The International Journal of Engineering and Science (IJES)

|| Volume || 7 || Issue || 12 Ver.I || Pages || PP 79-82 || 2018 ||

ISSN (e): 2319 – 1813 ISSN (p): 23-19 – 1805

Vacuum Measurement Technique on Edentulous Upper Jaw

Dobromira Shopova[1]

[1]*Assistant Professor, Department of Prosthetic Dentistry, Faculty of Dental Medicine, Plovdiv, Bulgaria*
Corresponding Author: Dobromira Shopova (dent.shopova@gmail.com)

----------***ABSTRACT***----------

Complete edentulizmis a wide-spread problem in nowadays old society. Creating vacuum during the process of impression taking is an informal method for quality. The vacuum or the negative pressure has to be obtained and between soft tissues and denture base. The level of the vacuum depends of anatomical features of the prosthetic field and it is related to border molding technique and the type of impression materials. With this new technique the negative amount of the vacuum can be measured in bar units.

KEYWORDS: *vacuum measurement, vacuum technique, edentulous maxilla.*

Date of Submission: 20-12-2018 Date of acceptance: 04-01-2019-

---

I. INTRODUCTION

Impressions for complete dentures fabrication can be made by minimal (mucostatic), maximal (biting) and functional pressure. Minimal pressure technique does not affect of a normal blood supply and tissue-fluid circulation, but border zone can not be impressed correctly. The aim of a maximal pressure technique is to improve the border seal. The functional pressure technique is a successful solution to the problems with harmful pressure and incorrect impressing of the border areas (1). Selective pressure concept is advocated by Boucher in 1950. It combines the mucostatic and mucocompressive techniques. The mucosa of the alveolar ridges is thicker and stands to the pressure, whereas the mucosa, covering the palate and a midline is thin and non-resilient (2). The greatest value was measured on the midline, followed by palate slopes and alveolar ridge (3). According to another study, the greatest value was in papilla incisive, distal part of the midline and the deepest part of the palate (4). According to this concept, it was made custom trays with different design to relieve the stress-bearing area – with relief (vent) holes, spacers, stops in the canine and first molar zones (5).

The value of the pressure depends of the type of impression materials. The pressure is not equal during the elastification of the materials. It decreases with almost 50% during the pressure of 0,5 kg (6). In similar study, with pressure 1 kg/cm^2 the decreasing was more than 80 % (7).

II. RESEARCH METHOD

For the clinical testing, a special method for measuring the vacuum was created. The vacuum is informal indication for a good impression. For the purpose of the study, special custom tray by authors design was created.

The special tray was made on an anatomical model with a light cured custom tray material. The vestibular edges of the tray was 2 mm less than the gingiva-buccal sulcus of the gypsum pattern. Instead of a classically shaped handle, a sloping surface about 1.5 cm wide, covering approximately the area of the frontal teeth, was designed. This modification was necessary to ensure the smooth joining of the adapter and the elastic tubing connected to the pump. Therefore, the size and position of this sloping surface used for the handle varied depending on the depth of the palate and the position of the adapter. A circular hole, 7 mm in diameter was made on the midline by pressing the metallic part of the adapter, which secured the same 90-degree adapter 7 mm (Figure 1). For better retention between the photopolymer plate and the hot silicone, which are chemically incompatible, mechanical retentions of 0.7 mm wire for orthodontic purposes were made which were fixed around the palatal opening in the light-curing base plate prior to polymerization.

The custom tray thus formed (level of vestibular edges, inclined surface, palatal opening and retentions) was subjected to one-stage light polymerization. The grooves on the side of the adapter were also used for mechanical retention (Figure 2). The final bonding was performed by hot silicone for technical purposes, which sealed the hermetically sealed space between the photopolymer plate and the adapter, and tightly coupled individual parts of the custom tray designed for clinical vacuum measurement during the border molding procedure (Figure 3).

