Postoperative Management

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Martha Mejia and Percy Rossell-Perry

Contents

Introduction

Interdisciplinary cleft care is essential for guaranteeing adequate outcomes, and the postoperative management represents an important period after primary cleft rhinoplasty. Complications observed after nose repair are associated with deficiencies in postoperative care; this attention is provided according to the short- and long-term moments, and more important topics are immediate postop monitoring, pain

M. Mejia
Department of Plastic Surgery, Nicklaus Children's Hospital, Miami, FL, USA

P. Rossell-Perry (✉)
Health of Science Faculty, School of Human Medicine, Peruvian University Union (UpeU), Lima, Peru
e-mail: percy.rossell@upeu.edu.pe

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management, wound care, feeding, scar care, and the use of nasal stents. The use of postoperative nasal conformers remains controversial because of the need for high-level evidence to demonstrate their effectiveness; however, they are commonly used by surgeons worldwide after primary cleft rhinoplasty [1]. Our experience in the postoperative management of primary cleft rhinoplasty is described in detail in this chapter.

Immediate Postoperative Care

This period represents the first 24 h after surgery.

PACU Monitoring

Postanesthesia care unit monitoring is important for patient assessment after primary cleft lip and nose repair. This is based on continuous cardiorespiratory control and body temperature should also be controlled while keeping the baby warm.

It is important to note that an increase in the temperature may be observed frequently after cleft lip and palate surgery during the first day which is related mostly to physiological factors. Patients are used to be in this unit approximately 3 h after surgery; later when the vital signs are stable, they will be moved to a regular patient room, if hospitalization is indicated (when intolerance toward oral foods and/or uncontrollable pain exist). The author recommends at least an overnight stay to guarantee patient feeding and control of vital signs and bleeding. Ambulatory cleft lip surgery should be avoided considering these patient age and the impact of potential complications, even when some studies reported that the same day discharge is safe. If the patient is not in stable condition (steady vital signs) and develops respiratory symptoms or has persistent bleeding, the patient should remain hospitalized and be evaluated by the team until this condition is resolved.

Wound Care

This is represented by the wound care provided immediately after surgery. Once the surgery is finalized, the wound is cleaned using saline solution. The author does not use any kind of wound coverage; it is left uncovered to facilitate free drainage of fluids. We observed drain collection and increased wound inflammation using coverages such as Steri-strips or gauze; this situation may lead to wound infection. Instead of wound coverage, we use an antibiotic ointment (bacitracin) applied once or twice daily to the lip and nose surgical wound; ointments are usually free of preservatives, so they are suitable for sensitive skin. The antibiotic ointment is applied over the lip closure and over the nasal tip and ala including the supraalar crease and alar facial groove where the transcutaneous stitches are placed. Compared with the use of antiseptics or placebo, the use of topical antibiotic effectively recues the risk

of infection in surgical wounds, but the absolute benefit is small [2]. There is a moderate quality evidence about the prevention of wound infection using topical antibiotics [3]; however, the application of skin ointment may protect the wound site from contamination and may reduce the inflammatory process of wound healing according to the author's observations. Scabbing on the wound is frequently observed (especially after rhinoplasty), and its removal is not recommended. This action is painful and may produce more bleeding and new scab formation. They may fall off on their own during wound cleaning or may be cleaned using a cotton swab soaked with hydrogen peroxide only if breathing problem exists. Bleeding is a common complication after rhinoplasty; therefore, nasal packing is mandatory after primary cleft rhinoplasty. However, this technique depends on the type of surgical technique, so techniques involving vestibular incisions (such as the rotational composite flap and VYZ) require nasal packing. This is why we did not use nasal stents after completing the surgery.

For this purpose, anterior nasal packing (vestibular) is performed and the technique used is described as follows:

1. The nasal pack is prepared by smearing it with antibiotic ointment. It is very important to use a long pack to avoid displacement outside or inside the nose.
2. The nasal vestibule is cleaned by removing fluids and clots.
3. Then, using the nondominant hand and a double skin hook, the ala of the operated side was pushed up to expose the nasal vestibule.
4. The pack is inserted placing it first medially against the caudal septum (medial wall of the vestibule) and then against the lateral wall in the horizontal plane, parallel to the nasal floor, and finally in the direction of the roof of the vestibule until the end of the pack, filling the nasal vestibule (Figs. 9.1 and 9.2).

The nasal packing is removed slowly the day before the surgery; some bleeding may appear, especially if the baby cries but rarely requires a new packing and stops spontaneously.

Feeding

It is initiated with IV administration of saline solution, and oral feeding is started 3 h after surgery using a small spoon to avoid the use of syringes because of the risk of aspiration. Even when the breastfeeding is possible during the immediate postoperative care, the use of a bottle and breast suction is not recommended during the first 24–48 h because of the risk of wound bleeding and hematoma [4]. There is no association with lip dehiscence, and breastfeeding or bottle-feeding may result in more weight gain facilitating wound healing [5]. The use of syringes for feeding is not recommended because of the risk of aspiration when syringes are not properly used. Breastfeeding may be initiated 2 or 3 days after surgery, and the use of special nipples is an alternative and not mandatory in our experience.

