Role of Feeding Plate in Cleft Palate: Case Report and Review of Literature

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Citation

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Abstract

The cleft palate is associated with feeding difficulties, eustachian tube dysfunction, middle ear effusions, middle ear infections, hearing loss, speech disorders, dental and orthodontic problems. Feeding plate is a prosthetic aid that is designed to seal the cleft and restore the separation between oral and nasal cavities.

INTRODUCTION

Clefts lip and palate is associated constellation of problems that need to be solved for successful habilitation.[1,2] Neonates with a cleft palate have difficulty in eating which may lead to failure to thrive.[3] The oro-nasal communication diminishes the ability to create negative pressure which is necessary for suckling.[4-7] To compensate, the baby presses the nipple between the tongue and the hard palate to squeeze out the liquids and milk, but this mechanism is insufficient if cleft is wide and the nipple gets trapped inside the defect.[8] The feeding process is also complicated by nasal regurgitation of food,[3,4,6,9] excessive air intake that requires frequent burping and choking.[3,6] Feeding time is significantly longer and fatigues both baby as well as mother.[3,4,6,8,9] Early treatment in cleft lip and/or palate patients is mandatory. Ideally these patients should be evaluated and treated by a team approach.[10] Cleft patients are associated with deficient facial growth, dental problems, velo-pharyngeal incompetence, articulation defect and otologic problems like eustachian tube dysfunction. This is coupled with delayed speech which leads to the impairment in the cognitive, linguistic and emotional development in these children, making it imperative to early repair of cleft palate.[11-13]

The feeding plate obturates the cleft and restores the separation between oral and nasal cavities. It creates a rigid platform towards which the baby can press the nipple and extract the milk.[4,14] It facilitates feeding,[3,6] reduces nasal regurgitation,[3,5,6,15] reduces the incidence of choking[3] and shortens the length of time required for feeding.[3,4,6,16] The obturator also prevents the tongue from entering the defect[3,4,6,15] and interfering with the spontaneous growth of palatal shelves towards the midline.[15] It also helps to position the tongue in correct position to perform its functional role in the development of jaws,[15] and contributes to speech development. The obturator reduces the passage of food into the naso-pharynx thus reducing the incidence of otitis media and naso-pharynhgeal infections.[4-,9,14,15,17,18] Feeding plate restores the basic functions of mastication, deglutition and speech production until the cleft lip and/or palate can be surgically corrected. The procedure for fabrication of feeding obturator is described.

CASE REPORT

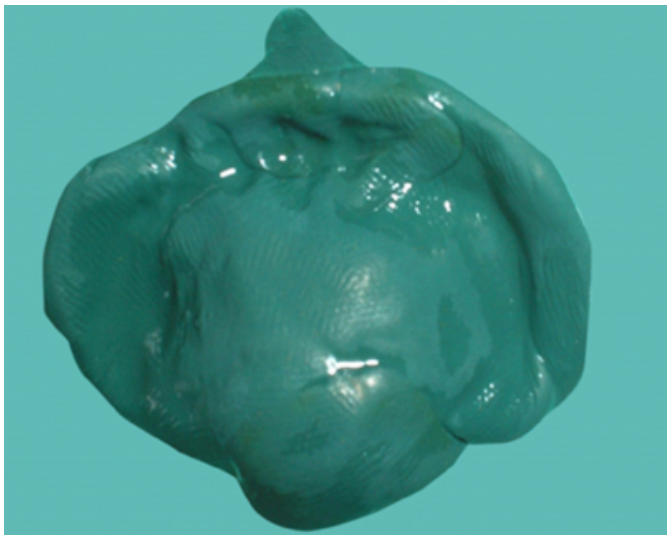
A 6 months old female infant presented with a history of cleft palate associated with difficulty in feeding, recurrent respiratory tract infection, nasal discharge and recurrent ear infections. The mother reported that the baby is not able to suckle milk properly and she was not gaining weight. There was no history of craniofacial clefts in maternal or the paternal family of the child. The pregnancy of the mother was uneventful and this baby was the first child. There was no history of previous treatment or surgery for the defect. Intraoral examination revealed a cleft in the soft palate and uvula.

