

Pneumatic impression: Improving dental arch impression with an inflatable balloon

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Abstract

Purpose: The purpose of this impression technique is to overcome the problem associated with restricted mouth opening in association with high arched palate by employing pneumatic impression technique using latex balloon.

Methods: A stock tray was modified with auto polymerizing acrylic resin. On the modified tray, a latex balloon was attached with aid of cyanoacrylate. The outlet of the balloon was then connected to a clinical sphygmomanometer bulb with the rubber pipe for air passage which would aid in inflating the balloon. The prepared tray assembly was then equipped for recording the impression. An adequate amount of addition polysiloxane impression material, sufficient to cover the entire area of the balloon was loaded onto the tray. The balloon was then inflated with the help of a sphygmomanometer bulb which transferred the air only in one direction. On completion of setting time of the impression material, the air pressure was relieved by deflating of balloon which helped in the easy removal of the impression. The impression was subsequently removed from the oral cavity and disinfected.

Conclusion: This novel technique was helpful for recording impression in patients presenting with restricted mouth opening and high arched palate.

Key Words: Balloon, dental arch impression, high arched palate, pneumatic impression, restricted mouth opening, sphygmomanometer

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Received: 11th December, 2015, **Accepted:** 27th April, 2016

INTRODUCTION

Dental impression procedures may pose a challenge to the dentist as well as be an exhausting procedure for patients under certain circumstances.^[1] These situations may include restricted mouth opening,^[2,3] presence of high arched palate, exaggerated gag reflex, etc., In these exasperating situations, achieving a good, and reliable outcome can be

difficult. These conditions may necessitate innovation in the existing impression techniques to make the clinical procedure convenient for the dentist and patient without compromising on the accuracy. These innovations can also be assisted by utilizing advanced impression trays^[4,5] and impression material. In this article, an impression technique is discussed for a preliminary purpose which utilizes a

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Quick Response Code: 	Website: www.j-ips.org
	DOI: 10.4103/0972-4052.186401

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How to cite this article: Gupta L. Pneumatic impression: Improving dental arch impression with an inflatable balloon. *J Indian Prosthodont Soc* 2016;16:311-4.

customized balloon impression tray using the principle of pneumatic mechanics.

CLINICAL CASE

An 18-year-old female patient reported to the Department of Prosthodontics with the chief complaint of missing teeth. On intraoral examination, high arched palate was observed with uncoordinated mandibular movements as a consequence of the patient was suffering from a neurological disorder [Figure 1]. It was also found that the patient had restricted vertical mouth opening of 15–20 mm. These signs were foreseen to be problematic while making impressions in a conventional manner. The high arched palate present in the patient further hampered the dentist's requirement of recording an ideal impression. The customized balloon impression tray appears to have been made in an attempt to optimize dental impression under the conditions presented by the patient.

Technique for impression

The key for a successful prosthesis is an accurate impression, as the prosthesis that is fabricated in the laboratory is only as accurate as the impression made.

Steps

- The stock tray was modified by reducing the height of the flanges and removal of the palatal part of the tray. The trimmed tray devoid of the palatal extension was attached with a flat acrylic palatal plate with auto-polymerizing resin. The flat palatal part thereby enabled the attachment of a latex balloon over it
- The latex balloon selected for attachment was tube-shaped so as to ensure proper adaptation to the palate when inflated and not expand horizontally to a considerable extent. The selected latex balloon was then attached with cyanoacrylate on the flat palatal plate of the impression tray [Figure 2]. In case of latex allergy nonlatex balloon can be used as an alternative
- The outlet of the balloon was then connected to a clinical sphygmomanometer bulb with the rubber pipe for air passage which would aid in inflating the balloon
- The prepared tray assembly was now equipped for recording the impression. Minimal amount of addition polysiloxane impression material sufficient enough to cover the entire area of the balloon was loaded onto the tray. The tray was then positioned inside the oral cavity with no pressure being applied toward the palate
- The balloon was then inflated with the help of a sphygmomanometer bulb and deflation was prevented by locking the knob of the sphygmomanometer bulb [Figure 3]



Figure 1: Intraoral photograph showing deep palate



Figure 2: Customized balloon impression tray



Figure 3: Impression recording with sphygmomanometer bulb

- The balloon was inflated till the adequate amount of pressure was applied until the patient expressed a feel of the expanding balloon over the palate. The pressure was maintained until the impression material had set
- On completion of setting time of the impression material,

the air pressure was relieved by deflating the balloon which helped in the easy removal of the impression. The impression was subsequently removed from the oral cavity and disinfected for cast fabrication [Figures 4 and 5]

- Cast was poured with balloon in inflated state using multiple pours to reduce flow and permanent deformation [Figure 6].

