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Feeding Techniques for New Born Babies with Non-Syndromic Cleft Lip and Palate with an Insight on Naso Alveolar Moulding Therapy and Dental Treatment Line -A Review

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ABSTRACT

Breastfeeding helps bonding, protects from infection, promotes optimal face and jaw development etc. Many mothers find breastfeeding their baby helps build a loving and trusting relationship. Breastmilk contains lysozyme and epithelial growth factors which help in reducing any wound infection. Human a-lactalbumin, is considered as lethal to tumour cells. But given the condition of the cleft babies for inherent poor suction, feeding is no small a challenge. Risks of aspiration and infections are more with cleft condition. To achieve good breast feeding, the mothers should be trained to incorporate certain changes in holding the baby like modified football hold, dancer hand, and cross-cradle positions. Feeding plate/obturator helps in prevention of aspiration by closing the cleft region. Presurgical orthopaedics therapy (PSOT) assist in feeding as well as facilitate surgery by moulding the alveolus to reduce the size of the cleft. Naso alveolar moulding (NAM) is a type of PSOT. The advantage of NAM therapy is that NAM moulds the shape of the nostril/dome along with alveolus, reducing the number of surgical revisions, while assisting in effective feeding. Every effort should be made by the care taker (mother) as well as attending healthcare professional to achieve a good feeding. The management of a patient with cleft lip and palate involves a multidisciplinary approach. The ultimate outcome is to have a fully rehabilitated patient with a good facial and dental aesthetics, speech and function, leading a normal life. The role of a dental practitioner is invariably an important one, all through the adult life of the patient, starting from the 1st week of life. Various treatment modalities like Lip taping, Naso alveolar moulding therapy, Expansion appliances, Orthodontic and Dentofacial Orthopedic corrections, Orthognathic surgeries, Distraction Osteogenesis are available at different stages of growth and development of the cleft patientomatic.

Keywords: breast feeding, cleft lip and palate, infant, suction, orthodontics

INTRODUCTION

CONTENTS:

7. Short Review on NAM (Naso alveolar moulding) Therapy

8. Conclusion

OBJECTIVES:

1. Review the concepts of various dental therapies available to Cleft patients.

2. Review on breast feeding techniques and other feeding equipments for cleft babies.

3. Brief review on Naso alveolar moulding therapy for new born babies.

INTRODUCTION:

Cleft Lip and Palate is one of the most common craniofacial anomalies occurring all over the world. It affects 1in 750 births. Prevalence has been found to vary based on ancestry, with the highest incidence rates observed amongst Asian population (0.82–4.04 per 1000 live births), intermediate rates amongst Caucasians (0.9–2.69 per 1000 live births), and the lowest rates amongst African population (0.18–1.67 per 1000 live births)[1,2]According to the International Perinatal Database of Typical Orofacial Clefts (IPDTOC) working group, the proportion of bilateral cases is 10.3% for cleft lip without palate (CL) and 30.2% for cleft lip with palate (CLP). Amongst unilateral cases, 36.9% of CL and 41.1% of CLP occur on the right side, suggesting that unilateral cases of CL/P occur more frequently on the left.[3]

PROMINENT CLINICAL FEATURES:

Unilateral cleft lip/palate:

Wide nostril base, separated lip segments on the cleft side, depressed dome, appearance of an increased alar rim, an oblique columella, overhanging nostril apex, if there is a cleft of the palate, the nasal septum will deviate to the noncleft side with an associated shift of the nasal base

Bilateral cleft lip and palate:

Procumbent and/or rotated premaxilla, increased alar base width, widely separated lip segments, severely deficient or absent columella, flattened nasal tip tethered directly to the prolabium, flared and concave lower lateral alar cartilages.

GENETIC ETIOLOGY:

Fabricius ab Aquapendente was the first to suggest the embryological basis of these clefts[4]. A complex interplay of several genes, each making a small contribution to the overall risk, may lead to formation of clefts. Association studies such as candidate gene studies and genome-wide association studies (GWAS), have been used to evaluate a variety of genetic polymorphisms associated with nonsyndromic oro facial clefts. More than 30 potential candidate loci and candidate genes throughout the human genome have been found.