FABRICATION OF FEEDING PLATE

Primary impression was made with molding the low fusing impression compound with hand adaptation to the palate of the patient. (Fig 1)

Figure 1

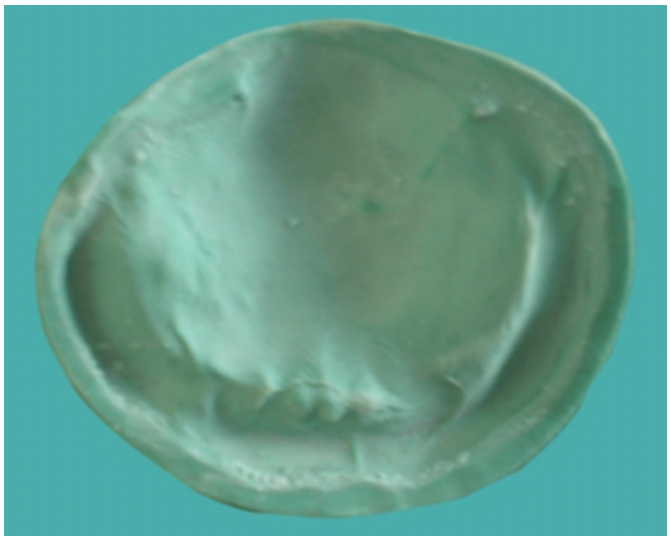
Figure 1: showing the primary impression



The infant was held upright by mother to prevent aspiration of any extra material. Primary cast was fabricated with dental stone (type III gypsum product). (Fig2)

Figure 2

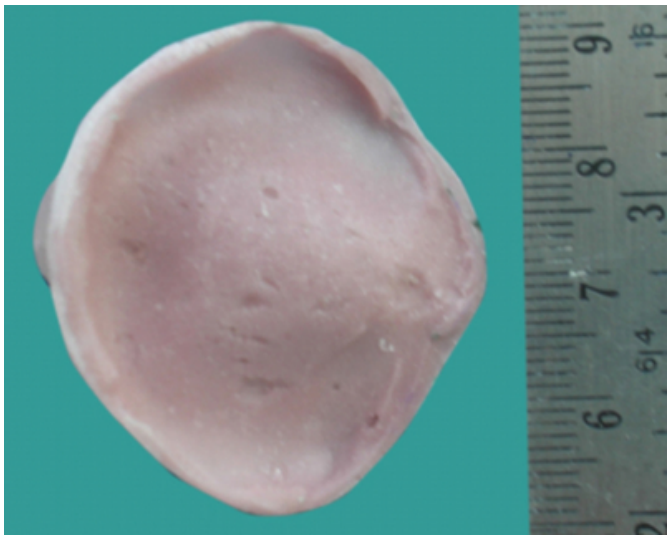
Figure 2: showing the primary cast



A customized special tray was fabricated with auto-polymerizing acrylic resin. (Fig 3)

Figure 3

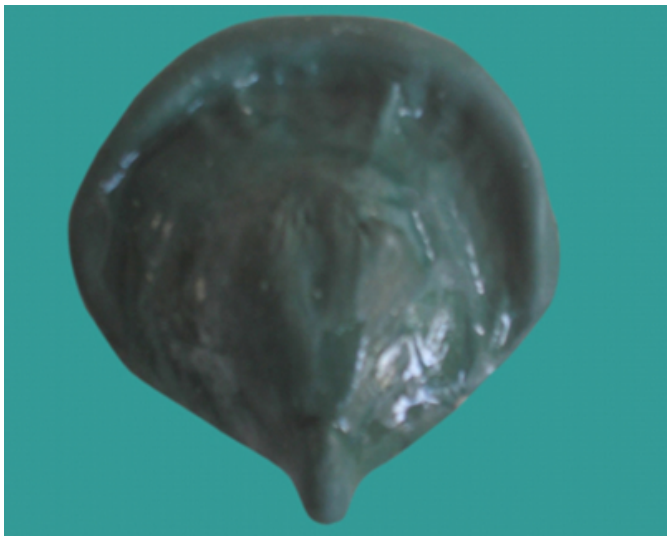
Figure 3: showing the custom tray



Final impression was made with rubber base impression material to record the precise details of the supporting structures and the defect. (Fig 4)

