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**Dr. Arshia R Baig**  
**MDS- Conservative Dentistry and Endodontics,**  
Senior Lecturer,  
Department of Conservative Dentistry and Endodontics,  
VSPM'S Dental College and Research Centre,  
Nagpur-440019,  
Maharashtra, India.

**Dr. Syed Navid Ali**  
Post Graduate Student,  
Department of Conservative Dentistry and Endodontics,  
CSMSS Dental College and Hospital, Aurangabad-431005  
Maharashtra, India.

**Dr. Hrishikesh Saoji**  
**MDS- Conservative Dentistry and Endodontics**  
Senior Lecturer,  
Department of Conservative Dentistry and Endodontics,  
Bharati vidyapeeth dental college, Kharghar,  
Navi Mumbai-410210,  
Maharashtra, India.

**Correspondence:**  
**Dr. Arshia R Baig**  
**MDS- Conservative Dentistry and Endodontics,**  
Senior Lecturer,  
Department of Conservative Dentistry and Endodontics,  
VSPM'S Dental College and Research Centre,  
Nagpur-440019,  
Maharashtra, India.

### Smart seal: Unique obturation system in dentistry

**Dr. Arshia R Baig, Dr. Syed Navid Ali, Dr. Hrishikesh Saoji**

#### Abstract

Newly introduced root canal obturating system "SmartSeal" is established on the polymeric technology. The hydrophilic nature of the obturating points can absorb surrounding moisture and expand, resulting in filling of voids and spaces, onto which the principle of this system depends. Ever since its introduction, Smartseal has been extensively stated to be efficaciously used in endodontic treatment. This review article goals to deliver an ephemeral synopsis of this obturating system with a reference of the studies associated with it.

**Keywords:** Root Canal Treatment, Obturation, Gutta percha, Smartseal

#### 1. Introduction

During the last few decades, the arena of endodontics has undertaken key paces in numerous facets, whether it is about the operating microscope or an extensive series of file systems and irrigation procedures. Regardless of these numerous improvements, there has been no significant change in the procedure of obturating a root canal system. Palmer *et al.* (2009) studied the current endodontic clinical training between 702 primary care dentists in the north west of England and concluded that lateral condensation obturating procedure was the standard obturation technique used, amongst most of them <sup>[1]</sup>.

Endeavors made to amend the use of gutta-percha in endodontics have principally been futile due to the equipment's cost, procedure sensitivity or the biocompatibility of the material when used in humans. For overcoming and improving such problems and for enhancing the consequences of the treatment, an advanced root canal obturating system called Smartseal TM (known as Prosmart TM outside UK) was established. This artifact is well-thought to unveil smart behavior and integrates improvements in hydrophilic polymer plastics. Smartseal is a two-part system comprising of: (a) Propoint and Smartpaste / Smartpaste Bio.

Propoint, best known as the 'C points', these obturation points are fabricated in two parts: Central Core and the Outer Layer. The central core comprises of a blend of two branded nylon polymers, Trogamid T and Trogamid CX. It is well-thought to deliver the point with the elasticity, allowing it to effortlessly permit around any curvatures in the biomechanically prepared canal, while being inflexible sufficient to pass effortlessly to the length in slender canals. The Outer Polymer Layer: comprises of a cross-linked copolymer of acrylonitrile and vinyl pyrrolidone that has been cross-linked using allyl-methacrylate and a thermal initiator. This layer is hydrophilic, having a hydrogel coating, that allows swelling up of the points to acclimatize the corollaries of the root canal system. This covering is planned to swell sideways, thus self-sealing the root canal. As there is no axial swelling, no length change is present and radiated swelling halts as soon as a seal is formed <sup>[1, 2]</sup>.

