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INFLUENCE OF PROSTHETIC RETENTION TYPE OF IMPLANT-SUPPORTED CROWNS

INFLUÊNCIA DO TIPO DE RETENÇÃO PROTÉTICA DE COROAS IMPLANTOSSUPORTADAS

INFLUENCIA DEL TIPO DE RETENCIÓN PROTÉSICA DE LAS CORONAS IMPLANTOSOPORTADAS

Renan Mota de Oliveira[1], Lyncoln da Silva Siqueira[2]

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ABSTRACT

The choice of retention type in implant-supported crowns is an important aspect of prosthetic planning, as it may influence the clinical and biological behavior of implant rehabilitations. In this context, the present study aimed to analyze, through a literature review, the clinical, biological, and radiographic outcomes associated with cement-retained and screw-retained implant-supported crowns, seeking to identify potential advantages and limitations of each retention system. For this purpose, clinical studies and systematic reviews comparing the performance of these two retention types over different follow-up periods were analyzed. Overall, the results demonstrated that both systems show similar clinical performance in several parameters, including implant survival, marginal bone loss, and prosthetic stability. However, some differences were observed regarding the profile of complications. Screw-retained crowns showed advantages related to the retrievability of the restoration and a lower occurrence of biological complications associated with residual cement, facilitating clinical maintenance and long-term monitoring. On the other hand, this system may present a higher incidence of mechanical complications, such as prosthetic screw loosening. Cement-retained crowns, in turn, demonstrated better prosthetic retention in certain clinical situations but may be associated with a higher risk of peri-implant inflammation when excess cement remains in the peri-implant tissues. Therefore, both retention systems can be considered predictable options for implant-supported rehabilitations. The choice between cement-retained and screw-retained crowns should be based on specific clinical, prosthetic, and biological factors in each case, allowing an individualized treatment approach supported by scientific evidence.

KEYWORDS: Dental Implants. Implant-Supported Dental Prosthesis. Esthetics, Dental. Periodontal Tissues. Mouth Rehabilitation.

RESUMO

A escolha do tipo de retenção em coroas implantossuportadas representa um aspecto importante no planejamento protético, podendo influenciar o comportamento clínico e biológico das reabilitações sobre implantes. Nesse contexto, o presente estudo teve como objetivo analisar, por meio de uma revisão de literatura, os desfechos clínicos, biológicos e radiográficos associados às coroas implantossuportadas cimentadas e parafusadas, buscando identificar possíveis vantagens e limitações de cada sistema de retenção. Para isso, foram analisados estudos clínicos e revisões sistemáticas que compararam o desempenho desses dois tipos de retenção em diferentes períodos de acompanhamento. De modo geral, os resultados demonstraram que ambos os sistemas apresentam desempenho clínico semelhante em diversos parâmetros, como sobrevivência dos implantes, perda óssea marginal e estabilidade protética. Entretanto, algumas diferenças foram observadas quanto ao perfil de complicações. As coroas parafusadas apresentaram vantagens relacionadas à facilidade de remoção da restauração e à menor ocorrência de complicações biológicas associadas ao cimento residual, favorecendo o controle clínico e a manutenção das próteses. Por outro lado, esse sistema pode apresentar maior incidência de complicações mecânicas, como afrouxamento do parafuso protético. Já as coroas cimentadas demonstraram melhor retenção protética em determinadas

[1] Cirurgião Dentista, Especialista em Prótese Dentária, Clínica Privada
[2] Cirurgião Dentista, Mestre em Odontologia.

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situações clínicas, porém podem estar associadas a maior risco de inflamação peri-implantar quando ocorre retenção de cimento nos tecidos peri-implantares. Dessa forma, conclui-se que ambos os sistemas de retenção são opções previsíveis para reabilitações implantossuportadas. A escolha entre coroas cimentadas ou parafusadas deve ser baseada em fatores clínicos, protéticos e biológicos específicos de cada caso, permitindo uma abordagem terapêutica individualizada e baseada em evidências científicas.
***PALAVRAS-CHAVE**: Implantes Dentários. Prótese Dentária Fixada por Implante. Estética Dentária. Tecidos Periodontais. Reabilitação Bucal.*

