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A Feeding Appliance for A Newborn Baby with Cleft Palate

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ABSTRACT: Cleft lip and cleft palate is one of the common developmental disorders of head and neck region with increasing incidences every year. Feeding problems for infants and children are one of the common complaints of patients with cleft lip and palate. Patients with cleft lip and palate can syndromic or non-syndromic. Common difficulties arising due to this condition is inability to form complete seal in the oral cavity leading to nasal regurgitation and choking. This article presents the Prosthodontic management of an infant with a cleft palate through fabricating a feeding plate.

Keywords: Cleft lip and palate, feeding appliance, obturator.

I. INTRODUCTION

Clefts are among the most common congenital malformations worldwide. Typically, they require complex multidisciplinary treatment throughout childhood and can have lifelong medical and psychosocial implications for affected individuals. The two main types of oral clefts are cleft lip and cleft palate[1]. Cleft lip is the congenital failure of the maxillary and median nasal processes to fuse, forming a groove or fissure in the lip **.**Cleft palate is the congenital failure of the palate to fuse properly, forming a grooved depression or fissure in the roof of the mouth **.** Clefts of the lip and palate can occur individually, together, or in conjunction with other congenital malformations**.[2,3,4]**

Epidemiologic studies of isolated (i.e., without other malformations or syndromes) cleft lip and/or cleft palate have been conducted worldwide, often resulting in varying prevalence rates. Differences in geographic and ethnic distributions may account for some but not all of the variations. Other factors contributing to the diverse figures are the inclusion criteria used to group cleft types (i.e., CL ± P versus CP) or define the cleft population (i.e., all cases of cleft including other birth defects versus cases of isolated cleft).[1,2] Cleft of the lip, palate, or both is one of the most common congenital abnormalities. The average prevalence of cleft lip with or without cleft palate is 7.75 per 10,000 live births in the United States and 7.94 per 10,000 live births internationally.[1,2] The Centers for Disease Control and Prevention (CDC) recently estimated that each year 2,651 babies in the United States are born with a cleft palate and 4,437 babies are born with a cleft lip with or without a cleft palate. Cleft lip is more common than cleft palate. About 70% of all orofacial clefts are isolated clefts.[3] Cleft lip with or without cleft palate is observed more frequently in males, while isolated cleft palate is more typically seen in females [1.2] . High rates of cleft lip with or without cleft palate are seen in Latin America, China, and Japan, but are relatively low in Israel, South Africa and southern Europe. Isolated cleft palate rates are high in Canada and parts of northern Europe, but low in Latin America and South Africa .[1,2] Clefts in unborn babies are often detected with an ultrasound examination during a routine antenatal appointment. This antenatal scan typically takes place at around 20 weeks **.** The accuracy of sonography for prenatal diagnosis of cleft lip and palate is highly variable and dependent on the experience of the sonographer and the type of cleft. Reported rates of detection for cleft lip and palate range from 16% to 93% . Isolated cleft palate is rarely identified prenatally. Furthermore, even when a cleft lip is visualized sonographically, it is difficult to determine whether the alveolus and secondary palate are also involved.[4,5]

Patients with orofacial clefts are best cared for by an interdisciplinary team of specialists with experience in this field. Generally, there are two variations in specialized teams that provide services to individuals with cleft lip and/or palate [3,4,5]. The Cleft Palate Team (CPT) provides coordinated and interdisciplinary evaluation and treatment to patients with cleft lip and/or cleft palate; while The Craniofacial Team (CFT) provides coordinated and interdisciplinary evaluation and treatment for patients with a wide range of craniofacial anomalies or syndromes[1,2,6].

Cleft lip and cleft palate can be surgically treated but repair of the palate is usually delayed until 6 months to 2 years of age. Early repair of the palate may have a negative effect on the growth and development