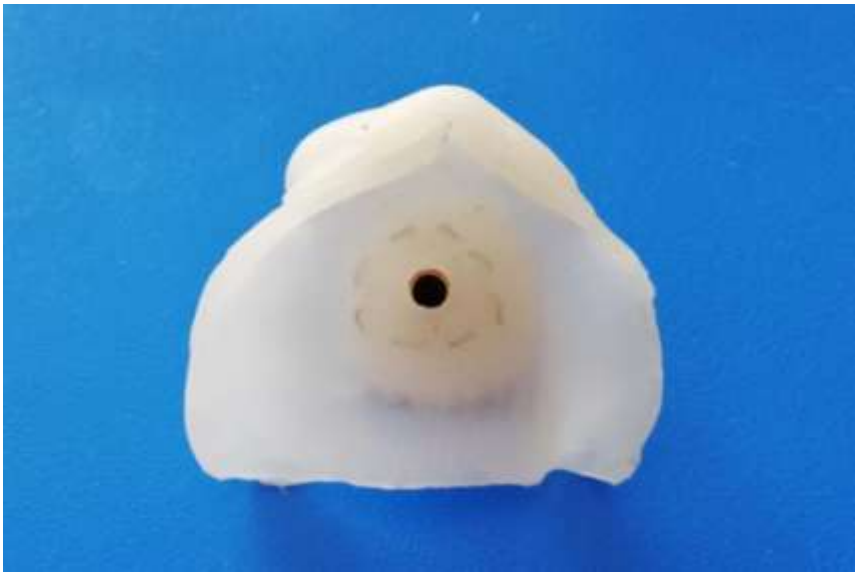

Fig. 1. Internal palatal surface of the designed custom tray

Fig. 2. Palatal surface of the custom tray with mechanical retentions before fixation of the adaptor

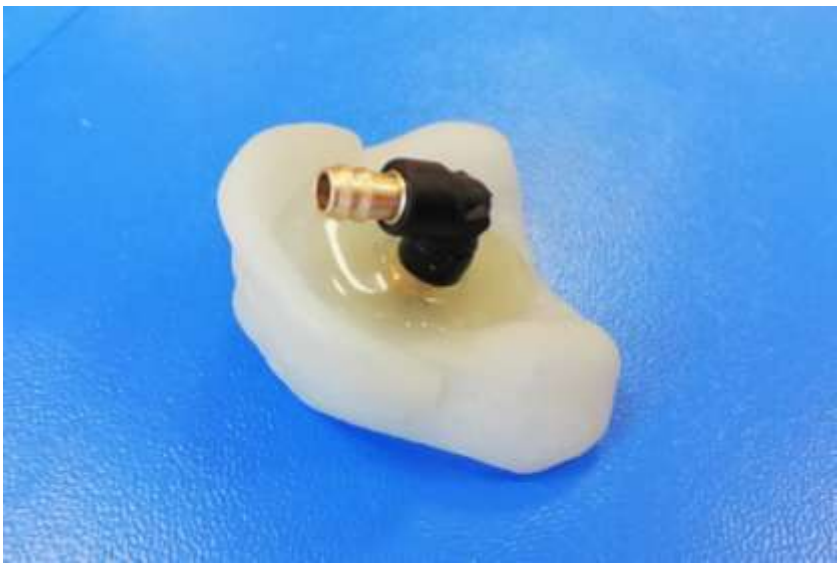

Fig. 3. Palatal surface of the custom tray after fixation of the adaptor with hot silicone

For the creation and measurement of the vacuum, a combined vacuum and pressure pump consisting of the following elements was used (Figure 4):

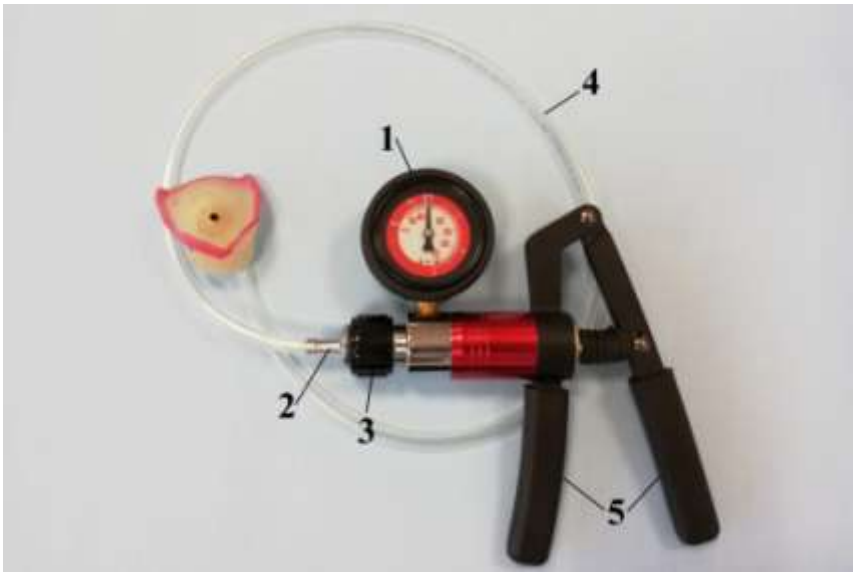

Fig. 4. Vacuum/ pressure pump
1 - Pressure Gauge
2 - Working Part
3 - Ring To Change The Operating Mode
4 - Elastic Tube
5 – Handles