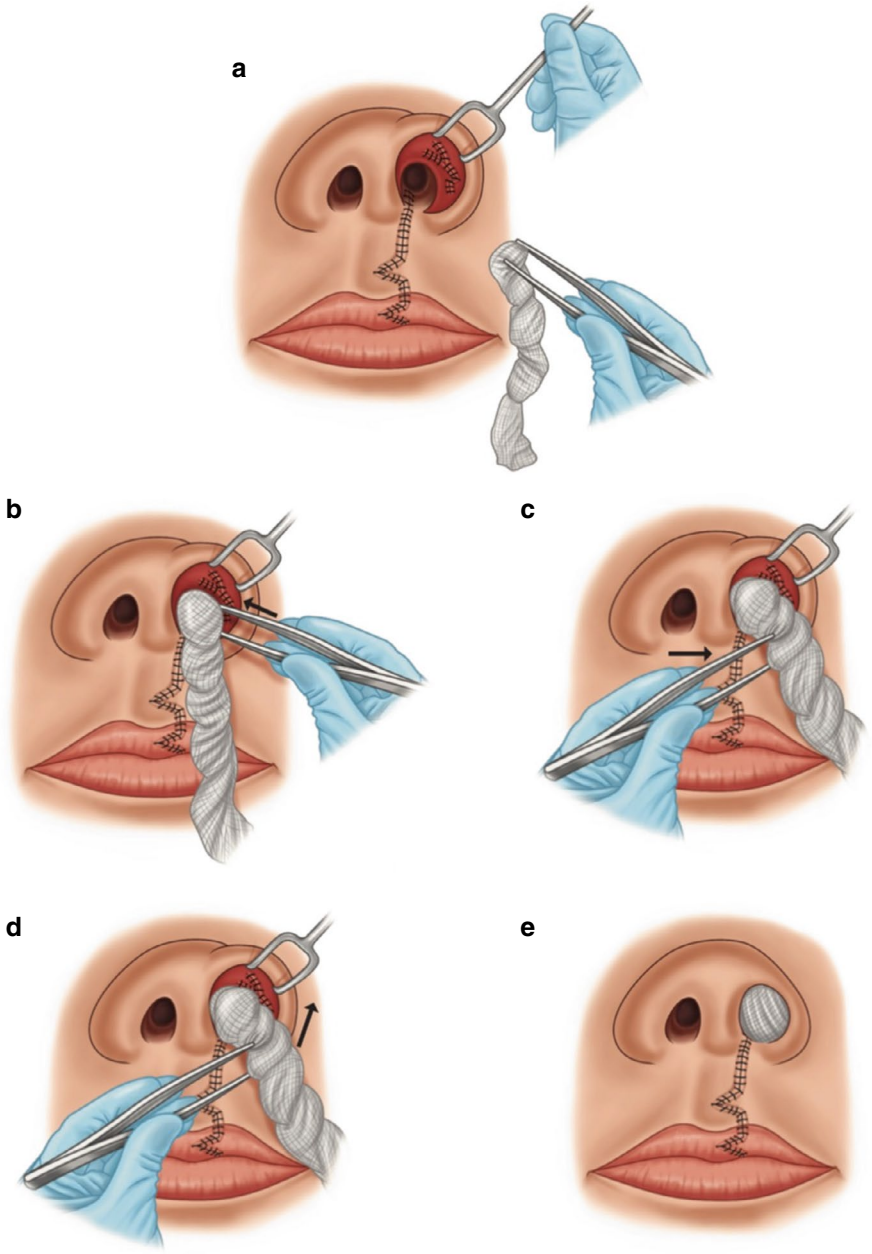

Fig. 9.1 Nasal packing technique. (**a**) The nasal pack is prepared by smearing it with antibiotic ointment and using a double skin hook; the nasal vestibule is exposed. (**b**) The pack is inserted placing it first medially against the caudal septum. (**c** and **d**) The pack is directed parallel to the nasal floor and finally in the direction of the roof of the vestibule until the end of the pack. (**e**) The pack fills the nasal vestibule

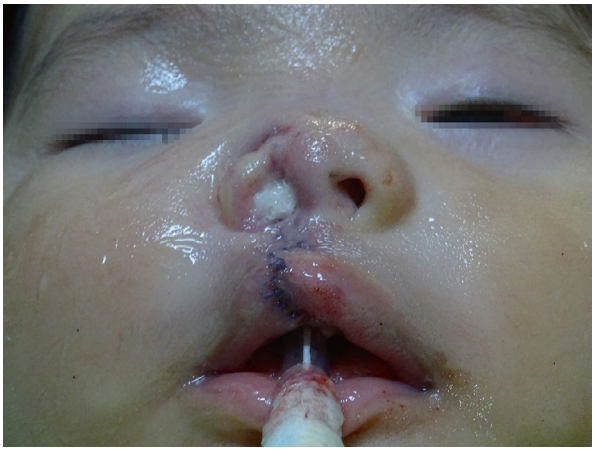

Fig. 9.2 Nasal pack after unilateral primary cleft cheilorhinoplasty

Pain Management

Multimodal pain management is actually recommended. A nerve block in combination with acetaminophen is sufficient for pain control. Opioids are not used in our practice due to the risk of undesirable side effects [6–8].

Agitation Control

Emergence agitation is a common complication and sedation may be necessary in selected patients after cleft lip nose repair [9]. The use of benzodiazepines is indicated when the baby is persistently crying under pain medication, and midazolam may be used for this purpose [10]. Dexmedetomidine is also effective in reducing the incidence of emergency agitation [11].

The medical discharge criteria for patients are stable vital signs, oral feeding restored, and surgical wounds without active bleeding. These are the medical indications: oral feeding including diet according to the patient's age and prophylactic antibiotics and analgesics conditional on pain.

Short-Term Postoperative Care

This period represents the first postoperatory week.

Antibiotics and analgesics A prophylactic antibiotic is used orally for 3–5 days. Analgesics are indicated only conditional to pain, and a pediatrician should evaluate any persistent crying or discomfort as a probability of associated disease.

Feeding To guarantee normal restoration, a pediatrician should supervise oral feeding during this period.

Wound care Antibiotic ointment is used until the stitches disappear (1 or 2 weeks depending on suture type). The author prefers to use 6/0 catgut fast-absorbing sutures for skin closure of the lip, but nose correction requires different absorbing sutures, and 5/0 or 6/0 PDS (polydioxanone) is indicated for that purpose. Using nonresorbable sutures for skin closure requires their removal under sedation in the operating room. The transcutaneous stitches may develop reaction in tissues and increase the risk of bacterial colonization at the sites they occupied. These stitches may lead to infections (small suture abscesses can be observed) and granulomas. Both of them are temporary and resolve spontaneously when the suture is reabsorbed.

Scar care After the sutures are resorbable, we recommend keeping the scar clean, starting the massage protocol 3 weeks after surgery, and using silicone scar gel and silicone tapes at night during the first 6 months of healing (Fig. 9.3).

Hypertrophic scar formation is a frequent postoperative complication that impairs soft tissue form, function, or movement. Hypertrophic scars require special attention and treatment because they sometimes exhibit chronic inflammation and fibrosis that may impact facial growth [12].

Our massage protocol consists of two phases: First, putting one finger is placed inside the lip because massage requires support. Finding a place for the finger is a little tricky because you cannot find too much space; the other finger is up to the scar tissue, so the scar tissue is in the middle of the fingers, and you need to apply some pressure to break the collagen formation.

The second step involves proper rotation between the fingers to produce a circular massage, and the last step involves slight elongation to stretch the upper part of the scar to down. Massage must be performed five times during the day if babies tolerate it (Figs. 9.4 and 9.5).