RESUMEN
La elección del tipo de retención en coronas implantosoportadas es un aspecto importante de la planificación protésica, ya que puede influir en el comportamiento clínico y biológico de las rehabilitaciones con implantes. En este contexto, el presente estudio tuvo como objetivo analizar, mediante una revisión de la literatura, los resultados clínicos, biológicos y radiográficos asociados a las coronas implantosoportadas cementadas y atornilladas, con el fin de identificar las posibles ventajas y limitaciones de cada sistema de retención. Para ello, se analizaron estudios clínicos y revisiones sistemáticas que compararon el desempeño de estos dos tipos de retención durante diferentes períodos de seguimiento. En general, los resultados demostraron que ambos sistemas presentan un desempeño clínico similar en varios parámetros, incluidos la supervivencia del implante, la pérdida ósea marginal y la estabilidad protésica. Sin embargo, se observaron algunas diferencias en cuanto al perfil de complicaciones. Las coronas atornilladas mostraron ventajas relacionadas con la posibilidad de retirar la restauración y con una menor ocurrencia de complicaciones biológicas asociadas al cemento residual, lo que facilita el mantenimiento clínico y el seguimiento a largo plazo. Por otra parte, este sistema puede presentar una mayor incidencia de complicaciones mecánicas, como el aflojamiento del tornillo protésico. Las coronas cementadas, a su vez, demostraron una mejor retención protésica en determinadas situaciones clínicas, pero pueden estar asociadas con un mayor riesgo de inflamación periimplantaria cuando permanece exceso de cemento en los tejidos periimplantarios. Por lo tanto, ambos sistemas de retención pueden considerarse opciones predecibles para las rehabilitaciones implantosoportadas. La elección entre coronas cementadas y atornilladas debe basarse en factores clínicos, protésicos y biológicos específicos de cada caso, permitiendo un abordaje terapéutico individualizado respaldado por la evidencia científica.
***PALABRAS-CLAVE**: Implantes dentales. Prótesis dental implantosoportada. Estética dental. Tejidos periodontales. Rehabilitación bucal.*

1- INTRODUCTION

Oral rehabilitation with fixed implant-supported prostheses has been established as one of the main therapeutic modalities for partially or fully edentulous patients, as it provides significant improvements in masticatory function, esthetics, and quality of life. Compared with removable prostheses, fixed implant-supported restorations tend to be more widely accepted by patients, particularly because of their comfort, stability, and the perception of natural aspect during speech and mastication (Pennington and Parker, 2012; Lemos et al., 2016; Alqutaibi, 2017). In this context, contemporary implant dentistry has come to value not only osseointegration, but also long-term prosthetic predictability.

Among the various factors that influence the success of implant therapy, the retention mode of the prosthetic crown represents a decisive step in rehabilitation planning. Implant-supported crowns may be retained either by cement or by screws, and both modalities have specific indications, advantages, limitations, and distinct complication profiles. The choice between these two systems

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should consider biomechanical, biological, esthetic, functional, and maintenance-related aspects, as well as the particular characteristics of each clinical case and the patient's expectations (Lemos et al., 2016; Jain et al., 2018; Atieh et al., 2025).

Screw-retained crowns are traditionally indicated to situations in which retrievability and ease of prosthesis removal are desirable, such as multiple-unit prostheses, cases requiring periodic maintenance, or situations in which future repairs may be necessary. In addition, this system allows direct access to the prosthesis without the need for decementation, which facilitates long-term clinical management. However, screw-retained crowns also present limitations, particularly related to a higher occurrence of technical complications, such as loosening or fracture of the prosthetic screw, as well as potential esthetic drawbacks when implant positioning compromises the emergence of the occlusal or buccal access channel (Shadid and Sadaqa, 2012; Lemos et al., 2016; Alqutaibi, 2017; Brägger et al., 2005).

Cement-retained crowns are often considered an advantageous alternative when esthetics is the priority, particularly in anterior regions or in situations of unfavorable implant angulation. This retention allows to compensate for minor positioning discrepancies and, from a laboratory perspective, is generally easier to fabricate. Laboratory studies also suggest that cement-retained prostheses may generate lower stress concentrations in prosthetic components and in the adjacent bone tissue when compared with screw-retained prostheses (Tonella et al., 2011; Lemos et al., 2016; Alqutaibi, 2017). Nevertheless, their main clinical limitation is related to the risk of cement extrusion into the subgingival region.

