



Research Article

Esthetic Evaluation of Single Tooth Implants Restored With Cemented and Screw Retained Crowns: A Comparative Cross-Sectional Study

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ABSTRACT

Implant-supported restorations are often attached as screw-retained or cemented prostheses, consistent with the sort of retention. Dental implants are commonly used not just to supply patients with function but also form and esthetics. The aim of this study is to gauge and compare the steadiness of peri-implant soft tissues around single implants restored with screw retained and cemented prosthesis and also to compare PES and WES for screw retained and cemented prosthesis. A total of 20 patients, both male and female with single unit implants will be selected and randomly grouped into group A and group B. Group A - 10 patients with screw retained prosthesis, Group B - 10 patients with cemented prosthesis. Evaluation of peri-implant soft tissues were analysed with photographs using PES and WES. Inferential statistics like Mann-Whitney U test and Spearman's correlation was used. A p - value less than 0.05 was considered to be significant. PES and WES in both CP and SP groups was not statistically significant, giving an almost perfect outcome ($p \leq 0.05$). Spearman's correlation test failed to show any significant associations between the overall mean PES or WES in both CP and SP groups ($p=0.65$). The study demonstrated that both the restorations showed no difference and achieved favourable esthetic outcome.

Keywords: Esthetic; Cemented; Screw retained; PES; WES; peri-implant

1 INTRODUCTION

The introduction of dental implants over several years has expanded the therapeutic options in various clinical situations. Proper planning and treatment of a dental implant should consider factors such as long-term success, appropriate implant dimensions, bone quality, healthy soft tissues, immobilized keratinized gingiva.

The implant-supported prosthesis subsequently placed is either screw-retained / cement retained.⁽¹⁾ In the esthetic zone, the type of implant supported prosthesis given should mimic the natural tooth^(2,3) and the influence on surrounding peri-implant tissues has a significant influence on the esthetic outcome of the treatment.⁽⁴⁾

Dental implants are not only used just to provide patients with function but also form and esthetics. Therefore, an accurate assessment of success unavoidably involves objective and patient-reported esthetic evaluation of the treatment outcomes. Earlier, the papilla index was used

to evaluate the esthetic aspects of dental implants, which assessed the size of the interproximal papilla.⁽⁵⁾ Today, several factors in addition to the size of the interproximal papilla include the color, form, and the level of peri-implant soft tissues which evaluates the esthetic outcomes.^(6,7)

The pink esthetic score (PES), focusing essentially on the peri-implant soft tissue around the implant restoration.⁽⁵⁾ Later an implant restoration index white esthetic score (WES) took into consideration, the visible portion of the implant restoration, that is, the crown that emerges from peri-implant mucosa. Thus, the purpose of the study is to evaluate and compare the esthetics and health of peri implant soft tissue of a single implant tooth restored with cemented and screw-retained crowns.

2 MATERIALS AND METHODS

2.1 Selection of patients

The present study was submitted and approved by the Research ethics panel of the Institution. Twenty patients were enrolled for the study. Maxillary anterior regions from canine to canine with the presence of adjacent natural teeth were included within the study. Patients with smoking habits, poor oral hygiene, parafunctional habits, multi-unit restorations, restored contralateral teeth, active oral infections, and chronic periodontitis with advanced loss of support (defined by PPD > 6mm with CAL > 4mm, radiographic evidence of bone loss, and increased tooth mobility) were excluded from the study.

2.2 Study design

This cross-sectional study evaluated 20 single-unit implants placed within the anterior maxillary region: 10 screw-retained prostheses (SP) and 10 cemented prostheses (CP). The principal investigator was blinded and each implant prosthetic crown which were already placed were randomly assigned and peri-implant soft tissue were photographed and analyzed. In each of the images, cemented or screw-retained prosthesis had to be visible for the evaluation of the peri-implant soft tissue, implant prosthesis, and therefore the contralateral tooth for comparison. PES and WES criteria introduced by Belser et al, 2009 were used for analyzing the images.

2.3 Ethical approval of studies and informed consent

This comparative study was approved by Institutional Review Board of Rajarajeswari Dental College and Hospital, Bangalore, India (RRDCHET/03PERIO/2020).

3 ASSESSMENT CRITERIA

3.1 Pink Esthetic Score

All patients were evaluated consistent with the pink esthetic score⁽⁵⁾ which comprised the assessment of seven variables including the mesial papilla, distal papilla, soft tissue level, soft tissue contour, alveolar ridge deficiency, soft tissue color, and soft tissue texture [Figure 1]. Each variable is given with a score of 0, 1, or 2. A score of 0 denotes the worst and a score of 2 denotes the simplest result for every variable, therefore the very best possible score of 14 denoted perfect peri-implant soft tissues [Table 1]. The edge for clinically acceptable soft tissues was set at 8. A score of 12 or higher is accepted as almost perfect peri-implant soft tissues as previously described by Furhauer et al.⁽⁵⁾