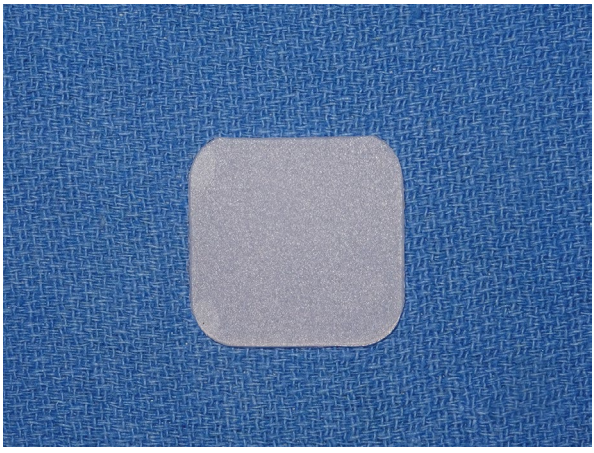

Fig. 9.3 Silicone tapes for hypertrophic scar prevention

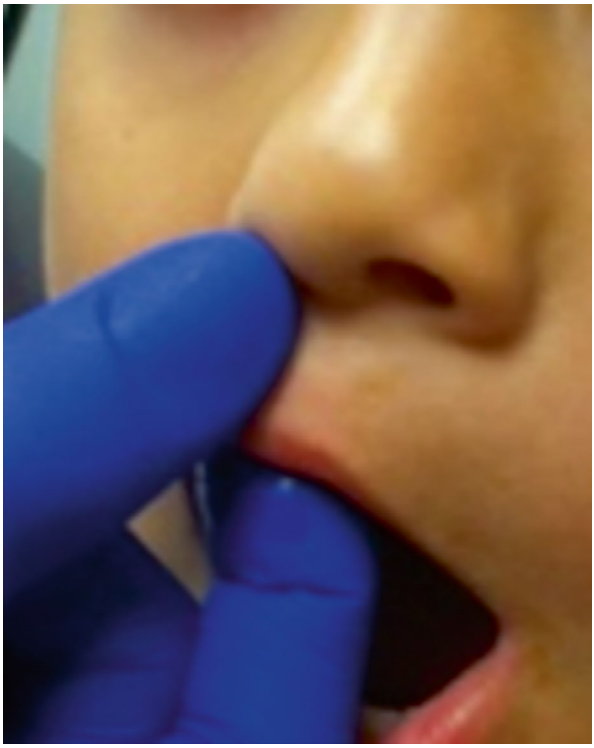

Fig. 9.4 Postoperative oral massages. Finger support and rotation between the fingers

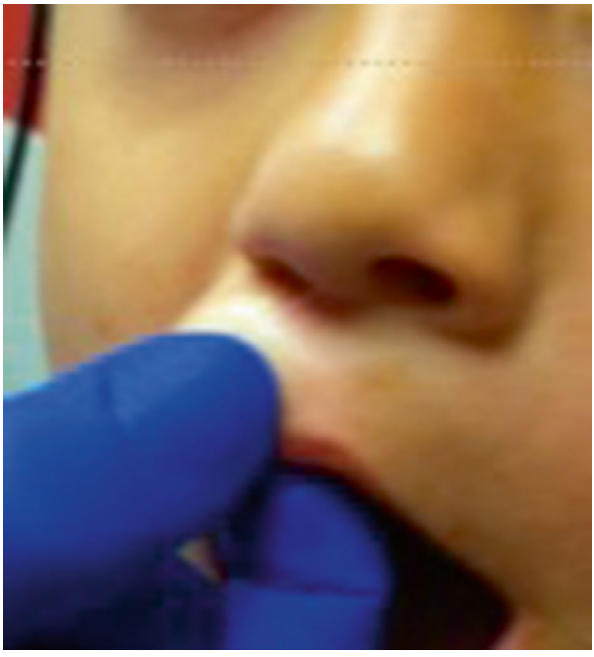

Fig. 9.5 Postoperative oral massages. Tension down with the upper finger

Postoperative Nasal Conformers

According to the nature of the techniques used (including vestibular incisions), nasal stents are strongly recommended to prevent scar contracture and synechia of the nasal vestibule.

After surgery, it is essential to maintain nasal structures in the correct position to prevent the relapse of nasal asymmetry and avoid cicatricial stenosis that may occur in the caudal most portion of the nasal vestibule in CLP patients, resulting in a micro or collapsed nostril [13].

An individual design is recommended and should be used early (second or third postoperative week) and least 6 months at least. Moisturizing cream is applied to prevent injury to the soft tissues which are fixed using tapes.

These devices have been used in combination with presurgical nasal molding and primary surgery, due to frequent nose deformity relapse after surgery, and different methods have been used for this purpose to guarantee long-term results. Postoperative nasal conformers may prevent the nose relapse because of wound contraction during healing process; however, the use of postoperative nasal conformers (stents) remains controversial, and there is a lack of evidence demonstrating its role after primary cleft rhinoplasty. To date, no randomized clinical trial has supported its efficacy.

A recent systematic review revealed that clear conclusions cannot be drawn because of the limited and low-quality evidence of the reviewed studies [1]. Another observational study concluded that the use of these devices does not improve nasal aesthetics but may prevent vestibular scar contracture and vestibular synechia [14]. For these purposes, different devices have been described in the literature, and they are based on two types of design: hooks and stents (Figs. 9.6, 9.7, and 9.8). Nasal stents were initially designed for nasal molding in combination with alveolar molding by Grayson (NAM device). The stent is supported using a wire fixed to the palatine plate. They are used as presurgical treatment. The stent molds the nose by pressure on the nasal vestibule. Its efficacy is under strong debate actually because there is a lack of evidence demonstrating its effect. Different hook devices have been designed for nasal molding, most of which are used empirically.

The Dynacleft system is based on tapes for alveolar molding and a hook attached to the forehead, which suspends the nasal structures only vertically. They can also be used also for postsurgical nasal treatment. A study published by Monasterio reported that the efficacy of this method was similar to that of the NAM device as a presurgical treatment [15].

Dr. Martha Mejia from the Nicklaus Children's Hospital in Miami Florida, USA, developed a postsurgical treatment using silicone Porex^{R} Stents for 3 weeks after surgery. Immediately after removal, the *Rhinoplastic Appliance System* (RAS) was used for 6 months for 24 h [16] (Figs. 9.9, 9.10, and 9.11).

