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Impression Techniques for Presurgical Nasoalveolar Molding (PNAM)

Dr. Apurva Vaidya[1], Dr. Ankur Sharma[2], Dr.Ankita Gill[3], Dr. Nupur Kalia[4], Dr Eden Therese Bhutia[5], Dr Aditi Chauhan[6]

[1,3,4,5,6] PG Student, Department of Pedododontics & Preventive Dentistry, HIDS, Paonta Sahib, Himachal Pradesh, India.
[2]MDS(Orthodontics and Dentofacial Orthopedics), Private practitioner at Chamba Smiles, Chamba, Himachal Pradesh,

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ABSTRACT

Presurgical Nasoalveolar molding have become an important procedure before proceeding with the surgical procedures for cleft lip and palate patient. PNAM reduces the size of the cleft which helps in better approximation and minimal scar formation.. To achieve this all proper tray selection is necessary and is a basic step in taking the impression of an infant. This article attempts to describe the various impression trays that can be used for the cleft patients routinely.

Keywords: PNAM impression techniques, PNAM impression trays, nasoalveolar molding, cleft patient trays, presurgical nasoalveolar molding, cleft lip and palate.

INTRODUCTION

Presurgical nasoalveolar molding (PNAM) is a non-surgical method of reshaping the gums, lips and nostrils by redirecting the forces of natural growth prior to CLP surgery, thus lessening the severity of the cleft. Before the introduction of the concept of PNAM, repair of a huge cleft involved several surgeries between birth and 18 years of age, setting the child at risk for emotional and social adjustment problems. With the advent of PNAM multiple surgical procedure is bypassed, and better results are obtained, with only one or two surgeries.[1] It also allows for correction of the flattened nose prior to surgery and facilitates nose repair at the time of lip repair.[2]

"Pre-surgical Nasoalveolar Moulding (PNAM)" was earlier known as "Pre-surgical orthopaedics" that just aimed at reducing the distance between the cleft elements to help make surgical correction easier and reduce post-surgical breakdown.[3]

In past decade, it has been made known that improvement of nasal abnormality by elongating of the nasal mucosal lining, and attainment of nonsurgical columella lengthening can be united with shaping of the alveolar process in these patients.[1]

Grayson and Cutting reported that the hyaluronic acid levels were found to be increased in the neonatal tissue till about 45 days even after birth. Therefore, the innate molding tendency of neonatal matrix is higher.[4]

PNAM works on the principle of "Negative sculpturing" and "Passive molding" of the alveolus and adjacent soft tissues. In passive molding, custom made molding plate of acrylic is used gently to direct the growth of the alveolus to get the desired result later on. While in negative sculpturing serial modifications are made to the internal surfaces of the molding appliance with addition or deletion of material in certain areas to get desired shape of the alveolus and nose.[2]

Tray selection is the most integral aspect during the impression making of a cleft patient. The use of a special, individual impression tray is required for impression-taking in an infant with cleft lip or palate.[5]

Considerations for tray selection;-

- The impression tray should be of enough size transversely, to include the lateral maxillary segments, to posteriorly cover up to the maxillary tuberosities and to provide a good reproduction of the mucobuccal folds.
- The anterior tray border is not critical, as the impression material flows forward far enough to cover the structures as the tray is seated.

- Rimming of the entire tray with utility wax has been suggested to provide an additional bulk of material laterally, to avoid the sharp edges of the tray and also to provide a posterior dam to prevent the material from seeping posteriorly.[6]
- A good high vaccum suction is of utmost importance.
- Four handed dentistry is almost always necessary to restrain unwanted movements of the newborns head, hands and legs.
- Breast feeding is advised after, rather than before, the procedure as vomiting and aspiration is of concern.[7]

Polymethylmethacrylate Tray[5]

Trays made of plastic such as polymethylmethacrylate (e.g., OrthocrylH) have been used up to now.[Figure 1]