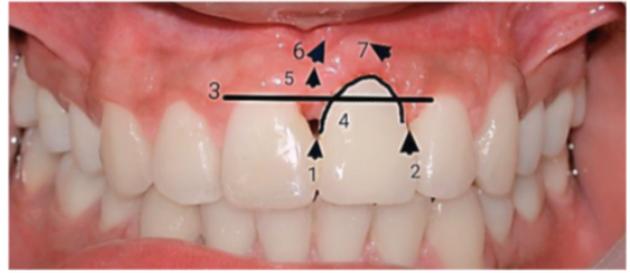


Fig. 1: Shows the seven variables for the PES assessment

Table 1: PES Scoring Indices

Parameters	PES		
	Absent	Incomplete	Complete
Mesial papilla	0	1	2
Distal papilla	0	1	2
	Major discrepancy	Minor discrepancy	No discrepancy
Soft tissue level	0	1	2
Soft tissue contour	0	1	2
Alveolar process deficiency	0	1	2
Soft tissue colour	0	1	2
Soft tissue texture	0	1	2
Maximum total PES			14

3.2 White Esthetic Score

All patients were assessed using White Esthetic Score⁽⁴⁾ which comprised the evaluation of 5 Variables including general tooth form, tooth contour, tooth colour (hue and value, surface texture, and translucence. Each variable is given with a score of 0, 1, or 2. A score of 0 indicated the worst and a score of two indicated the simplest result for every variable. The implant-supported tooth was compared with the contralateral reference tooth to gauge white esthetics [Figure 2]. A maximum score of 10 was given when the simplest mimicry of the contralateral tooth was achieved. The clinically appropriate and almost perfect implant crown thresholds were set at 6 and 9, respectively. [Table 2].

3.3 Statistical Analysis

The statistical analysis included a descriptive and inferential characterization of the sample.

SPSS version 18 (IBM Corporation, SPSS Inc., Chicago, IL, USA) were used to analyse the Results. Results of continuous measurements were presented as Mean±SD (Min-Max) and Results of categorical measurements were presented in Frequency (Percentage). Inferential statistics just like the Mann-Whitney U test and Spearman’s correla-



Fig. 2: Shows the variable for WES assessment

Table 2: WES Scoring Indices

Parameters	WES		
	Major discrepancy	Minor discrepancy	No discrepancy
Tooth form	0	1	2
Tooth volume / outline	0	1	2
Soft tissue level	0	1	2
Color (hue / value)	0	1	2
Surface texture	0	1	2
Translucency	0	1	2
Maximum total WES	0	1	2
			10

tion were used. It was considered that a p - value of 0.05 was significant.

4 RESULTS

4.1 Esthetic outcomes

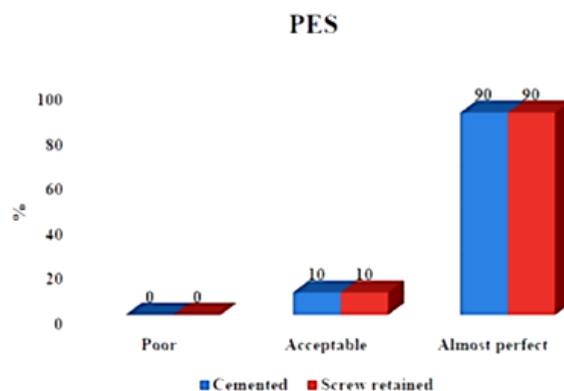
The mean PES within the CP group was 13.20 (range 11-14, SD ±0.92) which provides an almost perfect outcome. The mean PES within the SP group was 12.50 (range 11-14, SD ±0.85), which also gives an almost perfect outcome. The difference between the PES in both groups was not statistically significant (p < 0.05) [Table 3, Graph 1].

Table 3: Comparison between two types of implant (Mann-Whitney U test)

	Cemented	Screw Retained	P Value
PES	13.20 ± 0.92	12.50 ± 0.85	0.059
WES	9.50 ± 0.71	9.40 ± 0.96	0.964

The mean WES within the CP group was 9.50 (range 8-10, SD ±0.71), and within the SP group was 9.40 (range 8- 10, SD ±0.96). The difference between the WES in both groups was not statistically significant [Table 3, Graph 1].

Spearman’s correlation test did not show any significant associations between the general mean PES or WES in both



Graph 1: Comparison between two types of implant (Mann-Whitney U test)

CP and SP groups (p = 0.65).

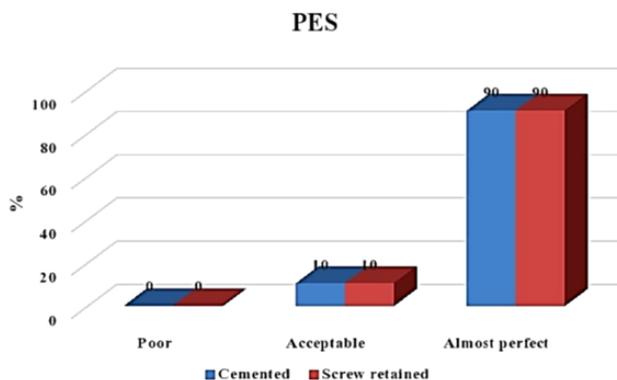
Detailed PES and WES score distribution of cemented and screw-retained prosthesis are provided in [Tables 4 and 5 and Graphs 2 and 3].

