



Indira Gandhi
National Open University
School of Health Sciences

MDT-002 Clinical Endodontics-I



Dental Council of India

Block

4

OBTURATION OF ROOT CANAL

Unit 25

Basics of Obturation **5**

Unit 26

Techniques of Obturation **17**

Unit 27

Problem Solving in Obturation **35**

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BLOCK INTRODUCTION

Is obturation difficult and does one really need to know more about what we know? This may be the response of a seasoned practitioner of general dentistry. Obturation must be kept very high on the list of root canal treatment steps.

Obturations should be undertaken with total focus on to the tooth amidst total isolation, assistants on high alert, instruments well spread on the table and no phone calls at that time please... A radiograph with an obturated tooth questions your inner self, as to, have you done a good job? and it's you, who have to answer to yourself.

The first unit of this block, **basics of obturation** tells us about the need to obturate, when to obturate and obviously, to obturate with what. Understand the difference between condensation and obturation.

Techniques of obturation is covered in the next unit it is all about the various prevalent techniques available and the newer concepts pouring in for achieving a dense, hermetically sealed canal. The way we have harnessed the properties of gutta-percha in developing thermo plasticized gutta percha techniques is worth appreciating. Warm vertical condensation may become the choice of technique in the time to come.

It is true that if you have no problems, either you are not doing it enough or you are lying. **Problem solving** unit gives us a glimpse of the common problems you come across during the obturation procedure. These are just the few, one may have one's own list of problems encountered. However, the problems are normally common, only they may be worded differently. Go through the unit well. Do innovate your own solution and remain creative in problem solving....

.....you are the Future.

Structure

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25.0 OBJECTIVES

After reading this unit, you should be able to:

- describe the need for obturation;
- explain the need to obturate the canal;
- identify the right time to obturate the canal;
- enumerate the advantages and disadvantages of “obturation on the same day”;
- list the requirements of ideal root canal sealer; and
- identify the requirements for an ideal root canal filling material.

25.1 INTRODUCTION

So, it was a long journey through the tooth from previous units and you have now come to a stage when you want to give the final touches to your root canal. Believe me this is a heavenly touch which is the report card for all you have done in the previous days in the canal. You can't score high marks in the present test (Obturation), unless you have done well in the last test (bio-mechanical preparation). How well the obturation has been done, tells about how well have you done the complete procedure. A good obturation is also important as that the longevity of your treatment depends very much on how well you have obturated the canal and restored the tooth.

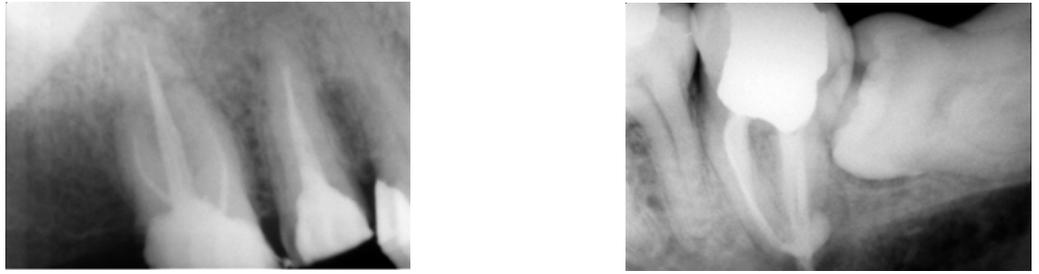


Fig. 25.1: Better the obturation, better the prognosis

So, it becomes very important for you to understand this topic nicely and replicate it in the patients in the clinic.

In the present unit you will learn about why and when to obturate. The different requirements of the sealers and the filling materials will also be explained.

After reading this unit you should be able to select the right sealer, filling material and be able to decide the right time of obturation.

