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*Cleft Surgery*

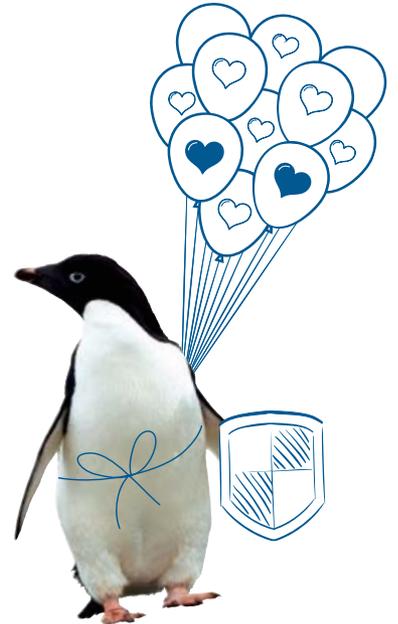


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## The Cover Shot



Cleft lip and palate deformities happen in 1 in 1,000 live births in Hong Kong. In the China mainland, the incidence can up to 1 in 600 live births. Though it does not cost any life, it causes great psychological impact to patients and their parents for life. Throughout the years there are numerous surgical techniques in correcting the deformities and this means it is a very heterogenous array of conditions which can only be corrected in different ways.



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# Editorial

## Dr Peter CW PANG



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**Editor**

Dr Peter CW PANG

Cleft deformity is the most common congenital deformity in live births, and there are around 200 new cases annually in Hong Kong. The work of a cleft surgeon is unique because these birth defects are detected during initial antenatal scans, therefore a surgeon gets to see his patients even before birth. We ensure that the parents are well supported and given the appropriate recommendations and expectations post birth. Besides restoring function by realigning the muscles in a cleft lip or palate and aim to restore a normal appearance and function, we also use aesthetic plastic surgical techniques to enhance their beauty if possible.

In this issue, we have a number of specialist surgeons from various hospitals dedicated and committed in correcting cleft deformities to share their experiences on cleft lip and palate treatments.



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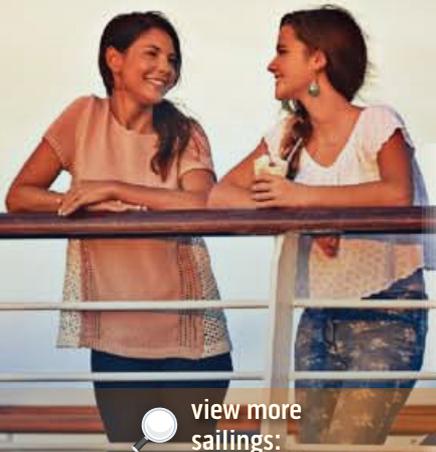
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# Overview of cleft services in Hong Kong

## Dr Joseph Hon-ping CHUNG

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Dr Joseph Hon-ping CHUNG

The management of cleft lip and palate and associated conditions is a multidisciplinary care. It starts from counselling of cleft parents and antenatal screening to surgical correction of the cleft lip and palate anomalies to correction of speech, dental and facial appearance throughout the growth development of the affected patients.

With modern ultrasound and imaging, cleft lips can well be identified in the first trimester. For isolated cleft conditions, termination of pregnancy is not necessary as cleft is a surgically correctable condition. Parents with suspected cleft foetuses can be referred to cleft clinics for counselling and explanation of the management protocol.

Currently cleft lip and palate are surgically corrected at 3 months and 9 months respectively. Before surgery, parents will be educated on the care of cleft babies, particularly on feeding and the use of special feeding bottles if indicated. Nursing advice is available in hospitals after delivery. A patient group, the Hong Kong Association for Cleft Lip and Palate, also provides support and advice to involved parents.

Surgery is performed when the child attains a certain age and body weight to allow safe surgery. Delay in surgical repair may be indicated in selected situations such as preterm delivery, Pierre Robin Sequence with small jaw and anticipated airway problems, or other premorbid medical conditions that make the anaesthesia and postoperative care more risky. The use of pre-operative orthodontic care, the nasoalveolar moulding (NAM) is still a controversial topic. While it is commonly practised in wide-gapping clefts, significant premaxilla protrusion and alar flaring, the use in less severe clefts has no proven value but causes inconvenience for its application, not to mention the compliance of the parents.

In Hong Kong, surgical repairs of cleft lip and palate are performed by both plastic and paediatric surgeons in the public sector. For plastic surgery, services are provided in Queen Mary (QMH), Kwong Wah (KWH) and Tuen Mun Hospital (TMH); all having multidisciplinary team protocols to deal with various ENT, dental and speech problems. This ensures convenience of care in the catchment area. Surgical corrections are also proved by private plastic and paediatric surgeons in private settings and patients can be referred back to the public sector for follow up and associated care or monitoring.

Taking QMH as an example, the joint cleft clinic is cared by plastic surgeons, dental surgeons and speech therapists. While plastic surgeons will complete the surgical correction of cleft lip and palate usually before one year of age, speech therapists will assess the speech development and provide appropriate training as needed. These include articulation, phonation and swallowing training. With the support of school based speech therapists in most settings, it helps to diversify the workload to allow for more resources and concentration on complicated patients. Dental surgeons will be involved in monitoring the growth of dentition, advice and care on dental caries, restoration of the upper alveolar arch by performing alveolar bone grafting (ABG) in the presence of alveolar bone clefting and the later orthodontic and orthognathic treatment.

In patients with severe cleft palate and particularly in bilateral involvement, the maxilla and alveolar bone may be underdeveloped leading to a small, contracted and triangular alveolar arch. With the limited space, the crowded teeth may be displaced and the discrepancy of growth of the upper and lower jaws will lead to malocclusion. A Class III malocclusion with maxillary retrusion and mandibular protrusion or a combination is more common in cleft patients. Moreover the receding maxilla will create a central depression on the facial profile. Orthodontic care helps to expand the contracted alveolar bone and realign the teeth while orthognathic surgery will recreate the normal facial profile and occlusion of upper and lower jaws by cutting and advancing the bone after completion of orthodontic treatment. This bone work will usually be carried out after completion of facial bone growth at the age of 16 to 18 years of age.

Before 2014, orthodontic care for contracted palate and associated dental misalignment is limited in the public sector. Nowadays, orthodontic care is provided by the Hospital Authority. Due to resource implications, the only orthodontic centre in HA is located in United Christian Hospital providing orthodontic support for all cleft services in various HA hospitals. This allows the continued care of cleft lip and palate and facilitates good support for subsequent orthognathic correction of malocclusion and facial profile in the relevant hospitals.

Besides, other parties such as ENT surgeons for middle ear effusion and myringotomy tube insertion, paediatricians for management of associated syndromic conditions, clinical psychologists for clinical support to parents and patients etc. are equally essential in the multi-disciplinary approach.



Following primary correction of cleft lip and palate, secondary cleft surgery and associated rhinoplasty correction provide refinement of both structural and soft tissue reconstruction, making a comprehensive treatment of the cleft and associated problems. Examples of secondary procedures include scar revision, tissue bulk augmentation, fistula correction, velopharyngeal insufficiency correction for hypernasality and others. Rhinoplasty with or without cartilage or bone graft also helps to improve the aesthetic appearance of associated cleft nose deformities. The timing of repair depends on a balance of the severity of disfigurement, anticipated scar contracture during facial growth and further plans for structural correction. Cleft management is not limited to infancy and there is no age limit. Patient follow up goes towards adulthood to ensure both functional and aesthetic reconstruction are achieved. Adult patients with cleft lip and palate problems are accepted and patients with other craniofacial anomalies will also be managed.

In order to have a good succession of skills and knowledge, surgical training in clefts is crucial. Besides local training within the hospitals, the local plastic surgeons group in public and private services is working with the HKU-Shenzhen Hospital to provide missionary services to patients with cleft anomalies in Southern China. The mission started in 2015 and has evolved into a regular event twice a year. This provides a good platform for continued and regular care to ensure the highest standard that can be transferred to our next plastic generation and to benefit our local and mainland patients with cleft problems. It is still a long way to go for the multidisciplinary approach as established in Hong Kong but we are seeing advancement as more parties are involved each year.

Cleft management is not one single surgery and a multidisciplinary, appropriate care at different timelines of growth is the essential theme. A continued care should be provided.

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# Primary Cleft Lip and Palate Repair

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This article has been selected by the Editorial Board of the Hong Kong Medical Diary for participants in the CME programme of the Medical Council of Hong Kong (MCHK) to complete the following self-assessment questions in order to be awarded 1 CME credit under the programme upon returning the completed answer sheet to the Federation Secretariat on or before 28 February 2018.

## Introduction

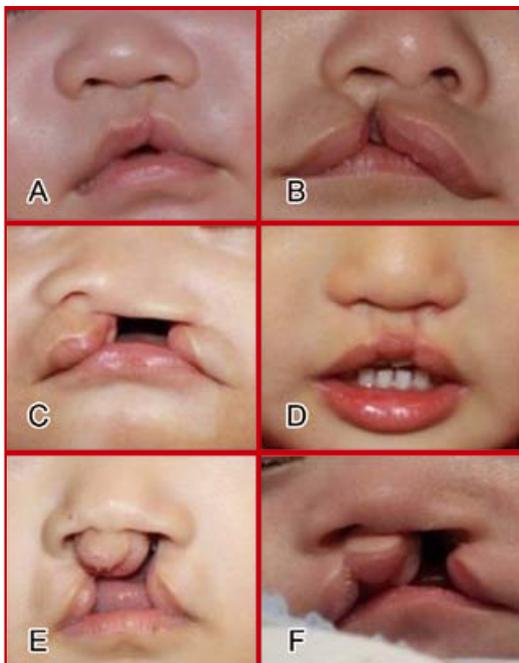
Cleft lip and cleft palate are the 2 most common cranio-facial deformities, having an incidence of about 1 in 1,000 live births in the Caucasian population. In the Asian population, it is almost twice as common, at around 1 in 600 live births.

Their clinical presentations vary:

- Syndromic / Non-syndromic
- Cleft lip with or without cleft palate
- Isolated cleft palate

The severity of deformities also varies:

- Bilateral or unilateral
- Complete, incomplete & microform lip deformities
- Complete, incomplete & submucous palate deformities



**Fig.1. Spectrum of cleft lip deformities: A. Unilateral Microform, B. Unilateral Incomplete, C. Unilateral Complete, D. Bilateral microform, E. Bilateral Complete, F. Bilateral asymmetrical with incomplete and complete lip deformities.**

## Associated problems

Because of the anatomical deformities, there is loss of muscle continuity of the upper lip and also communication between the oral and nasal cavities. Children with cleft lip and/or cleft palate may suffer from a variety of functional and social problems.

Functionally, they may have problems with:

- Feeding & swallowing
- Hearing – middle ear effusion
- Speech & language
- Dentofacial development

Socially, they may be stigmatised by their peers because of the condition itself as well as secondary deformities resulted from surgical repairs.