The presence of excess cement around implants has been consistently associated with biofilm accumulation, inflammation of the peri-implant tissues, and marginal bone loss. This residual material, especially when located in subgingival areas, may favor biofilm retention and act as an etiologic factor for the development of peri-implant mucositis, with potential progression to peri-implantitis. In such cases, bleeding on probing, edema, suppuration, increased probing depth, and progressive bone resorption may be observed, compromising the stability of the peri-implant tissues and the longevity of the rehabilitation. In addition, the difficulty in detecting and completely excess removing, combined with inadequate prosthetic seating, may favors the local inflammatory response and hinder the clinical control of these changes. Thus, although cement-retained restorations offer esthetic and laboratory advantages, this system may be associated with more relevant biological complications, particularly in the absence of strict control of prosthetic adaptation, cervical margin location, and residual cement removal (de Brandão et al., 2013; Thoma et al., 2018; Wolfart et al., 2021). In contrast, in screw-retained crowns, biological complications tend to be less directly related to the retention method, whereas mechanical complications remain an important cause of maintenance and retreatment.

When evaluating the longevity of implant-supported crowns, it is essential to consider that therapeutic success is not limited to the absence of implant mobility or the maintenance of osseointegration. It is currently understood that clinical success also involves stable long-term

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functional, esthetic, and biological outcomes, including peri-implant health, absence of pain, integrity of prosthetic components, and patient satisfaction (Sherif et al., 2011; Wolfart et al., 2021). Therefore, prosthetic longevity should be understood as a multifactorial outcome influenced not only by the type of retention, but also by prosthetic design, restorative material, implant positioning, and the quality of maintenance care.

Several prospective and retrospective clinical studies, as well as randomized clinical trials, have sought to compare the long-term performance of cement-retained and screw-retained crowns. Studies with medium- and long-term follow-up, such as those by Vigolo et al. (2012), Amorfini et al. (2018), Kraus et al. (2019, 2022, 2024), Lamperti et al. (2022), Heierle et al. (2019), and Cacaci et al. (2017), have shown that both systems can achieve high success and clinical survival rates when properly indicated and executed. However, these studies also indicate that the complications associated with the two retention types are not identical, varying in both nature and clinical impact.

Systematic reviews and meta-analyses reinforce this interpretation. Overall, evidence synthesis studies indicate that there is no robust evidence of the absolute superiority of one retention system over the other in terms of marginal bone loss or implant survival. Lemos et al. (2016), de Brandão et al. (2013), Potdukhe et al. (2024), Tomar et al. (2025), and Atieh et al. (2025) observed that cement-retained and screw-retained crowns present broadly comparable clinical outcomes, although they affect outcomes in different ways. While cement-retained crowns tend to concentrate a greater biological risk, screw-retained crowns are more commonly associated with technical complications, such as screw loosening and the need for retightening (Jain et al., 2018; Thoma et al., 2018).

Despite the widespread clinical use of both methods, decision-making regarding the type of retention still remains, in many cases, dependent on the clinician's preference and individual clinical experience. This is partly due to the absence of universal evidence-based guidelines that unequivocally determine the best choice for all clinical situations. Factors such as esthetics, access to the screw channel, implant inclination, ease of laboratory fabrication, retrievability, cost, biological risk, and maintenance history should be individually considered during treatment planning (Jain et al., 2018; Alqutaibi, 2017; Found et al., 2024; Atieh et al., 2025).

Although previous systematic reviews have compared screw-retained and cement-retained implant-supported restorations (de Brandão et al., 2013; Sherif et al., 2013; Lemos et al., 2016; Jain et al., 2018; Potdukhe et al., 2024; Atieh et al., 2025; Tomar et al., 2025), the available literature still presents considerable heterogeneity regarding the included study designs, follow-up periods, definitions of biological and mechanical complications, and the prosthetic and implant-related characteristics evaluated. In addition, the incorporation of more recent evidence and the persistence of non-uniform findings among studies make it difficult to reach a conclusive interpretation of the actual impact of the retention method on clinical outcomes. In this context, a new review is justified, with an updated synthesis and critical analysis of the available evidence, aiming to clarify more consistently the

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association between retention type and the occurrence of complications, as well as to provide stronger support for clinical decision-making.

On this scenario, it is relevant to critically review the available scientific literature on the influence of prosthetic retention type on the longevity of implant-supported crowns. The comparison between cement-retained and screw-retained crowns may contribute to a broader understanding of the factors that affect their clinical durability, complications, and long-term predictability. Therefore, this study aims to compare cement-retained and screw-retained implant-supported crowns, seeking to analyze, based on the literature, how the type of retention may influence the longevity of these restorations.

2- METODOLOGY

The present study is characterized as a literature review with a narrative and analytical approach, conducted with the aim of identifying and synthesizing scientific evidence related to the influence of prosthetic retention type on the longevity of implant-supported crowns. To identify relevant studies, an electronic search was performed in the PubMed/MEDLINE and SciELO databases, which are widely recognized for indexing scientific journals in the fields of health sciences and dentistry. The search strategy included articles published between January 2005 and February 2025, a period selected because it encompasses the consolidation of contemporary implant dentistry and the emergence of clinical studies comparing different prosthetic retention systems.

