Review Article

LATHAM'S APPLIANCE: A COMPREHENSIVE REVIEW

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Abstract:

The Surgeon as well as the orthodontist still faces several challenges on dislocation of the maxillary segments in CLCP. Pre-surgical orthodontic device known as latham appliance. The motive of this appliance is to decrease the cleft width before the surgical procedure. In first three months it is inserted on the patient. Segments gets relocated in a few weeks, it is situated their till lip surgery. Custom made appliance have the acrylic pads which are over maxilla hinged posteriorly with the help of a mechanism of expansion. Latham appliance main motive is to increase repair of lip and nose surgery by applying the appropriate force to skeletal base and also inhibits the patient tongue from pressing to the cleft.

Latham appliances is also modified to make it more ease and efficient than the traditional one. Modified latham device (MLD) may reduce the burden of treatment on parents and also decreases the quantity of time required for estimation of cleft segment.

Keywords: Pre-surgical orthodontic device, Cleft lip and palate, MLD, Acrylic pads, Expansion mechanism.

INTRODUCTION

One of the most common birth defect is cleft lip and palate which may causes appropriate expense relative to the emotional difficulties, rehabilitation as well as economics to a person. In a recent study, it had been projected that the total of 0.033% of all Indian population suffers from cleft lip and palate. The average prevalence rate among 100,000 was found 32.18 for both genders.[1] During the 6th & 12th weeks of gestation if any fusion failure occur in the left and right maxillary prominences can causes the CLCP. [2] The Surgeon as well as the orthodontist still faces several challenges on dislocation of the maxillary segments in CLCP.[3]

There are two common strategies which are commonly used to correct the nasal asymmetry and to close the lip. First strategy includes the repair of nose and lip about 3 months of age regardless of size of alveolar gap and sometime during childhood for any residual deformity may followed by secondary correction. The Second strategy includes pre-surgical orthopaedic molding early after birth prior to primary repair surgery.[2]

Braumann et al clearly mentioned in their paper, "the aims of pre-surgical infant orthopeadics are to reduce the width of the cleft gap to achieve an optimal alignment of the cleft segments within the first few months of infancy prior to cheiloplasty and to allow surgical repair with minimal tension".[5]

As the cleft width decreases the soft tissues subjected to low tension gives preferable outcome of surgical repair [6,7] . Moreover, there are so many other advantages of pre surgical infant orthopaedics which are normalizing the feeding as well as the function of tongue, development in speech, reduces the chances of aspiration, mainly it reduces the severity of original dental cleft deformity and skeletal deviations.[7,8]

Initially in 1686 the use of pre surgical infant orthopaedics was described by Hoffman in which he used an extraoral anchor headcap in order to place retraction force on premaxilla.[9] Then Desault performed CLCP patients in 1791 by using a cap on the premaxilla under extraoral force.[10] In 1950's McNeil along with Burston treated CLCP patients by utilizing intra oral plates through which they presented an arch (dentoalveolar) grade control.After then the other appliances

were developed to pin the bar made up of stainless steel which is expandable and can retained by Hagerty in the year of 1957 after that others like Mladick and Georgiade showed up at 1968, in the year of 1970 -71 Georgiade gave his observations. And at 1975 Georgiade collaborated with Latham for further analysis and at last Latham at 1980.[11,12]

LATHAM APPLIANCE

In 1950's Burston and McNeil introduces the pre-surgical orthopeadic correction and latham technique is a variant of that approach. Pre-surgical orthodontic device known as latham applaince. The motive of this appliance is to decrease the cleft width before the surgical procedure. In first three month it is inserted on the patient. Segments gets relocated in a few weeks, it is situated their till lip surgery. Custom made appliance have the acrylic pads which are over maxilla hinged posteriorly with the help of a mechanism of expansion.[3]

"ECPRA (Intraoral Elastic Chain Premaxillary Repositioning Appliance)" is another name for Latham appliance. Latham appliance is also known by the name as dentomaxillary advancement (DMA) appliance which was developed in the year of 1980. It is an active pin-retained appliance which require a surgical fixation to the bone. With the rapid orthopeadic correction latham appliance align the alveolar arch. From the age of 2 to 5 months the appliance is to be placed surgically. Latham appliance operated by concurrently applying the pressure to cleft segments, for proper positioning move the alveolar segments over a period of 4 to 6 weeks. Nevertheless, an anterior and posterior cross-bite is an unnecessary consequences may occur more often with the usage of Latham appliance.[13] All though prolong term observations had shown that more anterior and posterior cross-bites was occurred in children who were treated with the Latham appliance, Chan et al summarized in their study that the dental arch relationships did not get affected by in Latham appliance the preadolescent children.[14]

TREATMENT PROCEDURE

The initial step of the treatment of an infant having cleft disorder is to take the maxillary impression (Figure 1), here the newborn should be of 2 weeks or older. [15] On the basis of the complexity of the cleft team, Surgeon, dentist (paediatrician) or orthodontist would perform this part of treatment. Doctor or a dental specialty laboratory produces the master cast to fabricate the pre-surgical orthopaedic device.