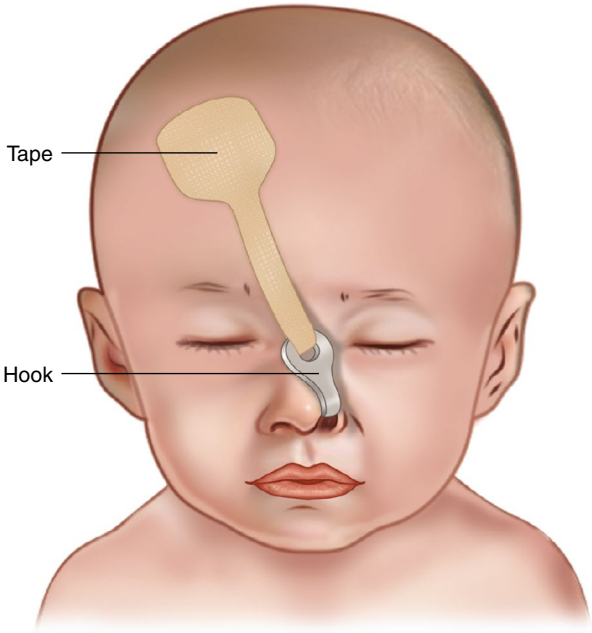

Fig. 9.6 Postoperative nasal hook type used in Dynacleft method

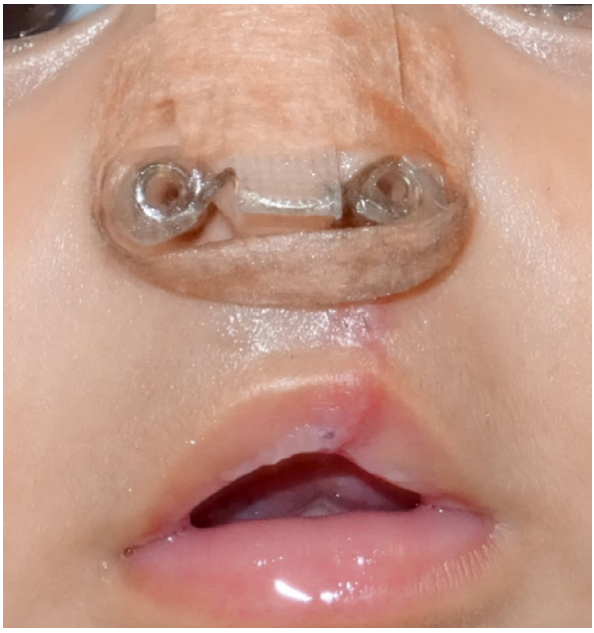

Fig. 9.7 Postoperative nasal stents in a patient after unilateral primary cleft rhinoplasty

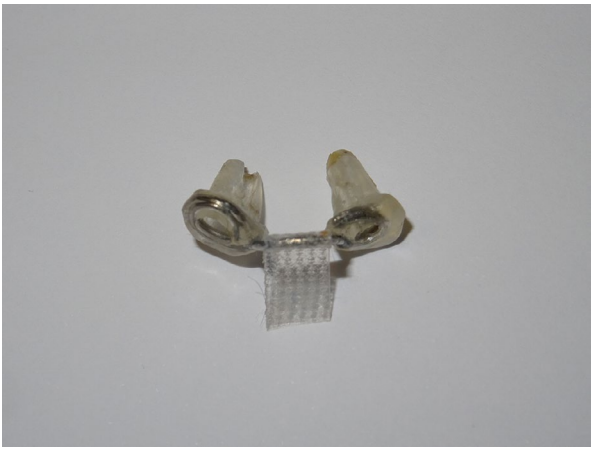

Fig. 9.8 Individualized acrylic custom-made postoperative nasal hook device

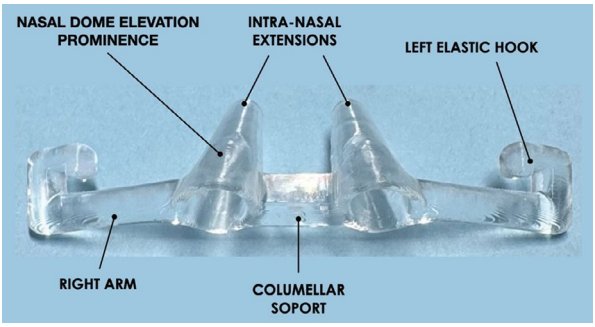

Fig. 9.9 Rhinoplastic Appliance System (RAS)

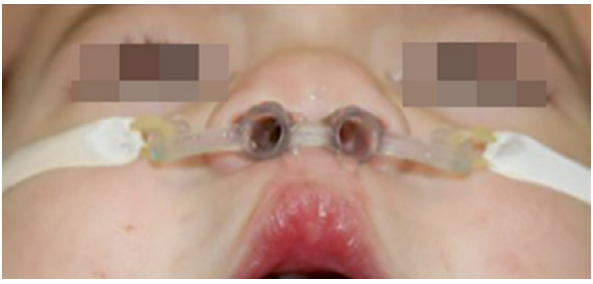

Fig. 9.10 Rhinoplastic Appliance System (RAS) in position

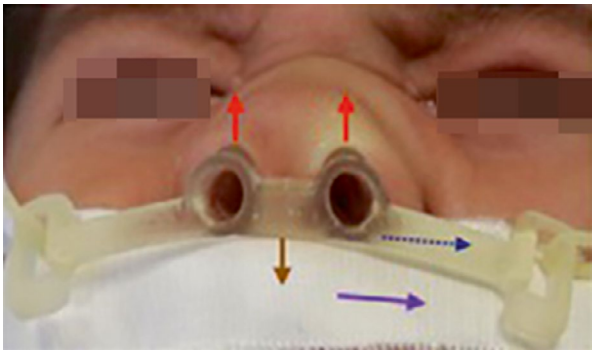

Fig. 9.11 Patient using the RAS illustrating the forces when the device is inserted

In postsurgical treatments, experience has shown that applying a dynamic nasal splint can contribute effectively to maintaining the surgical results by opposing forces of contracture. An alternative method is the use of individualized acrylic custom-made nasal stent used in our center in Lima, Peru. This is a less expensive method and represents an alternative for those sites where the manufactured devices (silicone, porex, etc.) are unavailable. This nasal conformer is recommended for at least 6 months and 8 h daily. Its utility has been studied in a recently published study [14].

