Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 08:2025
DOI: 10.5281/zenodo.16750359

CEMENT RETAINED VERSUS SCREW-RETAINED IMPLANT RESTORATIONS: A SYSTEMATIC REVIEW OF CLINICAL PERFORMANCE

ASEM ALI ALSHAWI
Assistant Consultant, Dental Services, Restorative Division, King Abdulaziz Medical City, Saudi Arabia.

ABDULLAH NASSER ALQAHTANI
Consultant, Dental Services, Restorative Division, King Abdulaziz Medical City, Saudi Arabia.

KHALID QASHAN ALSUBAIE
Associate Consultant, Dental Services, Restorative Division, King Abdulaziz Medical City, Saudi Arabia.

FARES IBRAHIM ALBALAWI
Assistant Consultant, Dental Services, Restorative Division, King Abdulaziz Medical City, Saudi Arabia.

ALI Y. ALSAEED
Assistant Professor, Restorative and Adhesive Dentistry.
Restorative Dental Sciences, College of Dentistry, King Khalid University, Saudi Arabia.

MOHAMMED ALI ALKITHRI
Staff Dentist, Dental Services, King Abdulaziz Medical City, Saudi Arabia.

KHALID MABROUK ALMESFER
Resident, Dental Services, Restorative Division, King Abdulaziz Medical City, Saudi Arabia.

HATIM HASHIM ALQAHTANI
Dental Student, King Khalid University, Saudi Arabia.

MAY MAMDOUH ALANAZI
Dental Assistant, Dental Services, Restorative Division, King Abdulaziz Medical City, Saudi Arabia.

Abstract

Study aim: This systematic review aimed to compare the clinical performance of cement-retained versus screw-retained single implant-supported crowns, and discuss implant survival, marginal bone loss (MBL), peri-implant soft tissue health, esthetic outcomes, and complication profiles. **Materials and Methods:** A systematic search was conducted in PubMed, Scopus, Web of Science, and Google Scholar for clinical studies published between 2018 and 2024. Eligible studies were randomized controlled trials, prospective, and retrospective cohort studies comparing cemented and screw-retained single implant crowns with a minimum follow-up of 6 months. Seven studies involving 396 patients and 464 implants met the inclusion criteria and were qualitatively synthesized. **Results:** Both retention types had high implant survival rates (98.8%–100%). No significant differences were observed in marginal bone loss or esthetic outcomes (PES/WES). Screw-retained restorations showed lower bleeding on probing (BOP%) in most studies, which indicate improved peri-implant soft tissue health, although one study reported a higher mucositis rate in this group. Mechanical complications, and screw loosening (1–8.7%), were more frequent in screw-retained crowns, while cement-retained restorations were associated with increased biological complications due to residual cement. **Conclusion:** Cement-retained and screw-retained implant crowns provide comparable survival and esthetic outcomes. Screw-retained restorations offer advantages in retrievability and soft tissue health but present higher mechanical complication risks. Cement-retained crowns is preferable in esthetically demanding situations in the anterior region. The choice of retention type is individualized based on clinical conditions, esthetic demands, and long-term maintenance considerations.

Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 08:2025
DOI: 10.5281/zenodo.16750359

Keywords: Cement-Retained Crown, Screw-Retained Restoration, Dental Implant, Soft Tissue Health, Implant Survival, Marginal Bone Loss, Peri-Implantitis.

INTRODUCTION

Dental implants are a predictable solution for the rehabilitation of missing teeth, with implant-supported single crowns give high survival and success rates in clinical scenarios. Method of prosthesis retention (cement-retained and screw-retained designs) affect the longevity and performance of implant restorations. Each retention system carries specific advantages and potential complications, making the choice highly relevant to both clinicians and patients. Cement-retained restorations are known for their superior esthetics and ease of fabrication, when managing non-ideal implant angulation or when screw access would compromise the appearance of anterior restorations. Residual cement is a well-documented risk factor for peri-implant disease, with several studies highlighting its role in promoting mucosal inflammation and marginal bone loss (Shi et al. 2018; Lv et al. 2021).