The bibliographic search was conducted by two independent investigators in order to minimize bias in study selection. Descriptors related to the topic were used, including combinations of the English terms “dental implants,” “implant-supported prosthesis,” “cement-retained,” “screw-retained,” “implant crowns,” “prosthetic complications,” “marginal bone loss,” and “implant survival.” These descriptors were combined using Boolean operators to increase the sensitivity of the search and identify studies potentially relevant to the topic under investigation.

After the initial identification of records in the databases, titles and abstracts were screened to assess their relevance to the study topic. Articles considered potentially eligible were then evaluated in full text according to previously established inclusion and exclusion criteria. Studies were included when they presented a direct comparison between cement-retained and screw-retained implant-supported restorations within the same research design, allowing comparative analysis between the two prosthetic retention systems.

Randomized controlled trials (RCTs), prospective and retrospective studies, systematic reviews, and comparative clinical studies were considered eligible for inclusion. The inclusion of observational studies was considered necessary because of the relative scarcity of randomized controlled trials available in the literature on this topic, thereby allowing a broader understanding of the existing clinical evidence.

Studies that did not compare the two types of prosthetic retention, articles addressing exclusively implant-supported removable prostheses, isolated case reports, laboratory studies without

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direct clinical correlation, and publications not available in full text in the consulted databases were excluded.

To guide the development of the search strategy and the analysis of the included studies, a research question was formulated according to the PICO framework (Population, Intervention, Comparison, Outcome), which is widely used in evidence-based literature reviews. The guiding question was: “In patients rehabilitated with implant-supported crowns, is cement-retained retention and screw-retained retention, associated with different survival rates, bone loss, and complications?”

According to this strategy, the population (P) consisted of patients rehabilitated with dental implants who received implant-supported crowns or prostheses. The intervention (I) corresponded to cement-retained restorations, while the comparator (C) was represented by screw-retained restorations. The main outcome (O) was the analysis of prosthetic longevity and the clinical outcomes associated with each retention system, including restoration survival rate, peri-implant marginal bone loss, occurrence of technical complications, and biological complications.

After the final selection of eligible studies, the relevant data were organized in a summary table (Table 1) and analyzed qualitatively, seeking to identify patterns of results related to the clinical performance of the two retention systems. Particular attention was given to aspects related to prosthetic survival rate, incidence of mechanical and biological complications, ease of clinical maintenance, and stability of peri-implant tissues over time.

The synthesis of the results was performed descriptively, with the aim of comparing the evidence available in the literature and identifying trends related to the influence of prosthetic retention type on the longevity of implant-supported crowns. Thus, this review sought to gather relevant information that may assist clinical decision-making during the planning of implant-supported rehabilitations.

3- RESULTADOS

Charts 1 and 2 present the synthesis of the studies included in this review, containing information regarding the author, year of publication, study design, evaluated sample, follow-up period, and main outcomes analyzed. Overall, the included studies presented varied methodological designs, with different clinical follow-up periods and different parameters used to determine the performance of implant-supported prostheses.

The analysis of the systematic reviews articles (Chart 1) shows that, overall, there is no definitive consensus in the literature regarding the superiority of cement-retained or screw-retained crowns on dental implants. Most studies report similar clinical outcomes between the two retention systems, particularly in relation to implant survival, prosthetic failure rates, and peri-implant clinical parameters.

Most clinical studies (Chart 2) demonstrate similar outcomes between cement-retained and screw-retained crowns regarding survival, marginal bone loss, and technical complications. Some studies indicate a higher risk of biological complications in cement-retained crowns, whereas others

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report a higher incidence of mechanical complications in screw-retained crowns. Thus, the clinical literature suggests that neither method shows consistent superiority, and the choice depends on prosthetic planning and clinical conditions.

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Chart 1 – Summary of systematic reviews articles on retention systems for implant-supported crowns.

