Primary Unilateral Cleft Lip-Nose Repair: The Tawanchai Cleft Center's Integrated and Functional Reconstruction†

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Background: *The challenges of previously described techniques in unilateral cleft lip repairs inadequately address all deformities of the primary palate, the problems of scar and secondary deformities and achievement of optimum outcome.*
Objective: *To propose the integrated and functional reconstruction of primary unilateral cleft lip-nose repair and to present the preliminary outcome and advantages of this technique.*
Material and Method: *The integrated concepts and functional reconstruction includes analysis of the deformities, interdisciplinary management and The Tawanchai Center's interdisciplinary protocol for cleft lip and palate care, pre-surgical orthopedic treatments, the integrated primary cleft lip-nose repair and post-operative management. This technique of repair includes modified rotation advancement technique for skin surgery, functional muscle reconstruction, the correction of nasal deformities, the reconstruction of vermillion and final skin closure.*
Results: *Between 2002 and 2010, this technique was performed and evaluated on 122 patients who received primary unilateral cleft lip-nose repair, including 72 complete and 50 incomplete, 81 males and 41 females. Six parameters (scar, Cupid's bow symmetry, vermillion border symmetry, philtrum anatomic fidelity, muscle function and nasal symmetry) were used for evaluating the results, based on 4 scales (0-3) by 2 plastic surgeons. Among the mean scores better rating scales were achieved in philtrum anatomic fidelity (0.25) and muscle function (0.36), while the mean of the those with less satisfactory rating scales were achieved found in scar (0.82) and nasal asymmetry (0.72). These preliminary outcomes showed satisfactory results. Secondary reconstruction is less difficult and may be performed at the age of 4-6 years if indicated.*
Discussion and Conclusion: *The authors introduce The Tawanchai Center's integrated concepts and functional reconstruction technique for unilateral cleft lip-nose repair. The technique provides the advantages of integrated assessment of all deformities of the cleft of primary palate, the design of integrated techniques together with the proper perioperative care, presurgical orthodontic treatment and a holistic and well-coordinated interdisciplinary management. The good preliminary outcome has been demonstrated. More improvement in outcome can be achieved by continuing assessment of these groups of patients until they reach maturity, continuing refinement of technique, improvement of interdisciplinary care and benchmarking of the outcome.*

Keywords: *Integrated concepts, Functional reconstruction, Primary unilateral cleft lip-nose repair, Tawanchai Center*

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The traditional consideration of skin and associated tissues as a composite block in cleft lip repair partially explains the numerous surgical techniques and modifications or variations on the original technique. There are challenges when analysis of the previously described techniques (such as all deformities in unilateral cleft lip) have inadequately addressed or incompletely repaired the nasal form or not completely effected muscle reconstruction. The problem of secondary deformities is serious because of scarring and/or improper scar placement: just as serious as improper outcome optimization.

Many variations in cleft surgery techniques have been reported. In 1754, Ambroise Pare described cleft lip repair by freshening the cleft edges and holding them together with a needle secured by a figure-eight thread. An early method of straight line closure was described by Rose[1]. Then the triangular flap technique was described by Tennison[2] and subsequently popularized by Randall[3]. Rotation advancement, first reported by Millard in 1957, is now the most widely used technique[4]. McComb advocated primary cleft lip-nose repair and reported no alteration in the growth of cartilage after nasal surgery[5]. Subsequently, Noordhoof reported the modification of rotation advancement technique by minimizing the lateral cut at the alar base of the advancement flap[6] and the reconstructive technique for the vermillion in unila teral and bilateral cleft lip[7].

Schendel[8] described three main reasons for the controversy surrounding surgical techniques in cleft lip surgery, namely: 1) they were the cause of some deformities; 2) the plethora of variables and timing factors that must be taken into account when evaluating the results; and, 3) the final evaluation when the facial skeleton is completely mature. In addition, adjunctive treatment for primary cleft lip repair also needed to take into account pre-surgical orthopedic treatment, nasal stenting, and appropriate timing of surgery.

Large variations of treatment protocols for this group of patients have been implemented among different cleft centers. Regarding the early esthetics and functions during the first years of life, primary cleft lip-nose repair is necessary to restore the upper lip. The pre-surgical orthopedics treatment has been performed in some cleft centers as well as our own Center of Cleft Lip-Palate and Craniofacial Deformities at Khon Kaen University (The Tawanchai Center) to help in repositioning of the primary palate or the alveolar segment before surgical correction.

