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Zirconia VS PFM in Long Span Bridges

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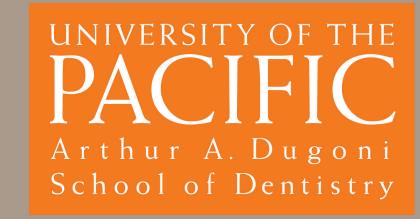
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Zirconia vs PFM in Long Span Bridges



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OBJECTIVE

- 1. Compare **the basic properties** of Zirconia and Porcelain-Fused-to-Metal (PFM) in dental prostheses.
- Assess the rates of technical complications like fracture, chipping and biological outcomes between Zirconia and PFM prosthesis.
- 3. Investigate the survival rates of Zirconia-based fixed dental prosthesis (FDPs) versus PFM FDPs.
- 4. Evaluate **the suitability of Zirconia and PFM for long-span bridges**, considering strength, durability, aesthetics and its effects.

METHODS

- Systematic research on peer-reviewed articles from Embase, PubMed and Google Scholar. Studies between 2010 and 2024 were evaluated that performed clinical studies with a mean followup rate of at least 5 years.
- 2. Selected studies evaluating technical outcome, aesthetics, biocompatibility, clinical outcomes and survival rates.
- 3. Extracted data on biological outcomes, technical outcomes, and survival rates from selected studies.
- 4. Analyzed data to identify trends and differences between materials in prosthesis as well as in long span bridges.

TECHNICAL OUTCOMES

- Posterior Zirconia Crown (ZC) and Metal Crown (MC) FDPs exhibited excellent 10-year survival rates with no statistical differences between the groups
- 2. Minor superficial chipping of the veneering ceramic occurred similarly at ZC and MC, yet clinically inacceptable major fractures of the veneering ceramic only observed for ZC FDPs
- 3. More frequent de-bonding with ZC FDPs
- 4. More clinically unacceptable marginal adaption clinically with ZC FDPs compared to MC FDPs.

BIOLOGICAL OUTCOMES

- 1. Both types of FDPs exhibited favorable results with **no differences between the groups for the majority of the assessed periodontal parameters (p>0.05).**
- 2. A **slightly higher rate for secondary caries** in the marginal areas of the FDPs was found at the ZC abutment teeth than at the MC abutment teeth.
- 3. Zirconia frameworks exhibited significantly larger internal gaps than the metal frameworks in cervical, axial and occlusal regions.
- 4. The biologic integration of the zirconia-ceramic and the metal-ceramic FDPs was similar at 10 years.
- 5. No differences in the periodontal parameters (PD, PAL and BOP) were found, and loss of vitality occurred similarly in both groups.

LONG SPAN vs SHORT SPAN

• Long span (5 units or more) cause excessive load on abutment teeth & periodontal area causing bridge fractures and periodontal problems.

Year	Long span	Short span
In year 5	85%	91%
In year 10	50%	68%
In year 15	18%	34%

Complication		Estimated annual complication rates (95% CI)	Cumulative 5 year complication rates (95% CI)			Cumulative 5 year compli- cation rates (95% CI)	
	Metal ceramic FDPs			Reinforced glass ceramic FDPs			
Caries on abutments	2497	0.24* (0.10-0.57)	1.2% (0.5–2.8%)	199	0.12* (0.01–1.27)	0.6%* (0.06–6.2%)	
FDPs lost due to caries	1053	0.54* (0.24–1.22)	2.7%* (1.2–5.9%)	118	0.12* (0.01–1.29)	0.6%* (0.06–6.2%)	
FDPs lost due to periodontal disease	1004	0.06* (0.03–0.11)	0.3%* (0.1–0.6%)	118	0.87* (0.14–5.53)	4.3%* (0.7–24.1%)	
FDPs lost due to abutment tooth fracture	1053	0.19* (0.11–0.30)	0.9%* (0.6–1.5%)	118	0.12* (0.03–0.53)	0.6%* (0.1–2.6%)	
Loss of abutment tooth vitality	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Marginal discolorations	20	4.82* (1.33-11.88)	21.4%* (6.4–44.8%)	118	0.72. * (0.23–2.19)	3.5%* (1.2–10.4%)	
Framework fracture	1530	0.12* (0.04-0.40)	0.6%* (0.2–2.0%)	136	2.14* (1.0-4.74)	10.1%* (4.7–21.1%)	
Ceramic fractures	1305	1.03* (0.42–2.56)	5.0% (2.1–12.0%)	115	1.63* (1.46–1.82)	7.8%* (7.0–8.7%)	
Ceramic chipping	781	1.79* (0.81–3.96)	8.6%* (4.0–18.0%)	141	1.45* (0.70–3.01)	7.0%* (3.5–14.0%)	
Loss of retention	955	0.42* (0.16–1.09)	2.1%* (0.8–5.3%)	106	0.51* (0.23–1.12)	2.5%* (1.1–5.4%)	

RESULTS

- Zirconia exhibits superior mechanical properties,
 biocompatibility, esthetics compared to PFM prostheses.
- 2. Limited long-term data is available for long-span FDPs, but existing evidence suggests almost similar 10-year survival rates for both zirconia and PFM with higher technical complication rates for Zirconia especially for veneering ceramic fractures.
- 3. Metal-ceramic FDPs have been the gold standard for posterior restorations due to its strength but lack aesthetic characteristics and can be challenging in areas with insufficient space.
- 4. Increase in span length of zirconia framework may decrease its marginal and internal fit.
- 5. Regardless of the material, long span prostheses (5 units or more) can be associated with a higher technical complication rate compared to short span prostheses.
- 6. The size of the connector can strongly influence the longevity of the restoration.
- 7. More tooth reduction is required with PFM compared to zirconia.

CONCLUSION

Zirconia and PFM prostheses exhibit similar 10-year survival rates. Zirconia emerges as a promising alternative with superior mechanical properties, biocompatibility and aesthetics.

Technical complication rates such as veneering ceramic fractures are higher with zirconia-ceramic FDPs.

Increase in span length of zirconia framework may **increase** the technical complications.

Connector size and framework span length must be considered for optimizing the longevity of zirconia restorations