**Critically Appraised Topic (CAT)**

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| **Project Team:** |
| **7A-1** |
| **Project Team Participants:** |
| **Shawn Tipple - D4, Kyle Coon - D3, Alex Merchant - D2, Jenna Guernsey - D1** |
| **Clinical Question:** |
| **Is there a difference in the amount of ferrule required based on the different types of posts available?** |
| **PICO Format:** |
| **P:** |
| **Pt has minimal residual coronal tooth structure available for crown** |
| **I:** |
| **Cast metal post** |
| **C:** |
| **prefabricated metal post, fiber post, and ceramic/glass/zirconia post** |
| **O:** |
| **utilize a post with a high level of stability on a minimal dentinal ferrule** |
| **PICO Formatted Question:** |
| **For patients with minimal coronal tooth structure and dentin remaining to prepare for a crown ferrule, which type of post can provide adequate stability for the restoration while requiring the least amount of dentin for the ferrule.** |
| **Clinical Bottom Line:** |
| **Which kind of post allows us to utilize as little remaining dentin as possible yet shows adequate support for a crown?** |
| **Date(s) of Search:** |
| **10/01/2020** |
| **Database(s) Used:** |
| **PubMed, AAE website** |
| **Search Strategy/Keywords:** |
| **Post, core, ferrule, failure** |
| **MESH terms used:** |
| **Post, core, ferrule, failure** |
| **Article(s) Cited:** |
| 1. Dr. Richard S. Schwartz, Restoration of Endodontically Treated Teeth: The Endodontist’s Perspective, Part 1, American Association of Endodontics, 2004, Spring/Summer. 2. **Fontana PE, Bohrer TC, Wandscher VF, Valandro LF, Limberger IF, Kaizer OB. Effect of Ferrule Thickness on Fracture Resistance of Teeth Restored With a Glass Fiber Post or Cast Post. Oper Dent. 2019 Nov/Dec;44(6):E299-E308.** 3. **Sendhilnathan D, Nayar S. The effect of post-core and ferrule on the fracture resistance of endodontically treated maxillary central incisors. Indian J Dent Res. 2008 Jan-Mar;19(1):17-21.** 4. **Marchionatti AME, Wandscher VF, Rippe MP, Kaizer OB, Valandro LF. Clinical performance and failure modes of pulpless teeth restored with posts: a systematic review. Braz Oral Res. 2017 Jul 3.** |
| **Study Design(s):** |
| **1) clinical guideline**  **2) randomized trial, in vitro research**  **3) in vitro research**  **4) systematic review of RCTs only** |
| **Reason for Article Selection:** |
| 1. Article is a clinical guideline with a nice overview of the types of posts available and the recommendations and requirements for restoring endodontically treated teeth form an edodontist’s perspective. 2. **head to head comparison of two posts types in consideration based on ferrule thickness** 3. **head to head comparison of two posts types in consideration based on ferrule availability** 4. **systematic review of RCTs – high level of evidence comparing different types of posts in question** |
| **Article(s) Synopsis:** |
| * **2) Method: 125 bovine incisors were randomized into 6 study groups of either fiber or cast posts and the amount of ferrule – no ferrule, 0.5mm or 1mm thickness, and retaining unaltered 2mm ferrule. Posts and metal crowns cemented using adhesive cement. Samples were subjected to mechanical cycling at varying directions, forces, and rates. Fracture load tests at a speed of 0.5mm/min at 45 degree slope were also applied until failure occurred. Failure were classified as favorable or unfavorable.** * **Results: for the cast post and core group the 1mm ferrule thickness group showed higher fracture resistance than the non-ferrule group(p=0.001). The glass fiber groups showed no significant difference in fracture resistance. Overall, 96.7% of the specimens survived the mechanical cycling.** * **Conclusions: “A thicker ferrule statistically increased the fracture resistance only for cast post and core when it was at least 1 mm thick, despite causing more unfavorable failures. Thus, ferrule thickness should be considered when choosing different intracanal posts, to reduce the occurrence of unfavorable failures. In the absence of a ferrule, the use of a cast post and core presents more favorable failures, and in the presence of a 1-mm-thick ferrule, the use of a glass fiber post seems to be the best clinical decision.”** * **Limitations: used bovine incisor teeth, classification of failure/non-failure seems subjective** * **3) Method: 60 human, central incisors were grouped into 6 categories (A-F). A was the control with no tx. B was endo treated and crowned with no post. Cast posts groups were C(2mm ferrule) and D(no ferrule). Prefabricated metal post groups were E(2mm ferrule) and F(no ferrule). All groups were subjected to load testing at 135 degrees to the lingual surface with a universal machine until fracture occurred. Fracture loads and mode of fracture were recorded. One-way analysis of variance was utilized with Tukey honestly significant difference procedure for the significant difference among the groups at a 5% level (P < 0.05).** * **Results: Among the 6 groups there was a significant difference(p<0.0001). Group C(cast w/2mm) recorded the highest fracture strength. Groups A(no tx) and D(cast w/o ferrule) showed significant difference versus B(endo + crown), E(prefab w/2mm) and F(prefab w/o ferrule). No significant difference was found between B, E, and F. Cervical fracture was most common source of failure in all groups besides A.** * **Conclusions: Custom cast posts with 2mm ferrule were as strong as the control group. Teeth with custom cast posts were more resistant to fracture than the prefabricated metal posts. Ferrule was more of a significant factor in cast posts than prefab posts.** * **Limitations: in vitro research on incisors with only one direction of force** * **4) Method: Inclusion criteria consisted of two elements: 1) study must be an RCT and 2) it must compare at least two types of interradicular retainers. 341 studies were identified and narrowed down to 11 that met criteria and were reviewed. The types of posts reviewed were prefabricated and custom fiber and prefabricated and custom metal with follow-ups ranging from 6mo to 10yrs.** * **Results: Ranges of survival rates for fiber retainers was 71 t0 100% and 50 to 97.1% for metal. The studies showed no differences in survival amongst the different types of metal posts and most showed no difference between fiber and metal posts. Two studies notes factors such as remaining dentin height, number of walls, and ferrule increased restorative longevity.** * **Conclusions: Metal and fiber posts showed similar clinical success for short and long term follow-ups and remaining coronal structure and ferrule increase the survival.** * **Limitations: only a few studies noted ferrule as a factor to sucess** |
| **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  **2a** – Systematic Review of Cohort Studies  **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  **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  **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):** |
| **- Ferrule is always desirable and improves the chances of success in all types of posts. Try to achieve a minimum of 1mm ferrule before you consider a post type because the post is less vital to success than the ferrule. If you cant achieve enough ferrule advise pt of the increased rate of failure and consider a cast post, extrusion to increase ferrule, or an implant.** |