

# Asian Rhinoplasty: Correction of the Short Nose with a Septal Integration Graft

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## Abstract

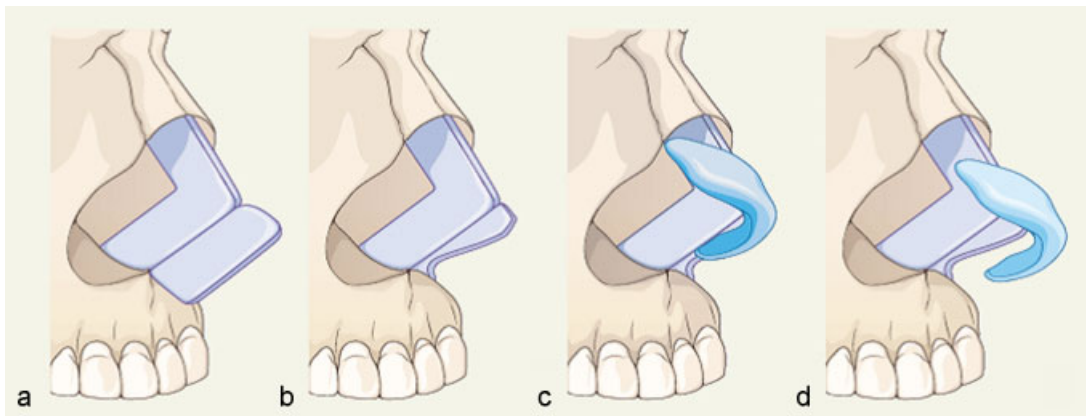
Correction of the short nose is the most challenging part in a rhinoplasty. It is even more difficult in Asians compared with Caucasians due to the thicker skin soft tissue envelope and weaker cartilaginous frameworks. Additionally, most of the Asian patients need augmentation of the nasal dorsum, and projection of the nasal tip at the same time of short nose surgery, which makes short nose correction more complex. Septal extension grafts can effectively and concomitantly correct a short nose. However, the amount of the septal cartilage is not sufficient as a source for the graft often; therefore, the authors devised a septal integration graft in which a septal cartilage graft was fixed to the caudal septum (columellar L-strut) in an end-to-end position to save an amount of the septal cartilage for correction of the short nose. A septal integration graft application resulted in lengthening of the short nose. In addition, the retracted columella and the acute columellar labial angle were improved aesthetically. Therefore, the authors suggest a septal integration graft, a modification of the septal extension graft, for correction of the short nose in an Asian rhinoplasty.

## Keywords

- ▶ Asian rhinoplasty
- ▶ septal integration graft
- ▶ short nose
- ▶ aesthetic surgery

Asians have a comparably low radix, dorsum, and tip of the nose and a more acute columellar-labial angle than Caucasian populations.<sup>1,2</sup> In the past, regardless of the various deformities of the nose, a simple procedure, augmentation of the radix and dorsum by using a silicone implant has been used. As a result, a characteristic disharmony of the nasal base resulted: The ideal ratio of the supratip lobule and the columellar proper was reversed, and an excessively longer supratip lobule resulted in an “operated look.”<sup>3,4</sup> The septal extension graft introduced by Byrd et al<sup>5</sup> not only let us go beyond simple augmentation of the radix and dorsum as an endpoint, to recognition of the tip plasty importance, with a reduced chance of implant exposure and simultaneous avoidance of nasal base disharmony. Although useful for most Caucasian nasal tip plasties, a septal extension graft that requires a considerable quantity of septal cartilage graft is limited in obtaining favorable results in Asians due to the small size of the septal cartilage. We perform end-to-end

positioning of a septal cartilage graft to the caudal septum to overcome the limitation in cartilage volume available for harvesting, instead of overlapping of the septal extension graft and the columellar L-strut. In consideration of the fixation method of the septal extension graft to the caudal septum, a horizontal figure-of-eight locking suture for fixation between graft and strut<sup>6</sup> increased the tensile forces and endurance to shear and buckling. By using our vertical variation of a figure-of-eight locking suture, instead of the vertical figure-of-eight locking suture introduced by Byrd et al,<sup>5</sup> the septal cartilage graft and columellar L-strut become one integrated unit, what we call a “septal integration graft” (SIG). Tip projection, short nose correction, and columellar base augmentation are achieved all at once by repositioning lower lateral cartilages anteriorly and inferiorly to the enlarged septal cartilage graft-columellar L-strut unit. We suggest a SIG, a modification of the original septal extension graft, for an Asian rhinoplasty (►Fig. 1).