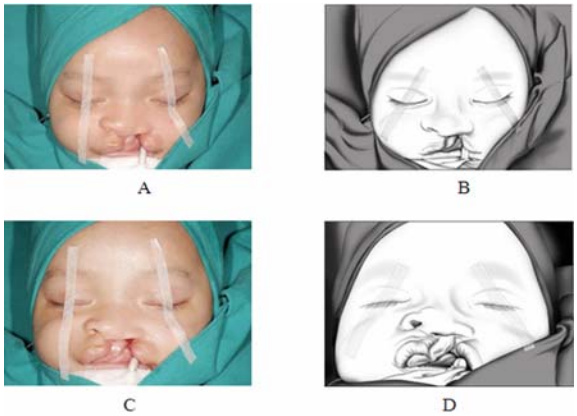

Fig. 1 Deformities of a complete unilateral cleft lip

Materials and Method

Individuals born with cleft lip require coordinated care from an interdisciplinary team to optimize treatment outcomes, with longitudinal care from birth to adulthood. Long-term integrated and an interdisciplinary team approach can provide the proper care and opportunity to achieve the optimum outcome and for normal living in society for these children. The team members may include plastic surgeons, audiologists, dentists, geneticists, nurses, nutritionists/

Fig. 1A Passive obturator with facebow in a newborn with complete right unilateral cleft lip and cleft palate. The obturator inner surface is relieved to allow for growth of lateral maxillary segments and movement of primary palate by lip-strapping (lip-strapping is not shown in the picture). B. External-strapping in a patient with left complete unilateral cleft lip, light force is applied to allow the posterior movement of the primary palate.

dietitians, oral surgeons, psychologists, social workers and speech pathologists. The cleft center coordinator is an important team member who coordinates among all the specialties as well as with the patients and their families, communities, referral and hospital system.

The protocol of this study has been reviewed and approved by the Ethics Committee of Khon Kaen University, based on the Declaration of Helsinki and written informed consent was obtained for each patient.

Analysis of Unilateral Cleft Deformities

Unilateral cleft lip is part of the cleft of primary palate and consists of the nose, anterior septum, premaxilla, soft tissue of the lip and vermillion, nasal floor, alveolar and hard palate anterior to incisive foramen. Its deformities can be divided into complete (extending from the vermillion border to floor of the nose), incomplete (sparing the nasal floor and including more severe forms that spares only the thin band of soft tissue, called the Simonart band) and microform (involving only the vermillion of the lip to the nose).

The width of cleft deformities, degree of alveolar collapse and associated nasal deformities play parts in planning surgical and orthodontic approaches as they may affect the difficulty of surgical closure of the cleft. In some cases, the associated cleft palate is also considered in treatment planning. The modified Kernahan and Stark's "striped Y" classification system[9] is used at the KKU Cleft Center for record keeping and future outcome research. The LAHSal classification[10] was also adapted for making comparisons to standard outcome registries such as of the American Cleft Palate and Craniofacial Association.

Interdisciplinary Management, Goal and Protocol for Unilateral cleft lip repair

In our Cleft Center, Ratanasiri proposed that cleft lip and palate could be identified through pre-natal ultrasound with an average detection rate of 20%. The foetal diagnosis of cleft lip, cleft palate and craniofacial anomalies had important implications for peri-natal management and counseling[11]. Ideally, the newborn with a cleft should be evaluated by a cleft team within the first week.

The goal of cleft care is to optimize a holistic outcome. Each essential intervention should be done at the critical period then evaluated for the benefits and burdens vis-à-vis cleft care. Interdisciplinary management with continuity and long-term follow-up is the key to successful cleft lip and cleft palate care. Our protocol (Table 1) was developed according to the critical needs at each age group of patient deve- lopment until adulthood and maturity (at age 21) of the facial skeleton.

Pre-surgical orthodontic treatment

There are two options for the treatment protocol: 1) primary cleft lip-nose repair; or, 2) primary

Table 1. The Tawanchai Center's interdisciplinary protocol for cleft lip and cleft palate care.

Age	Treatment	Team Members
Pre-natal	Pre-natal imaging and counseling	Multidisciplinary
Newborn	Feeding, management of associated anomalies, genetic counseling, providing information	Multidisciplinary
0-3 months	Pre-surgical orthopedics (Optional)	Orthodontist, plastic surgeon
3-6 Months	Primary cleft lip-nose repair	Plastic surgeon
12 months	Primary cleft palate repair with intra-velar-veloplasty with or without bilateral myringotomy and tubes	Plastic surgeon, otolaryngologist
4-6 years (pre-school age)	Evaluation of THAICLEFT 5 year-index, secondary cleft lip-nose correction, correction of velo-pharyngeal insufficiency	Speech pathologist, plastic surgeon, , orthodontist psychiatrist and multidisciplinary team
9-11 years (mixed dentition)	Evaluation of THAICLEFT 10 year- index, secondary alveolar bone grafting	Orthodontics, plastic surgeon, oral surgeon and multidisciplinary team
18-21 years (Skeletal maturity, adulthood)	Pre-surgical orthodontics, definitive rhinoplasty, LeFort I with or without mandibular orthognathic surgery	Orthodontist, plastic surgeon, oral surgeon and multidisciplinary team

cleft lip-nose repair following pre-surgical orthopedics. The decision for pre-surgical orthopedics is discussed between the plastic surgeon, orthodontist and patient's parents to ensure optimum compliance.

