Presurgical Nasoalveolar Molding Techniques for Complete Bilateral Cleft Lip, and Palate Infants: Two Case Reports

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Abstract

Cleft lip and palate are congenital craniofacial abnormalities that can lead to a number of problems, such as impaired facial growth, impaired esthetic, and speech disorders. Therefore, patients with cleft lip and palate usually undergo cheiloplasty, the surgical outcomes of which can be improved using presurgical nasoalveolar molding (PNAM). Various cleft centers have introduced their own PNAM protocol, including Khon Kaen University (KKU), where KKU-NAM protocol is followed. This case report presents two cases of bilateral complete cleft lip, and palate patients treated with KKU-NAM protocol. To reduce the alveolar cleft gaps before cheiloplasty, the protocol uses a forehead-type nasoalveolar molding device, an alveolar molding plate with traction screw, and an extra-oral strapping. After applying KKU-NAM protocol, the premaxilla was retracted into a proper position, and the alveolar cleft gaps were reduced due to the contraction screw.

Keywords: *Bilateral cleft lip and palate/ Presurgical nasoalveolar molding/ KKU-NAM*

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Introduction

Cleft lip and palate are congenital craniofacial abnormalities with an incidence of approximately 1.1 in 1,000 live births in Thailand.[1] The defects can cause a variety of issues, including impaired facial growth, impaired esthetic, and speech disorders, and thus requires multiple surgeries, starting from birth to adulthood.

Bilateral cleft lip, and palate patients (BCLP) have nasal deformity with lower alar cartilages that are flat and flared, which cause an increased alar base width.[2] Hence, the nasal tip of BCLP patients is depressed, and the patients have short columella and short philtrum with protruded premaxilla, causing a gaps between the premaxilla and the lateral alveolar segments. The large gaps between the premaxilla and the lateral segments affects the cheiloplasty outcome by increasing tension on the flap and can cause long-term surgical scarring.[2]

Presurgical nasoalveolar molding (PNAM) is a technique used to guide patients' alveolar segments into the proper position prior to cheiloplasty, in order to reduce cleft gaps, lengthen the columella, improve the shape of the nose, improving the cheiloplasty outcome by decreasing tension on the flap through close approximation of the relaxed lip segments[3] and reduced scar formation after healing.[4] In the long term, teeth near the cleft gaps are able to erupt with adequate periodontal support as a result of better position of the alveolar segments.[2] In 1998, Santiago et al.[5] found that 60% of patients treated with PNAM did not require secondary bone grafting, and Sato et al. (2002) later found that patients with previous PNAM treatment who required secondary bone grafting, more bone remained in the cleft site.[6]

In 1993, Grayson et al. introduced a PNAM technique to correct the alveolus, lip, and nose position in newborns with cleft lip and palate. The technique applied nasal stents extending from the anterior flange of an intraoral molding plate to improve the alignment of the base of the nose and lip segments and to reduce the width of the alveolar gaps.[2]

Subsequently, various PNAM protocols have been introduced by a number of cleft centers. Khon Kaen University (KKU) practices a PNAM protocol called KKU-NAM. This protocol uses an extra-oral strapping with

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adhesive tape, a forehead type nasal molding device, and an alveolar molding plate constructed from self-cured hard acrylic and combined with a traction screw.[7]

KKU-NAM (treatment) protocol

Treatment begins with the application of an extra-oral strapping to lengthen the columella, reduce soft tissue gaps, and decrease premaxilla protrusion. It is made from self-adhering athletic tape or self-adhering athletic wrap, the end of which is covered with adhesive tape (Figure 1). The forehead-type nasal molding device is constructed from hard acrylic in a rectangular shape lined with soft closed cell foam. The nasal stent is constructed by 0.8 mm round stainless-steel wire and is extended from the hard acrylic. The end of the wire is covered with teardrop shaped hard acrylics to improve the shape of the nose (Figure 2). The forehead-type nasal molding device is placed at mid forehead and adhered with adhesive tape applied at the edge of the acrylic pad. The nasal stent is inserted into the nostril and stretched until the tissue is blanched. The devices are used at all times except during cleaning. Similar to the forehead-type nasal molding device and extra-oral strapping, the alveolar molding plate is worn at all times aside from during cleaning.