**Fig. 1** (a–d) A septal integration graft: End-to-end positioning of the septal cartilage graft to the caudal septum.

## Operative Techniques

Surgery is generally performed under local anesthesia. We use 1% lidocaine with epinephrine 1:100,000 as the injectable agent for local infiltration anesthesia and hydrodissection to facilitate the elevation of the mucoperichondrium before septal cartilage harvest.

### Columellar Labial V-Incision and Bilateral Infracartilaginous Incisions

The midpoint of the natural crease between columella and upper lip is marked, and a right-angled V line is drawn at the narrowest points of the columella with brilliant green dye, followed by a bilateral infracartilaginous incision design. When incising the columellar–labial V-mark using a no. 15 blade, if the columellar artery is encountered, hemostasis with electrocautery is performed. The bilateral infracartilaginous incisions are then made with Metzenbaum scissors to avoid cartilage injury.

### Dissection of Skin–Soft Tissue Envelope and Release of Lower Lateral Cartilages

The skin–soft tissue envelope is elevated and released. Lower lateral cartilages are carefully released from adjacent structures including the upper lateral cartilages. Sufficient release of the lower lateral cartilages and secure SIG anchorage are very important procedures in the correction of a short nose. The fibrofatty tissue on the dome and the depressor septi nasi muscle are removed by dissecting just above the perichondrium of the lower lateral cartilages.

### Harvest of the Maximal Amount of the Septal Cartilage

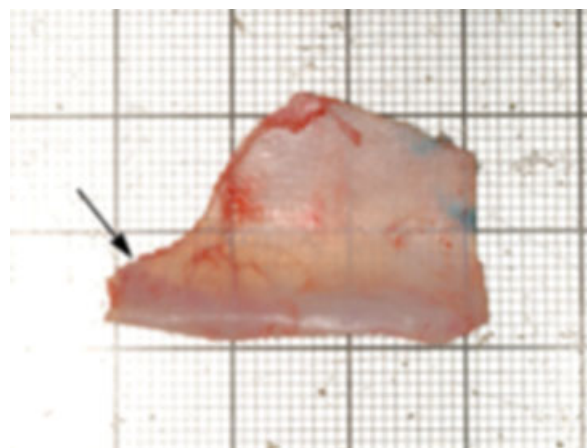
We try to harvest a maximal amount of the septal cartilage because the septal cartilage is often severely hypoplastic in Asians and its availability is almost always inadequate.<sup>7,8</sup> In our evolving experience, three aspects for harvesting the maximal amount of the septal cartilage have been established.

1. Avoidance of the swivel knife. The swivel knife has been commonly used to harvest septal cartilage; however, when

we used the swivel knife, there was still a substantial amount of remnant cartilage observed in a secondary rhinoplasty. Hence, we abandoned this technique.

2. Harvesting the vomerine extension of the septal cartilage. A careful dissection to include vomerine extension to septal cartilage harvest is required, which can provide a critical length of graft (→ Fig. 2).
3. Harvesting the septal cartilage leaving less than a 10-mm dorsal L-shaped strut. In a SIG, the dorsal L-strut is less preserved as it is under less strain than the columellar L-strut. In this case, we use an absorbable plate or mesh (Bionix, Toledo, OH) to reinforce the weakened L-strut (→ Fig. 3). The septal cartilage is exposed by scoring the perichondrium of the caudal septum with a no. 15 blade.

At this time, because of the direction of the conjoined fibers from the lower positioned vomer extending to the septal mucoperichondrium anteriorly, the mucoperichondrial layer is carefully peeled from a posterior to anterior direction, resulting in less tear of the septal mucoperichondrium. After exposure of the septal cartilage on both sides, 10-mm dorsal and columellar L-struts are measured with the



**Fig. 2** Maximizing a septal cartilage harvest. Arrow indicates the vomerine extension.



**Fig. 3** Absorbable plate or mesh (Bionix, Toledo, OH) was used to reinforce the weakened L-strut in case of remnant dorsal L-shaped strut less than 10 mm.