Screw-retained restorations enhanced retrievability, favorable peri-implant soft tissue health, and fewer biological complications, but they are more prone to technical complications (screw loosening and fracture) (Gehrke et al. 2024; Wolfart et al. 2021). Clinical studies compared the biological, technical, and esthetic outcomes of cemented and screw-retained single crowns. Yang et al. (2023) observed that screw-retained restorations are associated with better soft tissue response and lower bleeding on probing (BOP), while Lyu et al. (2023) reported comparable esthetic scores (PES/WES) between the two retention types. Retention systems show high survival rates over follow-up periods exceeding one year, with Gehrke et al. (2024) found survival more than 96% in both groups. Shi et al. (2020) found no significant difference in marginal bone loss (MBL). The literature show variability in clinical outcomes depending on patient factors, prosthetic design, and follow-up duration. This systematic review aims to evaluate the clinical performance of cement-retained versus screw-retained single implant-supported restorations by analyzing survival rates, soft tissue health, marginal bone levels, esthetic outcomes, and complication profiles, based on findings from recent high-quality studies.

METHODOLOGY

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Electronic search was carried out in major databases, including PubMed, Scopus, Web of Science, and Google Scholar. The search aimed to identify original clinical studies comparing cement-retained and screw-retained implant-supported single crowns. Only studies published in English from 2018 to 2024 were considered.

Eligibility Criteria

We include human clinical trials (randomized controlled trials, prospective or retrospective cohort studies), comparison of cement-retained and screw-retained single implant-supported crowns, evaluation of clinical performance including implant survival, marginal bone loss, peri-implant soft tissue conditions, esthetic outcomes, and/or technical

Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 08:2025
DOI: 10.5281/zenodo.16750359

complications, minimum follow-up duration of 6 months. We exclude in vitro or animal studies; case reports, review articles, editorials, or expert opinions; studies not reporting comparative outcomes between cemented and screw-retained crowns.

Search Strategy and Study Selection

The search yielded a total of 58 records. After removal of duplicates (n=7), and exclusions by automation and manual screening (n=17), 34 records were assessed for eligibility. Following full-text review of 14 articles, 7 studies met the inclusion criteria and were included in the qualitative synthesis. The study selection process is illustrated in the PRISMA flow diagram (Fig 1). Data were extracted independently by two reviewers and discrepancies were resolved through discussion.

