PARADIGM OF CORRECTING VERTICAL PREMAXILLARY DESCENT IN BCLP PATIENTS WITH ACCENTUATED CURVE NITI WIRES.

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INTRODUCTION

The most common pre-maxillary deformities in patients with complete bilateral cleft lip and palate (BCLP) is a prominent and downward displaced pre- maxilla with or without wide alveolar cleft. This is seen in develop world mostly in primary and mixed dentition however in developing countries, it is frequently seen in permanent dentition too. The cause may be lack of proper protocols, patient awareness and presence of palatal fistula due to failure of primary procedures. Both vertical and sagittal excess are induced by overgrowth at the premaxillary-vomerine suture [1, 2]. The Sagittal excess is physiological in bilateral cleft lip and palate (BCLP) during childhood and usually does not need any correction until the end of the growth spurt, as demonstrated by Smahe[3], Vagervik4,,and Trotman and Ross[5] who all showed a progressive and spontaneous decrease of maxillary protrusion (SNA angle) during growth in BCLP patients. On the other hand, vertical excess does not reduce spontaneously with growth, and need to be corrected[6], .If the vertical overdevelopment of premaxilla is not controlled during deciduous and transitional dentition a severe disproportion between occlusal plane of posterior teeth and incisors may develop in permanent dentition which is difficult to treat[4]. The various method for correcting the vertical excess are extraction of primary incisors in deciduous dentition[4], orthopedic intrusion (Liou technique) [7] and surgical intrusion. Liou's premaxillary orthopaedic intrusion technique is a great asset which has certainly reduced the number of osteotomy which was frequently performed in the 1960s to 1970s, In 1972, Friede and Pruzansky[8] and later Vagervik[4] in 1983, warned against the severe growth impairment induced by the premaxillary osteotomy.

Orthodontic correction of vertical excess involves intrusion of anterior teeth and extrusion of posterior teeth. Maezzini[6] has described the choice of procedure depending on age of patient and amount of vertical excess; however we must also consider incisor inclination before deciding the mode of treatment.

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The levelling of maxillary arch is a prerequisite for alveolar bone grafting in all situations. The forces required for intrusion of normal or proclined incisors should be purely intrusive in nature however retroclined incisors require intrusive and protrusive force both. The aim of this paper is to describe simple orthodontic management of vertically descended premaxilla with retroclined incisors and retrognathic mandible in permanent dentition. We report management of vertical premaxillary excess in 3 BCLP patients with help of accentuated curve Niti wire

Method

Orthodontic correction of 5-11 mm of pre maxillary vertical excess in 3 patients were corrected successfully with use of accentuated curve NiTi wires which produces both intrusive and protrusive forces. In present group of cases incisors were retroclined and didn't upright with mandibular growth. During intrusion of premaxillary teeth, the site of force application in these retroclined incisors are closer to centre of resistance hence created counter moment will be less which will cause minimum proclination .Proclination in these type of case is desired hence tie back with intrusive arches is not required and use of 3 piece intrusion arch is optional.

Results-

The Cephalometric evaluation in above cases revealed that correction of vertical excess was due to combination of factors like dental intrusion, dental proclination, orthopaedic effect and posterior dentoalveolar growth.

CASE REPORT

Patient -1 DK

A 15 year old female patient with bilateral cleft lip and palate has been referred to us for orthodontic treatment. History revealed that her lip repair was done at 3 month of age ,palatoplasty at 9 months of age, palatal fistula repair at 3 year of age, revision chelioplasty at age 6,lip nose revision at age 7,palatal fistula repair at age 10 and lip nose revision at age 11.

Clinical examination revealed that she had orthognathic profile, thick upper lip, Angle's class II molar relation, unilateral posterior cross bite, wide alveolar cleft, palatal fistula and complete deep bite. She has missing upper lateral incisors, upper right premolar and lower second premolars. Her lower deciduous second molars are retained. Upper occlusion plane was at 2 different levels due to descended premaxilla. Cephalometric examination

Fig1a-1c – Patient 1 pre treatment

Fig3a-3c – Patient 2 pre treatment

revealed that class II skeletal pattern (ANB =6 deg) with retroclined and retro positioned upper anterior teeth. The vertical excess of premaxilla was 7 mm in relation to posterior occlusal plane .Velopharangeal examination revealed mild incompetence.(Fig 1a-1c)

Treatment plan- The plan consisted of correction of cross bite, levelling of upper and lower arches and prepare the case for maxillary lateral segment advancement with intraoral segmental distraction to reduce the alveolar cleft width and palatal fistula.