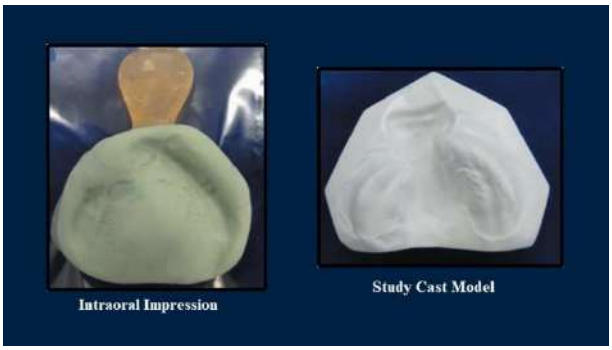

Figure 1: Impression and cast of the cleft patient

POC delivery is a rapid procedure should be done under general anaesthesia within age of 5 weeks.[15] The two channel locking pins affixes the two maxillary base which passes through acrylic material to palate for the intraosseous retention. When the POC device is inserted in the patient, the patient will send under keen observation of the doctor overnight and get discharged by following morning. Here, the outpatient surgery can be performed in the further procedure.[16]

UNILATERAL CLEFT LIP AND PALATE

Among all the UCLP cases, pre-maxillary part of larger segment mediopalatally brought by the mechanical forces and in many of the cases lesser segment is brought forward about 2 – 3 mm to come in contact with larger segment.[13]

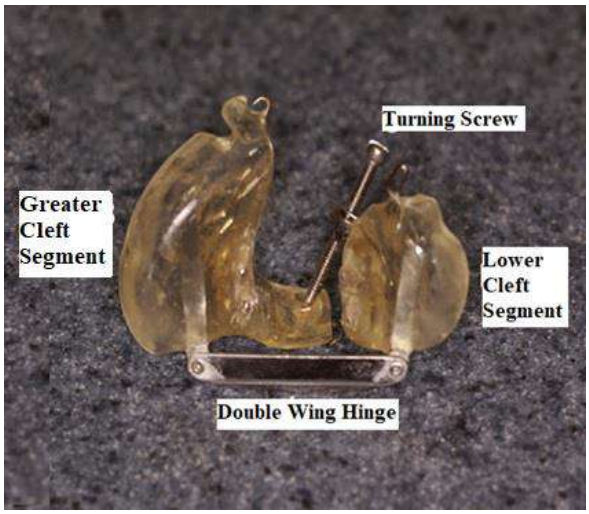

Figure 2: Dento maxillary advancement (DMA) appliance

Once the patient is sent back to the home after placing the DMA appliance (figure 2) it is instructed to their parents to activate screw by driving it to onehalf turn (i.e., 0.25mm distance) two times in a regular day in UCLP treatment. Alveolar alignment can be related to the activation rate, dimension of cleft as well as the measure of correction done (upto 14 mm).[16] Basically around 3 to 6 week time is taken for

cleft side to move forward w.r.t. alter side. [12] In the complete alignment time the patient is evaluated by the surgeon weekly until there is no possibility of screw turning. Elastomeric chain will be used in front of appliance if the remaining gap exceeds 2 – 3 mm between the segments. After insertion of the device 2 – 3 weeks resting period is recommended to achieve the ideal movement, the resting period helps to resolve the load residue that is strain which is generated because of applied active force that is stress.[16] The POC device is removed after three months under general anaesthesia and further reconstructive surgery can be performed by the surgeon.

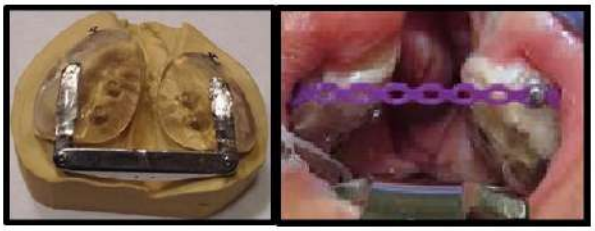

Figure 3: Modified Latham Appliance

Randy Feldman and Ernesto Ruas developed the Modified Latham Appliance (figure 3)in which they replaces the screw to an "orthodontic elastic power chain" in order to approx. cleft segments. Within 2 weeks lesser and greater alveolar (palatal) segments can be approximated. Furthermore the appliance is being updated in terms to spare the gingival tissue as well as to increase the performability of surgeon to execute a gingivoperiosteoplasty at removal of appliance. Modified latham appliance reduces the burden of treatment on parents and also decreases the quantity of time required for estimation of cleft segment.[17]