In 2001, Viwattanatipa N and Chowchuen B reported treatment of unilateral complete cleft lip and palate through primary lip-nose repair and pre-surgical orthopedic treatment[12]. The objectives are preservation and retraction of the premaxilla to achieve optimum lip repair. If possible, an acrylic passive obturator is delivered to a patient before the age of 2 weeks. All attempts are made to keep the acrylic from intruding into the cleft so as to allow growth of the lateral palatal segments and not to hinder the growth of medial segments. The obturator is worn at all times and the parents are instructed to apply the lip-strapping on the patient. The patient is checked approximately one month later to modify the obturator by grinding out the acrylic. The obturator is used for about three months until the time of the primary cleft lip-nose repair at age 4-6 months and discontinued after surgery.

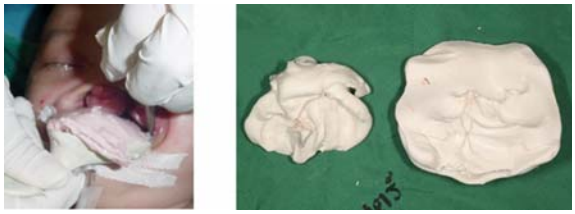

Fig. 2 Pre-surgical impression and dental models of patients with unilateral and bilateral complete cleft lip and cleft palate.

Integrated Primary Cleft Lip-Nose repair

The primary cleft lip-nose repair is performed at the age of 3-4 month using "the golden rule of 10s" (*viz.,* at least 10 weeks in age, at least 10 pounds in weight and having hemoglobin of 10%). There may be a higher risk of undergoing anesthesia before 3 months of age and orbicularis muscle reconstruction may be more difficult[13]. For a patient who receives pre-surgical orthopedic treatment, the primary cleft lip-nose repair is performed at the age of 4-6 months.

After pediatric anesthesia with bilateral infra-orbital nerve block, a pre-surgical impression is performed to achieve a dental model for clinical record and further outcome evaluation (Fig. 2).

The integrated technique of primary unilateral cleft lip-nose repair was first described by one of the authors (BC) in 2004[14]; specifically addressing primary cleft lip-nose repair, the modified rotation advancement technique, primary functional muscle reconstruction, wet-dry vermillion reconstruction and nasal floor closure.

Skin Surgery-Modified Rotation Advancement Technique

The objectives of skin surgery are: 1) the design of the skin flap with minimal skin incision; 2) restoration and preservation of the normal anatomical landmarks; and, 3) support for restoration of the nose and muscle restoration. Skin in a unilateral cleft lip may be retracted and displaced secondary to hypoplasia and lack normal muscle function. The primary repair of unilateral cleft lip-nose, in conjunction with muscle reconstruction of the lip, fulfills the basic integrated

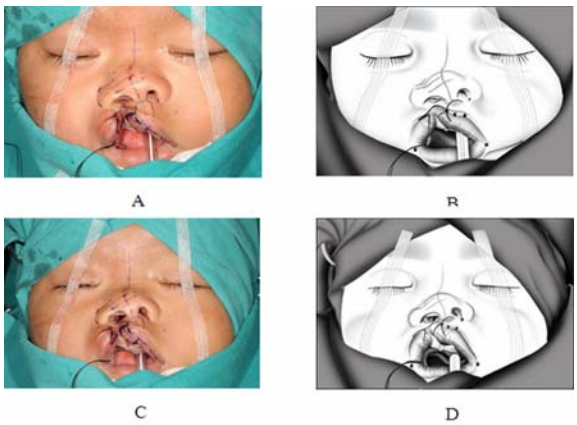

Fig. 3 Rotation advancement incision and bilateral alar rim incisions for primary cleft lip-nose correction in a patient with incomplete unilateral cleft lip

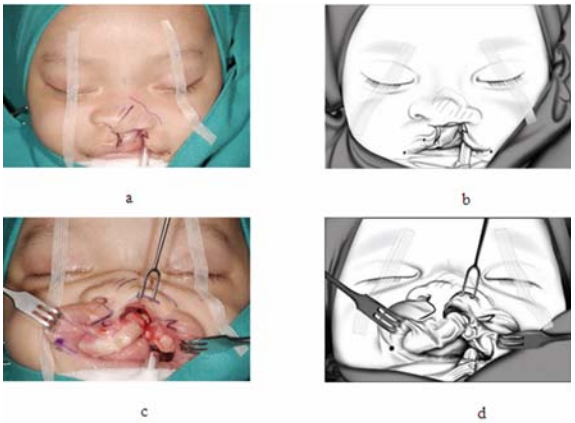

Fig. 4 Rotation advancement incision and bilateral alar rim incisions for primary cleft lip-nose correction in a patient with complete unilateral cleft lip