The msx1 4(p16.1) (4p16.1), tgfa (2p13), tgfb1 (19q13.1), tgfb2 (1q41), tgfb3 (14q24), rara(17 q12), and Mthfr (1p36.3) genes are among the strongest candidates[5]. Jugessur et al reported a strong effect of the tgfa variant among children homozygous for the msx1 a4 allele (9 ca repeats)[6]. Variants of irf6 may be responsible for 12% of non-syndromic cleft lip and palate, suggesting that this gene would play a substantial role in the causation of orofacial clefts[7]. A subset of nonsyndromic CLCP cases may principally be monogenic in origin, implying that a proportion of isolated cases is the result of de novo mutations. Detailed clinical phenotyping should be combined with consideration of diagnostic testing for the p120-Ecadherin gene complex and previously identified CLCP associated genes such as IRF6, TP63, SATB2, and MSX1 in multiplex families presenting with Non syndromic CLCP, as a first line assessment[8].

DIAGNOSIS:

Cleft lip may be detected with ultrasound, beginning around the 13th week of pregnancy. 2D ultrasound screening for cleft lip and palate in a low-risk population has a relatively low detection rate but is associated with few false-positive results. While complete orofacial clefts can be detected in ultra-sonographic examination as early as 16 weeks' gestation, at times, distinguishing between an incomplete and complete CL is difficult because there can be a thin band of tissue spanning the cleft even with a complete alveolar cleft[9]. 3D ultrasonography and prenatal MRI would improve the accuracy of prenatal diagnosis of orofacial clefts. Fetal MRI is less dependent on optimal amniotic fluid volume, fetal position, and maternal body habitus, than ultrasonography. Additionally, visualization of small structures on MRI is not

Volume 2, Issue 6; November-December 2019; Page No.24-37

limited by bone shadowing. MRI enables visualization of the anterior six teeth buds (four of which arise from the premaxillary segment); and the continuous, smooth, echogenic, and horseshoe-shaped curve of the tooth-bearing alveolar ridge. This allows the diagnosis of alveolar cleft and missing teeth buds, prenatally[10]
A routine intrauterine 3D picture (fig.1) can reveal the type of cleft lip and palate[11,12] Clinical presentation confirms the diagnosis. The babies are generally classified based on the level of cleft occurrence (ex: vieu's classification, Kernighan's classification, Davis classification)

MANAGEMENT OF CLEFT LIP AND PALATE BABIES:

The cleft palate was not recognized as a congenital disorder until 1556.For centuries, perforations of the palate were considered to be secondary to syphilis. The first documented Cleft lip surgery is from China in 390 BC in an 18-year-old would be soldier, Wey Young-Chi[13]. Ambroise Pare and Amatus Lusitanus introduced the use of an obturator. Pierre Fauchard in his book "Le Chirurgien Dentiste" described several different obturators to close the cleft palate defect[4].Various treatment modalities have been tried and followed since then. The management of a patient with cleft lip and palate involves a multidisciplinary approach. The ultimate outcome is to have a fully rehabilitated patient with a good facial and dental aesthetics, speech and function to lead a normal life. The role of a dental practitioner is invariably an important one, all through the adult life of the patient, starting from the 1st week of life.

CLCP DENTAL TREATMENT TIMELINE[14,15] is described in table-1.

PROTOCOLS FOLLOWED IN TREATING NEWBORN CLEFT BABIES:

Netherland protocol:

- Presurgical orthopedic treatment appliance (PSOT) – birth to 1 1/2 years.
- lip closure – 5-6 months
- 2 stage palatal closure – soft palate-12-18months, hard palate-6-9 years of age.
- Bone grafting of alveolar cleft.