Author (year)	Included articles	Sample	Follow-up period	Main findings (summary)	Trend
Shadid & Sadaqa, 2012	Varied	1,692 crowns (1,408 cement-retained; 284 screw-retained)	60 months	No difference was observed in implant survival. Cement-retained crowns showed more biological complications, including bone loss and implant loss, whereas screw-retained crowns showed more technical complications.	No clear trend
Sherif et al., 2014	23 studies	3,084 implants	Varied	No significant difference was observed between cement-retained and screw-retained restorations regarding implant survival or crown loss.	No difference
Lemos et al., 2016	20 studies	8,989 crowns / 2,139 patients	12–180 months	Cement-retained crowns showed lower marginal bone loss. Similar outcomes were observed for implant survival and prosthetic complications.	Favorable to cement-retained crowns
Jain et al., 2018	33 studies	1,034 prostheses (≤5 years); 884 (>5 years)	Varied	Retention failures were less frequent in cement-retained prostheses compared with screw-retained prostheses.	Favorable to cement-retained prostheses
Potdukhe et al., 2024	8 studies	Not reported	36–60 months	No significant difference was observed for marginal bone loss, probing depth, or biological and technical complications.	No difference
Tomar et al., 2025	7 studies	168 cement-retained crowns + 166 screw-retained crowns	Up to 60 months	Screw-retained crowns showed lower initial marginal bone loss and a lower risk of complications; long-term outcomes were similar.	Trend toward screw-retained crowns
Atieh et al., 2025	4 studies	167 crowns / 167 patients	12–72 months	Screw-retained crowns with an angulated screw channel showed lower bleeding on probing; no differences were observed in bone loss, probing depth, esthetics, or failures.	Slight trend toward screw-retained crowns

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Quadro 2 – Síntese dos estudos clínicos comparando coroas cimentadas e parafusadas em implantes

Author (year)	Study design	Participants / crowns	Follow-up	Main findings (summary)	Trend
Brägger et al., 2005	Prospective clinical study	69 crowns on 69 implants; 67 cement-retained and 2 screw-retained	120 months	Five biological implant losses with crowns and two crowns remade due to technical failures.	No clear trend
Schropp et al., 2005	Randomized clinical study	46 patients; 41 cement-retained / 2 screw-retained	Up to 24 months	No loss was observed in screw-retained crowns; a 13% loss was reported in cement-retained crowns.	Screw-retained
De Boever et al., 2006	Prospective clinical study	105 patients; 80 cement-retained / 45 screw-retained	40 months	Higher loss was observed in screw-retained prostheses (46%) than in cement-retained prostheses (16%).	Cement-retained
Nedir et al., 2006	Retrospective clinical study	236 patients; 231 cement-retained / 34 screw-retained	96 months	No loss was observed in screw-retained crowns, whereas a 2% loss was observed in cement-retained crowns.	Screw-retained
Romeo et al., 2009	Prospective clinical study	45 patients; 46 cement-retained / 13 screw-retained	96 months	No loss was observed in screw-retained crowns, whereas a 7% loss was observed in cement-retained crowns.	Screw-retained
Vigolo et al., 2012	Prospective clinical study	18 patients; 18 cement-retained / 18 screw-retained	120 months	No significant difference was observed in marginal bone loss or peri-implant tissues.	No difference
Ferreiroa et al., 2015	Retrospective clinical study	80 patients; 40 cement-retained / 40 screw-retained	48 months	Cement-retained crowns showed less screw loosening, whereas screw-retained crowns showed lower rates of mucositis and peri-implantitis.	No clear trend
Woelber et al., 2016	Retrospective clinical study	27 patients; 36 cement-retained / 36 screw-retained	120 to 276 months	Similar loss rates were observed, 11% for cement-retained and 14% for screw-retained crowns, with no peri-implantitis.	No difference
Cacaci et al., 2017	Randomized clinical study	58 patients; 61 cement-retained / 53 screw-retained	Up to 80 months	Similar outcomes were observed for fracture, plaque index, bleeding, and failures.	No difference
Amorfini et al., 2018	Randomized clinical study	32 patients; 16 cement-retained / 16 screw-retained	120 months	No significant difference was observed in marginal bone loss or biological complications.	No difference
Thoma et al., 2018	Randomized clinical study	33 patients; 17 cement-retained / 16 screw-retained	6 months	Cement-retained crowns were associated with a higher presence of inflammatory cells and periodontal pathogens; clinical outcomes were similar.	Screw-retained
Heierle et al., 2019	Randomized clinical study	34 patients; 17 cement-retained / 17 screw-retained	3 years	Marginal bone levels and technical complications were similar.	No difference
Weigl et al., 2019	Prospective clinical study	22 patients; 22 cement-retained / 22 screw-retained	12 months	Similar outcomes were observed for bleeding, plaque, and bone loss.	No difference