The patient then recalled every 2-4 weeks to update records and adjust the devices as needed until favorable outcomes are achieved. An alveolar molding plate with traction screw is also constructed to re-align the premaxilla toward the lateral segments. The alveolar molding plate is constructed from self-cured hard acrylic, model set-up also help to re-align the premaxilla and is held together with a traction screw in such a way as to facilitate closing the gaps (Figure 3) by cutting the premaxilla model and repositioning the alveolar segments 1-2 mm closer before constructing the alveolar molding plate. It could be combined with traction screw to re-align the premaxilla up to 4.5 mm by using the medium size traction screw, it is held in place by denture adhesive, and the contraction screw is activated once a day (0.4 mm/day). Once the outcome is considered satisfactory, the patient is recalled to update their records one last time before they are referred for cheiloplasty.

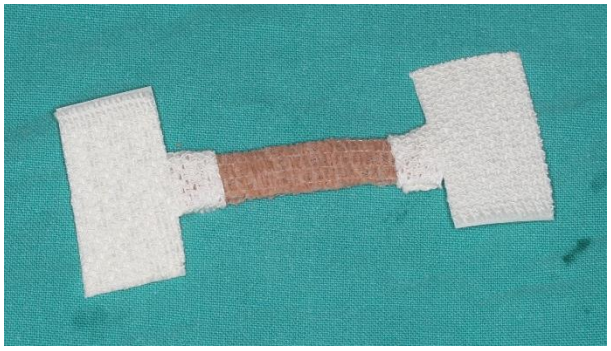

Figure 1 Self-adhering athletic tape or self-adhering athletic wrap with adhesive tape for the extra-oral strapping.

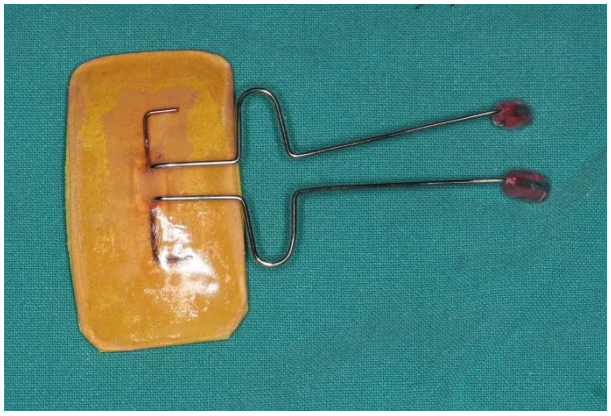

Figure 2 The forehead-type nasal molding device.

Figure 3 The alveolar molding plate.

The nose structure tends to relapse after surgery causing by the depression of nasal cartilage from healing process.[8] Liou et al. showed that the relapse in nasal asymmetry was the result of a differential growth between the cleft and noncleft sides in the first year after surgery.[9] Thus, maintenance of the nose should be continued, starting again two weeks after cheiloplasty. The patient should wear either a nasal retainer (Figure 4) or the forehead-type nasal molding device for at least six months or until undergoing palatoplasty. The nasal retainers from Khon Kaen University comes in 7 size (Figure 5). The appropriate size is chosen by fitting the nasal retainer in without having to use excessive force while inserting. Patients are recalled for outcome assessment every 2-4 weeks and records are updated again at three months after cheiloplasty.

At the age of 12 months, patients are referred for palatoplasty, and follow-ups are conducted 3 months, 6 months, and then every year after palatoplasty. The KKU-NAM treatment protocol practiced by Khon Kaen University are shown in Table 1.

Figure 4 The nasal retainer.