Figure 4

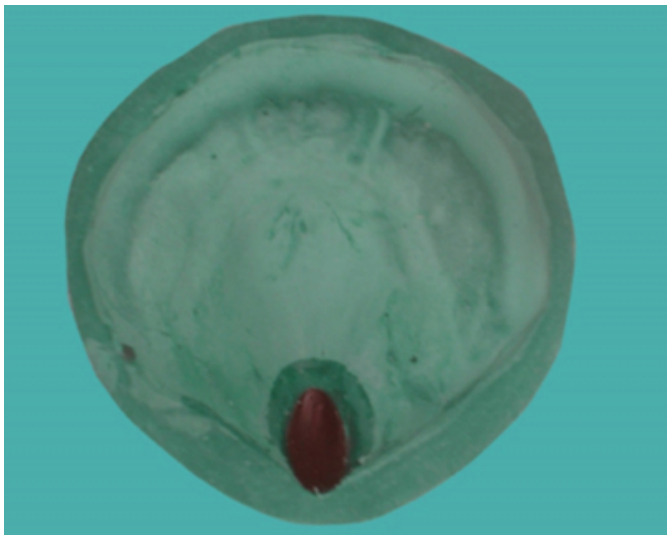
Figure 4: showing the final impression



Master cast was fabricated and excessive undercuts were blocked out with modeling wax. (Fig5)

Figure 5

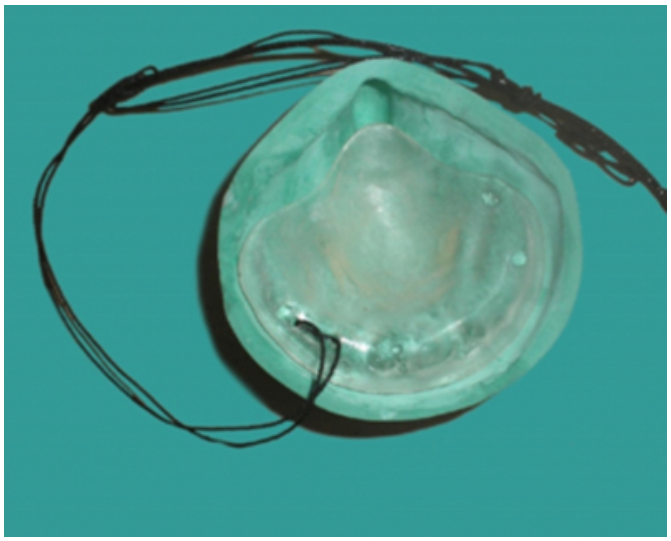
Figure 5: showing the master cast with block out



The wax pattern of the feeding plate was adapted on the master cast. Flasking, de-waxing was done and feeding plate was fabricated with heat activated clear acrylic for obturating the defect in the soft palate involving uvula. (Fig 6)

Figure 6

Figure 6: showing the palatal plate on master cast



Approximately 10 inch silk suture was passed through and tied to the eyelet of the feeding plate so as to facilitate easy insertion and removal of the prosthesis and also it acted as a safety measure to prevent swallowing of the appliance. (Fig 7)

Figure 7

Figure 7: showing the palatal plate with silk thread

After proper trimming, finishing and polishing the feeding plate was tried in the patient's oral cavity, and minor adjustments were made and final polishing of the feeding plate was done. Prosthesis was tried in the dental clinic and the patient's mother was asked to feed the baby and it was noted that there was no nasal regurgitation. Infant's mother was instructed about the method of usage, function, cleaning and maintenance of feeding plate. A regular follow up of the patient was done after 24 hours and monthly follow ups were scheduled. At the ninth month, the feeding plate was changed following the same procedure. During the regular follow up, neonate weight gain was evident and no history of recurrent infections was observed.

DISCUSSION

Patients with cleft lip and palate malformations require co-ordinated care involving multiple disciplines from birth throughout adolescence. Cleft palate may be inherited as an autosomal dominant condition with variable penetrance. Family history in a first degree relative increases the link by a factor of 20 percent. Environmental factors include maternal epilepsy, certain drugs like steroids, diazepam, phenytoin and folic acid deficiency. Cleft lip and palate also occur as a part of over 100 syndromes, including Down's syndrome and Treacher Collin's syndrome.[11, 12] Primary care plays a vital role in these patients, who often have numerous health care needs, including feeding difficulties, speech disorders, chronic ear infections and dental & orthodontic problems.