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Kraus et al., 2019	Randomized clinical study	44 patients; 20 cement-retained / 24 screw-retained	3 years	Clinical, biological, and radiographic outcomes were similar.	No difference
Lv et al., 2021	Randomized clinical study	56 patients; 10 cement-retained / 10 screw-retained	1 year	Both methods showed acceptable clinical outcomes; angulated screw-retained crowns favored peri-implant tissues.	Screw-retained
Nastri et al., 2021	Retrospective clinical study	20 patients; 10 cement-retained / 10 angulated screw-retained	44 months	Good esthetic outcomes and absence of bone loss were observed in both groups.	No difference
Sherif et al., 2011	Prospective multicenter clinical study	102 patients; 90 cement-retained / 103 screw-retained	60 months	Survival and clinical parameters were similar between groups.	No difference
Wolfart et al., 2021	Randomized clinical study	41 patients; 28 cement-retained / 28 screw-retained	24 months	No difference was observed in plaque index, gingival inflammation, or bone loss.	No difference
Kraus et al., 2022	Randomized clinical study	44 patients; 20 cement-retained / 24 screw-retained	60 months	A higher rate of biological complications was observed in cement-retained crowns.	Screw-retained
Lamperti et al., 2022	Randomized clinical study	26 patients; 13 cement-retained / 13 screw-retained	60 months	Clinical, technical, and radiographic outcomes were similar.	No difference
Naumann et al., 2023	Randomized clinical study	20 patients; 10 cement-retained / 10 screw-retained	36 months	No significant difference was observed between the methods.	No difference
Kraus et al., 2024	Randomized clinical study	44 patients; 20 cement-retained / 24 screw-retained	90 months	Higher bleeding on probing and more complications were observed in cement-retained crowns.	Screw-retained
Rajput et al., 2024	Randomized clinical study	14 patients; 10 cement-retained / 10 screw-retained	60 months	No significant improvement was observed with either method.	No difference
Khurshid et al., 2025	Prospective observational clinical study	100 patients; 50 cement-retained / 50 screw-retained	12 months	Screw-retained crowns showed more mechanical problems, whereas cement-retained crowns showed more biological complications.	No clear trend
Naumann et al., 2025	Randomized clinical study	20 patients; 10 cement-retained / 10 screw-retained	36 months	No significant difference was observed between the reconstructions.	No difference

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4- DISCUSSION

The present study aimed to analyze the clinical, biological, and radiographic outcomes associated with cement-retained and screw-retained implant-supported crowns, seeking to identify whether either of these retention systems demonstrates consistent clinical superiority. This analysis is particularly relevant in the context of contemporary implant dentistry, since restoration stability and the maintenance of peri-implant tissue health are key determinants of long-term success in prosthetic rehabilitation.

In the studies included in this review, clinical, biological, and radiographic outcomes were assessed using parameters widely adopted in the implant dentistry literature to measure success, complications, and the stability of implant-supported rehabilitations. Among the clinical outcomes, the most frequently reported were implant and restoration survival, prosthetic failures, and technical complications, such as screw loosening, fracture of the ceramic veneering material, and the need for prosthetic maintenance, as reported by Sherif et al. (2011; 2013), Jain et al. (2018), Lemos et al. (2016), Cacaci et al. (2017), Heierle et al. (2019), Kraus et al. (2019), Lamperti et al. (2022), Naumann et al. (2023; 2025), Rajput et al. (2024), and Khurshid et al. (2025). Biological outcomes were generally analyzed using peri-implant health indicators, such as bleeding on probing, probing depth, plaque index, presence of mucositis, peri-implantitis, inflammatory cells, periodontal pathogens, and other biological complications, as described by Lemos et al. (2016), Potdukhe et al. (2024), Atieh et al. (2025), Tomar et al. (2025), Ferreiroa et al. (2015), Thoma et al. (2018), Weigl et al. (2019), Kraus et al. (2019; 2022; 2024), Lv et al. (2021), Wolfart et al. (2021), Lamperti et al. (2022), and Khurshid et al. (2025). Radiographic outcomes were mainly assessed by measuring marginal bone loss, changes in the crestal bone, and stability of the peri-implant bone level on serial radiographs, as demonstrated by Vigolo et al. (2012), Lemos et al. (2016), Amorfini et al. (2018), Thoma et al. (2018), Heierle et al. (2019), Kraus et al. (2019; 2022; 2024), Atieh et al. (2025), Potdukhe et al. (2024), Tomar et al. (2025), Weigl et al. (2019), Nastri et al. (2021), Wolfart et al. (2021), and Lamperti et al. (2022). Together, these parameters allowed a comprehensive comparison of the clinical, biological, and radiographic behavior of cement-retained and screw-retained crowns over the follow-up period.

