

## **Isolation in Endodontics**

The goal of conventional root canal treatment is to properly clean, shape and obturate the root canal system. One of the main challenges during endodontic treatment is the elimination of bacteria from within the root canal system. This is accomplished by repetitive irrigation of the canal and enlargement of the main canals so that irrigant solution can reach all aspects of the root canal system. The oral cavity contains literally hundreds of different strains of bacteria which can infect and populate the root canal system. Furthermore, the endodontic specialty is full of small instruments and devices which can be easily aspirated or swallowed. These are the two main reasons why isolation in endodontics is ***mandatory***. When considering the importance of isolation during endodontics the following statement applies:

**“Endodontic procedures can not be expressed properly unless the moisture in the mouth is properly controlled”**

1. The goals of isolation:
  - a. Moisture control: Moisture control involves the limitation of moisture from contaminating the operatory field. (i.e. Moisture contamination during obturation which could negatively effect the sealer strength)
  - b. Retraction: Retraction of the lips, cheek and tongue as well as displacement of the gingival tissues surrounding the isolated teeth.
  - c. Harm prevention: Prevention of harm to the patient in the form of proper soft tissue retraction, prevention of toxic materials from spilling into the oral cavity (i.e. NaOCL) as well as the prevention of accidental aspiration or ingestion of sharp instruments (i.e. endodontic files)
  
2. What needs to be controlled during endodontic treatment?
  - a. Saliva
  - b. Tongue
  - c. Mandible
  - d. Lips & cheek
  - e. Gingival tissue
  - f. Buccal & lingual vestibule
  - g. Floor of the mouth
  - h. Adjacent teeth and restoration
  - i. Respiratory moisture

### 3. Advantages of isolation during endodontic treatment

#### a. Patient related advantages:

- i. It can provide comfort to the patient during endodontic treatment because the patient feels safe, protected and isolated from the procedures being undertaken.
- ii. Protect patients from swallowing or aspirating foreign bodies like endodontic instruments and materials.
- iii. Protect patients soft tissues by retracting them as well as from caustic materials used during endodontic procedures

#### b. Operator related advantages:

- i. A dry clean field
- ii. Infection control by reducing the amount of spatter and spray.
- iii. Increased accessibility to the operatory field by offering maximum retraction of soft tissues. This allows for comfort during the endodontic procedures as well as less dependency of auxiliary retraction and isolation.
- iv. Improved properties of materials being used due to elimination of the possibility of moisture contamination during the endodontic procedures.
- v. Improved visibility & less fogging of mirror due to elimination of respiratory moisture and maximum soft tissue retraction allowing for more light and less shadow in the operatory field.
- vi. Prevents contamination of root canal system with oral bacteria.

### 4. Methods used to obtain isolation:

#### a. Moisture isolation can be accomplished directly or indirectly:

##### i. Direct Methods:

- (1) Rubber dam
- (2) Cotton rolls & gauze
- (3) Absorbent cellulose wafers
- (4) Suction devices
- (5) Gingival retraction cord

ii. Indirect Methods:

- (1) Comfortable patient position & relaxed surroundings which will result in reduced salivation and patient agitation
- (2) Local anesthesia which will reduce pain and concomitantly affect the amount of salivation and patient agitation.
- (3) Drugs like atropin and barbiturates to reduce patient salivation and agitation.

b. Soft tissue isolation of the lips cheek and tongue and the gingiva:

i. Retraction of the lips, cheek and tongue

- (1) Rubber dam
- (2) Cotton rolls
- (3) Tongue guards
- (4) Throat Shield
- (5) Tongue depressor
- (6) Cheek and lip retractors (figure 1)
- (7) Mouth mirrors
- (8) Mouth props (figure 1)



Figure 1: A picture of a lip and cheek retractor (Left) and a mouth prop (Right)

## ii. Retraction of the gingiva

### (1) Physico-mechanical means:

1. Rubber dam
2. Retraction cord
3. Teflon tape

(2) Chemical means: Using astringent materials to shrink gingiva and reduce vascularity, i.e. Alum

### (3) Electrochemical means:

1. Electrocautery
2. Laser

### (4) Surgical means

## 5. What is a rubber dam?

It is a flat thin sheet of latex/non-latex that is held by a clamp and a frame, that is preferred to allow the tooth to teeth to protrude through the perforations, while all other teeth are covered. It was first introduced in 1864, S.C. Barnum, a New York city.

## 6. Advantages of the rubber dam:

- a. Acts as a raincoat for the tooth (Niqab)
- b. Long term moisture control
- c. Maximum accessibility and visibility
- d. Clean dry field
- e. Protects lips, cheek, and tongue
- f. Prevents accidental aspiration of foreign bodies
- g. Improves the performance of materials being used

## 7. Disadvantages of the rubber dam:

- a. Takes time to be applied, this is not true once a dentist is trained on rubber dam application it takes less than one minute to apply it properly.
- b. Communication with the patient is impaired

- c. Insecure clamps maybe swallowed, precautions should should be taken to prevent this from happening. By trying a piece of floss to the bow of the clamp during the procedures.