Figure: 1 ***Polymethyl methacrylate tray***

Disadvantage

After sterilization, impression trays made of polymethylmethacrylate crack, which causes plastic particles to break off, resulting in a sharp tray.[Figure 2]

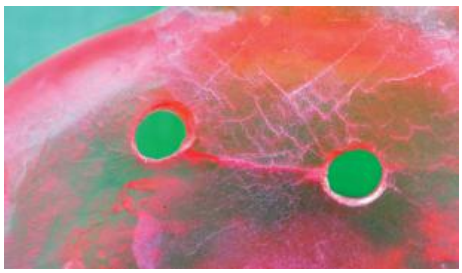


Figure: 2 ***crackling and cracks in the surface***

Impression trays made from polymethylmethacrylate are altered in shape and consistency when autoclaved during the sterilization process to be fabricated a fresh at regular intervals.

The individualized impression trays fabricated from polymethylmethacrylate were sorted by cleft site (bilateral, unilateral left or right, isolated cleft palate) and supplemented with additional shapes and sizes, providing a choice of 11 different tray sizes for each cleft form. [Figure 3].

Figure: 3 ***Conventional impression trays made of polymethylmethacrylate***

Ks-Impression Trays[5]

Unlike polymethylmethacrylate impression trays, the KS-impression trays (KS-AbformloffelH; Dietzel and Roesch, Dental GmbH, Forchheim, Germany), *made of chromium-cobalt-molybdenum alloy*, can be cleaned and sterilized with the procedures normally used in a dental practice and recommended by the Robert Koch Institute.

The new trays made of chromium-cobalt-molybdenum alloy are available in four basic forms in 11 different sizes [Figure 5] and can be used routinely when *taking maxillary impressions* of infants with cleft lip and palate.The KS-Impression tray (KS-Abformlo¨ ffel) proved effective in Dental Clinic 3–Orthodontics, Erlangen-Nuremberg University Hospital, Germany.

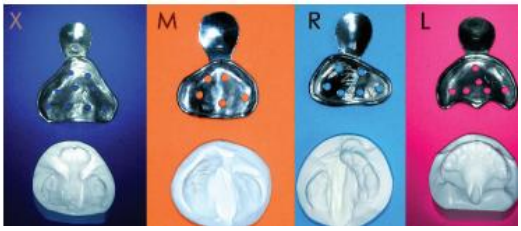


Figure: 4 ***Tray forms with corresponding examples of casts***

TRAY DESIGNATION BY CLEFT TYPE

Cleft Type	Tray Designation & Size
Right-sided	R 1- R11
Left sided	L 1- L 11
Bilateral	X 1- X 11
Median	M 1- M 11

(a) **(b)**

Figure: 5 (a) ***Eleven tray sizes (b) Impression making using KS Impression trays***

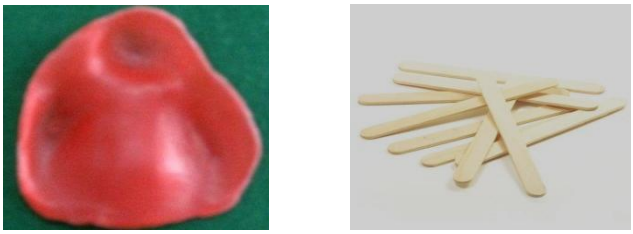
Primary Impression Tray Made From Other Size Casts[8]

Jacobson BN and Rosenstein SW suggested that a set of perforated custom acrylic trays of different shapes and sizes, both unilateral and bilateral, can be easily made from different size casts, or size and shape can be roughly estimated and trays individually trimmed and perforated with large round bur. As an alternative. Manufactured trays of different shapes and sizes may be modified as required.

Figure: 6 ***Perforated custom acrylic trays***

Wax & Ice Cream Sticks As Primary Impression Tray[6]

Shatkin and Stark have described the use of wax as impression trays in cleft lip and palate patients. Ice cream sticks can also be used to carry materials for infant impressions.