Types of Postoperative Nasal Conformers

In the literature, many different clips, hooks, and silicone stents are used in postsurgical treatments. This chapter presents three alternatives to be used according to the sites. The first two alternatives are used immediately after surgery to preserve nasal correction; the last alternative is for older patients with some degree of nostril stenosis.

Acrylic Custom-Made Nasal Stent

This is an interesting device developed by the author (P.R.P) in association with Olga Figallo DDS in a center in Lima Peru for postoperative treatment of primary cleft rhinoplasty. This is a custom-made acrylic device which can be easily fabricated and used in middle- and low-income countries [14] (Figs. 9.7 and 9.8).

These devices should be applied 1 week after surgery to prevent any associated complication during the early process of wound healing. They are manufactured in a mold acquired by taking an impression of the nose, and then they are fashioned from acrylic material to create stents according to the patient's nasal anatomy. A central perforation is included in the stent that keeps the airway clear; this perforation is also designed bilaterally and supported using a wire framework through the aid of tapes. The appliance is adjusted according to the patient's progress by adding acrylic to the stent.

Three-Dimensional Printer Rhinoplasty Appliance System (RAS)

The RAS (Rhinoplasty Appliance System) is a three-dimensional system printer with previous nasal correction and consists of nasal stents inserted into the nostrils, with two lateral components that keep the appliance in position allowing for simultaneous manipulation of the nasal septum and nostril height horizontally and vertically. The device is placed with adhesive tape on the patient's cheeks. With the RAS appliance system, it is possible to maintain the correction of the nasal septum, projection of the nose, and nostril symmetry [17] (Figs. 9.9, 9.10, and 9.11). This is a digitally designed device manufactured using CAD/CAM technology sequentially applied. The appliances are sequentially exchanged monthly for 3–6 months of postop. In postsurgical treatments, experience has shown that applying a dynamic nasal appliance RAS device can contribute effectively to maintaining the surgical results by opposing forces of contracture. Postsurgical treatment is essential to maintaining the proper shape and size of the nostrils. Holding the position of the nasal septum and nares is also crucial since cartilage has memory and tends to return; however, this limitation may be improved by using an adequate surgical technique.

Unilateral and Bilateral Postsurgical Treatment

Materials

- The nasal appliance in a measure printed on a three-dimensional laser printer.
- Four orthodontic elastics of 3/16 or 4.7 mm (half 3 ounces).
- Steri-strip adhesive tape or similar.
- A lcohol and gauze.

Procedure

- Remove excess grease from the cheeks at the height of the nose with alcohol and dry.
- The nasal apparatus is inserted with the elastics attached to the side straps of the steri-strip (5 cm long) and rubber bands to the side of the lateral alar of the nose.
- The appliance will be used for 24 h for the first 6 months after surgery and then in the evening for 4–6-month retention.
- The device is removed twice daily to clean it with soap and water.

Recommendations

1. The location of the rhinoplastic appliance with the tension of the elastics and tapes. It is a frequent complication. For this reason, it is necessary to explain to the parents how to put the device and the tension of the elastics.

Soft Tissue Complications

2. It is very important to properly insert the device and lubricate it with petroleum jelly so as not to cause irritation and subsequent wounds in the tissue. Additionally, there is special care in cleaning the tissue free of accumulated secretions. These can be the first complications; to manage them, if there is a wound in the tissue, a small portion of triple antibiotic cream is used. The wound healed for 1 week. However, the device was continued for only 2 days if it was strictly necessary for damage to occur. Secretions adhering to the skin or that have accumulated should be cleaned with a swab (Q-tip) two times a day.

3. Irritation or redness of the insertion area or the area where the tapes are used to hold the device. A mixture of a cream containing zinc and hydrocortisone should be applied.

   This mixture was used for approximately 5 h and then cleaned and returned to the device.
4. Allergy to tapes. This complication is not frequent, but if it occurs, the same mixture described above is used, and elastics with Velcro can be used. A hat to avoid using tape or dealing with other hypoallergenic tapes that you tolerate better.

The primary reason for not using the device is that the patient has any respiratory problems (asthma, low oxygen saturation) or any condition or disease that produces excess secretions. The other reasons are the time it is used (if it is not enough), the discontinuation of treatment and, finally, the need for cleaning (infection).

Orthonostric Appliance

It is used when the patient is older and has nasal stenosis. This appliance was designed on the bases of experience gained with passive nasoalveolar molding devices for the presurgical treatment of children with cleft lips; we have developed a stent called an orthonostric appliance that addresses all these problems. The orthonostric device is custom made for each patient with a previous impression and contains a small screw similar to an orthodontist retainer. The patient can activate it at home. Minor degrees of nostril asymmetry or stenosis can be corrected using this stent alone. The stent has the following features:

1. It is custom fabricated for each patient.
2. It is expansile, and the direction of expansion can be oriented as desired.
3. The head of the screw for the drive mechanism can be accessed without removing the stent.
4. The stent is maintained comfortably by an adjustable wire flange, which wraps around the alar crease [18]. After alginate impressions of the nose are taken, the device is fabricated on a stone model, inserted, and the expansion is started on the second day. The increase of the device is performed daily in increments of 0.5–1 mm at a time. The addition can be continued at home, but adjustments must be made by the orthodontist or the surgeon at the office. The appliance is used initially 24 h per day for 4–6 months and then for an additional 4–6 months at night only. It is generally preferable to initially perform an overcorrection because the forces of contraction frequently cause the recurrence of stenosis. To treat nostril stenosis, “the orthonostric” approach is used to correct and maintain nostril stenosis and other nostril shape abnormalities. Lesser degrees of deformity can be corrected nonsurgically by using this device alone. More severe degrees of stenosis or nostril asymmetry require surgical correction: in these cases, a Porex^{R} stent is placed at the time of surgery and maintained in place for the first 2 weeks; an expansile stent of the exact dimensions of the silicone stent is fabricated in the meantime and inserted at the time of removal of the silicone stent. Further expansion, if necessary, may be started 2 weeks postoperatively.

We recommend a 2 mm over increase because the nostril contracts approximately 2 mm when treatment is finished. These cases require longer retention times (Figs. 9.12 and 9.13).

