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CASE REPORT

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Single visit rehabilitation of 12-day neonate with cleft palate using modified feeding spoon impression technique: A case report

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Abstract

The rehabilitation of the cleft requires a multidisciplinary approach involving a pediatrician, surgeon, otolaryngologist, speech therapist, orthodontist, prosthodontist, and psychologist. The present case report illustrates the rehabilitation of a 12-day-old neonate with a cleft palate. Since the palatal arch of the neonate was very small, a feeding spoon was innovatively modified to obtain the impression. The obturator was fabricated on the same day and delivered in one appointment.

KEYWORDS

cleft palate, ethylene vinyl acetate, modified spoon technique

1 | INTRODUCTION

Among the oro-facial defects, cleft lip and palate (CLP) is the most common and occurs in the 4th–12th week of intrauterine life. The classification proposed by Veau's divides cleft palate into four main categories: Group I: Defects of Soft Palate only, Group II: Defects involving hard and soft palate, Group III: Defects involving soft palate to the alveolus usually involving lip; and Group IV: Complete bilateral clefts.[1] Panamota et al.'s systematic review showed that cleft lip and palate prevalence varies from 0.57–1.57 per thousand live births.[2] The etiology of cleft lip and palate is multi-factorial and influenced by environmental and genetic factors. Environmental factors include cigarette smoking, alcohol intake, and nutritional status of the mother, such as vitamin and folic acid deficiencies, obesity, diabetes mellitus, etc. Genetic factors are associated with various genes and loci known to cause isolated clefts- IRF6, ch8q24, vax1, and PAX7.[3] Strong correlation is also seen between consanguineous marriages

and family history. When the neonate is born with CLP, the primary concern is feeding. Because of the oro-nasal communication, it is difficult for the child to create a strong negative intra-oral pressure; hence, difficult to extract milk while suckling. When the neonate is born with CLP, feeding is compromised due to oro-nasal communication, which poses difficulty in achieving a strong negative intra-oral pressure while suckling. Moreover, leakage of fluid from the nasal cavity, choking, and milk reflux lead to infection of the middle ear.[4] CLP patients have difficulty pronouncing sounds like "s", "ch", "sh", and "j" are altered, especially in isolated cleft palate defects.

According to the Glossary of Prosthodontic terms, an obturator is "a maxillofacial prosthesis used to close a congenital or acquired tissue opening primary of the hard palate and/ or contiguous alveolar or soft tissue structure." It forms a seal and blocks the communication between the nasal and the oral cavity, helps in swallowing, prevents fluid leakage and hypernasality, and enhances speech. It blocks the communication between the nasal and the oral cavity that assists in speech, swallowing and prevention of fluid leakage, and hypernasality. To reach the proposed parameter of weight and blood hemoglobin level in the stipulated time, proper nutrition of the child is of utmost importance.

The present case report is an illustrative representation of the rehabilitation of a 12-day-old neonate where a feeding obturator was fabricated using an ethylene vinyl acetate sheet in a single appointment.

2 | CASE REPORT

A 12-day-old neonate was referred to the Department of Dentistry in a tertiary care center from the neonatal intensive care unit of the institute.

On intra-oral examination, it was found that the infant had a cleft palate (Veau classification class II) extending to the soft palate (Figure 1). Since the child's age does not permit surgery in the near future, a feeding obturator was decided as the treatment plan.

The family history did not reveal consanguineous marriage among the parents. However, the family tree showed family members with a cleft (Figure 2). The medical history of the mother showed pre-gestational diabetes mellitus.

To avoid aspiration due to vomiting, it was instructed not to feed the child till 2 h prior to the impression recording procedure. Since the size of the palatal arch of the child was very small, and it was difficult to insert even the smallest available stock tray, the child's stainless steel feeding spoon (Figure 3) was customized with acrylic extension to record an impression of the palate (Figure 4).

FIGURE 1 Intra-oral view of cleft palate.

Impression of the palate was recorded extending to the most posterior region of the cleft. While impression-making, the child was awake, crying without anesthesia or premedication. The head of the patient was tilted downward during impression-making. A gauze piece of appropriate size, attached to dental floss, was stuffed along the borders of the defect (Figure 5). Impression material was loaded on the custom tray and hand-molded by the operator as the child could not perform proper functional movements. The impression was made using fast-setting rubber base addition silicone impression material (Elite HD+ Putty Soft Fast Set, Zhermack, Italy) (Figure 6). After setting the impression material, it was retrieved from the child's mouth. The mouth was inspected for any broken or residual impression material. The cast was poured in dental stone type IV. Deep undercuts were blocked in the master cast with wax.

