INTRODUCTION

The basic objective of endodontic treatment is total debridement of the pulp space and development of an impermeable fluid tight seal at the apex. OBTURATION, the multi dimensional sealing of the entire root canal system is one of the important steps in endodontic procedure.\(^1\)

In the past many root canal filling techniques have been developed in the hope of achieving total root canal obturation. Gutta-percha was first introduced by Hill (1847) in restorative dentistry and by G.A.Bowman (1867) in endodontics.\(^2\)

Gutta-percha does not bond to the canal structure resulting in the absence of complete seal which produces a poor barrier to micro leakage.\(^3\) Most of the recent obturation techniques use either a solid core and a sealer or a plastic material which gets adapted to the shape of the root canal and give complete seal.\(^2\) The combination of Gutta-percha and sealer is the most frequently used filling material in the clinical practice. The ability of a sealer to flow by obturating material is important as it reflects its capacity to penetrate into minor irregularities and ramifications of root canal system and dentinal tubules thus eliminating the chances of endodontic failure.\(^4\)

Although treatment outcomes of contemporary root canal treatment with Gutta-percha are favorable, it is generally seen that conventional Gutta-percha and root canal sealers do not provide a fluid – tight seal.\(^5\) Many attempts have been made to resolve this problem through variations and modifications in obturation techniques, as well as material properties, including vertical and Lateral Compaction, use of Schilder technique, System B, Thermafil, Guttaflow etc.\(^6\)

As a consequence various obturation techniques, obturation materials and root canal sealers are available. The criteria for selection being, they should be easy to use, be easily removed, be radiopaque, expands slightly on setting, be biocompatible with periapical tissues and provide an excellent seal over time.\(^7\) Various attempts were made for the usage of obturation material have largely failed due to many factors like expensive equipment, technique sensitivity or material not compatible for human use. To overcome these problems and improve the treatment outcome, a root canal obturating system called SmartsealTM (known as ProsmartTM outside UK) was developed. The trade name of C- Point is SmartsealTM and ProsmartTM. This product is
considered to exhibit smart behavior and incorporates in hydrophilic polymer plastics\textsuperscript{8}. Assessing quality of apical seal obtained by different root canal filling materials and comparing them will demonstrate the superiority of one material over the other.\textsuperscript{9}

Many in vitro methods have been used to evaluate the sealing ability of root canal filling materials. Confocal microscope, a new and non-invasive method, has the advantage of providing correct information and a simple method to determine the ability of sealers inside dentinal tubules in non-dehydrated state through the use of Rhodamine-marked sealers. 3D reconstruction can also be generated with the digital data.\textsuperscript{10}

**APICAL LEAKAGE**- Apical or coronal leakage may adversely affect the success of the root canal therapy. Leakage studies remain important and necessary to determine the most suitable obturation materials for achieving therapeutic success. In so far as apical seals are the main barriers against tissue fluid leakage and bacterial recontamination, the long term success of endodontic therapy is directly dependent on the effectiveness of these seals.

- **VOIDS**- a void is a lack, in the three dimensional thermal replication of the canal space, of obturation material. Voids are not related to underfilling of the canal that might manifest as uncleaned and unfilled canal space such as an obturation that does not have the correct apical extent. Voids in obturation are primarily a function of a lack of continuity in the backfilling of canals. **SEALING ABILITY**- Complete obturation of the root canal with filling material and creation of a hermetic apical seal are the goals of endodontic treatment. It has been shown that approximately 60\% of endodontic failures are due to inadequate obturation of the root canal system. Hence it is important to use materials which are able to create a hermetic seal between the root canal system and the periapical tissue.

- **EXPANSION**- New obturation materials have been introduced into the endodontic market over the last decade. Accordingly, the new commercially available root filling materials which claim betterment of their seal of the root canal system may be classified by function into those that:
  - Adhere to canal wall dentin and root filling materials to eliminate interfacial gaps
  - Attempt to self-seal gaps by setting or hygroscopic expansion
- Enhance flow and adaptation of the root filling material to canal walls
  
  Utilize bioactive reaction products to salvage a compromised