



## Asian Rhinoplasty

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Most Asian patients seeking rhinoplasty exhibit platyrrhine characteristics with a low dorsum and inadequate projection. Typical reductive rhinoplasty techniques are not effective in managing the characteristic anatomy of the Asian patient. Asian patients also tend to have weak lower lateral cartilages with thick sebaceous skin over the nasal tip, leading to a blunting of the nasal contours. Augmenting the nose and adding structure enables the surgeon to create increased tip projection, a higher dorsum, and improved tip contour.

Cosmetic surgery among Asians has become more common and more socially accepted over the last decade. The history of corrective and aesthetic surgery of the Asian nose during this period is marked by evolution and refinement. Many surgeons seeking improved structure and tip contour have turned to alloplastic implants. Although most patients do well with this type of implant, a minority develop complications including thinning of the skin over the implant, extrusion, infection, displacement, translucency of the implant, and chronic pain [1,2]. The most common alloplast used in this application is the L-shaped silicone

implant, which has enjoyed a long history of safety and efficacy in Asia [3]. Although these implants can successfully increase dorsal height and projection, they are not able consistently to maintain nasal length, and over time the nose becomes shortened. The nasal tip skin can become thinned and atrophic at the genu of the L-shaped implant. Other alloplasts used for Asian augmentation rhinoplasty include Gore-Tex (W.L. Gore and Associates, Newark, Delaware) and Med-Pore (Porex Surgical, Fairburn, Georgia) [4,5].

In the search for appropriate autologous material, split calvarial bone graft, iliac bone, costal bone, and costal cartilage have been used [6–8]. The senior author has had extensive experience with the use of costal cartilage and has found that, with proper carving and meticulous construction, augmentation rhinoplasty using this material can produce excellent results.

### Preoperative evaluation

When evaluating a patient interested in aesthetic facial surgery, a thorough history and physical

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examination is essential. In the initial evaluation, discussion should begin by focusing on the patient's motivation for and goals of aesthetic facial surgery. The surgeon should help the patient develop realistic expectations with a frank discussion of the limitations of the proposed procedures based on the patient's anatomy. Adverse outcomes should also be discussed and the patient should demonstrate an understanding of these risks. Most Asian patients who are in good health and have realistic expectations are candidates for augmentation rhinoplasty.

Patients with pulmonary disease should be cautioned that this surgery can lead to some discomfort in the muscles of respiration. This should be considered when evaluating for the appropriateness of the surgery. In addition, older patients may have extensive calcification of the costal cartilage and may not be ideal candidates.

### **Consultation**

The surgeon should focus on the chief complaint to develop a clear understanding of the patient's concern. The patient should begin by describing what aesthetic characteristics are the most bothersome, often with the help of photo imaging. Computer imaging is particularly important in the Asian patient because desired aesthetic changes can vary greatly from patient to patient. A history of nasal symptoms should be discussed including the presence of right, left, or bilateral obstruction; fixed or changing obstruction; rhinorrhea; epistaxis; or sinusitis. Any history of trauma should be further explored. Any prior nasal procedures, especially septoplasty, should be known before surgery because this information may guide surgical planning.

In addition to a full exploration of the patient's past medical history, any personal or family history of bleeding should be noted; this may require further laboratory investigation. The surgeon should insist that patients who smoke refrain from doing so before surgery to achieve the best results. Likewise, the risks of smoking on postoperative wound healing should be clearly stated and the patient must demonstrate an understanding of these risks. A history of drug use, especially cocaine, should be noted. A history of collagen vascular diseases, although rare, should be known before surgery because it may impact the expected results.

All medication taken by the patient should be documented, especially topical nasal sprays, systemic decongestants, antihistamines, steroids, and anticoagulants. Patients who take aspirin, ibuprofen, or high-dose vitamin E should discuss discontinuing these medications with their primary care physician before surgery. The surgeon should inquire as to the use of herbal medications, especially

the "Four Gs": ginseng, garlic, ginkgo balboa, and ginger, which are known to produce an anticoagulant effect.

The physician should demonstrate realistic changes using computer imaging. It is important to realize that augmentation rhinoplasty with costal cartilage is a powerful technique in that it allows the surgeon to modify many aspects of the nose. These potential changes must be accurately related to the patient to facilitate discussion of the patient's desires and to show the limitations of the procedure. Creating realistic images ensures that the patient has appropriate expectations.

The physician should also describe the postoperative changes in the pliability of the nose with the use of costal cartilage grafts. The nose is typically stiffer, and although it softens over time, it remains much less pliable than it was before surgery. In addition, with the use of an extended columellar strut graft, there can be some changes in the appearance of the upper lip when smiling. The upper lip soft tissue can bunch up around the base of the nose, possibly creating a crease. This is more apparent in photographs and usually improves over time.

A thorough discussion must also include other reconstructive options including the use of other autologous and alloplastic materials. The incisions required to harvest the costal cartilage should be described and, if appropriate, the patient can be shown photographs of scars. The risks of surgery should be discussed including warping, visible cartilage grafts, infection, bleeding, hypertrophic scarring, and pneumothorax. The surgeon should also inform the patient that harvesting and carving costal cartilage is more time consuming than using a preformed alloplastic implant and that the results are more technique dependant with a higher potential for complications if not executed properly.

It is imperative that the surgeon clearly delineates the limitations of the proposed procedure. One of the most common reasons for dissatisfaction among facial plastic surgery patients occurs when there is discordance between the expectations of the patient and surgeon. The surgeon must stress that perfection is not a realistic goal and only leads to disappointment.

The surgeon should provide an overview of the healing process, including a timeline that covers the preoperative and postoperative period. Sample photographs can aid in this discussion. By adequately preparing for the surgical procedure, patients often feel more in control during the healing period. The surgeon should also provide the patient with a list of anticoagulants that should not be taken for 2 weeks before surgery; patients should discuss discontinuation of anticoagulant

therapy with the primary physician. Prescriptions for postoperative medications should be given at this visit and explained.

### Physical examination

An overall evaluation of the face emphasizes balance and symmetry and begins with a frontal facial evaluation. The nose should be seen as one of many aesthetic facial subunits that must interrelate with the other subunits in a balanced and harmonious manner.

The skin quality of the nose should be examined and may guide the surgical planning. The skin of Asian patients is often thick and rich in sebaceous glands. The nose should be examined by inspection and palpation. Any wrinkles, dryness, or sun damage should be noted. An internal nasal examination should include direct inspection with a nasal speculum; a fiberoptic nasal examination also may be warranted if the entire septum cannot be fully evaluated with a nasal speculum. The position of the caudal border of septum is noted. The surgeon should examine the quality of the mucosa and the size, color, and position of the turbinates. Palpation of the septum helps elucidate structural support. Any septal scar tissue is noted and may indicate prior surgery. A septal perforation, if found, is evaluated in size, location, and etiology.

Nasal respiratory function should be evaluated while supporting the external and internal nasal valve with a speculum or cerumen curette. This examination helps evaluate nasal valve collapse and may indicate the need for structural reinforcement. In patients with nasal obstruction responsive only to decongestion, a turbinate reduction should be considered.

