**Critically Appraised Topic (CAT)**

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| **Project Team:**  |
| **5A-5** |
| **Project Team Participants:**  |
| **Vishavdeep Singh, Alex Wedige, Cameron Young, Amanda Toy** |
| **Clinical Question:** |
| **How does antagonist tooth wear compare between posterior crown materials?** |
| **PICO Format:** |
| **P:** |
| **Patients with posterior crowns** |
| **I:** |
| **All-ceramic crowns** |
| **C:** |
| **Metal-ceramic crowns** |
| **O:** |
| **Antagonist tooth wear**  |
| **PICO Formatted Question:** |
| **In patients with posterior crowns, how does antagonist wear compare between all-ceramic and metal-ceramic crowns?** |
| **Clinical Bottom Line:** |
| **All-ceramic crowns are shown to demonstrate comparable wear to metal-ceramic crowns in posterior single-tooth fixed prostheses.**  |
| **Date(s) of Search:**  |
| **11/01/20** |
| **Database(s) Used:** |
| **PubMed** |
| **Search Strategy/Keywords:** |
| **Locate articles that addressed occlusal wear of crown materials. Keywords- Antagonist Wear, Tooth Wear, Attrition, Lithium Disilicate, Zirconium, Porcelain, Dental Crown Materials, Dental Crowns, PFM Crowns, Metal-Ceramic Crowns.** |
| **MESH terms used:** |
| **Crowns, Dental Enamel, Tooth Wear, Zirconium, Dental Porcelain, Metal Ceramic Alloys, Surface Properties, Dental Materials** |
| **Article(s) Cited:** |
| Hmaidouch, R., & Weigl, P. (2013). Tooth wear against ceramic crowns in posterior region: a systematic literature review. *International Journal of Oral Science*, *5*(4), 183–190. <https://doi.org/10.1038/ijos.2013.73>Mundhe, K., Jain, V., Pruthi, G., & Shah, N. (2015). Clinical study to evaluate the wear of natural enamel antagonist to zirconia and metal ceramic crowns. *The Journal of Prosthetic Dentistry*, *114*(3), 358–363. <https://doi.org/10.1016/j.prosdent.2015.03.001>Oh, W. S., Delong, R., & Anusavice, K. J. (2002). Factors affecting enamel and ceramic wear: a literature review. *The Journal of Prosthetic Dentistry*, *87*(4), 451–459. <https://doi.org/10.1067/mpr.2002.123851> |
| **Study Design(s):** |
| **Hmaidouch, R., & Weigl, P. (2013)- Systematic Review of Cohort Studies****Mundhe, K. et. al. (2015)- Individual Cohort Study** **Oh, W.S. Delong, R., & Anusavice, K.J. (2002)- Narrative Review** |
| **Reason for Article Selection:** |
| **The studies addressed our PICO question.**  |
| **Article(s) Synopsis:** |
| **Hmaidouch, R., & Weigl, P. (2013)-** **This systematic review evaluates tooth wear results from five in vivo studies investigating antagonist wear in all-ceramic and metal-ceramic crowns and met the authors’ study criteria. Wear comparisons between various all-ceramic (monolithic zirconia and lithium disilicate) and metal-ceramic crown materials varied between studies as testing methods, study duration and crown systems used differed. Lithium disilicate had lower comparative antagonist wear to zirconia, and metal-ceramic was either having the highest or the lowest relative antagonist wear. Upon further investigation, when metal-ceramic crowns had the lowest relative wear, the occlusal surface was made of metal and when metal-ceramics caused the most wear, its occlusal surface was made of veneering ceramic, highlighting the importance of occlusal material to the results. Hardness of ceramics was not found to be directly attributable to wear, implying that softer materials such as porcelain may cause more antagonist wear due to increased susceptibility to deterioration resulting in a rough and nonuniform ceramic surface. Surface finishing, particularly polishing and to some degree glazing, appear to relieve antagonist tooth wear by providing a more uniform surface structure and reducing friction, and polishing should follow any chairside adjustment. To conclude, the article stresses the need for future research on antagonist wear and proper experimental design to reduce of experimental biases and increase randomization, validity, and clinical relevance.** **Mundhe, K. et. al. (2015)-** **In this cohort study, antagonist enamel wear was measured against natural enamel, zirconia crowns and metal-ceramic crowns one year after placement and the groups were compared. Ten participants requiring bilateral posterior crowns opposing healthy natural teeth received one monolithic zirconia crown and one nickel-chromium with a veneering porcelain occlusal and facial surface. Wear of natural enamel opposing natural enamel was used as the control. PVS impressions were taken at the cementation appointment and one year follow up visit and the accompanying casts were scanned and analyzed digitally to determine the resulting wear over the duration of the study and for comparison between the three groups. Statistically significant differences in antagonist wear were found between all three groups, with enamel causing the least, then zirconia, then metal-ceramic crowns, highlighting the reduced fracture toughness and increased friction coefficient of feldspathic veneering ceramic compared to zirconia.** **Oh, W.S. Delong, R., & Anusavice, K.J. (2002)-** **This article investigates various features of ceramics relating to antagonist wear through a review of previous research. Physical factors of ceramics are discussed first. Material hardness has traditionally been attributed to increased wear, but research has not found a strong correlation between hardness and enamel wear in dental ceramics. Factors such as lower fracture toughness and increased coefficient of friction appear to be more related. Microstructural defects such as porosity and surface irregularities arising from fabrication and material wear appear to act as stress concentrators and increase wear, and surface finishing helps relieve wear related to these issues. Highly esthetic veneering porcelain appears to be inferior to zirconia in nearly all of the aforementioned ceramic properties, leading to a high incidence of crack propagation, degradation and fracture leading to increased wear. To conclude, the article addresses patient factors related to antagonist wear. Poor diet and systemic conditions such as acid reflux can negatively affect pH which can alter ceramic surface composition. Additionally, parafunctional habits or malocclusion can greatly influence antagonist wear and should be addressed when present.** |
| **Levels of Evidence:** (For Therapy/Prevention, Etiology/Harm) See <http://www.cebm.net/index.aspx?o=1025>[ ]  **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)[ ]  **1b** – Individual RCT[x]  **2a** – Systematic Review of Cohort Studies[x]  **2b** – Individual Cohort Study[ ]  **3** – Cross-sectional Studies, Ecologic Studies, “Outcomes” Research[ ]  **4a** – Systematic Review of Case Control Studies[ ]  **4b** – Individual Case Control Study[ ]  **5** – Case Series, Case Reports[x]  **6** – Expert Opinion without explicit critical appraisal, Narrative Review[ ]  **7** – Animal Research[ ]  **8** – In Vitro Research |
| **Strength of Recommendation Taxonomy (SORT) For Guidelines and Systematic Reviews**See article **J Evid Base Dent Pract 2007;147-150**[ ]  **A** – Consistent, good quality patient oriented evidence[x]  **B** – Inconsistent or limited quality patient oriented evidence[ ]  **C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening |
| **Conclusion(s):** |
| **All-ceramic crowns are capable of producing comparable antagonist wear to metal-ceramic crowns in posterior single-tooth prostheses.** **Material properties, production and finishing processes, and patient-based pH and occlusal conditions appear to influence opposing wear in ceramic crowns.** **More long-term studies and high-level research directly addressing antagonist wear between various crown materials are needed.****Antagonist wear should be one of the many factors considered in choosing a crown material for a respective case.** |