Fabrication of a Feeding Plate for an Infant with Cleft : A Review

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Abstract

A child born with an orofacial cleft is made to face the challenge since the time of birth. As an infant, its first challenge is to be able to accept the feed which is of utmost importance to be prepared for the further challenges. A dentist can play a major role in making the task easier for the infant by providing a feeding plate/ feeding appliance. This is possible only if one knows to fabricate the appliance with the available materials. This article has nearly all the techniques clinically adopted by various authors in the field of dentistry, mentioned in it, to fabricate a feeding appliance. Thus, leaving you with choices to be made based on feasibility of technique and material.

Key Words: Feeding appliance, Cleft lip/Palate, Polyethylene sheet.

Introduction

Cleft lip and/or palate involving the face and jaws and, occasionally, cleft of other facial structures is the most common congenital defect.[1] Lip repair is frequently achieved by the time the infant is 2 to 6 months old, but due to the fact that early repair of the palate may hinder the growth and development of the maxilla because of the postsurgical scars, repair of the palate is usually delayed until 12 months to 2 years of age.[2] Adequate nutrition is required to prepare a neonate with cleft for a corrective surgery. However, the difficulty during feeding, due to cleft involving palate, takes a toll over the nutritional status of the newborn. Sucking reflex is not able to develop sufficiently due to oronasal communication thus leading to problem in creating a negative pressure.[3] Nasal regurgitation of oral liquid, frequent burping due to excessive air intake during deglutition and choking are some more problems seen while feeding a newborn with cleft. These feeding complications not only delay the development of the newborn but also create parental anxiety.[3,4,5,6]

Different approaches used to feed babies with cleft palate are orogastric and nasogastric tubes, specially designed feeding bottles with nipples having enlarged openings to allow the flow of formula with less effort. But the above mentioned approaches have their own limitations.[4,5] A feeding plate is one more option which is comparatively more beneficial. It is a prosthetic aid that helps the infant in creating a negative pressure required for sucking, corrects the tongue posture and helps it not only perform its functional role in the development of the jaws but also facilitates swallowing, stimulates the spontaneous growth of the maxillary segments toward each other by preventing the tongue from entering the defect and reduces the incidence of otitis media and nasopharyngeal infections by minimizing the passage of food into the nasopharynx are the other advantages of a feeding plate.[3,4,7,8]

There are different techniques based on materials for fabricating a feeding plate are being followed. This article has been manuscripted discussing the available and possible ways to fabricate a feeding plate. The different methods/ techniques being followed are

i. Acrylised feeding plate
ii. Vacuum-formed feeding plate

Most of the steps are similar with little modification in case of both techniques and has been described below in detail.

Primary Impression

i. Acrylised Feeding Plate

Primary impression (PI) can be taken with Alginate material or with heavy-body polysiloxane elastomer material. Polyvinyl siloxane elastomer is comparatively safer than alginate as the latter has a tendency to get fragmented, the remnants of which, if not taken care of may choke the infant.[9-13] Modelling Plastic Impression Compound has also been used for taking a PI, [14] but with the advancement of materials, overcoming the disadvantages of Impression compound, better materials were introduced to dentistry for impression making. Though Impression Compound has an advantage that in case of emergency it can be removed from the oral cavity even if the setting time is not over, the endangering disadvantage of this material is that it can lead to scalding or burns in infants as the material is thermoplastic.[13] Considering the advantages of impression compound, a judicious use of the material was done by Narendra et al (2013) while taking primary impression which was then used as a custom tray during secondary impression taking procedure, with an advanced material i.e. medium body addition silicone impression material for secondary impression.[14]

The positions that have been adopted for making cleft palate impression-making in infants includes prone,[15] face down,[16] upright,[17] and even upside down.[18] These positions are preferred as it prevents the accidental aspiration of the impression material. A trained assistant is always required to hold the infant in the desired safe position while taking the impression.

It is important to make sure that the baby is crying while the impression is being taken as this ensures a clear airway and to achieve the desired border moulding.[14] The trays used can be the handle of a zero number stock tray wrapped with a peice of gauze,[19] a custom made impression tray[20] or the clinician's finger with a gauze wrapped on the finger.[21]

The impression is then poured into working model using Type V dental plaster.[13]

ii. Vacuum-formed Feeding Plate

The considerations while making primary impression for fabricating vacuum-formed feeding plate is similar to that of acrylised feeding plate.

Custom Tray

i. Acrylised feeding Plate

The cleft in the palatal region in the working model is filled with wax to approximate the contour and a custom tray is prepared with cold cure acrylic material. The tray is then smoothened and polished.[19,21]

A custom tray can be prepared by using impression compound for the primary impression and then scrapping

off the intaglio surface by 0.5mm and the undercuts, for creating a room for loading the material for secondary impression.[14]

Observing the properties and fabrication of an appliance made of thermo-plasticized vacuum fabricated sheets, the secondary impression can be taken using the cast-adapted thermo-plasticized fabricated tray as a carrier for the secondary impression material.

ii. Vacuum-formed Feeding Plate

The custom tray to be prepared before secondary impression making for fabricating vacuum-formed feeding plate is similar to that prepared for acrylised feeding plate.