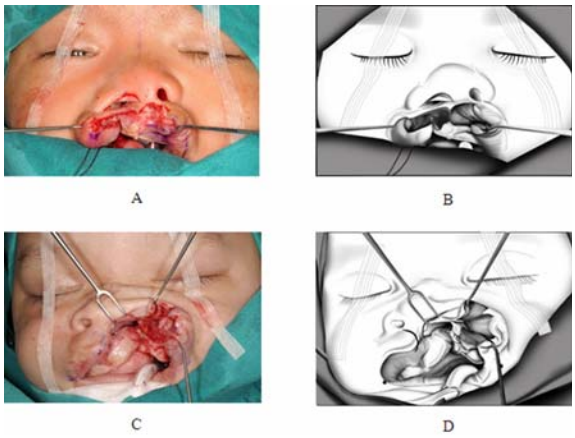

Fig. 5 Functional muscle reconstruction in incomplete and complete unilateral cleft lip-nose repair

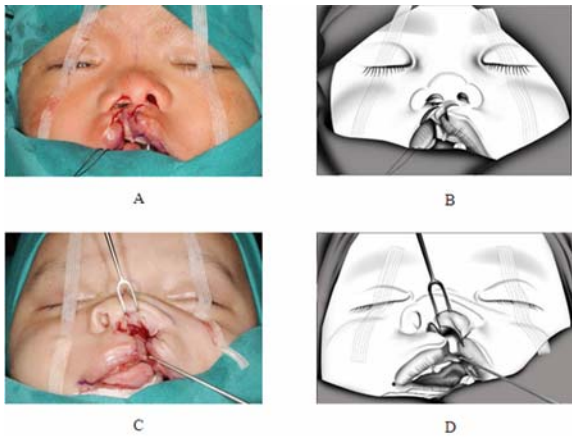

Fig. 6 Correction of nasal deformities

concepts for achievement of these objectives.

The author (BC) chose the modified rotation advancement technique as it is the most common and widely accepted method of the lip repair. The advantages of this method are: 1) the lines of the scar are placed at the correct anatomical position; 2) the unilateral lengthening of the columella is addressed; 3) the nostril floor is re-inforced; and, 4) the technique allows the surgeon to make needed adjustments at the time of surgery. Some of these advantages have already been reported by Millard in 1976[15].

The author (BC) modified the Noordhoff modification of the original Millard rotation advancement repair[6] by: 1) doing primary nasal reconstruction; 2) not dissecting over the premaxilla; and, 3) separating of skin and muscle. The lip incision is made using the rotation advancement technique, similar to that of the Millard technique, and the rear cut, up to columella, is performed to gain length of the rotation flap at the medial lip, as per the modification proposed by Moher[16].

Occasionally, in extreme cases where a rotation flap cannot provide the proper Cupid's bow position, it can be corrected by the transposition of small triangular flaps above the cupid's bow. A C-flap is created at the columella base to be rotated into this rotation defect and used for unilateral columella lengthening. The advanced skin flap is dissected from the underlying orbicularis and alar base muscle and advanced into the rotation gap at the columella base below the C-flap.

The traditional incision around the alar base is abandoned because it produces an unnatural scar and may lead to post-operative muscle denervation. The lower part of the advancement flap is designed in length and shape to reconstruct the philtral ridge of the cleft side, while in the upper part, the scar is placed at the columella base of the cleft side in the nasal floor, without any incision around the alar base. The nasal floor closure is achieved by the use of median alveolar flap and lateral buccal mucosal flap.

Functional Muscle Reconstruction

In a patient with unilateral cleft lip, there are abnormal attachments of the orbicularis muscle to the nasal septum medially and to the alar base and periosteum of the pyriform aperture laterally on either side of the cleft. This abnormal musculature has been reported to be due to: 1) delayed overall muscle development (*i.e.,* the increase in the amount of collagen tissue), 2) the atropic and disorganized fibers at the cleft margin), 3) asymmetrical fiber distribution (dysfunction of muscle groups, different fiber type groupings); and, 4) abnormal fiber insertion (the direction and attachment of the orbicularis muscle[17].

The objectives of muscle reconstruction of lip repair are: 1) providing normal motion of the lip; 2) preventing distortion (an optimal length and morphology of the lip during facial expression); and, 3) providing a strong framework for stimulation of development of the lip and nose. Abnormal muscle may have an influence on the outcome of primary cleft lip repair.

Joos[18] studied skeletal growth after muscular reconstruction and found that musculo-periosteal reconstruction with no orthopedic treatment led to better skeletal development than the Millard technique and orthopedic treatment. Fara[19] described the abnormal attachment of the orbicularis muscle in cleft

lip and advocated the release of the superficial retractor and deep constrictor components.

Indeed, accurate and balanced connection of the superficial retractor and deep constrictor of the orbicularis muscle is important. The importance of muscle repair has also been addressed by Nicolau[20] and Muller[22]. Differential muscle repair was described by Muller[21]. His key concepts are the alignment of different parts of the muscle by considering its insertion, then realignment of the muscle fibers. He also believed that balanced muscular reconstruction may be beneficial as the most effective orthopedic treatment. Restoration of the normal muscular anatomy is essential to balanced facial growth and prevention of secondary deformities.

The author (BC) uses the technique of functional muscle reconstruction, which is performed differently from the geometric arrangement of the skin flaps as it is divided into superficial and deep muscle reconstruction. The superficial muscle reconstruction includes dissection and separation of the superficial naso-labial muscle group and lip elevators from the deep orbicularis muscle under the skin flap from the lateral lip segment without incision around the alar base. The medial muscle fibers of orbicularis are dissected from their attachment to the anterior nasal spines and base of the columella.

