DOI: 10.14260/jemds/2014/3020

REVIEW ARTICLE

SELECTIVE PRESSURE IMPRESSION TECHNIQUE: AN OVERVIEW

Arun Gupta[1], Parul Singhal[2], Pooja Negi[3]

HOW TO CITE THIS ARTICLE:
Arun Gupta, Parul Singhal, Pooja Negi. "Selective Pressure Impression Technique: An Overview". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 29, July 21; Page: 8110-8114,
DOI: 10.14260/jemds/2014/3020

ABSTRACT: Impression 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. Our method for making impressions should be based on the basic principles of maximum area coverage and intimate contact so as to achieve the objectives of retention, support, stability, esthetics, preservation of ridge (supporting structures). Various impression techniques have been mentioned in the literature for recording impression of edentulous ridges. These techniques have been classified by different authors as functional, mucostatic, mucocompressive, selective pressure, minimal pressure etc. However none of these techniques has been designated as the 'time best' for a particular patient though selective pressure technique has got much attention in the literature. This article is presenting a critical review on the selective pressure impression technique used for edentulous patients.

KEYWORDS: Selective pressure, impression, retention, stability, support.

INTRODUCTION: The field of dentistry is ever-changing in today's world. Relating this to complete denture impression techniques, we have been provided with a set of philosophies - "no pressure, minimal pressure, definite pressure and selective pressure". The abilities of the different operators have led to devise impression procedures and these procedures are best suited to certain materials. The great variation of methods, materials, objectives and interpretation must leave the operator with chaos in his mind with any one particular method of philosophy.[1]

There are different criteria for impression making leading to a prosthesis having retention, stability, support and aesthetics.[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.
- Selective pressure concept.

A Brief Review: Mucostatic theory: In a brochure published by Hary L. Page in 1946, he stated that all soft tissues were chiefly fluid and 80% or more of the tissues are composed of water. According to Pascal's law which states that any pressure applied to a confined liquid is transmitted undiminished and equally in all directions; Page contended that since the soft tissues are confined under a denture, any pressure applied will be transmitted in all directions.[3]

The advocates of this principle consider interfacial tension as the only important retentive mechanism in complete denture.[4] Therefore they did not resist vertical displacement, which was the only movement capable of interrupting surface tension.

DOI: 10.14260/jemds/2014/3020

According to the principle of mucostatics, the impression material had to record without distortion, every detail of the mucosa so that a completed denture would fit all minute elevations and depressions. So much emphasis was placed on recording details that separating substances could not be used at any point in the procedure.

Mucocompressive theory: The mucocompressive technique was initiated by Greene Brothers.[5] They introduced a modeling plastic, a method for manipulating it and a technique that is said to have been the first to utilize the entire denture bearing area for denture retention. They were the first to teach the closed mouth all modeling plastic technique called the Greene Brothers all compound impression.

The main objective of this technique was to attain better retention of the dentures. But as the dentures were in continuous state of compression, more resorption of the underlying bone was proposed due to poor vascularity. Also, the opponents proposed that the teeth remain in functional states for only a few minutes during twenty four hours and hence a continuous functional state is not necessary in artificial dentures.

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. 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.[6, 7] These disadvantages indicated a need for spacer in the custom tray fabrication.

Selective pressure theory: Advocated by Boucher in 1950, it combines the principles of both pressure and minimal pressure techniques.[8] This principle of impression making is based on the belief that the mucosa over the ridge is best able to withstand pressure, whereas that covering the midline is thin and contains very little sub mucosal tissue. 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 non resilient 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 in the mandibular foundation. The non stress bearing areas are recorded with the least amount of pressure and the selective pressure is applied to certain areas of the maxilla and mandible that are capable of withstanding the forces of occlusion. Areas requiring relief 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.

Milo V Kubalik and Bert C Buffington developed this technique the objective of which was to reduce the stress on any given tissue by increasing load bearing area.[9] 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 sub atmospheric 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.

The method proposed for achieving selected pressure is by altering the spacer thickness and hence material thickness in selected areas. By altering spacer thickness, a narrow lumen exists between the special tray and seat. Bone reacts to the slight distortion caused by this pressure in the form of elastic forces which resist compression.

The limitations of selective pressure technique are that we cannot standardize the finger pressure while making impression. Moreover, when we are using a thixotrophic 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. The spacer design varies from one text to other text available in the literature and there is not sound proof explaining that thickness of spacer leads to change in pressure in a custom tray. There is variation in texts regarding stress bearing areas. So, there are many areas of concern regarding selective pressure application technique.