Data Extraction and Analysis

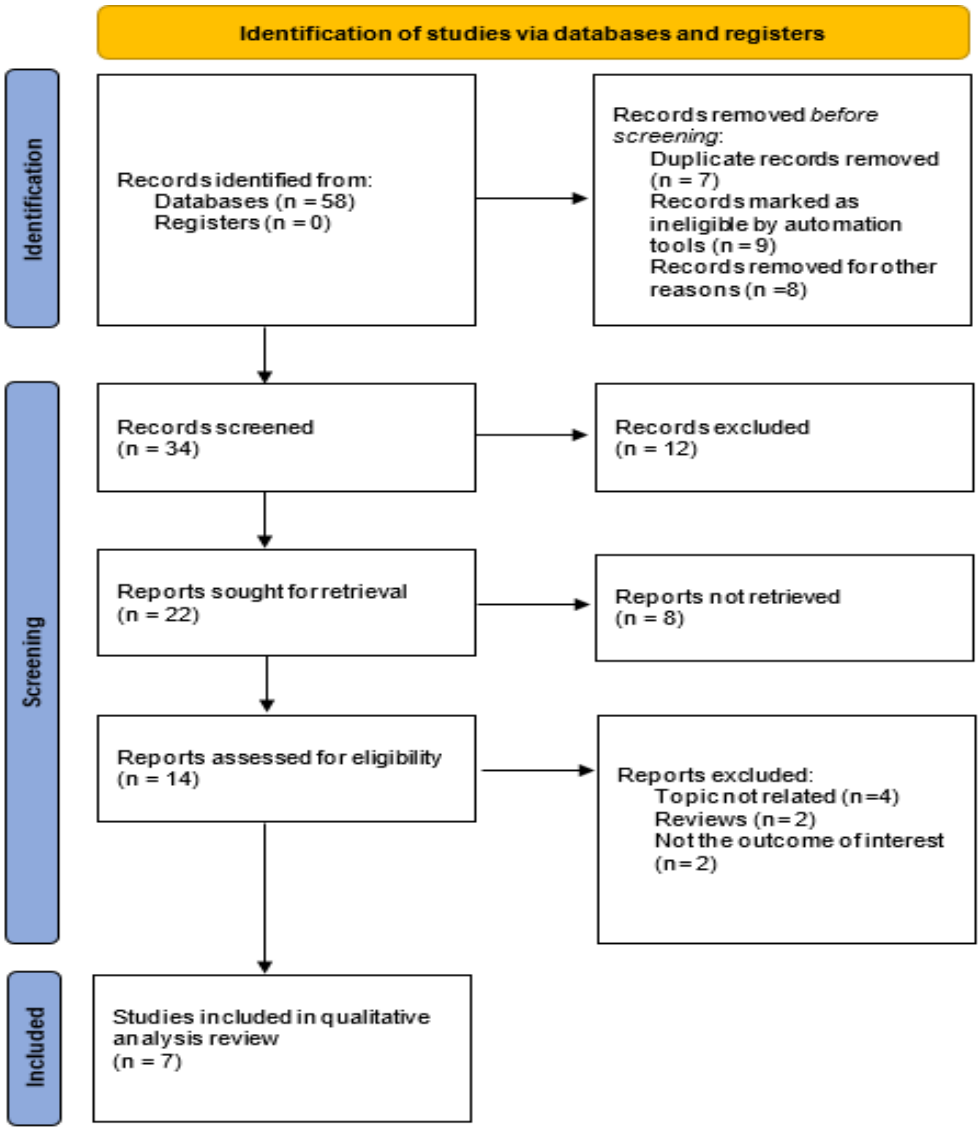

Fig 1: PRISMA consort chart

Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 08:2025
DOI: 10.5281/zenodo.16750359

For each included study, we extract (citation and study design; sample size and demographic information; type of restoration; follow-up duration; clinical outcomes assessed: implant survival, marginal bone loss (MBL), bleeding on probing (BOP%), probing depth (PD), pink and white esthetic scores (PES/WES), and mechanical/biologic complications) The data were synthesized narratively. All included studies were peer-reviewed and published in indexed journals.

RESULTS

A total of seven clinical studies were included, randomized controlled trials, prospective and retrospective cohort studies. The studies compared cemented and screw-retained implant-supported single crowns in both esthetic and posterior regions, with follow-up durations ranging from 6 months to 7 years.

The included studies involved a total of 464 implants placed in 396 patients. Sample sizes ranged from 36 to 176 patients per study. Three studies were randomized controlled trials, three were retrospective cohorts, and one was a prospective cohort.

The implant locations differ in studies, including both anterior (esthetic zone) and posterior regions. Several studies focused on angulated screw-retained crowns as a modern variation of the screw-retained design.

Implant survival rates were high in all studies, ranging from 98.8% to 100% for both cemented and screw-retained groups. Screw loosening was reported in screw-retained restorations, occurring in 1–8.7% of cases.

No differences in restoration failure were observed between the groups (Shi et al. 2018; Wolfart et al. 2021; Gehrke et al. 2024).

Most studies reported no significant differences in marginal bone loss between cemented and screw-retained crowns.

For example, Lyu et al. (2023) and Shi et al. (2020) reported comparable MBL outcomes at 6 and 12 months, respectively. Lv et al. (2021) and Yang et al. (2023) also found similar levels of bone stability over their follow-up periods.

Bleeding on probing (BOP%) was the most evaluated parameter in studies. Four studies (Lv et al. 2021; Lyu et al. 2023; Shi et al. 2020; Yang et al. 2023) reported lower BOP% in screw-retained or angulated screw-retained groups compared to cemented restorations. Shi et al. (2018) found a higher mucositis rate in the screw group, though this was not associated with increased peri-implantitis rates.

Probing depth (PD) and plaque indices were comparable between groups and did not differ in any of the included studies.

Pink Esthetic Score (PES) and White Esthetic Score (WES) were assessed in five studies.

Both retention types achieved acceptable esthetic scores. Shi et al. (2020) and Lyu et al. (2023) found no difference in PES/WES values, while Yang et al. (2023) suggested a soft-tissue benefit with screw-retained restorations due to reduced emergence angles.

Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 08:2025
DOI: 10.5281/zenodo.16750359

Patient satisfaction was high for both groups, with no significant differences reported in subjective esthetic evaluation.

Table 1: cemented vs screw-retained implant crowns

Citation	Study Design	Sample Size	Study Population	Methodology
Shi et al. (2018)	Retrospective cohort study	176 patients	Patients with cemented or screw-retained single crowns in posterior region	Compared peri-implant conditions and marginal bone loss using radiographic and clinical evaluations over a mean 2.5 years follow-up
Lv et al. (2021)	Randomized controlled trial	56 patients	Patients with single implant crowns in esthetic region	Compared angulated screw-retained and cemented crowns for peri-implant outcomes and inflammatory markers over 1-year follow-up
Lyu et al. (2023)	Randomized controlled trial	36 patients	Patients receiving anterior single crowns	Compared angulated screw vs. cemented crowns, clinical and radiologic evaluations at 6 months
Shi et al. (2020)	Prospective cohort study	43 patients (AG=23, CG=20)	Patients with immediate implant placement in esthetic region	Compared angulated screw vs. cemented crowns for aesthetic outcomes and peri-implant conditions
Yang et al. (2023)	Retrospective cohort study	48 patients	Patients with anterior restorations (ASC vs. cemented)	Measured BOP%, PES, probing depth, emergence angle, and marginal bone loss over mean 32 months
Gehrke et al. (2024)	Multicenter retrospective cohort study	63 crowns in 36 patients	Patients receiving zirconia single crowns cemented on titanium-base abutments	Long-term evaluation (mean 7 years) of biological, esthetic, and technical outcomes
Wolfart et al. (2021)	Randomized controlled trial	41 subjects (56 crowns)	Patients with posterior single crowns	Compared cemented vs. screw-retained lithium-disilicate crowns for technical/biologic complications and bone loss over 24 months

Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 08:2025
DOI: 10.5281/zenodo.16750359

Table 2: demographics, findings, and outcomes

Citation	Demographic	Main Findings	Outcome
Shi et al. (2018)	176 patients (SG: 94, CG: 82); posterior region	No significant difference in MBL, PPD, mPI; higher mucositis in screw group	High implant survival; comparable peri-implant conditions
Lv et al. (2021)	56 patients; esthetic region; CG: 27, AG: 29	Lower BOP% in screw group; TNF-α higher in AG; no MBL difference	Both restorations acceptable; screw-retained may benefit soft tissue
Lyu et al. (2023)	36 patients; AG: 19, CG: 17; anterior esthetic area	Higher BOP% in AG; no significant difference in PD, PES/WES	Both methods effective; screw-retained may improve soft tissue health
Shi et al. (2020)	43 patients; AG: 23, CG: 20; flapless immediate placement	Lower BOP% in AG; no significant difference in MBL, PD, PES	Excellent esthetic and survival outcomes in both groups
Yang et al. (2023)	48 patients; anterior region; mean follow-up 32 months	Lower BOP% and emergence angle in screw group	Screw-retained may benefit soft tissue; no implant failures
Gehrke et al. (2024)	36 patients, 63 ISCs; 32 anterior, 31 posteriors; 7-year follow-up	PD increased in 24%, BoP in 11%; overall survival 96.8%	Good long-term performance of Ti-based ISCs
Wolfart et al. (2021)	41 subjects; 28 cemented, 28 screw-retained; posterior crowns	Similar biological/technical complications; minor screw loosening	Retention type had no effect on complication rates

DISCUSSION

This systematic review compared the clinical performance of cement-retained and screw-retained single implant-supported crowns, focused on outcomes, implant survival, marginal bone loss (MBL), peri-implant soft tissue health, esthetic parameters, and technical complications. In all included studies, restoration types show high implant survival rates, ranging from 98.8% to 100% (Shi et al. 2018; Wolfart et al. 2021; Gehrke et al. 2024).

These findings align with previous systematic reviews, which reported comparable 5-year survival rates for cemented (96.03%) and screw-retained (95.55%) reconstructions (Wittneben et al. 2014; Sailer et al. 2012). Marginal bone loss is minimal and did not differ between retention types in most studies. Lyu et al. (2023) and Shi et al. (2020) found similar MBL at 6 and 12 months, respectively, Yang et al. (2023) reported no significant bone loss differences over 32 months.