#### 2. Controlled Expansion Mechanism

Propoints reveals the hydrophilic nature, permitting infinite small volume of water existing in the root canal system that is engrossed by these points. This water may hydrogen bond to the existing polar locations, permitting the enlargement inside the polymeric chains. The proportion and range of such expansion is well-ordered as part of the manufacturing course. This expansion befalls with a diminutive force that is appealed to be less than the testified tensile stress of dentine and a segment of the strength engendered while using the conventional methods such as warm vertical compaction. Such a type of expansion ensues in the first 4 hours after employing the point into the root canal and permitting the gentle adaptation of

point to whichever peccadilloes present in the root canal system. This results in the polymer and sealer being conveyed into the dentinal tubules. The trivial positive pressure against the root canal wall that is fashioned, forms a hallmark that is supposed to be effectively impervious to the microbial micro-leakage [2-5]. One propoint shields all tip sizes and it is obtainable in the following sizes:

- 6% taper - ISO tip sizes 25 to 45
- 4% taper - ISO tip sizes 25 to 45
- ProTaper™ - F1, F2, F3, F4 & F5
- Sendoline™ S5 - S2, S3, S4. [2, 3]

### 3. The Smartpaste

Smartpaste is a resin based sealer comprising of an active polymer that swells to fill any spaces or openings in the root canal system. The extent of the active polymer used well-orders the degree of pompousness. There can be swelling of the polymer at a future date for filling any cavities that may progress.

It is dispensed in a syringe to ensure an accurate ratio of sealer components is achieved every time and mixing/dispensing trays are provided to aid application [2].

### 4. Smartpaste Bio

It is a resin based sealant intended to swell up, by the addition of ground polymer. The manufacturer asserts that the adding of bioceramics, gives the sealer an extraordinary dimensional immovability, thus making it a non-resorbable inside the canal of the root. There is production of calcium hydroxide and hydroxyapatite as a byproduct during the setting reaction of the bio-paste, interpreting the material both anti-bacterial while setting and very biocompatible once set. Also, it has a delayed setting time (4 to 10 hours), and is hydrophilic in nature, allowing the propoint to hydrate and well to fill any voids. The sealant is delivered in a pre-mixed syringe and does not require mixing as it can be applied directly into the canal using an intra-canal tip minimising wastage of material. (Fig 2) The cement absorbs water from within the canal and once set smartpaste bio produces a radiopaque biocompatible cement [2, 3].

Delivering of the sealant is in a pre-mixed syringe and do not necessitate the mixing as it can be directly applied into the root canal using an intra-canal tip, thus reducing the material wastage. The cement engrosses water from inside the root canal and once set, the smartpaste bio exhibits a cement which is radiopaque and biocompatible cement.

### 5. Accessories

#### 5.1 Smart-trim

Comprises of a kit consisting of 2 long flame gold burs and 2 pear diamond burs, for trimming the superfluous amount of propoints.

#### Directions of use

Flame bur should be used on a high-speed for removing the additional and then forcing down on the top with the pear bur until the propoint is flush with the orifice. As the Smart paste is hydrophilic, water can be kept on it when used. If using smartpaste bio, burs must be kept dehydrated or else the water may wash away much of the sealer.

#### 5.2 Smartgauge

It is a measuring block designed to slender the 4% and 6% taper propoints to the apical wanted size. It diminishes the

necessity to transmit large stocks of pre-trimmed points and thus allowing a custom fit.

### Directions of use

The manufacturer has acclaims the trimming to one size small to that which is being prepared, i.e. if a size 40 has been prepared, then the propoint can be sheared to a size 35.

Trimming is done by stridenting the point through the equivalent hole in the smart-gauge and then shearing off the additional with a scalpel. The points are stiff enough to be gnawed at the root canal apex, a snug fit is sensed with positive tug back at the accurate working length. The smartgauge is autoclavable at the traditional settings [2, 3].

### 6. Conclusion

Advancements in materials such as Smartseal may ascertain to be an unwilling changer in the field of endodontics. One of the main benefits of this obturating system is the resourcefulness of the product, thus allowing the conception of points to equal most of the available different file systems that are presently used in daily practice. Usage of Smartseal in unification with the modern apparatus and procedures available in the field of endodontics will supplementarily augment the outcomes of the root canal therapy.

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