## Multidisciplinary team approach & management protocol

Managing children with cleft conditions is a long term commitment and inputs from different specialties at various stages are of paramount importance.

The multidisciplinary team includes:

- Paediatrician
- Plastic surgeon
- ENT surgeon
- Dental surgeon
- Speech therapist
- Medical social worker
- Patient self-help group

The management actually starts when the condition is diagnosed in the prenatal checkup with counselling of the parents. This is followed by the birth of the child with pre-surgical orthodontic treatment, staged surgical repair for the primary deformities, and subsequent corrective procedures for the secondary deformities. Finally, at puberty and skeletal maturity, definitive orthodontic treatment, orthognathic surgery and open rhinoplasty are performed if necessary.

With advances in the surgical techniques for primary repair and also the advocacy of multidisciplinary care, we are able to achieve continuous improvement in both functional and aesthetic outcomes.

AGE	TREATMENT
Prenatal	Prenatal imaging, diagnosis, and counseling
Newborn*	Feeding assessment, medical assessment, genetic counseling, treatment information
0-3 mo	Presurgical orthopedics
3 mo (or after presurgical orthopedics)*	Primary cleft lip repair and tip rhinoplasty ± gingivoperiosteoplasty
12 mo (delayed if airway or medical concerns)*	Primary cleft palate repair with intravelar veloplasty ± bilateral myringotomy and tubes
Diagnosis of velopharyngeal insufficiency (3-4 y)	Secondary palate lengthening or pharyngoplasty, speech obturator
School-age years	Treatment of secondary lip and nasal deformities
7-9 y (mixed dentition)*	Secondary alveolar bone graft
Puberty*	Presurgical orthodontics
Puberty	Definitive open rhinoplasty
Skeletal maturity	Le Fort I ± mandible orthognathic surgery

**Table 1. Management protocol for cleft lip and palate.** (Adapted From : reference <sup>2</sup>)

### Primary repair of cleft lip

A normal lip nose complex should have balanced alar bases and symmetrical nostrils. The Cupid’s bow should be levelled with well-defined philtral columns and adequate tissue bulk at the central vermilion tubercle.

The goals of primary cleft lip repair are to achieve:

- Muscle continuity
- Symmetrical lip length
- Levelled Cupid’s bow
- Adequate vermilion thickness
- Correction of nasal asymmetry
- Inconspicuous scar

The timing of lip repair is as early as the child can tolerate general anaesthesia with minimal risk. Traditionally, the following criteria should be achieved before considering lip repair:

- Age > 10 weeks
- Weight > 10 lbs
- Haemoglobin > 10g/dL

Lip repair at 3 to 6 months of age is considered the most optimal timing of surgery.

#### Unilateral cleft lip repair

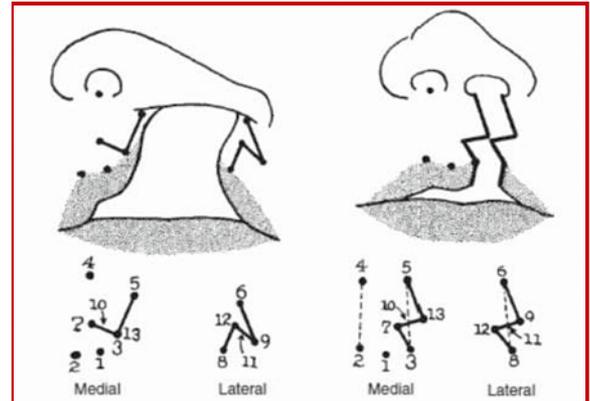
The first reported successful cleft lip repair was from China in 390AD, which was performed simply by excision and suture of the cleft margins.

Straight line closure for unilateral cleft lip repair was the standard approach in the early nineteen century described earlier by Malgaigne and Mirault. Later on, techniques using lateral flaps at the lower portion of the lip were published by LeMesurier and Tennison. In 1976, Millard published the rotational advancement technique for definitive repair. Subsequently, modifications appeared as described by Noordhoff & Mohler. More recently, an anatomic subunit approximation technique was described by Fisher in 2005.

Millard’s modifications and Tennison’s technique are now the most popular repairing methods for unilateral cleft lip repair.

#### Tennison’s triangular flap

A triangular flap is raised from the lateral lip segment and inserted to the lower half of the medial lip to level the Cupid’s bow.



**Fig. 2. Tennison’s triangular flap<sup>6</sup>**

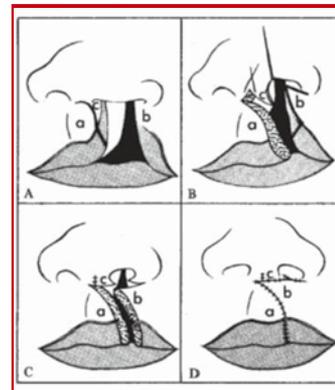
This method uses precise geometrical measurement to determine the lengthening required. Therefore, excellent lip shape can usually be achieved. Some of the criticisms concerning the Tennison’s method include the resulting distortion of the philtrum and the conspicuous scar created at the lower lip, especially when a large triangular flap is being used for repair of a wide unilateral cleft lip.



**Fig. 3. Tennison repair with nasal deformity. Satisfactory nose and lip shape after open rhinoplasty with cartilage graft but the prominent lower lip scar without hair growth persists even after scar revision.**

#### Millard’s rotation-advancement flap

The original Millard’s design uses a lateral triangular advancement flap introducing to the upper half of the lip with rotation of the medial lip segment downward to level the Cupid’s bow. This is claimed to be a more adaptive method and also known as a “cut as you go” technique.



**Fig. 4. Millard’s original rotational advancement technique<sup>6</sup> - A curved incision is made from the vermilion border to the columella lip junction for developing the medial rotation flap. The nostril sill is reconstructed with the C-flap. A back cut can be made at the upper lip to achieve adequate medial lip rotation**



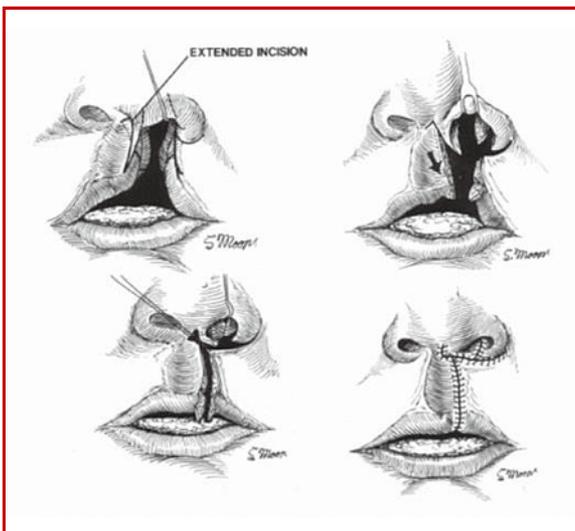
However, nasal deformities were not addressed by the original Tennison and Millard's repairs. Significant distortion of the alar and nasal tip persists after lip repair, which usually requires extensive correction with open rhinoplasty in the later stage.



**Fig. 5. Upper – wide unilateral cleft lip repair with Tennison's triangular flap without correction of nasal deformities. Lower – before and after open rhinoplasty.**

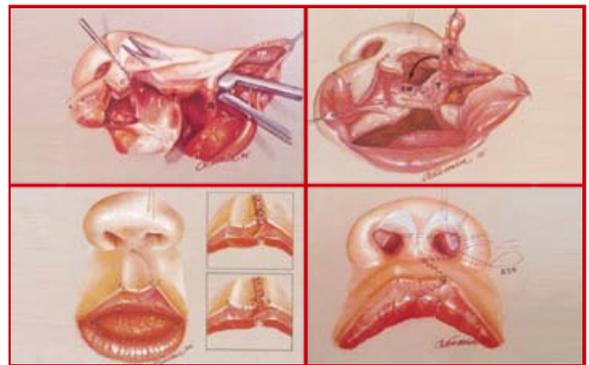
Subsequent modifications of Millard's technique focused on minimizing the perialar incision, development of more mucosal flap for closure of the nostril floor, and reorientation of the oblique lip scar along the philtral column.

**Mohler's and Noordhoff's modifications**



**Fig. 6. Mohler's Technique<sup>6</sup>**

In Mohler's technique, the back cut is located at the columella base rather than at the upper lip and columella junction. A more anatomically located scar along the new philtral column can be resulted.



**Fig. 7. Noordhoff's technique published in "The surgical technique for the unilateral cleft lip-nasal deformity, Chang Gung Crainofacial Centre"**

Noordhoff's modification emphasises on the use of various mucosal flaps for the reconstruction of the nostril floor. He also corrects nasal deformities by using a closed rhinoplasty technique to release the displaced alar cartilage from overlying skin and nasal mucosa. The released alar cartilage is fixed with multiple percutaneous fixation sutures to its anatomical position.

This is the technique I usually use to repair unilateral cleft lip and nose deformities.



**Fig. 8. Right unilateral cleft lip repaired with Noordhoff's technique with closed rhinoplasty and suture fixation, post-op day 7.**



**Fig. 9. Long term result at 7 years of age without nasal alveolar mouldings (NAM) or post-op nasal splint, over-correction of the nostril width and height are recommended to prevent recurrence. A bit of alar webbing and buckling are commonly seen after this type of closed rhinoplasty.**



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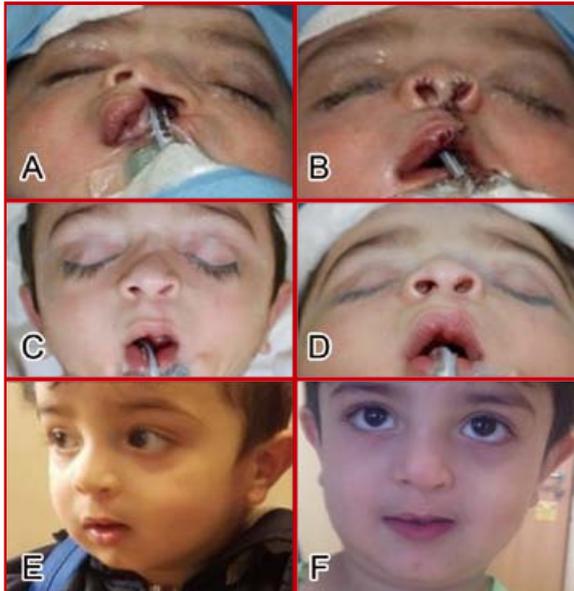


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To achieve a more sustainable nasal repair, some surgeons advocate a semi-open type of rhinoplasty with bilateral rim incisions for a more refined nasal tip and alar cartilage fixation. This is also applied to that of the bilateral cleft lip nose repair. Excessive skin at the alar rim can be trimmed to avoid webbing. I will use this technique for clefts with substantial width and significant distortion of the alar cartilage.



**Fig. 10. Wide unilateral complete cleft without NAM or post-op nasal splint.**-A; primary nasal repair with bilateral rim incision and fixation for the alar cartilage – B; Results at 9 month (at time of palate repair)- C & D; 3 years - E & 5 years of age – F.

