Impression

Impression: It is the negative reproduction (or negative likeness) of the oral soft and hard tissue and their relationship. Impression can be made by placing fluid or semi-fluid material inside the patient mouth and wait until it sets then removing it. From this (the impression) a positive reproduction, or cast is made.

Requirement of a good impression:

1. It should be an exact duplication of the prepared tooth including all the preparation and enough uncut tooth surfaces beyond the preparation to allow the dentist or technician to be certain the configuration of the finish line.

2. Other teeth and tissue adjacent to the prepared tooth must be accurately reproduced to permit accurate articulation of the cast and allow proper contouring of the restoration.

3. The Impression of the preparation must be bubble-free especially in the area of finish line.

Impression Material:

1. It must become elastic after placement in the mouth, because it must be withdrawn from undercut that is usually exist on the external tooth surface adjacent to the preparation. So it should be able to return to original shape after removal.

2. Must have adequate strength to resist tearing when removed from the mouth.

3. It must have adequate dimensional stability and reproduction of details so we can get the exact-re imprint of the prepared and unprepared teeth.

4. Must have good handling and setting property that meet the dental requirement and should be free of toxic or irritating compounds.

Classification of Impression Materials:

1. Non elastic impression materials:

(a) Impression Compound. (b) Impression Plaster (c) Zinc oxide eugenol paste

These are not used in our work because when they set they become rigid so upon removing undercut they will fracture. Sometimes we use impression compound for single tooth impression and with proper band.
2. **Elastic Impression Material:** it is the type we use in our work because it is elastic so when we remove it from the undercut it will not fracture. And there will be slight deformation that it will return to the original shape

(a) **Hydrocolloid:** (1)Irreversible (Alginate) (2) Reversible (Agar - agar)

1. Alginate is used to produce primary impression; it doesn't give us accurate details so we use it to produce the study cast.
2. Agar - agar gives us accurate details but it needs special tray and extra equipment so most of the dentists don't use this type of materials although it has accuracy.

(b) **Elastomeric impression materials:**

(1) Polysulfide polymer. (2) Silicon rubber base. (3) Polyether.

This type of impression Set by chemical reaction. Usually is supplied in different consistencies (viscosity; which depends on the amount of fillers). These are heavy, medium and light, most of the time the heavy is used as tray material while the light body is used with special plastic syringe to be placed on the preparation. While the medium viscosity is mostly used in the prosthetic work like partial denture. * Whatever the consistency of the elastic rubber material it is supplied as two containers or tubes (the base and the catalyst).

1. **Poly sulfide:-**

The first type used in dentistry.

Base: a liquid polysulfide polymer mixed with inert. Fillers.

Catalyst: lead dioxide mixed with a small amount of sulfur and oil, act as oxidation initiators.

**Disadvantages: -**

1. Must be poured as soon as possible after taking the impression.
2. It has long setting time (about 10 min.) so it's uncomfortable for the patient.
3. High temperature and humidity - reduce its working time.
4. Lead dioxide (catalyst) gives brown color for the material and the material after polymerization is sticky so we should be careful in handling this material because it may stain the clothes.
2. Conventional Silicon impression Mat:-

(A) Condensation type:-
* Base: liquid silicon polymer with terminal hydroxyl group and filler particles.
* Catalyst: A viscous liquid consists of ethyl-silicate with organic tin as activator(tin octet). Up on mixing condensation reaction take place with the elimination of ethyl alcohol as by product this is responsible for the shrinkage of the material, which result in poor dimensional stability after setting. Both polysulfide and conventional silicon after setting are dimensionally in stable because of the by product. When we take impression by this material it must be poured 1 hr after we take it.

(B) Addition type (vinyl polysiloxan silicon)
* Base: silicon with terminal hydrogen group and inert fillers.
* Catalyst: Silicon with terminal vinyl groups. Chloraplastinic acid as catalyst and other filler. Without elimination of byproduct which result in a more dimensional stable material.

