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Case Report

Dentistry Section

Pre-surgical Alveolar Molding in A Newborn Patient with Complete Unilateral Cleft Lip and Palate-A Report

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ABSTRACT

Clefts of the lip, alveolus and palate (CLAP) are the most common congenital malformations seen in the head and neck region. Children with CLAP face a vast variety of problems like feeding difficulties, hearing loss (ear infections), missing or malformed teeth and speech defects, along with psychosocial stigma which influences the social development and rehabilitation of such patients. Management of CLAP has been recognized as a unique challenge for parents as well as medical team. Pre-surgical alveolar molding has shown promising results in solving the problems which are associated with CLAP, to a great extent. We are reporting a case of a newborn patient with complete unilateral cleft lip and palate, who had inability in suckling and nasal regurgitation of oral fluids since birth, which were aided by providing a Pre-surgical alveolar molding to facilitate feeding and also to improve future facial appearance. This article highlights the effectiveness of alveolar molding appliance which was used to direct growth of the alveolar ridges and lips in the pre surgical treatment of cleft lip and palate. As a result of this appliance, the primary surgical repair of the nose and lip which was done, healed under minimal tension, thereby reducing scar formation and improving the aesthetic results.

Keywords: Pre-surgical alveolar molding, Unilateral cleft lip and palate, Alveolar segment

CASE REPORT

A 3-day-old baby boy, who was born by a full term normal delivery at JSS hospital, presented with the chief complaint of inability in suckling milk and nasal regurgitation of fluids since birth. He had no history of any consanguious marriage in his family and no other family member with a similar complaint was reported. No history of any illness, medicines which were taken, trauma, treatment which was taken or hospitalization during pregnancy was reported.

On general physical examination, patient was found to be moderately built, with a birth weight of 2.5 kg. His head's circumference was 13 cms and its length was 4 inches. On clinical examination, unilateral complete clefts of the lip, [Table/Fig-1] hard and soft palate were found, with nasal deformity and a displaced alveolar segment. Clinically, it could be characterized under group III of veau classification. The columella and nasal septum were inclined over the cleft, with base deviated towards the non-cleft side. No other associated syndrome was found. The intraoral cleft gap was 10 mm.

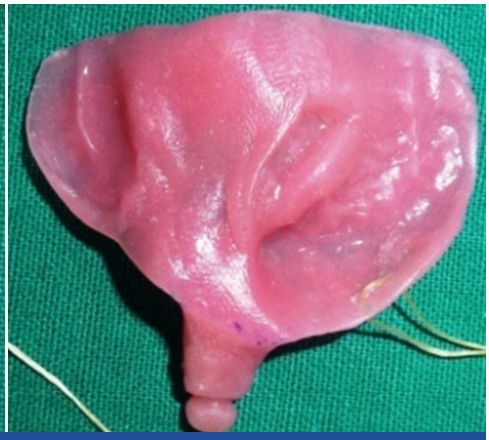
Alveolar molding technique was planned. Its risks and benefits were explained to his parents and a written, informed, parental consent was obtained. An impression of the cleft area was taken when the infant was fully awake and was able to cry, without any anaesthesia or premedication, by using an elastomeric impression material in an infant acrylic tray [Table/Fig-2]. The impression was taken in a clinical setting that was prepared to handle any airway emergency, in the presence of a surgeon.