Castroviejos spreading calipers, and then created with the harvested septal cartilage (the design is shown before harvest). The columellar L-strut is created by incising posteriorly parallel to the caudal septum; the dorsal L-strut is made by incising parallel to the dorsal line on the anterior portion, and by incising with a bayonet septal scissors on the posterior portion. The sharp Freer elevator is used to dissect between the junction of the septal cartilage and the perpendicular plate of the ethmoid, and along the vomerine groove. At this time, the vomerine extension is carefully harvested under direct vision. Smith forceps is used to lessen injury when holding the septal cartilage. The graft is then soaked in saline solution without antibiotics. The SIG, a shield graft, and a cap graft are created from this cartilage graft.

#### End-to-End Positioning of the Septal Cartilage Graft to the Caudal Septum for Making SIG

Before this procedure, we found the portion of the graft that had the most similar thickness with the thickness of caudal septum by observing all four sides of the septal cartilage graft. The graft portion near the vomerine groove was the thickest, but the contour was irregular, and the ethmoid perpendicular plate side was thin; as a result, both were unsuitable. The dorsal and columellar strut sides were both appropriate in thickness, and the incised line was straight, thus fit to use. The

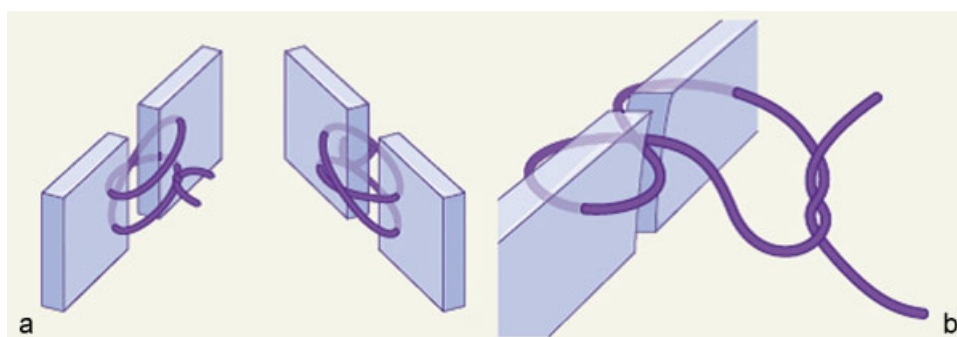
columellar L-strut side is used when tip projection is required; the dorsal L-strut side is used when inferior repositioning of the columella is required, depending on the patient's need. The columellar L-strut side is commonly longer than the dorsal L-strut side.

The anteroposterior dimension of the SIG equals the sum of the width of the entire caudal septum and the amount of planned tip projection anteriorly. The cephalocaudal dimension equals the sum of the width of the existing middle crura and the amount of planned dorsal lengthening caudally. The SIG is placed between the medial and middle crura in continuity with the entire caudal septum above the anterior nasal spine.

Vertical figure-of-eight locking sutures are used to position the septal cartilage graft to the caudal septum in an end-to-end alignment (►Fig. 4). A 5-0 PDS II is the most suitable suture material because its resilient characteristics appose the relevant structures without tearing. The incidence of overlapping decreases when the size of bite is similar to the graft thickness. The stronger the suture anchorage, the stronger is the integration between the two structures. With this method, the "x" mark is seen on one side, and two parallel horizontal lines on the other (►Fig. 5).

#### SIG–Crural Sutures

Both lower lateral cartilages are positioned anteriorly and caudally to achieve tip projection, dorsal lengthening, and protrusion of the columellar base; they are fixed temporarily using a straight needle (►Fig. 6). After ensuring that the tip and columella are reshaped as desired, the following three points of the lower lateral cartilages are sutured to the SIG: (1) the cephalic margin of the domal segment (for tip projection and dorsal lengthening), (2) the cephalic margin of the junction between the lobular and the columellar segment (to make the columellar breakpoint), and (3) the caudal margin of the junction between the columellar and the footplate segment (for caudal advancement of the columellar base). This combination of suture maneuvers allows retention of the morphology of the normal angle of domal definition, the angle of domal divergence, and the angle of footplate divergence of the paired lower lateral cartilages.<sup>9</sup> Any excess of the SIG is trimmed to prevent any irregularity at the columella.