The external nasal bones are evaluated by inspection and palpation. Asymmetries should be noted, as should the width and projection. The internal nasal bones should be examined by palpation. Any deviation of the perpendicular plate of the ethmoid should be noted.

### Surgical planning

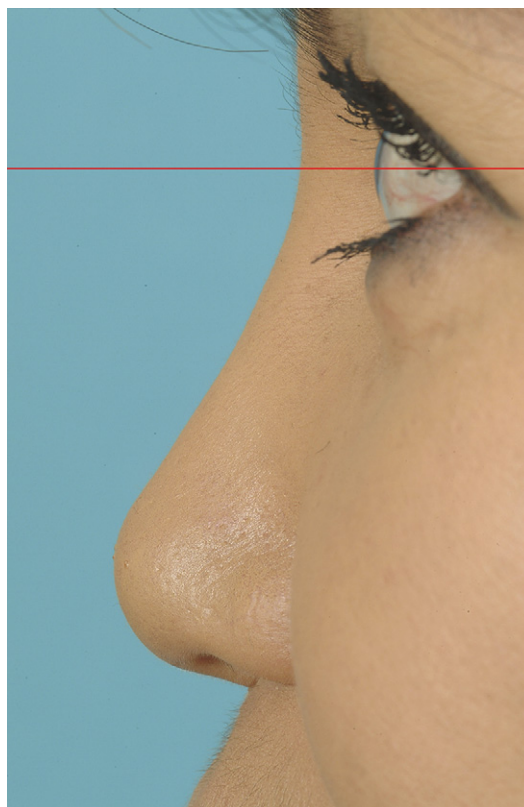
The surgical planning should be tailored to the unique deformities and functional problems presented by each patient. The surgeon should consider the aesthetic goals of the patient, including cultural, social, and ethnic aspects that may influence the desired outcome. General goals should include the improvement of nasal respiratory function; preservation or augmentation of the nasal support structures; aesthetic improvement; and avoidance of septal perforation, stenosis, and scarring.

Asian rhinoplasty should be tailored best to suit the Asian face with a size and shape that falls within

the range of naturally occurring noses in this population. Surgeons accustomed to reduction rhinoplasties should note that unlike the Caucasian nose where the radix occurs at the superior palpebral fissure, in Asian noses it occurs on a horizontal plane closer to the pupil (**Fig. 1**). Asian noses also have a lower dorsum, are shorter, and have a rounder tip than most Caucasian noses.

### Anesthesia

Rhinoplasty with costal cartilage harvest is best performed with the patient under general anesthesia with orotracheal intubation. Successful anesthesia relies on the close cooperation between the anesthesiologist and surgeon. Just as the surgeon expects to be updated on significant changes in the cardiovascular status of a patient, so too the anesthesiologist expects to be informed of what concentration and volume of epinephrine is being injected, or if the endotracheal tube is being adjusted.



**Fig. 1.** In the Asian patient the nasal starting point should be at the level of the mid pupillary line with the patient in forward gaze.

## Surgical technique

### Patient preparation

Once in the procedure room, the patient is positioned supine on the operating table. Preoperative photos and computer imaging are arranged for easy access throughout the procedure. Surgical landmarks should be noted by palpation and marked on the nose with a surgical marking pen. These may include palpable bony and cartilaginous irregularities, middle vault pinching, tip asymmetries, proposed size of alar batten grafts, and possibly the site of the chest incision for costal cartilage harvest.

Local anesthesia should be given, even with general anesthesia, to allow for a lighter plane of anesthesia. Neurosurgical cottonoids soaked with neosynephrine hydrochloride are placed intranasally. The authors use 1% lidocaine with 1:100,000 epinephrine as the injectable agent. In a patient with cardiovascular disease they use the same concentration, but less volume of injection. In general, approximately 15 to 18 mL should be sufficient to anesthetize the nose. Forceful injections should be made in the submucoperichondrial and submucoperiosteal planes on the septum, which produce hydraulic elevation of the flap. Injections also should then be made down the columella and along the marginal incision sites. The nasal apex is injected, and between the domes. The surgeon should next inject the supraperichondrial space of the upper and lower lateral cartilage, the supraperiosteal space over nasal bones, and the supraperiosteal planes on the maxilla along the proposed osteotomy sites. Following the final injection, the surgeon should wait 10 to 15 minutes before making incisions to allow for maximal effect of the epinephrine.

During the process of injecting, the surgeon notes the approximate size of the nasal septum to determine how much is available for harvest. Based on this information, and the degree of augmentation requested by the patient, the surgeon can then decide if additional cartilage is required. If the patient is requesting mild to moderate augmentation without premaxillary augmentation or a major change in the status of the nasal base, the septum may be adequate. In patients needing more substantial augmentation, auricular cartilage may be appropriate, so long as the dorsal augmentation is less than 5 mm. Augmentation of the dorsum beyond 5 mm, significant nasal lengthening, and premaxillary augmentation typically requires more grafting material than can be supplied by the ears and necessitates costal cartilage harvesting. Most Asian patients have a relatively small cartilaginous septum necessitating more frequent use of auricular or costal cartilage grafting.

### Auricular cartilage harvesting

Auricular cartilage is best harvested through a postauricular incision (Fig. 2). Correct incision placement and meticulous closure usually result in a scar that is difficult to identify postoperatively. After injection of 1% lidocaine with 1:100,000 epinephrine, the incision is placed on the back of the concha, 3 to 4 mm lateral to the postauricular crease. This incision is carried down to the cartilage and the skin is elevated off the concha, leaving the perichondrium in place. Next, the proposed area for harvest is identified. To preserve the structural integrity, and the shape of the ear, the vertical component of the conchal bowl, the area near the inferior crus, and the cartilage medial to the antitragus should be preserved. A 27-gauge needle is passed from the anterior surface of the ear, indicating the boundaries of the harvest, and an incision is made along these lines. The cavum and cymba cartilage should then be dissected from the skin, leaving the perichondrium intact on the skin flap, to prevent this thin flap from becoming compromised. The cartilage is not flat and it can be carved for grafting purposes (Fig. 3). Hemostasis should be attained with minimal, judicious use of bipolar cautery restricted to the border of the surgical bed. Excessive cautery of the skin elevated off the concha can lead to necrosis of the anterior conchal skin. The incision is closed with subcutaneous 5-0 Polydioxanone sutures and a running, locking 5-0 fast-absorbing catgut suture. Cotton dental rolls are placed on either side of the concha and sutured in place with a 3-0 nylon through-and-through suture.

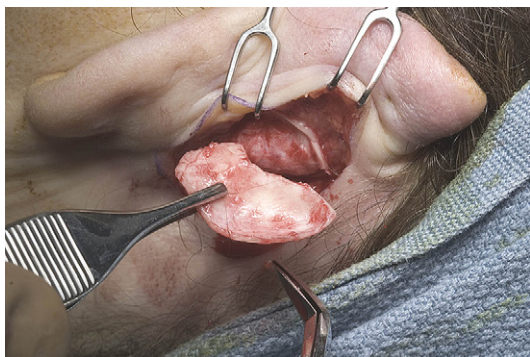
### Costal cartilage harvesting

Costal cartilage harvesting begins by palpating the chest to determine the preferred rib. The fifth or the sixth rib is most commonly taken. Both may



**Fig. 2.** Auricular cartilage can be harvested through a postauricular incision. The incision should be just on the back of the concha.





