

“Clinical Outcomes of Telescopic Crown–Retained Prostheses in Partially Edentulous Patients: A Systematic Review”

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ABSTRACT

Background

Prostheses retained with telescopic crowns offer biomechanical stability and ease of hygiene maintenance, making them the best option for partially edentulous cases with a compromised abutment tooth; still, their use in Asian countries is limited.

Objectives

To systematically assess the clinical results of telescopic crown–retained prostheses in patients with partial edentulism, emphasising retention, longevity, biological and technical issues, and patient satisfaction.

Methods

A systematic literature search was conducted in PubMed, Scopus, and Web of Science for English-language studies published between January 2000 and March 2025. Clinical studies assessing tooth or tooth–implant-supported telescopic crown prostheses in partially edentulous patients were included. Case reports, in vitro studies, and narrative reviews were excluded. Two independent reviewers performed study selection, data extraction, and risk-of-bias assessment. Telescopic crown–retained removable prostheses fabricated using conventional or digital workflows were considered the intervention.

Results

A total of 168 articles were identified through electronic searches. Duplicate citations were removed. Subsequently, two authors independently screened the retrieved articles by title and abstract to determine their suitability for inclusion. Finally, 13 full-text articles met the inclusion criteria. **Conclusions:** Telescopic crown–retained prostheses demonstrate reliable clinical performance in the management of complex partial edentulism. Their biomechanical advantages and long-term maintainability make them particularly relevant for resource-limited and South Asian clinical settings, where cost-effectiveness and prosthesis longevity are essential. Wider clinical adoption may be facilitated through improved training, appropriate digital integration, and the generation of region-specific clinical evidence.

Keywords

Telescopic crowns; Partial edentulism; Double-crown prosthesis; Prosthodontic rehabilitation; Systematic review

INTRODUCTION

Partial edentulism remains a common and clinically significant problem worldwide, particularly in Asian countries where access to advanced implant therapy is often limited. Tooth loss affects mastication, speech, facial aesthetic, and overall oral health-related quality of life. Although conventional removable partial dentures (RPDs) are widely used for their affordability, they often present clinical shortcomings, including inadequate retention, uneven stress distribution, overloading of abutment teeth, and reduced patient comfort and acceptance, particularly in distal extension situations^{1–3}.

Telescopic crown–retained prostheses represent a well-established alternative that combines the stability of fixed restorations with the hygiene and retrievability advantages of removable prostheses. The double-crown design provides controlled frictional retention, splinting of abutment teeth, and more favourable load distribution. These features make telescopic systems particularly useful in patients with compromised periodontal support, reduced dentitions, or complex prosthodontic requirements^{4–7}. Long-term clinical investigations and previous systematic

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reviews have reported encouraging survival rates and acceptable biological and technical outcomes for both tooth-supported and tooth-implant-supported telescopic prostheses⁸⁻¹⁰.

Despite these advantages, the clinical application of telescopic prostheses remains constrained, especially in Asian and developing regions. Factors such as elevated initial costs, sensitivity of technique, limited digital infrastructure, and deficiencies in undergraduate and postgraduate training contribute to their underutilization. Evidence from South Asian dental literature highlights broader challenges in prosthodontic care delivery, patient awareness, and acceptance of advanced rehabilitative techniques, emphasizing the need for context-specific evidence to guide clinical decision-making^{11,12}.

Although several reviews have examined the design concepts, materials, and biomechanics of telescopic crown systems, the available evidence remains fragmented. Considerable heterogeneity in study designs, outcome measures, materials, and follow-up periods limits the ability to draw firm clinical conclusions. Importantly, no comprehensive systematic review with meta-analysis has synthesised the clinical outcomes of telescopic crown-retained prostheses in partially edentulous patients.

Therefore, the present work is a new systematic review aimed at evaluating the survival, retention, biological complications, and overall clinical performance of telescopic crown-retained prostheses. By consolidating long-term clinical data and applying structured appraisal and synthesis methods, this review seeks to address existing gaps in the literature and provide practical, evidence-based guidance for prosthodontic rehabilitation, particularly in resource-limited and Asian region clinical settings.

MATERIAL AND METHOD

Study Design and Reporting Standard: This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The review protocol was developed a priori to ensure methodological transparency and reproducibility.

Eligibility Criteria: Clinical studies evaluating telescopic crown-retained prostheses in partially edentulous patients were considered eligible. Included studies involved tooth-supported or tooth-implant-supported

telescopic prostheses and reported clinical outcomes related to survival, retention, biological or technical complications, or patient-related measures. Randomized controlled trials, prospective and retrospective cohort studies, and clinical follow-up studies were included.