Fig. 9.12 Postoperative orthonostric appliance

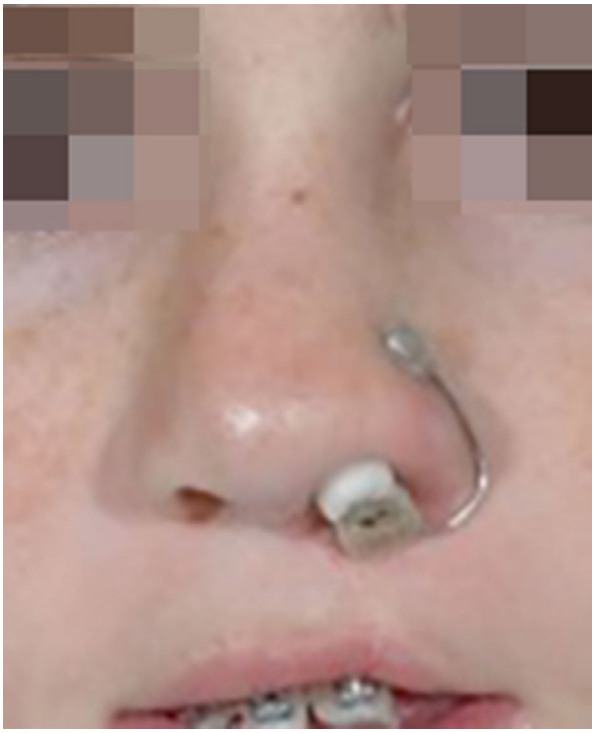

Fig. 9.13 Orthonostric appliance in position

Cases

Clinical Case 1

The patient was born with left unilateral cleft lip and palate consults for nostril stenosis on the left side at nine. The patient was treated with an orthonostric device 24 h for 6 months and for one-year retention with an acrylic stent used at nighttime (Fig. 9.14).

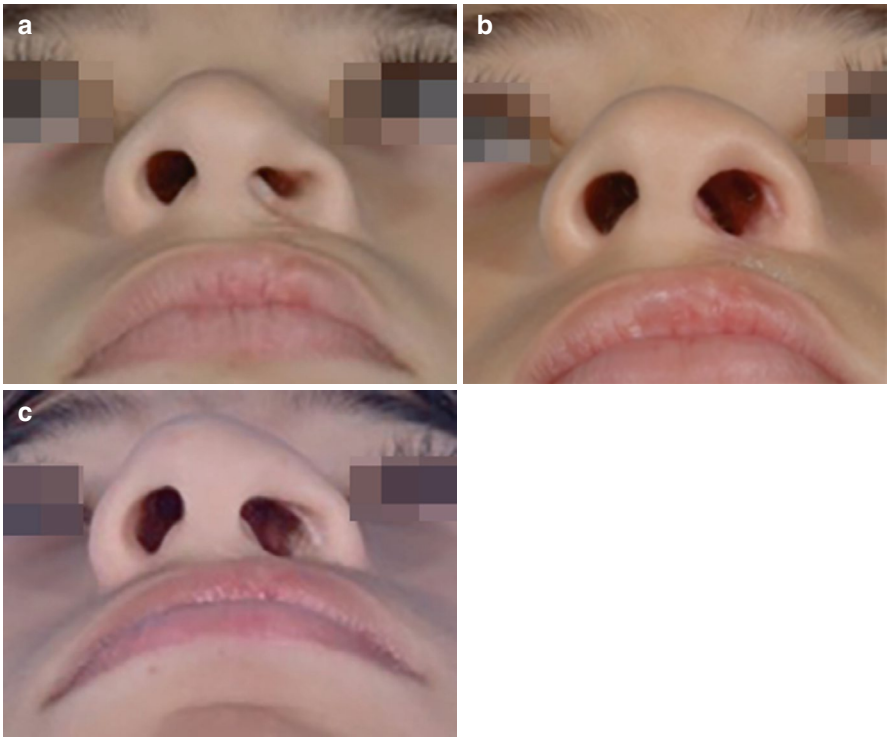

Fig. 9.14 Patient treated with an orthonostric. (**a**) Left nostril stenosis. (**b**) After orthonostric treatment. (**c**) Ten-year long-term follow up

Clinical Case 2

The patient was born with a complete unilateral cleft, lip, and palate on the left side at 8 years of age. The patient had severe stenosis in his left nostril. The stenosis was corrected twice with previous surgeries with no success. Patients came for a different approach with a combination of surgery, silicone stent, and orthonostric device. The patient used a silicone stent with suture for 3 weeks, and the day it was removed, the orthonostric device was inserted into the nostril, and the patient used it for 8 months, 24 h, and 1 year at nighttime for retention (Fig. 9.15).

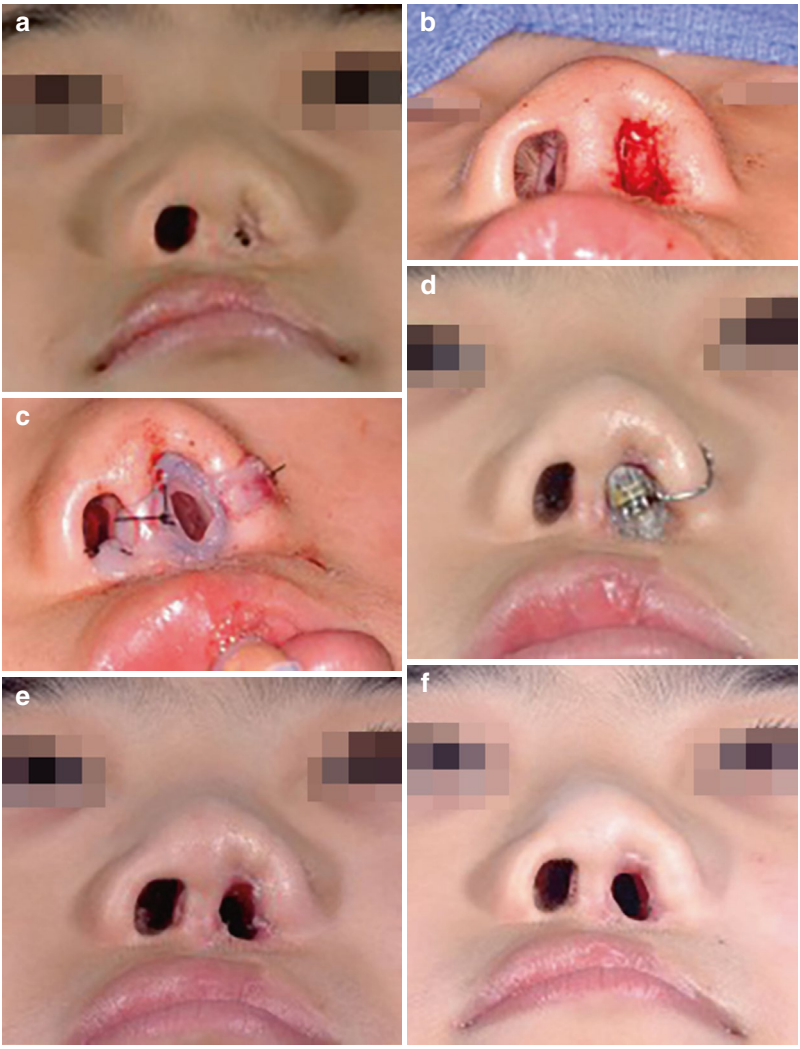

Fig. 9.15 (**a**) Severe left nostril stenosis. (**b**) Open surgically. (**c**) Silicone stent used during 3 weeks. (**d**) Orthonostric device applied. (**e**) Photo after treatment. (**f**) Long-term follow-up