Oslo protocol:

- Evolved at the oslo cleft center.
- Does not follow preoperative orthopedics
- millard lip repair at the age of 3 months .In cases with an associated cleft of the alveolus and palate, a cranial base single layer vomer flap is sutured under the alveolus palate periosteum at the time of lip closure

Zurich protocol:

- Zurich concept aims to maximize palatal growth.
- Passive plates used in conjunction with delayed surgical procedures.
- Zurich appliance is a combination of both soft & hard acrylic. • it is worn continuously for 16 – 18 months & is replaced every 6 months. reduction of gingival side of the plate every 3-8 weeks.
- lip closure - 6months of age, soft palate closure – 18 months, hard palate closure– 4-5 years.

. A modified surgical protocol is designed for patients with cleft lip and palate, in whom the cleft palate is first repaired at 6 to 9 months of age. The cleft lip is repaired 3 to 6 months after the first surgery. Advantages of the modified protocol 1. Cleft palate is repaired at the most accepted time schedule for palatoplasty at 6–9 months for good speech result. 2. Compliance for second surgery for cleft lip repair improved [16]

FEEDING THE NEW BORN:

Feeding the babies is one of the most important and immediate post-natal concern. It has been consistently demonstrated, over many years and in many nations that bottle-fed infants contract far more illnesses than infants who are exclusively breast-fed for the first six months of life. Human milk increases resistance to infections in early infancy, artificial feeding, which provides no immunological benefits, may alter the child's responses to early infection. The interaction of the developing immune system and infectious agents may be critical to the individual's subsequent immune response to infection or to reactivation of a latent viral infections[17]. The major milk protein lactoferrin can destroy microbes and reduce inflammatory responses. The non-absorbed milk oligosaccharides block attachment of microbes to the infant's mucosae, preventing infections[18]. After a specific reorganization of the molecule a major

Volume 2, Issue 6; November-December 2019; Page No.24-37

milk protein, a-lactalbumin, has been found to have a striking effect on human tumour cell lines and has been termed 'human a-lactalbumin made lethal to tumour cells[19]. Breastfeeding promotes optimal face and jaw development. Baby's suckling at the breast exercises her facial muscles.20 Protection from infection is very important for babies who may need surgery. Breastmilk contains lysozyme and epithelial growth factors that help to stop post- surgical wounds getting infected.21

Psychological bonding:

Babies with a cleft often need extra care. Breastfeeding helps to bond. Many mothers find breastfeeding their baby helps build a loving and trusting relationship. The baby does not know that he has a cleft and his needs to suckle frequently after birth, is a natural phenomenon. Even if the new-born gets most of his milk from a cup or feeding bottle, breast feeding practice act as an exercise to his muscles and help him get ready for breastfeeding once the cleft is repaired. Given the condition of the cleft babies for inherent poor suction, feeding as such is challenging. To achieve good breast feeding, the mothers should be trained to incorporate certain modifications like modified football hold, dancer hand position. Every effort should be made both by the care taker (mother) as well as attending healthcare professional to achieve good breast feeding and/or assisted feeding. The parents should be given instructions about avoiding emergencies like aspiration.

TECHNIQUES OF BREAST FEEDING A CLEFT BABY[22] are described in Table -2.

Apart from breast feeding with modifications, other types of feeding method such as Feeding plates, special bottles and nipples are also available. Spoon feeding and Breast feeding were the most common feeding practice methods for cleft babies, under 6 months of age. A statistically significant difference in weight (kg) at 6 weeks post-surgery was shown in favour of breastfeeding when compared to spoon-feeding [23].

Feeding plates:

Obturators are simple feeding plates, usually made of acrylic material. It is fabricated to cover or obturate the cleft area during feeding. It also helps prevent aspiration of food into the nasal cavity. New plates may be required to accommodate the growing alveolus. Turner L et al., concluded that the combined use of a palatal obturator and lactation education reduced feeding time and increased volume intake and was associated with good growth. Mothers who had desired to breast-feed elected to use the obturator to support high-volume intake, decrease infant fatigue, and provide breast milk for nutrition[24].Obturators can be used with breast, bottle or any type of feeding.

Other Feeding Equipments and Methods:

Syringe Feeding, Spoon Feeding - often used in conjunction with breast feeding.