Exclusion criteria comprised in vitro studies, finite element analyses, narrative reviews, case reports, conference abstracts, and studies lacking extractable clinical outcome data. Studies not published in English were also excluded. Studies were grouped for synthesis based on type of prosthetic support (tooth-supported vs tooth-implant-supported) and reported outcomes.

Information Sources: A comprehensive literature search was performed in PubMed/MEDLINE, Scopus, and Web of Science. The final search was conducted on March 31, 2025. Reference lists of all included articles and relevant reviews were manually screened to identify additional eligible studies.

Search Strategy: The search strategy combined controlled vocabulary and free-text terms related to telescopic prostheses. Key search terms included “telescopic crown,” “double crown,” “conical crown,” “telescopic denture,” “removable partial denture,” and “overdenture.” Boolean operators (AND, OR) were used to combine terms. Filters were applied to restrict results to human studies and English-language publications. The complete search strategy for each database was documented and is available as supplementary material.

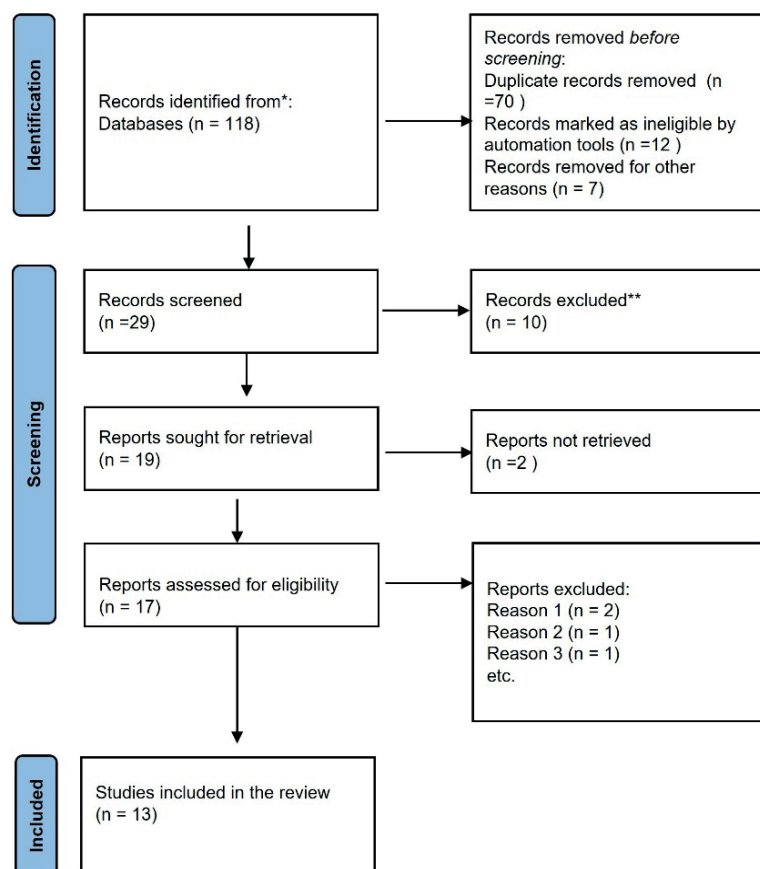
Selection Process: Two reviewers independently screened titles and abstracts for eligibility. Full texts were retrieved for included or unclear studies. Disagreements were discussed, and a third reviewer was consulted if needed.

Data Collection Process: Data extraction was conducted independently by two reviewers using a standardised data extraction form. Extracted data were cross-checked for accuracy. When necessary, corresponding authors were contacted to clarify any missing or unclear information.

Data Items: Primary outcomes included prosthesis survival, retention, and complications. Secondary outcomes covered patient-reported results and maintenance. All relevant data from included studies were extracted. When multiple measures or follow-ups were reported, the longest follow-up data were used.

Risk of Bias Assessment: The risk of bias was assessed independently by two reviewers. Randomized controlled

Figure 1. Flowchart of the literature selection



* The PRISMA statement flow chart

trials were evaluated using the Cochrane Risk of Bias tool, while non-randomized studies were assessed using the Newcastle–Ottawa Scale. Discrepancies were resolved by consensus.

Reporting Bias Assessment: Publication bias was assessed visually using funnel plots when at least ten studies were included in a meta-analysis.

Certainty of Evidence: The certainty of evidence for each outcome was evaluated using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach, considering risk of bias, inconsistency, indirectness, imprecision, and publication bias.