Table 4: PES score distribution

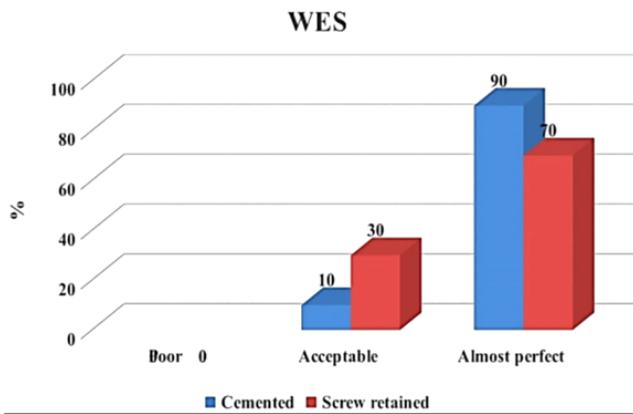
PES	Cemented	Screw Retained
POOR (0-7)	0	0
ACCEPTABLE (8 - 11)	1(10)	1(10)
ALMOST PERFECT (12-14)	9(90)	9(90)

Table 5: WES score distribution

WES	Cemented	Screw Retained
POOR(0-5)	0	0
ACCEPTABLE (6-8)	1(10)	3(30)
ALMOST PERFECT (9-10)	9(90)	7(70)



Graph 2: PES score distribution



Graph 3: WES score distribution

5 DISCUSSION

This cross-sectional study with 20 patients showed the results of peri-implant soft tissues using PES and WES restored with screw-retained and cement-retained crowns within the maxillary anterior region. Implant restorations in the anterior aesthetic zone now focus on obtaining optimal aesthetics while also fulfilling functional rehabilitation goals.^(6,7)

Pink and white esthetic scores (PES and WES) were developed to permit objective evaluation of esthetics in implant dentistry.^(4,5) PES and WES in both CP and SP groups revealed acceptable outcomes. Assessment of gingival esthetics was performed using the PES index created by Furhauser et al,⁽⁵⁾ which compares the implant to a contralateral natural tooth. The entire mean PES within the SP and CP groups showed no statistically significant differences, revealing that an esthetically satisfactory result are often obtained with both sorts of prosthetic connections. Nine out of ten patients in both groups provides a mean of PES > 12, revealing 90% of the patients give almost perfect esthetic outcomes (Table 4, Graph 2). Consistent with Belser et al,⁽⁴⁾ PES scores above 60% represent a threshold of fantastic clinical acceptability. No minimum value of acceptability was established for the PES; however, the authors observed that the PES may change with time and will therefore be a useful gizmo in longitudinal monitoring of peri-implant soft tissues.

The WES leads to both the groups also showed no statistically significant differences. Ninety percentage of CP and seventy percentage of the SP group showed almost perfect outcomes (Table 5, Graph 3). This study did not show any significant correlation between PES and WES in both groups. Only a couple of studies compared esthetic outcomes of implants placed using different Protocols.^(8–10) A majority of those studies compared the results of immediate implant placement (type 1) with other protocols. Type 1 and type 2 implant placement showed no difference in terms of esthetics as described by Huynh- Ba et al.⁽⁹⁾ Similarly, Boardman et

al. observed higher PES results following implant placement, although not reached statistical significance.⁽⁸⁾ Another analysis of patient-related outcomes of immediately loaded single implants in the anterior maxilla found no statistically relevant variations between PES and WES of implants placed immediately (type 1) and late (type 4) protocols.⁽¹⁰⁾ However, there are no statistically relevant variations in PES and WES results for immediate and delayed loading protocols, according to the previous literatures.⁽¹¹⁾ The type of restoration whether CP or SP did not show any difference within the esthetic outcome. However, the cemented restoration has reported the peri-implant inflammation due to overflow of cement residues resulting in peri-implant bone loss. Access hole in the cemented crowns has been able to reduce the overflow of cement residues. However due to the implant position and angulation in certain clinical situations providing access hole in the CP may not be possible.^(12–14)

6 CONCLUSION

Achieving optimum esthetics with long-term functional stability is the goal of implant therapy. The present cross-sectional study evaluated the esthetic outcome of two different types of implant prosthetic restoration. The study demonstrated that both the restoration showed no difference and achieved a favorable esthetic outcome.

7 ABBREVIATIONS

PES: Pink esthetic score, WES: White esthetic score, CP: Cemented Prosthesis, SP: Screw retained prosthesis

8 CONFLICT OF INTEREST

None

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