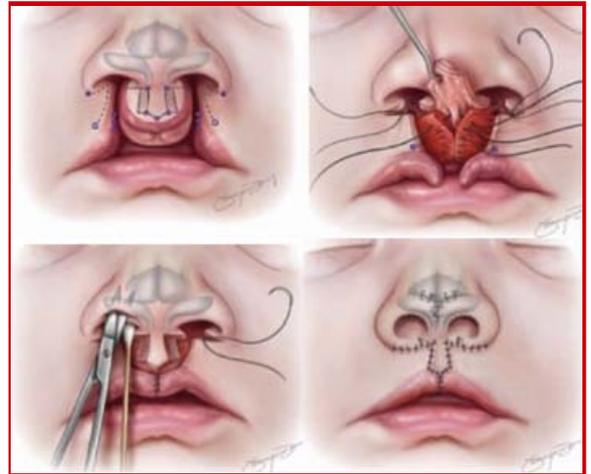
### Bilateral cleft lip repair

Repair of bilateral cleft lip also evolved from a straight-line repair to the usage of lateral flaps for closure. The Millard based technique using bilateral vermilion flaps to reconstruct the central lip vermilion. When comparing with the straight-line repair, the Millard's technique prevents whistle deformity at the central lip by adding additional tissue bulk from the lateral lip segment. This also avoids notching along the 2 parallel scars crossing the vermilion border in straight-line repairs.



**Fig. 11. Whistle deformity and notching at the vermilion border are commonly seen in straight-line repairs.**

### Millard based technique



**Fig. 12 Millard based bilateral lip repair<sup>6</sup>.**

A narrow prolabial skin (upper – 3mm; lower – 4-5mm) is used to avoid excessive widening of the philtrum as the prolabial skin grows. The central lip vermilion is reconstructed completely by bilateral lateral vermilion flaps. Blunt dissection is used to separate the alar cartilage from the overlying skin and mucosa through bilateral rim incisions. Excessive skin at the rim can be trimmed with fixation of bilateral alar cartilages to the upper lateral cartilage. Interdomal sutures are also used for tip projection and elongation of the columella.



**Fig. 13. Upper -Bilateral complete cleft lip and nose deformity Lower- Bilateral incomplete cleft lip and nose deformity, repaired with Millard and bilateral semi-open rhinoplasty. Lengthening of the columella can be achieved, result at 2 years of age for the upper and 1 week post-op for the lower. (Charity mission in HKUSZH, 2016)**

### Role of presurgical orthodontics

The application of presurgical orthodontics is based on the plasticity of the facial bone during the first 2 months of age. The bone can be guided to its desired position by either an active external force or a passive orthodontic appliance.

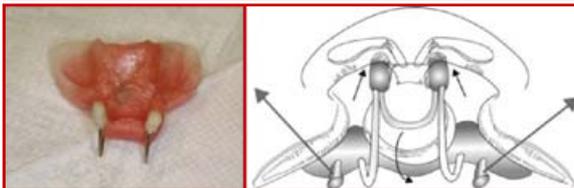
Nasoalveolar Moulding (NAM) is the most popular presurgical orthodontic treatment nowadays. An additional nostril strut is incorporated for support of the collapsing alar cartilage on the cleft side. Details of how

it works will be covered by other chapters but the aims of using NAM can be summarised as below:

- Align the collapsed alveolar segments
- Narrow the cleft, including the alveolus and palate, which could make primary gingival periosteoplasty possible
- Reposition the dislocated lower lateral cartilage
- Lengthen the columella and limit protrusion of the premaxilla in bilateral clefts
- Lessen difficulties and complications in primary repair and minimise secondary lip nose deformity



**Fig. 14.** Presurgical orthodontic treatment in 2003, the deviated premaxilla was guided to its central position and the clefts were narrowed, which made the subsequent repair less challenging. (photos from Dr. Alfred Tsang, OMF consultant, Tuen Mun Hospital)



**Fig. 15.** Nasoalveolar Moulding – the nasal struts reposition the dislocated alar cartilages and limit protrusion of the premaxilla.<sup>1</sup>

However, controversies still exist concerning the routine use of NAM, especially on the claimed effect of nasal asymmetry for unilateral clefts.<sup>4</sup>

In our centre, we selectively apply presurgical NAM to children with bilateral complete cleft lips or wide complete unilateral cleft lip only. Most of our patients also are not prescribed nasal splint postoperatively.

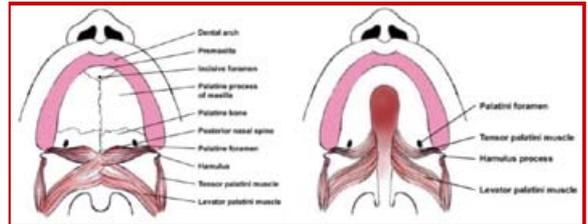


**Fig. 16.** Presurgical NAM – left : repositioning of the collapsed alar cartilage and narrowed cleft; middle : early postop; right : 6 months postop showed satisfactory alar position and nostril size, small stepping at the white roll required minor revision at the time of palate repair

## Repair of Cleft palate

The function of the palate is to separate the oral and nasal cavities. When the levator muscles of the soft palate contract, it closes up the velopharyngeal passage. This prevents nasal regurgitation during swallowing and allows accurate phonation.

In cleft palate patients, the defect may include the alveolus, hard palate and soft palate. The muscles of the soft palate are separated in the midline and inserted to the posterior border of the hard palate.



**Fig. 17.** Anatomy of cleft palate

In case of submucous cleft, the muscles are separated but the mucosa is still intact. This usually presents with a bifid uvula, zona-pellucida (thin, blue-tinged mucosa) at the midline of the soft palate, and posterior nasal spine notching. Surgery is not always required unless velopharyngeal insufficiency is detected.



**Fig. 18.** Submucous cleft with bifid uvula and zona pellucida

Because of the malinsertion of the soft palate muscles, the Eustachian tube function and the middle ear pressure may be affected. Middle ear effusion and hearing impairment may result.

The aim of palate repair is to close the palatal defect and reconstruct the levator sling for proper speech and swallowing functions.

Surgery for cleft palate repair lagged far behind because of inadequate anaesthesia. Until 1562, the first obturator for palate perforations appeared and in 1766, a French dentist reported the first successful cleft velum repair for a child.

In early 1900s, Von Langenbeck first proposed the use of a bipedicle mucoperiosteal flap to close the hard palate cleft. Veau later described the V-Y push back technique for palatal lengthening.

With more understanding on the function of the soft palate muscles in relation to speech, reconstruction of the abnormally inserted levator muscles to a more posterior and transverse orientation were advocated. This is known as intravelar veloplasty. Bardach in 1967 described the 2-flap palatoplasty technique for palate closure with emphasis on muscle dissection, repositioning and layered closure.



Leonard Furlow published the double-opposing-Z-plasty in 1978 with the aim of lengthening the soft palate and reconstructing the levator sling by reorienting and overlapping the muscles, 86% of his patients were shown to have normal speech in his study<sup>2</sup>.

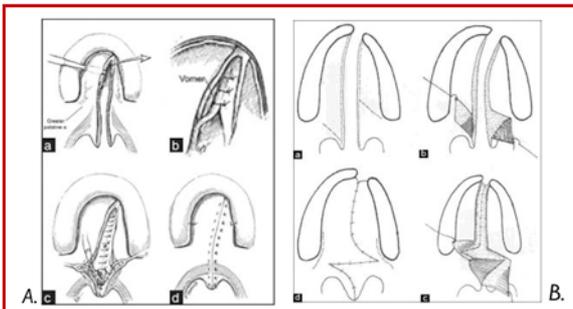


Fig. 19. A. Two-flap palatoplasty<sup>7</sup>; B. Furlow's double-opposing Z-plasty<sup>7</sup>

The major concern in cleft palate repair is the timing of surgery. Graber in late 1940s described that early palate closure will have significant negative effects on facial growth. Late repairs on the other hand will affect speech development. Most surgeons now agree that the optimal time for palate repair is between 9-18 months of age. Some surgeons will stage the repair by first repairing the soft palate at the time of lip repair at 6 month of age in order to achieve maximal potential in speech development. Myringotomy and grommet insertion should be considered at the same time if middle ear effusion is detected.

## Conclusion

Management of cleft children is a long term commitment. We should adhere to the standardised treatment protocol with a multidisciplinary approach.

With the selective use of presurgical orthodontic treatment /NAM, together with refined repair techniques and primary rhinoplasty, we can continuously improve the overall outcomes of primary lip repair. Hopefully, this can reduce the degree of secondary cleft lip-nose deformity and the extent of subsequent revision surgery.

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Please read the article entitled "Primary Cleft Lip and Palate Repair" by Dr Eric WK CHOI and complete the following self-assessment questions. Participants in the MCHK CME Programme will be awarded CME credit under the Programme for returning completed answer sheets via fax (2865 0345) or by mail to the Federation Secretariat on or before 28 February 2018. Answers to questions will be provided in the next issue of The Hong Kong Medical Diary.

Questions 1-10: Please answer T (true) or F (false)

- 1. The incidence of cleft lip and/or cleft palate is about 1:1000 in the Asian population.
2. Children with cleft palate may present with hearing problems.
3. Cleft conditions cannot be detected in the prenatal checkup.
4. Primary repair of cleft lip is usually performed at around 3 months of age.
5. The first reported successful cleft lip repair was from China.
6. Millard's repair technique is also known as the "cut as you go" technique.
7. Tennison's technique may create conspicuous scars at the lower portion of the lip.
8. Submucous clefts always require surgical repair.
9. Early repairs of cleft palate can result in better speech development.
10. Nasoalveolar moulding must be used for every complete cleft lip condition.

ANSWER SHEET FOR FEBRUARY 2018

Please return the completed answer sheet to the Federation Secretariat on or before 28 February 2018 for documentation. 1 CME point will be awarded for answering the MCHK CME programme (for non-specialists) self-assessment questions.

Primary Cleft Lip and Palate Repair

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Answers to January 2018 Issue

Precision Medicine in Lung Adenocarcinoma

- 1. T 2. F 3. T 4. T 5. T 6. F 7. T 8. F 9. T 10. F



# Cleft lip Nose: Secondary Rhinoplasty Revisited

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The management of cleft lip and palate does not stop after the primary repair. Subsequent management including velopharyngeal incompetence, orthodontic and orthognathic surgery and secondary cleft lip nose deformity may be needed in some of our patients. In this article, we would like to focus on the management of cleft nose deformity.

Anatomical studies by Atherton demonstrated that the cartilage on the cleft side was similar to the cartilage on the non-cleft side in dimension. The deformity is related to abnormally shaped cartilage rather than deficiencies in cartilage in unilateral cleft lip patients. The framework of the secondary unilateral cleft nasal deformity is commonly described by the tilted tripod. The tripod is composed of the septum, lower lateral cartilage and maxilla, which comprises the central support, the side walls and the base respectively. The hypoplastic and laterally displaced maxillary base ultimately will be associated with laterally splayed ala, loss of nasal tip projection and definition, oblique alar-facial angle, caudal positioning of the nostril floor and also septal deviation.