25.2 THE NEED TO OBTURATE

At the time of patient's appointment for obturation, many times it comes in our mind during the treatment that, well all is well now, patient is asymptomatic and using his teeth to eat. Why to further try to do some thing in the tooth, which can give him pain during the procedure or after wards. Why not let it be like this and just “wait and watch”? This just “wait and watch” is a dangerous line in endodontics. This line is used when

- 1) The operator is fixed and doesn't know what to do next.
- 2) The operator is too busy to do some thing else or
- 3) The operator is tired of treating a mischievous tooth not getting “ok hundred percent”

Many failures may result with this wait and watch attitude.

So let us keep this attitude at the back and start understanding the real thing. Now let's be serious about the objectives.

Yes, you don't need to do a filling, provided the canals and the internal area of the tooth remains clean and microbe free.

In gum treatments, once you have made the area clean and healthy, you recommend regular plaque control, irrigation and perhaps root planning as maintenance. Similarly in the root canal treatment once the canal system has been prepared, it has to be maintained like that. Repeated entry for maintaining the environment in the canal is not possible since root canal treated tooth needs to be restored with a crown. It is therefore difficult to imagine, practically, how a clean canal system can be preserved without filling it.

Researches also indicate that nearly 60% of endodontic failures are apparently caused by incomplete obturation of canal space.

The prognosis will be poor unless a dense well adapted root canal filling is achieved, regardless of all you have done in the canal. To achieve this well adapted filling, there are various techniques and various things to fill the canal with, which we will follow-up later as we move on.

The dense well adapted filling does 3 things as described below:

- 1) **Prevents micro leakage of periapical exudates into the root canal space:**
The fluid percolates into the unfilled canal space and stagnates. The stagnated fluid break downs and diffuses into the periapical area. The exotoxins, irritants released by breakdown of fluid causes periapical inflammation.
- 2) **Prevents reinfection:** Thorough sealing of the root canal till the apical foramen prevents micro-organisms and exotoxins to reinfect the periapical area.

The idea of root canal treatment is to create an environment in the periapical area so that favourable process of tissue healing can take place.

- 3) **Imprisons, deny nutrients and space** to multiply for any organisms left after bio mechanical preparation.



Fig. 25.2: Dense well adapted root canal filling

The coronal restoration is also as important as the root filling in achieving these goals, neither will deliver alone.

Check Your Progress 1

- 1) Why do we need to obturate the canals?

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- 2) What is the function of a well adapted root canal filling?

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25.3 WHEN TO OBTURATE THE CANAL

Regardless of the material and the technique used, certain parameters should be met before the canal is considered ready for filling.

There are various schools of thoughts illustrating these parameters. These thoughts come from the clinical experiences of various practitioners and research of

scientists. We always believe that endodontics moves with the clinical symptoms and signs. Listen to the tooth and it tells you what to do. To listen to tooth you need to know its language. It speaks in various languages. These languages when interpreted by your knowledge and your experience becomes the parameter. The important parameters are:

1) **The Tooth is Asymptomatic.** (The tooth is tamed)

This happens to be the first and the most logical and simple requirement for obturation. The tooth is lightly tapped with the butt end of a mouth mirror and by digital manipulation of the buccal and lingual plates of the bone surrounding the tooth. There should be no sensitivity or pain/tenderness during percussion or palpation. The presence of sensitivity indicates inflammation in the periodontal membrane space. If the canal is filled before the inflammation has subsided, the additive inflammation of filling, packing the canal, will cause extremely painful episode. Unless tissue resistance is strong enough to overcome this considerable increase of inflammatory potential, an area of periapical inflammation will result or a previously existing lesion will recur.

2) **The Canal is Dry** (The tooth is not crying)

It is important to check with the paper points that the canal to be obturated is free of all the exudates and is dry. This is done for two reasons

- a) Exudates from the canal is indicative of some infection. You will many times come across cases of weeping canals. Calcium hydroxide preparation helps to dry the canal. (Fig.25.3)
- b) Canal needs to be dry at the time of obturation for the adaptation of the filling material to the canal walls.



25.3: (a) Weeping canal; clinically lot of exudate was found after first visit.



(b) Calcium hydroxide was placed into the canal and pushed beyond the apical foramen.



(c) Two months follow-up: resorption of the extra material in the periapical area.