The deep muscle is reconstructed by mobilizing the nasal muscle complex medially toward the nasal septum by releasing its deep fibers from attachment at the border of the pyriform opening and anterior part of maxillary periosteum. This muscle is repositioned and attached to the lower part of the nasal septum just above the anterior nasal spines to raise the nostril floor, pull the alar base toward the midline and correct the flaring of alar base. The width of the alar base will be also determined by the proper muscle suturing.

The superficial orbicularis muscle is reconstructed in different parts including the muscle of the lip and muscle of the vermilion border. The muscle of the lip is then repositioned and attached to the medial muscle fibers that are released at the base of the columella and rotated to the central part of the lip. This suture also helps to correct the vertical distention of the lip.

The muscle of the vermillion is reconstructed using a vermillion triangular flap reconstruction.

Another important point is that the junction of muscle repair has to be lateral to the midline to minimize the distortion of the philtrum and philtral ridge.

Correction of Nasal Deformities

The typical unilateral cleft nose deformities are: 1) depressed cleft side dome; 2) splayed alar; 3) depressed and elevated alar base of the cleft side; and, 4) elevated nasal dorsum to the non-cleft side. The deformities may involve both the nasal cartilage and bony components.

The variable collapse of the lower lateral cartilage framework and associated nasal anatomy may be due to abnormal muscle attachment of the alar base. Bardach and Cutting[22] related the unilateral nasal cleft deformity to three factors: 1) imbalance of the facial musculature; 2) hypoplasia of the skull base; and, 3) asymmetry of the skull base. The transverse nasalis muscle, between the upper lateral cartilage and the lower lateral cartilage, is addressed to correct the drooping of the cleft nostril and for superior repositioning of lower lateral cartilage. The challenges of primary nasal reconstruction are the stability of the primary nasal reconstruction and the possibility of interference with nasal growth.

Correction of the position of the lower lateral cartilage and restoration of muscle in the cleft deformity is the key to re-positioning the lower lateral cartilage. The flaring of the nostril margin may be due to the splaying of the lower lateral cartilage and abnormal muscle attachment at the alar base. Absorbable transfixing sutures are used for: 1) suturing the upper and lower lateral cartilages, 2) fixing the position of the alar dome, 3) fixing the medial crus of the alar cartilages, and, 4) fixing the release of the lateral part of the lower lateral cartilage.

McComb[23] first published the technique of primary nasal reconstruction in 1975 and subsequently presented a long-term study in 1996[24]. Stable, long-term correction was achieved with no recurrence of drooping of the nostril rim and no interference of nasal growth. He advised no incision in the nasal lining in order to avoid nasal stenosis.

The surgical access for cleft lip-nose repair is via the alar rim incision; however, on the cleft side, the incision is slightly higher into the normal skin. The step for nasal correction requires widely undermining the nasal skin from the nostril rim to the nasion, thus elevating the lower lateral cartilage into its proper position. The alar cartilage is also mobilized from the pyriform aperture and maxilla.

Prevention of relapse is achieved by freeing the cleft-side alar cartilage by separating the skin and mucoperichondrium creating a concave nasal fold. Then re-draping and transfixing the vestibular lining with

cartilage and external skin is done.

Reconstruction of Vermillion and Final Skin Closure

The author (BC) creates a triangular vermillion flap for use in reconstructing the central vermillion tubercle and re-construction of the wet-dry mucosal junction as per Noordhoof's vermillion reconstruction[25]. The final skin closure is demonstrated in Fig. 7 and 8.

Post-operative management

Infra-orbital nerve blocks are given during surgery to patients undergoing unilateral cleft lip-nose repair to keep them comfortable for up to 6 hours post-surgery. Post-operative feeding is started as early as possible. The authors advocate the same feeding technique, breast or nipple feeding, used pre-operatively. Parents are advised to clean the lip with normal saline and place antibiotic ointment over the suture line twice daily. Skin-tape is used during the first day post- operatively. A fine absorbable suture is used to avoid the need for suture removal. Information with hand book and video media, empowerment and training for wound care are provided. After wound healing, the parents are instructed to gently massage the scar 4 to 6 weeks after surgery until scar maturity to promote scar elasticity.

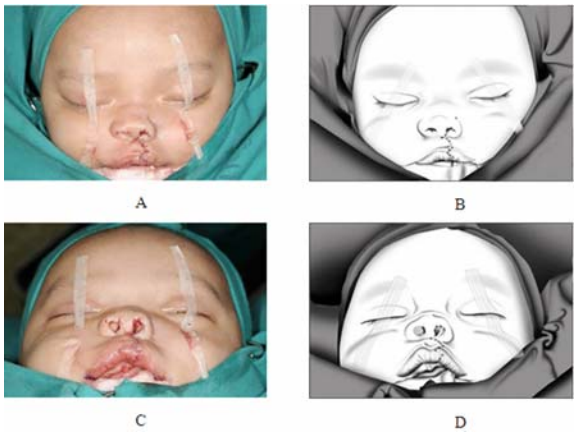

Fig. 7 Final skin closure of incomplete unilateral lip repair.

