statistical analysis. The statistical analysis showed no significant difference between the OPI and TPI based on the gingival index, probing depth, and crestal bone loss. On the contrary, there was a statistical significance in comparing the same parameters during the follow-up period of 3, 6, and 9 months. Mohamed AMA et al<sup>8</sup> conducted a study to find out the difference in the stresses induced by the one-piece dental implants designed to be used in the All-on-4® concept and the conventional two-piece ones under simulated lateral occlusal schemes using nonlinear finite element analysis. Two finite element models of the maxilla, implants, and prostheses were designed according to the All-on-4® concept. In the model TP, two-piece dental implants were placed while in the model OP one-piece dental implants were used. Two loading scenarios were applied to each model; the first one simulated a group function occlusal scheme while the second scenario simulated a canine guided one. The highest stress value was recorded in the model TP with the group function occlusion and the lowest stress value was in the model OP with the canine guidance occlusion. The one-piece dental implants can be concluded to induce less stress compared to the two-piece dental implants when used in the All-on-4® implant supported prosthesis in the different lateral occlusal schemes. Canine guided occlusion can be concluded to cause lower stress values in comparison to the group function occlusal scheme.<sup>8</sup> Similar findings were also reported by Turker et al. when they compared different occlusal schemes in the All-on-4® implant supported prosthesis. They related the lower stress values in the canine guided simulation to the anterior and posterior disocclusion of all the teeth except the canines during lateral movements of the mandible. Moreover, Abdou et al. stated in their systematic review that the group functional occlusion had double the stress values of canine guidance during lateral movements. Moreover, more marginal bone loss was reported to take place in the implant supported fixed partial dentures having the group function occlusal scheme compared to those with the canine guidance occlusion. This was attributed to the greater occlusal stresses exerted in group functional occlusion. Another reason was the increased



possibility of contact with the opposing teeth in the nonfunctional lateral movements.<sup>9-15</sup>

## Conclusion

There was no significant difference between the OPI and TPI in terms of gingival index and crestal bone loss. On the contrary, there was a statistical significance when comparing the same measures after three, six, and nine months. OPIs outperform TPIs over time because of better design and implantation procedures.

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