Aims of Rhinoplasty in cleft patients

Functional Objective	Aesthetic Objective
<ul style="list-style-type: none"> <li>• Reposition the nasal skeleton and soft tissue to provide a patent airway</li> </ul>	<ul style="list-style-type: none"> <li>• Symmetry</li> <li>• Minimal scar</li> <li>• Reasonable profile</li> </ul>



The recent advancement in nasoalveolar moulding before primary surgery can help to reshape the deformed alar cartilage and stretch the nasal lining, which may facilitate the operation by reduced tension and potentially reduces the chance of secondary cleft nose repair. However, most of the patients still require some form of nasal correction in the later stage.

Controversy exists regarding the best time to correct these nasal problems. Currently, some surgeons prefer primary rhinoplasty as the results are increasingly promising. During the mobilisation of the cleft lip segment, all lateral attachments of the nose to the pyriform aperture are released by dissection at the alar base via the lateral lip elements incision. The soft tissues along the alar rim are completely freed from the alar base. Dissection continues up to the nasal tip using blunt dissection both in the subcutaneous plane and submucosal plane. This frees the fibroadipose tissue from the lower lateral cartilage along the alar rim and allows it to redrap internally when the alar base

is positioned in a corrected place. Central dissection into the nose and septum is avoided to preserve circulation to the skin and avoids growth disturbance. Several transnasal sutures are then put to reshape the cartilage once the skin envelope is completely mobilised. These include transmucosal mattress sutures to approximate the domes in order to redefine the nasal tip. Transdermal sutures are inserted between the lower lateral cartilage to the contralateral upper lateral cartilage in order to lift off the hooded lower lateral cartilage. These mattress sutures start in the intranasal side, through the lower lateral cartilage, and are then insert through the external skin overlying the contralateral upper lateral cartilage. The suture is then passed through the same hole in the skin and brought back into the same nostril and tied down. Additional transnasal sutures are added to redrap the vestibular webs in order to open up the nostril and create the alar groove, further supporting the lateral position of the lower lateral cartilage. Postoperatively, some surgeons prefer the patient putting on a nostril splint for 6 weeks in order to hold the cartilage in the proper position.

For the timing of the secondary surgery, we would recommend secondary cleft nose repair after puberty. However, nasal correction can also be safely done before that if the deformity is severe enough to cause social problems for the child. However, as mentioned before, extensive septal dissection should be avoided during childhood to prevent any growth disturbance. But parents should be informed that revisional surgery may be needed when the child grows up.

When a patient comes for secondary cleft nose rhinoplasty, it is important to assess the whole facial profile, including the upper face, midface and lower face. It is only after the detailed assessment of the entire face that a personalised operative plan can be formulated. The skin is first checked for its thickness, thicker skin in Asians makes the tip profile more difficult to show up especially under a bulbous tip skin. The nasal bones are examined for asymmetry, length, and distance from the midline. The midvault is observed for upper lateral cartilage collapse and vertical symmetry, which is important for nasal passage patency. The shape of the nasal tip is then defined as being bulbous, boxy or narrow and we need to decide which nose tip matches the whole facial profile of the patient. The alar base width is measured and the thickness of the ala is compared between both sides. The vertical position of the ala is also evaluated, to determine the effect of maxillary hypoplasia and the need for alar base augmentation. The configuration

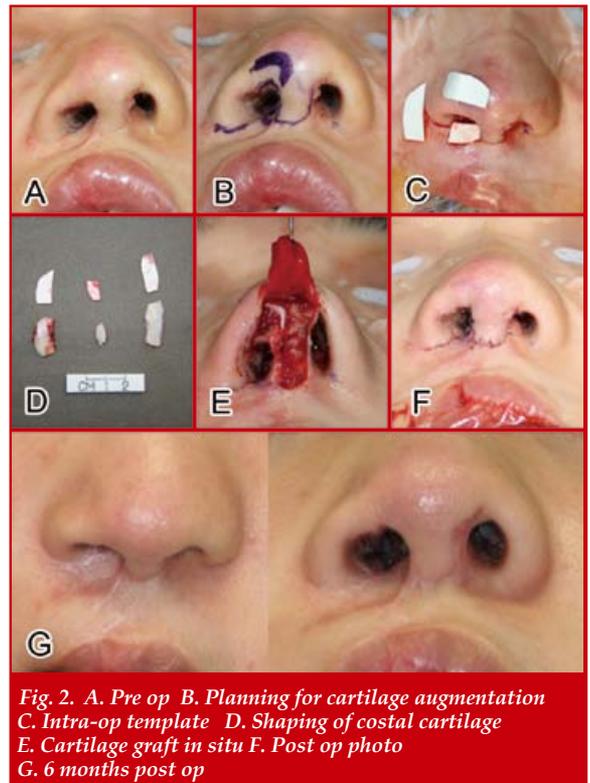
of the nasal sill is observed on the front view. On the lateral side view, the depth of the radix, the presence of a dorsal hump, tip projection, and nasolabial angle is documented in detail, best with photographing. The basilar view is very critical for determining the position of the nasal tip, the infratip lobule, the nostril length, direction of the columella, shape of the ala, and the position and symmetry of the nostril sill. The internal nasal examination using a nasal speculum should also be included. Detailed observation of stenosis of the internal and external valves, presence or absence of a deviated septum, size and shape of the turbinates, presence of synechia, and septal perforation should be performed. Preoperative nasal patency should be documented correctly, as rhinoplasty can sometimes worsen the symptoms of nasal blockage.

Secondary surgery can be performed with open or close rhinoplasty but the majority will prefer an open approach since a better exposure allows a better visualisation of the anatomy and hence makes the repair more satisfactory. Open rhinoplasty is most commonly performed through bilateral marginal or rim incisions connected by a transcolumellar incision at either the base or middle of the columella, depending on how long is the columella and how much we need to lengthen it. Kirschbaum described medial to lateral rotation of a chondromucosal sleeve for secondary correction of the cleft lower lateral cartilage. And Noordhoff described an open tip rhinoplasty with complete release of the cleft lower lateral cartilage and advancement in a V-Y fashion. The lower lateral cartilage is then sutured to the lower edge of the upper lateral cartilage to elevate the alar rim. The medial crura are fixed to each other to recreate the dome and hence to give a better tip definition. (Fig 1)



**Fig. 1. Secondary lip nose revision by open rhinoplasty and reposition the lower lateral cartilage.**

Others prefer cartilage graft augmentation. The donor sites can be septal, conchal and costal cartilages. The advantage of using cartilage graft can give extra support to the already weakened abnormal cartilage and hence able to keep the intraoperative shape post-operatively. It can be used as columella strut to increase the projection of the nose tip and elongate the columella. It can also be used as onlay alar graft or tip graft to further support the lower lateral cartilage and for better tip definition. It can be used for nasal dorsum augmentation to improve the profile of the nose. Last but not least, it can also be used to augment the alar base so as to provide a more balanced base for the nose to sit on, especially for those patients with severe maxillary hypoplasia. (Fig 2)



**Fig. 2. A. Pre op B. Planning for cartilage augmentation C. Intra-op template D. Shaping of costal cartilage E. Cartilage graft in situ F. Post op photo G. 6 months post op**

Some authors described lobule complex rotation technique to reorientate the nostril position by mobilising the skin with the cartilage as a whole unit. Extensive external scar makes this technique less popularised.

In unilateral cleft lip patients, the anterior septum is usually subluxed towards the noncleft side due to imbalanced muscle pull. Therefore, there is a deviation of the columella towards the normal side. Correction of the septal deviation is crucial to correct the cleft nose deformity because it is one of the important tripod limbs in the nose structure. It is usually corrected with submucosal dissection of septal cartilage and trimmed the excess length, reposition and fixation at midline of the caudal septum to the anterior nasal spine, correction of the intrinsic L-strut deformities with controlled Mustarde sutures, cartilage scoring and splinting with previously trimmed septal cartilage as strut. Other causes of nasal airway obstruction are inferior turbinate hypertrophy, internal nasal valve collapse, external valve constriction or vomer bone spurs. They can be dealt with through inferior turbinectomy, spreader grafts insertion, expansion of the external nasal valves and removal of bone spurs at the time of septorhinoplasty.

Early postoperative complications could include infection, which can be minimised by perioperative use of antibiotics. Necrosis of the skin is extremely rare and commonly associated with smoking. Asymmetry is common, and patients should be informed before the operation. The most common late complication of this operation is asymmetry and septal deviation and the need of revisional surgery.



Cleft lip rhinoplasty patients are usually very satisfied after the operation. Study showed patient satisfaction was high based on the Rhinoplasty Outcome Evaluation questionnaire. In one study, 91% of patients rated their appearance as improved, and teenage females (score 94.1) showed statistically higher satisfaction, when compared with their male counterparts (score 69.8). Although cleft rhinoplasty is among the most challenging operation for plastic surgeons, these are the patients who benefit from surgery tremendously and are often the most grateful.

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# Cleft Orthognathic Surgery– Tri-phasic approach in cleft lip & palate maxillofacial reconstruction

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## Introduction

Good surgical outcome in cleft surgery demands meticulous surgical skills and sound knowledge foundation in respect to craniofacial growth and oral function. Therefore, cleft surgeons have made great strides in treatment concept during the past few decades. Inevitability, secondary cleft maxillofacial deformities developed due to the cumulative effects of functional and morphological abnormalities from the various stages of primary repair. Problems could range from uncorrected defects, complicated healing from initial repair, to some exaggerated developmental facial disharmonies as the patient attain adolescent or adult age. Some challenges include malpositioned premaxilla with large oronasal fistula, severe mid-facial retrusion and poor lip-nose maxilla complex etc. In order to correct such complex maxillofacial deformities that take almost two decades of time since primary surgery, a tri-phasic approach (TPA) interphased by orthognathic surgery is essential.

## Strategic Surgical Planning by Tri-phasic Approach

An interdisciplinary team is essential to perform a comprehensive treatment protocol for cleft lip & palate deformities that the cleft surgeon will be the clinical co-ordinator with sequential approach interfaced by various specialists such as Paediatrician, Nurse specialist, Otorhinolaryngologist, Speech therapist, Orthodontist, Paediatric Dentist, Clinical psychologist and a committed Patient support group. This is in pace with the key requirements to ensure good quality of service by multidisciplinary care as stated by Cooper<sup>1</sup> and/or Palate Report of a Clinical Standards Advisory Group Committee by the United Kingdom<sup>2</sup> (1988).