RESULTS

The original electronic search, which was conducted from January 2000 to March 2025. (Figure 1). Thirteen publications were included after the final

consensus conference of the two independent investigators. An updated search was performed regularly and last occurred in June 2025. The electronic search resulted in 118 hits. After analysing the titles, 70 articles were included. The abstract-level analysis then resulted in the inclusion of 29 articles, from which the full texts were obtained. After analysis at the full-text level, duplicates that were already part of the original search results were excluded. Then, a consensus conference was held for all papers that had received differing evaluations from authors, and 13 additional full texts were ultimately included. All identified papers were available in full text.

4 HISTORICAL BACKGROUND AND EVOLUTION

The concept of telescopic crown prostheses, also known as double crown systems (Figure 2), has developed considerably over the past seventy years. Its origins date back to the 1950s, when early dental pioneers investigated friction-fit double crowns as an alternative to traditional clasp-retained RPDs⁷. These systems were initially created to offer better retention, stabilise periodontally compromised teeth, and improve load distribution, especially in partially edentulous patients^{5,6,13,14}. One of the earliest and most influential contributions came from German prosthodontic literature, where the double crown system, often called “*Teleskopprothese*,” gained widespread clinical acceptance¹⁵. Innovators like Dr. Wichmann and Dr Koerber were crucial in defining the biomechanical principles of the telescopic system, including optimal taper angles (generally between 2° and 6°) and the significance of parallelism to ensure long-term retention and retrievability^{16,17}. Initially,

Figure 2: Representation of telescopic crown



* Conceptual schematic of telescopic crown-retained prosthesis. This image was generated using an artificial intelligence-based image generation tool and used for illustrative purposes only

precious metal alloys such as gold were the preferred materials for both primary and secondary crowns due to their excellent biocompatibility and workability. These traditional methods relied on labour-intensive techniques such as electroforming, casting, and precise manual adjustments to ensure the required frictional retention^{7,18}.

The move towards modern design ideas began in the late 1990s and early 2000s, propelled by advances in material science and digital dentistry. The introduction of CAD/CAM technology enabled the production of more precise and consistent copings¹⁹. At the same time, newer materials such as Zirconia, Polyetheretherketone (PEEK), and non-precious metal alloys offered alternatives that balance aesthetic, durability, and cost²⁰. Furthermore, the adoption of digital scanning and milling has significantly shortened chairside time and reduced human error, thereby improving patient outcomes and increasing clinician efficiency. Today, telescopic crown systems have been upgraded to support hybrid tooth–implant designs, magnet-retained overdentures, and digitally planned full-arch rehabilitations. Nonetheless, despite these innovations, their application remains limited in many areas, mainly due to a steep learning curve and limited clinical exposure²¹.

The historical development of telescopic prostheses thus mirrors a persistent effort to enhance retention, functionality, and durability in prosthodontic rehabilitation, progressing from a specialised option to a technically advanced yet underused technique in modern practice^{15,18}. This narrative review provides a detailed overview of the evolution, design principles, material advancements, and clinical applications of telescopic crown prostheses from the 1950s to the present. It emphasises ongoing issues related to protocol standardisation and digital integration while highlighting gaps in clinical adoption and awareness, especially in underserved regions. Additionally, the review consolidates existing evidence to recommend best practices and discusses future research opportunities and educational needs.

5 DESIGN PRINCIPLES AND BIOMECHANICS

Telescopic crown prostheses operate on a system of double crowns, designed to provide a removable yet secure and stable prosthetic solution, especially in complex partially edentulous cases. Their biomechanical effectiveness relies on the precision of their components

and how these elements interact under functional load⁵.

5.1 Components: Primary Copings, Secondary Crowns, and Frameworks:

The basic structure of a telescopic prosthesis includes:

- 1) Primary copings, which are fixed onto the prepared abutment teeth or implants,
- 2) Secondary crowns, which are incorporated into the removable superstructure, and
- 3) A metal framework or acrylic base that connects these elements and supports the prosthesis.

Primary copings are usually made from high-strength alloys or ceramics and are permanently cemented on prepared abutment. The secondary crowns, which fit snugly over the primary copings with minimal tolerance, serve as the retention interface. This “double crown” system provides the advantages of both removability and stability, merging features of fixed and removable prostheses^{2,15}.

5.2 Taper Angle Considerations and Frictional Retention:

A key aspect in telescopic design is the taper angle between the inner and outer crowns. Conventional guidelines recommend taper angles ranging from 0° to 6°, based on the desired frictional retention^{13,20}. A smaller angle, approaching parallel walls, enhances frictional retention but can complicate insertion and removal. Conversely, a larger taper reduces retention and can improve patient comfort. The retention force depends on surface finish, material selection (such as precious versus non-precious metals and zirconia), and the fit of the copings. Over time, wear can impact retentive values, so material hardness and surface treatment are important factors to consider²².