(a) **(b)**

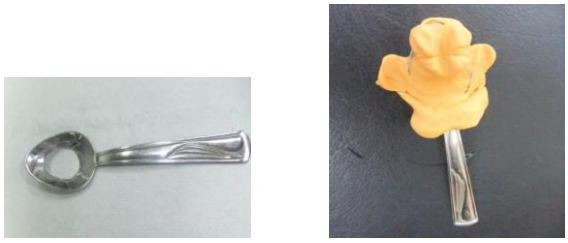
Figure: 7 Impression trays using (a) wax (b) Icre cream sticks

Tray From Preliminary Compound Impressions Of The Patient's Maxilla[9]

According to Lipp MJ and Lubit EC trays can be fabricated with preliminary compound impressions of the patient's maxilla. The impression should be poured up immediately with the use of quickset plaster. The working cast is then covered with a single layer of softened pink base plate wax. A fast-set acrylic material, placed over the wax, forms a custom tray with a handle. ***With the addition of layers of wax to the working cast, a collection of stock trays of various sizes can be made.***

Teaspoon As Primary Impression Tray[10]

Akay etal sterilised teaspoon with a hole in the middle and used it for the first impression. Heavy-body impression material (Zetaflow; Zhermack, Badia Polesine, Italy) was loaded into the modified spoon tray; after the material had set fully, the tray was removed from the oral cavity.The modified metal spoon tray can be sterilised easily, preventing any risk of cross infection. ***This characteristic is an advantage over stock poly (methyl methacrylate) impression trays, which can become deformed with autoclave sterilisation.*** *Although this procedure is not applicable in all infants, it can be considered an alternative method of obtaining an initial impression.*



(a) **(b)**

Figure: 8 (a) ***Modified tea-spoon impression tray (b) Preliminary impression of the infant***

Back Of The Small-Sized (U-0) Impression Tray [11]

According to ravichandra KS etal the back of the small-sized (u-0) impression tray is used in delivering the impression material. The impression tray is filled with wax and covered with guaze piece material and then loaded with impression material. When the material is fully set, the impression is to be removed and inspected to ensure that all the desired landmarks have been captured.

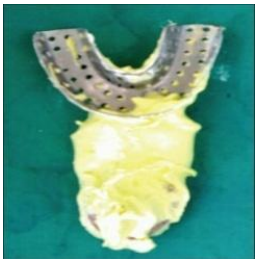


Figure: 9 back of the small-sized (U-0) impression tray

Gauze Piece Material & Finger As A Tray[12]

According to Vijayaprasad K E et al a gauze piece material was used to cover the finger and impressionmaterial was loaded for making *primary impression* when the material was fully set the impression was removed and inspected to see that all the desired landmarks have been captured.

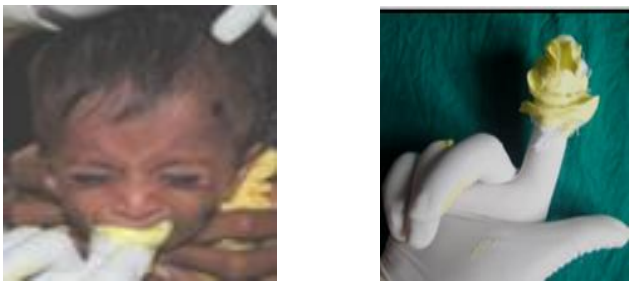


Figure: 10 ***(a)Impression Technique with finger (b) Inspection of the primary impression***

Alginate Spatula As An Impression Tray[13]

According to Moness Ali AM an alginate spatula was used to carry the impression material into the infant's mouth and the material *was gently pressed against the hard palate and into the buccal and labial vestibules*, while the baby was held in the mother's lap.

CONCLUSION

PNAM, when performed prior to primary lip repair causes less scarring after the surgical outcome thus enhancing the aesthetics. But to achieve all the Steps of PNAM, tray selection becomes the integral part as trays are modified according to the infant's mouth so as to obtain a close to perfect impression for the further steps of presurgical nasoalveolar molding.

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