3) **Presence of Sinus**

It is controversial as to whether to do obturation in the presence of sinus or not. First find out the amount of bone loss and stability of tooth. Prepare the canal and ask for a follow-up after 2-3 days. If you find that the sinus shows signs of healing, canals are dry and tooth asymptomatic— you may obturate without waiting for the sinus to heal completely. Follow-up the patient to check the progress.

The presence of sinus is not a contraindication for filling. You may rather consider it as advantageous, as post-operative pain rarely occurs when ever the canals are filled with periapical sinus present.

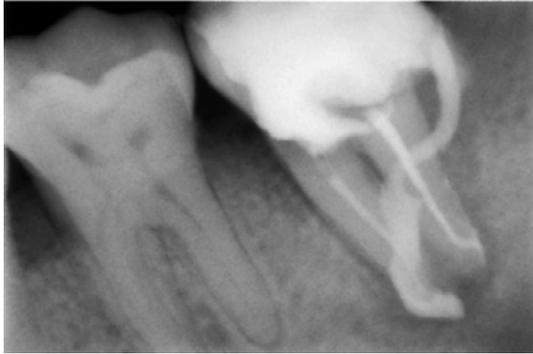


Fig. 25.4: Extension root of the sinus seen. (Vitapex extruding out of sinus and the distal pocket)

4) **Foul Odour** (The Canal smell ill)

Many years ago in my days of graduation my teacher used to tell two methods.

- 1) I was told to smell the paper point, used as a root canal dressing, and check for any foul odour.
- 2) The paper point was then dipped in hydrogen peroxide to check for any effervescence.

The logic was that, if there was a foul odour then canal was infected. The effervescence was an indication of the exudates.

Researches later reported a poor correlation between canal odour and culture results. Positive cultures were found in canals free of odour. In addition, a foul odour has been associated with anaerobic growth, which is difficult to verify without routine culturing technique. You should not consider absence of canal odour alone as any indication for filling. It must be correlated with other clinical findings.

5) **Negative Culture Test**

This has been a dominating criterion for many years. It has been statistically found that there will be an average of 11% more success in healing when teeth are filled with negative culture. The probability of post-filling discomfort is more when the root filling is done into infected canals.

6) **Temporary Filling is Intact**

A breach or a washed off temporary filling is an indication of seepage of saliva in the canal. This may be presumed as a case of infected canal. You should always fill the temporary filling as if, you are filling it permanently. I have seen that temporary filling is always done with a very heavy heart. It is always considered to be temporary but is intended to work as permanently. The temporary filling should hermetically seal to prevent leakage of the canals and be strong enough to withstand the masticatory forces.

- 7) **When you have enough time to achieve quality seal.**(hungry, hurry, haphazard) It is a fact that you cannot do a good obturation if you are hungry, in a hurry or haphazardly organized.

Check Your Progress 2

Enumerate the various parameters required for obturation.

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25.4 SAME VISIT OBTURATION

Until recently the most accepted technique of doing endodontic treatment stresses multiple visit procedures. Most schools also concentrated upon teaching the multi-visit concept. However, it has now been reported that the procedure of single visit treatment is advocated by at least 70% of schools in all geographical areas.

Some of the problems of root canal treatment are post-obturation pain, inter-appointment pain and swelling. Although these in most cases do not last long, but could be a source of embarrassment to the dentist and annoying for the patient, more so if the tooth was symptomless before the commencement of treatment.

Literature review revealed varied opinions on the incidence and severity of post-obturation pain. Some authors reported slightly more post-obturation pain following single visit than with multiple visit procedures. Others found no significant differences in the post-obturation pain experienced by patients following single or multiple visit treatment procedures. Some authors however, proposed a correlation between pretreatment pain and post-obturation discomfort. The rate of endodontic flare-ups was reported to be more following multiple visits than for the single visit.