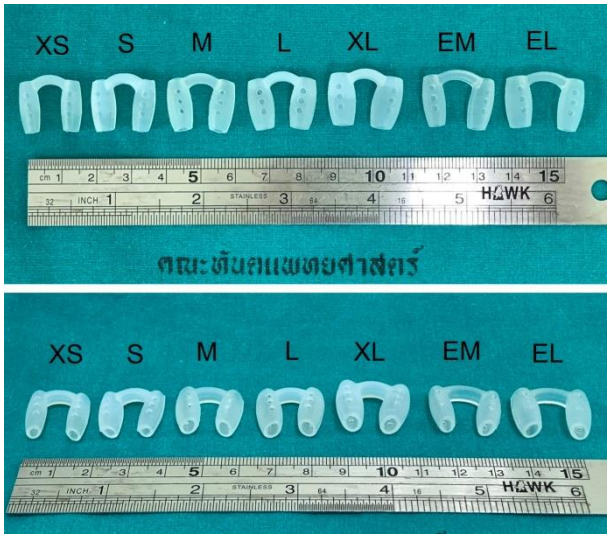

Figure 5 The nasal retainers from Khon Kaen University.

Table 1 KKU-NAM treatment protocol as practiced by Khon Kaen University

Visit	Treatment
1	1.1) Take history, conduct clinical examination, diagnosis, and treatment planning. 1.2) Recommend treatment process to parents and obtain signed consent forms. 1.3) Take records, including: 1.3.1) 3D photography and photography of: - extra-oral and intra-oral abnormalities, abnormalities of other organs - family members who have similar abnormalities (only if permitted) 1.3.2) Nose and upper lip measurements 1.3.3) Take an impression for further study of the model 1.4) Apply extra-oral strapping and forehead-type nasal molding device. 1.5) Provide extra-oral strapping kit to parents, along with guidelines for oral hygiene care and how to use and care for the devices.
2	2.1) After 2 weeks, assess the outcomes of extra-oral strapping and nasal molding device use, update records, and adjust the devices. 2.2) Take impression for use as a working model and then construct the active alveolar molding plate. 2.3) Insert the active alveolar molding plate in this visit and advise parents to activate the retraction screw once a day.
3	3.1) Follow up every 2-4 weeks, updating records as 1.3 and making new devices as needed). 3.2) About 2-3 months after beginning treatment, assess treatment outcomes and update records as 1.3 before referring the patient for cheiloplasty.
4	Cheiloplasty and gingivoperiosteoplasty.
5	5.1) Follow up 2 weeks after cheiloplasty and update records as 1.3. 5.2) Apply nasal molding device and extra-oral strapping to promote nasal retention until secondary palate is repaired (at this stage, patients will tend to give less cooperation). 5.3) Recall and assess treatment outcomes every 2-4 weeks until secondary palate is repaired. 5.4) Update records as 1.3 at 3 months after cheiloplasty.
6	Update records as 1.3 and refer the patients for a secondary palate repair at the age of 10-12 months.
7	Discard all devices and follow up and update records as 1.3 after 3 and 6 months and then every year after the secondary palate is repaired.

Case report

Case 1

Diagnosis and Etiology A Thai girl, aged 8 days, with non-syndromic BCLP. The clinical examination showed BCLP through the nasal floor, a short columella, slightly protruded and slightly deviated premaxilla (about 2 mm to the left), large alveolar cleft gaps of about 5 mm on the right- and 3 mm on the left-hand side, and a broadened and flattened base of the nose (Figure 6).

Figure 6 Pre-treatment photography taken during the first visit.

Treatment Progress According to KKU-NAM protocol, during the first visit and after clinical examination and data collection, the patient was treated by using an extra-oral strapping made from self-adhering athletic tape. The forehead-type nasal molding device was placed. The nasal stent was inserted into the nostril and allowed to stretch the nostril until the tissue was blanched. The devices were used at all times except for during cleaning (Figure 7).

Figure 7 The **p**atient after inserting the nasal molding device and applying the extra-oral strapping.

The patient (3 weeks of age) was recalled for a 2nd visit to assess the outcomes of the treatment, to update records, and to adjust the extra-oral strapping and nasal molding device. An alveolar molding plate with traction screw was constructed during this visit to re-align the premaxilla toward the corrected position. The plate was constructed on a set-up model to move the premaxilla towards the palatal by about 2 mm and to the right-hand side by about 2 mm. The parents were instructed to activate the screw once a day (0.4 mm/day) (Figure 8).

For the 3rd visit (1 month and 2 weeks of age) and 4th visit (2 months and 1 week of age), the patient was recalled to evaluate the results of the treatment. Records were updated, and the extra-oral strapping, nasal molding device, and alveolar molding plate with screw were adjusted.