5.3 Splinting Effect and Load Distribution:

Telescopic prostheses provide a notable splinting effect, which is especially helpful when managing periodontally compromised or widely spaced abutments^{10,23}. By rigidly connecting the abutments with a common framework, they help distribute occlusal forces more evenly, reducing localised stress and safeguarding delicate periodontal tissues. This splinting also aids in the long-term preservation of abutment teeth, especially when paired with implants in tooth–implant-supported setups. The load-sharing capacity of the telescopic system fosters biomechanical harmony, crucial for complex rehabilitations^{24,25}.

5.4 Retention vs. Stability Characteristics:

A major distinction in telescopic systems involves balancing retention and stability. Retention is primarily achieved through the friction between copings, whereas stability depends on the precise fit of the prosthesis and tissue support. To enhance stability, it is essential to focus on occlusal planning, proper abutment placement, and appropriate framework extension. Contemporary designs also incorporate features such as conical crowns, cylinder–piston mechanisms, and magnetic retention systems, giving clinicians greater ability to customise this balance based on individual patient needs ^{9,26,27}.

MATERIALS USED IN TELESCOPIC SYSTEMS

The materials used in telescopic crown systems affect retention, durability, wear resistance, biocompatibility, and clinical effectiveness. Developments from precious metals to polymers and ceramics have improved their versatility and cost-efficiency.

6.1 Traditional Materials: Gold Alloys and Cobalt–Chromium:

Historically, high-noble gold alloys were preferred for primary copings and secondary crowns due to their excellent castability, corrosion resistance, and precision. Gold's beneficial mechanical properties also provided stable retention with minimal wear, making it suitable for long-term prosthetics. However, the high cost and growing patient preference for tooth-coloured restorations have led to a decline in their use over time. Cobalt–chromium (Co–Cr) alloys are now a more cost-effective alternative. These base metal alloys offer high stiffness, deformation resistance, and good biocompatibility, which make them popular for telescopic frameworks and copings. Nonetheless, they present some challenges, including increased casting shrinkage, difficulties in achieving a passive fit, and higher surface hardness that could affect long-term retention ^{28,29}.

6.2 Contemporary Materials: Zirconia, PEEK, Titanium, and Hybrid Systems:

The advancement of CAD/CAM technology has facilitated the use of advanced materials with enhanced aesthetic, accuracy, and wear resistance ¹⁹.

Zirconia (Y-TZP) is a popular ceramic for telescopic crowns because of its strength, translucency, and biocompatibility. For secondary crowns, it shows low wear and good polish. However, its rigidity can

cause retention issues if not milled precisely, and microfractures may develop over time ²⁹.

PEEK and Polyetherketoneketone (PEKK) are high-performance polymers offering low weight, shock absorption, and a modulus of elasticity similar to dentin. They suit elderly or compromised patients due to their lightweight and force distribution. However, their low surface energy might limit long-term bonding unless properly treated ^{30,31}.

Titanium is becoming more popular for primary copings, particularly in implant-supported telescopic systems, due to its biocompatibility, light weight, and corrosion resistance ^{32,33}. However, it is more difficult to polish and adjust than traditional alloys.

Hybrid systems that combine metal–ceramic or polymer–metal interfaces aim to enhance aesthetic and mechanical performance while reducing the disadvantages of each material ^{34,35}.

1.3 Comparative Advantages and Disadvantages (Table 1):

Table 1: Comparison of Conventional Telescopic Crowns and CAD/CAM-Fabricated Telescopic Crowns

Material	Advantages	Disadvantages
Gold alloys	Excellent fit, biocompatibility, stable retention	High cost, less aesthetic
Co–Cr alloys	Durable, cost-effective, strong	Hard to finish/polish, less precise casting
Zirconia	High strength, aesthetic, biocompatible	Brittle, retention inconsistencies if milled poorly
PEEK/PEKK	Lightweight, shock-absorbing, flexible	Difficult bonding requires surface modification
Titanium	Corrosion-resistant, strong, biocompatible	Technically demanding, poor polishability

*CAD/CAM = Computer-Aided Design / Computer-Aided Manufacturing.

6.4 Surface Treatment and Finishing for Retention:

The effectiveness of telescopic systems largely depends on the surface quality of the copings. A smoother primary coping surface provides better frictional control and reduces wear. For metal systems, techniques such as electropolishing or oxide layer adjustments

are commonly used to enhance the friction interface. When working with zirconia copings, airborne-particle abrasion (sandblasting) is applied cautiously to prevent surface flaws. PEEK and titanium require more advanced surface conditioning techniques, including plasma treatment, acid etching, or adhesive primers, to improve retention and bonding when paired with acrylic bases or resin cements^{30,36–38}.