8. Possible contraindications of rubber dam isolation:

- a. Asthmatic patients
- b. Latex allergy, non-latex rubber dam maybe used as a substitute.
- c. Severely malposed and tilted teeth i.e wisdom teeth

9. Components of the rubber dam (Armamentarium): (Figure 2)

- a. Rubber dam sheet
- b. Rubber dam clamps
- c. Rubber dam forceps
- d. Rubber dam frame
- e. Rubber dam punch
- f. Rubber dam template
- g. Scissors

Accessories

- h. Lubricant
  - i. Dental floss
  - j. Rubber dam napkin
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a. Rubber dam sheet:

- i. Material of make: Latex or Non-Latex sheets
- ii. Form: Available in sheets or rolls
- iii. Sizes: 5"x5" or 6"x6"
- iv. Thickness: Light, Medium, Heavy, Extra Heavy
- v. Color: Comes in different colors i.e. Green, Blue, purple etc..

b. Rubber dam clamps:

i. Functions:

- (1)Secures the dam to the teeth
- (2)Retract the gingiva



Figure 2: A picture showing the Components of the rubber dam

ii. Types:

- (1)Winged clamps
- (2)Wingless clamps

iii. Parts of the clamp: (Figure 3)

- (1)Central wing: Present on winged clamps. The rubber dam is attached to it prior to application of the clamp to the tooth.
- (2)Jaws:
- (3)Beaks
- (4)Anterior wing: Present on winged clamps. Gives more retraction.
- (5)Perforation or Hole

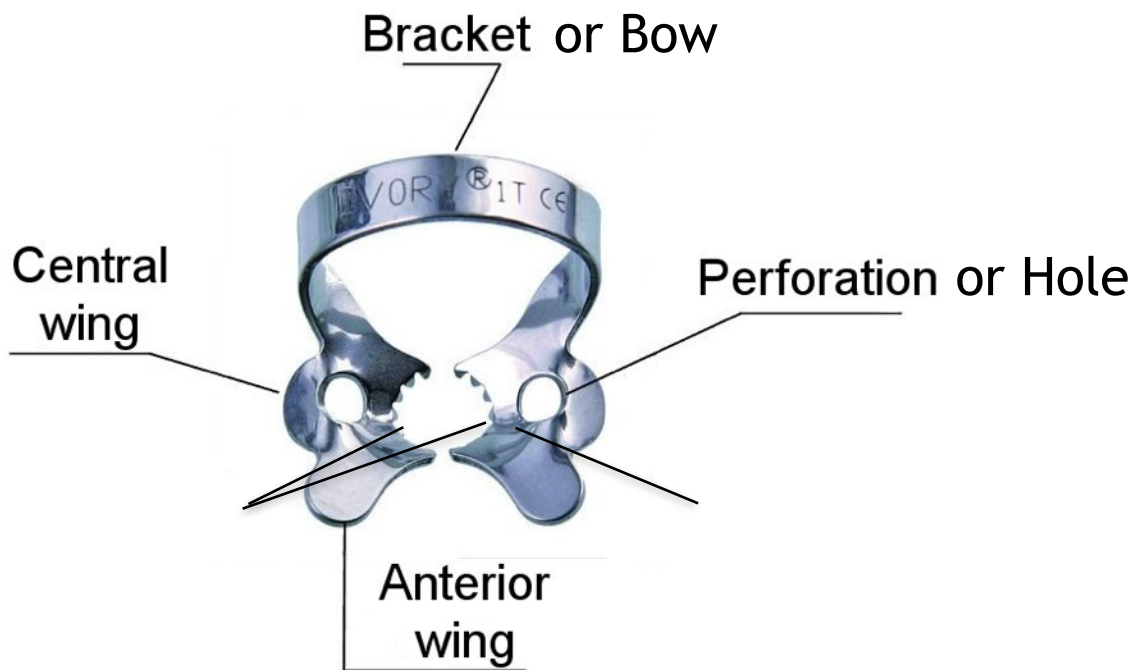


Figure 3: A picture showing the Components of the rubber dam

c. Rubber dam frame:

i. Functions:

- (a) Maintains the border of the dam in position
- (b) Supports the edges of the rubber dam
- (c) Retracts the soft tissues

ii. Types:

- (a) Plastic
- (b) Metal

d. Rubber dam forceps: Used to place and remove the clamp on the tooth to be isolated.

e. Rubber dam Punch: (Figure 4)

i. Functions: Makes holes in the sheet through which the teeth can be isolated.

ii. Parts:

- (a) Rotating disc with different sized holes

(b) Sharp pointed plunger



Figure 4: A picture showing the Components of the rubber dam

- f. Rubber dam template or stamp: Marks the correct position of the tooth to be isolated on the rubber dam. The holes should be punched in the proper position to allow for proper placement of the rubber dam.
- g. Dental floss: It is used to pass the rubber dam sheet through tight contacts.
- h. Rubber dam napkin: Absorbent material placed between the rubber dam sheet and the patients face to prevent irritation.
- i. Lubricant: It is applied to the holes in the rubber dam to facilitate the passage of the dam 'septa' in between the teeth.

10. Application of the rubber dam:

- a. Testing and lubricating the proximal contacts to ensure all contacts are accessible clear for rubber dam placement.
- b. Punching the holes in the rubber dam sheet using the rubber dam punch.
- c. Lubricating the dam sheet around the hole.
- d. Selecting the retainer (clamp), choosing the correctly sized and shaped clamps according to the teeth to be isolated.
- e. Testing the retainers (clamps) stability and retention
- f. Positioning the dame over the retainer



- g. Applying the rubber dam napkin under the rubber dam sheet before stretching the sheet on to the rubber dam frame.
- h. Attaching the frame
- i. Applying the anterior anchor (Optional)
- j. Invert the dam interproximally to ensure an effective seal in the interproximal areas.
- k. Inverting the dam faciolingually to ensure an effective seal on the labial and lingual surfaces.
- l. Check for access and visibility

#### 11. Application of the rubber dam:

- a. Cutting the septa
- b. Remove the clamps
- c. Remove the dam
- d. Wipe the lips clean
- e. Massage the tissue around the isolated tooth
- f. Examine the rubber dam