

# The selective pressure maxillary impression: A review of the techniques and presentation of an alternate custom tray design

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An impression in complete dentures is the first step in the fabrication of the complete denture prosthesis. Various theories have been proposed by different authors as to how to achieve an optimum impression in different ways. Among them the most accepted is selective pressure theory, which was advocated by Carl O Boucher. In the last few decades many authors have interpreted Boucher's selective pressure in various ways making it more complicated and difficult to follow. But all the authors proposed their concepts based on the available information of the underlying functional and histologic anatomy during their time.

This article reviews the various ways of achieving selective pressure as seen by different authors and also includes a custom tray design to achieve selective pressure, which is based on the newer concepts of the stress bearing and relieving areas in the maxillary edentulous impression procedures.

**Key words:** Escape holes/ relief holes/ vent holes, relief areas, selective pressure impression, spacer design, stops, stress-bearing areas

The selective pressure technique is based on the selective pressure theory, which was proposed by Carl O. Boucher.<sup>[1]</sup> It combines the principles of both pressure and minimal pressure technique. The philosophy of selective pressure technique is that certain areas of the maxilla and the mandible, by anatomy, are better suited to withstand loads from the forces of mastication and at the same time there are certain areas, which cannot withstand such forces due to its underlying anatomy and thereby need to be relieved.

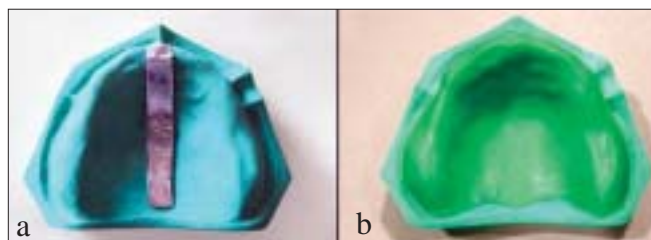
Selective pressure can be achieved either by scraping of the primary impression in selected areas or by fabrication of a custom (special) tray with a proper spacer design and escape holes (relief). The latter is more reliable because of the accuracy with which we can achieve variable thickness of impression material (because of variable thickness of wax spacer) and thereby achieve variable compression of tissues at different areas (selective pressure at selected areas).

## VIEWS OF DIFFERENT AUTHORS ON 'HOW TO ACHIEVE SELECTIVE PRESSURE IMPRESSIONS?'

A. Roy Mac Gregor<sup>[2]</sup> recommends placement of a sheet of metal foil in the region of incisive papilla and mid palatine raphae. He also says that the other areas that may require relief are maxillary rugae, areas of mucosal damage, buccal surface of the prominent tuberosities. Finally he concludes that the relief should not be used routinely in the dentures [Figure 1a].

Neill<sup>[3]</sup> recommends adaptation of 0.9 mm casing wax all over except PPS area [Figure 1b].

Heartwell<sup>[4]</sup> mentions two techniques for achieving selective pressure for maxillary impressions. In the first technique he makes the primary impression with impression compound with a non perforated stock tray, the borders are refined, later space is provided in selected areas by scraping of the impression compound. In the second technique, he recommends



**Figure 1:** (a) A. Roy Mac Gregor's design, (b) Neill's design

fabrication of a custom tray (but did not mention about the wax spacer). Border molding is done with low fusing compound. He recommends placement of five relief holes on the palatal region, (Three in rugae area and two in glandular region) before making the secondary impression with ZOE paste. !

Boucher<sup>[5]</sup> recommends placement of one mm base plate wax on the cast except posterior palatal seal (PPS) area. He mentions that this PPS area will act as guiding stop to position the tray properly during the impression procedure. He also mentions about the placement of escape holes with no.6 round bur in the palate [Figure 2a].

Morrow, Rudd, Rhoads<sup>[6]</sup> recommends to block out undercut areas with wax and then adapt a full wax spacer two mm short of the resin special tray border all over. Then he recommends placement of three tissue stops (4x4 mm) equidistant from each other [Figure 2b].

Sharry<sup>[7]</sup> recommends adaptation of a layer of base plate wax over the whole area outlined for tray (even in PPS area). He recommends placement of four tissue stops (two mm in width located in molar and cuspid region which should extend from palatal aspect of the ridge to the mucobuccal fold) and one vent hole in the incisive papilla region before making the final impression with the metallic oxide impression material [Figure 3a].