Primary surgeries at very young age are essential to restore a peer acceptable facial appearance including lip and palate perioral muscular speech function. However as a sequelae of these early surgical interventions, nasomaxillary development and dentoalveolar integrity might be compromised in addition to the underlying intrinsic mesodermal defect. A thorough description of the late effects on residual cleft deformities was made by Banks<sup>3</sup> in 1983. Thus a stringent reconstruction schedule is often devised as a 3-phase protocol for the correction of cleft maxillofacial deformities: Phase 1-Pre-orthognathic preparation; Phase 2-Orthognathic Reconstruction and Phase 3-Post-orthognathic nasolabial reconstruction. The strategy is again indispensable on the collaborative effort as accomplished by a coherent multidisciplinary specialist team.

## TPA 1 Pre-orthognathic preparation : Interceptive orthodontic/orthopaedic treatment & Alveolar Bone Grafting

As unsatisfactory surgical results in primary cleft repair and aberrant localised dentoalveolar development cause deranged orofacial jaw growth, timely attention in respect to the dentofacial growth should be scrutinised so that necessary interceptive orthodontic or early skeletal surgical treatment to remove those adverse factors such as anterior mandibular displacement resulting in pseudo CI III or malpositioned premaxilla segment. Interceptive orthopaedic care is crucial such as reverse head gear therapy and a good orthodontic preparation as an interventional therapy that will alleviate the complexity of future orthognathic corrections. Sometimes an aggressive premaxillary repositioning osteotomy is indicated to restore a normal maxillomandibular occlusion to facilitate normal mandibular growth.(Fig. 1) A retrospective analysis of 346 cleft patients in a secondary reconstruction clinic in Hong Kong<sup>4</sup> showed 43% of them required interceptive orthodontic care at the mean age 11.4 years old.



**Fig. 1. Patient with Severe inferior positioned premaxilla corrected by 7mm impaction osteotomy and simultaneous alveolar bone grafting to repair the oronasal fistula**

Secondary repair of alveolar defects by bone grafting is a commonly practised procedure to restore the integrity of the dental arch and nasal floor defects. It is considered as an interim surgical procedure preceded by pre-surgical orthodontic dental preparation and followed by a post-surgical orthodontic teeth alignment. Despite some surgeons advocating primary grafting at a very young age, secondary grafting is the most common practice nowadays. El Deeb et al concluded the most favourable



outcome by performing the grafting at 1/4 to 1/2 canine root formation by the age of 9-12 years<sup>5</sup> and that was almost accepted as a standard protocol. However, Precious<sup>6</sup> had proposed the alveolar bone grafting at an earlier time at the eruption of the maxillary central incisor at about 5.5 to 6 years of age. Long et al reported that more than 80% of root coverage of incisors and canines adjacent to the grafted cleft would contribute to the long-term periodontal health<sup>7</sup>. Liou et al<sup>8</sup> had devised interdental distraction osteogenesis for approximation of wide alveolar clefts or bony defects as a new treatment option. Definitive orthodontic tooth movement will depend on the full consolidation of the alveolar bone graft. Further pre-surgical orthodontic preparation of dentition is in a more favourable situation particularly for those patients who need later orthognathic surgery.

## TPA 2 Orthognathic Surgical Reconstruction

It is not uncommon to see a hypoplastic maxilla in a previously repaired cleft lip and palate patient, and this is recognised as part of the secondary dentofacial deformity that causes class III dental malocclusion. Ross reported that approximately 27% patients presenting with significant hypoplastic maxilla did not respond well to orthodontic treatment alone, and a combined orthodontic-orthognathic treatment strategy was normally envisaged<sup>9</sup>. The presentation of maxillary hypoplasia with or without mandibular prognathism or pseudo-prognathism is almost universal and clear in all cleft patients at adolescence. In order to harmonise the facial aesthetic profile and achieve a functional occlusion, mid-facial maxillary advancement osteotomy, and sometimes with mandibular setback procedures, is often indicated. However the blood supply to the repaired maxilla is dubious so is the choice of techniques for cleft maxillary osteotomy had long been debatable<sup>10,11</sup>. A high horizontal relapse rate could be up to 30%-37% in cleft maxillary advancement osteotomy whereas vertical relapse at A-point could be at 65%<sup>12,13</sup> was of its inherent primary surgery sequelae. Various designs and modifications of maxillary osteotomies were accompanied by simultaneous bone grafting and titanium mini-plates for rigid internal fixation in an attempt to enhance skeletal stability and surgical movement<sup>14</sup>. Moreover, velopharyngeal function had shown to be deteriorated following maxillary advancement in this group of patients<sup>15,16</sup>. Nowadays, the application of distraction osteogenesis seems to offer twilight of severe maxillomandibular discrepancy in cleft patients<sup>17,18</sup>. The complexity of a cleft maxilla surgical anatomy such as oronasal fistula, defective repaired orbicularis oris muscle and the hypoplastic piriform rim that had initiated various modifications and designs of maxillary osteotomy. Combined lip revision and anterior fistula repair going along with the cleft maxilla osteotomy have been described by Henderson and Jackson<sup>19</sup>. Posnick described modifications of the Le Fort I and segmental osteotomies, fistula closure, bone grafting and application of mini-plates and screws fixation but without risk of circulation injury to the dento-osseous musculomucosal flaps<sup>12</sup>.

The evolving concept of Surgery First Approach in orthognathic surgery has recently been more recognised in the medical literature. The lengthy pre-

surgical orthodontic preparation of the dentition (15 to 24 months)<sup>20,21</sup> that causes discomfort and psychosocial inconvenience to patients is well known. The bio-functional benefits of this approach to facilitate orthodontic forces by two reasons are: 1. Immediate resolution of hard and soft tissue imbalance prior to tooth movement<sup>22</sup>, 2. The process of demineralisation and re-mineralisation consistent with the wound healing pattern of regional acceleratory phenomenon<sup>23-25</sup>. Chow et al in 2017 reported a quantitative analysis of the peri-operative parameters<sup>26</sup> namely surgical complexity, estimated blood loss and operating time by comparing conventional and surgery first approach SFA group in bimaxillary orthognathic surgery that all were found to be similar statistically despite the pre-surgical orthodontic preparation was shortened significantly by 14.6 months. A case of unilateral cleft CI III patient showed very stable result by SFA after a 2 years follow-up.

## TPA 3 Post-orthognathic Nasolabial Reconstruction

Once the maxillofacial skeleton has been corrected by orthognathic surgery, definitive lip nose revision on such skeletal base is considered as the exit-stage of the protocol. Radical rhinoplastic reconstruction is an open rhinoplasty approach for de-skeletalisation of the nasal cartilage-bony complex by incorporation of septoplasty, serration and repositioning of the disarticulated lower lateral cartilage and necessary cartilage grafting that could reconstruct a stable and symmetrical cleft nasal complex<sup>27</sup>. Additionally, meticulous lip scar revision with the attention of plication of the orbicularis oris muscle and the use of autogenous grafting materials such as temporalis fascia, free dermal fat graft for volume augmentation of a 3-dimensional deficient lip could produce a promising aesthetic result<sup>28</sup>.

## Case Illustration : Cleft Orthognathic Surgery <Surgery First Approach>

A 20-year-old unilateral cleft lip & palate male patient presented with a severe prognathic mandible and retrusive maxilla profile of -11mm overjet to seek for orthognathic surgical correction. His primary lip and palate was repaired in a public hospital. His severe anterior cross bite caused him both speech and chewing inefficiency. The minor segment was found to have a steep occlusal curve towards the repaired alveolar cleft with a rotated left central incisor and palatalised canine. There was minimal crowding in the lower arch with a satisfactory occlusal plane.(Fig. 2) In view of this markedly deranged occlusion, a lengthy pre-surgical orthodontic correction time was envisaged. However, he requested corrective surgery as soon as possible within 3 months time so to have a more normal appearance to commence his first year university life. After much discussion with him and the attending orthodontist, the Surgery First Approach SFA was adopted. A working diagnosis of Skeletal Class III due to secondary cleft lip and palate deformities resulting in A-P(antero-posterior) maxilla hypoplasia and mandibular hyperplasia. His pre-surgical orthodontics preparation was done with mainly brackets attachment performed by the orthodontist a week before surgery. The surgical treatment was 2-piece Le'Fort I maxillary advancement

by segmentalisation at the repaired alveolar cleft and bilateral sagittal split mandibular setback osteotomies. (Fig. 3). His post-operative recovery was uneventful with commencement of orthodontics three weeks after operation. Clinical photos showed positive overbite and overjet (Fig. 4) with a pleasing profile (Fig. 5) and stable occlusion two years after surgery.



**Fig. 2. Pre-operative frontal and Overjet view showed the extent of large AP discrepancy of his secondary cleft dentofacial deformities**



**Fig. 3. Intraoperative view showed 2-piece LeFort I osteotomies and 3 weeks postoperative frontal occlusal view on left side**



**Fig. 4. Two years postoperative frontal and overjet views**



**Fig. 5. Pre and post-operative 2 year Lat Ceph & profile superimposed views**

## Conclusion

Morphological variations of cleft maxillofacial deformities are so diverse that rely on the covariates of intrinsic genetic, developmental factors and the extrinsic effect from primary repair surgeries. Therefore, cleft surgeons need a thorough understanding of the craniofacial development in cleft patients and are well aware of the latest surgical and technological advances

that could kindle their wisdom on solving the challenges. The tri-phasic approach could provide a clinical path for definitive surgical reconstruction of such a complex dentofacial deformities. Notwithstanding, good quality primary surgery and prospective interdisciplinary follow-up would definitely ease the magnitude of challenges in secondary cleft maxillofacial reconstructive surgery.

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# Radiology Quiz

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Fig. 1. Longitudinal scan of right scrotum

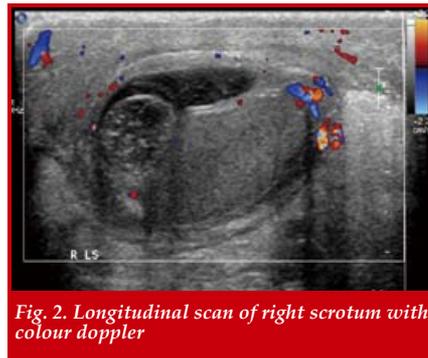


Fig. 2. Longitudinal scan of right scrotum with colour doppler

A 10- year-old boy presented with acute right sided scrotal pain. An ultrasound examination of the scrotum was performed.

## Questions

1. What are the ultrasound findings?
2. What is the diagnosis?
3. What is the management?
4. What is the typical feature of this condition?

(See P.37 for answers)

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# Controversies in Cleft lip and palate repair

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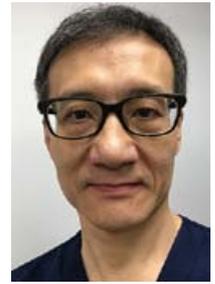
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Cleft lip and palate are common craniofacial deformities especially among Asians. Patients with cleft deformities require multidisciplinary care from birth through adulthood. Different treatment protocols are employed in different centres with new treatments emerging from time to time. This article will list controversies in current cleft lip and palate management.

