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Comparative Evaluation of Screw-Retained vs. Cement-Retained Implant Prostheses

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ABSTRACT

AIM: To *comparatively evaluate the clinical performance, survival, and complications of screw-retained versus cement-retained implant-supported prostheses*

MATERIALS AND METHODS: *This prospective, randomized clinical trial was designed to compare screw-retained and cement-retained implant prostheses. Ethical approval was obtained prior to commencement, and informed consent was taken from all participants. Adults between 20 and 65 years of age who required single implant-supported crowns, were systemically healthy, and had adequate bone volume for implant placement were included. Patients with uncontrolled systemic diseases, history of radiotherapy, smoking of more than ten cigarettes per day, pregnancy, parafunctional habits, or previous implant failures were excluded. A total of 50 implants were placed and randomly allocated into two equal groups, with 25 implants each for screw-retained and cement-retained prostheses. Randomization was carried out using computer-generated numbers in sealed opaque envelopes.*

RESULTS: *In our study, 50 patients were evaluated, equally divided into screw-retained and cement-retained groups with comparable baseline characteristics. At the 12-month follow-up, both groups demonstrated 100% implant and prosthesis survival with high patient satisfaction. Clinical outcomes such as probing depth, plaque index, gingival index, and peri-implant health showed no significant differences, except for marginal bone loss which was significantly lower in the screw-retained group. Prosthetic complications were minimal, with screw loosening seen only in screw-retained prostheses and loss of retention observed only in cement-retained restorations. Overall, both retention types performed successfully, though screw-retained prostheses exhibited slightly more favorable bone preservation.*

CONCLUSION: *Both screw-retained and cement-retained implant prostheses show comparable success, with the final choice best guided by individual patient needs and clinical considerations.*

KEYWORDS: *implant, screw, prostheses*

INTRODUCTION

Implant-supported reconstructions are regarded as one of the most reliable treatment options in modern dentistry. Advances in implant designs, surface modifications, and restorative materials have greatly enhanced the predictability and stability of treatment outcomes. A critical decision in implant prosthodontics is the choice of restorative connection, either screw-retained or cement-retained. Screw-retained restorations offer the advantage of retrievability, allowing the prosthesis to be easily removed and reattached, while cement-retained restorations often provide simplicity in fabrication through conventional clinical and laboratory techniques.[1-4]

Although cement-retained restorations are easier to fabricate and less costly, they may pose biological risks such as residual cement leading to peri-implant complications. On the other hand, screw-retained restorations, despite requiring additional components and being more expensive, provide predictable retrievability and facilitate management of technical or biological complications. Both approaches are capable of delivering satisfactory esthetic outcomes when implants are placed in favorable positions, and

customized abutments may be used when implant placement is less than ideal to optimize esthetics and function.[5-7]

Previous studies comparing screw-retained and cement-retained prostheses have reported conflicting results. Some investigations suggest screw-retained restorations are associated with improved peri-implant tissue health, while others report no significant differences between the two types of retention. Systematic reviews have further highlighted these inconsistencies, with some noting higher biological complications in cement-retained prostheses, while others find comparable outcomes across both modalities. Such discrepancies highlight the need for further evidence to determine which restorative approach provides superior long-term outcomes.[8]

Both cement and screw-retained reconstructions have distinct advantages and limitations. Cement-retained prostheses are recognized for their versatility, passivity, and enhanced occlusal control, yet they are prone to complications from residual cement. Screw-retained prostheses are favored for retrievability, oral hygiene maintenance, and simplified management of complications, but screw loosening remains a common drawback. The lack of consensus in the literature underscores the importance of continued comparative research.[9]

MATERIALS AND METHODS

This prospective, randomized clinical trial was designed to compare screw-retained and cement-retained implant prostheses. Ethical approval was obtained prior to commencement, and informed consent was taken from all participants. Adults between 20 and 65 years of age who required single implant-supported crowns, were systemically healthy, and had adequate bone volume for implant placement were included. Patients with uncontrolled systemic diseases, history of radiotherapy, smoking of more than ten cigarettes per day, pregnancy, parafunctional habits, or previous implant failures were excluded. A total of 50 implants were placed and randomly allocated into two equal groups, with 25 implants each for screw-retained and cement-retained prostheses. Randomization was carried out using computer-generated numbers in sealed opaque envelopes.

All implants used in the study were titanium endosseous implants (12 × 3.5 mm, Nobel care or equivalent), placed under local anesthesia by experienced surgeons following standardized surgical protocols. A healing period of three to four months in the mandible and four to six months in the maxilla was observed prior to prosthetic loading. For the screw-retained group, prostheses were secured by torquing the abutment screws to manufacturer recommendations, and screw access holes were sealed with PTFE tape and composite resin. In the cement-retained group, crowns were luted with non-eugenol provisional cement to ensure retrievability, and careful removal of excess cement was carried out under magnification, confirmed radiographically. Occlusion was standardized across both groups, ensuring light centric contacts and absence of lateral interferences.

Clinical and radiographic assessments were performed at the time of prosthesis delivery, six months, and twelve months post-loading. The primary outcome was marginal crestal bone level change, measured radiographically using standardized periapical radiographs obtained with the paralleling technique and calibrated with implant length. Secondary outcomes included plaque index, probing depth, gingival or bleeding indices, presence of peri-implant mucositis or peri-implantitis, as well as technical complications such as screw loosening, veneering material fracture, or re-cementation. Patient-reported outcomes regarding comfort, esthetics, and function were collected using structured questionnaires. All clinical measurements were performed by calibrated examiners blinded to the prosthesis type.

