

**A REVIEW ON DIFFERENT IMPRESSION TECHNIQUES INVOLVED IN  
FABRICATION OF COMPLETE DENTURES****Dr. Surabhi Thakur\***Senior Lecturer, Seema Dental College and Hospital, Virbhadra Road, P.O. Pashulok, Aam Bag, IDPL Colony,  
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**ABSTRACT**

Success of the dental prosthesis mainly depends on the accuracy of the dental impressions. It is very important for a clinician to select an appropriate impression technique and material to accomplish this task. Each technique has several advantages and drawbacks. This article creates a comprehensive review of both traditional and new impression techniques for the construction of complete denture. **Defination:** Dental impression- a negative imprint or a positive digital image display of intraoral anatomy; used to cast or print a 3D replica of the anatomic structure that is to be used as a permanent record or in the production of a dental restoration or prosthesis. (GPT-9).

**INTRODUCTION**

A good impression is of utmost importance in the process of fabricating a well fitting complete denture. "Ideal impression must be in the mind of the dentist before it is in the hand. He must literally make the impression rather than take it" [(DeVan, 1952)].<sup>[1]</sup>

Fabrication of complete dentures involves primary impression, border moulding, final impression, laboratory procedures, jaw relation, teeth selection, teeth arrangement, try in stage and denture insertion.<sup>[2]</sup>

Many impression techniques have been developed over the years but the success of these impressions can be determined by several factors like the type of material used, technique and the patient's needs.<sup>[3]</sup>

Selection of the proper technique is crucial and mainly depends on the clinical situation, material availability, clinician knowledge and experience.<sup>[4]</sup>

Hence it becomes very important for a professional to understand the existence of all these multiple options to choose the best option for each case.<sup>[3]</sup>

This paper summarizes the techniques to be adopted in complete removable prosthodontics based on available evidence.

**CONVENTIONAL TECHNIQUE**

In general, these techniques can be grouped into mucostatic, mucocompressive, selective pressure, functional and neutral zone impressions; however, other classifications can be considered.<sup>[3]</sup>

**MUCOSTATICS**

It was proposed by Richardson and popularized by Harry L Page in 1938.<sup>[1]</sup> Minimal pressure technique is based on mucostatic principle. The advocates of this principle considered interfacial surface tension as the only important retentive mechanism in complete dentures. Therefore, they did not resist vertical displacement, which was the only movement capable of interrupting surface tension. According to the principle of mucostatics, the impression material had to record every detail of the mucosa without distortion so that a completed denture would fit all minute elevations and depressions.<sup>[5]</sup> Oversized impression tray and low viscosity impression materials are used.<sup>[1]</sup> The demerit of this principle was that it ignored the value of dissipating masticatory forces over a large possible basal seat area. Also it minimized the retentive role of the musculature described by Fish in 1948. The merit of this technique was its high regard for health and preservation of tissue.<sup>[5]</sup>

**MUCOCOMPRESSIVE TECHNIQUE**

This theory was initiated by Green brothers [(Vig and Smith, 1972)].<sup>[1]</sup> They introduced a modeling plastic, a method for manipulating it and a technique to utilize the entire denture bearing area for denture retention.<sup>[5]</sup> It records the mucosa in its functional form.<sup>[1]</sup> The main objective was to attain better retention of the dentures. The technique was as follows: A preliminary impression was made in impression compound and a custom tray was constructed with its periphery 1/8th inch shorter than the denture outline. With this tray another impression with compound was taken. Well fitting rims were made and the height of the bite was adjusted against a similar bite rim on the mandibular ridge. Area to be relieved like

median raphe was softened on the impression and was again inserted in the mouth and was held under biting pressure for 1/2 minutes. The peripheral margins of the impression were then softened and border molding was done by asking the patient to give various cheek and lip movements as in whistling and smiling. The posterior palatal seal was obtained by swallowing movements by the patient under biting pressure. The claim made by the advocates of this technique was that since border molding was done in their functional positions, the final dentures would retain well and cannot be dislodged during functional movements of the jaw. The amount of pressure applied to the tissues in the mucocompressive technique was not only great but was applied to the center of the palate and the peripheral tissues which were not well suited to receive the maximum biting load and this interferes with normal blood supply of the tissues resulting in their breakdown. As soon as this change took place both the peripheral seal and excellent retention were lost. Hence, the retention achieved by these means was transient and harmful to the health of tissues. Dentures made by this technique would fit well during mastication, i.e. only a short period each day, but would not be closely adapted to the tissue when the patient was at rest. This is because of the rebounding of tissues. These disadvantages indicated a need for spacer in the custom tray fabrication.<sup>[5]</sup>

