



COMPARISON OF SCREW-RETAINED VERSUS CEMENT-RETAINED IMPLANT PROSTHESES: A REVIEW OF CLINICAL OUTCOMES AND COMPLICATIONS

Prosthodontics

Dr. Md Siraj ur Rahman

Assistant Professor, Department of Prosthodontics, Govt Dental College and Hospital, Hyderabad, Telangana

Dr. Avinash Vallabhaneni*

BDS Kamineni Institute of Dental Sciences, Narketpally*Corresponding Author

ABSTRACT

Implant-supported prostheses are a widely accepted treatment for partially and completely edentulous patients. Retention methods, namely screw-retained and cement-retained prostheses, have distinct advantages and drawbacks relating to esthetics, retrievability, fit, biological response, and technical complications. Screw-retained prostheses offer better retrievability and fewer biological issues due to less cement, while cement-retained restorations provide better esthetics and simpler fabrication. However, screw-retained prostheses face complications like screw loosening and fracture, whereas cement-retained ones are more prone to peri-implant inflammation and retention loss. Current evidence indicates similar long-term survival rates for both options. The choice should factor in clinical circumstances, implant angulation, esthetic needs, maintenance, and clinician experience.

KEYWORDS

Dental Implants; Dental Prosthesis, Implant-supported; Dental Cements

INTRODUCTION

Dental implant therapy has transformed prosthodontics by offering reliable solutions for replacing missing teeth. The success of osseointegrated implants has increased the demand for implant-supported prostheses among both partially and completely edentulous patients. These prostheses can be retained by screws attached to the implant or through cementation onto abutments. The choice between screw-retained and cement-retained restorations has been debated due to their distinct advantages and disadvantages concerning clinical performance, biological compatibility, esthetics, and maintenance needs [1].

Screw-retained prostheses offer easier retrieval, while cement-retained options may enhance esthetics by eliminating screw access openings [2]. Systematic reviews have shown similar overall implant survival, but varying rates and types of complications exist. This review will assess the clinical outcomes and complications linked to both prosthesis types, providing an evidence-based perspective on their use [3].

Historical Perspective and Development

The evolution of implant-supported restorations has been shaped by Brånemark's work on osseointegration. Initially, screw-retained restorations were common due to design limitations and the need for retrievability. However, advancements in implant components and materials have made cement-retained restorations more favoured for their improved aesthetics and simpler procedures. Today, implant dentistry focuses on personalized treatment planning that considers esthetics, implant angulation, occlusal factors, and maintenance needs when choosing a retention method [4,5].

Screw-Retained Implant Prostheses

Screw-retained implant restorations are directly attached to implants or intermediary abutments using fixation screws. The prosthesis may be removed whenever required, allowing easy retrieval for maintenance, hygiene procedures, repair, or replacement.

Advantages of Screw-Retained Prostheses

Screw-retained restorations offer key advantages, primarily retrievability, allowing easy access for complications like porcelain fractures or screw loosening, which is especially beneficial in full-arch rehabilitations [1]. Additionally, they eliminate excess luting cement, reducing the risk of peri-implant mucositis and peri-implantitis. These restorations are also ideal for patients with limited interocclusal space, as they don't require extra abutment height. Furthermore, immediate loading protocols often incorporate screw-retained provisional restorations for easy removal and modification during healing [2,6].

Disadvantages of Screw-Retained Prostheses

Screw-retained restorations have advantages but also face limitations. A major drawback is the visible screw access hole, which can impact

esthetics and occlusion, especially in the anterior region [3]. Screw loosening can occur due to occlusal forces and insufficient preload, leading to instability and discomfort. Additionally, achieving a passive framework fit can be challenging, with inaccuracies potentially stressing the implant-abutment interface and complicating laboratory fabrication [1,7].

Cement-Retained Implant Prostheses

Cement-retained implant restorations involve the cementation of the prosthesis onto implant abutments. The abutments themselves are secured to the implants using screws, while the definitive restoration is luted with dental cement.

Advantages of Cement-Retained Prostheses

Cement-retained restorations provide superior esthetics due to the lack of visible screw access openings, making them ideal for the anterior maxillary region [4]. Their fabrication is often simpler, resembling conventional crown and bridge procedures. Minor discrepancies in implant angulation can be adjusted through abutment preparation [2]. Additionally, these restorations improve occlusal morphology and reduce stress transmission to implants through the cement layer [5].

Disadvantages of Cement-Retained Prostheses

The main disadvantage of cement-retained restorations is the risk of excess cement extruding into peri-implant tissues, which can lead to inflammation, bleeding, and bone loss. Removing this excess can be challenging, especially with deep margins, and retrievability is limited, often requiring sectioning for removal. Additionally, decementation can occur due to factors like inadequate abutment height, incorrect taper, occlusal overload, and cement choice [7].