**Fig. 4** (a) Concept of authors' vertical figure-of-eight locking suture. (b) The figure-of-eight locking suture of Byrd et al. As the suture does not exist between the apposed interface of the two cartilage structures in the (a) type, the vertical suture firmer and tighter.



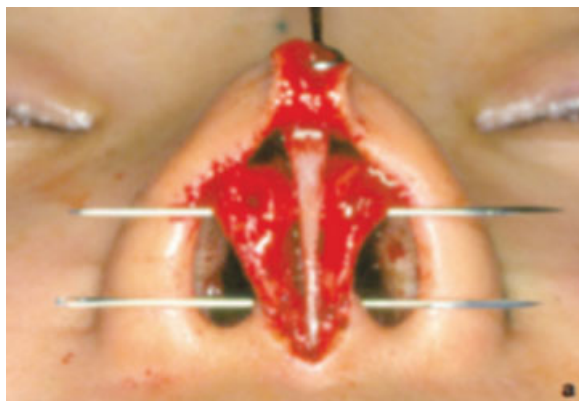
**Fig. 5** Authors' vertical figure-of-eight locking suture. "x" mark is seen on one side (arrow), and two parallel horizontal lines on the other side.

### Tip Graft: Shield Graft and Cap Graft

At least a 3-mm projected-type shield graft is done; then two to three layered cap grafts are added to support the shield graft because most Asians have thick lobular skin. A comparatively sturdy part of the septal cartilage is used for a shield graft, and the septal cartilage of the vomerine groove with a thick and irregular contour is used for a cap graft.

### Radix and Dorsal Augmentation

Radix and dorsal augmentation is required due to the relatively lower radix and dorsum after a short nose correction with tip projection. A supraprimerichondrial dissection of the dorsal septum and medial portion of the upper lateral cartilages followed by subperiosteal dissection is performed to make space for implants. The upper end of the implant is positioned at the same level as the supratarsal crease, which is the nasal starting point, and the lower end of the implant is trimmed to position just above the cephalic margins of the domes of lower lateral cartilages because the nasal tip is already repositioned antero-inferiorly, thus augmentation of the tip is not necessary. The implant is inserted under the periosteum of nasal bone while the periosteal layer is elevated with an Aufrecht retractor, and the lower portion of the implant is sutured to the lower lateral cartilages with 4-0 nylon.



**Fig. 6** Lower lateral cartilages were fixed temporarily to the septal integration graft with a straight needle.

### Intranasal Splint with Multiple Quilted Sutures of the Septum

Multiple quilted sutures on the septal cartilages are placed at the end of the procedure to avoid any septal hematoma formation and to maintain the new tip projection, and dorsal lengthening by the SIG-crural suture. A silicone sheet had been used previously, but was changed to this current quilting method due to rare complications of septal perforation. By making multiple quilted sutures to the SIG-columellar L-strut, dorsal strut, and septal cartilage donor site with 3-0 chromic catgut, support of the integrated SIG-L-strut-crural sutures is possible, while an assistant retracts both nostrils in an anterosuperior direction with double hooks.

### Closures and Dressing

A 4.5-cm polyvinyl alcohol (PVA) sponge (Meroceel Nasal Dressings, Medtronic) impregnated with antibiotics and a silicone ventilation tube for ventilation is inserted into each nasal cavity. A thermoplastic nasal splint (Aquaplast PS, WFR/Aquaplast Corp.) is applied over the extranasal splint with 1-cm brown paper tape. Both stitches and splint are left in place for 5 days.

