A feeding obturator for a preterm baby with Pierre Robin sequence

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The article describes a clinical and laboratory technique for the fabrication of a feeding obturator for a baby with Pierre Robin sequence. Emphasis is placed on the direct fabrication of a preliminary custom tray, preventing thermal trauma to the tissues, and overcoming the danger of airway obstruction or foreign body aspiration. The functional problems associated with a cleft palate and various methods to overcome them are also discussed. (J Prosthet Dent 2005;93:197-200.)

Pierre Robin sequence (formerly known as a syndrome) is named after the French stomatologist who, in 1923 and 1934, described the problems associated with newborn micrognathia. The phenomenon is comprised by the triad of mandibular micrognathia, U-shaped cleft palate, and glossoptosis.[1] The prevalence of Pierre Robin sequences is 1:8500 live births.[1] The developmental anomaly was originally classified as a syndrome but was reclassified as a sequence in 1982[2] because the associated anomalies are due to a primary etiology, unlike a syndrome in which all anomalies have a single etiology.[3] In Pierre Robin, the primary anomaly is the mandibular micrognathia, which prevents the fusion of the palatal shelves. Additionally, the abnormally small mandible encourages the tongue to fall back into the pharynx and obstruct the airway.[1,3] The major risk for neonates with Pierre Robin sequence is prolonged hypoxia due to airway obstruction, which can lead to brain damage and death.[1]

Neonates born with a cleft palate have difficulty eating, which may lead to failure to thrive.[4] The oronasal communication diminishes the ability to create negative pressure, which is necessary for suckling.[5-8] To compensate, the baby presses the nipple between the tongue and the hard palate to squeeze out the liquid,[3] but this mechanism is insufficient if the cleft is wide and the nipple gets trapped inside the defect.[3] The feeding process is also complicated by nasal regurgitation of food,[4,5,7,9] excessive air intake that requires frequent burping,[3-5,7,9] and choking.[4,7] Feeding time is significantly longer and fatigues both baby and parent.[3-5,7,9] As might be expected, these feeding complications can be a source of parental anxiety[4,9] and even delay the development of the mother-infant bond in which feeding constitutes a significant role.[4]

There are different approaches to address the problems associated with feeding cleft palate babies. The literature suggests that the use of specially designed nipples with enlarged openings can increase the ejection of milk with reduced effort.[4,9,10] However, this option is not sufficient for all patients. Orogastric and nasogastric tubes can be effective but should be used only for a limited length of time.[9] Surgery may completely close the oronasal communication and resolve the problems associated with the cleft. However, timing of surgery differs significantly between medical centers and may be as early as 10 to 12 weeks of age[9] or 12 to 18 months[4] or even well past 12 months of age.[11]

The feeding obturator is a prosthetic aid that is designed to obturate the cleft and restore the separation between the oral and nasal cavities. It creates a rigid platform toward which the baby can press the nipple and extract milk.[5,12] It facilitates feeding,[4-7,13] reduces nasal regurgitation,[4,6,7,13] reduces the incidence of choking,[4] and shortens the length of time required for feeding.[4,5,7,14] The obturator also prevents the tongue from entering the defect[4,5,7,13] and interfering with the spontaneous growth of the palatal shelves toward the midline.[13] It also helps to position the tongue in the correct position to perform its functional role in the development of the jaws,[13] and contributes to speech development.[5,15] The obturator reduces the passage of food into the nasopharynx, reducing the incidence of otitis media and nasopharyngeal infections.[5,13] The literature also shows the feeding obturator to be effective in reducing parents' frustration over the feeding problems[4,10] and in relieving anxiety related to the birth of a child with this pathology. The fabrication of an obturator demonstrates to parents that help is available and that the problem can be addressed.[5,13]

The patient presented in this report, a preterm male born in the 37th week of pregnancy, weighing 2.525 kg, was diagnosed with Pierre Robin sequence. The attending physician of the Pediatric Intensive Care unit referred the patient at the age of 7 days to the Maxillofacial Prosthetics service at the Medical Center of Louisiana in New Orleans because of poor swallowing ability. A

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Fig. 1. Preliminary custom impression tray.