During peformance of impression procedure, the infant was held in an inverted position (method of Grayson et al.,) to prevent his tongue from falling back and to allow fluids to drain out of his oral cavity. Operator positioned himself in a comfortable 10 'O' clock position. After impression was made, his mouth was examined for residual impression material, as a precaution. Cast was poured, trimmed and initial gap was measured by using a caliper, which was 10 mm. Undercuts on the cast were blocked out and alveolar molding appliance was fabricated by using self cure acrylic resin. First, resin was adapted on the cast for the preparation of plate, the thickness of which was kept as 2 mm, to provide structural integrity and to permit adjustments during the process of molding. The exact location of the retention arm was determined at the chair side. Then, a 5 mm x 10 mm pin shaped retention arm was made with acrylic resin and it was placed at an angle of 40 degrees from the plate. The retention arm was positioned so as not to interfere with bringing of the cleft lips together and its vertical position was maintained at the junction of the upper and lower lips [1]. After setting of resin, excess material was trimmed and a notch was created, approximately 3mm from the tip of the retention arm, to grasp elastics [2]. Finally, all surfaces and borders were smoothened and checked for any roughness [Table/Fig-3]. The borders in the place of the frenum and other attachments were relieved adequately. Appliance was inserted into patient's mouth and it was checked for proper fit and retention. The primary retention of the appliance was obtained by using extra-oral facial tapes and elastics [Table/Fig-4]. Regular replacement of new elastics was followed, as it increased the effectiveness of the appliance by maintaining the tension. Parents were given instructions regarding feeding and proper maintenance of the appliance, so that they could remove appliance only for cleaning purposes and change of elastics.

After the initial insertion, the baby was observed for several minutes to check the stability of the appliance which was in place against the palate. Breast feeding was initiated to ensure proper suckling without gagging. Patient was recalled after 24 hours to evaluate and correct sore spots or other problems associated with the appliance, if there were any. The recall appointments were scheduled weekly, for making adjustments. During these visits, the serial modification of appliance was done by selective trimming and addition of acrylic, depending on the direction in which bone movement was required. The modification was done by making 0.5 – 1 mm increments during each visit [3].

Follow-up done at three months post appliance placement [Table/Fig-5] showed that the cleft gap was 4 mm. At this time, patient underwent a cleft lip surgery, followed by palatoplasty [Table/Fig-6]. A nasal stent which was planned for the correction of nasal deformity, when the cleft gap reached approximately 5-6 mm, could not be given to this patient, due to unwillingness and non-compliance of his parents in placing it.





[Table/Fig-1]: Unilateral complete cleft of the lip, hard and soft palate with nasal deformity and a displaced alveolar segment at patient's first presentation
[Table/Fig-2]: Final impression of cleft area using elastomeric impression material
[Table/Fig-3]: Pre-surgical alveolar molding appliance fabricated using pink acrylic resin



[Table/Fig-4]: Appliance placed in patients mouth along with extra-oral facial tapes and elastics
[Table/Fig-5]: Patient's view at 3 months follow-up
[Table/Fig-6]: Patient's view at post-surgical follow-up

DISCUSSION

Clefts of the lip, alveolus and palate (CLAP) are the most common congenital malformations seen in the head and neck region [4]. Children with CLAP face a vast variety of problems, like feeding difficulties, hearing loss (ear infections), missing or malformed teeth and speech defects, along with psychosocial stigma which influences social development and rehabilitation of such patients [5].

The prevalence of CLAP deformities has been reported in 0.5-2 per live births, depending upon populations of countries. CLAP is more commonly seen in Asian countries (2.1 in 1000 live births) as compared to its incidence which is seen in African and American countries. India, being the second most populous country of the world with a population of 1.21 billion, it has been estimated that the birth prevalence of CLAP was somewhere between 27,000 to 33,000 per year. Cleft lip was more commonly seen in males, while cleft palate was more commonly seen in females. This was possibly because fusion of palatine shelves occurred one week later in females [6].

Management of CLAP has been recognized as a unique challenge for parents as well as medical team. Furnas D W in his study on unilateral cleft lip and palate patients stated that initial description of the surgical method and post-operative care for CLAP patients was given by pierre Franco in 1556 [7]. Later in its development, technique advanced and focus shifted towards achieving a precise muscle closure, better aesthetics and a delicate technique, which led to the concept of Pre-surgical orthopaedics [8] for CLAP patients.

Pre-surgical nasoalveolar molding [9] has shown promising results in solving the problems which are associated with CLAP, to a great extent.

