

BACKGROUND

Monolithic zirconia has become a preferred material for full-arch implant-supported prostheses due to its high strength and optimal esthetics. Directly connecting monolithic zirconia frameworks to multiunit abutments (MUAs), without the use of titanium bases, has gained interest as a method to simplify workflows and minimize complications associated with cementation and debonding. However, evidence on the mechanical reliability, complications, and long-term outcomes of this design remains limited.

PURPOSE

This review evaluates the available literature on monolithic zirconia full-arch prostheses connected directly to MUAs without a titanium base interface, focusing on **mechanical performance, reported complications, long-term clinical outcomes, and the types of screws utilized.**

METHODS

Electronic searches of MEDLINE, Embase, and Web of Science were conducted through August 2025 using the terms “monolithic zirconia,” “full-arch,” “multiunit abutment,” “titanium base/sleeves,” and “implant-supported prosthesis.” Eligible studies included in vitro investigations, randomized clinical trials, and retrospective analyses that evaluated zirconia full-arch prostheses directly connected to MUAs without titanium bases. Studies on non-MUA designs, Ti-base or sleeve prostheses, and external hex connections were excluded. Data extraction focused on study design, mechanical testing, complication rates, survival outcomes, and screw types, with primary outcomes of interest being mechanical performance, complications, long-term clinical results, and screw protocols.

REFERENCES



Figures 2,3,5 reproduced from Heller et al. (2019)

