Final impression

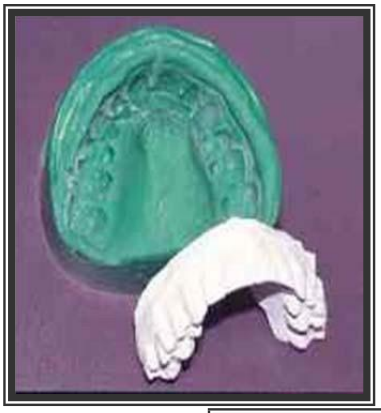
To take a final impression, we need a special tray (custom tray), impression syringe, and an impression material.

The special tray is constructed on the study cast.

The impression syringe.

Advantages of the study cast

1. It is useful for the diagnosis and treatment planning.
2. It is used for the construction of a provisional restoration.
3. It is used for the construction of a special tray.



The study cast after its removal from the impression and its trimming,

Advantages of the special tray

1. It allows the use of the impression material in minimum thickness, so it reduces its dimensional changes.
2. It reduces the discomfort of the patient because it is well-fitted to the patient's mouth.
3. Its small size prevents the forcible opening of the mouth.
4. It allows free snap removal of the impression from the patient's mouth without applying rotary movement.

Materials used to construct the special tray

1. Auto-polymerizing acrylic resin (mostly used).
2. Shellac base plate.
3. Vacuum thermoplastic material.

Requirements of the special tray

1. It should be rigid enough to resist breakage; therefore, it should have a thickness of 2-3 mm.
2. It should extend about 5 mm cervical to the gingival margin.
3. It should be stable on the cast with stoppers.
4. It should be constructed at least 9 hours prior to its use.

To construct a special tray, we need:
1. Study cast.
2. Pink base plate wax.
3. Self-cured acrylic resin.

Construction of the special tray

1. With a pencil, we draw a line on the study cast around the dental arch about 5 mm cervical to the gingival margin. This line represents the finishing line of our special tray.
2. We adapt two layers of base plate wax on the study cast. Then we remove the wax from the periphery until we see the line that we have drawn (cut back).
3. After that, we create two perforations in the occlusal surface of the wax (2 posterior and 1 anterior) to obtain stoppers for our special tray. The stoppers are created in the area of non-functional cusps. The stoppers serve the following advantages:

-They help to equalize the pressure that is going to be applied on the tray.
-They help to localize the tray in the patient's mouth during impression taking.
-They maintain even space for the impression material.
-They prevent sinking down of the impression tray.

4. A layer of tin foil is adapted on the two layers of the wax.
5. Auto-polymerizing acrylic resin is mixed according to the manufacturer's instruction. When it reaches the dough stage, it is adapted on the wax that has been covered with the tin foil. The excess acrylic resin beyond the line previously drawn is removed. The excess acrylic resin removed can be used to construct a handle for the special tray.

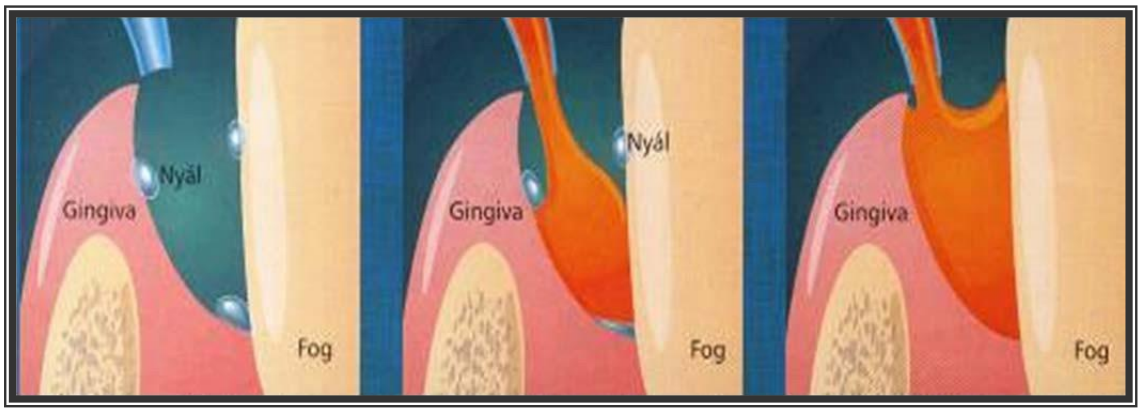
After complete polymerization of the acrylic resin, the tray is removed from the cast. Removal is facilitated by the presence of the tinfoil which will prevent the acrylic resin from sticking to the wax. Then the margins of the special tray can be finished, smoothed, and polished.

Gingival retraction

In cases when the finishing line is located below the level of the gum (subgingivally) or with the level of the gum, we need to do gingival retraction, which is a procedure by which the finishing line is temporarily exposed by enlarging the gingival sulcus so that we can take a good impression which involves the details of the end margin of the preparation that is located subgingivally.