These outcomes are consistent with data from recent reviews that showed no significant difference in bone loss (Fiorillo et al. 2024; Wittneben et al. 2014). A key distinction was observed in peri-implant soft tissue health, bleeding on probing (BOP%). Four studies in this review reported lower BOP% in screw-retained groups (Lv et al. 2021; Lyu et al. 2023; Shi et al. 2020; Yang et al. 2023).

Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 08:2025
DOI: 10.5281/zenodo.16750359

This is supported by earlier findings that suggest screw-retained restorations lead to better soft tissue outcomes due to the absence of residual cement, a known risk factor for peri-implant inflammation (Wittneben et al. 2017; Hamed et al. 2020). Shi et al. (2018) found higher mucositis in screw-retained cases, suggesting that peri-implant soft tissue health influenced by multiple factors beyond retention type alone. In terms of esthetics, both restoration types achieved acceptable Pink and White Esthetic Scores (PES/WES). While some studies (Lyu et al. 2023; Shi et al. 2020) reported no significant esthetic differences, Yang et al. (2023) found a potential benefit of screw-retained restorations due to a more favorable emergence angle.

Cemented restorations are preferred for esthetics, especially in the anterior zone, due to the absence of a visible screw access channel (Manawar et al. 2012; Wittneben et al. 2017). Mechanical complications and screw loosening were more common in screw-retained restorations, with reported rates ranging from 1% to 8.7% (Wolfart et al. 2021). These results are consistent with broader literature, which identifies screw loosening and veneering fractures as frequent issues in screw-retained designs (Sailer et al. 2012).

Cement-retained restorations carry a higher risk of biological complications peri-implantitis due to residual cement (Fiorillo et al. 2024; Wittneben et al. 2017). Both cemented and screw-retained restorations offer reliable outcomes in terms of survival and esthetics. Screw-retained crowns offer the added benefit of retrievability, facilitating easier management of technical complications. The choice of retention is based on clinical scenario, esthetic demand, implant position, and the need for future maintenance.

CONCLUSION

Both cement-retained and screw-retained single implant-supported crowns show a good clinical performance, with high implant survival rates and comparable outcomes in marginal bone stability, esthetic results, and patient satisfaction. No significant differences in survival or restoration failure were observed between the two retention types, and distinct patterns of complications were noted.

Screw-retained restorations had a higher rate of mechanical issues such as screw loosening, and cemented restorations were more associated with biological complications, peri-implant inflammation due to residual cement. Screw-retained restorations offer advantages in retrievability and peri-implant soft tissue health, in cases with ideal implant positioning. Cemented restorations, provide esthetic benefits and preferable in anterior regions or when implant angulation limits screw access.

Abbreviations

1) AG, Angulated Group
2) ASC, Angulated Screw Channel
3) BOP, Bleeding on Probing
4) CG, Cemented Group
5) MBL, Marginal Bone Loss

Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 08:2025
DOI: 10.5281/zenodo.16750359

6) PD, Probing Depth
7) PES, Pink Esthetic Score
8) PPD, Peri-implant Probing Depth
9) RCT, Randomized Controlled Trial
10) SG, Screw-retained Group
11) TNF-α, Tumor Necrosis Factor Alpha
12) WES, White Esthetic Score.