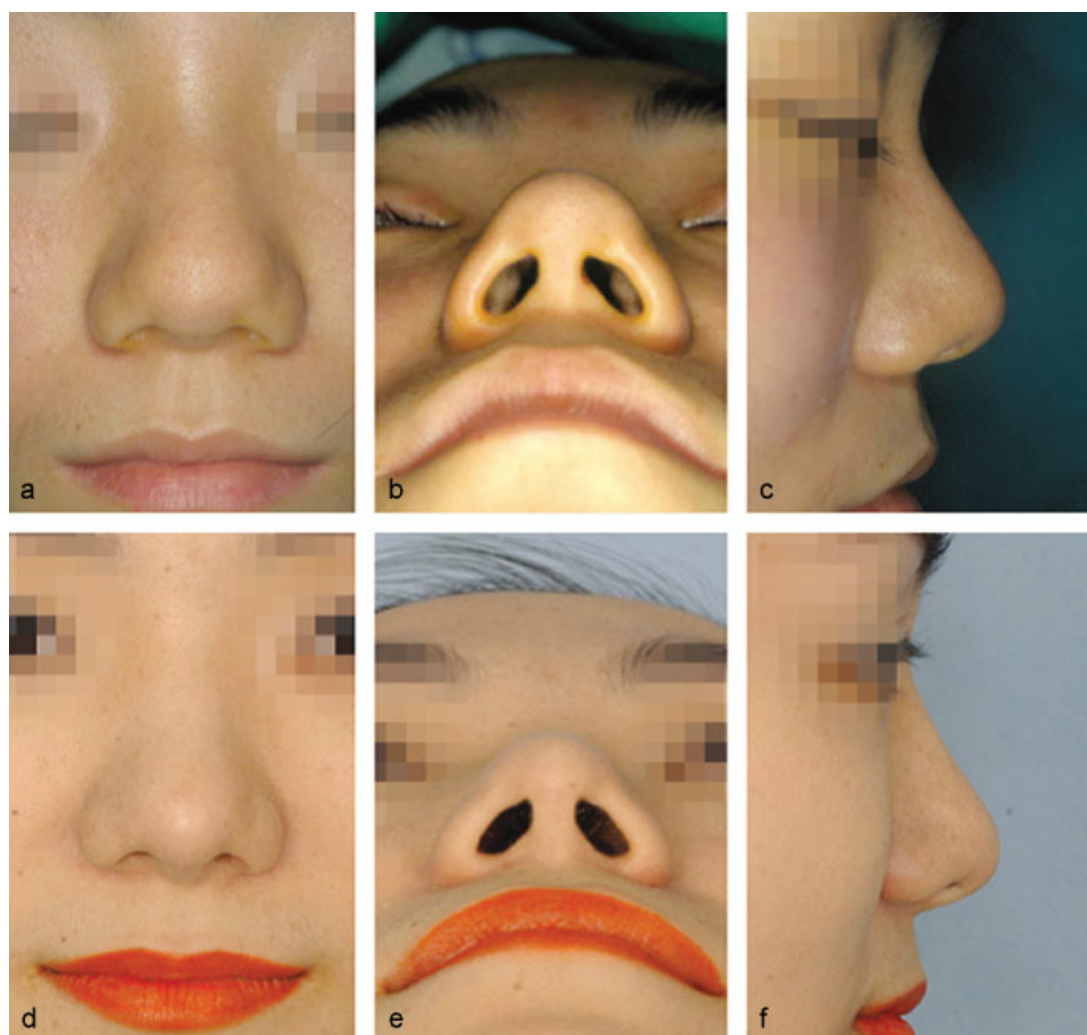
### Results

Septal integration grafts are used to lengthen a short nose. Additionally, an underprojected tip, a retracted columella, and an acute columellar labial angle are all improved aesthetically (► Figs. 7–11).

### Discussion

Asians generally have a flat and wide nasal radix and dorsum, an underprojected tip, a retruded columellar base, a flared alar, and a short nose with thick sebaceous skin.<sup>10,11</sup> We assumed that Asians have inherent hypoplasia of the nasal septum. Therefore, correction of the hypoplastic septum achieved by augmenting in the anterior and caudal direction was considered the main focus in the correction of a short nose. The anterior enlargement of the septum can improve a flat and wide nasal dorsum as well as an underprojected tip. Also, caudal augmentation of the septum enables the surgeon to correct a retruded columellar base and a





