Single Visit Custom Made Flexible Feeding Obturator for an Infant with Tetralogy of Fallot

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ABSTRACT

Cleft lip and palate prevalence is more in patients with heart diseases than in patients with normal hearts. The co-existence of tetralogy of Fallot and cleft palate undermines the health of the infant by underfeeding and circulation of low arterial oxygen concentration. Early prosthodontic adjuvant therapy with feeding obturator is mandatory for rehabilitation till corrective surgery.

Key words: Cleft palate, feeding obturator, feeding plate, impression, tetralogy of Fallot

INTRODUCTION

Tetralogy of Fallot (ToF) is the most common form of cyanotic congenital heart disease. Etienne Fallot separated it from other forms of cyanotic heart diseases in 1888, hence the name ToF.[1] The overall incidence is 10% of all forms of congenital heart diseases with male predilection.[2] It is a combination of four different defects including: (a) Ventricular septal defect; (b) pulmonary stenosis; (c) over riding aorta and (d) right ventricular hypertrophy. Although exact etiology is unknown, karyotype anomaly, genotype 22q11 deletion, is believed to cause faulty development pathway of pulmonary vessels.[3] The prevalence of cleft lip and palate in patients with heart lesions is observed to be much higher than in cleft patients with normal hearts.[4] Cleft lip and palate is one of the most common craniofacial anomalies of humans.[5] Neonates with cleft palate have difficulty in feeding, which may lead to failure to thrive.[6] Cleft palate affects feeding, facial growth, dentition development, speech and may cause psychological problems for the child and parents.

A feeding appliance or obturator is a prosthetic aid that is designed to obturate the cleft and restore the separation between oral and nasal cavities.[7] It assists in suckling hence feeding. The clinical and laboratory procedure for a quick, single visit, custom made and flexible feeding obturator with a modified design to assist handling for an infant with ToF is presented.

CASE REPORT

This was a case report of a 4-month-old female infant who was referred from the Department of Plastic Surgery for the fabrication of feeding plate. The patient had a known history of ToF. The chief complaint was the inability to feed the infant properly. The mother of the child reported that the baby keeps crying for most of the time she is awake and the same was observed during the clinical phase. There was no history of breast feeding or bottle feeding and the liquids were fed with spoon
frequently. There was evident frustration in the mother’s behavior regarding infant’s feeding.

Family history was noncontributory. Mother of the infant reported continuous weight loss since birth. There was no history of cyanotic attack on exertion or any previous treatment or surgery for the defect. General physical examination of the patient revealed an undernourished infant with no clubbing or cyanosis.

Intraoral examination revealed a median cleft of the palate involving complete soft palate and adjoining hard palate [Figure 1]. The maxillary gum pads were healthy. No cyanosis was observed intraorally. Since the patient was not scheduled for the corrective surgery in the near future, it was planned to construct a feeding obturator to assist feeding.

**Clinical procedure**

Parents were instructed not to feed the infant for at least 2 h prior to clinical procedure to prevent aspiration in the event of vomiting. Impression was made when the infant was fully awake without any anesthesia or premedication. The baby was held in mother’s lap with face downwards in order to avoid asphyxiation due to airway obstruction by accidentally detached impression material. The child was crying and was not still for even small spells of time. The oral aperture was strained. She did not permit to insert even the simplest of impression tray, flat wooden stick. Thus it was planned to make finger loaded and manipulated impression of the maxillary arch.

Putty polyvinyl siloxane impression material was used for impression making. Small amount of fast setting elastomeric putty material was kneaded together taking care to use more catalyst to accelerate setting. It was loaded on the ventral surface of two distal phalanges of the index finger extending towards dorsal surface of the finger to ensure grip of the impression material on the digit. Use of finger facilitated impression making as it could perceive that the baby is making sucking movements needed for the desired border molding. Suction pressure during sucking movements was resisted against the finger to avoid intrusion of impression material into the cleft area of the soft palate as no blockage was achieved with pack prior to the impression making, which could not have been controlled with impression tray.

After the material was set, the impression was removed and the oral cavity was inspected for any loose fragment of impression material. The impression was poured in Type IV dental stone to obtain the master cast [Figure 2]. It was planned to fabricate the feeding obturator using clear, flexible thermal forming material. It permits a single visit treatment as no custom tray fabrication and wax pattern is required. A clear, round sheet of low-density Biostar CH of 2 mm thickness was used in a vacuum former machine (Biostar VI, USA). Thermal molding was achieved with vacuum machine run for 60 s. Following adaptation of the sheet to cast, it was allowed to cool. The adaptation along the palate, ridges and vestibule was checked. The appliance was removed from the cast and the extensions into the vestibule were marked. Excess material was trimmed to the marked size incorporating a handle in the midline extending onto the base of the master cast. This negated the use of separate handle and ensured a handle with smooth joint with the plate. The handle design did not interfere with feeding as the lip formed a comfortable seal around it.