Bernard<sup>[8]</sup> recommends a layer of pink base plate wax (about two mm thick) attached to the areas of the cast that usually have the areas of the softer tissues; he recommends placement of wax spacer all around, except the posterior part of the palate which according to him are at right angles to the occlusal forces [Figure 3b].

Sheldon<sup>[9]</sup> describes two techniques. In the first technique the primary impression is made with low fusing modeling compound (Kerr white cake compound). The borders are refined with Kerr green stick compound. Once the operator is satisfied with the retention, selective relief is accomplished by scraping in the region of incisive papilla, rugae and mid palatal areas. In the second technique he describes of making an alginate primary impression. A primary cast is poured. After analysis of cast contours, undercuts are blocked out. Later he recommends the placement of spacer or pressure control (but did not mention about the wax spacer design). Border molding is done with green stick compound before making the secondary impression with ZOE paste. !

Halperin<sup>[10]</sup> recommends the 'Philosophy of the custom impression tray with peripheral relief'. According to his philosophy the slopes of the ridges are considered to be the primary stress bearing areas and therefore these areas are functionally loaded with compound during making of the final impression. Moreover he !

says that there is no need to make a wash secondary impression as he considers the tray surface and the border-moulded areas as the final impression surface.

Though there is exhausting literature on impressions in complete dentures very few have mentioned the selective pressure spacer design, which is a most reliable method of producing selective pressure impressions. The spacer design for the selective pressure is directly governed by the knowledge of the stress bearing areas (areas where pressure can be applied) and the relieving areas (areas where pressure should not be applied). According to the present concepts the stress bearing areas in the maxillary arch are the crest of the alveolar ridge<sup>[4,11]</sup> and the horizontal plates of the palatine bone.<sup>[12,13]</sup> The relieving areas are midpalatine raphae and the incisive papilla. Taking these into consideration we have come out with the following spacer design for the maxillary arch.

## ALTERNATIVE CUSTOM TRAY DESIGN TO ACHIEVE SELECTIVE PRESSURE MAXILLARY IMPRESSIONS

Certain amount of space is always necessary for the impression material (Zinc oxide eugenol paste or light body rubber base impression material) as the tissues would always be compressed to a certain extent during the preliminary impression, be it impression compound or irreversible hydrocolloids. Therefore a thin sheet of wax {(0.4 mm major connector wax (Renfert, Germany) [Figure 4]} is required to be placed in all the areas except the posterior palatal seal area, as this area requires to be compressed during the border molding procedures. !

A 1.5 mm modeling wax (Deepthi modeling wax, India) is adapted on top of the already adapted wax sheet. Remove the modeling wax in the region of crest of the alveolar ridge and the horizontal plates of the palate, as these are the stress bearing areas, as shown in Figure 5.

The next step is the fabrication of tissue stops, which needs to be four in number located in the canine and molar region [Figure 6]. Fabricate the special tray with auto-polymerized acrylic resin in the usual manner. After completion of the border molding, spacers is removed and relief holes are placed in relieving areas for further relief. Frank<sup>[15]</sup> has shown that the least displacement will occur when an impression tray has relief space and escape holes [Figure 7a, b]. The above-mentioned spacer design is for patients with no abnormalities or who are considered to be having healthy basal seat areas. But in some clinical situations where the mucosa over the ridge or the palate is hyperplastic or flabby, severe undercuts, tori, etc.; an additional layer of wax can be added in these !

