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### **Introduction:**

Dental Science is in constant pursuit for more recent and near ideal dental materials. Introduction of MTA in 1993<sup>1</sup> has undoubtedly been one of the greatest scientific innovations in the history of dentistry in the last few decades. MTA has been widely investigated in various scientific researches and has come up as a potential alternative to a number of present dental materials indicated for diverse applications in endodontic therapy.

Studies have also shown that MTA is biocompatible<sup>2</sup>, promotes Regenerative strategies<sup>3</sup> and has an excellent sealing ability<sup>4</sup>, both orthograde and retrograde.

The original formulation developed at Loma Linda University is manufactured by Dentsply International (ProRoot MTA and Tooth Colored MTA; Dentsply-Tulsa Dental, Tulsa-USA; Dentsply-Johnson City-USA). Various innovations and modifications have been tried as biomaterials similar to that of MTA such as MTA plus (Prevest Denpro Limited, Jammu city, India), MTA-Angelus (Angelus Soluções Odontológicas, Londrina, PR, Brazil), OrthoMTA (Bio

MTA, Korea), Biodentine (Septodont, Saint-Maur-des-Fosses, France). All the aforementioned materials show biological activities similar to MTA with varying degree of success.

The major limitations in the use of these materials in addition to their high cost have been slow setting kinetics and complicated handling<sup>5</sup>, rendering these procedures even more challenging and restricted their use to Endodontists.

This Paper provides comparative evaluation of some of the important features of MTA and MTA like materials available in the market and lays down the guidelines for clinical selection of these materials under different circumstances.

### **Evidence based Dentistry:**

MTA has been proposed as a reliable pulp-capping material on direct carious exposures in permanent teeth.<sup>6</sup>Biodentin has also been successfully used in direct pulp capping of permanent teeth.<sup>7</sup>

Complete or partial obturation of the root canal system with MTA is a tenable alternative for teeth that require retreatment, teeth with resorptive defects, open apices, and teeth that show wide anatomic variations that cannot be predictably sealed using conventional techniques.<sup>8</sup>

Biodentin has also been used for treating external cervical resorption, external apical resorption and obturating root canal.<sup>9</sup>It has been proposed that MTA-Angelus (Angelus, Londrina, Brazil), might also exhibit properties suitable for nonsurgical root canal obturation.<sup>10</sup>

A study<sup>11</sup> comparatively evaluated the push-out bond strength of ProRoot MTA, Biodentine, and MTA plus in repairing furcal perforations utilizing an internal matrix, when subjected to blood contamination. . Blood contamination was found to affect the 7 day MTA samples but had no significant effect on 24-h samples. In the MTA Plus group, blood contamination significantly decreased the strength both in 24-h and 7-days samples. Blood contamination had no effect on the perforations repaired with Biodentine.

Hashem and Hassanien in a salability study<sup>22</sup> concluded that ProRoot MTA has excellent sealing ability and can be used with or without matrix in repair of large furcation perforations. MTA Angelus should be used with internal matrix to repair large furcation perforations.



**Table 1: Guideline to Clinical Selection of Portland derived materials**

Material	Composition	Vehicle	Setting Time	Radioopacity	Equipment needed	Price in India
Pro Root MTA	Portland Cement+ Bismuth oxide+ Gypsum	Distilled Water	2 hours 45 minutes	5.34 mm/ Al	MAP	5000 for 1 gram
MTA Plus	Dicalcium Silicate+ Bismuth oxide+ CaSulfate+Silica	Viscous Polymer Hydrogel / Distilled Water	1.2 hours	5mm/ Al	No special equipment needed	5000 for 2 grams
MTA Angelus	Tricalcium Silicate+ Dicalcium Silicate+ Tricalcium Aluminate+ Free lime+ Bismuth Oxide	Distilled Water	15 Minutes	7.17 mm/ Al	No special equipment needed	2350 for 0.28 grams
Ortho MTA	Tricalcium silicate + Dicalcium Silicate+ Tricalcium Aluminate+ Tetracalciumaluminoferrite+ free calcium oxide	Distilled Water	5 hours 30 minutes	NA	Carrier, Compactor and Automixer	NA
Biodentin	Tricalcium silicate +CaCO <sub>3</sub> + ZrO <sub>2</sub>	CaCl <sub>2</sub> in a hydrosoluble polymer	12 Minutes	3.5 mm/Al	Triturator	1600 per capsule

**Table 2: Clinical Applications of MTA and MTA like materials.**

Material	Pulp Capping	Retrofilling Material	Obturation	Perforation Repair	Resorption	Apexification
Pro Root MTA	***	*	*****	***	***	*****
MTA Plus	*****	*****	*****	*****	*****	*****
MTA Angelus	*****	***	**	*****	***	**
Ortho MTA	*****	***	**	***	***	
Biodentin	*****	*****	**	*****	***	***

**Conclusion:**

MTA is one of the materials in field of dental sciences which is known for its unique blend of physical, chemical and mechanical properties well supported by various scientific researches. This material stands for its potential biological activity with far and wide applications in the field of Endodontic therapy. Various permutations and combinations regarding its composition and properties are available under different brand names. Each material combination has its certain potential property so it is advisable to the clinician to wisely choose a particular MTA formulation for a specifically indicated treatment protocol to achieve best possible clinical and biological success.



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