**Fig. 7** (a–f) Preoperative (above) and 5-year postoperative (below) clinical images of a 21-year-old woman. Her short nose was corrected by a septal integration graft with no dorsal silicone augmentation.

short nose. A septal extension graft is considered the most typical method employed, and was first introduced by Byrd et al in 1977.<sup>5</sup> The method proved very useful for tip projection, columellar base augmentation, and dorsal lengthening when used in rhinoplasty for Asian patients. However, our modification of the technique was required due to an insufficient amount of septal cartilage in Asians whose nose is small. We anchor the SIG graft to the columellar L-strut in an end-to-end position instead of overlapping the junction to maximally use the limited amount of septal cartilage graft. To make the end-to-end apposition stronger, we developed a vertical-type figure-of-eight locking suture, which turned out to better withstand shearing, buckling, and tensile forces than Byrd et al's horizontal-type figure-of-eight locking sutures in a porcine rib cartilage experiment. It enables firm fixation with the use of the fewer stitches.<sup>8</sup> As the suture does not exist between the septal cartilage graft and the caudal septum in an X shape, and the two structures can be brought into firm contact, the suture can be thoroughly tightened. By using the vertical figure-of-eight locking suture, the septal cartilage graft and columellar L-strut become one unit (►Fig. 5). The SIG can improve tip projection,

dorsal elongation, and columellar base augmentation concomitantly by repositioning of the lower lateral cartilages in an anterior and inferior reposition on the enlarged septal cartilage graft-columellar L-strut unit. An additional advantage of the SIG is that the economical and strategic use of the cartilage allows for a sufficient amount of remnant cartilage for a shield and cap graft.

There are some issues to be aware of during end-to-end positioning of the septal cartilage graft to the columellar L-strut:

1. Trimming of the caudal septum. The caudal margin of the columellar L-strut is curvilinear, compared with the straight margin of the cartilage graft. There should be no gap at the graft apposition interface. Fibrous tissue ingrowth into the gap can be found on secondary (revisonal) rhinoplasties, and the integration of septal cartilage and columellar L-strut can be weakened through this ingrowth.
2. 5–0 PDS is more resilient than 4–0 PDS during end-to-end positioning, and the more suture passes there are, the stronger the graft is anchored.



**Fig. 8** Preoperative (*left*) and 1-year postoperative (*right*) clinical images of an 18-year-old woman. Her short nose was corrected by a septal integration graft; dorsal silicone augmentation was done.



**Fig. 9** Preoperative (*left*) and 1 year postoperative (*right*) clinical images of a 28-year-old man. His short nose was corrected by a septal integration graft; dorsal silicone augmentation was done.