Breastfeeding supplementer –A bottle is placed alongside the lactating breast and milk is allowed to trickle down such that the baby suckles both the breast milk and bottle milk as one. This boosts the volume of intake while satisfying the need for suckling. Cleanliness of the bottles is a major concern.

Nipple Shields-Nipple shields can be of use when the baby is struggling to attach or has got used to a bottle teat, and can be used in combination with breast compressions.

Cups-Ex.-The Softplas squeeze bottle, The Medela Softcup Feeder.

Feeding bottles:

There are several bottles and teats designed for babies with cleft palate (fig.5,6). The common method of feeding is to use a 250 mL polythene squeeze bottle. It is important that baby does not receive the milk too quickly and easily as he needs to learn the suck-swallow-breathe pattern. Trying to drink too fast can make the baby gag, cough or regurgitate. 'Working' for the milk will also help the baby develop his facial muscles and a strong suckling response. Medela Special Needs (previously called Haberman) Feeder, Dr Browns Bottle and teat and valve, Pigeon squeezy bottle, The Softplas squeeze bottle, CleftPALS squeeze bottle are few varieties available.

Teats: Chu Chu, Pur Simplicity teats, Pigeon cleft palate teat and valve, Nuk rubber, fast flow for thick foods, x-cut teats, Nuk feeding spout are different types of teats available to use with bottles.

Volume 2, Issue 6; November-December 2019; Page No.24-37

NASO ALVEOLAR MOULDING (NAM)THERAPY-

Patients undergo many surgeries for correction of the cleft deformity from the age of 3 months. Reconstruction of the lips, palate and nose to normal anatomy is a challenge for surgeons. Presurgical Infant Orthopedics (PSO) was developed as an adjunct to the surgical management. The concept of an intraoral device to reposition the cleft alveolar segments is attributed to C. Kerr McNeil, Scottish prosthetist[25]. Through a series of acrylic plates, the segments are actively moulded into the desired position. In 1975, Georgiade and Latham[26] introduced a pin-retained appliance to simultaneously retract the premaxilla and expand the posterior segments over a period of days. In response to controversy associated with active retraction of the premaxilla, Hotz described the use of a passive orthopaedic plate to align the cleft segments slowly. The premaxilla was not retracted and by age 10 the face had grown forward into appropriate balance with the premaxilla[27] These appliances were designed to mould only alveolar clefts, but the cleft nasal deformity still remained the greatest aesthetic challenge, even after a cleft palate surgery. Presurgical nasoalveolar moulding appliance (PNAM-fig.7), a type of PSO was introduced by Grayson and Cutting[28], based on Matsuo's cartilaginous moulding concept. Matsuo found that the nostril on the side of the cleft could be shaped to look proportionate to the non-cleft side by reshaping the alar cartilages in the unilateral CLCP patient. He further described that, the new-born has traces of the maternal hormone estrogens in their vascular system, around the first 28 days. This makes the bones and cartilage of the baby more flexible, to avoid damage to the skeleton during delivery[29]. The level of estrogen begins to decline immediately after birth. Matsuo used a stent in the form of a pair of silicone tubes to shape the nostrils, with some limitations. These include the need for an intact nasal floor (Simonart's band or lip adhesion) and the inability to direct the force because the stent expands circumferentially. Grayson et al adapted his nasal stent to extend from the anterior flange of an intraoral molding plate avoiding the need for an intact nasal floor[28].

Procedure:

Nam procedure is initiated as early as one week of age of the newborn. The entire procedure is carried out in the presence of a trained anaesthetist with a good high vacuum suction and or in a hospital setup to prevent aspiration and other respiratory emergencies.