For the 5th visit, the patient (3 months and 1 week of age) came back to adjust the nasal molding device and extra-oral strapping. The same alveolar molding plate was used to maintain the position of the alveolar segments.

The alveolar molding plate was used for two weeks, after which the patient was referred for cheiloplasty at the age of 3 months and 3 weeks due to the patient's condition meeting the criteria described by rule of 10.[10]

Figure 8 At the 2nd visit (3 weeks of age); the patient after inserting the alveolar molding plate, the extra-oral strapping, and the nasal molding device

Treatment results After completing the pre-cheiloplasty treatment, there was a 1-mm gap between the premaxilla and the right segment and no gap at the left-hand side. The premaxilla was slightly protruded and slightly deviated to the left side. The columella had increased in length and proximity of the lip segments and convexity of the nose had each increased. The nasal symmetry also improved and the nostril length also increased in both sides. (Figure 9).

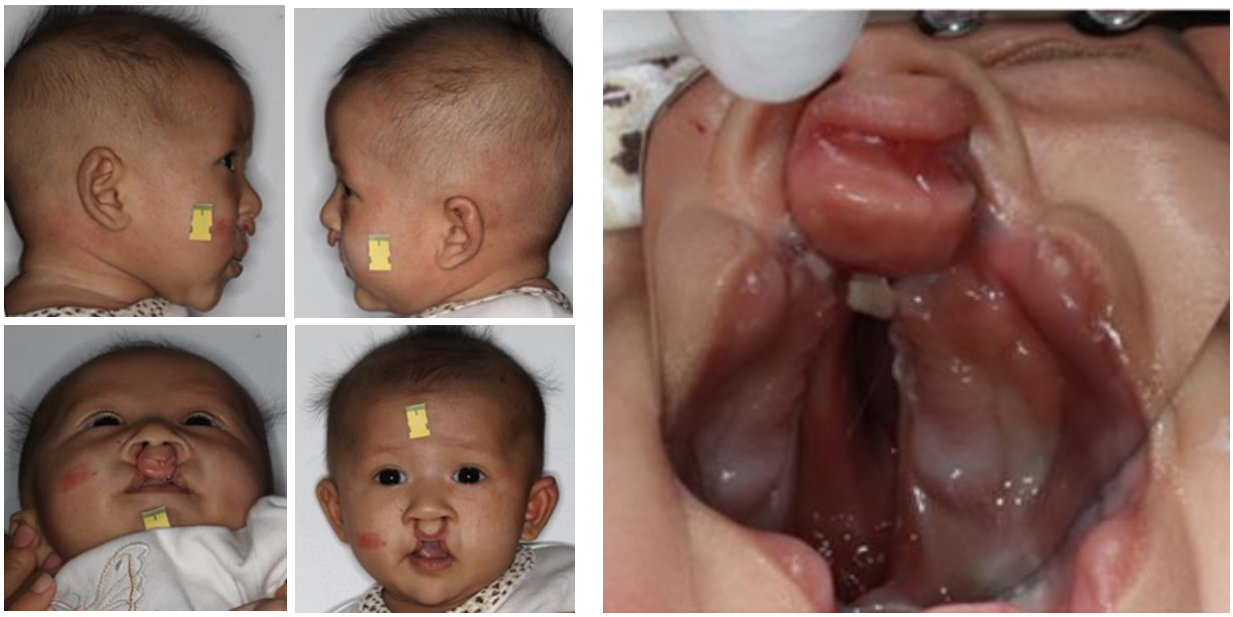

Figure 9 Extra- and intra-oral photography taken prior to cheiloplasty (3 months and 3 weeks of age).

One month after cheiloplasty (4 months and 3 weeks of age), minimal lip tension was noticed in the patient. Premaxilla protrusion was reduced due to scar contraction (Figure 10).

A nasal retainer was used to maintain nose convexity. Three months after cheiloplasty (6 months and 3 weeks of age), the patient showed no signs of nasal collapse or lip tension, the nose shape, nasal convexity and the nasal symmetry maintained. (Figure 11)

Figure 10 Extra-oral appearance one month after cheiloplasty (4 months and 3 weeks of age).

