

THERMOPLASTIC ENDODONTIC OBTURATION
– THERMAFIL SYSTEM: CASE REPORTS

ABSTRACT:

Success of non-surgical root canal treatment is predicted by meticulous cleaning and shaping of the root canal system, three-dimensional obturation and a well-fitting, leakage-free coronal restoration. Various techniques have been developed to achieve the proper obturation of root canal system including the lateral compaction, vertical compaction and carrier based obturation. Over the years, pitfalls with one technique have often led to the development of newer methods of obturation. This article presents the case report of endodontic obturation by means of thermoplasticized gutta percha by using ThermaFil system along with Thermaprep oven in two different cases to achieve 3- dimensional hermetic seal. Thermafil provides a void free obturation with higher degree of homogeneity and less working time.

Keywords- Obturation, ThermaFil system, thermoplastification, curved canals.

Date of Submission : 3/3/17

Date of Acceptance : 4/4/17

1. Navdeep
2. Prashant Monga
3. Pardeep Mahajan
4. Shikha Baghi Bhandari

1. Post Graduate student, Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab.
2. MDS, Reader, Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab.
3. MDS, Professor and Head, Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab.
4. MDS, Reader, Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab.

Corresponding author:

Name: Dr. Prashant Monga

Address: Department of Conservative Dentistry and Endodontics,
Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab.

Phone numbers:9780623558

E-mail address : artdentalstudy@yahoo.co.in

INTRODUCTION

Root canal treatment consists of cleaning, disinfection and obturation of the root canal. The primary objective of obturation is to prevent communication of bacteria from the oral cavity through the root canal system into the periapical tissues.¹ Additionally obturation prevents the ingress of apical tissue fluids and the growth of any residual bacteria left in the canal system. Complete filling of the root canal system using a semisolid core such as gutta-percha (GP) and sealer is critical in accomplishing these goals. An inadequate seal can result in contamination of the canal system and can lead to periapical disease.² The gutta-percha has been the most commonly used filling material due to its

biocompatibility, dimensional stability, plasticity and ease of removal whenever necessary.

Schilder first introduced the vertical condensation technique with heated gutta-percha and since that, thermoplastic methods have been proposed.¹ Thermoplastic method use gutta percha in alpha phase and system used in these case reports is ThermaFil (Dentsply Maillefer, Ballaigues, Switzerland).

ThermaFil System

In 1978, Johnson introduced an obturation technique using a carriers coated with alpha phase gutta-percha (ThermaFil Endodontic Obturator, Dentsply Maillefer, Switzerland).³

ThermaFil is a patent endodontic obturator consist of a flexible central carrier that is uniformly coated with a layer of "alpha phase" gutta-percha. When heated, the "alpha phase" gutta-percha becomes sticky and tacky, with excellent flow characteristics and thus obturates the main canal as well as available lateral and accessory canals. The ThermaFil carrier is a flexible 25mm biocompatible radiopaque plastic material with a .04 taper. The greatest feature of ThermaFil is that it is so quick and easy to learn and no longer there is the need to use lateral spreaders and multiple accessory gutta-percha points.⁴

ThermaFil obturators are designed to correspond to the ISO standard file sizes, various tapered nickel-titanium rotary

files. Size verifiers are available to aid in selection of the appropriate carrier and which should fit passively at the corrected working length.²

ThermaPrep plus oven

The ThermaPrep Plus Oven (Dentsply Maillefer, Switzerland) has been specially developed for heating ThermaFil endodontic obturators for use in root canal obturation.⁵

Before obturation, turn the oven on by the power on and the green stand-by indicator will light up. Put both obturator holders in the upper position. After disinfecting the obturator and setting the silicone stop according to working length, place the ThermaFil endodontic obturator in the left