A putty impression of the baby's cleft region is made and models are prepared. An acrylic plate with a retainer, covering the cleft as well as the entire alveolus is fabricated. In the unilateral cleft type, only one retentive arm is used. The placement of the retentive arm should be at the junction of upper and lower lips the adhesive tape should be placed starting from the non-cleft side to the cleft side. When the cleft alveolus is reduced to 6 mm or less, the nasal stent is added. The stent is made of 0.036-gauge round stainless steel wire and takes the shape of a swan neck. The stent is positioned 3–4 mm into the nostril just below the soft tissue triangle of the nose. The size and shape of the stent is adjusted by adding soft acrylic to help create a "tissue expander" effect on the length of the cleft-side columella, as well as to reposition the malpositioned lower lateral cartilage. In bilateral cases two retainers are added. (fig.8) The premaxilla is retracted and derotated as needed using the moulding plate in conjunction with external tape and elastics. Cutting et al[28]. stated that a saddle should be placed at the lip and columella junction. This saddle produces a separation between lip and columella that is expanded along an anterior vector, while the prolabium is stretched downwards using tape.

Weekly visits are required to modify the moulding plate to guide the alveolar cleft segments into the desired position. soft liner is added to give mild pressure to the cleft segments to aid for the approximation of the segments. Closure of the alveolar gap brings the lip segments together, reduces the nasal base width, and introduces laxity of the alar rim. Care should be taken not to add the nasal stent before achieving laxity of the alar rim because an increase of the nostril circumference may result in mega nostril.

The techniques that are followed are Grayson's and Figueroa's, with Grayson's being the most common one applied. In Grayson's technique, nasal stent is attached when the cleft is reduced to 6mm or less, whereas in Figueroa's technique, nasal moulding is

Volume 2, Issue 6; November-December 2019; Page No.24-37

started along with alveolar moulding, from the beginning of therapy. Few modifications have been made with different levels of success[30,31].

WHY NAM?

The aim of the NAM therapy is 1.to approximate the cleft segments by moulding, to facilitate further surgeries 2. to effect good feeding (breast/bottle/other). 3. to avoid or reduce secondary nasal reconstructive surgeries. Studies conducted to find the effectiveness of NAM therapy[32-37], show a positive trend towards the application of NAM therapy

Nasoalveolar moulding improves nasal symmetry and achieves an improvement of all maxillary alveolar dimensions, increasing alveolar rim width, reducing the size of alveolar cleft gap, and improving shape of the maxillary dental arch[32.]The approximation of the alveolar processes before surgery also enables the surgeon to perform gingivoperiosteoplasty successfully. This reduces further surgical revisions. cleft surgeons assess NAM-prepared patients as more likely to have less severe clefts, to be among the best of their surgical outcomes, and to be less likely to need revision surgery when compared with patients not prepared with NAM[33,34.]NAM improves arch symmetry and stability, and may prevent arch collapse in the long term[35,36].This device provides significant decrease in both alveolar and palatal cleft deformities in both Unilateral CLP and Bilateral CLP infants, as compared with their birth status[37].

The protocol followed varies widely in different countries, based on many factors including the availability of the sources. American cleft palate and craniofacial association have included NAM/ presurgical orthopaedics as part of their treatment parameters[38].61% of Korean institutes with plastic surgery training programs were using presurgical orthopaedics before the repair of the cleft, and most common method was presurgical nasal-alveolar moulding (43%)[39.] In Nigeria, Adhesive tapes were usually employed by 63.7% for managing the protruding premaxilla. Revision surgeries, alveolar bone grafting, rhinoplasties, and maxillary osteotomies were uncommon[40]. In India, NAM is considered as the least invasive procedure and is the recommended procedure if facilities are available for presurgical orthopaedics in cleft centres [41,42]. Many surgeons feel that it is an excellent addition to a cleft lip and palate team's armamentarium, although techniques can be challenging [43]

COMPLICATIONS OF NAM THERAPY

Soft tissue breakdown, intraoral ulcerations, inflammation on the intra nasal lining, Cheek skin rashes/contact dermatitis, failure to apply tapes and elastics, eruption of neonatal teeth during treatment, bruises or petechiae in the dome area due to over activation, Mega nostril produced by improper positioning of the nasal stent.

CONCLUSION:

All the initial treatments for cleft should aim for breast feeding of the new-born. For overall wellbeing, every mother and baby should experience the benefits of breast feeding. NAM helps to achieve a better feeding experience along with moulding of nasal and alveolus deformities for a better surgical outcome. With proper training and clinical skills, NAM has demonstrated tremendous benefit to the cleft patients as well as to the surgeon. More research on new materials or appliances is needed to create the best solution for effective breast feeding of the cleft lip and palate babies.