Overall, the results of this literature review indicate that there is no absolute superiority between cement-retained and screw-retained systems. Most of the available evidence demonstrates similar clinical performance between both systems in parameters such as implant survival, marginal bone loss, and prosthetic stability. Systematic reviews have reported no statistically significant differences between the two systems for most of the evaluated outcomes (Lemos et al., 2016; Potdukhe et al., 2024; Shadid and Sadaqa, 2012). Similar findings have also been observed in long-term clinical studies, which demonstrated comparable rates of clinical success and peri-implant stability between cement-retained and screw-retained crowns (Vigolo et al., 2012; Amorfini et al., 2018; Lamperti et al., 2022). However, several authors emphasize that each system presents distinct profiles of biological and mechanical complications, supporting the need for individualized therapeutic decision-making (Sherif et al., 2011).

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Evidence from systematic reviews reinforces this balanced scenario between retention systems. Lemos et al. (2016) observed lower marginal bone loss in cement-retained crowns, although similar results were reported between groups regarding implant survival and technical complications. Similarly, Jain et al. (2018) identified a lower incidence of retention failures in cement-retained prostheses compared with screw-retained prostheses.

On the other hand, some reviews have reported specific advantages for screw-retained crowns. Atieh et al. (2025) observed lower bleeding on probing in restorations with an angulated screw channel, whereas Tomar et al. (2025) reported lower initial marginal bone loss for this type of retention. Even so, systematic reviews such as those by Potdukhe et al. (2024) and Sherif et al. (2013) concluded that there are no statistically significant differences between the two methods for most of the evaluated clinical parameters.

Another advantage frequently associated with screw-retained crowns concerns the biological behavior of peri-implant tissues, since this system eliminates the risk of residual cement retention. Lv et al. (2021) observed that angulated screw-retained crowns showed better outcomes regarding bleeding on probing. Similarly, Atieh et al. (2025), in a systematic review, reported less peri-implant inflammation in screw-retained restorations compared with cement-retained restorations. Clinical studies have also shown that cement-retained restorations may present a greater peri-implant inflammatory response, as observed by Thoma et al. (2018), who identified a higher presence of inflammatory cells and periodontal pathogens in this group. Similar results were reported by Kraus et al. (2022; 2024), they observed a higher incidence of biological complications and bleeding on probing in cement-retained crowns during clinical follow-up.

In addition, screw-retained crowns present an important biological advantage by eliminating the risk of residual cement retention in the peri-implant tissues. Lv et al. (2021) observed that angulated screw-retained crowns showed better outcomes regarding bleeding on probing. Similarly, Atieh et al. (2025) reported less peri-implant inflammation with this type of retention. Clinical studies have also shown that cement-retained restorations may present a greater peri-implant inflammatory response, as observed by Thoma et al. (2018), who identified a higher presence of inflammatory cells and periodontal pathogens in this group. Similar findings were reported by Kraus et al. (2022; 2024), who observed a higher incidence of biological complications and bleeding on probing in cement-retained crowns during clinical follow-up.

Despite the described advantages, screw-retained crowns also have disadvantages mainly related to mechanical complications. Jain et al. (2018) reported that screw-retained restorations may present a higher incidence of retention failures, often associated with loosening of the prosthetic screw, a phenomenon related to factors such as inadequate torque, material fatigue, prosthetic misfit, and occlusal overload. Clinical studies have also demonstrated this tendency. Ferreiroa et al. (2015) observed that cement-retained restorations appear to reduce episodes of screw loosening, whereas Khurshid et al. (2025) identified a higher frequency of mechanical complications in screw-retained crowns. Similar findings were reported by Tomar et al. (2025), who observed a higher incidence of technical complications, such as screw loosening and fracture of the ceramic veneering material.

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Consistently, Brägger et al. (2005) also reported a higher failure rate in screw-retained restorations during clinical follow-up.

However, screw-retained crowns also present limitations mainly related to mechanical complications. Jain et al. (2018) highlighted that loosening of the prosthetic screw is one of the most frequently reported technical complications in implant-supported restorations. Factors associated with this occurrence include inadequate torque, occlusal overload, prosthetic misfit, and material fatigue. Clinical studies support these findings, demonstrating a higher incidence of mechanical problems in screw-retained crowns. Ferreiroa et al. (2015) observed that cement-retained restorations may reduce episodes of screw loosening, whereas Khurshid et al. (2025) reported a higher frequency of mechanical complications with this type of retention. Similar results were also discussed by Tomar et al. (2025), who identified a higher occurrence of technical complications, including screw loosening and ceramic fracture, in screw-retained restorations.