of maxilla due to the resulting scar tissue .[7] Orogastric and nasogastric feeding tubes may be effective but should be used only for limited duration (because of the risk of perforation, pulmonary complication, nasal alar ulceration or necrosis and the risk of esophagitis and gastritis .[8] Percutaneous endoscopic gastrostomy tube placement is an invaluable tool in clinical practice but there is a big risk of complications: pneumonia, peritonitis, perforation, colon injury, gastro – colo – cutaneous fistula, liver injury, abscess and wound infection, gastrointestinal bleeding and ulceration, ileus and gastroparesis .[9] The other solution – a feeding plate (palatal obturator). It obturates the cleft and restores the separation between the oral and nasal cavities, creating negative intraoral pressure during feeding.[10]A feeding plate reduces the incidence of choking, prevents the tongue from entering defect, reduces nasal regurgitation and helps to stop the growth of palatal . [11,12]It also helps to position the tongue in the correct position to perform its functional role in the development of the jaw .[4,5] During breast sucking, the oral muscles are being stimulated, increasing tonus, and promoting the correct position to perform the chewing function in the future.[13] .Bönecker et al. state that infant`s mandibular division is vertically short and the chin prominence is incomplete. Muscles stimulation during breastfeeding plays important role in mandibular growth, establishing a harmonious relationship with the maxilla.[13]

This article presents the Prosthodontic managment of an infant with a cleft palate through fabricating a feeding plate.

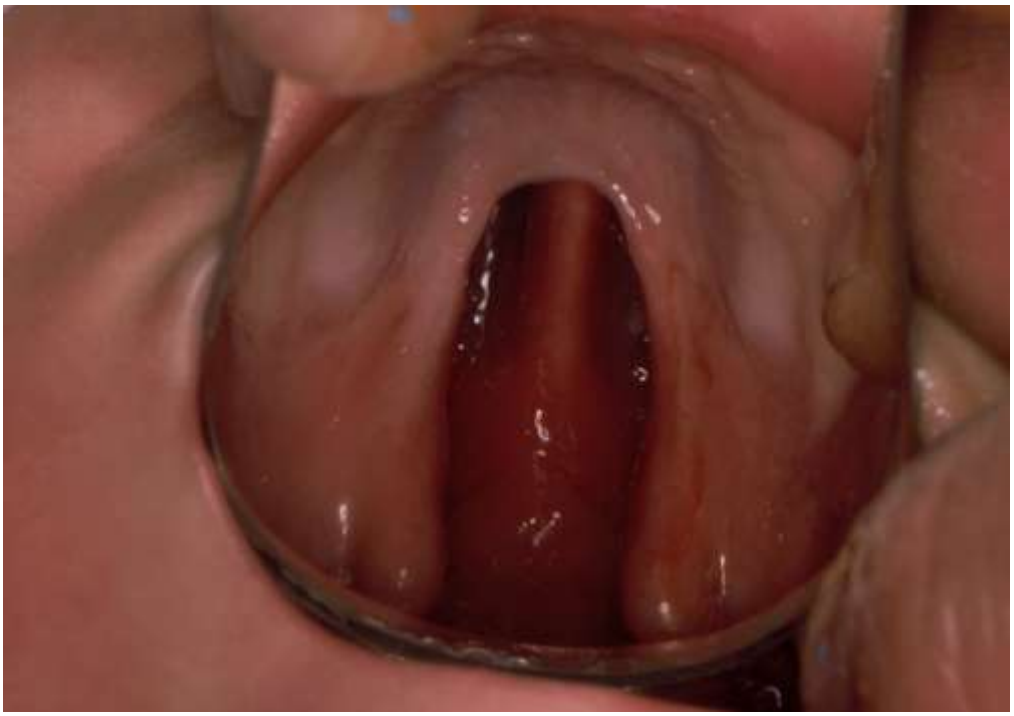

Fig. 1. Infant with cleft palate

II. CASE REPORT

The patient (Figure 1) was a 3 week old female born with a cleft palate (Veau classification, Class II) in the 36th week of the gestation period. Her weight was 2400g. Because of poor feeding, the mother and infant were admitted to the hospital. Fig. 1

Diagnosis: Pierre Robin syndrome (micrognathia, short frenulum of the tongue and palatal defect) .
The infant had a sucking reflex but could only swallow 10-15ml during one feeding (remaining feeding formula was fed via nasogastric tube).
We were planning to fabricate a feeding plate and use it until the cleft repair surgery was to be performed.