CLINICAL APPLICATIONS AND INDICATIONS

Telescopic crown prostheses offer a versatile prosthodontic solution for various clinical situations, including partially edentulous arches, periodontally compromised teeth, and complex rehabilitations involving both teeth and implants.

7.1 Kennedy Classification Relevance:

Telescopic prostheses are especially useful for Kennedy Class I and II cases, where distal extension RPDs often struggle with support and retention. Adding telescopic copings on abutments or implants can significantly improve load distribution and reduce prosthesis rotation³⁹. A systematic review by Wigianto et al. confirms that implant-assisted RPDs (IARPDs) with telescopic designs greatly enhance stability and patient satisfaction in these arch types⁴⁰.

7.2 Tooth–Implant Combinations:

Telescopic prostheses are particularly effective for combined tooth–implant-supported restorations, as their rigid splinting of abutments helps reduce mobility differences between natural teeth and Osseointegrated implants⁴¹. Molinero-Mourelle et al. showed that telescopic crowns serve as a reliable interface in IARPDs, improving biomechanical stability and long-term results⁴².

7.3 Geriatric and Medically Compromised Patients:

In elderly or medically compromised populations where fixed restorations or surgery might not be feasible, telescopic dentures offer a removable, stable, and functional solution⁴³. They are easy to clean and can splint weak abutments, making them especially useful in geriatric prosthodontics. However, clinical decisions should consider case complexity and the patient's ability to handle the prosthesis^{9,44}.

DIGITAL WORKFLOWS AND CAD/CAM INTEGRATION

8.1 Current Digital Fabrication Techniques:

Advancements in CAD/CAM have transformed telescopic crown fabrication from conventional casting to digital workflows, including optical scanning, 3D modelling, additive, and subtractive methods, ensuring consistent results. Kamel et al. noted that system accuracy depends on taper angle, material, and surface finish²⁰. CAD/CAM crowns offer greater precision and retention than manual methods, thanks to digital control over design and milling tolerances^{19,45}. Intraoral scanners (IOS) capture high-resolution 3D data of abutments and edentulous areas, which are then imported into design software like Exocad, 3Shape, or Dentalcad. Virtual articulation simulates occlusal dynamics, while computer-aided milling, SLM, and SLS techniques enable precise fabrication of zirconia, titanium, and Co–Cr alloys. These workflows reduce the need for physical impressions, wax-ups, and casting, improving reproducibility and reducing operator error⁴⁶.

Hybrid digital workflows are advancing by integrating subtractive and additive techniques—like using 3D printing for resin prototypes and then milling final crowns, to enhance fit and aesthetic. The use of digital implant planning software enables smooth integration of telescopic abutments in tooth–implant-supported designs⁴⁷.

8.2 Advantages of Digital Telescopic Crowns:

The adoption of CAD/CAM systems has brought various clinical and laboratory benefits in the manufacturing of telescopic prostheses.

Enhanced Precision and Fit: Digital workflows eliminate the cumulative errors inherent in manual casting, leading to improved marginal integrity and reproducibility²⁰.

Material Versatility: CAD/CAM enables the use of high-performance materials like zirconia, PEEK, and titanium, known for their excellent biocompatibility and mechanical stability⁴⁶.

Reduced Fabrication Time: Streamlined workflows decrease chairside and laboratory durations, enabling quicker delivery and fewer adjustment appointments⁴⁸.

Enhanced Patient Comfort and Aesthetic: Digital customization ensures better retention without visible clasps, improving both functionality and appearance⁶.

Data Storage and Reproducibility: Digital archives allow re-creating or altering components without needing to repeat the entire impression and design process.

Integration with Digital Implantology improves load distribution and prolongs the lifespan of tooth–implant-supported restorations by ensuring accurate prosthesis and implant system alignment ⁴².

8.3 Limitations and Clinical Adoption Barriers:

Although digital telescopic systems offer benefits, various challenges hinder their broad clinical use ^{5,7,20,30,49}.

- i. High Initial Investment: The acquisition and maintenance costs of scanners, software, and milling units remain prohibitive for many practices.
- ii. Learning Curve: Proficient operation of digital systems requires specific training, which may be lacking in many dental curricula,
- iii. Limited Long-Term Data: There remains insufficient evidence on the longevity and wear resistance of digitally fabricated telescopic prostheses compared to conventional systems.
- iv. Surface Finish Challenges: Milling of high-strength ceramics and polymers (like PEEK and zirconia) can produce micro-defects that compromise retention if not properly polished or post-processed.
- v. Inconsistent Digital Standards: Variability among software systems and file formats may hinder interoperability between laboratories and clinicians.
- vi. Patient-Specific Issues: Intraoral scanning of subgingival margins and mobile abutments may produce digital artifacts affecting fit accuracy.