Secondary Impression

i. Acrylised Feeding Plate

Secondary Impression can be made with Alginate material or with heavy or medium-body polysiloxane elastomer material.[14,21,22] Medium body polysiloxane elastomer can be used when the impression has been made with modelling Plastic Impression Compound. The scrapping of the intaglio surface of the primary impression by 0.5mm and the undercuts has to be done before loading the medium body polysiloxane elastomer.[14]

The positions that have to be adopted is similar to as described during PI.

The master cast and a final working model is poured with type III dental stone.[13,14]

ii. Vacuum-formed Feeding Plate

Similar secondary impression steps that have been followed for making acrylic feeding plate have to be followed for making vacuum-formed feeding plate.

Final Fabrication of Feeding Plate

i. Acrylised Feeding Plate

Final fabrication of the feeding plate may be done with various materials like acrylic resin, vacuum formed polyethylene,[20,23] ethylene vinyl acetate.[24] Properties like lesser leaching-out of monomer from an heat cured acrylic appliance which can be allergic or toxic to the infant than that in case of cold cured acrylic appliance, more stability of size and shape with heat cured appliance than that with cold cured appliance, more finished surface of an heat cured acrylic appliance that that of the cold cured; heat cured acrylic is more preferable over cold cure acrylic.[13]

ii. Vacuum-formed Feeding Plate

Thermo plasticised or vacuum formed polyethylene feeding plate has many advantages like; very smooth surface of the appliance; no harmful or allergic ingredient which can harm the tissue of the infant; easy and less time consumption for fabrication; but functionally it is not as superior as the conventional acrylic feeding plate.[20]

Safety attachment in the Appliance

For helping in the retention and in order to avoid gagging or accidental swallowing, an 8 inch floss or silk thread can be tied to the feeding plate by either incorporating it in the plate during polymerization or by making a hole in the plate for tying the floss/silk thread. It is advisable to secure the the floss/silk thread on cheeks with a micro-pore tape.[14,20]

Modifications

For the Extension of Soft Palate

Conventional feeding plates are too rigid to have a synchronized movement with the soft palate if extended over it. This might even injure the soft palate.[7,25,26] Two techniques that have been adopted to serve the purpose are use of an obturating bulb of soft plastic attached to the acrylic part of the hard palate or a piece of tulle supporting a light body poly-siloxane material covered with tissue conditioner, in the extended portion of the feeding plate in the region of soft palate.[22,27] For the fabrication of such feeding plate, lac can be applied on the dental cast model and in the Biostar device. A 1- mm Bioplast clear plate (soft plate) is to be pressed on the model, and the plate is to be cut so as to cover the palatal vault and the cleft region to construct a flexible bulb obturating the cleft region. For attachment to the hard plate several retentive holes are made at the edges of soft plate. Acrylic resin was put on the retentive holes and a 2 mm Biocryl C Rosa-transparent plate (hard plate) was pressed. The feeding plate was inserted into the mouth to check the fit of the feeding plate and of the flexible bulb with the cleft region.

Another method for preparation of flexible extension that would cover the defect is attachment of tulle to the acrylic plate that is prepared on the preliminary impression. A light-body polysiloxane impression material is applied to the cast to serve as the flexible extension to cover the clefted area of the soft palate. With the help of tissue conditioner impression is made in the infant's mouth and the appliance sis delivered.

For the Incorporation of Nasal Stent

In case of acrylic feeding plate, a nasal stent can be incorporated in the anterior flange which in later stages can serve the purpose of presurgical nasoalveolar moulding. The stent should be incorporated only if the alveolar segment gap is 5mm or less. If the gap between the alveolar segments is more than 5 mm, it is very difficult to incorporate the nasal stent medial enough to obtain desired moulding of the ala of the nose.[29,30,31]

Conclusion

Though there are many materials and techniques available to fabricate a feeding plate, right selection of technique and material has to be done based on the requirement of the case. Nevertheless, few facts will remain the same in all cases, such as, poly-viny siloxane material is the safest material for impression making, the position of the infant should be such that it prevents aspiration of impression material, retention is of utmost importance to solve the purpose of sucking, and no step should be taken casually as it is the matter of an infant who cannot express its suffering. However, the technique followed, the material used and the position for the impression-making procedure, may vary from infant to infant. Lastly, the choice for the technique and material depends on the operator's convenience within the safety limits for the infant.

References

References are available on request at editor@healtalkht.com

Recommendations for Clinical Decision Making

Procedures	Recommendations
Primary Impression	Polyvinyl siloxane elastomer > Alginate > Impression compound
Secondary Impression	Light body and medium body Polyvinyl siloxane elastomer > Alginate
Position of the infant during the impression	Upside down > prone > face down > upright
Tray for carrying primary impression material	Handle of "0" no impression taking metal tray > finger support > spatula
Custom Tray	Cold cure acrylic
Material for feeding plate	Heat cure acrylic > cold cure acrylic > thermo-plasticised sheet