Objectives of gingival retraction

1. To create an access for the impression material to the area of the preparation that is located subgingivally.
2. To provide enough thickness of the impression material at the area of the finishing line to prevent tearing and distortion of the impression material.
3. To control the amount of fluid in the gingival sulcus (crevicular fluid) that will cause voids in the impression.



The objectives of gingival retraction: (1) to create an access, and (2) to provide enough thickness for the impression material at the area of the preparation that is located subgingivally.

Techniques of gingival retraction

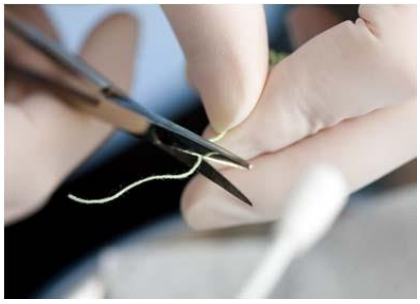
1. Mechanical.
2. Chemo-mechanical.
3. Gingival retraction paste (cordless technique).
4. Electrosurgical.
5. Laser.

1. Mechanical:

In this technique, we apply pressure on the gingival to open the gingival sulcus. It might be done by either of the followings:

-Construction of a temporary crown with a slightly long margin leaving it in place for 24 hours, or

-Using a plane retraction cord (free of any medicament) which is the most common. The retraction cord is a special cord made of cotton which comes either plane (free of medicament), or is pre-impregnated with a medicament (usually a vasoconstrictor). Using a plane retraction cord is considered as a mechanical means only.



2. Chemo-mechanical:

In this technique, we use a retraction cord that is pre-impegnated with a medicament, usually a vasoconstrictor (adrenaline, aluminum chloride, or ferric sulfate). By packing this cord with a plastic instrument (Ash No.6 or Ash No.49) in the gingival sulcus between the gingival tissue and the prepared tooth, the cord will mechanically push the gingiva away from the finishing line, and the combination of the chemical action of the medicament and the pressure exerted by the cord will cause a transient

gingival ischemia. This will lead to shrinkage of the gingival tissue and control the fluid seepage from the gingival sulcus.

The retraction cord is left inside the gingival sulcus all around the tooth for 10 minutes. The working area should be kept dry during this period. Then the cord can be removed leaving the gingival tissue in an expanding state. This will provide a space to inject the impression material all around the tooth at the area of the finishing line by the use of an impression syringe.

The retraction cords in place inside the gingival sulci of the prepared teeth.

3. Gingival retraction paste (Cordless technique):

In most cases, gingival retraction cord is the most effective method for retracting tissue to the depth of the sulcus. Unfortunately, gingival retraction cord may injure the gingival sulcular epithelium and the gingival bleeding is difficult to control when packing a cord into the sulcus making impression difficult or impossible. Using a retraction cord requires proper tissue manipulation and is technique sensitive. For this reason a new class of gingival retraction materials has been introduced in the form of retraction paste like Expasyl (Aluminum chloride 15%) and Magic Foam Cord (Polyvinylsiloxane, addition type silicone elastomer).

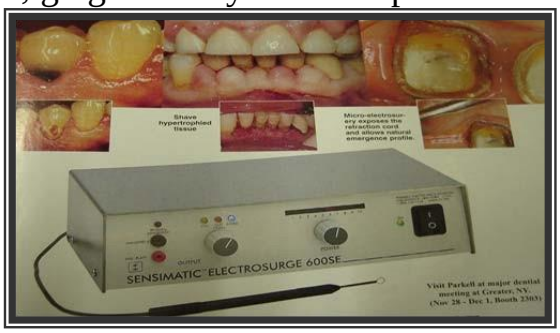
The advantage of cordless retraction technique is providing a non-traumatic, non-invasive tissue management and excellent hemostasis in the gingival sulcus for fixed prosthodontic impressions.

The Expasyl gingival retraction paste injected in place inside the gingival sulcus of the prepared tooth.

Magic Foam Cord gingival retraction paste injected in place inside the gingival sulcus of the prepared tooth.

4. Electro-surgical:

In this technique, an electro-surgical unit could be used to remove the gingival tissue from the area of the finishing line with the advantage of controlling the post-surgical hemorrhage. However, electrosurgery is contraindicated when there is gingival inflammation or periodontal disease. In this case, gingivectomy could be performed.



The electrosurgical unit.

5. Laser : For gingival retraction, Nd- YAG lasers are used.

Advantages of laser:

1. Certain laser dentistry procedures do not require anesthesia.
2. Laser procedures minimize bleeding because the high-energy light beam aids in the clotting (coagulation) of exposed blood vessels, thus inhibiting blood loss.
3. Bacterial infections are minimized because the high-energy beam sterilizes the area being worked on.
4. Damage to surrounding tissue is minimized.
5. Wounds heal faster and tissues can be regenerated.

