Complete Denture Impression Techniques: A Review

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Abstract

Code of practice is dangerous and ever-changing in today’s world. Relating this to complete denture impression technique, we have been provided with a set of philosophies - “no pressure, minimal pressure, definite pressure and selective pressure”. The objectives and principles of impression-making have been clearly defined. Do you think any philosophy can satisfy any operator to work on these principles and achieve these objectives? These philosophies take into consideration only the tissue part and not the complete basal seat, which comprises the periphery, the tissues and the bone structure.

Under such circumstances, should we consider a code of practice dangerous or should we develop an evidence-based approach having a scientific background following certain principles, providing the flexibility to adapt to clinical procedures and to normal biological variations in patients rather than the rigidity imposed by strict laws?

Key words: Basal seat, bony trajectories, impression techniques, selective pressure.

Main Article

Abilities of individual operators have led them to devise impression procedures which are particularly good in their own hands, but which others may be unable to handle successfully. Impression techniques seem to be based upon various philosophies and personal preferences and our heads often whirl in an effort to choose between the alternatives.[1] Nobody is satisfied with any one particular method or philosophy.

A multitude of concepts have been presented over the years with various considerations in mind.[2] The following article is an attempt to focus our attention on theories presented in relation to one particular criterion i.e. pressure applied while making impression. Ideas presented over the years in relation to pressure applied:[1]

• No pressure / mucostatic concept.
• Pressure / mucocompressive concept.
• Minimal pressure concept.
• Selective pressure concept.

Mucostatic theory (based on Pascal’s law) sets out to record the mucosa in its static (supported by underlying basal bone), undisturbed form. This is possible only if the impression material is watery and virtually requires no pressure to place it against tissues. Such an impression will not cover enough area to afford retention, stability and esthetics of a denture.

Mucocompressive theory claims to record the tissues in their functional / supporting form so as to achieve stability in occlusal function. This concept is not very encouraging since it seeks to subject the tissues to a continuous pressure which is conducive to resorptive changes in basal tissues. In addition to this, displaced tissues tend to displace the denture in their attempt to return to their original form.

Minimal pressure theory is a compromise between the previous two. It advocates application of minimal possible pressure which is supposed to be little more than the weight of free flowing material. But the questionable part is, How to decide this minimal pressure clinically? How can one judge that the amount of pressure one is applying is not too much or too less?

Last but not the least is the selective pressure theory which is the most widely respected and accepted theory. Here, the idea is to vary the pressure over the denture seat (which is a single unit) depending on the displaceability of the supporting tissues and hence transferring the load over to the selected areas of the seat e.g. buccal shelf area (assuming that it is better suited for the purpose).

The method proposed for achieving selected pressure is by altering the spacer thickness and hence material thickness in selected areas. A few questions come to my mind:

• Can we alter the pressure by simply changing the thickness of spacer / impression material in a loaded tray?
• Can we control the finger pressure, thereby choosing a particular area of the basal seat to receive excess load?
• Can the load received at occlusal surfaces be selectively distributed or does it get transferred uniformly over the seat?

It is supposed that by altering spacer thickness, a narrow lumen exists between the special tray and seat. Placement of selective pressure is based on the presumption that impression material passing through
A narrow lumen exerts pressure on bone. Bone reacts to the slight distortion caused by this pressure in the form of elastic forces which resist compression. Thus, the method proposed to achieve the supposed aim is futile.

Secondly, we cannot quantify or standardize the finger pressure while making impression. Moreover, when we are using a thixotropic material for making impressions, it flows in contact with tissues under finger pressure. But as soon as the material starts creeping out of borders, finger pressure is released. The only pressure that remains is by virtue of the viscosity of the material or the frictional forces. Thus, use of finger pressure for selective loading is out of question.

Another question as mentioned earlier is that, What is the need for selectively loading the basal seat? Nature itself has made a provision for receiving and distributing occlusal load by virtue of
- Resiliency of mucosal tissues
- Bony trajectories.