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Volume 2, Issue 6; November-December 2019; Page No.24-37

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Volume 2, Issue 6; November-December 2019; Page No.24-37

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Volume 2, Issue 6; November-December 2019; Page No.24-37

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Figure legends:

Fig.1- 3D intra uterine pictures of various orofacial clefts

Fig.2- Cross cradle position

Fig.3 Dancer –hand position

Fig.4 Modified foot ball hold position

Fig.5 Types of feeding bottles

Fig.6 Modified 45 degree hold position

Fig.7 NAM therapy

Fig.8- NAM for unilateral and bilateral cleft lip and palate

Table 1: CLEFT LIP AND CLEFT PALATE DENTAL TREATMENT TIMELINE

Table 2: TECHNIQUES OF BREAST FEEDING A CLEFT BABY.

Volume 2, Issue 6; November-December 2019; Page No.24-37

TABLES

Table-1-CLEFT LIP AND CLEFT PALATE DENTAL TREATMENT TIMELINE

AGE OF THE CHILD	COMMON PROBLEMS FACED BY THE PARENTS /PATIENTS	TREATMENTS	
Age 0 to 3 months	1.Pschycological/emotional shock to the parents 2.social stigma 3.Feeding 4.Aspiration of fluids 5.Difficulty in learning how to handle the baby	1.Psychological counselling and support to the parents 2.lip taping 3. NAM-Naso alveolar moulding therapy (recommended) 4.Assisted feeding 5.Modified Feeding bottles	
Age 3 months	1.apprehension about the feeding in general and aspiration ,in particular 2.overcoming the psychological trauma and challenges in handling the cleft baby.	1.Lip surgery 2.NAM/obturator continued. 3.Parent to be advised to visit the dentist if there is any tooth erupting into the cleft area.	
Age 10 to 12 months	i. Erupting primary teeth ii. Maintenance of oral hygiene Some of the common techniques of palatal repair are [14] iii. von Langenbeck's bipedicle flap technique iv. Veau-Wardill-Kilner Pushback technique v. Bardach's two-flap technique vi. Furlow Double Opposing Z-Plasty vii. Two-stage palatal repair viii. Hole in one repair ix. Raw area free	*Palatal repair-early at 18-24 months* Advantages: • Development of normal speech • Proper feeding Disadvantage: • scar tissue • Tendency towards maxillary underdevelopment	*Palatal repair at 9 years* Advantages: • Maxilla can grow to its full potential. Disadvantages: • Feeding is not proper • Speech difficulty • Aesthetics • psychological trauma of untreated cleft.

Volume 2, Issue 6; November-December 2019; Page No.24-37

	palatoplasty x. Alveolar extension palatoplasty (AEP) xi. Primary pharyngeal flap xii. Intravelar veloplasty xiii. Vomer flap xiv. Buccal myomucosal flap		
age 3 to 7 years	1.Establishment of primary dentition 2.Facial soft tissues may mask the underlying skeletal deficiency of the midface in young children	1. control or eliminate oral habits, functional shift or space loss after premature loss of primary teeth. 2.maintanence of good oral hygiene 3.good care of primary dentition –prevention and treatment of dental diseases (eg. caries, enamel hypoplasia) 4. correction of developing dental cross bite, if the discrepancy is not severe.	
Age -7 to 12 years	1.Cross bite 2.Psychological trauma – peer pressure at school	1.Correction of cross bite with expansion appliances like jack screw, quad helix, niti expanders. 2.Maintanence of space for proper eruption of permanent teeth. 3.Expansion of collapsed segment to improve surgical access to the graft site. 4.Traumatic occlusion is eliminated in preparation of alveolar graft. (By aligning offending tooth) 5.correction of class III skeletal and dental profile- face mask therapy, reverse pull head gear.	
Age-11-17 years)	late mixed dentition to permanent dentition	• Eruption of the permanent canine with the help of alveolar graft, with a minimal interference in growth. • Late secondary alveolar bone grafting aids in replacement of missing teeth with implants • Biocompatible membrane synthesis., Epithelial sheets are available to facilitate grafting.	
Above 18 years	1.Severe Skeletal Discrepancy 2. Deterioration of Esthetics and Occlusion 3.Psychological Implications Leading to Low Self Esteem,	1. A Combined Orthodontic and Orthognathic Approach. 2.Distraction Osteogenesis Distraction osteogenesis (DO) has been used recently to correct maxillary hypoplasia with predictable and stable results. In patients with clefts of the secondary palate,	