Proportional difference exists between young infant, child and adult in the anatomy of eustachian tube. The infant's

eustachian tube runs horizontally from the middle ear into the naso-pharynx rather than its later vertical angle in the older child and adult. The horizontal positioning of the ear tube places the infant at greater risk for ear infections from food or liquid that refluxes upwards into the naso-pharynx. Patients with cleft palate have an increased incidence of middle ear diseases. Abnormal insertion of the levator and tensor veli palatine muscles into the posterior margin of the hard palate and muscular hypoplasia with resultant eustachian tube dysfunction appears to be the primary cause consequently exposing the middle ear to oral contaminants and contributing to inflammatory edema of mucosa. Inadequate aeration of the middle ear also results in retraction of the tympanic membrane and adhesive otitis media. Middle ear effusion may occur up to 96.2 percent of cleft case, permanent perforation in 13 percent and cholesteatoma in 1 percent.[19] The early repair of the palate is associated with good cosmesis, better feeding, adequate velo-pharyngeal competence and good speech & hearing development.[20] Until the cleft palate/lip can be surgically corrected, a feeding plate is of great help in feeding and effectively separates the oral cavity from the nasal cavity. The concept of early treatment of cleft palate patients by pre-surgical oral prosthesis was pioneered by McNeil.[21] Mellor & Volp[22, 23] made useful contribution in the technique of cleft palate prosthesis for infants.

It is the general opinion of the plastic surgeon and prosthodontists that pre-surgical management should be undertaken as soon possible after birth. Simplified technique given by Chang and Wang used for the fabrication of feeding plate[24]. The procedure described is easy, simple and minimizes any risks to the infant during the procedure.

Impression procedures in cleft infants pose a unique set of challenges including the size constraints imposed by the infant's oral cavity, anatomical variations associated with the severity of cleft and a lack of ability of the infant to cooperate and respond to commands. Various impression materials have been routinely employed for making impressions of neonates with oral clefts. An ideal impression material should exhibit certain characteristic in both clinical and laboratory settings. Impression compound which was used for taking the primary impression in the procedure has the advantage that it can be removed before it sets in case of any emergency and it has excellent resistance to tearing. Impression compound is a thermoplastic material and overheating can lead to scalding or burns and leaching out of volatile components which may be harmful to the infant. Proper tempering and handling of the material should be followed. The material used for final impression was heavy body rubber base which has the advantage as it reproduces all the areas of interest with good surface details and resist tearing, as a result removal is atraumatic to the infant. Additionally in a laboratory setting, the material remains dimensionally stable and permits accurate pouring of multiple casts.

Various techniques have also been used to enhance the retention of the plate. However, the retention of the obturator is not that critical as generally thought, because it can be held in the baby's mouth during sucking, swallowing and the resting state by the tongue and by mouth closure.

A regular follow up of the infant is required for the examination of oral mucosa which is very delicate and easily damaged by the obturator. Also check up every 3-4 weeks at which the bilateral sides of border are reduced to accommodate growing arches. A new obturator should be constructed every three months to accommodate the enlarged craniofacial sutures at growth. The mother should be advised to hold the infant in an upright or semi-upright position in feeding state so that the swallowed air can be expelled during the feeding process.[25]

A comprehensive management of children born with cleft lip and palate is best accomplished by the multidisciplinary team approach. Dentist play an important role in the team which is working closely with medical and allied health specialties. However, prompt intervention by fabrication of feeding plate can eliminate the immediate problems i.e. proper nourishment and prevention of infections for the already debilitated infant.

CONCLUSION

The feeding obturator overcomes the factors that act as a stumbling block in the milestones of normal development and should be inserted as early as possible after birth. It can aid nursing, stimulate oral-facial development, helps develop the palatal shelves, prevent tongue distortion and nasal septum irritation, decrease the number of ear infections, expand the collapsed maxillary segment, constrict the expanded anterior part of the maxilla which aids the cleft palate team of health care practitioners and psychological help to the parents.

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