Regarding the advantages of cement-retained crowns, several studies have reported better performance in certain mechanical and prosthetic aspects, particularly with respect to restoration retention. Jain et al. (2018) observed a lower incidence of retention failures in cement-retained prostheses compared with screw-retained prostheses, suggesting greater prosthetic stability with this system. In addition, Lemos et al. (2016) reported lower marginal bone loss in cement-retained restorations over different follow-up periods. These findings are also supported by clinical studies, such as those conducted by Brägger et al. (2005) and De Boever et al. (2006), which reported a higher incidence of prosthetic failures or complications in screw-retained restorations during clinical follow-up. Similarly, Ferreiroa et al. (2015) observed that cement-retained restorations may reduce the risk of prosthetic screw loosening. Taken together, these results suggest that cementation may provide greater mechanical stability under certain clinical and prosthetic conditions.

Despite these advantages, cement-retained crowns present important limitations, especially regarding biological complications. The presence of residual cement in the peri-implant region has frequently been associated with inflammatory processes in peri-implant tissues. Thoma et al. (2018) observed a higher presence of inflammatory cells and periodontal pathogens in cement-retained restorations compared with screw-retained restorations, suggesting a greater inflammatory response in these cases. Similar findings were reported by Kraus et al. (2022), who identified a higher rate of biological complications in cement-retained crowns after five years of clinical follow-up. In longer follow-up periods, cement-retained restorations have been associated with a higher incidence of bleeding on probing and a higher frequency of biological complications, including mucositis and peri-implantitis, as observed by Kraus et al. (2024) and Ferreiroa et al. (2015). From a mechanistic perspective, this finding has mainly been attributed to the possible persistence of residual cement in subgingival areas, particularly when the cementation margin is positioned apically in relation to the peri-implant tissue. This remnant may favor biofilm retention, hinder local control, and perpetuate chronic inflammatory stimuli, with negative consequences for the stability of peri-implant soft and hard tissues. Nevertheless, this association should be interpreted with caution, since the available studies present methodological heterogeneity and different clinical conditions. Therefore, the greater biological risk attributed to cement-

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retained restorations may reflect, at least in part, the influence of operative, prosthetic, and maintenance-related factors, and not only the retention principle itself.

Clinical studies reinforce this concern. Thoma et al. (2018) observed a higher presence of inflammatory cells and periodontal pathogens in cement-retained restorations. Likewise, Kraus et al. (2022) and Kraus et al. (2024) reported a higher incidence of biological complications and bleeding on probing in cement-retained crowns in medium- and long-term follow-up periods.

Despite these specific differences, several studies have demonstrated similar clinical outcomes between the two retention systems. Vigolo et al. (2012), Sherif et al. (2011), Weigl et al. (2019), Amorfini et al. (2018), Heierle et al. (2019), Lamperti et al. (2022), Wolfart et al. (2021), and Naumann et al. (2023; 2025) did not identify significant differences between cement-retained and screw-retained crowns in parameters such as marginal bone loss, technical complications, and success rates.

Some limitations of this study should be acknowledged. The search was conducted in only two databases, which may have restricted the retrieval of relevant studies. In addition, no formal risk-of-bias assessment was performed, limiting the analysis of the methodological quality of the included evidence. Considerable heterogeneity was also observed among studies regarding follow-up time, which ranged from 6 months to 23 years, as well as the restorative materials used. These factors hinder the comparability of results and recommend caution in the interpretation of the findings.

In summary, the analyzed literature demonstrates that cement-retained and screw-retained crowns are clinically predictable options for implant-supported rehabilitations. However, each system presents specific advantages and limitations, mainly related to mechanical and biological aspects. Therefore, the choice of retention method should consider factors such as implant position, esthetic demands, possibility of retreatment, risk of peri-implant complications, and the clinician's experience, allowing individualized decision-making based on scientific evidence.

5- CONCLUSION

Cement-retained and screw-retained implant-supported crowns show comparable clinical performance. Screw-retained crowns are advantageous due to their greater retrievability and lower risk of biological complications associated with residual cement. However, they may be associated with a higher incidence of mechanical complications. Conversely, cement-retained crowns tend to provide improved prosthetic retention but may be related to an increased risk of peri-implant inflammation. Therefore, both retention systems represent predictable and effective treatment options. The selection of the retention type should be individualized, considering the clinical, prosthetic, and biological factors of each case.

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