BILATERAL CLEFT LIP AND PALATE

In these cases, lateral palatal segments get expands mechanically by the use of the appliance. This permitted the following retraction of protrude premaxilla in the suitable position.[13]

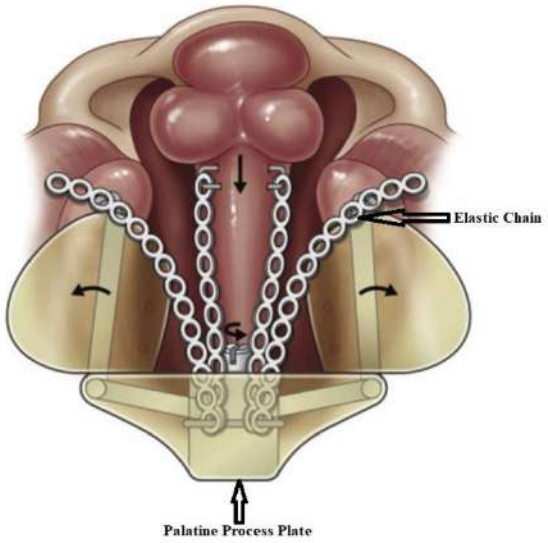

Figure 4: "ECPR (elastic chain premaxillary repositioning) appliance". Elastic chain generates activation force for retruding the pre maxilla in order to expanding lateral segment. Pre maxillary pins which are located ahead to the vomerine suture are pulled by the elastic chains.[24]

Staple is placed through septal premaxilla by the surgeon and connects that with chains that may proceed posteriorly undercross over the roller beneath the expansion drive box (figure 4). If there is a need of maxillary segment, instruct the parents to turn one-quarter twice a day or numerous onequarter turns in weekly done by surgeon. Forces produced by chains is about 57g (2oz) in 4 to 6 weeks, the required pre-maxillary allignment is to be achieved with this.

To correct the deviated septum, the wire islet is added to palatal margin which is opposite as well as adjacent to deviated vomer. The removal of the appliance is done under general anaesthesia, around 3 months of age to perform reconstructive surgery by the surgeons.[12]

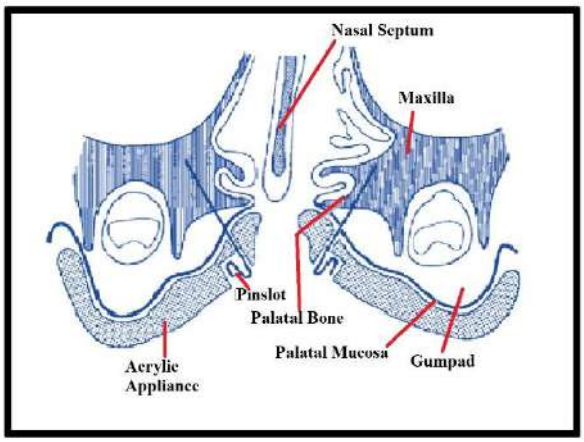

Figure 5: Latham appliance stabilization in maxilla by stainless steel pins

Two slots can positioned within the palatal planes, in both the acrylic plates. Into the palatal shelves, pins are inserted through these slots.[3] (figure 5).

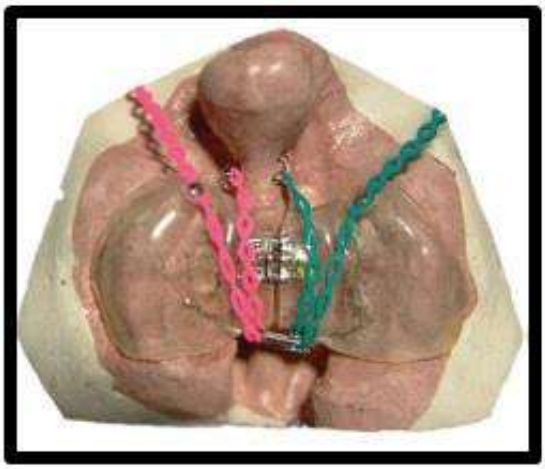

Figure 6: Modified latham device for bilateral cleft lip and palate patient

Modified latham's device, (figure 6) in which latham screw, replaced by an 8 mm expansion screw and in the anterior portion there are two buttons in the device. For orthopaedic treatment the modified device provides a low cost alternative.[18]

CONCLUSIONS

In a series of cleft patients, latham appliance was generally come up with favourable long term results, without harming facial skeletal growth. Effective in reducing a protruded premaxilla, alveolar ridges gets aligned, expands the maxillary segments, decreased fistula formation, minimal tension of soft tissues on the surgical closure. It is a valuable pre-surgical orthopaedic device for treating cleft cases. As there is always a scope for improvement, further study is needed to analyse the merits and demerits of this appliances.

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