A feeding appliance was fabricated using a 2 mm thick, low-density ethylene vinyl acetate sheet using a vacuum-former machine (Biostar VI, USA) on a single visit (Figure 7). Thermal molding was done for 60 s. It was ensured that the sheet was properly adapted onto the palate and ridges, and extension into the vestibule was adequate. It was retrieved from the cast, trimmed, and polished before inserting it in the patient's mouth. The borders were smoothened properly to avoid impingement and ulcerations on the oral mucosa. After insertion, the extensions were checked, marked, and trimmed accordingly. A floss was attached to the feeding appliance (Figure 7) to prevent accidental aspiration and ensure easy retrieval of the appliance. Then, the obturator was placed in the mouth and bottle feeding was done (Figure 8). The child could be easily fed with an appliance placed in his mouth. There was no leakage of fluid from the nose. There was no obstruction in breathing. The parents were demonstrated on inserting and removing the feeding obturator. They were advised to clean the obturator properly with normal water, soap, and a soft brush. It is instructed to remove the obturator at night. Also, properly cleaning the child's oral

FIGURE 2 Family tree of the infant.

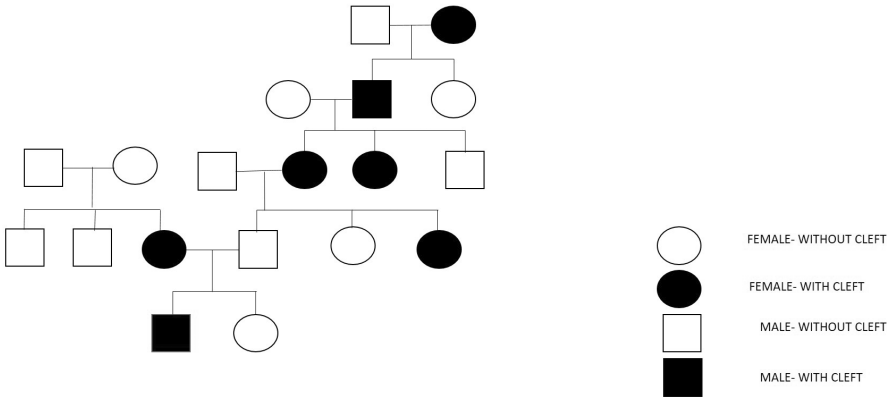

FIGURE 3 Feeding spoon.

FIGURE 4 Modification in feeding spoon.

cavity with a wet cloth wrapped around the finger was advised. Follow-ups after 24 and 72 hours were done. No ulcerations were seen in the child's oral cavity. On the day of delivery of the appliance and each follow-up the parents were trained on insertion and removal of the obturator. A follow-up every 3 months was suggested for refabrication to accommodate the growth of the palate.

3 | DISCUSSION

CLP are complex disorders with varying etiology. Failure of fusion of fronto-nasal and maxillary processes causes cleft lip, and that of palatal shelves of the maxillary process leads to cleft palate.[5] The cleft lip and palate incidences are: cleft lip alone- 15%, cleft lip and palate- 45%, and isolated cleft palate- 40%. The primary etiology of the cleft is mainly related to genetic, maternal risk, environmental, and teratogenic factors. Genetic factors include single gene mutations, genomic locations, chromosomal abnormalities, or polygenic genes; environmental factors like phenytoin, valproic or retinoic acid, or any chemical substances consumed at the time

FIGURE 5 Gauze piece with floss attached.

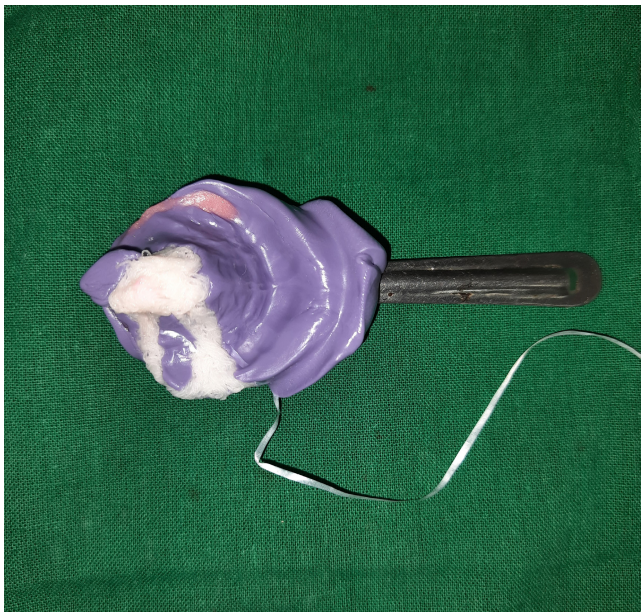

FIGURE 6 Impression of patient.