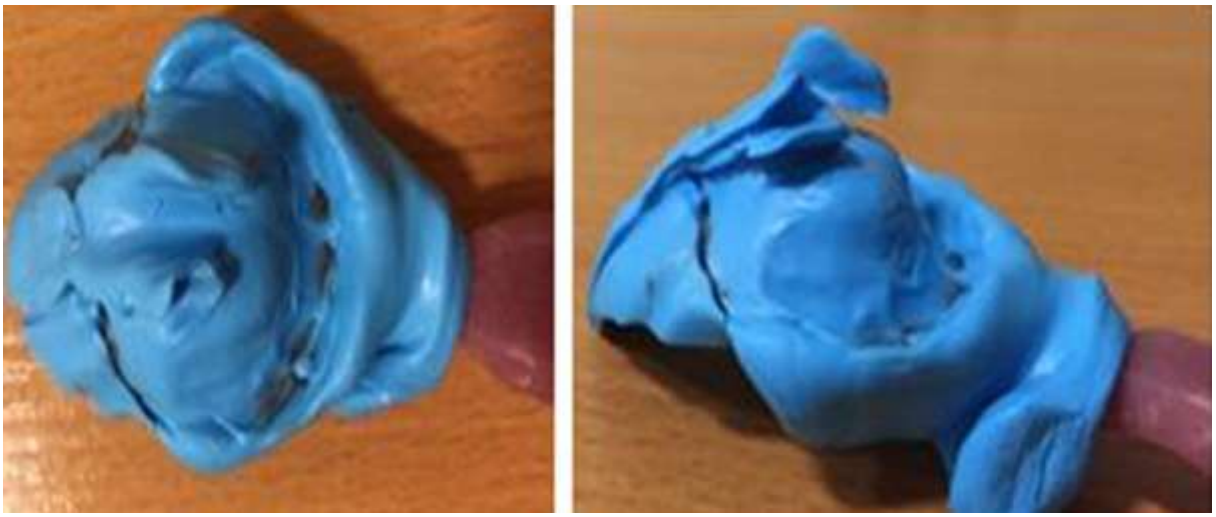

Fig.2. Final impression.

A preliminary impression of the maxillary arch was made with warm wax. It was used for making an individual tray. The final impression was made by using an individual tray with polyvinyl siloxane putty material (Figure 2).

The feeding plate was planned on a final cast that was poured into Type III dental stone. It was made with heat-cured acrylic resin (Figure 3).

Dental floss was attached to the obturator to allow for easier removal and to avoid accidental swallowing. The appliance was positioned in the infant mouth. The mother was instructed on: use of the obturator, its placement, removal and cleaning.

Parents were instructed on placement and removal of the appliance and its regular maintenance. Parents were also instructed to use the plate as much as possible.

The infant was recalled for any adjustments a week after initial delivery of the appliance. Mother was enquired regarding the use of feeding plate. A steady weight gain was also seen. The oral cavity was examined for any possible soreness or ulcerations. Oral hygiene and feeding instructions were reinforced.

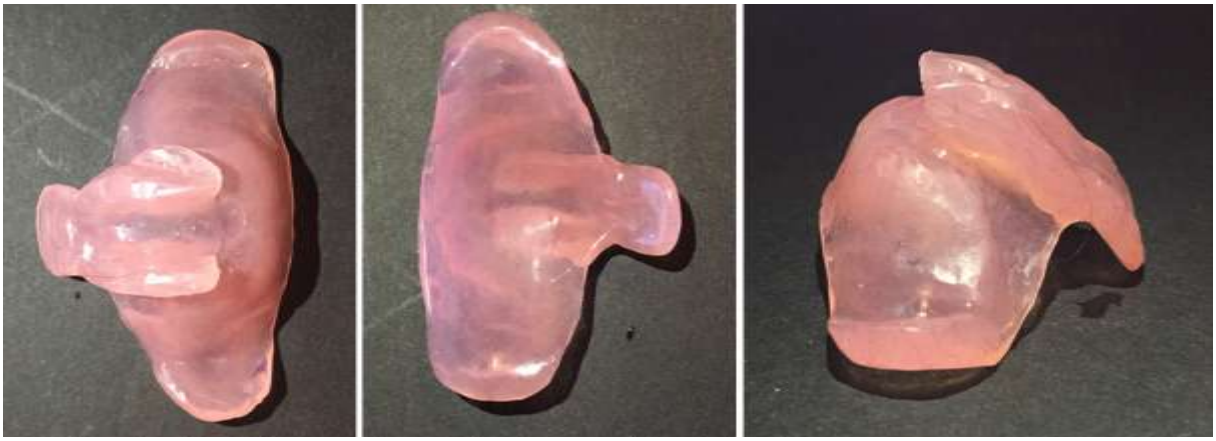

Fig. 3. Feeding plate/ palatal obturator

III. DISCUSSION

Pediatric dentistry plays a critical role in creating a proper plan of care for oral health and overall nutrition . Dentists as members of the cleft palate team provide assistance to maintain healthy dentition and gums, monitor craniofacial growth and development, and correct jaw relationships and dental occlusion to achieve proper function and appearance . Feeding appliances and presurgical infant orthopedic appliance impressions are most frequently provided by the pediatric dentist on cleft palate teams at most hospital-based programs .[3;4]