Results

Between 2002 and 2010, an integrated and functional reconstruction technique was used by the author (BC) and evaluated on 122 patients (81 males; 41 females) receiving primary unilateral cleft lip-nose repair. There were 72 complete and 50 incomplete. Syndromic patients and patients who had inadequate clinical records for evaluated their results were excluded.

The surgical outcome evaluation for incomplete and complete unilateral cleft lip was performed by a plastic surgeon (BC) and a peer (another plastic surgeon) using 6 parameters- scar, Cupid's bow symmetry, vermillion-free border symmetry, philtrum anatomic fidelity, muscle function and nasal symmetry. Each parameter was rated on 4-point scales: non cleft side or normal (=0), mild deviation from normal (=1), moderate deviation from normal (=2) and severe deviation from normal (=3). The mean score for each parameter of 42 patients were shown in Table 2.

The mean of better rating scales were achieved in philtrum anatomic fidelity (025) and muscle function (0.36) while the mean of the less satisfactory rating scale was achieved in scar (0.82) and nasal asymmetry (0.72). These preliminary outcomes showed satisfactory results. Secondary reconstruction is less difficult and may be performed at the age of 4-6 years if indicated.

The average results from among the many patients who received primary unilateral cleft lip-nose repair by integrated concepts and functional reconstruction are shown in Fig. 10 to 16.

Discussion

The problems encountered in infants born

Table 2. The results of integrated and functional reconstruction technique, evaluated by 6 parameters.

Parameters	Number of Cases	Mean	Standard Deviation
Scar	122	0.82	0.41
Cupid' bow symmetry	122	0.48	0.45
Vermillion-free border symmetry	122	0.63	0.45
Philtrum anatomic fidelity	122	0.25	0.36
Muscle function	122	0.36	0.34
Nasal symmetry	122	0.72	0.42

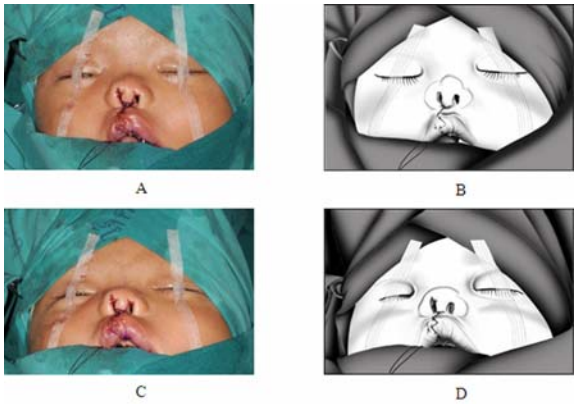

Fig. 8 Final skin closure of complete unilateral lip repair.

Fig. 10 Pre- and post-operative photos of a female patient with incomplete unilateral cleft lip and palate. A, B and C are pre-operative photos taken in 2003 at the age of 3 months. D, E and F are post-operative photos taken in 2005 at the age of 2 years. G, H and I are post-operative photos taken in 2009 at the age of 6 years and 10 months.

with cleft lip and palate present several challenges. Although there have been a number of advances and new concepts, there are still challenges to overcome for achieving the optimum care. The principles of an integrated concept and functional reconstruction include:

Fig. 9 Post-operative care for the patients after primary cleft lip-nose repair

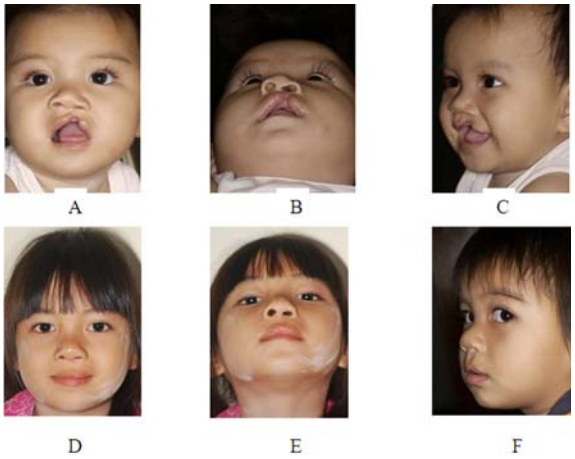

Fig. 11 Pre- and post-operative photos of a female patient with unilateral incomplete cleft lip. A, B and C are pre-operative photos taken in 2003 at the age of 7 months. D, E and F are post-operative photos taken in 2008 at the age of 6 years and 1 month.

pre-surgical orthodontic treatment as an in tegral part of primary cleft lip-nose repair; skin surgery using a modified rotation advancement technique with optimum cupid's bow position and avoidance of a scar around alar base; functional muscle reconstruction; correction of nasal deformities with adequate cartilage dissection, positioning and trans fixing; reconstruction of the central lip vermillion; and, addressing of wet-dry vermillion reconstruction. Pre-surgical orthopedic treatment is an integral part of primary cleft lip-nose

Fig. 12 Pre- and post-operative photos of a female patient with left complete unilateral cleft lip and cleft palate. A, B and C are pre-operative photos taken in 2002 at the age of 3 months. D, E and F are post-operative photos taken in 2007 at the age of 5 years and 2 months.

