

Critically Appraised Topic (CAT)

Project Team:
Group 2B-2, Clinic A
Project Team Participants:
Troy Olson, Sky Fox, Andrew Altfillisch, Hamaad Khan
Clinical Question:
What is the mechanical aspect of gutta percha for the restorative placement of a post and core?
PICO Format:
P:
Patients with endodontically treated teeth
I:
Gutta percha
C:
Mineral trioxide aggregate (MTA)
O:
Better apical seal with less bacterial microleakage
PICO Formatted Question:
In patients with endodontically treated teeth, does gutta percha or mineral trioxide aggregate (MTA) result in a better apical seal with less microleakage when post and core placement is indicated?
Clinical Bottom Line:
Both gutta percha and MTA serve as viable options for producing a clinically acceptable apical seal. However MTA results in a better apical seal compared to gutta percha, especially when minimal amounts of material must be used, and offers several benefits over gutta percha. Examples of such situations may include teeth with short roots or immature apices, or when trying to accommodate a post of an ideal length.
Date(s) of Search:
10/13/20 and 10/14/20
Database(s) Used:
PubMed, Science Direct
Search Strategy/Keywords:
I first tried to find established literature to determine the “gold standard” for an acceptable apical seal, and found a minimum of 5mm of gutta percha was the common recommendation from textbooks and research articles. The literature review I found was somewhat older (1995), so I then attempted to confirm/support the minimum amount of remaining gutta percha with more recent data. I then wanted to find research comparing the cumulative gutta percha data against the apical sealing ability of mineral trioxide aggregate (MTA).

MESH terms used:
Endodontically treated teeth, post and core, post space preparation, apical seal, microleakage, gutta percha, mineral trioxide aggregate
Article(s) Cited:
(1) Goodacre, C.J. and Spolnik, K.J. (1995) The Prosthodontic Management of Endodontically Treated Teeth: A Literature Review. Part II. Maintaining the Apical Seal. Journal of Prosthodontics, 4(1), 51-53.
(2) Rahimi, S. et al. (2008). In vitro comparison of three different lengths of remaining gutta-percha for establishment of apical seal after post-space preparation. Journal of Oral Science, 50(4), 435-439.
(3) Reyhani, M.F. et al. (2015). Comparing the Coronal Seal of Different Thicknesses of MTA with Gutta-Percha after Post Space Preparation. The Scientific World Journal, Volume 2015, Article 708639.
Study Design(s):
(1) Literature review addressing factors related to prosthodontic treatment that can affect the apical seal and endodontic success.
(2) 126 single-rooted maxillary anterior teeth without resorption selected. Root canals filed to size #40 and filled with gutta percha using lateral condensation technique. A post-space was then prepared using Gates-Glidden bur, leaving 4, 5 and 6mm gutta percha remaining. Tooth sealed using glass ionomer cement. Entire surface except for apical 2mm covered with sticky wax and nail polish, then placed in India ink for 72 hours to observe leakage.
(3) 50 central incisors selected without caries or resorption, crowns removed to leave roots measuring 13mm in length. Root canals filed to size #60, irrigating with sodium hypochlorite and removing smear layer with EDTA. Five different experimental groups of roots had apical seal placed using either gutta percha or MTA, leaving specific lengths of material at the apical end. Outside of tooth sealed with nail varnish except for apical 2mm. Roots placed in leakage evaluation system and observed for bacterial exchange.
Reason for Article Selection:
Endodontic research is somewhat of an established field with little new breakthrough studies being published. Comparing more recent research to established historic gold standards verifies the validity of the information and gives a baseline to compare to. Advances in the development of newer materials, such as mineral trioxide aggregate (MTA), offers room for expansion of current practices and may offer better results in situations where the gold standard may not offer the best outcome.

Article(s) Synopsis:

(1) A minimum amount of 5mm gutta percha is necessary for an adequate apical seal. When only 3mm or less is present, there is a greater incidence of leakage.

(2) The least amount of microleakage was observed using the maximum amount of gutta percha (6mm). Even though 5mm is the minimum, providers should make every attempt to conserve as much gutta percha as possible when preparing post space.

(3) Teeth sealed with MTA showed significantly less microleakage than teeth sealed with gutta percha, even when less material was used to create the apical seal. The number of days without microleakage was maximized with the maximum amount of MTA used as an apical stop, with the least amount of days being the lowest amount of gutta percha.

Levels of Evidence: (For Therapy/Prevention, Etiology/Harm)

See <http://www.cebm.net/index.aspx?o=1025>

[1] 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

[2, 3] 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):

Gutta percha has proved itself over time as a standard option for producing a clinically acceptable seal. However MTA may offer extra benefits that result in a better apical seal, particularly when the length of apical seal is limited.