Treatment progress- The posterior cross bite was corrected with quad helix appliance and then .018 preadjusted Roth appliances was bonded in upper arch. .016 and .016X.022 accentuated curve Niti wire was used in progression for 9 months. Once the deep bite was corrected, lower arch was bonded and .016 and .016X.022 NiTi Wires were used for levelling and aligning. Later segmental .016x.022 S.S wire in upper arch and Continuous .016X.022 S.S wire in lower arch was placed after 15 months of treatment At this stage computed tomography scan was taken for the purpose of segmental distraction to reduce the alveolar cleft. CT scan revealed alveolar cleft of 11 mm on right side and 6 mm on left side. After evaluating the surgical scar, width of alveolar cleft and Velopharangeal junction upper right segment was planned for distraction with the help of internal distractor and left segment was planned for repositioning with routine Le fort type 1 osteotomy.

Treatment results- Vertical descent of premaxilla was corrected with Orthodontic accentuated curve Niti wires.(Fig: 2a-2b)

Fig2a-2b – Patient 1 post vertical correction.

Fig5a-5c – Patient 3 pre treatment

Fig6a-6b – Patient 3 post vertical correction.

Patient 2 PD

A 12 year old female patient with bilateral cleft lip and palate was referred to us for orthodontic correction. History revealed that her lip repair was done at 6 month of age, palatoplasty at 1 year of age, lip nose revision at 1.5 year, anterior palatal fistula repair at 6 and 10 year of age.

Clinical examination had revealed that she had convex profile with retrognathic mandible, Angle's class II molar relation, unilateral posterior cross bite, wide alveolar cleft, palatal fistula and complete deep bite due to descended premaxilla. She has peg shape lateral incisor, missing upper right second premolar and transposed upper right canine and first premolar. Fistula closure with tongue flap was unsuccessful. Cephalometric examination revealed that class II skeletal pattern (ANB =10 deg) with retroclined and retro positioned upper anterior teeth. The vertical excess of premaxilla was 11 mm in relation to posterior occlusal plane. (Fig 3a-3c)

Treatment plan - Correction of cross bite, levelling of upper and lower arches, intrusion of upper incisor to provide room for mandibular growth and closure of of palatal fistula.

Treatment progress- The posterior cross bite was corrected with jack screw appliance and then .018 Roth appliances was bonded in upper arch. Initially lateral incisors were not bonded due to reduced alveolar bone support. .016and .016X.022 accentuated curve NiTi wire was used in progression for 11 months for levelling the upper arch .After 4 months of treatment, Begg brackets were placed on lateral incisors. Once the deep bite was reduced, lower arch was bonded and then .016 and .016X.022 NiTi wire was used for levelling and aligning. Later .016x.022 S.S wire is placed in lower arch .Total treatment time was 18 months.

Treatment results-

Cross bite, deep bite and vertical excess of premaxilla was corrected. Upper and lower incisors became upright, ANS was lifted up, upper incisors were intruded, both point A& point B came forward. Over jet was created for future late mandibular growth. No root resorption was present.(Fig 4a-4b)

Case-3

Patient V.B

A 13 year old male patient with bilateral cleft lip and palate was referred from pedodontia department for orthodontic correction. History revealed that mother had unilateral cleft lip .His lip repair was done at 4 months ,palate repair at 1 year ,lip nose revision at 10 year of age. Arch expansion was done with hyrax appliance and then appliance was left for 7 months for retention.