Case report - 1



Fig 1: Preoperative IOPA

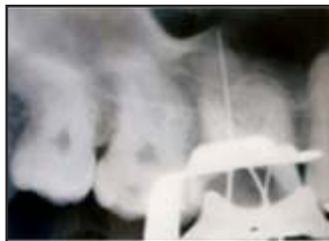


Fig 2: Working length determination



Fig 3: Verifiers placed in canals after BMP



Fig 4: Verifiers on IOPA



Fig 5: Corresponding obturator heated in the oven



Fig 6: Obturators in canals



Fig 7: Complete obturation



Case report - 2



Fig 8: Preoperative IOPA



Fig 9: Working length determination



Fig 10: MTA apical plug and thermoplasticized obturation done



Fig 11: Follow up at 3 month

obturator holder and silicone stop must be under the holder. Push the holder down (arrow down) until it sounds a click. Push the button which corresponds to the size of the ThermaFil endodontic obturator to be heated. Then push the "start left" button. The obturator is now being heated. The heating time depends on obturator size varies from 20 to 45 seconds and is regulated automatically.

After the first signal beep, the obturator is ready for use. Push the obturator holder (arrow up) and take the obturator carefully out of the holder by pulling it towards and not to scrape the obturator on any part of the holder. The oven will "beep" every 15 seconds to remind, that the obturator is still in the oven but after 90 seconds, the heating element will switch off automatically. If more obturators are required, alternatively use the left and right holders. Wait until after the signal "beeps" for the first holder, then immediately start to heat the other one. It is unable to heat both sides at the same time.

Case reports in the article presents the obturation of root canal with ThermaFil system.

CASE REPORTS

Case-1: A 31 year old patient visited the Outpatient Department of Conservative Dentistry and Endodontics in Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab with chief complaint of pain in upper right back teeth region since 10 days. After taking history and performing various diagnostic tests, it was decided to go for root canal treatment of 16 (fig 1).

After explaining all procedure to patient, access cavity was made and working length was determined under rubber dam isolation. Biomechanical preparation of root canals were completed by using universal ProTaper system in crown down manner, following the instructions recommended by manufacturer. Instrumentation was under copious irrigation with 3% sodium hypochlorite (Prevest DenPro Ltd) followed by 17% EDTA(Prime dental product Ltd) . MB canal was prepared upto F2, DB upto F3 and palatal upto F3, but after apical gauging it was extended to apical size 35no. Canal sizes were verified by verifiers of corresponding sizes and the matching obturators were selected (fig 3,4). After confirming the verifiers on radiograph, canals were dried with sterile paper points and a thin layer of zinc oxide eugenol based sealer was applied to canal walls. One by one obturators were placed into Thermaprep oven, when heated obturators were securely placed into canals and left undisturbed for 2 minutes to set warm gutta percha (fig 5,6). Remaining carriers were removed by shearing off from the canal orifices with round bur. Post obturation radiograph shows well defined sealed canals. Composite restoration

was used to restore the pulp chamber and advise for coronal restoration (fig 7).

Case-2: A 23 old male patient visited the Out Patient Department of Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab with chief complaint of fractured and discolored upper right front tooth. Patient gave history of accident at the age of 11 year. Clinical examination revealed Ellis class III fracture and discolored 11. After performing various diagnostic tests, root canal treatment was indicated for 11. In this case of internal resorption, H files were used for biomechanical preparation of root canals (fig 9).

Due to wide apex, MTA apical plug was made by placing MTA with help of amalgam carrier and condensed with hand plugger upto 5mm and over it a moist cotton pellet was kept and temporary restoration (Orafill –G, Prevest Dent pro) was placed. After 48 hours, patient was recalled and setting of MTA was checked to form a hard mass of cement (fig 11). After a apical plug was made, same procedure was followed to obturate the canal with ThermaFil system. After 3 month follow up, tooth was asymptomatic and well secured in a dentition (fig 12).

Discussion

The main aim of endodontic treatment is to fill the space of root canals with the best possible adaptation to the walls, through the use of a homogeneous mass of gutta-percha and a thin layer of endodontic cement. Piati et al. stated that the seal must be sufficient to prevent reinfection by fluids and bacterial byproducts. The obturation techniques assist in this process, but the strong influence of the anatomical variability of root canals may lead to failure.