3. Polyether impression Material:-
The material is two-paste system of medium consistency.
* Base: Polyether polymer with terminal ethylene amine group with filler.
* Catalyst: Alkyl aromatic sulfinate with filler particles.
This material absorbs moisture that might result in dimensional changes, it must be kept dry after taking the impression, and sometimes we can pour it after one day. It is stiff material and we should be very careful when separated, we must be careful because we might break the area of the prepared tooth.

General factors that affect most of elastic rubber impression material:-
1. The rubber impression Material shrinks, during polymerization, so we must be sure about complete setting of the material before we remove it from the patient mouth.
2. The impression Must be casted (poured) after 1 hr after removal.
3. The rubber impression Materials are most accurate when they are used in thin section and this will necessities the use of special tray when taking the impression. To reduce the amount of the impression Material so that we reduce the dimensional change that will occur.
4. The temp, and humidity reduce the setting time.
5. Alteration in the ratio of catalyst to base will affect the setting time of the material.
**Impression**

*For final impression We need special tray, special impression Syringe and the impression Material.

* The special tray is made on the study cast.

**The advantage of study case**

1. Diagnosis and treatment planning.
2. Construction of temporary crown.
3. Construction of special tray.

To have a good impression we must have:

1. Special tray (to reduce the volume (thickness) of the impression material and so reduce distortion by reducing
   (1) polymerization shrinkage and
   (2) the thermal contraction).
2. Knowledge of the physical property of the impression material.
3. Dry field during taking the impression.
4. If it's necessary we need to do gingival retraction.

**The advantage of special tray:**

1. It allows the use of impression Material in minimum thickness essential to control the dimensional changes that increase with thick section.
2. It allows more comfortable impression tech, of impression taking as it reduces the gag reflex so it will reduce the discomfort of the patient.
3. The small size of the special tray prevents the forcible opening of the mouth.
4. It allows free snappy removal of the impression (without applying rotary movement).

* Materials used for special tray are:-

1. Self cure acrylic.
2. Shellac base plate.
3. Vacuum thermoplastic material.

Both 2 and 3 are not rigid enough and most of the time we use acrylic to construct special tray. To construct special tray we need:-

(a) Pink base plate wax.  (b) Study cast.  (c) Acrylic.
**Requirements of special tray:**

1. Must be rigid and have thickness, of 2-3 mm.
2. Should extend about 5 mm cervical to the gingival margin.
3. Stable in the cast with stoppers.
4. Made at least 9 hrs prior to be used.

**Construction of special tray**

We will construct the special tray on the study cast by the use of cold cure acrylic and pink base plate wax. On the study cast we draw a line by a pencil around the dental arch, which is about 4 mm cervical to the gingival margin, this line represents the finishing line of our special tray. After that, we adapt two layers of base plate wax over the cast. Then we remove the wax from the periphery until we see the line that we draw. Then we create holes (two posterior and one anterior) on the occlusal surface of the wax to obtain stoppers for our special tray (we remove wax from the area of non-centric cusps) then over these two layers of wax we adapt a layer of tin foil.

After that we start to adapt the acrylic on the wax and we use it when it reaches the dough stage all around the layer of the pink base plate wax and we remove the excess until the finishing line appears. We use the excess to make the handle and wait until complete setting, then we remove it from the cast, which will be facilitated by the layer of tin foil.
The advantage of the stopper is:
1. To equalize the pressure that is going to be applied on the tray.
2. It gives us benefit to localize our tray in the mouth during impression making.
3. Maintain even space for impression material, and prevent making contact with the prepared teeth. Now we are ready to take final impression. For making final impression we also need special impression Syringe and impression material. **Impression syringe** is made from clear plastic, and should be available with different nozzle sizes: we need this syringe to carry the light body material from the mixing slab to the preparation. **Gingival Retraction** To displace gingival tissue or to expose the margin of the preparation: so that better impression could be taken. It is used when the margin is sub gingival or with the gingival.