8.4 Examples of CAD/CAM-Based Prostheses:

Several CAD/CAM-based telescopic systems are documented in recent literature ^{5,14,15,15,37,46}.

- 1) Zirconia–Titanium Hybrid Crowns: Combining milled titanium primary copings with zirconia secondary crowns has demonstrated optimal frictional fit and improved aesthetics.
- 2) PEEK Telescopic Frameworks: Additively manufactured PEEK frameworks have been used in geriatric patients, providing lightweight, shock-absorbing prostheses with reduced stress on abutments.
- 3) Laser-Sintered Co–Cr Systems: SLM-produced cobalt–chromium telescopic crowns have shown comparable retention and precision to cast metal systems, with reduced fabrication variability.
- 4) Digital Electroforming Alternatives: Fully digital electroformed telescopic crowns with CAD/CAM-produced primary copings have shown high accuracy and stable long-term retention.

COMPARISONS WITH OTHER PROSTHETIC OPTIONS

9.1 Telescopic Crowns vs. FPDs:

Telescopic crown systems differ from traditional FPDs mainly in their biomechanical design and maintenance. Unlike FPDs, which are cemented permanently and rigid, telescopic prostheses utilise double-crown technology, providing both retention and removability. This modular approach enables better management of abutment health and eases prosthetic hygiene. Wierichs et al. note that telescopic crowns distribute occlusal loads more evenly across the abutments and soft tissues, thereby reducing the risk of abutment overload, a common issue with FPDs ^{46,50,51}.

FPDs initially offer superior aesthetic and comfort for patients, but they face challenges in adapting to abutments, especially when the abutment teeth are periodontally compromised. Conversely, telescopic systems allow for abutment retrieval and re-cementation if needed, helping to maintain long-term oral function. It was observed that telescopic crowns tend to last longer than FPDs in complex partial edentulism cases, due to their enhanced biomechanical flexibility and easier maintenance ²².

9.2 Telescopic Crowns vs. RPDs:

Telescopic crown prostheses provide better retention, stability, and load distribution than RPDs, which rely on clasps and rests that can cause aesthetic issues and torque. Telescopic systems use frictional retention, improving functionality ^{5,51}. Higher patient satisfaction was found with telescopic prostheses for comfort, chewing, and aesthetic.

Furthermore, telescopic designs serve as splints for weakened abutments, an advantage not found in clasp-retained RPDs. Studies emphasise their importance in geriatric and periodontally compromised patients, as the removable superstructure allows easy access for hygiene while providing stable support and retention ^{6,48,52}.

9.3 Cost-Effectiveness and Patient Satisfaction

While telescopic crown prostheses generally cost more initially than FPDs or RPDs, their precise CAD/CAM fabrication and lower maintenance costs over time benefit patients. Replacing worn parts or recementing can be done without full reconstruction, extending their lifespan. Dinu et al. demonstrated that implant-assisted telescopic prostheses had better cost-benefit ratios after 10 years than RPDs, owing to fewer repairs and better abutment preservation⁴⁷. Patients report higher satisfaction and comfort with telescopic prostheses, with Michaud et al. noting they outperform conventional maxillary dentures and RPDs in mastication, aesthetic, and maintenance^{9,53}. Patients especially value the lack of visible clasps and ease of cleaning.

9.4 Long-Term Outcomes and Prosthetic Maintenance

Long-term evaluations reveal that telescopic systems are reliable and effective. Research has shown survival rates exceeding 90% at five years for conical and electroplated designs, outperforming traditional RPDs and matching or surpassing FPDs in cases of partial edentulism. The Marburg Double Crown System consistently maintains retention and retrievability over many decades.^{7,10,43}

Maintenance protocols for telescopic crowns typically involve regular checks of retention surfaces and friction fit. Surface wear can be minimised by choosing high-performance materials like zirconia or titanium, which help preserve stability and reduce retentive loss over time.^{54–56}. Importantly, the modular design of telescopic prostheses enables the selective replacement of damaged parts without affecting the primary abutments, a key benefit in geriatric and implant-supported rehabilitation. To summarise, the comparisons with other prosthetic options are mentioned in Table 2.