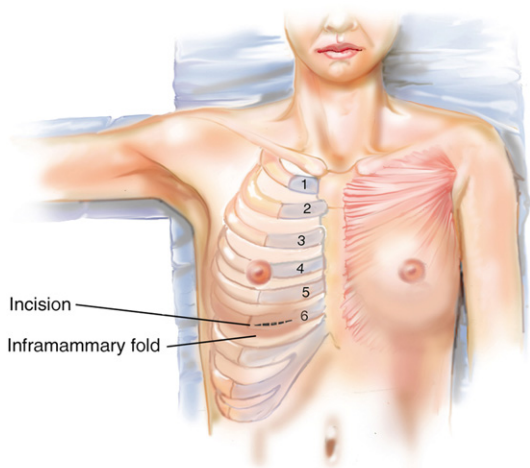
**Fig. 3.** The cartilage harvested from the ear is not flat and tends to have areas of concavity and convexity.

be used if dorsal and premaxillary augmentation is necessary. The fifth rib tends to be straighter and usually has less connection to neighboring ribs, but is shorter than the sixth rib. The skin incision is usually placed on the bottom of the right breast over the sixth rib and is about 3 cm in length (**Fig. 4**). A scar in this location is completely covered by a brassiere or bikini top. The right side is chosen because left-sided chest pain during the healing process can be confused with cardiac pain. After incising through skin, a scalpel is used to divide the overlying breast tissue. Bleeders are cauterized with bipolar cautery. Fascia over the muscle is incised, and the muscle fibers are separated with a hemostat (**Fig. 5A**). A cotton dissector is used to clear the remaining soft tissue off the rib and a 27-gauge needle is used to locate the junction between the bony and cartilaginous portion of the

rib. Incisions are made into the perichondrium along the periphery of the rib and a Freer elevator is used to remove this 5- to 10-mm strip of perichondrium. Next, the rib is dissected away from the perichondrium circumferentially, taking care to avoid injuring the perichondrium deep to the rib, because it is in close proximity to the pleura (**Fig. 5B**). An incision is made halfway through the rib just medial to the osteochondral junction. A medial incision is also made based on the length of cartilage required for the augmentation (**Fig. 5C**). The Freer elevator is used to complete these incisions and the remaining attachments to the perichondrium are dissected away. The segment of costal cartilage is removed and set aside.

Attention is then directed to the medial and lateral margins of the rib. A rongeur is used to bevel these sharp edges to prevent them from being visible or palpable. Irrigation solution is then instilled into the surgical bed and the anesthesiologist is instructed to perform a Valsalva maneuver. If there are any openings into the pleural space, bubbles may be noted in the irrigation fluid. The closure is done in layers, first closing the uncut muscle with interrupted 3-0 PDS sutures. The muscle fascia is then closed with 4-0 PDS sutures. Deep dermal sutures are done with 5-0 PDS and the skin is closed with a running vertical mattress suture using 6-0 black nylon.

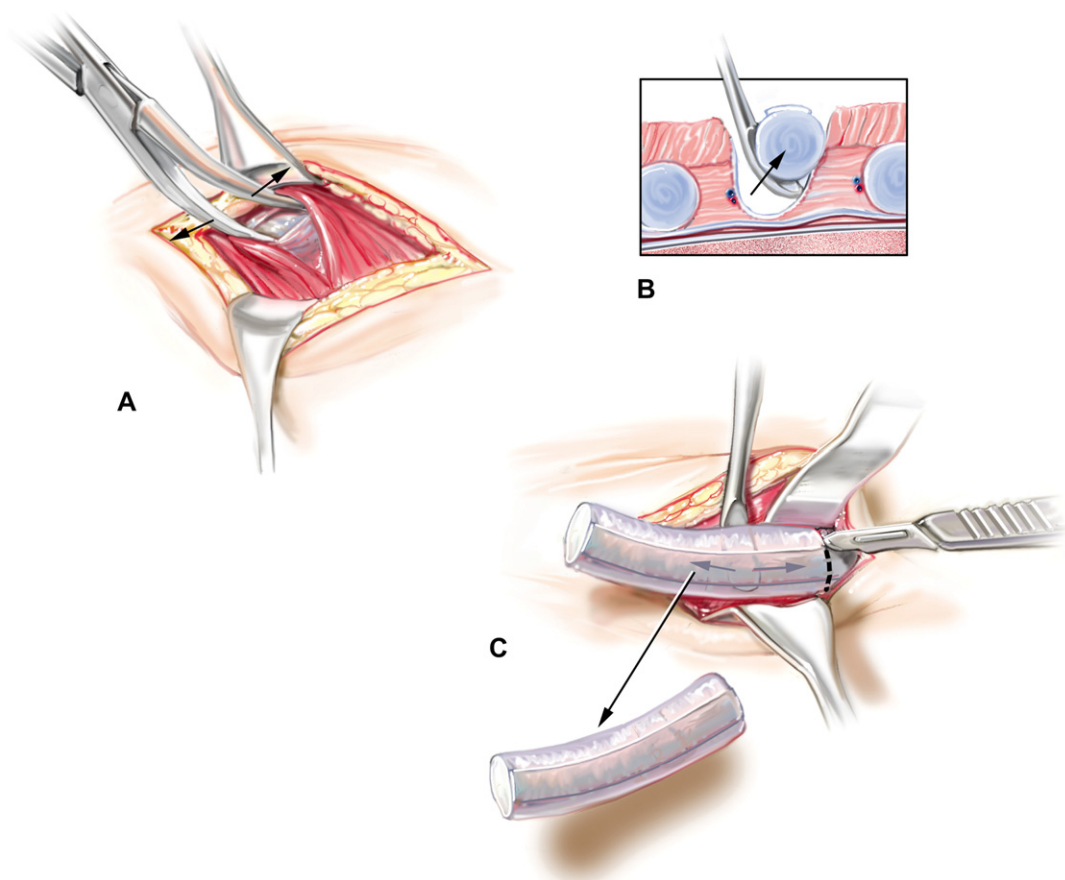
The most technically challenging aspect of augmentation rhinoplasty using costal cartilage is the carving. Costal cartilage must be carved sequentially, over several hours, to allow the natural warping tendencies of each piece to be demonstrated. The dorsal graft must have minimal warping, and is best carved from the central core of the rib (**Fig. 6**) [9–11].



**Fig. 4.** The incision for harvesting costal cartilage is made at the lower aspect of the right breast. The incision typically lies over the sixth rib.

### **Augmentation rhinoplasty**

Attention is then turned to the nose. The open approach is preferred for this type of augmentation rhinoplasty, and it begins with an inverted V-shaped incision midway up the columella. It is important to avoid incisions high on the columella, because these are more likely to be visible. Marginal incisions are made and the skin flap is elevated off the medial crura, then off the lateral crura. The dissection is carried up onto the middle vault, staying in a plane immediately adjacent to the cartilage. A Joseph periosteal elevator is used to create a small subperiosteal pocket over the bony dorsum in the midline. The size and position of this pocket determine where the dorsal graft sits, and should be made with great care. The superior aspect of this pocket should be at about the midpupillary line, which corresponds to the proposed nasal starting point.