The objective of the gingival retraction are:
1. Create access for the impression material to the area of preparation that is located sub gingival.
2. To provide enough thickness of the impression material at the area of the finishing line to prevent distortion of the impression. Techniques of gingival retraction could be either:
1. mechanical.
2. Combination of mechanical and chemical.
3. Surgical technique.
**Mechanical:** we apply pressure on the gingival to open the gingival sulcus. May be done by construction of temporary crown with long margin and leave it for 4 hrs. The most common way to do gingival retraction is by using **retraction cord** which is special cord made of cotton comes either with or without medicament (vasoconstrictor). The cord that is free from vasoconstrictor is used as mechanical technique. While, when containing vasoconstrictor (adrenaline), we use it as mechanical and chemical retraction, by packing this cord in gingival sulcus, between the tooth and the gingival tissue using plastic instrument (Ash no. 6 or 49) so that the cord physically push the gingival away from the finish line and the combination of the chemical action and pressure packing help to control seepage of fluid from the wall of the gingival sulcus. We put the retraction cord inside the gingival sulcus all around the tooth, it is left for 10 min. the area during our work should be dry then we remove the cord. The area will be expanded providing space to inject the impression material around the tooth at the area of finishing line by the impression syringe. **Radial or surgical** means is sometimes by using electro surgery unit and to remove gingival from finishing line or sometimes we do gingivectomy in case of periodontal disease or inflammation.
**Impression Techniques:**

1. Single stage tech.
2. Two stage tech.
3. Putty wash tech.

**Single stage tech.:**

Most of the time we use this tech when we have impression material with single viscosity (mostly medium viscosity material). e.g. Polyether, after we mix the impression material part of it is loaded in an impression syringe from the mixing slab, and the other part we place it on the special tray, we inject the material over preparation. And we start with the most critical parts (pin holes, F.L.) the whole preparation, and the remaining part of the dental arch. After wards, place the special tray over the dental arch, wait for complete set, then removed.

**Two stage tech.:**

Used with materials that have two viscosities light and heavy special tray, we start to inject the light body on the dental arch starting with the prepared tooth. After we finish injecting the impression material we place the special tray with the heavy body in the patient mouth. The pressure exerted by heavy body will create intimate contact between light body and the prepared tooth and will make direct flow of the light into the details of the preparation.
Putty wash tech.

This technique uses a high viscosity material, we start to take impression with the heavy body (before or after preparation). If we make it **before preparation**: We leave the impression material until it sets inside the patient mouth. Then we remove it and do our preparation after that we start to mix the light body and load it, we reseat the tray inside the patient mouth and wait until setting occurs.

If we make the impression **after preparation**: we use it with spacer made of polyethylene material, placed over the heavy body and inserted in the patient's mouth and wait until setting then remove the polyethylene (spacer). In putty wash technique, initial pressure will cause distortion of heavy body impression if pressure is not released the light body is allowed to polymerize completely, then on the withdrawal of the impression, the heavy body layer relapse causing distortion of the light body.

In cases of bridge, initial pressure will cause displacement of the soft tissue covering the bridge area, this displacement will create space between the fitting surfaces of the pontic and the underlying mucosa All techniques can be used in any type of preparation but it depends on the material.

*To have good impression we do the following:*

1- Special tray and impression are ready
2- Gingival retraction when necessary.
3- Proper understanding of the physical property of the impression material which result in good handling of the material.
4- Dry field must be used.

Because all elastic impression materials except the hydrocolloid impression material are hydrophobic that is they do not tolerate or displaced moisture, so any moisture will result in voids in the final impression.
When we take impression for post crown we need impression for the root canal space so
the impression inserted inside the tiny canal and even when it fills the canal it might tear
off or distorted during pouring the die materials (stone). So the impression material need
a type of reinforcement either by a plastic post or by stainless steel wire placed after
injecting of the impression material, the impression will not be torn or distorted because it
is not movable. we should make the surface of the wire rough by burs in order not to be
pulled away from the impression.

After taking the impression we should inspect the impression for the following points:

1. Finishing line of impression must be continuous from one surface to the other.
2. No air bubbles present on the surface of the impression especially at the area of F.L.
3. The attachment of the impression to the tray must be firm.