FIGURE 7 Obturator with floss attached.

FIGURE 8 Bottle feeding with obturator.

of pregnancy that might be teratogenic; maternal risk factors such as alcoholism, smoking, addiction to drugs like benzodiazepens, diabetes, maternal age more than 40 years, etc.[6] It has been found that gene–environment interaction plays an important role in the onset of the deformity.[5] As in the present report, the mother had a history of diabetes mellitus. Preconceptionally, diabetes mellitus is a known risk factor for oro-facial malformations like cleft. Mothers with a history of Type 1 and Type 2 diabetes mellitus have 3–4 times higher chances of the cleft.[7,8] Various studies have shown that congenital malformations are 3–4 times more in mothers with pre- or gestational diabetes mellitus.[7,9] The family history of the patient revealed a cleft. The family history of up to five generations was charted. The pattern of inheritance showed X-linked dominance.

Cleft palate surgeries are done in the 9th–18th month of the child's age.[10] To combat the problems associated with cleft, various feeding devices have been modified, such as Haber's nipples. However, even with these modifications, regurgitation and reflux are possible. The feeding obturator helps in feeding, positioning the tongue away from the cleft allowing movement of segments toward each other. Palatoplasty and pharyngoplasty are done at 12 months and 6 years of age for speech enhancement in later years.

During the fabrication of the feeding appliance or obturator, selection of the impression tray, impression material, and the patient positioning during the impression are important. Stock trays or custom trays are primarily used for making an impression. Using a stock tray requires two stages of impression making- primary and final impression. This would require multiple visits by the patient. In the present study, the appliance was delivered in a single appointment; hence modified impression tray using the patient's feeding spoon was used. Acrylic extensions were made to match the size of the child's palate. The edges of the extension were smoothened to avoid any irritation or abrasion to the mucosa. It helps in more accessible and faster, single-stage impression-making customized according to the size of the patient's palate. Various impression materials that can be used are irreversible hydrocolloids and rubber-based impression materials. Poly-vinyl siloxane soft putty viscosity impression material helps in making impressions faster and provides better handling and control over the flow of impression material compared to irreversible hydrocolloid impression material. Polyvinyl siloxane has more strength and elasticity, hence, can be retrieved from the defect without breakage of the impression material into the defect. It provides good surface detail and allows retrieval of multiple casts. While recording the impression, a gauze piece was placed in the undercut of the defect to prevent the impression material from engaging in deep undercuts, causing a problem in retrieval. During impression making, the child's face was turned downward to avoid asphyxiation due to airway obstruction by the impression material. The child was crying during impression-making, which ensures a patent airway.

Various materials that can be used for the fabrication of an obturator are auto-polymerizing self-cure acrylic resin, heat-cure acrylic resin, and vacuum-adapted ethylene vinyl acetate sheet.[11,12] Self-cure and heat-cure acrylic resins are rigid and not flexible. They provide a seal but may be uncomfortable for the child due to their hard texture, and there are more chances of ulceration. A vacuum-adapted low-density ethylene vinyl acetate sheet has been used to fabricate the obturator. It is lightweight, moldable, and offers a good fit over the palate. Its adaptability is good, is soft, prevents ulcerations in the oral cavity, and requires fewer adjustments. Hence, the child's acceptance of the ethylene vinyl-acetate sheet obturator is better.[13] Also, the parents were advised to bring the child for regular monthly appointments to monitor the child's weight gain and to check if any adjustments were required.

4 | CONCLUSION

The feeding of neonates is essential for proper nutrition and weight gain. The feeding appliance obturator provides benefits not only in proper food intake but also improves speech, preventing regurgitation and infection of the middle ear. Modifying the feeding spoon to a customized impression tray helps obtain an accurate impression in a short appointment. The use of an Ethylene vinyl acetate sheet provides the benefits of soft texture, better acceptability, and fabrication in a single appointment.

AUTHOR CONTRIBUTIONS

Neelam Chandwani: Conceptualization; data curation; writing – original draft; writing – review and editing. **Monika Nandan:** Conceptualization; investigation; project administration; resources; writing – original draft. **Ganesh Jadhav:** Investigation; methodology; project administration; visualization; writing – original draft. **Ajinkya Mansing Pawar:** Data curation; formal analysis; resources; validation; writing – review and editing. **Mohmed Isaqali Karobari:** Investigation; methodology; project administration; visualization; writing – original draft; writing – review and editing. **Anand Marya:** Conceptualization; investigation; methodology; resources; software; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Any data related to the case can be provided on reasonable request.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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