A small hole was made using a round bur at the center of the handle and an approximately 10 inch long cotton thread was attached through this hole to provide safety
mechanism in case of gagging or accidental swallowing and also to facilitate easy removal and withdrawal of the prosthesis by the parents [Figure 3]. The appliance was positioned in child’s oral cavity and checked for retention [Figure 4]. Then mother was asked to use the pacifier while the feeding obturator was *in situ*. It was observed that the child was successfully able to suck with feeding obturator appliance in place and normal breathing [Figure 5]. Mother was asked to feed the baby with the bottle and no nasal regurgitation was noted. There was immediate appreciation by the mother that provided psychological benefit to the parents.

Parents were demonstrated as to how to insert and were instructed to use it during feeding in upright position, remove it afterwards and thoroughly clean the appliance as well as baby’s oral cavity. A regular follow up was done after 24 h and monthly follow ups were scheduled. No ulceration or irritation because of excessive pressure was observed during follow up. Parents were advised to use the appliance until the palate is surgically repaired to prevent passage of food via cleft into the nasal cavity and get the new feeding obturator every 3 months to accommodate facial growth of the baby.

**DISCUSSION**

Various methods for fabrication of feeding obturator have been published in the literature but none could be identified that presents the treatment of infant with ToF and cleft palate. ToF generally proves fatal unless the child’s heart is repaired surgically. However, in rare instances it may go unnoticed till as late as 86 years of age.[8] Open heart surgery is done to close the defect in the septum, remove extra heart muscle and open/repair the pulmonary valve at an early age (<1 year).[9,10] A feeding obturator is mandatory to facilitate feeding that helps to gain the health and nutrition required for the surgical correction.

Traditionally, the feeding appliance is fabricated using acrylic resin but for this patient vacuum formed thermal forming element was used. It offered the advantages of light weight, uniform thickness, smooth surface, flexibility, moldability, quick to fabricate, good fit and adaptation to the palate and ridges and less possibility of soft-tissue injury because of its soft texture. The design avoided the use of any metallic wires and the provision of attachment of the handle as the conveniently placed handle was made up of the same material and merged with no joint. The extension of flanges into the vestibule and pressure the tongue applies are usually sufficient to stabilize the feeding obturator.

Making an impression is a major concern due to size constraints imposed by the infant’s oral cavity, lack of ability of the infant to cooperate and the inability to respond to the verbal commands. Parents were involved

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**Figure 3:** Feeding obturator with handle and attached string

**Figure 4:** Feeding obturator retained *in situ*

**Figure 5:** Feeding obturator with a pacifier *in situ*
from the beginning. It helped in assuring as well as motivating them to be involved in the care of their infant. Patient position, impression tray and impression material are important factors during impression making. Positions adopted for cleft palate impression making in infants include face downwards, upright, horizontal raised to sitting as the impression sets and even inverted upside down. Impression compound and irreversible hydrocolloid have been used for impression making. The putty type vinyl polysiloxane was chosen for making an impression because it avoids the dangers of inflicting thermal trauma to the tissues; its high viscosity reduces the dangers of aspiration or swallowing, good surface detail reproduction, dimensionally stable and permits accurate pouring of multiple casts. The infant should be able to cry during the impression procedure as the absence of crying is indicative of airway blockage.

It is imperative to mention that the child should be referred to the maxillofacial prosthodontist as early as possible so that the feeding for adequate nutrition can be ensured as the difficulty in feeding affect the health and acts as a primary hurdle in the milestones of normal development. Also early adjuvant therapy with feeding obturator improves appliance acceptability and provides psychological help to the parents and care takers. Feeding obturator for infants serves the purpose to create a rigid platform toward which child can press the nipple and feed with a decrease in the time required for feeding. The obturator decreases the nasal regurgitation and provides protection against middle ear infections also.

**CONCLUSION**

Based on the above case it can be concluded that infants having cleft palate with ToF are really challenging to the rehabilitation team. Early non-surgical intervention is important to assist feeding and promote weight gain which is mandatory in preparing the baby for corrective surgery. The initial treatment with simple appliance design and procedure for the infant decreases stress that both the parents and the baby experience resultant from poor feeding ability.

**REFERENCES**


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