Disadvantages:

1. Slow technique.
2. Expensive.

The Nd-YAG laser unit used in dentistry.

Gingival retraction obtained by laser.

Impression Techniques

1. Single mix technique (monophase technique).
2. Double mix technique.
3. Putty-wash technique.

1. Single mix technique

Most of the time, this technique is used when we have an impression material with single viscosity (such as the medium body consistency of polyether or addition silicone impression materials). This is because both materials are pseudoplastic materials and have the capacity for shear thinning. Pseudoplastic materials demonstrate a decreased viscosity when subjected to high shear rates such as occurs during mixing and syringing. When the medium viscosity material is forced through an impression syringe, the viscosity is reduced, whereas the viscosity of the same material residing in the tray is unaffected. In this manner, such materials can be used for syringing and for trays.

In this technique, after mixing the material, part of the material is loaded in the tray and the remaining part is loaded in the impression syringe. i.e., the same mix of the material is used to load the tray and the syringe. The impression material is injected from the impression syringe around the preparation area starting with the most critical parts such asthe finishing line, then the prepared teeth and the other teeth in the dental

arch. Then the special tray loaded with the impression material is inserted inside the patient's mouth and seated over the whole dental arch. After complete setting of the material, the impression tray is removed from the patient's mouth.

2. Double mix technique

This technique is usually used with materials that have two viscosities (heavy and light bodies). We mix the heavy body and the light body at the same time. The light body is loaded in the syringe, while the heavy body is loaded in the tray. We start to inject the light body on the dental arch starting with the prepared tooth, and then the tray loaded with the heavy body is inserted inside the patient's mouth and seated over the dental arch. The pressure created by the heavy body after seating of the tray will cause a direct flow of the light body into the details of the preparation including the finishing line.

3. Putty-wash technique

This technique requires the use of a high viscosity material. We take an impression with the heavy body either before or after tooth preparation:

-*Before preparation:* we take a preoperative impression with the heavy body only prior to tooth preparation, and after complete setting of the heavy body we remove the impression tray from the patient's mouth and leave it aside. Then we do tooth preparation. After completion of tooth preparation, we mix the light body and load it in the syringe and inject it over the preparation area. Then we reseat the impression tray inside the patient's mouth and wait for the complete setting of the light body.

-*After preparation:* in this technique, after mixing of the heavy body and loading it in the tray, a spacer made of polyethylene is placed over the heavy body and the tray is inserted inside the patient's mouth. After complete setting of the heavy body, the tray is removed and the spacer is removed. The light body is then mixed and part of it is loaded in the syringe and the other part loaded in the tray over the heavy body. Thenthe light body is injected over the whole dental arch starting from the areaof tooth preparation, and the tray is reseated inside the patient's mouth. After complete setting of the light body, the tray is removed from the patient's mouth.

This technique was developed for condensation silicones to minimize the effects of dimensional changes during polymerization. Most of the shrinkage during polymerization takes place in the putty material when the preliminary impression is made, confining final shrinkage to the thin wash portion of the impression.

Impression for post crown

In case of post crown, we need to take an impression for the inside of the root canal. Most of the time, it is difficult to insert the impression material inside the tiny root canal, and even when it is inserted inside the canal it might tear during removal or become distorted during pouring of the impression. Therefore, the impression material needs a type of reinforcement. Such reinforcement could be obtained either by the use of a plastic post (impression post) or by using a stainless steel wire. After injection of the light body inside the root canal, the impression post or the stainless steel wire is inserted inside the canal. This will support the impression material and prevents its tearing or distortion during removal of the impression.

An impression for the post crown with the plastic post (impression post) recording the inside of the canal.

After removal of the impression from the patient's mouth, it should be inspected for the following:

1. The finishing line should be continuous all around the prepared tooth.
2. No air bubbles should be present at the area of tooth preparation.
3. The impression material should be attached well to the impression tray.

Disinfection of the impression

Disinfection of the impression is a concern with respect to viral diseases such as hepatitis B, AIDS, and herpes simplex, because theviruses may be transferred to the gypsum models and present a risk to dental laboratory and operating personnel.

The most common form of disinfection is spraying or immersion in disinfectants like 1% sodium hypochlorite or 2% potentiated glutaraldehyde solutions and iodophor.

Remember that you need the following requirements to obtain a good final impression:

1. Special tray.

2. Impression syringe.
3. Gingival retraction when needed.
4. Good understanding of the physical properties of the impression material which results in good handling of the material.
5. Dry field of operation. This is because all elastic impression materials, except hydrocolloids, are hydrophobic. i.e., they don't displace moisture; therefore, any moisture if present will result in voids or folds within the final impression.