Figure 11 Extra-oral appearance three months after cheiloplasty (6 months and 3 weeks of age).

Case 2

Diagnosis and Etiology A Thai girl, aged 2 months and 12 days, with non-syndromic BCLP. The clinical examination showed BCLP through the nasal floor, a short columella, protruded and deviated premaxilla (about 8 mm to the left), large alveolar cleft gaps of about 13 mm on the right- and 7 mm on the left-hand side, and a flattened nose (Figure 12).

Figure 12 Pre-treatment photography taken during the first visit

Treatment Progress According to KKU-NAM protocol, the treatment should begin with an extra-oral strapping and a forehead-type nasal molding device. However, this case began with only an extra-oral strapping made from self-adhering athletic wrap with adhesive tape. A forehead-type nasal molding device could not be inserted during this visit, as the patient's premaxilla had blocked her nostrils, and her columella was too short (Figure 13).

The patient (2 months and 3 weeks of age) was recalled for a 2nd visit, and records were updated. The extra-oral strapping was adjusted. An alveolar molding plate with traction screw was constructed during this visit to re-align the premaxilla. The plate was constructed on a set-up model for 2 mm in the palatally direction and 2 mm in the right-hand direction. The parents were instructed to activate the screw once a day (0.4 mm/day) (Figure 14). At this point, the patient's premaxilla was still blocking her nostrils, and her columella was still too short to insert the nasal molding device.

Figure 13 The patient was treated only with an extra-oral strapping.

Figure 14 At the 2nd visit (2 months and 3 weeks of age); the patient after inserting the alveolar molding plate with traction screw and the extra-oral trapping.

For the 3rd visit, the patient (3 months and 3 weeks of age) was recalled and evaluated. A new alveolar molding plate was constructed during this visit, as the traction screw in the old plate was insufficient for decreasing the remaining cleft gaps. At this point, the cleft gaps were reduced and her premaxilla had moved palatally, causing her nostrils to be freed from the premaxilla. Therefore, the forehead-type nasal molding device was inserted during this visit to improve the shape of the nose (Figure 15).

Figure 15 At the 3rd visit (3 months and 3 weeks of age); the patient after inserting the alveolar molding plate, the extra-oral strapping, and the nasal molding device.

At the 4th visit (4 months and 1 week of age) and 5th visit (6 months and 1 week of age), the patient was recalled to adjust the nasal molding device to improve the nose shape and for continued extra-oral strapping. The 3rd and 4th alveolar molding plate was inserted to decreased the remaining cleft gaps. At this point (5th visit), the primary left central incisor had erupted (Figure 16).

This last alveolar molding plate constructed during the 5th visit was used for two months before the patient was referred for cheiloplasty at the age of 8 months and 1 week.

Figure 16 At the 5th visit (6 months and 1 week of age); the patient after 4 months of KKU-NAM treatment.

Treatment results After completing the pre-cheiloplasty treatment, there was no gap between the premaxilla and the lateral segments, no deviation of the premaxilla, the columella was lengthened, and proximity of the lip segments and convexity of the nose had been successfully increased. The nasal symmetry and the nostril length also improved in both sides. (Figure 17)

One month after cheiloplasty (9 months 1 week of age), minimal lip tension was noticed in the patient. In this case, the nasal molding device was continued in order to improve the nasal form and to serve as a nasal retainer (Figure 18).

Three months after cheiloplasty (10 months and 1 week of age), the patient showed no sign of nasal collapse or lip tension, the nose shape, the nasal convexity and the nasal symmetry maintained.

Figure 17 Extra- and intra-oral photography taken prior to cheiloplasty (8 months and 1 week of age).

Figure 18 Extra-oral appearance one month after cheiloplasty (9 months 1 week of age).