### SELECTIVE PRESSURE THEORY

Advocated by Boucher in 1950.<sup>[6,7,8]</sup> It combines the principles of both pressure and minimal pressure techniques.<sup>[1]</sup> The philosophy of this technique is that certain areas of the maxilla and mandible are by nature better adapted for withstanding extra loads from the forces of mastication. These tissues are recorded under slight placement of pressure while other tissues are recorded at rest or relieved with minimal pressure in a position that will offer maximum coverage with the least possible interference with the health of surrounding tissues. Here, equilibrium between the resilient and the nonresilient tissues is created. Primary stress bearing areas of maxilla are crest of alveolar ridge and the horizontal plate of palatine bone and in the mandible it is the buccal shelf area. Secondary stress bearing areas of the maxillary foundation are rugae area and the slopes of the ridge. Areas requiring minimum pressure are incisive papilla, midpalatine suture, tori in the maxilla and crest of mandibular residual ridge. In the maxilla, the tissue underlying the region of posterior palatal seal has glandular and soft tissue between the mucous membrane lining and the periosteum covering the bone. This tissue can be more readily displaced for the maintenance of peripheral seal of the maxillary denture.<sup>[5]</sup>

### THE MUCOSEAL TECHNIQUE

It was stated by Pryor in 1948 which was introduced as a variation to the mucostatic technique.<sup>[9]</sup> The anterior lingual border is molded by the floor of the mouth with the tongue in repose. The tray is extended horizontally backward, over the sublingual glands toward the tongue

to affect a border seal. Thus, this technique utilizes the benefit of minimal pressure and also provides maximum extension of denture borders and maximum coverage of denture bearing area. Sub atmospheric pressure technique was based on the concept of mucostatics. Milo V Kubalik and Bert C Buffington<sup>[10]</sup> developed this technique the objective of which was to reduce the stress on any given tissue by increasing load bearing area. The form of the tissue is recorded vertically and laterally, when a controlled partial vacuum is established in impression tray specially built for the patient. It is maintained in the mouth without direct mechanical support of any kind. The difference between the subatmospheric pressure within the tray and the atmospheric pressure outside the tray is all that is needed to center the tray over the ridges in a static position. A vacuum is developed between the soft tissues and the tray. A recording material in a fluid state flows from the border region into the evacuated space and develops the basal tissues. Border seal is determined by the readings remaining constant.<sup>[5]</sup>

### Management of Hyperplastic or Flabby Tissue (Unsupported Movable Tissue), Severely Resorbed Mandibular Ridges

#### DYNAMIC IMPRESSIONS

In patients with extreme resorption of the mandibular residual ridge, muscle attachments are located near the crest of the residual ridge and consequently, the dislocating effect of the muscles on the denture is great. Also shape of the osseous structures offers little retention and stability of complete dentures. For these reasons, the range of muscle action, as well as spaces into which the denture can be extended without dislocation, must be accurately recorded in the impression. Such impressions can be made by means of dynamic methods.

**First technique-** Fabrication of the special tray is done. A ridge of self-curing resin is built up in the premolar-molar region on each side to support the thermoplastic material. While the thermoplastic material is soft, the tray is placed in position on the lower ridge in the mouth and the patient is asked to close the jaws slowly. The upper residual ridge will form an impression in the soft thermoplastic material at a height corresponding to the rest mandible. A tray is removed from the mouth and cooled. Lingually the mandibular rests should be concave to provide space for the tongue. Sufficient amount of an irreversible hydrocolloid is mixed with 50% extra water and material are placed directly into the mouth to cover all tissues. The tray is pressed through alginate by digital force until the stops are firmly seated on the residual ridge. Then, the patient is asked to close his mouth slowly until the mandibular rests have obtained firm contact with the maxillae. The patient should swallow three to four times at 10 seconds interval while the final impression material is still in a moldable condition. The action of the muscles that function in deglutition is accentuated because the mandibular rests prevent the mandible from reaching the vertical relation

of occlusion and force it to remain in its rest position. This procedure develops a registration of the denture space which ordinarily results in a proper extension of the lingual flanges of the finished dentures. Forceful protrusion of the lips brings the mentalis and orbicularis oris muscles into action and is responsible for forming the labial part of the impression.<sup>[11,12]</sup>

**Second technique** - In another method, an old denture can be used for impression when opposing natural or artificial teeth are present. Often the vertical dimension at occlusion is decreased hence stops are built to the desired height that will re-establish correct vertical relationship. The mandibular rests are built up until the inter-occlusal distance.<sup>[11]</sup> The denture must be perforated and completely dried. The impression material is placed directly in the oral cavity, the denture base is filled with impression material, and the impression is made. After removal of the impression from the mouth, the margins are examined and if necessary, this procedure is repeated until the denture borders are completely covered by impression material.<sup>[12]</sup>