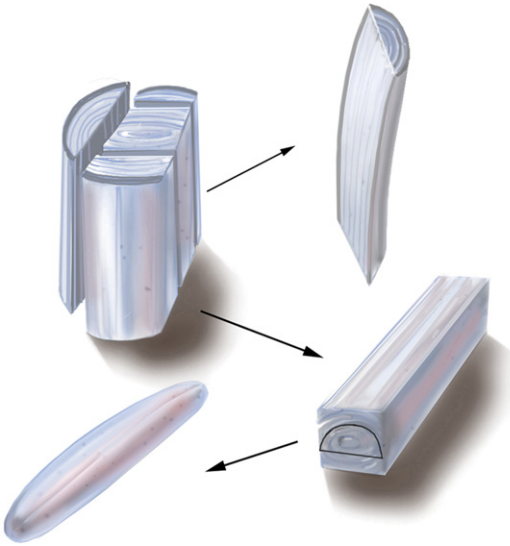
**Fig. 5.** Harvesting costal cartilage. (A) When harvesting costal cartilage the muscle fibers over the designated rib are carefully dissected and not cut. By preserving the muscle fibers they can be sutured tightly during the closure to provide a splinting effect over the harvest site. (B) The perichondrium is dissected off of the circumference of the rib leaving the underlying perichondrium and pleura intact. (C) A medial cut is made in the costal cartilage just lateral to the bony transition point.

### ***Stabilization of the nasal base***

The next step in augmentation rhinoplasty is stabilization of the nasal base, and the surgeon must choose a method based on the tip support, nasolabial angle, desired rotation or counterrotation, and the alar-columellar relationship. Nasal length is a critical parameter that must be stabilized by grafting the nasal base. Preservation of nasal length is a key to success in Asian rhinoplasty. When these parameters are appropriate for the patient and do not require modification or reinforcement, the base can be stabilized with a conventional columellar strut. This strut is carved 8 to 14 mm in length, 3 to 4 mm in width, and 1 to 2 mm thick. It is placed into a pocket between the medial crura and sutured with 4-0 plain gut mattress suture on a straight septal needle (Fig. 7). When creating the pocket, it is best to leave a cushion of soft tissue over the

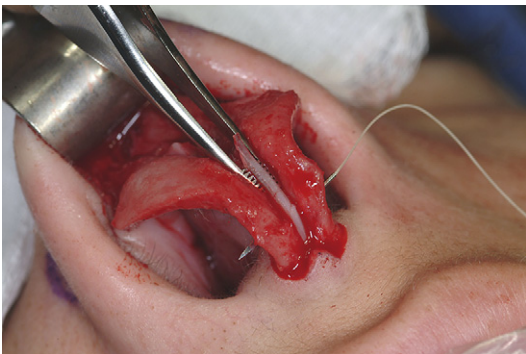
nasal spine to prevent direct contact between the cartilage and bone, which can lead to a clicking sensation when the nose is manipulated or when the patient smiles. This graft adds support to the tip, but does not alter tip position.

In cases where there is insufficient tip support, an acute nasolabial angle, poor tip position (underrotated or overrotated), inadequate nasal length, or inappropriate alar-columellar relationship, and if there is no need for premaxillary augmentation, a caudal extension graft can be used [12]. This graft typically overlaps and is fixated to the caudal septum with 5-0 clear nylon sutures. The shape and attitude of this graft and the location of placement sets the tip rotation, tip projection, nasal length, and alar-columellar relationship. Care must be taken to ensure that the warping tendencies of this graft are noted and these tendencies are taken

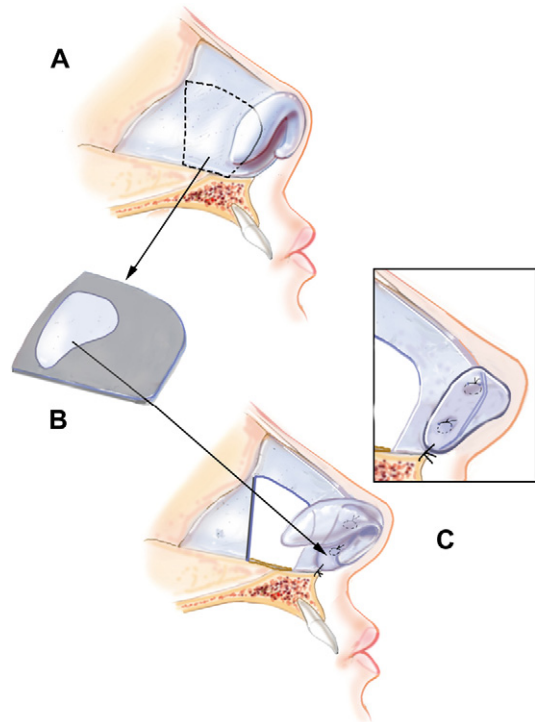


**Fig. 6.** When carving the costal cartilage the central core tends to bend or warp less than the periphery.

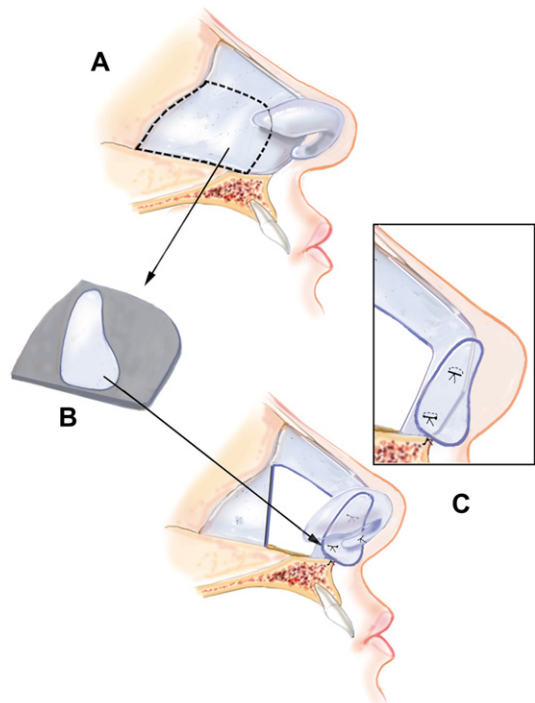
into account when the graft is sutured into place. Any deviation of the caudal edge of the graft directly leads to deviation of the tip. The area of overlap between the graft and caudal septum must not create excessive fullness along the floor of the nose or it may block the airway. The angle of the caudal edge of the graft can be tailored to create the desired tip rotation, nasal length, and nasolabial angle. Patients requiring counterrotation benefit from a graft that is longer on the superior margin, whereas patients requiring increased rotation benefit from a graft that is longer on the inferior margin (Figs. 8 and 9). Major lengthening can be accomplished with this graft in combination with extended spreader grafts, which extend beyond the caudal septum and are fixated to the caudal extension graft (Fig. 10). In many cases the skin envelope limits the degree of nasal lengthening that can be safely achieved (Fig. 11). Preoperatively, the