Clinical Case 3

This was an infant with an incomplete bilateral cleft lip started with presurgical orthopedics at 4 weeks old for 18 weeks and underwent surgery at 6 months of age. After surgery, the patient received a Porex^{R} silicone stent with sutures for 3 weeks, and after it was immediately removed, the RAS appliance was inserted and used. This appliance is removable and needs to be cleaned daily and held in place with rubber bands and tape. The patient used the RAS for 6 months after surgery (Fig. 9.16).

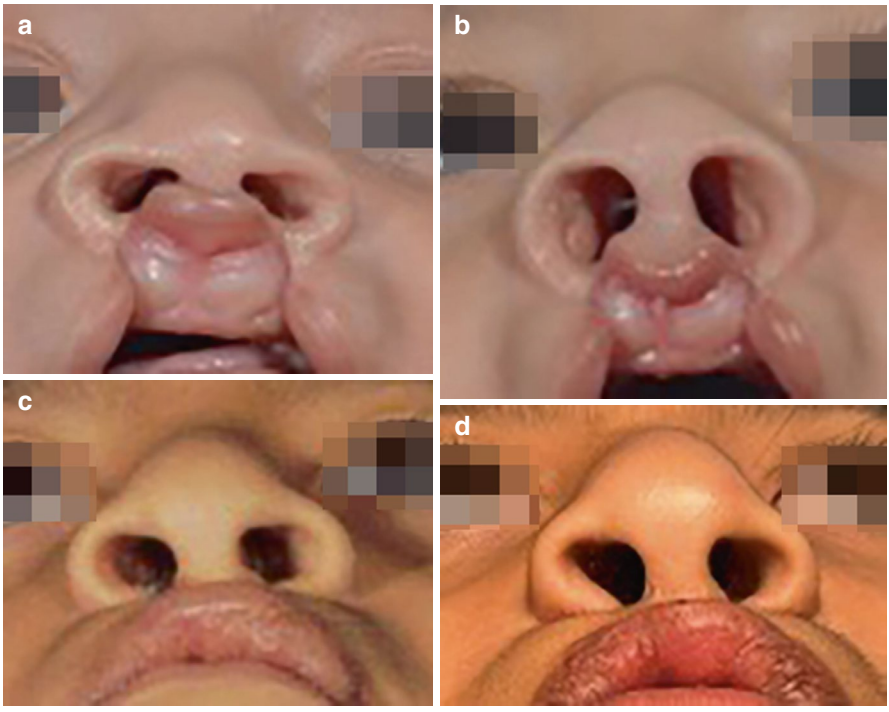

Fig. 9.16 (**a**) Incomplete bilateral cleft lip before presurgical orthopedic treatment. (**b**) After presurgical orthopedics. (**c**) After primary bilateral cleft lip nose repair. (**d**) A 15 year long-term follow-up

Clinical Case 4

An infant with complete bilateral cleft, lip, and palate. The baby started with presurgical orthopedics at 6 weeks old for 18 weeks and underwent surgery at 6 months of age. The patient initially used a maxillary plate for 6 weeks to rotate the premaxilla, reduce the gap between the segments, and start the nasal molding for 12 weeks. After surgery, the patient used the silicone PorexR stents for 3 weeks and an RAS device for 6 months (Fig. 9.17).

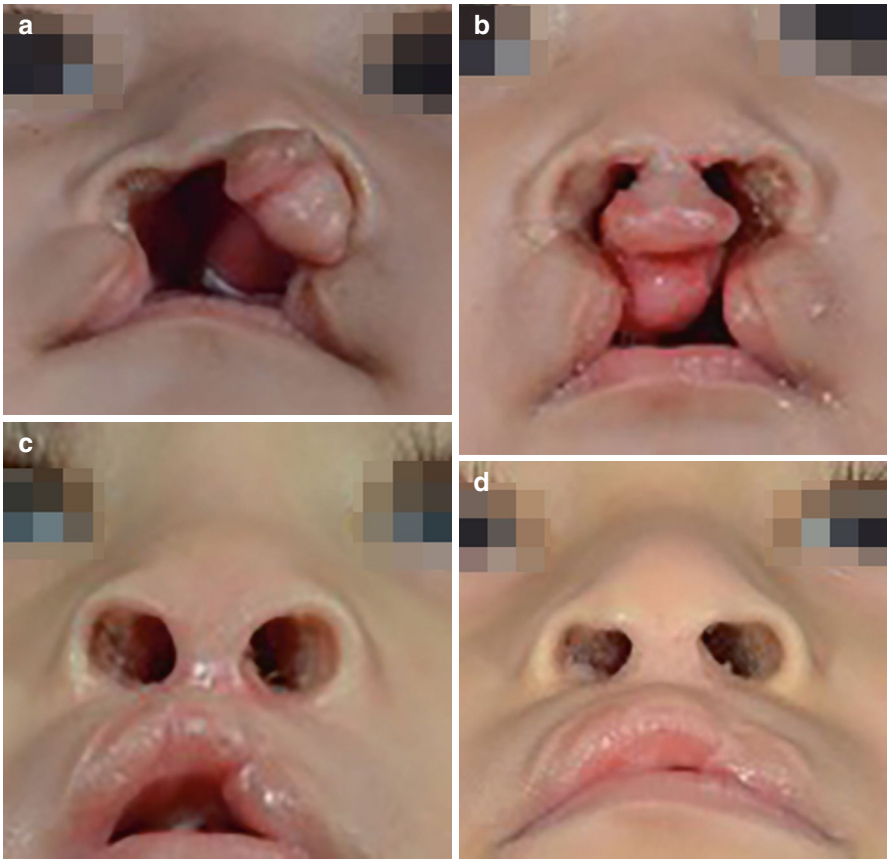

Fig. 9.17 (**a**) Complete bilateral cleft lip and palate before presurgical orthopedic treatment. (**b**) After presurgical orthopedic treatment. (**c**) After primary bilateral cleft lip nose repair. (**d**) A 5-year long-term follow-up

Clinical Case 5

This is an incomplete unilateral cleft lip and palate. The baby started with PSO at 2 weeks old and underwent surgery at 4 months of age. The patient used the RAS system 4 months after surgery (Fig. 9.18).