**Third technique** - This procedure was originally indicated by Momme in 1872. The denture is processed conventionally. Mandibular rests are added to the completed denture and a correct dynamic impression is made in the denture base to reshape and complete the final design and the denture is relined.<sup>[12]</sup>

#### KLEIN'S TECHNIQUE

Stock tray will cause some tissue distortion as it may not exactly fit over the tissue so he proposed a method in which impression tray is processed in clear acrylic resin. The tray is checked for stability, retention, and muscle interferences. No. 6 round bur is used to drill four holes spaced 5 mm apart on each posterior lingual flange. The holes reduce hydraulic pressure on the lingual flanges where the pressure is more likely to build. Platforms of modeling compound are placed bilaterally in the premolar and molar region to serve as bilateral finger rests during the impression-making procedure. The platforms are built to half the height of the retromolar pad to aid in reducing the pressure applied to the basal tissues. The loaded mandibular impression tray is seated posteriorly first and then in a downward and anterior direction and secondary impression is made. This technique attains both physiologic and anatomic registration of the attached and unattached tissue of the denture-bearing areas.<sup>[13]</sup>

#### ADMIXED TECHNIQUE

Proposed by Mccord and Tyson. Impression compound and green tracing stick compound are taken in the ratio of 3:7 parts by weight is placed in a bowl of water at 60°C and kneaded to a homogenous mass that provides a working time of about 90 seconds. This homogenous mass is loaded to the tray after wax spacer is removed and the patient is made to do various tongue movements to record the borders.<sup>[14]</sup>

#### ALL GREEN TECHNIQUE

In this technique the mandibular secondary impression is made using green stick tracing compound. Greenstick compound is kneaded to a homogenous mass and was loaded on the special tray and border movements were done. The final impression is made using zinc oxide eugenol.<sup>[15]</sup>

#### FUNCTIONAL TECHNIQUE

Winkler proposed this technique. The denture base and occlusal rims are fabricated on the primary cast and tentative jaw relation is done. Tissue conditioning material is applied on the tissue surface of mandibular denture base do various functional movements such as puffing, blowing, whistling and smiling. Three application of tissue conditioner material is done at an interval of 8–10 minutes. The final impression is made with light body addition silicone material with closed mouth technique.<sup>[16]</sup>

#### COCKTAIL IMPRESSION TECHNIQUE

In this technique, a customized tray is fabricated using auto polymerizing acrylic resin. A tray with cylindrical mandibular rests in the posterior region and 1mm wax spacer is made at increased vertical height. High-fusing impression compound is softened, placed on top of the mandibular rests and inserted in the patient's mouth. Patient is advised to close his mouth so that the mandibular rests fit against the maxillary alveolar ridge. Lingual surfaces of mandibular rests are made concave, to provide space for the tongue to move freely during functional movements. McCord and Tyson's technique for flat mandibular ridges is followed for definitive impression. Impression compound and green tracing stick in the ratio of 3:7 parts by weight is placed in a bowl of water at 60°C and kneaded to a homogenous mass. Wax spacer is removed, this mass is loaded and patient is guided to close his mouth on the mandibular rests. For recording the functional state, patient is instructed to run his tongue along his lips, suck in his cheeks, pull in his lips and swallow by keeping his mouth closed, as in closed mouth impression technique, till the impression material hardens.<sup>[17]</sup>

#### WILLIAM H FILLER

He described a modified impression technique using two trays in cases where patient has extremely hyperplastic (flabby) residual ridges and when surgical preparation of the mouth is contraindicated. The first of the two trays is made in cold-curing acrylic resin in which most of the basal surface of the tray is removed except for the borders and the "lattice work" of acrylic resin. The second tray is keyed on the first tray and is oriented at least three places. Both trays are painted with adhesives ensuring its extension onto the buccal surface of the tray by approximately 1 to 2 mm and onto the lingual flange of the mandibular tray. Light body material is used in the first tray as a corrective wash material. The second tray is filled with Plastogum and gently vibrated into place until the "keyed" parts of the trays are in contact. The

two trays are held lightly together until the impression material sets, and then the impression is removed as a unit.<sup>[18]</sup>

#### **ZAFRULLA KHAN TECHNIQUE**

Described a technique for making impressions where unsupported and movable tissues exist. A window is cut in the custom tray where unsupported area is present and this area is recorded with impression plaster. Remaining areas are recorded with final impression material and the impression is removed as a single unit.<sup>[19]</sup>