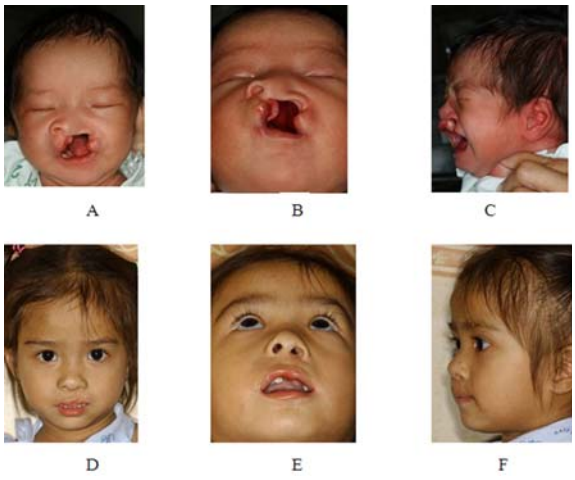

Fig. 13 Pre- and post-operative photos of a female patient with left complete unilateral cleft lip and cleft palate. A, B and C are pre-operative photos taken in 2003. D, E and F are post-operative photos taken in 2005 at the age of 2 years and 2 months.

Fig. 14 Pre- and post-operative photos of a male patient with right complete unilateral cleft lip and cleft palate. A, B and C are pre-operative photos taken in 2002 at the age of 5 months. D, E and F are post-operative photos taken in 2004 at the age of 2 years.

repair to enable an optimal primary surgical outcome. The objectives of pre-surgical orthodontic treatment are: 1) preservation and retraction of premaxilla to achieve optimum lip repair; 2) division of the oral and nasal cavity; 3) decreasing the deviation of the primary palate; 4) nasal molding; and, 5) psychosocial/economic support of the parents. The obturator and extraoral-strapping are most beneficial for a severe and wide cleft when the pre-operative lip tension may prevent an appropriate surgical outcome and should be started within 2 weeks of birth. The limitations of this technique are the health status of the patient and the compliance of the parents with the planned follow-up.

The optimum results for cleft lip repair depend on: 1) integration of the concepts of assessment for all deformities of the primary cleft lip; 2) a holistic multi- and inter-disciplinary approach; 3) and, well-coordinated management of follow-up assessments and treatments. The factors that may affect the outcome of cleft lip repair depend on the severity of primary deformities, the surgical technique(s) used, overall treatment/care protocol, competency and the coordination of the interdisciplinary team. The factors for complete rehabilitation of the cosmetic, functional and psychosocial/economic aspects are evaluated according to critical needs for each age group and at the end of complete facial development in adolescence. Getting an optimal outcome evaluation will depend on: 1) the availability of important clinical records; 2) establishment of the universal and holistic outcome parameters for evaluation at various stages and at skeletal maturity; and 3) comparison of the results with other centers.

Early, well-executed surgery releases the patient from both physical and social handicaps and allows normal physical growth and development and socialization. The Tawanchai Center's integrated concepts and functional reconstruction method do

Fig. 15 Pre- and post-operative photos of a female patient with right complete unilateral cleft lip and palate. A, B and C are pre-operative photos taken in 2003 at the age of 2 months during pre-surgical orthodontic treatment. The operation was performed at the age of 6 months. D, E and F are post-operative photos taken in 2006 at the age of 2 years and 11 months. G, H and I are post-operative photos taken in 2008 at the age of 5 years and 2 months.

Fig. 16 Pre- and post-operative photos of a female patient with left complete unilateral cleft lip and palate. A, B and C are pre-operative photos taken in 2003 at the age of 3 months during pre-surgical orthodontic treatment. D, E and F are intraoperative photos. G, H and I are post-operative photos taken in 2006 at the age of 2 years and 11 months. J, K and I are post-operative photos taken in 2008 at the age of 5 years and 2 months.

provide optimum results. Minor variations and/or secondary deformities are less difficult to correct during a secondary surgery, if indicated. It is also easy to adapt and vary the techniques according to the analysis of initial primary cleft lip-palate deformities.

Conclusion

The children with significant cleft deformities are best managed by a well-coordinated, interdisciplinary cleft team. The authors introduced The Tawanchai Center's integrated concept and functional reconstruction method for unilateral cleft lip-nose repair. Improved outcome will be achieved by refining surgical techniques; improving the interdisciplinary care and team management; implementing long-term evaluation; and, benchmarking the staged outcomes.