## The technique in unilateral cleft lip repair

Throughout the evolution of cleft lip repair, plastic surgeons have innovative ideas in surgical techniques aiming at achieving a symmetric Cupid's bow. Today, the most common technique for cleft lip repair is the rotation advancement repair first introduced by Millard in 1955. A survey in the U.S. and Canada showed that over 80% of surgeons adopted this method for the repair of unilateral cleft lip<sup>1</sup>. The rotation advancement technique adopts the "cut-as-you-go" principle, and is a technique with a learning curve which relies on the experience and artistic sense of the surgeon. It creates scars with minimal disruption of aesthetic unit and resembles a continuous philtral column mirroring the normal side but with the shortcoming of creating complex scars beneath the nose disturbing the columellar-labial crease (Fig. 1).



Fig. 1. Milliard rotational advancement repair.

It can also result in a shorter lip with reduced horizontal lip length and narrowed nostril in the repair of a wide unilateral complete cleft lip<sup>2,3</sup>. In view of the above shortcomings of the rotation advancement technique, numerous modifications were proposed based on Millard's original description.

Another commonly practised technique is the geometric-style repair introduced by Tennison, LeMesurier and later modified by Fisher (Fig. 2).



Fig. 2. Tennison cleft lip repair.

A balanced Cupid's bow is created with strict geometric measurements but at the expense of creating scars that disrupt the continuity of the philtral column. In contrast to the rotation advancement technique, lip height can be maintained by this technique without compromising the lip length. This technique can be applied to a wide range of cleft sizes. Because of the ability to geometrically design precise flaps, these techniques are easier to learn and teach<sup>4</sup>.

There is no one single best technique to the repair of cleft lip. Each method has its own strengths and weaknesses and every surgeon has his own modification of the technique. Even if only one technique is repeatedly used, the long-term outcome should be reviewed from time to time and the efficacy of repair should be evaluated in order to refine one's surgical technique for a better surgical outcome.

## Corrective surgery for cleft nasal deformity

Nasal deformity is a significant component of cleft lip deformity. Historically, cleft lip is corrected at 3 months of age without addressing the nasal deformity. Although the nasal deformity will be improved to some extent after lip repair, the stigmata of cleft remain until corrective surgery (rhinoplasty) which is performed before school (pre-school rhinoplasty) or after puberty (secondary rhinoplasty). There is reluctance to perform nasal correction during primary cleft lip repair due to the fear of disrupting natural growth centres existing in the nose and creating scarring that affects nasal growth and makes future rhinoplasty more difficult<sup>5-7</sup>. Furthermore, over-dissection can compromise vascular supply to the columella and lip increasing the risk of lip repair especially in bilateral cleft deformities<sup>8</sup>. With advances in technique and knowledge in the field, there is increasing evidence from the literature that primary rhinoplasty (at the time of cleft lip repair) does not affect nasal growth<sup>5,9-13</sup>, but rather it reduces psychosocial stress for patients and reduces frequency and magnitude of intermediate and definitive rhinoplasty operations<sup>5,6</sup>. And if the position of the lower lateral cartilage is not corrected during lip repair, the cartilage may become locked and tethered in its abnormal position with an altered growth of the nasal tip making future rhinoplasty more difficult<sup>14</sup>. Thus, cleft surgeons now tend to shift to perform more primary nasal corrections.



## Presurgical infant orthopaedics - nasoalveolar moulding

Cleft surgeons have sought ways to reduce the severity of cleft lip nose deformities before definitive surgery to achieve a better result. Multiple pre-surgical infant orthopaedics (PSIO) technique have been developed including maxillary plates, lip taping, lip adhesion, the Latham device and nasoalveolar moulding (NAM)<sup>15</sup>. The NAM appliance consists of a removable alveolar moulding plate made of acrylic combined with outrigger nasal prongs. The intraoral and nasal components are adjusted weekly or biweekly to gradually correct the nasal and alveolar deformity taking advantage of the increased plasticity of the infant cartilage during the first 6 months of life due to the elevated levels of maternal oestrogen<sup>16</sup>. It can be applied since birth and treatment lasts for 3 to 4 months. NAM as compared to other PSIO like the Latham device and lip adhesion, has the advantage of being less invasive and does not require sedation or anaesthesia during insertion. Multiple studies have been published supporting the long lasting positive effect of NAM with improved nasal and facial aesthetic outcome after surgery<sup>17,18</sup>. The frequent visits required for NAM adjustment also reduces caregiver anxiety and lead to a sense of empowerment<sup>16</sup>. Another argument for using NAM is that it reduces cost by reducing surgeries for alveolar bone grafting and secondary nasal correction<sup>15</sup>.

However, application of NAM requires expertise in the field for planning and frequent follow up care from a craniofacial or paediatric orthodontist as well as the daily care of appliance by caregivers. The appliance can cause local skin and alveolar irritations, thrush<sup>19</sup> or even pressure ulcers<sup>20</sup>, decreasing caregivers' compliance. In contrast to the positive aesthetic outcome as shown in Grayson's and many other studies, some showed no or negative effect<sup>15</sup>. Others argue that the changes brought by NAM relapse after a short period of time<sup>21</sup>. More importantly, application of NAM may affect maxillary growth in the long run<sup>22</sup>.

To conclude, there is no definite answer to whether NAM application is beneficial from literature as there is no standard protocol to appliance adjustment, duration of application and frequency of adjustment. Different techniques from orthodontists and compliance of caregivers are also factors affecting the outcome of NAM. In order to answer the above question, a high quality randomised control trial with a well-defined aesthetic outcome and long term follow up will be the solution.

### Objectives of NAM<sup>16</sup>

- Provide symmetry to severely deformed nasal cartilages
- Achieve projection of the flattened nasal tip
- Provide nonsurgical elongation of the columella
- Improve alignment of alveolar ridges
- Reduce distance between cleft lip segments



## The timing and technique for cleft palate repair

The technique, sequence and timing of palatoplasty for cleft patients vary across centres since there is no one agreed best protocol. Single-stage techniques such as the "straight-line techniques" including the von Langenbeck, the Veau-Wardill-Kilner push back and the Bardach two-flap; two-stage techniques such as the Schwegendieck and the Delaire are different techniques recommended by different surgeons<sup>23</sup>. A successful palatal repair not only reconstructs the hard and soft palates anatomically, but also allows development of normal speech while minimising the incidence of oronasal fistula and has minimal effect on maxillary growth.

The reason behind a two-stage palatoplasty instead of one is to allow the best possible postoperative maxillary growth since patients whose hard and soft palates are closed before the age of 3 have maxillary growth deficiency as compared to those closed at a later age<sup>24</sup>. However, there is conflicting evidence from different studies as shown in a systematic review as to whether two-stage palatoplasty promotes less restricted maxillary growth<sup>25-27</sup>. Apart from maxillary growth, there is also inconclusive evidence on speech development after one and two-stage palatal repairs regarding phonation, nasal resonance, hypernasality, nasal emission, speech intelligibility, articulation errors and prevalence of velopharyngeal insufficiency<sup>23</sup>. Fistula rate of one and two stage palatal repair are also studied but with inconclusive scientific support to suggest either one is superior<sup>23</sup>.

Regarding the soft palate repair, Krien, Cutting and Sommerlad advocated intravelar veloplasty (IVV) to reorientate the abnormal levator veli palatine muscle insertion in straight-line repair<sup>28</sup> while Furlow suggested to lengthen the soft palate with Z-plasty<sup>29</sup>. In a systematic review looking into patients affected by unilateral cleft lip and palate, a straight-line repair combined with IVV was associated with inferior speech outcome and increased risk of a secondary operation for velopharyngeal insufficiency compared to those with Furlow's palatoplasty<sup>30</sup>. This result has to be interpreted carefully since the extent of repositioning of the levator muscle in IVV varies among surgeons and incomplete mobilisation of muscle is associated with less favourable speech outcome<sup>31</sup>. And there are impressively good results published by the authors adopting IVV which is excluded from this systematic review<sup>31,32</sup>. Apart from the speech outcome, there is no difference in the fistula rate between the two repair methods. The type of cleft itself is a significant factor in causing fistula rather than the technique used. There is a higher fistula rate in complete clefts and wider clefts<sup>30</sup>.

To conclude, there is no evidence showing a two-stage palatal repair is superior over an one-stage palatal repair in terms of maxillary growth, speech outcome and the fistula rate. And straight-line repairs with IVV may have a higher risk for secondary operation when compared to Furlow's palatoplasty, but with no significant differences in the fistula rate.

## Conclusion

To conclude, the controversies in cleft surgery will take time and further scientific evidence to settle. Updates from well-designed trials are guidance to our clinical practice.

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## Plastic surgeons and humanitarian cleft missions

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## Dr Teresa TAN is a young plastic surgeon who is passionate about mission work, and has an interest in cleft lips and palates.

My interest in medical mission trips started back in my high school days when medical missionaries who returned from third world countries shared their experiences with us. Since then I was determined to become a doctor and hoped to serve on medical mission trips after graduation. I started joining cleft medical missions since 2013 and my interest grew ever since.



The role of plastic surgeons in managing cleft patients starts from neonates all the way till adulthood – from the initial cleft lip and palate repair to repairing the alveolar bone gap at around 9 years of age, to lip revision and rhinoplasty as the child grows into adulthood. Cleft lips and palates are very challenging to manage, with very steep learning curves – one can only see one's own results many years down the road, after the cleft child reaches adolescence, and immediate good results don't guarantee good long term results. It is hence very important to learn from experienced cleft surgeons who have followed their patients into adulthood.

As a young plastic surgeon, learning from seniors and experienced cleft surgeons is very valuable to me, as they share with me what they have learnt from their many years of experience. I am very blessed to have the privilege to learn from 2 very experienced cleft surgeons, Dr Peter PANG and Dr Sik-kuen CHOW, who are both plastic surgeons based in Hong Kong and are very active in volunteering their services on mission trips.

## Dr Peter PANG is a private plastic surgeon who has been a volunteer cleft surgeon for almost 20 years.



### How did you get started as a volunteer cleft surgeon?

I first joined Operation Smile China Medical Mission (now known as BEAM International Foundation Limited) 18 years ago as a volunteer surgeon. Since then I have been to more than 30 missions and operated on almost 1,000 patients in total. I enjoy working with volunteers from different parts of the China mainland and these trips help me understand more about the culture of different provinces.



Dr Peter PANG operating on one of his many surgical missions

In order to help more patients, I became a director of Operation Smile China Medical Mission (微笑行動中國基金有限公司), which is now known as BEAM International Foundation Limited (逸傑國際慈善基金會有限公司). Recently I have the privilege of being the Chairman of the BEAM International foundation.

### **Could you tell us more about the organisation you are involved with?**

BEAM International Foundation Limited is a medical charity headquartered in Hong Kong to provide free surgeries for underprivileged children with cleft lips and/or cleft palates in Mainland China. Volunteers come from all parts of the world, such as the United Kingdom, the United States, Australia, Germany, and many other big cities and countries. In the past 25 years, nearly 300,000 patients have been treated.