Fig. 2. Intaglio view of preliminary impression.

Fig. 3. Diagnostic cast.

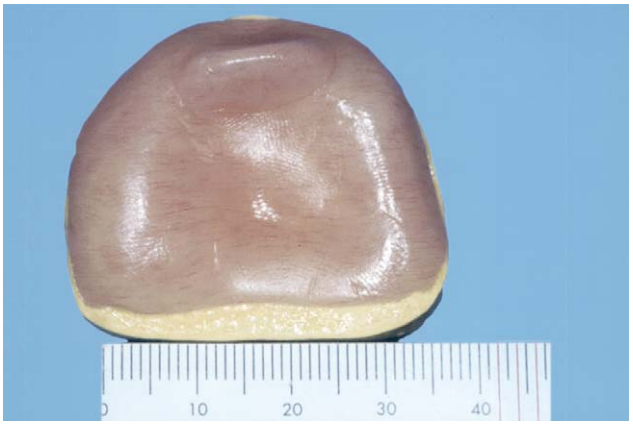

Fig. 4. Custom tray constructed over diagnostic cast.

nasogastric tube had been used for feeding. Examination of the baby revealed a large median cleft of the hard palate that extended to the soft palate. Since the baby was not scheduled for corrective surgery in the near future, it was decided to construct a feeding obturator. The parents approved of this treatment plan. This article describes a technique for the fabrication of a feeding obturator in a manner that overcomes the dangers of inflicting thermal trauma to the tissues and foreign body aspiration.

TECHNIQUE

1. To create a preliminary impression tray, cut a piece of light-polymerizing acrylic resin (Triad VLC Reline Material; Dentsply Intl, York, Pa) to the approximate size of the hard palate. Use a finger to insert it into the baby's mouth and press the material over the hard palate and into the buccal and labial vestibules. Remove the material and light-polymerize it extraorally.
2. Examine the tray intraorally and identify areas that it does not cover. Add strips of the light-polymerizing acrylic resin to those areas; remove the tray and light-polymerize it extraorally. Verify that the tray covers the hard palate and extends into the vestibule as much as possible. Add a small handle to the tray to make it easier to manipulate (Fig. 1).
3. Load the tray with a thick mix of tissue conditioning material (Coe Soft, resilient denture liner; GC America Inc, Alsip, Ill) and insert it intraorally, while the baby is held face toward the floor, in order to prevent aspiration in the event of vomiting and asphyxiation due to airway obstruction (Fig. 2).
4. Pour the impression in Type III dental stone (Yellow Stone; Whip Mix Corp, Louisville, Ky) and fabricate a custom impression tray from light-polymerizing acrylic resin (Triad VLC Reline Material; Dentsply Intl). Place the posterior border of the tray between the hamular notches. Do not attempt to include the cleft area of the soft palate.[16,17] Extend the borders into the vestibule and add a handle (Figs. 3 and 4).
5. Evaluate the impression tray intraorally. Determine the easiest path of insertion, paint vinyl polysiloxane

Fig. 5. Definitive impression.

Fig. 6. Definitive cast.

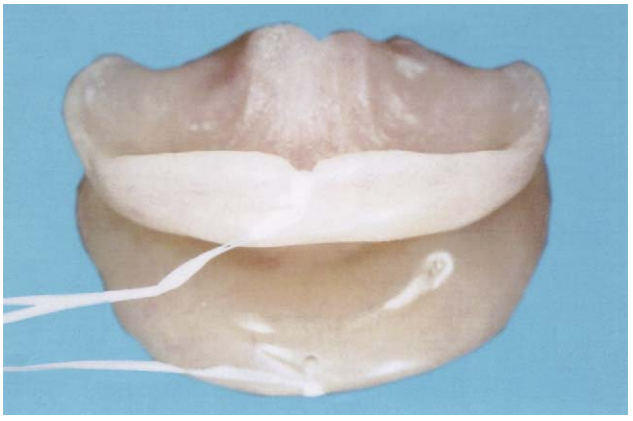

Fig. 7. Labial view of completed feeding obturator. Note ligature to facilitate removal.