Table 2. Advantages and Limitations of Telescopic Crown-Supported Prostheses

Parameter	Telescopic Crown Prosthesis	Fixed Partial Denture (FPD)	Removable Partial Denture (RPD)
Retention Mechanism	Frictional fit (double crown)	Cemented connection	Mechanical clasps
Retrievability	High	Low	High
Aesthetic Quality	Excellent (no visible clasps)	Excellent	Moderate

Parameter	Telescopic Crown Prosthesis	Fixed Partial Denture (FPD)	Removable Partial Denture (RPD)
Maintenance	Easy, modular repair	Difficult (requires full remake)	Frequent relining/repairs
Cost (Initial/Long-term)	High / Moderate	Moderate / High	Low / High
Patient Satisfaction	Very High	High	Moderate
Long-Term Survival	>90% (10 years)	85–90%	70–80%

*Proper taper selection (0–6 degrees) is critical for predictable retention.

In summary, telescopic crown prostheses serve as a bridge between fixed and removable restorations, offering excellent biomechanical adaptability, ease of retrieval, and high patient satisfaction. While their use remains limited due to technical challenges and cost considerations, advancements in digital fabrication and CAD/CAM technology have established them as a reliable, long-term option for complex prosthodontic rehabilitation^{19,49,52,56}.

GAPS, BARRIERS TO ADOPTION AND FUTURE NEEDS

10.1 Lack of Standardized Guidelines

Despite proven potential, telescopic crown prostheses lack standardized protocols for design, taper angles, materials, and surface treatments⁴⁹. Current approaches depend on practitioner preference rather than consensus, with significant heterogeneity in taper angles from 0° to 6° and no agreed criteria for retention^{15,29}. Guidelines for selecting materials such as zirconia, Co–Cr, and PEEK, and for surface finishing methods such as electropolishing and sandblasting, are inconsistent, complicating reproducibility and predictability^{28,30}. This lack of standardisation limits comparability across studies and prevents the establishment of long-term success benchmarks for telescopic systems.

10.2 Variability in Retention Force Data

A major controversy involves inconsistent retention force data from in-vitro and in-vivo studies. Retention depends on factors like taper geometry, coping material, manufacturing method, and surface roughness. Variations among research results are due to differing testing conditions and protocols⁵⁷. Studies showed that small deviations in taper angle ($\pm 1^\circ$) can cause more than 25% difference in retention force, highlighting the

need for standard testing²⁰. Additionally, wear-related changes in friction over time are not well documented, casting doubt on the long-term stability of these systems^{2,5,54}. This inconsistency hinders evidence-based decisions and reduces clinical confidence in telescopic restorations.

10.3 Underutilization and Limited Awareness in Clinical Practice

Although telescopic crowns offer biomechanical and aesthetic advantages, they are underutilized in clinical practice and education. Surveys have highlighted a lack of practitioner awareness regarding their indications and maintenance. The complexity of double-crown systems and a steep learning curve discourage many practitioners. Training programmes often concentrate on fixed and implant-supported prostheses, leaving telescopic techniques less covered. Consequently, many rely on conventional options such as FPDs and RPDs despite the biomechanical benefits of telescopic systems.^{3,6,22,52}

10.4 Barriers to Adoption, Especially in Developing Regions

In developing countries, economic and infrastructural barriers impede the adoption of telescopic prostheses. The technique requires advanced laboratories, digital CAD/CAM, and skilled technicians¹⁹, resources often scarce in low- and middle-income regions. High costs, lengthy treatment durations, and limited expertise render these prostheses less accessible.¹⁸ Although digital workflows could reduce costs and enhance reproducibility, the high initial investment often limits their adoption in many clinics. Additionally, lack of patient awareness and poor reimbursement diminish their perceived feasibility. As a result, despite good long-term outcomes, telescopic prostheses are mainly available in specialised centers or academic institutions^{2,13,47}.

10.5 Summary and Future Needs

To advance the clinical integration of telescopic crown systems, the following are essential:

- 1) Development of standardized international guidelines specifying design parameters, taper ranges, and material combinations.
- 2) Consensus on retention testing protocols to ensure reproducible biomechanical data across laboratories.
- 3) Educational inclusion of telescopic prosthodontics in undergraduate and

postgraduate curricula.

- 4) Cost-reduction strategies through local digital manufacturing and open-source CAD/CAM workflows.
- 5) Clinical trials in diverse populations, especially in resource-limited settings, to establish globally relevant outcome data.

Telescopic crowns are a technically superior but underused solution in prosthodontics. Addressing gaps in protocol standardization, awareness, and access is vital to unlocking their full global clinical potential^{29,38,44,55,58,59}.

