

Removal of gutta percha: A review

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Abstract

Root canal therapy is one of the most complex procedure of modern dentistry due to several canal configurations of the teeth. Significant advancements in debridement and obturation techniques have occurred in recent years. However, Root fillings can, and do fail and failures necessitate retreatment. In order to get a successful outcome. in the retreatment procedure all the previous materials should be removed from the canal space and debrided. this article gives a review of the gutta-percha removal from the root canal system.

Keywords: gutta percha removal, solvents, thermafill.

Introduction

Endodontic therapy is one of the most progressive aspects of dentistry. However, endodontic procedures can be among the most technically challenging procedures faced by many dentists. in recent years due to the several

advances in endodontic retreatment instruments and materials, first choice for a failed root canal treatment is nonsurgical retreatment. Endodontic retreatment may offer the patient as well as clinician a second chance to save a failed root canal treated tooth that would otherwise be destined for extraction.

Gutta Percha

Gutta percha has been used as a root filling material for over a century.[1] There are many techniques that have been devised for obturation using gutta percha:

- Single cone and sealer.

Condensed gutta percha techniques:

- Cold lateral condensation
- Warm lateral condensation
- Warm vertical condensation
- Thermocompaction
- Hybrid techniques.

Carrier-based methods.

- Solvent/chloropercha techniques.
- Cold paste.
- Bonded root filling materials (similar properties to gutta percha but chemically different).

Single Cone

There will usually be space alongside a single cone root filling that is normally filled with sealer during obturation. The sealer is often degraded by bacterial microleakage, and when a single cone root filling fails this leaves a void.

Hedstroem File

Most single cone fillings can be simply removed by engaging the gutta percha with a Hedstroem file carefully wound alongside it. When withdrawn, the file should pull the cone with it.

Endosonics

An endosonic file (ISO 15), used with irrigant spray, will break up the sealer layer and aid in removal of the cone.

Rotary Nickel–Titanium Instruments

An alternative approach is to tackle the case as if it were an untreated canal, as the root canal will often have been under-prepared and poorly tapered. A crown-down approach is normally used. The coronal aspect is flared first, followed by apical preparation. The cone will undoubtedly be removed during the preparation sequence.

Over-Extended Gutta Percha

Over-extended gutta percha points can often be retrieved. The canal may be over-filled because the apical part of the root canal has been over-prepared and, in many cases, zipped. Sometimes, gutta percha is extruded when there has been inflammatory resorption. If the operator fails to achieve an adequate taper or an apical stop during preparation, the gutta percha point can be pushed beyond the apex. In both cases there is often space alongside the cone at the root canal terminus. As much sealer and debris as possible should be removed using irrigants or

endosonics on low power before attempting retrieval of the cone.

A fine Hedstroem file (ISO 15) is then gently inserted so that it extends 1–2 mm beyond the apical end of the root canal and engages the cone. Gentle pulling should allow the cone to be retrieved. It is important in this instance not to use too large an instrument, as this will result in the extraradicular portion of gutta percha being severed at the apex. Sometimes a braiding technique with two or three Hedstroem files will help dislodge the fragment.

Condensed Gutta Percha

The main aim when removing condensed gutta percha is to eliminate as much material from the root canal system by mechanical means before applying solvents. This prevents dissolved gutta percha coating the walls of the access and pulp chamber in a messy smear. Less solvent will also be required. Even a poor obturating technique can result in material being forced into the complex internal anatomy of the root canal system. For this reason, a solvent will always need to be used when removing condensed gutta percha.⁷ Many ways of removing the bulk of gutta percha have been suggested, including Gates–Glidden burs, rotary instruments, heat and lasers. [3–9]

Gates–Glidden Burs

A Gates–Glidden bur size 2 or 3 is a very efficient instrument for penetrating and removing gutta percha from the coronal part of the root canal. The bur, which is rotated at 2000–3000 rpm, thermoplasticizes and removes gutta percha simultaneously.

Heat

Heat can be used to remove the bulk of gutta percha from the coronal part of the root canal. A heated instrument, or electrically heated pluggers such as the Touch and Heat or System B (SybronEndo, Orange, CA, USA), are useful. Place the plugger in the canal hot and allow to cool

slightly. Small amountsof gutta percha will be removed with the plugger.

Ultrasonic Removal

Energized instruments produce heat that thermo softens gutta-percha, specially designed ultrasonic instruments are carried in to canals that have sufficient shape to receive them & will float gutta-percha coronally in to the pulp chamber where it can be subsequently removed.

Nickel–Titanium Rotary Instruments

Rotary nickel–titanium instruments such as ProFiles (Dentstply-Maillefer, Ballaigues, Switzerland) offer an efficient means of removing gutta percha and can be used further apically than Gates–Glidden burs. [2,8,10] If the canal has previously been well prepared, a rotary instrument should be selected that has a smaller taper than that of the prepared canal to avoid binding and potential separation. In other words, the instrument is working mainly within the mass of gutta percha. If the canal has been under-prepared, then mechanical preparation is completed in the normal fashion but a solvent can be applied to help aid removal of the gutta percha.

There are specific gutta percha removal instruments available, such as the GPX (Brasseler USA, Savannah, GA, USA). This instrument is rotated in a speed-reducing handpiece and has cutting flutes arranged in a reverse screw thread. Gutta percha is thermoplasticized and withdrawn from the canal by the action of the flutes. There is a risk of fracture if excessive force is applied, when the instrument is rotated too quickly, or is made to work around curvatures in the root Following the use of mechanical instruments, any small tags that remain can be visualized under the operating microscope with good illumination and magnification.