Some studies have reported a positive correlation between flare-ups and multiple appointments, peri-radicular pain prior to treatment and presence of radiolucent lesions. Others reported no correlation between post-obturation flare-ups and the status of the pulp. However, few reported a significantly higher incidence of flare-ups in necrotic teeth than in vital teeth. One study showed that female patients had more post-operative pain than did males. Factors of age, bacteriologic status, tooth position and type of filling material showed no clear effect upon post-operative results.

Three contradictions exist in completing a root canal treatment in one appointment:

- A) Inability to dry the canals completely.
- B) Insufficient time to complete the procedure.
- C) Increased psychological stress on patients or clinicians because of longer appointment time, or both.

Now the question is what should you do?

What is the hurry? It is best to start with a multiple visit endodontic treatment. It takes many cases for you to develop your confidence in root canal treatment. 2-3 cases of post obturation tenderness in 2-3 days of time can very well shake your confidence and patient's moral to under go the treatment or to recommend to any one else.

Further details about simple sitting root canal treatment is discussed in unit 40, Single visit endodontics.

If you can follow the complete protocol of root canal treatment including use of rubber dam, use of apex locator, engine driven rotatory with autoclaved files and spend good amount of time in bio-mechanical preparation and obturation, you may think of a single sitting root canal treatment.

Check Your Progress 3

What are the contraindications for a single visit root canal treatment?

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25.5 REQUIREMENT OF AN IDEAL ROOT CANAL CEMENT SEALER

So, now you have come to the stage that you will learn about the sealers. In the previous unit you learnt about the various types of sealers used in obturation of the canal. They are many but surprisingly little is known about the relative clinical performance of root canal sealers and most of the time we select the sealer because of following reasons:

- a) **Riwaaz:** You are using a sealer because it was used by your teacher at school, or you were told to use it at your school.

In one of the banquets of the conference you were told by someone to use a particular sealer or that you might have overheard that some one had lot of problem with one type of sealer or the trend now a days is to use this type of sealer.

- b) **Dental Dealer:** Your dealer told you to use a particular brand telling you that this is the best, cheap, effective etc. Have you ever thought as to why you are using a particular sealer? When was the last time you picked-up the literature of the sealer and read to see its – composition/ingredients?

Well let us try to understand the factors to be considered when selecting a sealer.

1) **Workability**

You know that it is very important that the canal should have more of solid core material rather than the cement. The idea of the cement is like, if you have seen the construction of house. In that, the mason prepares the beam of the building. He puts in lot of iron rods (Sariya) and then fills the cement in the gaps. Similarly in obturation of the canal, you fill it up with a solid core and the space in between the core is filled up with cement. Sealer acts as a gasket and provides the seal. During compaction it flows to fill irregularities. Lubricate the glide path of gutta percha into the canal. It actively suppress microbial growth and promote hard tissue repair at the root end. As a clinician what is important to you is that you should be able to coat the walls of the canal nicely.

It is important that when you mix the sealer, it should develop a consistency which can be loaded on to the lentilspiral easily, carried to the canal and when the lentilo rotates, it should sprinkle the cement onto the walls uniformly.

Many times you will notice that:

- a) Cement is too thin. Try to get the consistency by adding more powder, mixing the particles well. It should be the consistency of the toothpaste or your favourite facial cream.
- b) The cement is too thick. If it becomes thick, it bends the lentilo as soon as you try to pick it up the cement becomes like a dry toothpaste. Add more liquid and spatulate.

I personally believe that we hardly follow the manufacturer's direction regarding dispensing of the powder and liquid. It is important to follow the direction of mixing the cement, as so whether to incrementally add powder with liquid or other wise etc., but when it comes to number of spoons of powder or the number of drops of liquid for a canal, we are more conservative. So it is important for you to get the feel of the consistency required for that. It is also important to know why you need that consistency.

- c) The cement mix is too sticky. Some cements becomes-so sticky that it adheres to the slab, spatula, etc. If it touches to the skin it becomes difficult to remove it. Just avoid such cements.