**Fig. 7.** A columellar strut is sutured into a pocket between the medial crura.

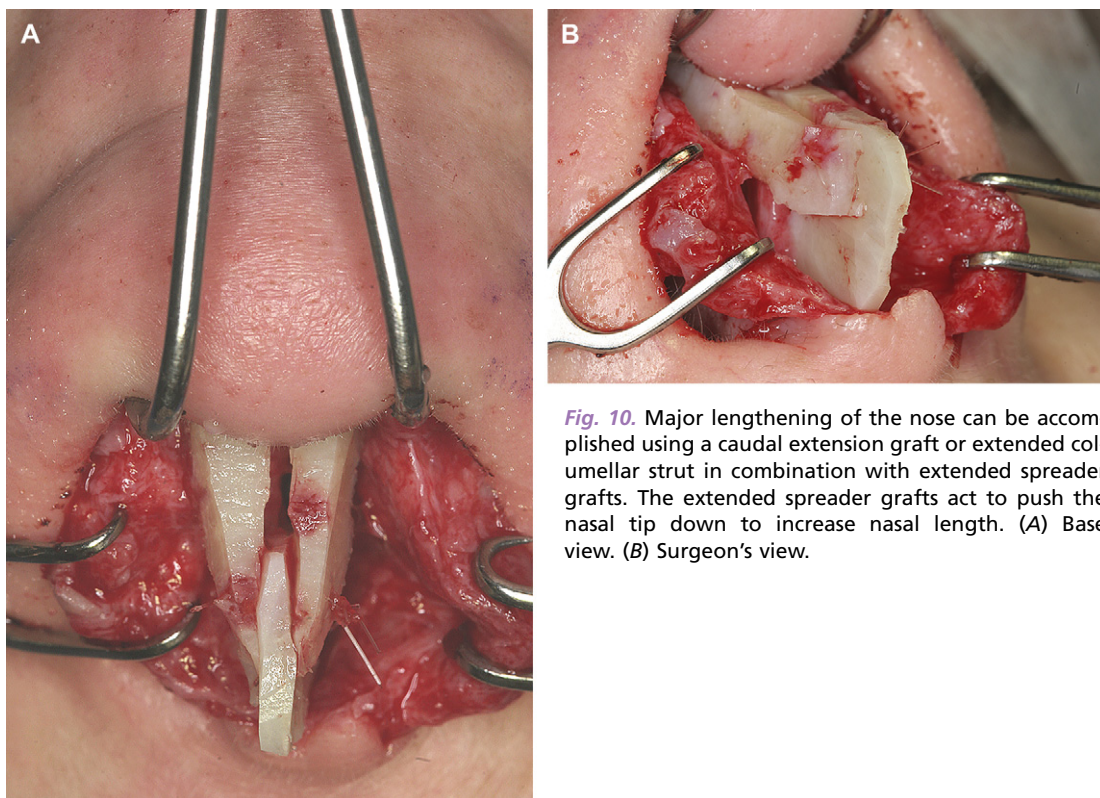


**Fig. 8.** (A–C) To counterrotate the nasal tip a caudal extension graft should be longer along the superior margin to push the nasal tip down.



**Fig. 9.** (A–C) To increase tip rotation and blunt the nasolabial angle the caudal extension graft should be longer along the inferior margin.





**Fig. 10.** Major lengthening of the nose can be accomplished using a caudal extension graft or extended columellar strut in combination with extended spreader grafts. The extended spreader grafts act to push the nasal tip down to increase nasal length. (A) Base view. (B) Surgeon's view.

surgeon can pull down on the nasal tip to determine how much the nasal tip moves. After suture fixation of the graft to the caudal septum, the medial crura are sutured to the graft with 4-0 plain gut on a straight septal needle. Following verification of symmetry and proper tip position and alar-columellar relationship, a 5-0 clear nylon is placed along the internal surface of the medial crura and through the graft.

In patients requiring premaxillary augmentation or major tip support, an extended columellar strut with or without a premaxillary graft is used. A pocket is made between the medial crura down to the nasal spine. The position of the nasal spine is evaluated. If the nasal spine is off midline, the extended columellar strut graft can be placed on one side of the spine such that the caudal margin of the graft is in the midline. When the nasal spine is in the midline the surgeon has two options. The graft can be placed into a groove created in the center of the spine with an osteotome, or thin cartilage wafers can be sutured to either side of the graft, to stabilize the graft over the nasal spine (Fig. 12). To provide increased premaxillary augmentation, the graft can be contoured such that

it flares out at the base. A notch carved into this base can then accept the nasal spine and allow for stable fixation (Fig. 13). For maximal premaxillary augmentation, the extended columellar strut can be integrated into a notch in a premaxillary graft that is sutured to the nasal spine (Fig. 14). Smaller cartilage plumping grafts can be placed from above between the medial crura. Larger wider premaxillary grafts may need to be positioned through a sublabial approach. Regardless of the technique used, the graft is suture fixated to the nasal spine either with a suture through the periosteum or through a small hole drilled into the nasal spine. The graft can then be further fixated and the tilt of the graft can be set by suturing it to extended spreader grafts or integrated into the dorsal graft (Fig. 15). Once these parameters are evaluated, a 5-0 clear nylon suture can be passed between the internal surface of the medial crura and through the graft.

#### **Management of the nasal tip lobule**

The least complex method of tip contour adjustment is placement of dome binding sutures. This





**Fig. 11.** Patient with a short nose. A costal cartilage extended columellar strut was combined with extended spreader grafts to lengthen her nose. Her tight skin envelope limited the degree of lengthening. Layered septal cartilage was used to augment her nasal dorsum. (A, C, E, and G) Preoperative views. (B, D, F, and H) Postoperative views.

technique is best suited to Asian patients with thinner or moderate thickness skin with adequate tip projection. Separate 5-0 clear nylon sutures are used for each dome. Placement of dome sutures can increase rotation of the nasal tip lobule. If this is a problem a caudal septal extension graft can help to preserve nasal length. After placing dome sutures, the cephalic trim cartilage can be gently bruised with a Brown-Adson forceps and sutured horizontally over the domes to provide additional tip projection and definition [13].