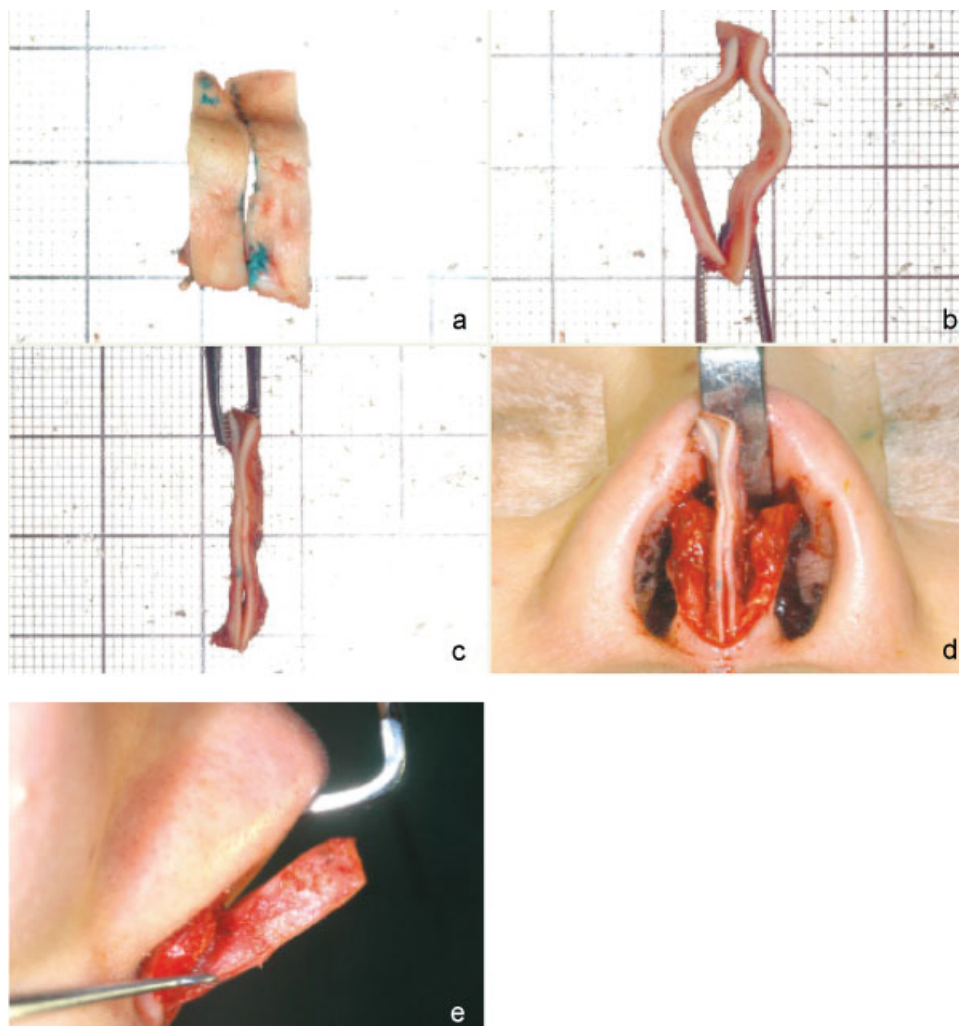




**Fig. 10** Preoperative (*left*) and 7-year-postoperative (*right*) clinical images of a 21-year-old woman. Her short nose was corrected by a septal integration graft; dorsal silicone augmentation was done. She also underwent reduction mandibuloplasty at the same time.



**Fig. 11** Preoperative (*left*) and 6-month postoperative (*right*) clinical images of a 30-year-old woman. Her short nose was corrected by septal integration graft; dorsal silicone augmentation was done.



**Fig. 12** A conchal cartilage graft as a septal integration graft. Note the reciprocal positioning of the strips of the conchal cartilage strips.

The technical advancement in a tip-plasty is achieved with the emergence of the septal extension graft. However, the only disadvantage of the septal extension graft is an insufficient amount of septal cartilage in the Asian nose. To overcome this limitation, we first tried to maximize the harvested septal cartilage leaving a 5-mm L-shaped strut; positive long-term clinical outcomes were possible with the Byrd septal extension graft overlap approach. However, to increase the stability of the nose and for a better aesthetic outcome, the septal graft was harvested leaving a 10-mm L-strut, with end-to-end apposition to the graft—hence, our SIG. With this method, the amount of septal cartilage graft for a SIG, and shield and cap grafts was adequate in most Asian rhinoplasties.

In certain scenarios, when a septal graft is insufficient, the following are options:

1. Harvesting the septal cartilage, leaving less than a 10-mm L-shaped strut, and reinforcing the weakened L-strut with an absorbable plate or mesh on the remnant intact donor site of the septal cartilage (see ► **Fig. 3**).

2. When conchal cartilage has to be used, comparatively two long strips are harvested from cavum concha and used after suturing two strips in a reciprocal position to reduce an irregular surface and curvature (► **Fig. 12**).
3. As a final option, a porous high-density polyethylene (PHDP) sheet can be used instead of a SIG.<sup>7</sup>

## Conclusion

The septal extension graft introduced by Byrd et al can effectively and concomitantly correct a short nose. However, the amount of the septal cartilage is often not sufficient as a donor graft source in Asians. As a result, we devised the SIG, in which septal cartilage graft is fixed to the caudal septum (columellar L-strut) in an end-to-end position to maximize the limited amount of septal cartilage for short nose correction. A SIG results in lengthening of a short nose. In addition, an underprojected tip, a retracted columella, and an acute columellar-labial angle are all improved aesthetically. Thus, we suggest a SIG, a modification of the septal extension graft, for correction of the short nose in an Asian rhinoplasty.



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