2) Working time/Setting time

The cement should have an ample setting time. I think the working time or the manipulation time of the cement should be enough for you to be able to mix, carry the cement into the canals. It should give enough time for adequate gutta percha compaction, even in the presence of heat and humidity. Some cements set very fast and it becomes impossible to work with them. Though DYCAL is not an obturation cement but to just give you an example, it is a fast setting cement and doesn't give any chance of proper manipulation.

3) Adhesiveness to Canal Walls

The cement should have a good adhesion to the walls and help produce a hermetic seal. This is a very important technical property of cement. It is mainly because of these two properties, the cement is used for.

4) Immune Response

The cement should not provoke immune response in the periapical tissues. You should be very careful about this property of the sealer. Many times, if the sealer extrudes in the periapical area, it initially causes acute apical periodontitis followed by swelling in the periapex area. The tooth becomes very tender and the patient needs to take few analgesics in a day. The condition may persist for several days. Many times the filling needs to be removed to give relief from pain.



Fig. 25.5: Endofloss extruded in the periapical area causing an acute inflammatory response

5) **Solubility to Tissue Fluid (Fig. 25.6)**

Many types of cement are soluble in tissue fluid and post obturation recall radiograph shows poor radio opacity.



Fig. 25.6: Zinc oxide eugenol is very soluble cement.left -at the time of obturation. Right – Follow up X-Ray after 12 months

6) **Retrieval**

The cement should be **retrievable** or soluble in solvents, since sometimes removal becomes necessary. Obtainate the canal keeping in mind that one day it may need to be repeated. It is better to be in a situation when you can repeat the treatment than to extract the tooth.

The sealer used should be either soluble in commonly available solvents (Obviously not water) or should be such that it can be easily removed mechanically.

7) **Radioopaque**

The sealer should be **radio opaque** so that you may come to know the extent of its flow and give a good impression of the filling.

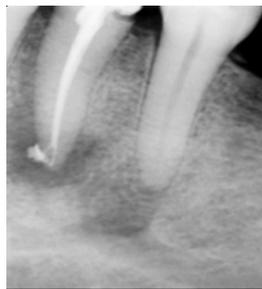


Fig. 25.7: Radiopacity and flow into lateral canals

8) **Bacteriostatic: The sealer should be bacteriostatic**

There are many other minor ones, which can be read from any standard text.

Check Your Progress 4

What are the qualities of sealer you should look at?

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25.6 REQUIREMENTS FOR AN IDEAL ROOT CANAL FILLING MATERIAL

For years various root canal filling materials have been used. The gold standard properties are the one, still named by Grossman years back.

25.6.1 Properties

The properties of an ideal root canal filling material is as follows:

- 1) Provide for easy manipulation with ample working time.
- 2) Be able to seal the canal laterally and apically conforming and adapting to the various shapes and contours of the individual canal.
- 3) Have dimensional stability; not shrink or change form after being inserted.
- 4) Not irritate periapical tissues.
- 5) Be unaffected by tissue fluids and insoluble in tissue fluids, not corrode or oxidize.
- 6) Be radiopaque, easily discernible on radiographs.
- 7) Not discolor the tooth structure.
- 8) Be easily removed from the canal if necessary.
- 9) Be sterile or can be quickly sterilized immediately before insertion.
- 10) Be bacteriostatic; at least not encourage bacterial growth.

You have already come to know the various root canal filling materials in the previous units. Silver points, pastes, gutta percha are the most commonly used.

Pastes and silver points fall short of ideal properties of root canal filling material.

25.6.2 Silver Points

Silver points fall short of ideal filling material for the following reasons:

- 1) Requires an absolutely circular canal preparation.
- 2) Corrode when in contact with either oral fluids or periradicular tissue fluids. The corrosive product is highly cytotoxic.
- 3) Often binds in one or two places on the root canal wall, giving a false sense of fit.
- 4) Cannot obturate the canal system three dimensionally.