Pre-surgical alveolar molding appliance works on the principle of 'negative sculpturing' and 'passive molding' of the alveolus and adjacent soft tissues. The principal objective [10] of Pre-surgical nasoalveolar molding (PNAM) is to reduce the severity of the initial cleft deformity by getting symmetrical, lower, lateral alar cartilages, an adequate nasal mucosal lining, a close contact of lip segment at rest and reduction in the width of the alveolar cleft segments, which can enable the surgeons to repair cleft deformities with minimal severity.

We are presenting a case of a newborn patient who had complete unilateral cleft lip and palate, who had inability in suckling and nasal regurgitation of oral fluids since birth, which were aided by providing a Pre-surgical alveolar molding to facilitate feeding and also to improve future facial appearance. Pre-surgical alveolar molding appliance provides alignment of the displaced segments, which enables the surgeon and the patient to enjoy the benefits which are associated with repair of cleft deformities, with minimal severity. It reduces [11] the number of surgical revisions required for excessive scar tissue, oronasal fistulas, nasal and labial deformities. Deng et al., [12] reported alveolar cleft narrowing by 0.5 mm after one month in unilateral cleft lip and palate cases. In bilateral cleft lip and palate, the average width of left cleft had decreased by 4.7 mm and that of the right cleft had decreased by 4.2 mm. Pai et al., [13] reported reduction of alveolar cleft gap by 5.8 mm after 3-4 months of

treatment in 57 infants with unilateral cleft lips and palates with use of alveolar molding plate. In our case, alveolar cleft was originally 10 mm, which had reduced to 4 mm at the end of 3 months. This effect was most likely to result from prevention of tongue insertion into the cleft area by alveolar plate, which had led to the margins being pushed apart. Additional effects on the alveolar cleft segment in present case were achieved by using adhesive plaster traction. Various authors [1,9,12,13] have used adhesive traction along with alveolar plate and the results were found to be better as compared to those seen with use of alveolar plate alone. The clinical procedures and fabrication of Pre-surgical alveolar molding plate should be started in first week or in early second week after the birth of the baby. Molding of tissues can be easily achieved during early life, because of raised levels of hyaluronic acid [14] and maternal circulating oestrogen levels [15] present in neonates. Grayson [16] et al., reported that 60% of patients who underwent nasoalveolar molding technique did not even require secondary bone grafting.

Drawbacks of technique

There are certain limitations which are associated with this technique. This process requires a high degree of compliance of parents during treatment. It may not be practical in situations where parents must travel a great distance for weekly care (multiple visits). The technique is very labour intensive for first 4-6 months and it requires a committed team comprising a dentist and a surgeon. To produce optimal results, Pre-surgical alveolar molding must begin as soon as possible after the baby's birth. The complications which are associated with this method are tissue ulceration [17], misdirected molding of the alveolar segment, failure in retaining appliance during molding, irritation and over stretching of skin where tapes are adhered. If the moulding plates are not removed daily for cleaning, they can lead to Candida infections in the mouth [18]. Creation of a mega-nostril [19], as a soft tissue complication, is also seen in some of the cases, which is the result of the distended nasal aperture which is created from excessive tension on the flexible lower nasal alar cartilage, due to improper stent positioning or nasal over contouring.

Hard tissue complications include an asymmetric T-shaped arch, premature eruption of primary maxillary incisors [20] through overlying gingival tissue, as a result of the pressure which is exerted by the molding plate.

CONCLUSION

Pre-surgical alveolar molding appliance serves dual functions by acting as a feeding appliance, as well as it aids in molding of alveolar segment. The combined strategy of alveolar molding and surgical repair presents excellent clinical outcomes, which helps in boosting the psychology of the growing child for facing the society. However, it is important that parents or caregivers become active members of the treatment team. Similarly, it is crucial that members of the cleft team provide the parents and caregivers adequate training, education, active support and encouragement during Pre-surgical alveolar molding therapy.

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