#### **ELASTOMERIC TECHNIQUE**

In this technique, the mandibular secondary impression was made using elastomeric impression material. Tray adhesive is applied over the border, an internal and external surface of the acrylic custom tray, to facilitate the retention of the silicone border molding material. An addition silicon putty material with an extended working time is loaded along the borders of a special tray. The special tray is placed in the mouth and is border molded; the patient is asked to move the tongue according to standard impression procedures. The tray is removed from the mouth, and the impression is examined. Light-body addition of silicone impression material is loaded in the impression and inserted in the mouth. The patient is instructed to repeat the tongue movements, more vigorously, while the light-body impression material is border molded along the buccal and labial flange areas. After the material is set, the impression is removed from the mouth and examined for any discrepancy.<sup>[11]</sup>

#### **MODIFIED FLUID WAX IMPRESSION TECHNIQUE**

The preliminary impression is recorded with an irreversible hydrocolloid. A custom impression tray is fabricated on the preliminary cast. Softened modeling plastic impression compound is placed on the intaglio surface of the tray, corresponding to the region of the mandibular central incisors and both the mandibular first molars to serve as a spacer for wax. Segmental border molding is done with a compound. Spacers are removed with a scalpel blade once the border molding is complete. The tray is trimmed over the crest of the residual ridge to create a window opening above the displaceable alveolar ridge using a No.8 round bur. Mouth temperature impression wax is melted and applied onto the borders of the tray. Ensure that the wax temperature is less than the working temperature of the modeling plastic impression compound to prevent distortion. Place the impression tray immediately over the edentulous ridge, and leave it in the mouth for approximately 5 minutes. Allow adequate time for the mouth temperature impression wax to flow and escape to the periphery of the impression. Apply impression wax onto the remaining intaglio surface of the tray. Add impression wax onto the slopes of the ridge, rather than the crest, in increments until a glossy surface is visible. Trim away any excess impression wax on the periphery or over the window opening with a scalpel blade. Apply

adhesive on the tray in the area surrounding the window opening, and allow it to dry. Place the impression tray onto the residual ridge and inject vinyl polysiloxane impression material over the window opening. Prevent distortion of the soft tissues by placing the impression material in the most passive manner possible. Remove and box the impression using a mix of plaster and pumice. Avoid using a conventional boxing procedure that requires boxing wax, as it may distort the impression wax.<sup>[20]</sup>

#### **THE NEUTRAL ZONE TECHNIQUE**

Primary impression is made using impression compound or impression plaster. Upper wax rim and a lower special tray which is a plate of acrylic is adapted to the lower ridge, with spurs or fins projecting upwards towards the upper arch. This will help in retention of the impression material. The upper wax rim is adjusted and the lower special tray is placed in the mouth. Two occlusal pillars are then built up in self-cured acrylic on opposite sides of the lower arch. These pillars are molded and adjusted to the correct height to give the usual 3mm freeway space. A thick mix of viscogel is then placed around the rest of the lower special tray, distally and mesially to the occlusal pillars. The patient is then asked to make functional movements to locate the neutral zone. After 5-10 minutes the set impression is removed from the mouth and examined. The patient's musculature will mold the viscogel material into a position of balance. Indices are then constructed with plaster and wax is filled into it, teeth arrangement is done accordingly. More comfortable and be more stable and retentive as the denture will not interfere with functions of the lips, cheeks, and tongue.<sup>[21,11]</sup>

#### **MODERN TECHNIQUES**

Maria et al. conducted a study in which a group of patients were treated with conventional impression techniques and with the digital impression (2019). Majority preferred digital impression technique because it was more comfortable and there was no possibility of allergic reactions due to conventional materials or swallowing the impression materials. Parameters such as low cost, accessibility, shorter chair times, and comfortability are being assessed and valued over conventional techniques. Another critical advantage the newest procedures provide is the capacity to avoid trimming procedures that can lead to distortions on the duplicates, a disadvantage present on the rock, alginate, and tray conventional materials. Addressing this problematic, Ammoun & Bencharit provided a view of a digital technique that combines a desktop scanner and open-source software to generate a file that can then be used to create duplicates offering the possibility to save it for future uses (2020). The principal advantage of this technique is the accuracy it provides to the duplication, accessibility and the possibility to save the information provided by the scanning. Unfortunately, with the apparition of new techniques, new clinical challenges appear. Alqarni et al. addressed this issue with the use of

computer-aided design and computer-aided manufacturing (CAD-CAM) technology for the creation of complete dentures (2019). From their point of view, they assessed the difficulty linked to capturing maxillomandibular records due to an excessive loss of alveolar ridge height. However, considering the many advantages, this technique provides, adaptations are proposed to eliminate these complications. Fang et al. proposed the use of intraoral scanners to avoid the possible deviation of conventional techniques, making it a direct digital impression (2018). This is a significant advance as it translates into less deviation and, therefore, more accurate, complete dentures that, contrary to Alqarni's response, do not depend on the use of conventional techniques. This kind of technology applied to complete denture procedures has the potential to reduce chair time and clinical appointments, achieving a faster solution for them.<sup>[3]</sup>