Discussion

The KKU-NAM technique uses an alveolar molding plate and nasal molding device that are separate from each other, thus resulting in separate effects on the nose and mouth.[7] The retention of the alveolar molding plate results from the adhesion and cohesion from the saliva like a complete denture. If the alveolar molding plate is loose, the denture adhesive can be used to hold the appliance in place. A disadvantage of the original PNAM device is that the plate dislodges when the nasal stent is activated because of the reaction force that pushes the plate. Thus additional retentive buttons or retention straps are needed for retention which can make the alveolar molding plate bulkier.[2] The forehead nasal molding device, on the other hand, is easy to fabricate in the laboratory, resulting in less chair time. Moreover, because this nasal molding device does not require a nasal impression, it reduces the risk of airway obstruction. The nasal molding device can also be used to maintain the nasal structure after cheiloplasty instead of a nasal retainer, as it does not interfere with the wound healing of the upper lip. Monasterio[11] similarly introduced a nasal molding device without an intra-oral plate and reported on its advantages, including that it is easy to fabricate and eliminates the need for a dental specialist, as it can be managed and maintained by the patient's parents or caregivers.

Grayson[4] recommends starting the patient on a nasal stent once the width of the cleft gaps is less than six mm; however, the KKU-NAM technique starts the nasal molding device as early as possible. According to Matsuo,[12] the cartilage of the newborn in the first six weeks after birth is soft due to the mother's estrogen levels continuing to have an effect, coupled with an increase in hyaluronic acid, which inhibits the linking of the cartilage matrix. The high level of

estrogen remains for the first six weeks after birth and begins to decline after that.[12-15] Thus, the nasal molding device would be most effective in this period. Bajaj[16] likewise suggested beginning the nasal molding device as early as possible. Pool[17] introduced the adhesive lip taping technique by using narrow strips of tape to decrease the cleft gaps. The KKU-NAM technique also used the extra-oral strapping and combine with nasal molding device at the first two weeks because the extra-oral strapping can rapidly help reduce the severity of the cleft gaps and lengthens the columella due to the increase of estrogen levels and hyaluronic acid,[12] however it cannot control the movement of alveolar segments.[4] Thus afterward, the alveolar molding plate with traction screw was needed to close the remaining cleft gaps in this protocol.

In the first case study, the treatment started at the age of 8 days. The age of the patient matched the golden period for nasal molding. The patient was fitted with the nasal molding device from the first visit, and its use was continued until cheiloplasty was performed. This helped improve the patient's nose shape and increased convexity of the nose. Regarding the second case study, the treatment started at the age of 2 months and 12 days, and the patient did not begin using the nasal molding device until the third visit (4 months of age). In terms of estrogen levels, according to Matsuo[12] it was late to start the nasal molding device. However, because the columella of the patient was too short during the first visit, the nasal stent could not be inserted into the nostril. Fortunately, Grayson[18] suggests that the plasticity of the cartilage fades over the first 6 months after birth, during which time the shape of the nasal cartilage can be modified with PNAM. Although the patient got a late start with the nasal molding device in this case, the outcome of the nasal molding device was still favorable, as her nose shape improved and showed more convexity. This nasal molding device was used until cheiloplasty and was subsequently used as a nostril retainer after surgery until one month after cheiloplasty. Williams et al.[19] suggested that late nasal molding (later than the golden period but prior to surgery) results in more symmetrical nostril height-width ratios than surgery alone without nasal molding.

Complications of KKU-NAM have included: allergies to the adhesive tape or micropore tape, soft tissue ulceration caused by the alveolar molding plate, esthetic issues resulting from the nasal molding device, and dislodgement of the alveolar molding plate. Grayson[4] also reported complications of PNAM, including soft tissue ulceration that developed intraorally and cleft gaps re-opening if the appliance was lost or not worn. Fortunately, neither of our cases resulted in the latter complication thanks to our patients' high level of cooperation.

In the first case study, the cleft gaps were reduced from 5 mm on the right side and 3 mm on the left side to 1 mm and 0 mm, respectively. Grayson[2] suggested that PNAM should reduce the cleft gaps until passive contact of the alveolar is achieved for the sake of continuity between alveolar segments. However, Kongprasert et al.[20] found that a remaining alveolar gaps of up to 3-4 mm can be self-corrected after cheiloplasty due to scar contraction. Therefore, it was likely that the remaining gap on the left side of this patient would be self-corrected after cheiloplasty. The patient's premaxilla was no longer deviated at the end of treatment, the columella was lengthened, and lip segment proximity was higher. After cheiloplasty, because of the reduction in alveolar cleft gaps, minimal tension was observed thanks to the KKU-NAM treatment and a high level of cooperation from parents. The nasal retainer was used to improve nose shape. The cleft gaps of the second patient were reduced from 13 mm on the right side and 7 mm on the left side to 0 mm on both sides. Three months after cheiloplasty, minimal tension and nasal relapse were observed, and the patient stopped wearing the nasal molding device due to a lack of cooperation at that point.