Gutta-percha is the trans isomer of polyisoprene (rubber) and exists in two crystalline forms (α and β). In the unheated β phase the material is a solid mass that is compactable. When heated the material changes to the α phase and becomes pliable and tacky and can be made to flow when pressure is applied. A disadvantage to the α phase is that the material shrinks on setting, same, when α-phase gutta-percha is heated and cooled it undergoes less shrinkage, making it more dimensionally stable for thermoplasticized techniques. The use of α-phase gutta-percha for obturation has increased as thermoplastic techniques have become more common.²

Ribeiro et al. stated that the thermoplastification aims to promote greater amount of gutta-percha, better adaptation to irregularities and consequently, the smaller amount of cement as compared to those that use cold gutta-percha lateral condensation and vertical condensation and the single cone.⁷ Internal root resorption presents as an irregular

resorptive defect in root canals. In the presented case report 2, maxillary central incisors with internal resorptive cavities located in the middle third of the root was obturated with ThermaFil system, as it is difficult to achieve 3D obturation with other obturation techniques.⁸

Various studies shows obturation of curved root canals with Thermafil, results in a more dense and well adapted root canal filling throughout the entire canal system, than lateral condensation with standard gutta-percha. The predisposition for extrusion of filling materials with the ThermaFil obturation technique is observed when the apical foramen was not patent. Prevention of this occurrence is to be done by the use of an apical dentine matrix plug, that has been demonstrated by Scott & Vire (1992).⁹ Emmanuel Samson et al, evaluated that the apical seal by ThermaFil obturating technique shows minimum mean apical dye penetration as compared to Obtura II and lateral condensation.¹⁰

Once the Thermafil obturation is completed, Pro-Post drills (DENTSPLY Tulsa Dental Specialties) are recommended if post space is required for restoration of the tooth. The unique eccentric cutting tip keeps the instrument centered in the canal while friction softens and removes the gutta-percha and plastic carrier. When retreatment is necessary the thermafill plastic carrier has a groove along its length to provide an access point for placement of a file. Chloroform and hand files can be used to remove the gutta-percha surrounding the carrier. All aspects are covered in Thermafil system for making it universally accepted even if post core and retreatment is to be done. It all contributes to its versatile nature and mechanically well accepted in obturating the complex root canals anatomies.

Conclusion

The ThermaFil system of thermoplastification obturation is effective in different clinical situations regardless of the curvature, number of root canals and resorptive defects, thus providing its versatility. The technique is fast contributing for a shorter working time, if previous training is delivered.

References

1. Schilder H. Filling root canals in three dimensions. *Dent Clin North Am.* 1967;11:723-44.
2. W.T Johnson and J.C.Kulild. Obturation of the cleaned and shaped root canal system, in Cohen's Pathways of the Pulp, K. M. Hargreaves and S. Cohen, Eds., pp. 349–351, Mosby, St. Louis, Mo, USA, 10th edition, 2010.
3. Johnson B. A new gutta-percha technique. *J Endodon* 1978; 4: 184–8.
4. Gavan O'Connell, Thermafil CLINICAL HINTS clientservices@dentsply.com, www.dentsply.com.au
5. Maalouf S, Attieh- Abikanaan, Qunsi HF. Thermafil: a conventional technique in endodontics. *Dental News* 1996;3:27-31.
6. www.dentsplymaillefer.com
7. Ribeiro MA, Queiroz ACFS, Silva PG, Yoshinari GH, Guerisoli DMZ, Pereira KFS. Estudo comparativo da área apical preenchida pela gutapercha nas técnicas de obturação TC, ThermaFil e condensação lateral. *Revista de Odontologia da UNESP*: 2009; 38(1):65-71.
8. Agarwal M, Rajkumar K, Lakshminarayanan L. Obturation of internal resorption cavities with 4 different techniques: An in-vitro comparative Study, *Endodontology* 2002;14:3-8.
9. J. L. Gutmann, W. P. Saunders, E. M. Saunderst & L. Nguyen. An assessment of the plastic Thermafil obturation technique, Part 1 -Radiographic evaluation of adaptation and placement, *International Endodontic journal* 1993;26:173-8.
10. Samson E, Kulkarni S, Sushil K C, Likhitar M. An In-Vitro Evaluation and Comparison of Apical Sealing Ability of Three Different Obturation Technique - Lateral Condensation, Obtura II, and Thermafil. *J Int Oral Health* 2013; 5(2):35-43.