Most parents are traumatized when a child is born with an orofacial cleft as there is an increased financial, social, and personal impact prior to primary treatment completion. The problems in coping are more in families with children having cleft lip and palate when compared to families with isolated cleft palate.[5.6]

The present line of management involves a reparative surgery within the first 12 months of life. At this point of time the body weight varies between 5 and 10 kg and the whole blood volume between 400 and 700 ml. According to Fillies et al there was a direct relationship between decreased body weight and complications in surgery

Neonates with a cleft palate have difficulty in eating, which may lead to failure to thrive. The oronasal communication results in a diminished ability to create negative pressure that is necessary for suckling.[4] To compensate, the baby presses the nipple between the tongue and the hard palate, but this mechanism is also ineffective if cleft is wide. Nasal regurgitation of food, excessive air intake and choking are other frequent complications.[11,12]

Maintaining healthy and balanced nutrition is very important for normal infant growth. In this case, the cleft palate included all of the soft palate. Infants with the same clefts have velopharyngeal dysfunction (a term describing an inappropriate function of velopharyngeal (VP) port which consists of the lateral and posterior pharyngeal walls and the soft palate). [13,14]This muscular valve can control the air passage between oro- and nasopharynx. When the proper closure cannot be performed, the individual can experience: liquid regurgitation during swallowing, nasal air emission, hyper-nasality and unintelligible speech. [15,16]

An obturator restores the palatal cleft and helps to make negative pressure that is important for sucking and swallowing. Different devices have been used to improve feeding with a cleft palate (syringe feeding, Haberman feeder, Hotz plate, nasogastric tubes). In the presented case, a modified feeding plate was constructed using hard, heat- cured acrylic resin.[17,18]

Bongaarts et al. (2006) reported that the effect of lip and palatal surgery was much better than the effect of infant orthopedics. However, palatal surgery can only be performed on infants between 6 and 12 months of age. Orthopedic treatment is an initial solution prior to surgical treatment.[19]

A feeding plate not only helps to solve feeding problems, but also prevents the tongue from entering the cleft area and moves the palatal segments closer to their normal relation.[15]

A disadvantage of the feeding plate is the rigid bulb that cannot move with soft palate during swallowing. It can also be challenging to determine the proper distance between the bulb and posterior pharyngeal wall to prevent regurgitation. In this case, the infant could swallow more than 60 ml of milk during one feeding with the feeding plate installed. Before placement it was only 10-15 ml. We would like to relign the feeding plate every month to adjust for the infant's growing maxilla. [17]

It is believed that this feeding plate has many advantages and helps to avoid the gastrostomy. Feeding plate stimulates the development of mandibula, which is too small because of the Pierre Robin syndrome, and can be used routinely as the initial treatment before surgery.[15.16]

Mother requires adopting certain modifications to proper feed the child. Modified football hold is one such modification of position (holding the child at an angle of 45°), which reduces nasal regurgitation.6 History quotes numerous appliances being tried for temporary closing of cleft lip and palate cases. Many of these have been successful in providing symptomatic relief to infants like squeeze bottles, modified nipple bottles with large openings etc. [20] These devices when inserted over the palate of the infant completes the seal of the oral cavity creating pressure gradient thereby enabling he feeding of the infant and reducing nasal regurgitation and shortening the time required for feeding.[4,5,15,16,20]

IV. CONCLUSION

Cleft lip and palate results in improper nourishment due to difficulty in feeding which affects the health status of the patient acts as a psychological block in the milestones of normal development.

One of the early treatment options in case of delayed surgery is a feeding appliance. Such feeding appliances cover the defect and bridge the obstacle which occurs between a malnourished and an adequately nourished cleft palate patients. At the same time, such obturators are at the risk of being swallowed regardless of the material from which they are made of.

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