In terms of premaxilla protrusion and deviation, Grayson[4] demonstrated the use of a combination of elastic bands and surgical tape to correct its position. However, the extra-oral strapping cannot properly control the movement of the alveolar segment. In both of our cases, the premaxilla was protruded and deviated to the left-hand side. We used the alveolar molding plate with traction screw and an extra-oral strapping to retract and correct the deviation of the premaxilla (Figure 19). The traction screw is able to control the vector of force more easily than elastic bands and surgical tape, and when applied together with an extra-oral strapping, the treatment results in a less challenging and quicker reduction in the alveolar cleft gaps. The extra-oral strapping also

simultaneously helps to lengthen the columella. Retnakumari et al.[21] and Neha et al.[22] also used an alveolar molding plate with traction screw and an extra-oral strapping to improve the position of the premaxilla with favorable results. Ijaz et al.[23] proposed an alternative design, using an alveolar molding plate with the anterior part of the plate extended as a ring around the protruded and deviated premaxilla. The component thus had an active part in correcting the position of the premaxilla.

Pai et al.[7] and Liou et al.[8] showed that nose structures tend to relapse after surgery. In the first case study, the patient wore a nasal retainer designed and made at KKU center to improve the nose shape and decrease the chance of relapse after surgery. In the second case, however, the patient used the nasal molding device as a nasal retainer after surgery. The advantages of the nasal molding device over the silicone nasal retainer are an overall cheaper cost of treatment and ease of application. The patient can use the same PNAM device after surgery and does not require a new device to be constructed. In terms of ease of application, the nasal molding device needs only minor adjustments before its application as a nasal retainer, but the silicone retainer is prefabricated and usually, when it does not fit to the patient's nostrils, needs to be reshaped before use. Moreover, the nasal molding device can be used to adjust the nose shape after cheiloplasty if needed. Its disadvantages are that it is relatively bulky, lacks esthetic appeal, and when used in older babies, it can be pulled off easily.

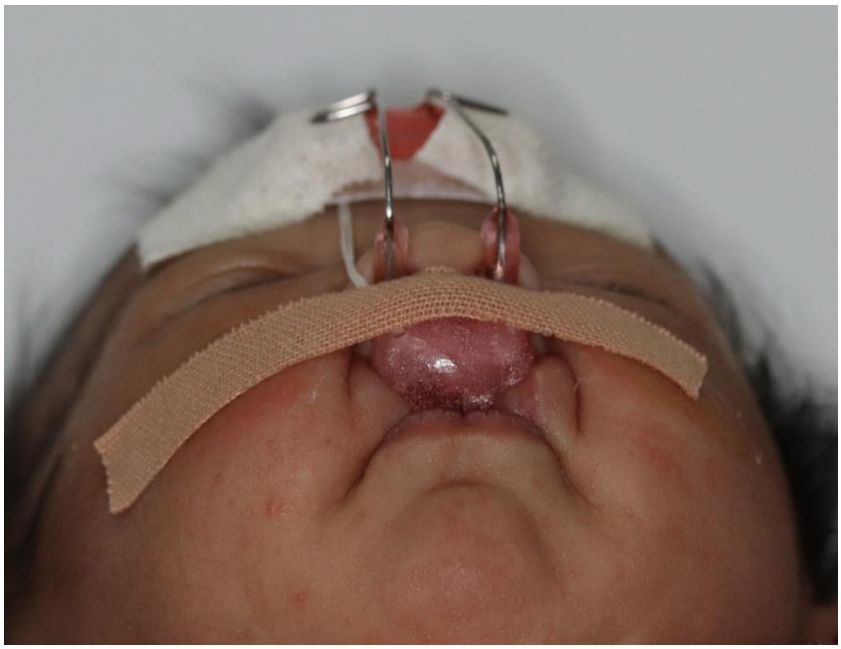

Figure 19 The alveolar molding plate with traction screw, combined with an extra-oral strapping were placed to correct the position of the premaxil