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การซ่อมแซมภาวะปากแหว่งและการแหว่งของจมูกข้างเดียวแบบปฐมภูมิโดยวิธีการ แบบบูรณาการและเสริมหน้าที่การทำงานของศูนย์ตะวันฉาย

บวรศิลป์ เชาวน์ชื่น, ชุติมาพร เขียนประสิทธิ์, สุธีรา ประดับวงษ์

ภูมิหลัง: *เทคนิคการผ่าตัดแบบเดิมที่ได้ถูกนำเสนอแล้วได้รับความท้าทายคือ การที่ไม่สามารถเน้นความพิการทุกส่วนของการแหว่งของเพดานปากปฐมภูมิ ปัญหาด้านแผลเป็นและความพิการทุติยภูมิ และผลการรักษาที่ดี*

วัตถุประสงค์: *เพื่อนำเสนอวิธีการผ่าตัดเสริมสร้างแบบบูรณาการและเสริมหน้าที่การทำงานของการซ่อมแซมปากแหว่งและการแหว่งของจมูกข้างเดียว และนำเสนอผลการรักษาในระยะเบื้องต้นและข้อดีของวิธีการนี้*

วัสดุและวิธีการ: *การผ่าตัดเสริมสร้างแบบบูรณาการและเสริมหน้าที่การทำงานประกอบด้วยการวิเคราะห์ความพิการ การดูแลแบบทีมสหวิทยาการ และสร้างแนวทางการดูแลผู้ป่วยปากแหว่งเพดานโหว่ของศูนย์ตะวันฉาย การจัดสันเหงือกก่อนการผ่าตัด การผ่าตัดซ่อมแซมปากแหว่งและการแหว่งของจมูกแบบปฐมภูมิและการดูแลก่อนและหลังการผ่าตัด เทคนิคการผ่าตัด ประกอบด้วย การประยุกต์วิธีการหมุน และเคลื่อนที่ของการผ่าตัดผิวหนัง การเสริมสร้างกล้ามเนื้อแบบเสริมหน้าที่การทำงาน การแก้ไขความพิการของจมูก การเสริมสร้างเยื่อบุริมฝีปาก และการเย็บปิดผิวหนัง*

ผลการศึกษา: *ตั้งแต่ปี พ.ศ. 2545-2553 ได้มีการผ่าตัดและประเมินผลการรักษา โดยวิธีการนี้ในผู้ป่วย ที่มารับการซ่อมแซมปากแหว่งและการแหว่งของจมูกข้างเดียว 122 ราย เป็นปากแหว่งข้างเดียวแบบสมบูรณ์ 72 ราย และแบบไม่สมบูรณ์ 50 ราย เป็นชาย 81 ราย และหญิง 41 ราย การประเมินใช้ปัจจัยการประเมิน 6 ด้าน (แผลเป็นความสมมาตรของคันศรคิวปิด ความสมมาตรของขอบเยื่อบุขอบริมฝีปาก ความละเอียดถูกต้องของสันกลางร่องริมฝีปากบน การทำงานของกล้ามเนื้อ และความสมมาตรของจมูก) ใช้ 4 มาตรวัด (0-3) โดยศัลยแพทย์ตกแต่ง 2 คน ค่าเฉลี่ยของมาตรวัดที่ได้ผลดี ได้แก่ ความละเอียดถูกต้องของสันกลางร่องริมฝีปากบน (0.25) และการทำงานของกล้ามเนื้อ (0.36) ขณะที่ ค่าเฉลี่ยของมาตรวัดที่ได้ผลดีน้อยกว่า ได้แก่ แผลเป็น (0.84) และความสมมาตรของจมูก (0.72) ผลลัพธ์เบื้องต้นเหล่านี้เป็นที่น่าพึงพอใจ การผ่าตัดเสริมสร้างแบบทุติยภูมิทำได้ง่ายและสามารถทำได้ที่อายุ 4-6 ปี ได้ถ้ามีข้อบ่งชี้*

สรุป: *ผู้นิพนธ์นำเสนอแนวความคิดแบบบูรณาการและการผ่าตัดเสริมสร้างแบบเสริมหน้าที่การทำงาน ในการซ่อมแซมภาวะปากแหว่งและการแหว่งของจมูกข้างเดียวแบบปฐมภูมิของศูนย์ตะวันฉาย วิธีการนี้มีข้อดี คือ การประเมินความพิการทั้งหมดของการแหว่งของเพดานปากปฐมภูมิ การออกแบบวิธีการบูรณาการการดูแลก่อนและหลังการผ่าตัดที่เหมาะสม การจัดสันเหงือกก่อนการผ่าตัด การดูแลแบบองค์รวมโดยทีมสหวิทยาการที่มีการประสานงานกันเป็นอย่างดี ผลการรักษาในเบื้องต้นได้รับผลที่ดี การปรับปรุงผลการรักษาให้ดียิ่งขึ้นทำได้โดยการติดตามและประเมินกลุ่มผู้ป่วยเหล่านี้จนโตเป็นผู้ใหญ่โดยสมบูรณ์ การพัฒนารายละเอียดของเทคนิคและวิธีการผ่าตัด การพัฒนาการดูแลแบบทีมสหวิทยาการ และการเทียบเคียงผลการรักษา*