As far as tissues are concerned, they are distributed over the basal seat in different viscosities, thickness and characteristics.[3] We should treat the basal seat as one unit [Figure 1].

Next comes the bone. It is not the permanent fixed structure that its dense external composition might indicate. Any changes in diet, function and tissue metabolism are recorded. Bone is one of the most labile tissues of the body. Wolff’s law (1884) states that mechanical stimulus can cause changes in bone structure and surface contour. Any kind of functional stresses correlate with trabecular and cortical bone reinforcement.[4,5]

No force is ever lost. Once introduced into a system, force is dealt with according to the laws of inertia, momentum and interaction. Applied masticatory loads cannot just disappear into the maxillary and mandibular geometry. They are distributed to the craniofacial complex via stress trajectories.[6]

There are four trajectories in the mandible[7] [Figure 2].
- From the angle of the mandible up the posterior border of the ascending ramus to the condyle.
- Obliquely from below the molars through the body of the mandible and ramus to the condyle.
- From the molar alveolar crests up the anterior border of the ascending ramus towards the coronoid process.
- Along the margin of the sigmoid notch between the coronoid process and the condyle.

In the maxilla, these trajectories follow an upward direction, running through the middle third of the face to reach the frontal bone. Whenever a person exerts occlusal force, the entire viscerocranium and most of the neurocranium is involved in absorbing the load.

There are three main trajectories [Figure 3].
- Maxillonasal
- Maxillozygomatic
- Maxillopterygoid

In a dentate person, the periodontal ligament acts as a buffer space and serves to modify and distribute the occlusal load resulting in a more even stress distribution within the trabecular lattice extending finally to the cortex. In a denture wearer, the mucous membrane performs the load modifying and distributing function of the periodontal ligament to some extent. Since in an artificial denture, we aim to arrange the teeth in the same position as that of natural teeth, the forces are supposed to follow the same pathways.

If at all we expect reaction from the denture seat, we must get it from the whole seat rather than a particular area because such pressure will be dealt with as in natural teeth.

Taking all this into consideration, I propose that • We should not try to disturb the natural configuration of the basal seat by selecting pressure.

• We should not try to change the load transfer mechanism of the basal seat from when the patient was dentate to now when he wears artificial denture.

• We should not expect a reaction from a particular area but from the whole seat.

A clinician should try not to depend on adaptation of form to function since with age, the potential for constructive remodeling is very limited.

This brings us back to our problem of impression-making. What is an impression? It is basically an interaction between tissues and impression material. The variety of impression materials and the range of working characteristics of these materials, make possible the development of impression procedures best suited for specific conditions in each area in a given mouth.

Our method for making impressions should be based on the basic principles[8] of Maximum area coverage and Intimate contact so as to achieve the objectives of:
- Retention
- Support
- Stability
- Esthetics
- Preservation of ridge (supporting structures).

The denture-bearing surface comprises:
- Periphery - covered by lining mucosa
- Main seat - covered by masticatory mucosa

In between these two is a zone of transition [Figure 4] where the denture border has to be placed. This has characteristics of both the above and is an ideal place...
to end the denture borders for adequate peripheral seal without unduly stressing the periphery.

So what I propose is:
- Make an initial impression for making a study model and fabricating a special tray up to the mucogingival junction.
- Border molding carried out at the zone of transition
- Make a Final impression using a thixotropic material, applying minimal pressure, just enough to make the material creep out of the borders.

References

Illustrations

Illustration 1

Figure 1a: Mandibular coronal section showing varying degree of compressibility of tissues

Illustration 2

Figure 1b: Maxillary coronal section showing varying degree of compressibility of tissue
Illustration 3

Figure 2: Trajectories in the mandible

Illustration 4

Figure 3: Trajectories in maxilla
Illustration 5

Figure 4: Zone of Transition A. Alveolar mucosa  C. Mucogingival junction D. Masticatory mucosa E. Free gingiva F. Interdental papilla
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