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 present case report illustrates the rehabilitation of a 12-day old neonate with 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.

Introduction

Among the oro-facial defects, cleft lip and palate (CLP) is the most common and occurs in 4^{th} to 12^{th}week of intra uterine life. Classification proposed by Veau's divides cleft palate into 4 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) A systematic review by Panamota et al. showed that prevalence of cleft lip and palate varies from 0.57 -1.57 per thousand live births.(2) The aetiology of cleft lip and palate is multi-factorial and is influenced by both environmental and genetic factors. Environmental factors include cigarette smoking, alcohol intake, nutritional status of the mother such as vitamin and folic acid deficiencies, obesity, diabetes mellitus etc. Genetic factors are associated with various genes and genetic loci that are known to cause isolated clefts- IRF6, ch8q24, vax1 and PAX7.(3) Strong correlation is also seen in 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 strong negative intra-oral pressure hence, difficult to extract milk while suckling. When the neonate is born with CLP, feeding is compromised due oro-nasal communication that poses difficulty in achieving strong negative intra-oral pressure while suckling. Moreover, leakage of fluid from the nasal cavity, chocking and milk reflux leads to infection of middle ear.(4) CLP patients have difficulty in pronunciation of sound like like 's', 'ch', 'sh' and 'j' are altered, more so 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 hyper nasality, and enhances speech. It blocks the communication between the nasal and the oral cavity that assists in speech, swallowing, prevention of fluid leakage and hyper nasality. 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 rehabilitation of 12-day old neonate where fabrication of feeding obturator has been done using ethylene vinyl acetate sheet in a single appointment.

Case report

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

On intra-oral examination, it was found that, the infant had cleft palate (Veau classification class II) extending to the soft palate (figure 1). Since the age of the child 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 cleft (figure 2). 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 hours prior to the impression making. Since the size of the palatal arch of the child was very small and was difficult to insert even the smallest available stock tray, hence, the child's stainless steel feeding spoon (figure 3)was customized with acrylic extension for making impression of the palate (figure 4). Impression of the palate was made extending to the most posterior region of the cleft. While impression making the child was awake, crying and without any anaesthesia or any premedication. The head of the patient was tilted downwards 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 was hand moulded 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 of 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 2mm thick, low density ethylene vinyl acetate sheet using vacuum former machine (Biostar VI, USA) on a single visit (figure 7). Thermal moulding was done for 60 seconds. 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 in the patients 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 the accidental aspiration and easy retrieval of appliance. Then, the obturator was placed in the mouth and bottle feeding was done (figure 8). The child could be easily fed with appliance placed in his mouth. There was no leakage of fluid from the nose. There was no obstruction on 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 soft brush. It is instructed to remove the obturator at night. Also, proper cleaning of the child's oral cavity with wet cloth wrapped around the finger was advised. Follow up 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 after every 3 months was suggested for refabrication to accommodate the growth of the palate.

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 incidences of cleft lip and palate are- cleft lip alone- 15%, cleft lip and palate- 45% and isolated cleft palate- 40%. The major etiology of cleft is mainly related to genetic factors, maternal risk factors, 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 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 history of diabetes mellitus. Preconceptionally diabetes mellitus is a known risk factor for oro-facial malformations like cleft. Mothers with history of Type 1 and Type 2 diabetes mellitus have 3-4 times higher chances of 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 cleft. The family history up to 5 generations were charted. The pattern of inheritance showed X- linked dominance.

Cleft palate surgeries are done in the 9^{th}-18^{th} month of child's age.(10) To combat the various problems associated with cleft various modifications in feeding devices have been done such as Haber's nipples. However, even with these modifications chances of regurgitations and reflux is there. The feeding obturator helps in feeding, positioning the tongue away from the cleft allowing movement of segment towards each other. Palatoplasty and pharyngoplasty are done at 12 months and 6 years of age for speech enhancement in later years.

During fabrication of the feeding appliance or obturator selection of impression tray, impression material and the patient positioning during impression are important. Stock tray or custom trays are mostly used for making impression. The use of 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 easier 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 impression faster, provides better handling and control over the flow of impression material compared to irreversible hydrocolloid impression material. Polyvinyl siloxane have 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 making the impression a gauze piece was placed in the undercut of the defect to avoid the impression material from engaging into deep undercuts causing problem in retrieval. While making impression the child's face was turned downwards to avoid asphyxiation and the child was crying during the procedure ensuring a patent airway. During impression making the child's face was turned downwards to avoid asphyxiation due to airways obstruction by the impression material. The child was crying during impression making which ensures a patent airway.

Various materials that can be used for fabrication of obturator are auto polymerizing self-cure acrylic resin, heat cure acrylic resin and vacuum adapted ethylene vinyl acetate sheet. Self-cure and heat cure acrylic resin are hard and not flexible. They provide a seal but may be uncomfortable for the child due to its hard texture and there are more chances of ulceration. A vacuum adapted low density ethylene vinyl acetate sheet has been used for the fabrication of obturator. It is light weight, moldable and offers a good fit over the palate. Its adaptability is good, is soft, prevents ulcerations in the oral cavity and requires less adjustments. Hence, the acceptance of the ethylene vinyl acetate sheet obturator by the child is better. Keeping in view

Conclusion

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

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FIGURE LEGENDS

Figure 1: Intra- oral view of cleft palate

Figure 2: Family tree of the infant

Figure 3: Feeding spoon

Figure 4: Modification in feeding spoon

Figure 5: Gauze piece with floss attached

Figure 6: Impression of patient

Figure 7: Obturator with floss attached

Figure 8: Bottle feeding with obturator