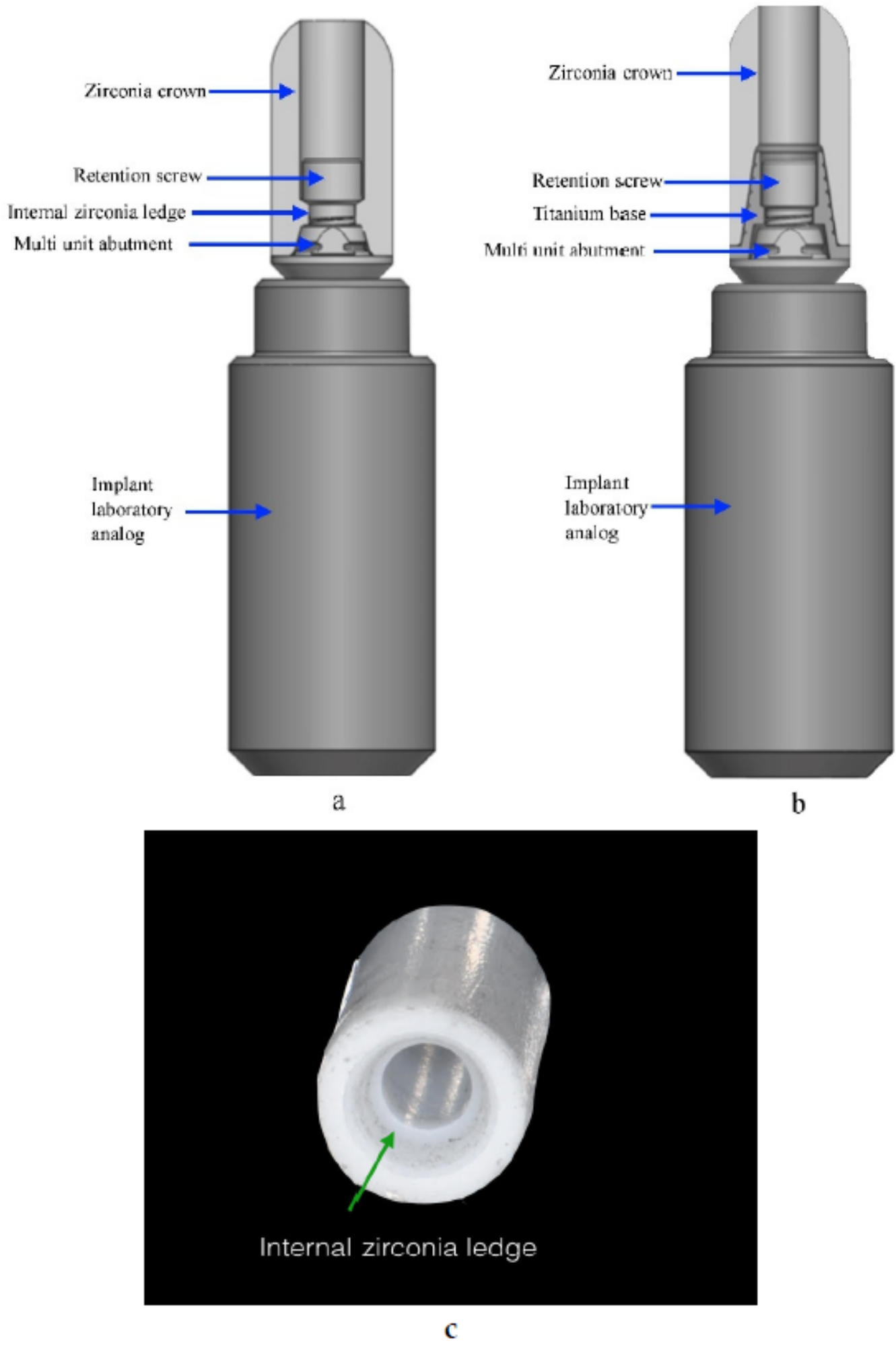


Figure 5. Components of the zirconia-abutment restorations. (a) Screwed restoration; (b) screwed-cemented restoration; (c) apical view of the screwed zirconia cap. Note the internal zirconia ledge for the support of the screw head.



Figure 3. Specimen number one in group A shows fracturing of the zirconia concomitantly with bending of the restoration screw head under an applied load of 450 N. This failure was observed in group A at only high loading forces.