They are then retrieved with a Hedstroem file or micro-debrider (Maillefer, Ballaigues, Switzerland). It is sometimes useful to run an instrument along the lateral

borders of the canal, especially if it is ribbon-shaped, to remove any gross deposits of material that have been compacted into lateral grooves and fins.

Solvents

Any remaining gutta percha can be removed using a solvent and these include:

- chloroform BP (stabilized in ethanol)
- eucalyptus oil rectified turpentine
- xylene
- methyl chloroform
- halothane.

Solvents can usually be obtained from larger pharmacies or chemical companies and they vary in their effectiveness.¹⁵ Chloroform is highly effective and probably the most popular solvent for endodontic use. Some concern has been expressed about the cytotoxic effects of gutta percha solvents.¹⁶ However, it is unlikely that with careful use the small amounts of chloroform required in endodontic retreatment would be hazardous. Chloroform is introduced a few drops at a time to the root canals. It should be drawn up in a glass or polypropylene syringe. Normally, less than 1 ml will be required for a retreatment case. The rubber dam will dissolve should the solvent come into contact with it. Initially, a Hedstroem file can be used to remove dissolved material. The file is wiped clean on a gauze between insertions. Following this, more solvent is placed into the canal and paper point used to wick the dissolved material from lateral canals and fins. When the paper points are no longer coloured on removal, the root canals should be free of gutta percha.

Carrier-Based Gutta Percha

Thermafil

There have been several carrier-based obturating devices marketed for use in endodontics. Most consist of a metal or plastic carrier covered in alpha-phase gutta percha. Thermafil (Dentsply-Maillefer, Ballaigues, Switzerland) is

probably one of the most well-known. Early Thermafil carriers were made of titanium but were soon replaced by a plastic alternative. The most recent development is a V-shaped cross section on the 0.04 tapered plastic carrier that is aimed at making retreatment simpler. The removal of Thermafil is not considered to be a major problem in retreatment. [12-15] Removing the carrier is important in speeding up the process and allowing removal of the gutta percha.[16]

Hedstroem Files

Using magnification and illumination, it is possible to uncover the carrier and insert a Hedstroem file alongside by gently screwing it clockwise. Occasionally, the carrier can be removed by withdrawing the file by hand. If more force is required, the file can be clamped in a pair of artery forceps and leverage applied by rotating about a cotton wool roll placed on the adjacent tooth. The remaining gutta percha can be removed in a similar manner to well-condensed gutta percha.

When Thermafil has been in place for a number of years, the gutta percha can become quite hard. In this instance, it is difficult to make progress with the Hedstroem file. A well can be created in the orifice of the canal using a size 3 or 4 Gates–Glidden bur, into which solvent such as chloroform is placed. The gutta percha will soften sufficiently to enable a Hedstroem file to be introduced alongside the carrier.

Nickel–Titanium Rotary Instruments

The plastic carrier can sometimes be removed using a rotary nickel–titanium instrument 0.04 taper, rotated at 600–1200 rpm. The file should be rotated in the groove of the carrier and advanced with light pressure. Frictional heat will melt the gutta percha, allowing the instrument to advance apically and create a pilot channel. Once resistance is felt, a 0.06 taper instrument is used at normal working speed of 300 rpm to grip the carrier and extract it.

If the carrier seems resistant, a Hedstroem file and solvent can be used. The remaining gutta percha can be removed in a similar manner to well-condensed gutta percha.

Quickfill

This system utilized nickel–titanium carriers covered in gutta percha to obturate the root canal system. Removal is relatively simple when the heads of the carriers have been retained. First, gutta percha around the head of the carrier is removed with a Gates–Glidden bur. The carrier is then removed using Stieglitz forceps. The remaining gutta percha can be removed in a similar manner to well-condensed gutta percha. If the carrier has been severed below orifice level, then it will have to be uncovered using Gates–Glidden burs or solvents under magnification and illumination. It can usually be removed using either the instrument removal system (IRS) or braiding

Other Systems

Solvent/Chloropercha

Canals obturated using gutta percha and solvent techniques can be treated in a similar manner to condensed gutta percha.

Gutta Flow

Gutta Flow (Coltene Whaledent Ltd, Sussex, UK) is a cold gutta percha filling system that utilizes a silicone matrix and shredded gutta percha. It can be removed using similar techniques to condensed gutta percha.

Resilon

Resilon (Resilon Research LLC, Madison, CT, USA) is a thermoplastic, synthetic, polymer-based root canal filling material. The material contains bioactive glass and radio-opaque fillers. It performs like gutta percha and has similar handling properties. For retreatment purposes, it may be softened with heat, or dissolved with solvents such as chloroform.

Epiphany

Epiphany (Pentron Clinical Technologies, LLC, Wallingford, CT, USA) is a dual curable dental resin composite sealer that is used with Resilon. It is claimed that the resin can impregnate dentinal tubules, providing a bond between the mass of obturating material and the wall of the root canal. In a retreatment situation, this hybrid layer may need to be removed mechanically by enlarging the canal.

Considerations for Gutta-percha removal Wong DCNA (2004)

	Pull out	Dissolve
Condensation	Poor	Well
Shape of canal	Straight	Curved
Length	Overextended	Incomplete

Conclusion

Endodontic treatment success completely depends on the type of care taken during all the steps of treatment, as it is well known that most of the endodontic failures are of iatrogenic origin, proper knowledge and skill of the dentist plays a major role in preventing the failures.

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