Data were systematically recorded and analyzed using SPSS software. Continuous variables were expressed as mean and standard deviation, while categorical variables were expressed as percentages. Group comparisons were performed using independent t-tests or Mann–Whitney U tests, while changes over time within groups were analyzed using repeated-measures ANOVA or Friedman tests. Categorical data were compared using chi-square or Fisher's exact tests. Implant and prosthesis survival rates were assessed with Kaplan–Meier survival analysis, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Baseline characteristics of study participants (N = 50)

Variable	Screw-Retained (n=25)	Cement-Retained (n=25)	p-value

Age (years, mean ± SD)	42.8 ± 9.6	43.5 ± 10.2	0.78
Male	14 (56%)	13 (52%)	0.79
Female	11 (44)	12 (48%)	
Maxilla, n (%)	15 (60%)	16 (64%)	0.77
Mandible, n (%)	10 (40%	9 (36%)	

Table 2: Radiographic and clinical outcomes at 12 months

Variable	Screw-Retained (n=25)	Cement-Retained (n=25)	p-value
Marginal bone loss (mm, mean ± SD	0.62 ± 0.21	0.78 ± 0.24	0.03*
Probing depth (mm, mean ± SD)	2.35 ± 0.41	2.48 ± 0.39	0.29
Plaque Index (mean ± SD)	0.92 ± 0.30	1.05 ± 0.34	0.18
Gingival/Bleeding Index (mean ± SD	0.88 ± 0.27	0.95 ± 0.31	0.36
Peri-implant mucositis, n (%)	0 (0%)	1 (4%)	0.31
Peri-implantitis, n (%)	(0%)	0 (0%)	—

*Significant at $p < 0.05$

Table 3: Prosthetic complications and patient satisfaction

Variable	Screw-Retained (n=25)	Cement-Retained (n=25)	p-value
Screw loosening, n (%)	3 (12%)	0 (0%)	0.07
Loss of retention (re-cementation), n (%)	0 (0%)	2 (8%)	0.15
Fracture/chipping, n (%)	0 (0%)	0 (0%)	—
Overall implant survival, n (%)	25 (100%)	25 (100%)	—
Prosthesis survival, n (%)	25 (100%)	25 (100%)	—
Patient satisfaction (VAS 0–100, mean ± SD)	91.2 ± 4.8	89.6 ± 5.1	0.34

DISCUSSION

Implant-supported prostheses have become a widely accepted treatment option for the replacement of missing teeth, offering excellent functional and esthetic outcomes. One of the key considerations in implant prosthodontics is the method of prosthesis retention, with screw-retained and cement-retained restorations being the most commonly employed options. Each retention system presents distinct advantages and limitations in terms of retrievability, esthetics, biological response, and technical complications. While screw-retained prostheses allow for easier retrieval and maintenance, cement-retained prostheses often provide superior esthetics and occlusal integrity. However, both systems have been associated with unique biological and mechanical challenges that may influence long-term clinical success. A comparative evaluation of these two retention modalities is therefore essential to guide clinicians in selecting the most appropriate option for individual patients.[10,11,12]

In our study, 50 patients were evaluated, equally divided into screw-retained and cement-retained groups with comparable baseline characteristics. At the 12-month follow-up, both groups demonstrated 100% implant and prosthesis survival with high patient satisfaction. Clinical outcomes such as probing depth,

plaque index, gingival index, and peri-implant health showed no significant differences, except for marginal bone loss which was significantly lower in the screw-retained group. Prosthetic complications were minimal, with screw loosening seen only in screw-retained prostheses and loss of retention observed only in cement-retained restorations. Overall, both retention types performed successfully, though screw-retained prostheses exhibited slightly more favorable bone preservation.

In the study by Hamed MT et al., no significant difference was observed between screw-retained and cement-retained implant-supported reconstructions. However, dental implants were found to be associated with complications that could lead to implant failure, depending on the type of restoration used. Overall, screw-retained reconstructions posed fewer biological and technical complications, while treatment outcomes were more stable and functional when the choice of restoration was guided by clinical efficiency and tooth condition.[13]

In the study by Wittneben JG et al., it was highlighted that fixed dental prostheses can be secured to implants either through cementation on an abutment or by direct screw retention. The choice between screw- and cement-retained restorations depends on multiple clinical considerations, including the specific indication, advantages and disadvantages of each method, retention capacity, retrievability, ease of provisionalization, esthetics, and long-term clinical performance with associated failures or complications. [14]

Sherif S et al. conducted a 5-year multicenter prospective cohort study to compare the survival and success of screw- versus cement-retained implant crowns in the anterior maxilla. A total of 102 patients with 214 implants were evaluated, with complete data available for 99 patients (193 implants). The restorations were almost evenly distributed between screw (53.4%) and cement (46.6%) retention. Over an average follow-up of about 62 months, the overall implant survival rate was 96.4%, with no significant difference between the two groups ($p = 0.45$). Both clinician- and patient-reported outcomes regarding soft tissue and restoration quality showed comparable results, indicating that screw- and cement-retained restorations provide equivalent success in the anterior maxilla.[15]

Taken together, the findings from our study and previous research suggest that both screw-retained and cement-retained implant-supported prostheses can achieve high survival rates and patient satisfaction, with largely comparable clinical outcomes. While screw-retained restorations may offer advantages in terms of retrievability and slightly better marginal bone preservation, cement-retained restorations continue to provide excellent esthetics and functional stability. Ultimately, the choice of retention type should be guided by individual patient needs, clinical conditions, and the practitioner's judgment, with careful consideration of the benefits and potential complications associated with each system.

CONCLUSION

Both screw-retained and cement-retained implant prostheses show comparable success, with the final choice best guided by individual patient needs and clinical considerations.

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