- ✓ Pressure gauge with a vertical zero value with maximum values of 3 bar for pressure and -1 bar for vacuum (negative pressure) (point 1 of figure 4)
- ✓ The working or the outgoing part - with conical shape and transverse retentions for a more stable fixation of the elastic tube (point 2 of figure 4)
- ✓ A plastic ring - sealed in its inner part by a rubber ring, which serves to change the mode of operation - creates a vacuum in extreme external position, in extreme internal - pressure (point 3 of figure 4).
- ✓ 6 mm flexible tube - for connecting and operating the pump and the individual impression tray (point 4 of figure 4).
- ✓ Handles for vacuum or pressure creation (item 5 of figure 4).

III. TECHNIQUE VIEW

For each patient, four individual impression trayswith a palatal adapter were made. Following chemical disinfection of the elements via *Zhivasept rapid*, the composition was clinically administered. First, silicone materials were tested because of their easy removal and cleaning of the custom tray. After manual mixing of the components of the condensation silicone *Sta-seal f(Detax)*(base mass and activator on drops), the impression mass was shaped like an elongate cylinder and placed at the edges of the individual tray. Next positioning, pressing and performing the functional tests on Herbst. It was necessary to wait for their final elasticity. Next step was to connect the elastic tube with the metal part of the adapter. The custom tray was held gently throughout the manipulation because the connecting tube was moderately rigid and there was a risk of shifting. The other end of the elastic tube was previously connected to the combined pump.

Vacuum suction was achieved until a stable and unchanging value of the pressure gauge was reached. Once the vacuum has been measured, to release the tray from the patient's mouth, the pump has to be switched to a pressure mode and, after repeated pumping, the system is painlessly desiccated (Figure 5).

Fig. 5. Clinical setup of vacuum measurement after border molding of the custom tray of complete edentulous upper jaw

The same procedure was repeated with the additive silicone *Detaseal function (Detax)*. In this case, the two constituent components were of the same viscosity as that of the main mass of the condensation silicone Sta-seal f.

After the silicone impression materials, the thermoplastic impression materials *(GC Iso functional sticks (GC), Impression Compound green sticks (Kerr))* were placed on the edge of the individual custom tray after heating the alcohol lamp.

IV. CONCLUSION

This measuring technique can be used with different impression materials, various functional tests, not only Herbst's tests, and one- or two-phases impression techniques. It is possible to test different impression materials on one patient and by the measured vacuum to compare their properties.

REFERENCE

[1]. El-Khodary, N. M., N. A. Shaaban, and A. M. Abdel-Hakim. "Effect of complete denture impression technique on the oral mucosa." The Journal of prosthetic dentistry 53.4 (1985): 543-549.

[2]. 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

[3]. Rihani, Awni. "Pressures involved in making upper edentulous impressions." The Journal of prosthetic dentistry 46.6 (1981): 610-614.

[4]. Iwasaki, Masatoshi, et al. "Pressure dynamics in the trays caused by differences of the various impression materials and thickness of the relief in the maxillary edentulous model." Journal of prosthodontic research 60.2 (2016): 123-130.

[5]. Shetty, Sanath, P. VenkatRatna Nag, and Kamalakanth K. Shenoy. "The selective pressure maxillary impression: A review of the techniques and presentation of an alternate custom tray design." The Journal of Indian Prosthodontic Society 7.1 (2007): 8.

[6]. Fouladi, T. Imani, et al. "In Vitro Effect of Vent Size and Spacer Thickness on Pressure Produced during Maxillary Edentulous Impression Making by Different Impression Materials." Journal of Islamic Dental Association of IRAN (JIDAI)28.1 (2016): 1.

[7]. Chopra, Sakshi, et al. "Comparative evaluation of pressure generated on a simulated maxillary oral analog by impression materials in custom trays of different spacer designs: An in vitro study." Contemporary clinical dentistry 7.1 (2016): 55. ContempClin Dent. 2016 Jan-Mar; 7(1): 55–60. DOI: 10.4103/0976-237X.177108