**A very grateful mother with her child who suffers from bilateral cleft lip**

The mission of Beam International Foundation is to recruit more donors and medical and non-medical volunteers in order to set up more missions and local educational programmes, so as to help more children. A medical team usually consists of plastic surgeons, anaesthesiologists, paediatricians, dentists, ward and operating theatre nurses, and also non-medical volunteers who look after logistics, medical records, and clinical photo taking.



**Group of volunteer surgeons at one of the cleft missions**

### **How many days of leave does one need to take for a mission trip?**

A mission usually takes 7 days, where the first day is mostly spent on travelling as volunteers come together from different parts of the world. The second day is set aside for patient screening, selecting patients for surgeries, and also identifying patients with medical conditions who are at increased risks of surgery. These patients can either be optimised over the next 2 days for surgery or the surgeries may be cancelled.

The 3<sup>rd</sup> to 6<sup>th</sup> days are dedicated for surgeries, with each surgeon operating on 7 to 10 patients each day. The number of patients registered before the team arriving will determine the number of surgeons and number of operating tables required. The evening of the 7<sup>th</sup> day is for celebration and to commemorate the team for their hard work, and the last day is for packing up and returning to various countries. Some volunteers sometimes would like to spend an extra day at the mission site for sightseeing.



**Families gathering to check whether their child is enrolled on the surgical list for the mission**

### **Could you share some memorable moments from your trips?**

Operating for cleft patients under local anaesthesia is very challenging, but it does bring instant gratification to the patients. Children as young as 10 years old are usually very brave and are willing to undergo surgeries under local anaesthesia. It is my practice to keep a mirror in my toolbox so that my patients can look at their faces immediately after surgeries under local anaesthesia. The smiles it brings to their faces are very rewarding.

Once I asked a young girl what she would like to do after her surgery, and she said she'd like to kiss her mother as her mother has never kissed her before, probably due to her strange appearance due to her cleft lip. I was very touched, and realised my work is not merely a technical surgical repair of her cleft lip, but it is also a psychological healing of her soul.

**Dr Sik-kuen CHOW is a private plastic surgeon with a special interest in cleft lips and palates, and has been serving as a volunteer cleft surgeon for over 30 years.**

### **What do you think is the aim and purpose of cleft mission trips?**

The purpose of the cleft team on mission trips is for both service and for training purposes. Not only do we treat patients with cleft lips and palates, but we also train the local staff team on the management of cleft patients: sharing and transferring of surgical skills to local surgeons, paediatric anaesthetic skills for local anaesthetists, and perioperative and care for cleft children for local nurses.

In Hong Kong, cleft lips are usually operated on around 3 months of age and palates at around 9-18 months of age. On our mission trips, it is not uncommon to see patients with unrepaired cleft lip and palates outside



this time frame. If a child has both cleft lip and cleft palate that are unrepaired, we would consider doing a "combo" repair – a 1-stage procedure repairing the lip and palate, and correcting their nasal deformities in one surgery which takes around 3-4 hours. In such patients, only one admission and one operation is required, which is an advantage for families which may have to travel for days to get to the mission location.

I believe knowledge would improve our living, but love would change our lives. On such missions, not only are we sharing knowledge, but also sharing love with the less fortunate.

“知識改善生活，愛改變生命。”

### *Could you tell us more about the organisation you are involved with?*

HIS Foundation Limited is a Christian non-profit service organisation whose mission is to spread God's love through helping the poor and needy, rendering free educational and medical services in Mainland China and the rest of the world. I am serving the organisation in 2 capacities – as the Chairman of the organisation and also as a cleft surgeon.

The Foundation is entirely self-financed from offerings from brothers and sisters in Christ, with no government funding at all. Our medical and educational volunteers fund their own trip expenses, with the core belief "it is more blessed to give than to receive" and love is life changing, igniting hope.

### *What countries have you been to for your mission trips?*

I have been to Kenya, Mainland China, Indonesia, and more recently Madagascar. In Madagascar, it is considered a curse to have a cleft lip and palate child in the family, and many families would choose to remove the curse by killing the cleft child. When our voluntary cleft team repairs the cleft lip or palate, the family is elated as the child regains a normal appearance, and the curse is thus removed. Not only is the cleft child treated, but the whole family is "cured" as well, and they no longer have to hide the cleft child at home and the entire family can now stand up and face their community.



*Dr CHOW and his medical team on their first medical mission to Madagascar, 2014*

### *What do you find memorable on your trips?*

Families love to take pictures with us. The parents tell us they want to keep these pictures as memories and to show them to their children when they grow up, telling them that a Christian surgical team has done a free operation for them, and would urge their children to help others whenever they can. When we hear them saying this, we feel extremely glad.



*Pictures showing a child with a unilateral cleft lip, pre and post surgery*



*A very grateful mother with her child postoperatively*

### *Could you share what you learnt from your trips throughout these years?*

Many cleft children are orphans, abandoned by their biological parents. They are either sent to orphanages or the "lucky" ones may be picked up by good-hearted passers-by who may be elderly. These foster parents are not well-off, yet they are willing to offer help and to take the abandoned cleft child under their wings and to care for the child for life. I learnt from these families that we should offer our help to those in need whenever we come across people in need, and NOT only offer help when we are "free".

## Annual Dinner 2017 – Federation Galaxy

The Annual Dinner, held on New Year's Eve each year, is one of the flagship events of the Federation in which friends and families gather to enjoy themselves and welcome the arrival of a new year. This year's theme was Federation Galaxy. Like a galaxy, the Federation is full of stars and wonderful people. We had more than 260 guests from our member societies and the medical and healthcare communities. The programme and the venue were designed to match this shiny theme with brilliant melodies, sumptuous food and festive decorations. The glittering evening was hosted by Ms. Skye CHAN (陳倩揚). We were privileged to have many distinguished guests joining us, including Prof. Sophia CHAN, the Secretary for Food and Health; Dr CHUI Tak-yi, Under Secretary for Food and Health; Prof John LEONG, Chairman of the Hospital Authority, and Mrs Annie LEONG; Dr LAU Chor-chiu, Vice-President (General Affairs) of the Academy of Medicine; Dr HUANG Chen-ya, Past President of The Federation of Medical Societies of Hong Kong, and Mrs HUANG Chak-ye; Dr York Yat-ngok CHOW; Dr LUK Wai-sum, Vice President of Association of Licentiates of Medical Council of Hong Kong; Dr Bernard KONG, President of The Hong Kong Society of Medical Professionals; Dr Henry YEUNG, President of Hong Kong Doctors Union; The Hon Prof. Joseph LEE and Prof. Diana LEE; The Hon Dr LEONG Che-hung and Dr Lillian LEONG; Dr Laurence HOU, Dr LUK Wai-sum, Dr Nancy YUEN, and Dr Bernard KONG. The presence of these honourable guests brightened up the evening and we owe them our heartfelt thanks.

Throughout the evening, many superb and talented performers from the medical community gave a variety of performances during the dinner, including dance performances by EC Swag and Dr Ludwig TSOI, string music by Forever Fiddlers and members of the HKMA Orchestra, dance performances by Dr HUI Wei Lee and Mr Johnny LIU, Dr LAU Wing-ci and Dr Dora WONG, and Dr WU Dui and Mr ZOU Jian-yu, singing by Dr Johnny Leo CHAN, Dr York CHOW, Dr Nancy YUEN and Dr Samuel KWOK, and songs by the SPOT Band from HKOTA. The dinner was indeed a star-studded event. The highlight was undoubtedly the rendition of the Cantopop classic, 'a Bright Future', by Prof Sophia CHAN, Dr Mario CHAK, President of FMSHK, Prof John LEONG, Prof the Hon Joseph LEE, Dr York CHOW, Dr Nancy YUEN, Ms Tina YAP, Dr LAU Chor-chui, Dr KM SIU and our executive committee members.

Everyone was thoroughly absorbed in the Bingo hosted by our very own bingo masters Dr Desmond NGUYEN and Dr Kingsley CHAN. Our guests turned into the stars of the evening in The Costume Prize and the Dance Fever Competition. The atmosphere of the evening was brought to a climax with the countdown party and pop classics performed by Dr Mario CHAK; Dr Ludwig TSOI, Dr Victor YEUNG, and Dr Desmond NGUYEN, EXCO members of FMSHK.

After midnight, everyone was still enjoying themselves. There were many happy winners in the lucky draw because we had many fabulous prizes this year, including the Premier Prize of a 12-Day Aristocratic British Isles Cruise Vacation on the Princess Cruises' Come Back Heritage Royal Princess, and delightful prizes such as the Venus Facial Package, AQ Bio Gift sets, KODAK Photo Printer Mini, and NDG Mini Me Coffee Machines.

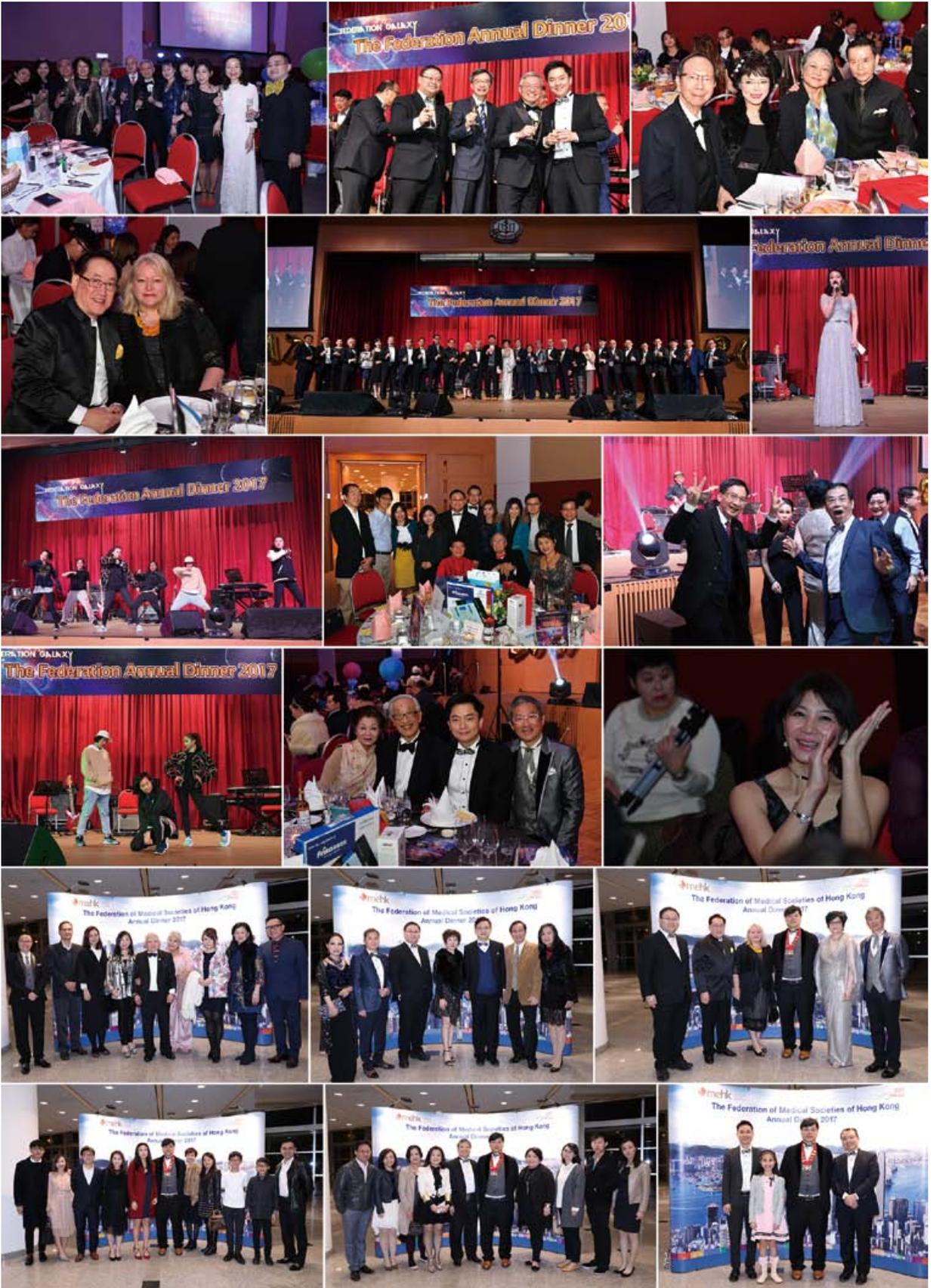
All in all, it was a beautiful night during which we shared our joy and excitement together. We express our sincere gratitude to all our sponsors, and thank all our guests for joining us on this memorable occasion.