DISCUSSION: According to Boucher, there is no single 'best' impression technique. The variety of impression materials and the range of working characteristics of these materials, make possible the development of impression procedures best suited for the specific conditions in each area in a given mouth. Blindly following a technique will not produce the results which are possible by critical analysis of the requirements of the patient and, therefore, devising a technique for that particular patient. A technique should be an orderly sequence, but not a dictator.[1]

M. M. Devan stated that the impression problem would not be a problem if we were taking impressions of casts. The problem is due to the fact that the mouth is lined with displaceable tissue that varies in degree of displace ability, according to its thickness, its rigidity, the point, magnitude, and direction of the forces applied to it. In view of these facts, it is reasonable to say that the ideal impression must be in the mind of the dentist before it is in his hand. He must literally make the impression rather than take it.[10]

The theories attempting to explain the retention of dentures seem to agree that close adaptation of denture bases to the tissues is desirable, and that retention is proportionate to the area covered. Experiments show that a border seal and a posterior palatal seal add much to the retention of dentures. Also a positive pressure should be exerted on the border tissues by the denture. The amount of this pressure must be based on our professional judgment. This will result in a force that will have a tendency to displace the denture, but it will result also in added retention from the border seal. A compromise must be made to gain this added retention.

Henry A. Collett studied complete denture impressions and stated that tissues covering an edentulous ridge can be displaced by an impression procedure has been graphically demonstrated by Woelfel. Different tissue contours resulted when impressions were made of one edentulous maxillary arch with different materials. Tissue displacement occurred to a variable extent with all materials,

although the largest displacement occurred over the ridge crest when using the rubber impression material.[2]

Craddock did a cross-over Randomised Controlled Trial (RCT) of selective pressure impressions for lower complete dentures. In this trial he showed a preference for the denture constructed from the selective pressure impression technique, providing dentists with useful evidence for a clinical impression technique. This advocates the selective pressure impression technique and provides dentists with good evidence for the clinical procedure.[11]

According to Taylor and colleagues, selective-pressure impression technique described provides the clinician with a method for improving the palatal adaptation of maxillary complete dentures. By displacing the tissues of the palate and effectively creating a deeper vault on the definitive cast, the technique compensates for the shrinkage of the polymethylmethacrylate.[12]

Wolff's law 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. 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. In a dentate person, periodontal ligament acts as a buffer space and serves to modify and distribute the occlusal load resulting in even stress distribution within the trabecular lattice extending into the cortex. In a denture wearer, the mucous membrane modifies load 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. But taking all above considerations, natural configuration by selective pressure should not be disturbed. The load transfer mechanism of basal seat should not be changed and whole seat should be considered instead of a particular area.

Impression 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. Our method for making impressions should be based on the basic principles of maximum area coverage and intimate contact so as to achieve the objectives of retention, support, stability, esthetics, preservation of ridge (supporting structures).[10]

CONCLUSION: Various impression techniques have been mentioned in the literature for recording impression of edentulous ridges. These techniques have been classified by different authors as functional, mucostatic, mucocompressive, selective pressure, minimal pressure etc. The selective pressure theory 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 displace ability of the supporting tissues and hence transferring the load over to the selected areas of the seat.

REFERENCES:

1. Boucher CO. A critical analysis of mid century impression techniques for full dentures. J Prosthet Dent 1951; 1: 472-90.
2. Collett HA. Complete denture impressions. J Prosthet Dent 1965; 15: 603-14.
3. Page HL. Mucostatics: A principle not a technique. Chicago, 1946.

DOI: 10.14260/jemds/2014/3020

4. Portar CG. Mucostatics: A panacea or propaganda. J Prosthet Dent 1953; 3: 464-66.
5. Starcke EN. Historical review of complete denture impression materials. J Am Dent Assoc 1975; 91: 1037-41.
6. Filler WH. Modified impression technique for hyperplastic alveolar ridges. J Prosthet Dent 1971; 25: 609-12.
7. Glossary of prosthodontics (7th ed). J Prosthet Dent 1999; 81: 48-110.
8. Bernard L. Impressions for complete dentures. Quintessence Pub Co 1984; 69-77.
9. Milo V, Kubalek MV, Bufington BC. Impressions by the use of sub atmospheric pressure. J Prosthet Dent 1966; 16: 213-23.
10. Devan MM. Basic principles in impression making. J Prosthet Dent1952; 2: 26-35.
11. Hyde TP, Craddock HL, Blance A, Brunton PA. A cross-over Randomised Controlled Trial of selective pressure impressions for lower complete dentures. Journal of Dentistry 2010; 38: 853 – 858.
12. Jacqueline P. Duncan, Raghavendra S, Thomas D. Taylor. A selective-pressure impression technique for the edentulous maxilla. J Prosthet Dent 2004; 92: 299-301.

AUTHORS:

1. Arun Gupta
2. Parul Singhal
3. Pooja Negi

PARTICULARS OF CONTRIBUTORS:

1. Professor and Head, Department of Prosthodontics, RUHS College of Dental Sciences, Jaipur, Rajasthan, India.
2. Assistant Professor, Department of Prosthodontics, RUHS College of Dental Sciences, Jaipur, Rajasthan, India.
3. Post Graduate Student, Department of Prosthodontics, RUHS College of Dental Sciences, Jaipur, Rajasthan, India.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Arun Gupta,
A-275, Malviya Nagar,
Jaipur-302017, Rajasthan.
Email: gupta.drarun@gmail.com

Date of Submission: 28/06/2014.
Date of Peer Review: 29/06/2014.
Date of Acceptance: 10/07/2014.
Date of Publishing: 18/07/2014.