Conclusion

Beneficial outcomes for the nose and lip can be achieved in BCLP patients by following KKU-NAM protocol. Nose prominence was improved, and lip and alveolar segments increased in proximity prior to cheiloplasty, helping to minimize scarring and relapse after the surgery and resulting in a more esthetic facial appearance. KKU-NAM devices are not bulky and the patient can use the same nasal molding device as a nasal retainer.

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การใช้เครื่องมือปรับแต่งจมูกและสันเหงือกก่อนการทำศัลยกรรมในผู้ป่วยปากแหว่งเพดานโหว่ทั้งสองด้านโดยสมบูรณ์วัยแรกเกิด: รายงานผู้ป่วย 2 ราย

อมรรัตน์ มโนสุดประสิทธิ์ คงกฤษ เตชะอภัยคุณ** ภาวิณี ตันกิตติวัฒน์** วิลาสินี วิจิตรานนท์** มนเทียร มโนสุดประสิทธิ์**

บทคัดย่อ

ภาวะปากแหว่งเพดานโหว่เป็นภาวะความผิดปกติแต่กำเนิดบริเวณศีรษะและใบหน้าที่ทำให้เกิดปัญหาแก่ผู้ป่วยได้ เช่น การขัดขวางการเจริญเติบโตของใบหน้า ปัญหาด้านความสวยงาม และ ปัญหาทางด้านการพูด โดยผู้ป่วยที่มีภาวะปากแหว่งเพดานโหว่โดยส่วนมากจะต้องได้รับการผ่าตัดเย็บริมฝีปาก ซึ่งการใช้เครื่องมือปรับแต่งจมูกและสันเหงือกก่อนการทำศัลยกรรมสามารถทำให้ผลของการผ่าตัดดีขึ้น ได้มีการนำเสนอวิธีการใช้เครื่องมือปรับแต่งจมูกและสันเหงือกขึ้นตามศูนย์การรักษาผู้ป่วยปากแหว่งเพดานโหว่ในแต่ละแห่งและรวมไปถึงมหาวิทยาลัยขอนแก่น ที่ได้มีการรักษาผู้ป่วยด้วยเครื่องมือปรับแต่งจมูกของมหาวิทยาลัยขอนแก่น รายงานผู้ป่วยนี้ประกอบด้วยผู้ป่วยปากแหว่งเพดานโหว่ทั้งสองด้านโดยสมบูรณ์วัยแรกเกิดจำนวน 2 ราย ซึ่งได้รับการรักษาด้วยเครื่องมือปรับแต่งจมูกและสันเหงือกของมหาวิทยาลัยขอนแก่น เพื่อลดความกว้างของช่องระหว่างสันเหงือกก่อนที่ผู้ป่วยจะได้รับการรักษาด้วยการเย็บริมฝีปาก โดยวิธีการรักษานี้จะใช้เครื่องมือปรับแต่งจมูกชนิดยึดติดที่หน้าผาก แผ่นปรับแต่งสันเหงือกที่มีสกรูชนิดหดตัว และ ผ้าคาดปาก ซึ่งหลังจากที่ผู้ป่วยได้รับการรักษาด้วยเครื่องมือปรับแต่งจมูกและสันเหงือกของมหาวิทยาลัยขอนแก่น กระดูกพรีแมกซิลลาของผู้ป่วยถูกดึงให้เข้ามาอยู่ในตำแหน่งที่เหมาะสมและช่องว่างระหว่างสันเหงือกของผู้ป่วยก็ลดลงจากผลของสกรู

คำไขรหัส: *ปากแหว่งเพดานโหว่ทั้งสองด้านโดยสมบูรณ์/ เครื่องมือปรับแต่งจมูกและสันเหงือก/ เครื่องมือปรับแต่งจมูกและสันเหงือกก่อนการทำศัลยกรรมของมหาวิทยาลัยขอนแก่น*

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