Most Asian patients, however, have thicker skin and require increased tip projection. A tip graft can project into this thick skin, creating favorable nasal tip contour. A tip graft is carved in a shield shape and should be slightly convex. The edges are beveled and the graft is sutured to the caudal margin of the medial crura with at least four 6-0 Monacryl sutures. The top edge of the graft should then be camouflaged to prevent visibility in the future. If the top of the graft is between 2 and 3 mm above the dome it can be camouflaged with

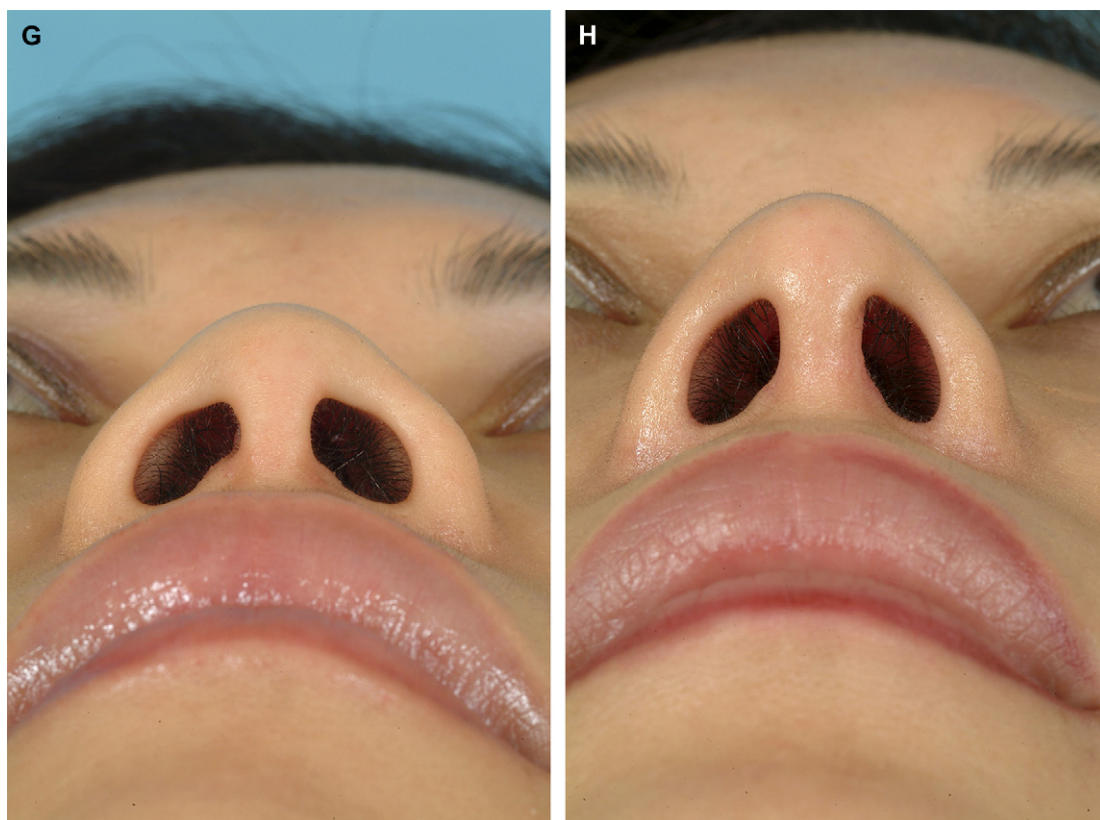


Fig. 11 (continued)

a buttress graft sutured immediately behind the graft (Fig. 16). The cephalic trim cartilage can be used as the buttress graft and sutured just behind the leading edge of the shield graft. The buttress graft should extend a millimeter or two lateral to the shield graft to provide adequate camouflage [13]. When additional projection is needed and the graft projects more than 3 mm above the existing domes, lateral crural grafts should be sutured to the posterior surface of the graft (Fig. 17). These grafts are carved and sutured so that they are at 45 degrees to each other, creating a smooth transition between the graft and the lateral crura. Flat pieces of cartilage create the best tip contour. These grafts also provide structural support to the tip, preventing cephalic rotation of the shield graft, and should be of adequate strength. The lateral crural grafts are sutured to the lateral crura with 6-0 Monacryl sutures. Further camouflage can be achieved with a strip of perichondrium. This tissue is sutured over the leading edge of the shield graft with 6-0 Monacryl in a horizontal orientation (Fig. 18). This additional tissue adds tip projection

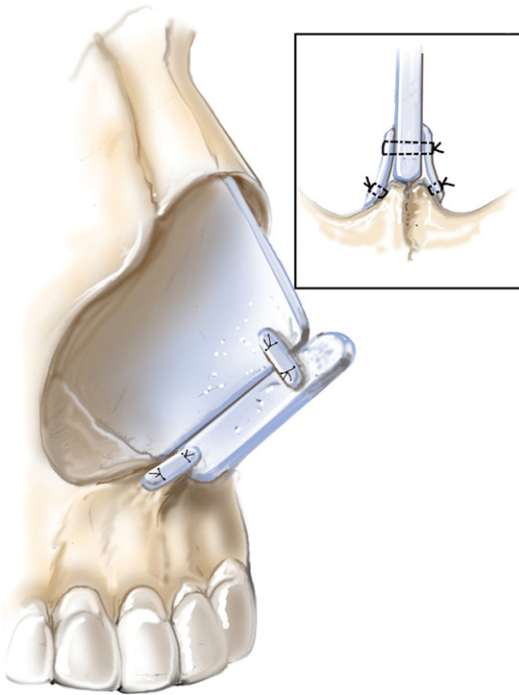
and creates a more rounded tip, which is ideal for the Asian patient.

### **Dorsal augmentation**

Dorsal height is next set based on the tip projection. A canoe-shaped dorsal graft can be fabricated from auricular cartilage or costal cartilage (Fig. 19). When auricular cartilage is used it is important to understand that this material tends to deform and curl along its edges over time. Depending on the degree of augmentation required, this cartilage can be stacked. The edges are beveled and, if available, a strip of septal cartilage or perichondrium can be sutured to the dorsal side of the graft for additional camouflage. The graft is then placed into the narrow dorsal pocket. The surgeon should inspect and carefully palpate to ensure the graft is midline, symmetric, and without irregularities. Fortunately, the thicker skin of Asian patients can mask many of these irregularities.

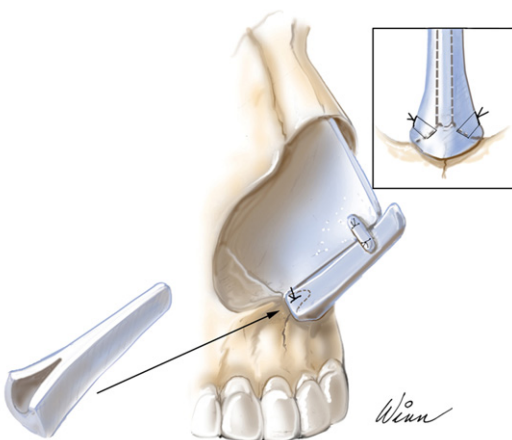
When costal cartilage is used, the dorsal graft should be carved sequentially over a period of hours,



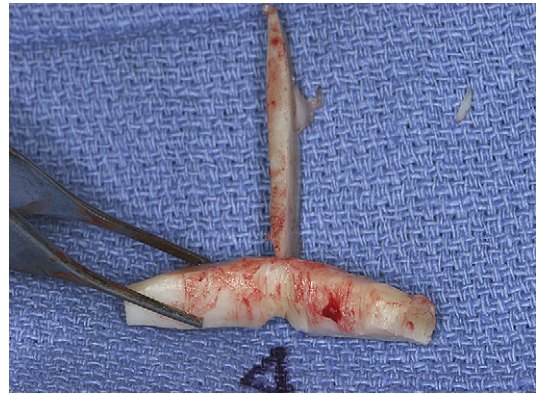


**Fig. 12.** The extended columellar strut can be fixed to the nasal spine region by using paired splinting grafts on both sides of the nasal spine. The splinting grafts act to stabilize the extended columellar strut in the midline.