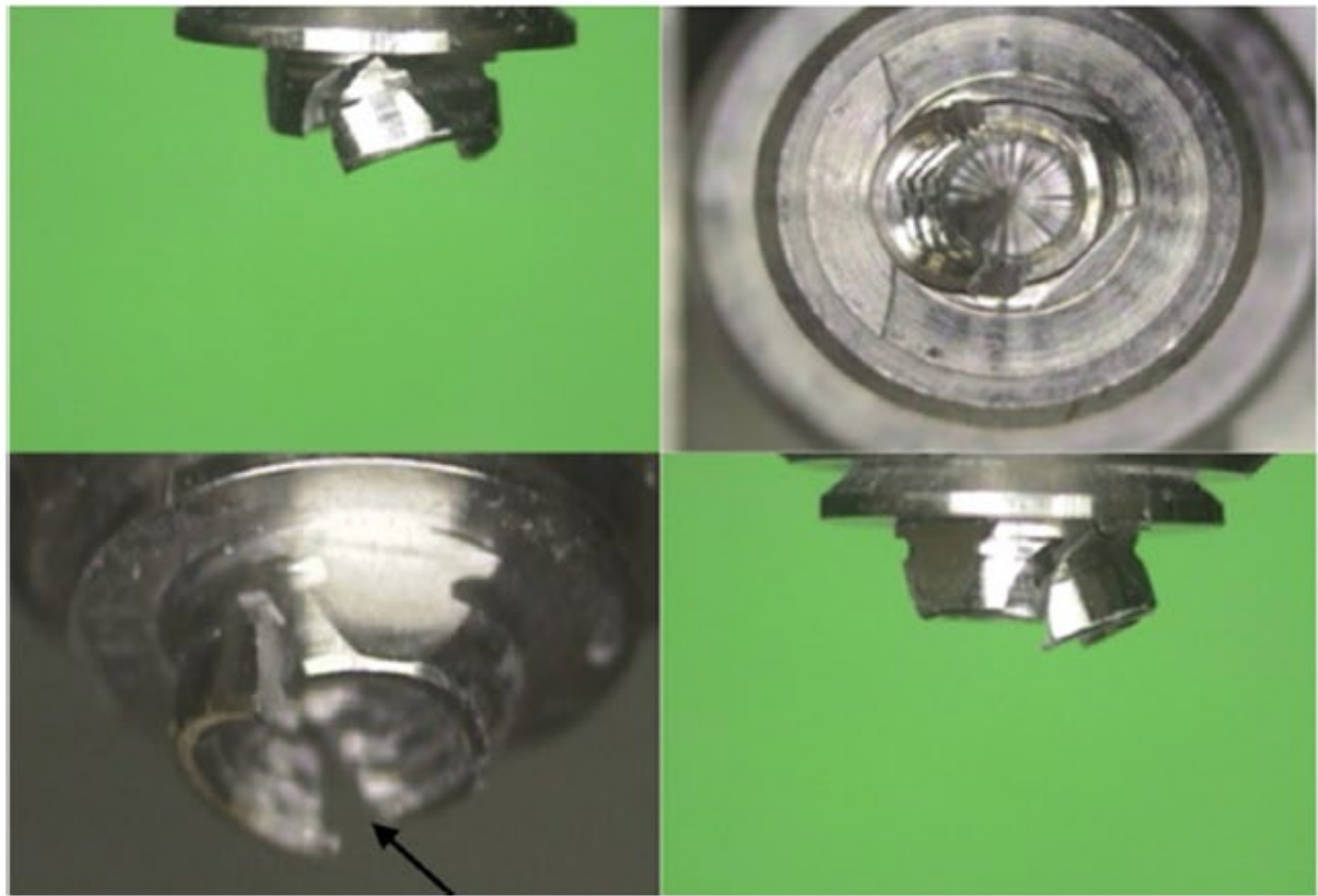


Figure 2. Specimen number seven in group A shows deformation and fracturing within the cone of the multi-unit abutment (MUA) under an applied load of 350 N. This mode of failure was predominant in group A.

Figures 4, 5, 8, 9 reproduced from Pozzi et al. (2023)



Figure 4. Maxillary and mandibular ISZFDs anatomically designed to have zirconia surface tightly adhered to scalloped soft tissue architecture. ISZFDs, implant-supported zirconia fixed dental prostheses.



Figure 5. Maxillary ISZFDP delivered at implant and abutment levels with monolithic zirconia at connector and pontic sites. ISZFDP, implant-supported zirconia fixed dental prosthesis.



Figure 8. Intraoral frontal view at last visit: 12-year follow-up for maxillary ISZFDP and 6-year follow-up for mandibular ISZFDP. ISZFDP, implant-supported zirconia fixed dental prosthesis.



Figure 9. Panoramic radiograph at 12-year follow-up for maxillary prosthesis and 6-year follow-up for mandibular prosthesis.

RESULTS

Article (Author, Year)	Study Type	Direct Connection to Implant/MUA Without Ti Base	Mechanical Performance	Reported Complications	Long-Term Clinical Outcomes	Types of Screws Utilized
Pozzi et al. (2023)	Retrospective multicenter	Yes (direct to MUA, no Ti base)	No zirconia fractures; stable bone levels; high survival	Chipping (13.5%), peri-implantitis (3.8%), mucositis (2.7%)	Prosthetic survival 98.2%, mean follow-up 7.2 years, up to 12 years	Not specified; screw-retained to MUA
Schäfer et al. (2025)	In vitro	Yes (abutment-free and MUA)	Similar failure loads for abutment-free monolithic zirconia vs. other designs; static/dynamic load testing	Torque loss after aging; no major screw failures	In vitro only; no clinical outcomes	Standard prosthetic screws; torque measured pre/post aging
Heller et al. (2019)	In vitro	Yes (direct to MUA, no Ti base)	Comparable static/dynamic load capacity for direct-to-MUA vs. Ti base	Metal failure in direct-to-MUA; adhesive failure in Ti base; repair easier in Ti base group	In vitro only; no clinical outcomes	Standard prosthetic screws; 30 Ncm torque

Monolithic zirconia full-arch prostheses connected directly to multiunit abutments without a titanium base interface demonstrate comparable mechanical performance to conventional designs, with high survival rates and low rates of framework fracture over long-term follow-up.^[1-3] The most common complications are ceramic chipping and screw loosening, with peri-implantitis rates remaining low in clinical cohorts.^{[1][4]} In vitro studies confirm reliable fatigue resistance and similar failure loads for abutment-free designs, with standard prosthetic screws typically utilized, though specific screw types are often not reported.^[2-3] Short-term clinical success is high, but long-term data remain limited, highlighting a need for further research.^[5]

DISCUSSION

The current literature review reveals a substantial gap in high-quality evidence regarding the clinical performance of monolithic zirconia full-arch prostheses connected directly to multiunit abutments without a titanium base interface.

- Few high-quality studies on direct zirconia-to-MUA prostheses.
- Clinical use is advancing faster than evidence.
- Need for randomized controlled trials on long-term outcomes and screw protocols.
- Until then: cautious case selection and close follow-up advised.