DISCUSSION

Telescopic crown-supported prostheses offer a unique combination of retention, stability, and durability, making them particularly suitable for patients with compromised periodontal support or complex partial edentulism. Although their biomechanical advantages are well documented, their routine clinical use remains limited. Findings from this review indicate that recent developments in materials, digital workflows, and tapered crown design have improved predictability and reduced some of the technique sensitivity traditionally associated with telescopic systems, thereby enhancing their clinical reliability^{23,60,61}.

Across the reviewed literature, telescopic prostheses consistently demonstrate the ability to splint abutment teeth, distribute occlusal loads effectively, and provide a removable yet stable prosthetic solution. These features are especially valuable in clinical situations where conventional fixed prostheses or implant therapy may not be feasible. The introduction of materials such as zirconia, PEEK, and hybrid combinations has expanded treatment options and improved aesthetic and wear resistance^{30,62}. However, variability remains regarding optimal taper angles, long-term wear behaviour, and frictional retention requirements. While digital workflows can reduce manual inaccuracies and improve reproducibility, their adoption is still limited, largely due to high equipment costs and insufficient training opportunities²⁹.

The underutilization of telescopic prostheses is particularly evident in South Asian and other developing regions, where economic limitations, restricted access to advanced laboratory support, and limited formal training strongly influence clinical decision-making. Evidence from the South Asian prosthodontic

literature, including studies published⁶⁶ indicates a clear preference for cost-effective, technically straightforward, and easy-to-maintain removable prosthetic options. These regional studies consistently emphasize patient acceptance, functional efficiency, and long-term serviceability, factors that closely align with the fundamental advantages of telescopic crown-retained prostheses.^{53,63}

Similarly, South Asian studies on complete dentures and maxillofacial rehabilitation highlight the importance of retention, stability, and long-term maintainability, reinforcing the relevance of double-crown systems for populations where prosthodontic needs are high but advanced implant therapy may not be widely accessible. These parallels support the argument that telescopic prostheses could fulfil an unmet rehabilitative need in such regions if cost and training barriers are addressed^{27,61,63,64}. This alignment suggests that the limited adoption of telescopic systems in South Asia is not due to a lack of clinical relevance, but rather to practical barriers related to cost and training.

Furthermore, South Asian reports on complete denture therapy and maxillofacial prosthetic rehabilitation emphasise the importance of retention, stability, and long-term maintainability for satisfactory clinical outcomes. These priorities are especially critical in populations with high prosthodontic demand and limited access to implant-based rehabilitation, underscoring the potential role of double-crown systems in addressing unmet regional needs. These parallels support the argument that telescopic prostheses could fulfil an important rehabilitative role in such settings if financial and educational barriers are adequately addressed^{27,61,63,64}.

Despite these advantages, several gaps persist, including the lack of standardised clinical protocols, limited long-term comparative studies, and inconsistent reporting of taper-retention relationships^{2,10}. Digital telescopic workflows, especially in tooth-implant-supported designs, need more clinical validation. Well-structured trials, better reporting, and thorough training can help make telescopic crown-retained prostheses a mainstream, evidence-based treatment rather than a niche option^{23,29,42,51,60,65}.

CONCLUSION

This review examines the development, biomechanics, materials, and clinical significance of telescopic crown

prostheses, from traditional to digital systems. These designs balance retention, retrievability, and load distribution, suitable for complex cases. Advances in CAD/CAM and materials like zirconia, PEEK, and titanium have enhanced fabrication and aesthetics. Adoption is often hindered by the absence of clear standards, inconsistent retention data, and limited clinical information, which can make the process seem daunting experience. The review advocates global standardisation, long-term research, and education to increase use. Telescopic crowns demonstrate that blending traditional and digital methods yields predictable, functional, and patient-centred outcomes.

CONSENT FOR PUBLICATION

The author has reviewed and approved the final version and agrees to be accountable for all aspects of the work, including any accuracy or integrity issues.

DISCLOSURE

Artificial intelligence-assisted tools were used to generate the illustrations in Figure 2. No patient data were used, and the image was reviewed and approved by the authors.

DISCLOSURE

The authors declare no competing interests related to this work. The funding body had no role in study design, data collection, analysis, interpretation, or manuscript preparation.

DATA AVAILABILITY

This review paper draws on publicly available sources.

AUTHORSHIP CONTRIBUTION

All authors contributed significantly to the work, whether through conception, design, utilization, data collection, analysis, or interpretation, or in multiple of these areas. They also participated in drafting, revising, and critically reviewing the paper, provided final approval for the published version, selected the journal for submission, and assumed responsibility for all aspects of the work.

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