soaking the cartilage in an antibiotic solution between modifications. This sequential method of carving allows the warping tendencies of the particular piece to be revealed (**Fig. 20**). Any warping noted should lead the surgeon to orient the graft

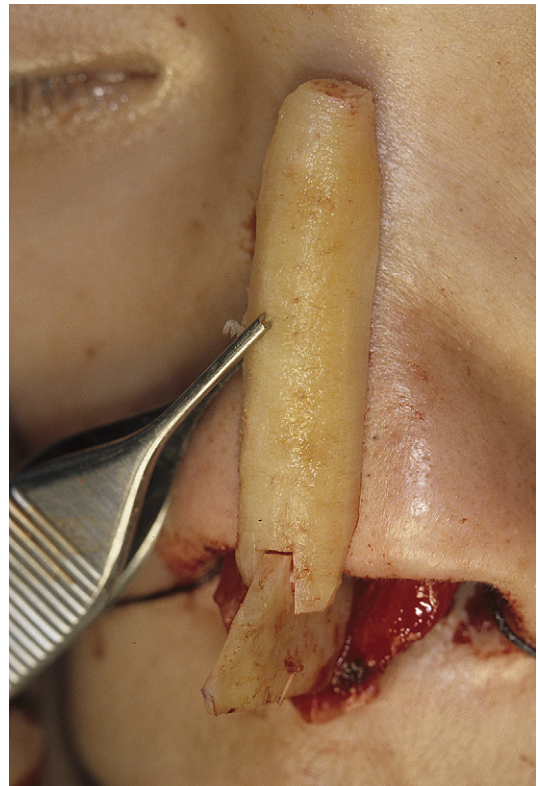


**Fig. 13.** The extended columellar strut can also be fixed to the nasal spine region by creating a groove in the inferior margin of the strut, which allows it to sit over the nasal spine. By making the base of the strut wider it provides a greater degree of premaxillary augmentation.

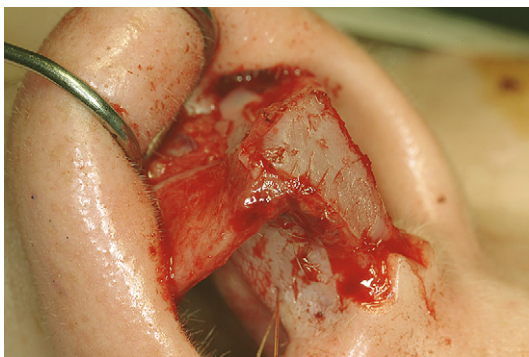


**Fig. 14.** For maximal premaxillary augmentation the extended columellar strut can be integrated into a notch in a premaxillary graft placed into a pocket over the premaxilla.

such that the dorsal surface is slightly convex (**Fig. 21**). By placing the dorsal graft with the convex surface oriented upward the tension of the overlying skin helps to flatten the graft against the dorsum. More importantly, this orientation decreases the



**Fig. 15.** The extended columellar strut can also be integrated into a notch in the caudal margin of the dorsal graft. The higher the dorsal graft is integrated on the extended columellar strut, the higher the dorsum and supratip.



**Fig. 16.** Tip grafts projecting less than 3 mm above the existing domes can be camouflaged with a small buttress graft placed behind the leading edge of the tip graft. The cephalic trim is soft and usually contains some soft tissue and is ideal for such a camouflaging buttress graft.

chances of the dorsal graft warping to create supratip and radix deformity. The dorsal graft is ideally canoe-shaped, symmetric, with round edges. The undersurface of the graft should be slightly concave in the horizontal plane to allow it securely to sit atop the native dorsum. It is placed into the dorsal pocket, and the top of the graft should be at approximately the midpupillary level. The graft should be suture fixated with two 5-0 PDS to the septum and the upper lateral cartilages.

In patients requiring major tip support, counter-rotation, or lengthening, the surgeon can consider integrating the dorsal graft with the extended columellar strut graft. This is done by carving a notch into the caudal edge of the dorsal graft. These grafts are suture fixated, creating a continuous support

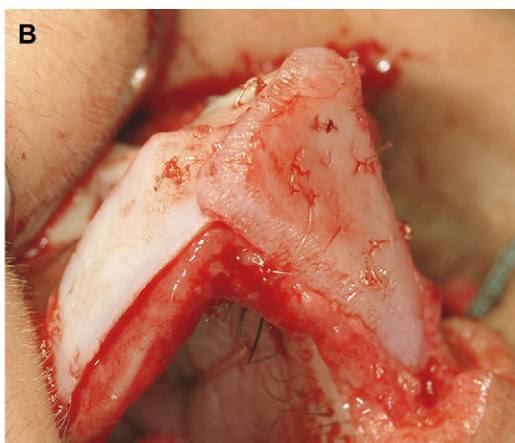
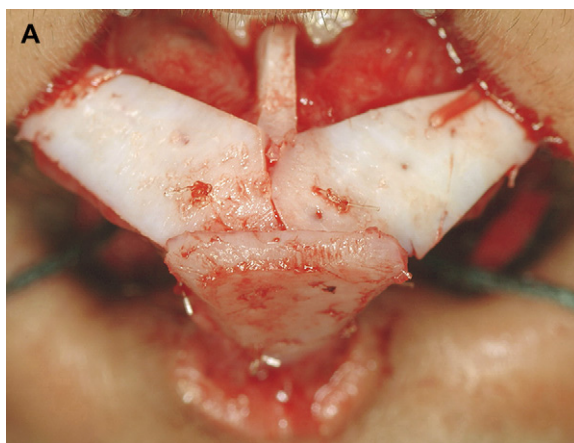
structure from the nasofrontal angle to the nasal spine. These combined grafting maneuvers can create significant changes in nasal contour (**Fig. 22**).

### **Closing the nose**

Closure of the columellar incision begins with a subcutaneous 6-0 PDS suture in the midline. This suture decreases the tension on the columellar skin incision and helps to preserve a very thin scar. Skin is closed with a 7-0 vertical mattress suture and mucosal incisions closed with 5-0 chromic simple interrupted sutures. Septal quilting sutures are placed with 4-0 plain gut on a straight septal needle. The nose is packed with a Telfa dressing coated in antibiotic ointment. Hypoallergenic paper tape is applied to the nose followed by a malleable thermoplastic splint.