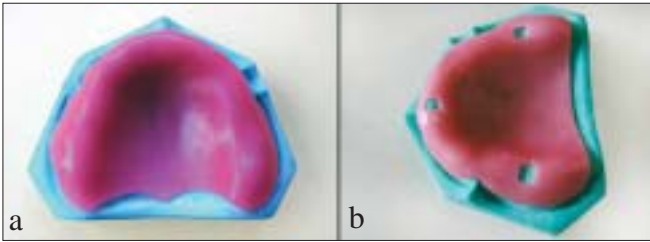


Figure 2: (a) Boucher design, (b) Morrow, Rudd, Rhoads design

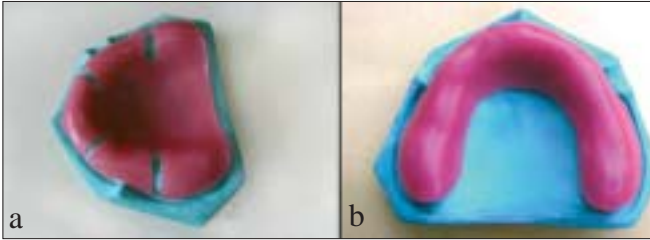


Figure 3: (a) J.J Sharry's design, (b) Bernard Levin's design

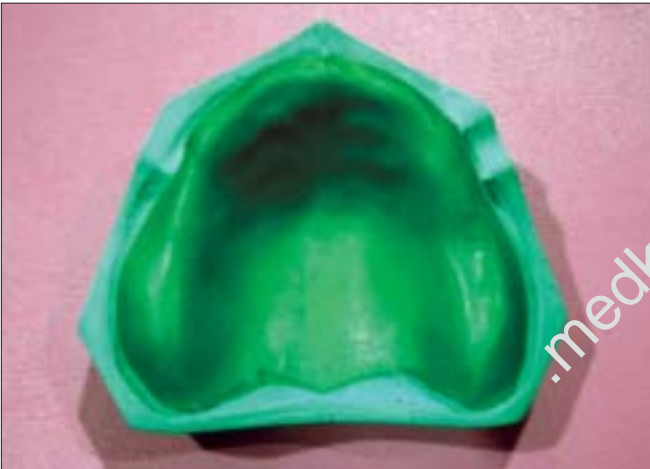


Figure 4: Adaptation of 0.4 mm wax



Figure 5: Modeling wax removed in the regions of crest of the alveolar ridge and the horizontal plates of the palate



Figure 6: Completed spacer design with wax cut in four areas located in the canine and molar region for tissue stops

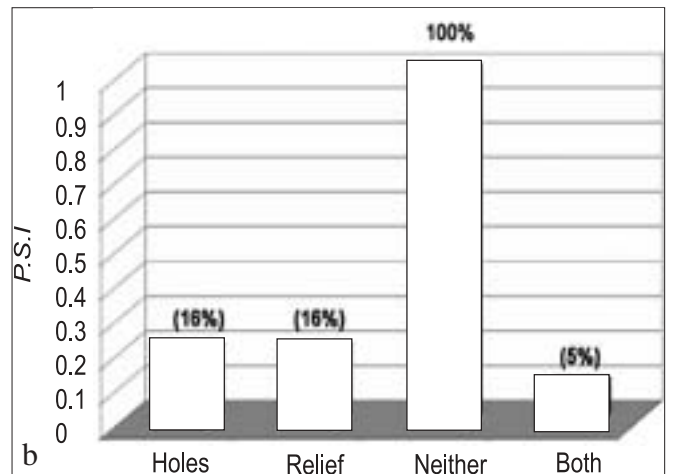
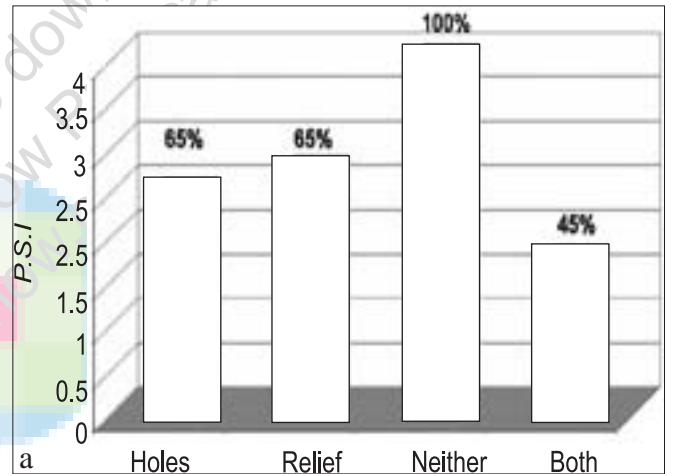


Figure 7: (a) Graph showing initial pressures during mechanical tray seating, (b) Graph showing end pressures during mechanical tray seating

regions. In cases of inoperable severe hyperplastic tissues over the ridge an open tray technique is to be followed to obtain maximum relief.

## DISCUSSION

De Van's dictum 'Our objective is perpetual ! preservation of what remains rather than the meticulous ! restoration of what is missing', has never been ! challenged or disproved. Keeping this in mind while ! making impressions, one should apply pressure ! selectively only in certain areas, which can withstand ! the forces of mastication to minimize the possibility ! of soft tissue abuse and bone resorption. Much is said ! about selective pressure impressions, but not much ! is taught as to how to achieve it. The best way to ! achieve selective pressure impression is by the use of ! a custom tray with a proper spacer design. Keeping ! these things in mind we have come out with the ! above mentioned alternative spacer design, which ! is according to the current concepts of the stress ! bearing and relieving areas in the maxillary edentulous ! impression procedures.

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