Volume 2, Issue 6; November-December 2019; Page No.24-37

	4. Defective Speech, Oronasal Fistulas.	Distraction Osteogenesis allows soft tissue adaptation, including scar tissue. DO can also be used to aid in vertical alveolus augmentation and rapid orthodontic tooth movement. If an osteotomized dental arch can be transported to a new position without complications, it would reduce or eliminate the need for a secondary bone graft to the cleft alveolus in cleft patients and help prevent dentoalveolar defects by approximating the native alveolar bone and gingiva. Mobilizing a segment in the dentoalveolar region also results in the creation of new bone and attached gingiva[15]

Table -2 TECHNIQUES OF BREAST FEEDING A CLEFT BABY.

Cleft condition	Favourable Position for breast feeding	Technique
Unilateral cleft lip alone	modified football method or straddle position	I. The infant should be held so that the CL is oriented toward the top of the breast. (for example, an infant with a [right] CL may feed more efficiently in a cross-cradle position (fig.2) at the right breast and a ‘‘football/twin style’’ position at the left breast. ii. position the baby with cleft toward the breast, to allow the cleft to be tucked into the breast tissue, making it easier for the baby.
Bilateral cleft lip alone	Dancer hand position	i. Slide the hand under the breast, i.e. supporting the breast with three fingers rather than four form a U-shape with the thumb and forefinger to cradle the baby's chin, this helps the baby to press the nipple and areola between the gums. (fig.3). *ii* support infant's cheek, it decreases the width of the cleft and facilitates closure around the nipples.
Unilateral / Bilateral cleft lip and palate	Straddle/football hold/twin position	a ‘‘face on’’ straddle position i. Positioning should be semi-upright to reduce nasal regurgitation and reflux of breastmilk into the Eustachian tubes. ii. A ‘‘football hold’’/twin position (the body of the infant positioned alongside the mother, rather than across the mother’s lap, and with the infant’s shoulders higher than his or her body) may be more effective than a cross-

Volume 2, Issue 6; November-December 2019; Page No.24-37

		cradle position(fig.4). iii. position the breast toward the ‘‘greater segment’’—the side of the palate that has the most intact bone. This may facilitate better compression and stop the nipple being pushed into the cleft site[22].
Cleft of the soft palate alone	modified football method or straddle position	Baby is kept in an upright position to allow the milk to flow down and to prevent choking

Figures:

Fig.1- 3D intra uterine pictures of various or facial clefts

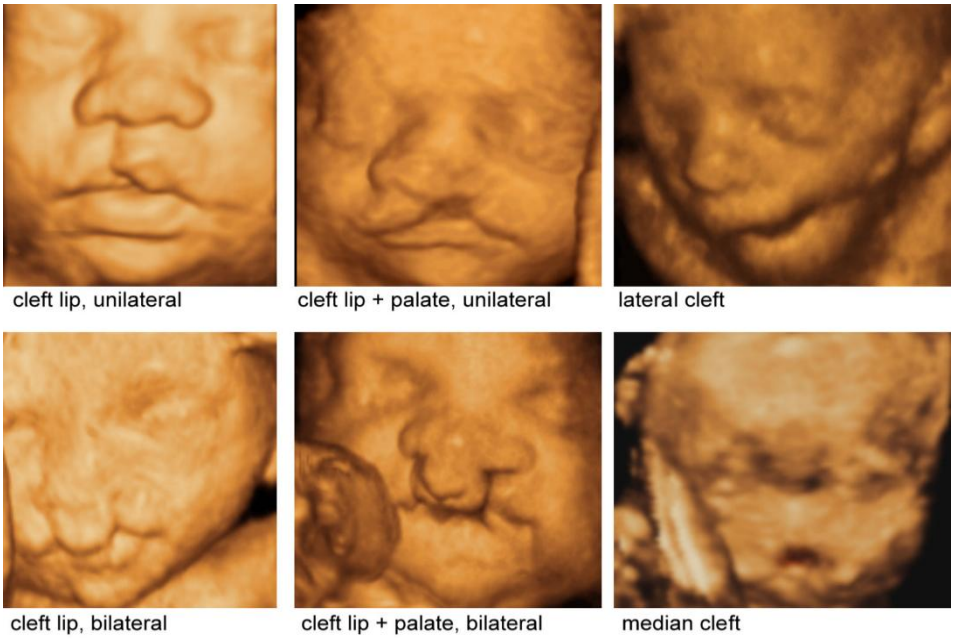
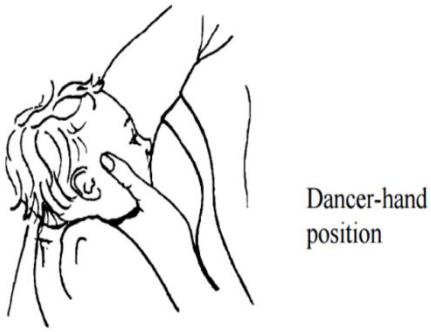


Fig.2- Cross cradle position

Fig.3 Dancer –hand position



Volume 2, Issue 6; November-December 2019; Page No.24-37

fig.4 Modified foot ball hold position

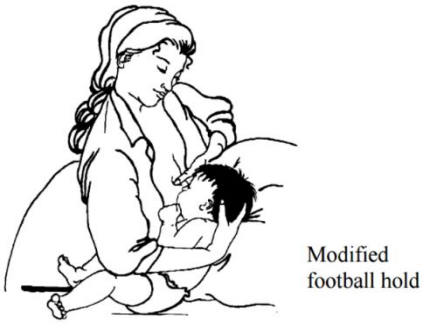


Fig.5 Types of feeding bottles

Fig.6 Modified 45 degree hold position

Fig.7 NAM therap

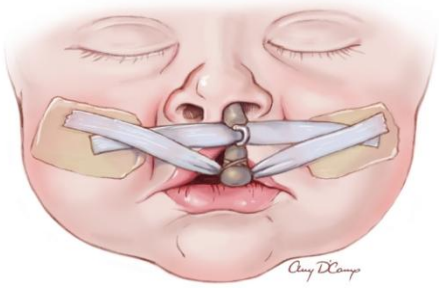
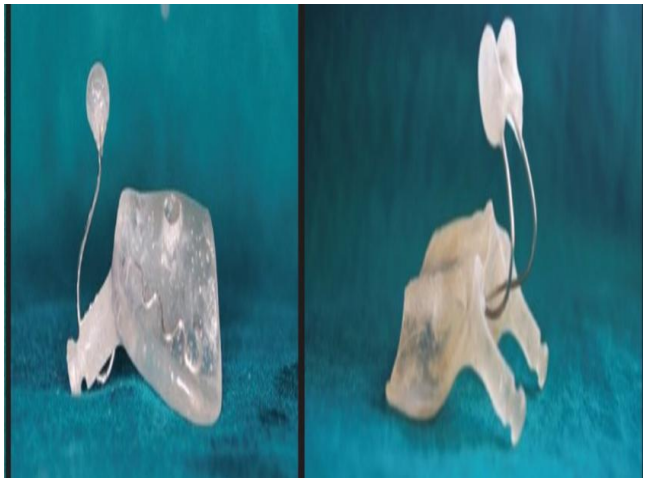


Fig.8- NAM for unilateral and bilateral cleft lip and palate



Volume 2, Issue 6; November-December 2019; Page No.24-37