Fig4a-4b – Patient 2 post vertical correction

Clinical examination revealed that he had concave profile with obtuse nasolabial angle thin upper lip ,angle's class II molar relation with deep bite , missing lateral incisors and upper left first premolar, presence of supernumery teeth ,impacted upper right second premolar ,retained right second deciduous molar ,crowded lower incisors ,wide alveolar cleft ,nasolabial and palatal fistula . The crown tip of impacted upper right second premolar was at lateral incisor place. Upper occlusion plane was at 2 different levels due to descended premaxilla. Cephalometric examination revealed that class II skeletal pattern (ANB =6 deg) with retroclined and retro positioned upper anterior teeth. The vertical excess of premaxilla was 5 mm in relation to posterior occlusal plane.(Fig 5a-5c)

Treatment plan- Removal of hyrax appliance, levelling of upper and lower arches, alignment of lower arch, extraction of retained upper right deciduous molar, eruption of second premolar , closure of nasolabial and palatal fistula .Treatment progress- The hyrax appliance was removed, and upper right deciduous molar was extracted and then .018 Roth appliance was bonded in upper arch, .016and .016X.022 accentuated curve NiTi wire was used in progression for 9 months for leveling the upper arch .After 4 months of treatment lower arch was bonded and .016 NiTi was placed. Later lower right central incisor was extracted to maintain positive overjet. Upper and lower arch wire was progressed to .016 X .022 S.S wire and canine was retracted to provide room for eruption of transposed upper second premolar. At this stage Patient is referred for closure of fistula and alveolar bone graft.

Treatment results-

After 16 months of treatment vertical excess with deep bite was corrected. Palatal fistula was closed. Guided eruption of upper second premolar was noticed. Upper incisors were intruded and proclined to reduce the facial concavity but was masked due to late mandibular growth. No root resorption was noticed.(Fig 6a-6b)

DISCUSSION

The aim of this paper is to discuss orthodontic management of premaxillary vertical excess with retroclined incisors and alveolar cleft in bilateral cleft lip and palate patients .The protrusive premaxilla at birth is moulded back by lip repair. By the age of 3-4 years the primary incisors usually contact the mandibular incisors (Harvold 1947[9]) .From then maxillary incisors and alveolar process come forward along with mandibular growth[4]. There position become gradually upright and then labially inclined depending on amount of mandibular growth and position of premaxillary basal bone. However variation exists in appearance of premaxilla and incisor inclination. The present group of patients had vertical premaxillary excess with retroclined incisors .The premaxiila didn't upright with the mandibular growth. The reasons could be the hyperactive labial muscle forces and deep bite which has hinder the mandibular growth. All patients showed good mandibular growth after correction of vertical maxillary excess. The Cephalometric evaluation in above cases revealed that correction was due to combination of factors like dental intrusion, dental proclination, orthopaedic effect (ANS was lifted up) and posterior dentoalveolar growth.

The intrusion mechanics for premaxillary vertical excess should be selected by evaluating incisor inclination since intrusive forces also produce moment or counter moment depending on force and centre of resistance. If teeth are proclined and intrusive force is applied ahead of centre of resistance it produces intrusion as well as counter-clock wise moment which results in anterior proclination. This can be prevented either by tie back with intrusive arches or use of 3 piece intrusion arch where force is applied closer to centre of resistance. In present group of cases incisors were retroclined and didn't uprighted with mandibular growth. The site of force application in these retroclined incisors are closer to centre of resistance hence created counter moment will be less which will cause minimum proclination .Proclination in these type of case is desired hence tie back with continuous intrusive arches is not required and use of 3 piece intrusion arch is optional. However in severely retroclined incisors where point of force application is lingual to centre of resistance use of continuous intrusive arches will further retroclined the incisors due to clockwise moment, hence it should be avoided. The premaxilla is small bony segment which has considerable mobility without bone graft hence anterior nasal spine was lifted up. Accentuated curve wire produces

extrusive force in premolar region which was tolerated well by posterior dentoalveolar growth. The orthodontic correction of vertical excess in these patients shifts the balance towards orthodontic correction from surgical correction. Since these patient undergo various surgeries at different stages, orthodontic management of vertical excess will reduce the surgical, economical and physiological burden of these patients.

CONCLUSION

With appropriate patient selection and assessment of incisor inclination orthodontic correction of vertical excess can be done with accentuated curve NiTi wires after achieving a satisfactory maxillary arch expansion and alignment.

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