Fig. 8. Intaglio surface of feeding obturator.

adhesive (Universal VPS Adhesive; GC America Inc) over the intaglio surface, and load it with viscous vinyl polysiloxane impression material (3M Express STD, Putty; 3M Dental Products, St. Paul, Minn). Insert the loaded impression tray into the mouth while holding the baby, face toward the floor. Monitor the baby's oxygen level throughout the impression-making process to prevent accidental hypoxia. Ensure that the baby is making suckling motions, for this will create the desired border molding (Fig. 5), and ensure the baby's ability to perform nasal breathing.

6. Box and pour the impression in Type V dental stone (Die-Keen Green; Heraeus Kulzer, South Bend, Ind) (Fig. 6).
7. Inspect the definitive cast for significant undercuts in the cleft area. If these exist, block them out with wax before fabricating the prosthesis. Paint separating medium (Orthodontic Resin Separator; Dentsply Intl Inc, Milford, Del) over the surface of the definitive cast and use the salt and pepper technique to fabricate an acrylic resin prosthesis (Jet Acrylic self curing resin; Lang Dental Mfg Co, Wheeling, Ill).
8. After retrieving the prosthesis, verify the existence of uniform thickness and smooth any sharp edges. Finish and polish the prosthesis. Create a small hole using a round bur at the labial flange and attach a ligature to facilitate easy retrieval of the prosthesis by the parents (Figs. 7 and 8).
9. Evaluate the intaglio surface of the obturator intraorally for excessive pressure areas, using a disclosing material (Fit Checker; GC Corp, Tokyo, Japan), and adjust accordingly.
10. Instruct the parents and care givers on how to insert, remove, and clean the prosthesis. Instruct them to use the obturator during feeding time, remove it afterwards, and thoroughly clean the baby's oral cavity and cleft with a soft cloth soaked in warm water.

DISCUSSION

Articles describing methods of fabricating feeding obturators have been published in the literature; however, none could be identified that discuss the treatment of preterm neonates or babies affected by Pierre Robin sequence. A major concern in treating these patients is obtaining a good preliminary impression. The clinician usually uses a specially designed prefabricated impression tray to obtain a preliminary impression of the cleft palate; however, the correct size might not be available to fit the small-size palate of the preterm neonate. To address this size problem, some have suggested using thermoplastic materials,[5,6,9,13,16] but those materials must first be heated and softened, then inserted into the patient's mouth and molded to the desired form. As might be expected, the inherent problems with these methods are the danger of inflicting thermal damage upon the delicate soft tissues of the newborn and the locking of the impression in the nasal cavity. The use of light-polymerizing acrylic resin overcomes these problems.

A variety of impression materials were advocated in the literature for the purpose of obtaining a definitive impression, including alginate,[4,5,9,13,17] beeswax,[6] periphery wax,[16] Adaptol[16] (Jelenco Dental Products, Armonk, NY), Citricon[7] (Kerr USA, Romulus, Mich), polysulfide impression material,[9] and very-high–consistency vinyl polysiloxane.[18] The putty-type vinyl polysiloxane is the material of choice because its high viscosity reduces the danger of aspiration or swallowing, and its relatively good detail duplication is satisfactory for the purpose of fabricating a palatal prosthesis.

The retention of the appliance is usually satisfactory, and no further means to enhance retention are needed. The extension of the flanges into the vestibule and the pressure the tongue applies are usually sufficient.[13] If more retention is necessary, it is possible to use denture adhesives[4,13,17] or to engage the undercuts within the defect with resilient denture liner (Coe Soft; GC America Inc).[5,7] The oral tissues should be monitored after 48 hours to detect areas of ulceration or irritation due to excessive pressure. A new feeding obturator should be constructed after approximately 3 months to accommodate the facial growth of the baby.

SUMMARY

This article describes a method for the fabrication of a feeding obturator for a preterm baby with Pierre Robin sequence. The feeding obturator can be effective in overcoming some of the feeding problems associated with a cleft palate defect. An obturator prosthesis may also reduce the stress both parents and the baby experience with the feeding process and promote neonate weight gain, which is important in preparing the baby for corrective surgery.

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0022-3913/$30.00

doi:10.1016/j.prosdent.2004.10.016