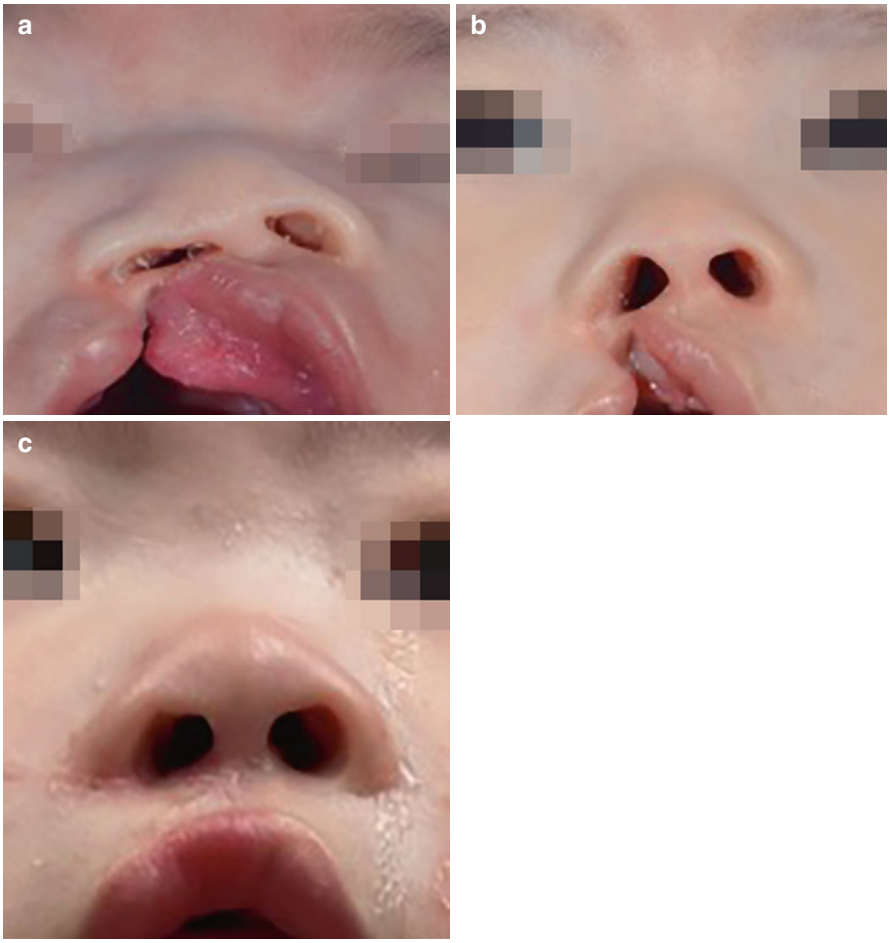

Fig. 9.18 (**a**) Incomplete unilateral cleft lip before presurgical orthopedic treatment. (**b**) After presurgical orthopedic treatment. (**c**) Eight months after primary unilateral cleft lip nose repair

Clinical Case 6

Patient was born with a complete right unilateral cleft lip and palate and used an individualized custom-made acrylic device starting 1 week after primary cleft lip and nose surgery and during 6 months (Fig. 9.19).

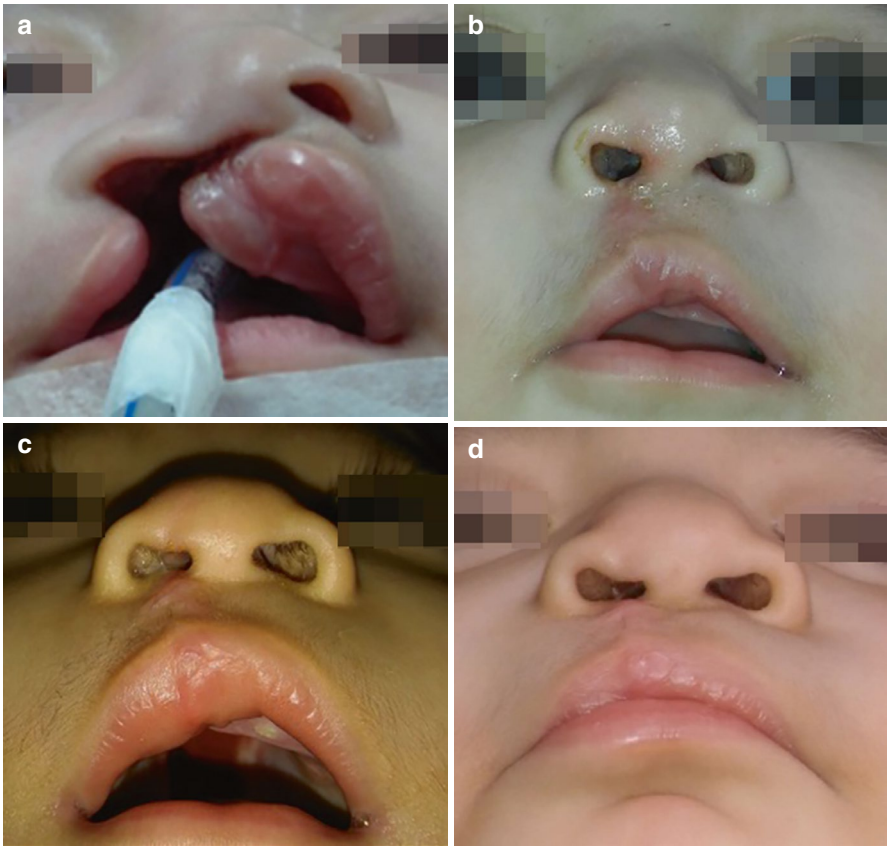

Fig. 9.19 (**a**) Complete unilateral cleft lip before surgical treatment. (**b**) One month using nasal stent orthopedic treatment. (**c**) One year after nasal stent orthopedic treatment. (**d**) Three-year long-term follow-up

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