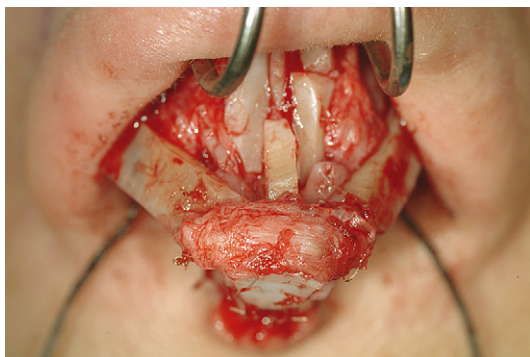
### **Follow-up care**

Immediate postoperative care focuses on patient comfort with measures taken to reduce pain and edema. Patients awaken in the recovery room with an intranasal dressing in place and are unable to breathe through the nose. The authors prescribe an antibiotic and acetaminophen-hydrocodone combination. In addition, a form should be given to the patient that contains a brief timeline of the healing process and outlines self-care issues and any behavioral restrictions deemed appropriate. No nose blowing, no straining, and no manipulation of the nose are recommended. The patient should sleep with a slight elevation of the head. Overheating and excess salt can lead to increased tip edema and should be avoided. The first postoperative visit occurs 24 hours after surgery. The intranasal dressing is removed at this time and any



**Fig. 17.** (A, B) If the tip graft projects more than 3 mm above the existing domes lateral crural grafts can be used to camouflage and support the tip graft from behind. Note how the lateral crural grafts are oriented obliquely from the posterior surface of the shield graft.





**Fig. 18.** Additional camouflaging of the tip graft can be achieved by suturing a layer of costal cartilage perichondrium over the leading edge of the tip graft. This helps to minimize the chances of tip graft visibility.

questions or concerns can be addressed. The second postoperative visit occurs on day 7. On this visit, the nasal splint and the nonabsorbable sutures are removed. The dorsal graft should be carefully examined. If it has shifted or has developed any curving, the patient is instructed to perform nasal exercises to help stabilize the graft. Severe warping or shifting of the graft may require a revision procedure.

If a patient experiences prolonged supratip edema (beyond 6 weeks), nasal taping at night can be used. If this does not improve the swelling, a subdermal injection of triamcinolone acetonide (Kenalog, 10 mg/mL) can be used. The authors typically use about 0.2 mL injected into the deep subdermal tissues. Intradermal injection should be avoided because it can lead to atrophy.

The nose continues to heal over an extended period of time. Patients are told that the nose is 40% healed at 1 year and 50% at 2 years. This helps them understand that the edema resolves slowly, producing improved tip definition with noticeable changes even 1 year after surgery.



**Fig. 19.** Dorsal grafts should be canoe-shaped with narrowing at the superior and inferior margin of the graft.



**Fig. 20.** Costal cartilage segment carved into three potential grafts. Note how the peripheral margins are curving laterally or outward.

## Complications

Complications can occur because of the augmentation rhinoplasty and at the site of the cartilage harvest. Nasal complications include visible, displaced, or warped grafts; infection; bleeding; and visible scarring. Auricular cartilage harvest can result in pain, bleeding, infection, change in the shape of



**Fig. 21.** Dorsal graft has a slight curvature with the convexity oriented along the dorsum of the nose. This tendency to curve is resisted by the overlying skin envelope and suture fixation.





**Fig. 22.** Patient who had a silicone L-shaped implant that extruded through her nasal tip leaving a tip scar. Reconstruction was accomplished using costal cartilage extended columellar strut, premaxillary graft, and dorsal graft. The extended columellar strut was integrated into a notch in the caudal margin of the dorsal graft. (A, C, E, and G) Preoperative views. (B, D, F, and H) Postoperative views.

the ear, dehiscence of the incision closure, keloid formation, scar banding, and necrosis of the skin over the conchal bowl. Costal cartilage harvest can result in pain, bleeding, infection, hypertrophic scar, palpable cartilage edge, pneumothorax, and pneumonia. Many of these complications are preventable through proper execution of the techniques described.

### Summary

Augmentation rhinoplasty with autologous cartilage grafting in Asian patients is a safe and effective

procedure. The techniques and cartilage source chosen depend on the degree of augmentation requested by the patient. Patients who have costal cartilage harvesting can return home the day of surgery and rarely complain of excessive discomfort in the chest. The incidence of cartilage warping has been very low in the authors' experience and this may be caused by the sequential technique of carving the grafts. Sequential carving allows identification of warping or bending tendencies of the costal cartilage. Once these tendencies are identified one can choose the ideal grafting material for each of the respective grafts used in augmentation

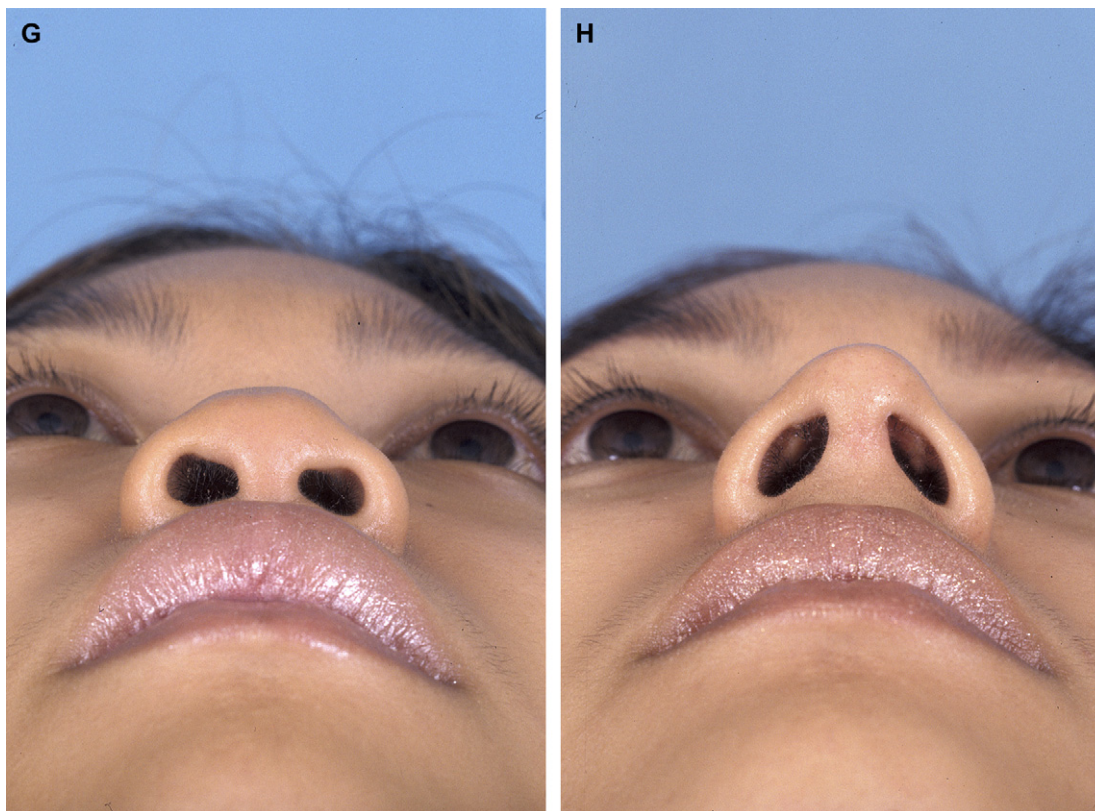


Fig. 22 (continued)

rhinoplasty. Autologous cartilage does not resorb over time and provides patients with a lifelong correction [14]. Structural grafting not only improves the appearance of the nose, it also frequently improves nasal obstruction, allowing patients to breathe better after surgery.

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