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試用者使用前  
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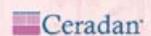
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After 4 sections of treatment

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				<p>1</p> <p>HKMA Kowloon East Community Network - Antibiotic Stewardship Programme in Primary Care</p>	<p>2</p> <p>HKMA Kowloon City Community Network - Improving Cardiovascular Outcomes in Patients with Type 2 Diabetes: Applying New Evidence in Practice</p>	<p>3</p> <p>★ Refresher Course for Health Care Providers 2017/2018</p>
4	5	<p>6</p> <p>HKMA Yau Tsim Mong Community Network - Certificate Course on Allergy (Session 3) - Co-morbidities of Allergic Rhinitis in Children</p> <p>★ FMSHK Officers' Meeting</p> <p>★ HKMA Council Meeting</p>	<p>7</p> <p>HKMA Shatin Doctors Network - Antibiotic Stewardship Programme in Primary Care</p> <p>★ HKMA Central, Western &amp; Southern Community Network - Asthma - What Should Be Done to Help Patients Achieving Disease Control?</p>	<p>8</p> <p>HKMA Hong Kong East Community Network - Palliative Treatment and Care in the Community</p>	<p>9</p>	<p>10</p>
11	12	13	<p>14</p> <p>★ Hong Kong Neurosurgical Society Monthly Academic Meeting: The glymphatic system: review and its clinical implication</p>	<p>15</p>	<p>16</p>	<p>17</p>
18	19	20	21	<p>22</p> <p>★ FMSHK Executive Committee Meeting</p> <p>★ FMSHK Council Meeting</p>	<p>23</p>	<p>24</p>
25	26	<p>27</p> <p>★ HKMA Kowloon West Community Network - An Update on AF Management and Screening</p>	<p>28</p> <p>★ HKMA Shatin Doctors Network - Case Sharing on Fever in Children and Preventive Strategies</p>			



Date / Time	Function	Enquiry / Remarks
<b>1 THU</b> 1:00 PM	<b>HKMA Kowloon East Community Network - Antibiotic Stewardship Programme in Primary Care</b> Organiser: HKMA Kowloon East Community Network and the Centre for Health Protection of the Department of Health; Chairman: Dr. LEUNG Wing Hong; Speaker: Dr. LAM Tin Keung, Edman; Venue: Lei Garden Restaurant, Shop No. L5-8, APM, 418 Kwun Tong Road, Kwun Tong	Mr. Ian YAU Tel: 2527 8285 1 CME Point
<b>2 FRI</b> 1:00 PM	<b>HKMA Kowloon City Community Network – Improving Cardiovascular Outcomes in Patients with Type 2 Diabetes: Applying New Evidence in Practice</b> Organiser: HKMA Kowloon City Community Network; Chairman: Dr. CHAN Man Chung, JP; Speaker: Dr. WU, Enoch; Venue: President's Room, Spotlight Recreation Club, 4/F, Screen World, Whampoa Garden, Hung Hom	Ms. Candice TONG Tel: 2527 8285 1 CME Point
<b>3 SAT</b> 2:15 PM	<b>Refresher Course for Health Care Providers 2017/2018</b> Organiser: Hong Kong Medical Association; HK College of Family Physicians; HA-Our Lady of Maryknoll Hospital; Speaker: Dr. IP Fong Cheng, Francis; Venue: Training Room II, 1/F, OPD Block, Our Lady of Maryknoll Hospital, 118 Shatin Pass Road, Wong Tai Sin	Ms. Clara TSANG Tel: 2354 2440 2 CME Point
<b>6 TUE</b> 1:00 PM	<b>HKMA Yau Tsim Mong Community Network - Certificate Course on Allergy (Session 3) - Co-morbidities of Allergic Rhinitis in Children</b> Organiser: HKMA Yau Tsim Mong Community Network; Chairman: Dr. HO Lap Yin; Speaker: Dr. LEUNG Ngan Ho, Theresa; Venue: Crystal Ballroom, 2/F, The Cityview Hong Kong, 23 Waterloo Road, Kowloon	Ms. Candice TONG Tel: 2527 8285 1 CME Point
<b>8 THU</b> 8:00 PM	<b>FMSHK Officers' Meeting</b> Organiser: The Federation of Medical Societies of Hong Kong; Venue: Gallop, 2/F, Hong Kong Jockey Club Club House, Shan Kwong Road, Happy Valley, Hong Kong	Ms. Nancy CHAN Tel: 2527 8898
<b>8 THU</b> 9:00 PM	<b>HKMA Council Meeting</b> Organiser: The Hong Kong Medical Association; Chairman: Dr. CHOI Kin; Venue: HKMA Wanchai Premises, 5/F, Duke of Windsor Social Service Building, 15 Hennessy Road, HK	Ms. Christine WONG Tel: 2527 8285
<b>7 WED</b> 1:00 PM	<b>HKMA Shatin Doctors Network - Antibiotic Stewardship Programme in Primary Care</b> Organiser: HKMA Shatin Doctors Network the Centre for Health Protection of the Department of Health; Chairman: Dr. MAK Wing Kin; Speaker: Dr. LAM Tin Keung, Edman; Venue: Royal Park Chinese Restaurant, Level 1, Royal Park Hotel, 8 Pak Hok Ting Street, Shatin	Ms. Candice TONG Tel: 2527 8285 1 CME Point
<b>8 THU</b> 1:00 PM	<b>HKMA Central, Western &amp; Southern Community Network - Asthma - What Should Be Done to Help Patients Achieving Disease Control?</b> Organiser: HKMA Central, Western & Southern Community Network; Chairman: Dr. TSANG Kin Lun; Speaker: Dr. WONG King Ying; Venue: Dr. Li Shu Pui Professional Education Centre, 2/F, Chinese Club Building, 21-22 Connaught Road Central, HK	Mr. Ian YAU Tel: 2527 8285 1 CME Point
<b>8 THU</b> 1:00 PM	<b>HKMA Hong Kong East Community Network - Palliative Treatment and Care in the Community</b> Organiser: HKMA Hong Kong East Community Network; Chairman: Dr. YIP Yuk Pang, Kenneth; Speaker: Dr. CHEN Wai Tsan, Tracy; Venue: HKMA Wanchai Premises, 5/F, Duke of Windsor Social Service Building, 15 Hennessy Road, HK	Ms. Candice TONG Tel: 2527 8285 1 CME Point
<b>14 WED</b> 7:30 AM	<b>Hong Kong Neurosurgical Society Monthly Academic Meeting The glymphatic system: review and its clinical implication</b> Organiser: Hong Kong Neurosurgical Society; Chairman: Dr CHU Sai Lok; Speaker: Dr LUK Kin Long, Ben; Venue: Seminar Room, G/F, Block A, Queen Elizabeth Hospital	1.5 points College of Surgeons of Hong Kong Dr. LEE Wing Yan, Michael Tel: 2595 6456 Fax. No.: 2965 4061
<b>22 THU</b> 7:00 PM	<b>FMSHK Executive Committee Meeting</b> Organiser: The Federation of Medical Societies of Hong Kong; Venue: Council Chamber, 4/F, Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai, Hong Kong	Ms. Nancy CHAN Tel: 2527 8898
<b>22 THU</b> 8:00 PM	<b>FMSHK Council Meeting</b> Organiser: The Federation of Medical Societies of Hong Kong; Venue: Council Chamber, 4/F, Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai, Hong Kong	Ms. Nancy CHAN Tel: 2527 8898
<b>27 TUE</b> 1:00 PM	<b>HKMA Kowloon West Community Network - An Update on AF Management and Screening</b> Organiser: HKMA Kowloon West Community Network and the Hong Kong College of Cardiology; Chairman: Dr. WONG Wai Hong; Speaker: Dr. YUEN Ho Chuen; Venue: Fulum Palace, Shop C, G/F, 85 Broadway Street, Mei Foo Sun Chuen, Mei Foo	Mr. Ian YAU Tel: 2527 8285 1 CME Point
<b>28 WED</b> 1:00 PM	<b>HKMA Shatin Doctors Network - Case Sharing on Fever in Children and Preventive Strategies</b> Organiser: HKMA Shatin Doctors Network; Chairman: Dr. FUNG Yee Leung, Wilson; Speaker: Dr. HUNG Chi Wan, Emily; Venue: Royal Park Hotel, 8 Pak Hok Ting Street, Shatin	Ms. Candice TONG Tel: 2527 8285 1 CME Point



## Answers to Radiology Quiz

### Answer:

1. A well-defined roundish extra-testicular mass with mixed echogenicity is seen between the epididymal head and testis. It measures around 1.1cm. There is no Doppler signal seen on colour doppler imaging. Reactive hydrocoele is noted.
2. Torsion of the right testicular appendage.
3. Management is conservative, consists of bed rest and non steroidal anti-inflammatory agents. Within days, the twisted appendix may calcify and becomes detached, leaving a scrotal calcification, known as a scrotolith.
4. Torsion of the appendix testis occurs mainly in prepubertal boys (aged 7-14 years), is more frequent on the left side, and is a common cause of acute scrotum in this age group. Affected patients typically present with gradual or sudden intense pain, usually localised in the upper pole of the testis. In approximately one-third of the patients, a nodule of the upper scrotum with bluish skin discoloration ("blue dot" sign) is palpated.

**Dr Andrew CHENG**

MBBS (HK)

Resident, Department of Radiology, Queen Mary Hospital

**The Federation of Medical Societies of Hong Kong**  
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