References

1) Chantler JGM, Evans CDJ, Zitzmann NU, Derksen W. Clinical performance of single implant prostheses restored using titanium base abutments: A systematic review and meta-analysis. Clin Oral Implants Res. 2023;34(Suppl. 26):64–85. doi:10.1111/clr.14128.
2) Fiorillo L, D'Amico C, Ronsivalle V, Cicciù M, Cervino G. Single dental implant restoration: cemented or screw-retained? A systematic review of multi-factor randomized clinical trials. Prosthesis. 2024;6(4):871–886. doi:10.3390/prosthesis6040063.
3) Froimovici FO, Butnărasu CC, Montanari M, Săndulescu M. Fixed Full-Arch Implant-Supported Restorations: Techniques Review and Proposal for Improvement. Dent J (Basel). 2024;12(12):408. doi:10.3390/dj12120408.
4) Gehrke P, Pietruska MJ, Korth A, Schöttler T, Jenatschke R, Fischer C, et al. Retrospective, multicenter cohort study evaluating clinical, technical, biologic, and esthetic outcomes of implant-supported zirconia single crowns cemented on titanium-base abutments: 7-year mean follow-up. Int J Oral Maxillofac Implants. 2024;39(3):445-454. doi:10.11607/jomi.11039.
5) Hamed MT, Mously HA, Alamoudi SK, Hashem ABH, Naguib GH. A systematic review of screw versus cement-retained fixed implant supported reconstructions. Clin Cosmet Investig Dent. 2020; 12:9–16. doi:10.2147/CCIDE.S231070.
6) Henriksson K, Jemt T. Measurements of Soft Tissue Volume in Association with Single-Implant Restorations: A 1-Year Comparative Study after Abutment Connection Surgery. Clin Implant Dent Relat Res. 2004;6(4):181–189.
7) Lv XL, Qian SJ, Qiao SC, Gu YX, Lai HC, Shi JY. Clinical, radiographic, and immunological evaluation of angulated screw-retained and cemented single-implant crowns in the esthetic region: A 1-year randomized controlled clinical trial. Clin Implant Dent Relat Res. 2021;1–11. doi:10.1111/cid.13035.
8) Lyu XL, Shi JY, Qian SJ, Lai HC. Short-term comparison of the clinical efficacy of angulated screw-retained implant crowns and cemented implant crowns in esthetics region. Hua Xi Kou Qiang Yi Xue Za Zhi. 2023;41(1):15-21. PMID: 36710559.
9) Manawar A, Dhanasekar B, Aparna IN, Naim H. Factors influencing success of cement versus screw-retained implant restorations: a clinical review. J Osseointegr. 2012;3(4):43–47.
10) Sailer I, Mühlemann S, Zwahlen M, Hämmerle CHF, Schneider D. Cemented and screw-retained implant reconstructions: a systematic review of the survival and complication rates. Clin Oral Implants Res. 2012;23(Suppl 6):163–201. doi:10.1111/j.1600-0501.2012.02538. x.
11) Shi JY, Gu YX, Lv XL, Lai HC. Angulated screw-retained and cemented implant crowns following flapless immediate implant placement in the aesthetic region: A 1-year prospective cohort study. Clin Implant Dent Relat Res. 2021;23(6):943-950. doi:10.1111/cid.12987.

Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 08:2025
DOI: 10.5281/zenodo.16750359

12) Shi JY, Jie-Ni, Zhuang LF, Zhang XM, Fan LF, Lai HC. Peri-implant conditions and marginal bone loss around cemented and screw-retained single implant crowns in posterior regions: A retrospective cohort study with up to 4 years follow-up.
PLoS One. 2018;13(2): e0191717. doi: 10.1371/journal.pone.0191717.

13) Wittneben JG, Joda T, Weber HP, Brägger U. Screw retained vs. cement retained implant-supported fixed dental prosthesis. Periodontol 2000. 2017;73(1):141–151. doi:10.1111/prd.12175.

14) Wittneben JG, Millen C, Brägger U. Clinical performance of screw- versus cement-retained fixed implant-supported reconstructions: a systematic review. Int J Oral Maxillofac Implants. 2014;29 Suppl:84–98. doi: 10.11607/jomi.2014suppl.g2.1.

15) Wolfart S, Rittich A, Groß K, Hartkamp O, von der Stück A, Raith S, Reich S. Cemented versus screw-retained posterior implant-supported single crowns: A 24-month randomized controlled clinical trial. Clin Oral Implants Res. 2022;33(12):1196-1207. doi:10.1111/clr.13849.

16) Yang H, Xu L, Jiang J, Xu Y, Li X, He F. Clinical effect of Nobel Biocare angulated screw channel crown compared with cement crown in the aesthetic area: A retrospective cohort study with a mean 32 months follow-up. Clin Implant Dent Relat Res. 2023;25(5):445-455. doi:10.1111/cid.13264.

17) Yilmaz ZS, Yanikoglu N, Koseoglu M. Comparison of Different Implant-Supported Fixed Restoration Types: A Literature Review. Open J Stomatol. 2024; 14:421–432. doi:10.4236/ojst.2024.1411036.