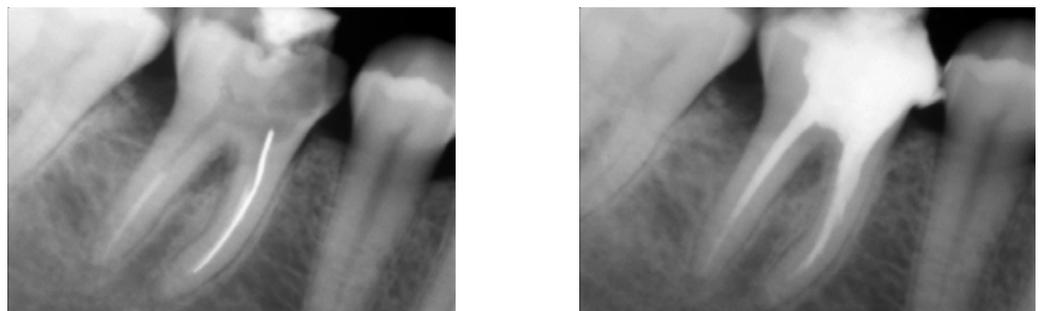


Fig. 25.8: Silver points poorly placed in the canals, retreatment done and filling with gutta percha

25.6.3 Pastes

Pastes fall short of ideal filling material for the following reasons:

- 1) The apical extrusion of paste is always possible as no apical stop is present.
- 2) Toxicity results from components of some pastes that either leaches out of paste or in contact with periradicular tissues.
- 3) Because of porosities in paste fills, most pastes will resorb in time, resulting in apical leakage, and strong possibility of endodontic failure.
- 4) Chemical components of the paste have been shown to be antigenic, causing immunological responses.

25.6.4 Gutta Percha

Gutta percha provides the bulk of root filling and is presently considered the root canal obturating material of choice, it is:

- Inexpensive, versatile and easy to handle.
- Adequately bio-compatible.
- Capable of adaptation with pressure, solvents and heat.
- Non supportive of microbial growth.
- It is simple to remove for re treatment and post space.

Check Your Progress 5

1) What are the requirements of root canal filling material?

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2) Why will you prefer gutta percha as a root canal filling material?

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25.7 LET US SUM UP

Obturation is an important aspect of root canal treatment. The basics of obturation were described here. The need to obturate the canal is to keep the root canal system free of the activities of microbial organisms and to maintain the environment at the periapex, healthy. There are various types of sealers available. The choice of the sealer should be made on the merits and convenience of manipulation and loading in the canal system. Gutta percha is the root canal filling material of choice. Silver cones and pastes are not too often recommended for obturation.

25.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) It is important to obturate the canal so as to keep the canal complex clean, free of the seepage of saliva and bacteria.
- 2) A well adapted filling prevents micro leakage of periapical exudates into the root canal space. It prevents reinfection, it also denies nutrients and for the bacteria to grow and so to keep the root canal complex sterile.

Check Your Progress 2

- 1) The tooth is asymptomatic, has no pain on percussion and palpation. The canal is dry with no exudates and foul smell from the root canal dressing. The temporary filling was intact and you have enough time and instruments to do the obturation.

Check Your Progress 3

- 1) The contraindications for the same visit obturation are:
 - i) Inability to dry the canals completely.
 - ii) Insufficient time to complete the procedure.
 - iii) Increased psychological stress on patients or clinicians because of longer appointment time, or both.

Check Your Progress 4

- 1) A good root canal sealer should have good workability. It should have an optimum working time and setting time. It should instigate no immune response at the apex and be retrievable as well as not soluble in the oral fluids.

Check Your Progress 5

- 1) A good filling material should be, easy to manipulate with ample working time, it should be able to seal the canal laterally and apically, conforming and adapting to the various shapes and contours of the individual canal. It should not irritate periapical tissues and be unaffected by tissue fluids, and insoluble in tissue fluids, not corrode or oxidize it should be radiopaque, easily discernible on radiographs and be bacteriostatic; at least not encourage bacterial growth.
- 2) Gutta percha is an inexpensive, versatile filling material which is easy to handle. It is adequately bio-compatible, capable of adaptation with pressure, solvents and heat. It is non-supportive of microbial growth and is simple to remove for re treatment and post space.



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