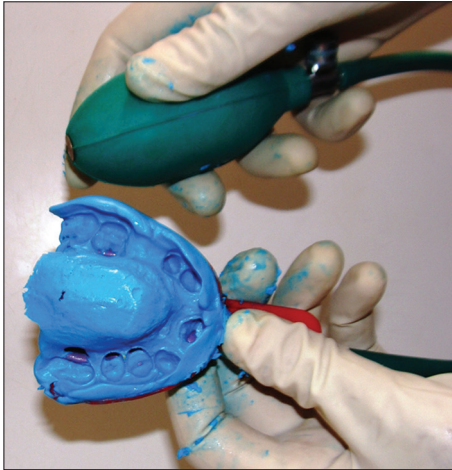


Figure 4: Polysiloxane maxillary impression

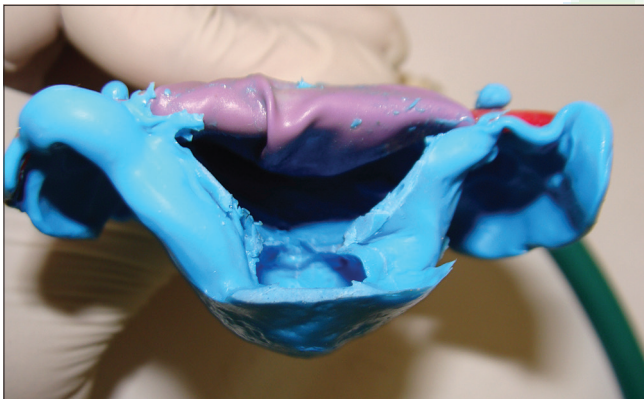


Figure 5: Maxillary impression showing deflated balloon



Figure 6: Maxillary cast

DISCUSSION

Palatal adaptation of the prosthesis may be influenced by the anatomic morphology of the palate^[6,7] and the technique used to record the same. The impression procedure plays a vital role in recording any altered morphology of the palate^[8] frequently encountered in various neurological disorder and syndromes. In the present case along with a morphological variation of palate, limited mouth opening was also a major problem which would cause an impediment to the impression procedure.

The technique is useful in preventing gag reflex by reducing the amount of loaded impression material for a patient with a deep palate which usually under normal circumstances required more material. High arched palate impression techniques are very minimal in the literature. In 2008 Nandini *et al.*,^[9] have mentioned that If the patient has a high palatal vault, tracing stick compound can be used in the center of the maxillary tray to record the palatal depth, however, in the present case, due to restricted mouth opening extending the palatal part of the tray is not advisable.

The basic promise of the technique is to reduce the amount of impression material used, by accommodating an inflated balloon into the palatal space. The basic principle behind this impression technique is the pneumatic mechanics which works or operated by air or gas under pressure. The sphygmomanometer bulb is used in the present technique because the inflation-deflation mechanism allows transfer of air in or out, either direction, in a controlled manner by means of the control valve,^[10] thereby maintaining the balloon in a desirable state to adapt to the shape of the palate to be recorded. The balloon selected for this technique was tube-shaped which when inflated aided in restricting the impression material to flow only toward the palate and not toward the throat thereby negating a gag reflex. Addition polysiloxane impression material with good elastic recovery^[11,12] was selected which enabled the easy removal of the impression from the mouth without any loss of detail and also maintained its shape after the deflation of the balloon. To reduce flow and permanent deformation, cast was poured with balloon in the inflated state using multiple pours. The inflation or deflation of the balloon can be sustained by counting the pumps manually or by keeping the gauge (manometer) reading in mind. In the present technique, manual counting was done to retain the shape of the inflated balloon after each deflation. However, the limitations of technique involves the application of pressure during inflation which is subjective, variation depending on tactile sensation of the patient and concerns regarding dimensional accuracy of the impression after deflation of the balloon which requires further studies. Nevertheless, conditions such as those mentioned

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earlier, this preliminary impression technique might favor the dentist in treating the patients prudently.

CONCLUSION

It is often difficult to apply conventional clinical procedures to record impressions in patients who demonstrate neurological problems, syndromes, and cleft palates. For the patient shown above customized balloon impression tray along with modification of the routine impression, procedure helped in overcome many clinical difficulties.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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