Clinical Outcomes and Survival Rates

Numerous studies have assessed the survival rates of screw-retained and cement-retained implant restorations, finding both systems show high long-term survival with no significant differences in outcomes. Research by Sherif et al. revealed no notable differences in implant survival or crown loss between the two modalities [3]. Wittneben et al. reported five-year survival rates of 96.03% for cement-retained and 95.55% for screw-retained restorations, highlighting their comparable performance [5].

The success of implant-supported prostheses depends on factors such as treatment planning, implant placement, occlusal management, oral hygiene, and prosthetic design. The choice between screw and cement retention should prioritize complications and maintenance ease over survival statistics alone [2,4].

Technical Complications

Screw Loosening and Screw Fracture

Screw loosening is a common complication with screw-retained prostheses, caused by inadequate preload, framework misfit, occlusal

overload, and parafunctional activity. Repeated loosening can lead to screw fracture [7]. However, screw-retained restorations simplify management, allowing for non-destructive removal and repair. Advances in implant systems with improved screw designs and torque control have reduced these complications [8].

Porcelain Fracture and Chipping

Porcelain fracture and chipping may occur in both screw-retained and cement-retained restorations. Factors such as occlusal overload, inadequate framework support, and material properties contribute to ceramic complications. Some studies have reported slightly higher incidences of porcelain chipping in screw-retained prostheses due to the presence of access openings affecting structural integrity [5].

Decementation

Loss of retention is primarily associated with cement-retained prostheses. Temporary cements may facilitate retrievability but increase the risk of decementation, whereas definitive cements improve retention at the expense of retrievability [1]. Proper abutment design and cement selection are therefore essential for long-term success.

Biological Complications

Peri-Implant Mucositis and Peri-Implantitis

Excess residual cement is a major factor in peri-implant disease, with studies showing higher rates of peri-implant mucositis and peri-implantitis in cement-retained restorations compared to screw-retained ones [6]. Subgingival restoration margins complicate cement removal and increase inflammation risk, leading to clinical signs such as bleeding, suppuration, increased probing depths, and bone loss [8]. Screw-retained restorations generally have fewer biological complications since they avoid cement remnants, but poorly designed prostheses and microgaps can still cause inflammation [5].

Marginal Bone Loss

Marginal bone stability is an important indicator of implant success. Several systematic reviews have reported slightly greater marginal bone loss around cement-retained restorations, potentially due to the inflammatory effects of excess cement [9]. Nevertheless, the differences are often small and may not always reach statistical significance.

Esthetic Considerations

Esthetics are crucial in selecting implant prostheses, especially in the anterior maxillary region. Cement-retained restorations typically offer better esthetics by eliminating screw access openings, allowing for ideal contouring and shade matching [4]. Conversely, screw-retained restorations can face esthetic challenges if the screw channel emerges on visible surfaces, though angled screw channel technology has improved this. Additionally, proper soft tissue management, implant positioning, and prosthetic contouring are essential for optimal esthetic outcomes, regardless of the retention type [9].

Retrievability and Maintenance

Retrievability is often regarded as the greatest advantage of screw-retained prostheses. The ability to remove restorations facilitates professional maintenance, hygiene procedures, screw retightening, and repair of fractured components [1].

In contrast, cement-retained restorations may complicate maintenance because removal often requires destruction of the prosthesis. This becomes particularly problematic in cases involving peri-implant disease or prosthetic complications [2].

Long-term implant maintenance requires periodic monitoring and intervention. Therefore, many clinicians prefer screw-retained restorations in situations where future retrieval is anticipated, such as full-arch rehabilitations and patients with high risk of complications.

Clinical Decision-Making

Choose between screw-retained and cement-retained implant prostheses based on patient-specific factors.

Screw-retained restorations are best for retrievability and limited space, while cement-retained options suit poor angulation and high esthetic demands [5].

Clinicians should consider implant position, occlusion, esthetics, and patient needs in their decision [3].

Future Perspectives

Advancements in digital implant dentistry enhance retention systems and improve prosthetic precision through CAD-CAM techniques, minimizing complications. Angled screw channel technology enables screw-retained restorations that maintain aesthetics while correcting implant angulation. Hybrid designs, such as screw-cement-retained prostheses, combine the advantages of both methods. Future research should focus on long-term patient outcomes, peri-implant health, prosthetic longevity, and standardized cementation and maintenance protocols [9].

CONCLUSION

Both screw-retained and cement-retained implant prostheses have high success rates but differ in advantages. Screw-retained restorations allow easy retrieval and reduce biological risks, while cement-retained options enhance aesthetics but may cause complications from excess cement. Success relies more on careful planning and design than on retention method, so an individualized approach is essential.

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