# Secondary Rhinoplasty (2): Mid-vault Correction

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There are a variety of mid-vault problems that occur after mid-vault and septal surgery. Among them, the most common are dorsal irregularity, open roof deformity, inverted-V deformity after hump reduction, and saddle nose deformity after septal surgery.

## Post-humpectomy Dorsal Irregularities

Dorsal irregularities after hump reduction include residual hump and focal dorsal depression.

### Residual Dorsal Hump

Small residual hump is difficult to detect due to swelling during dorsal hump reduction surgery. Reduced hump area should not be evaluated purely based on sight but should also be checked by finger palpation several times. In spite of this precaution, small hump can be revealed as the swelling subsides.

A small residual bony hump can be corrected by rasping with a file, which can be easily accomplished through closed approach. Intercartilaginous incision is close to residual hump and allows greater visualization of the residual hump. After mucosal incision between upper and lower cartilage, the soft tissue and periosteum is elevated from the upper lateral cartilage and nasal bone. The scar tissue from prior operation makes this a difficult step that requires a meticulous and tenacious approach. Application of excessive force through the elevator can result in penetration injury to the underlying bone or cartilage. In addition, incompletely elevated soft tissue on the framework will be eliminated by rasping. This decrease in soft tissue thickness can worsen the dorsal irregularity.

A bony hump can be removed by rasping, while a cartilaginous residual hump will require excision using No. 15 blade under direct vision.

Large dorsal septal hump should be removed after the upper lateral cartilages are separated from the dorsal septum to avoid inverted-V deformity (component resection). Component resection is easier to perform through an open approach.

Spreader graft may be required for the prevention of inverted-V deformity and for filling the large open roof in narrow nasal bone in which osteotomy cannot be performed.

### Depressed Dorsum

Dorsal depression from the excessive removal of hump is treated with filling up the depression with crushed cartilage graft.

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A piece of crushed conchal or septal cartilage can be a good solution for a small defect, but a diced cartilage wrapped in deep temporal fascia will be required for large defect. Crushed cartilage graft can be placed through a closed approach (Fig. 1).

Depression can also be filled with an autogenous dermal or allodermal graft. However, this will require overcorrection to compensate for partial resorption, and this will be less predictable than cartilage graft.

## Open Roof Deformity

Nasal dorsum of the nose appears flat after large hump reduction, which is an open roof deformity. This deformity is characterized by the visibility


**Fig. 1** Correction of dorsal irregularity. (**a**) Focal point of dorsal irregularity after hump reduction, (**b**) Crushed septal cartilage, (**c**) Photographs at 3 months after operation (rasping of bony hump and crushed cartilage graft on the depressed lower dorsum)

or palpability of dorsal groove between the nasal bone and the bony septum.

It is not uncommon to observe an open roof deformity despite attempts at closing the roof with osteotomy after bony hump reduction. This deformity comes from several causes. First, osteotomy was not accomplished successfully in closing the roof. Second, the roof was closed during the operation but was distracted from an incomplete greenstick fracture. Other causes include high septal deviation and large hump with thick nasal bone.

Correction of open roof deformity requires revisional lateral and medial osteotomies to close open roof (Fig. 2). Sometimes spreader graft to fill the bony gap is needed, and camouflage layers like perichondrium or fascial graft maybe required.


**Fig. 2** Open roof deformity. (**a**) Flat open roof deformity is observed on mid-dorsal area which occurred after hump reduction surgery. This patient also has a deviated dorsal septum. (**b**) Operative markings for medial and lateral osteotomy. (**c**) Intraoperative picture showing spreader graft on both sides of the dorsal septum to fill the open roof and to correct the dorsal septal deviation. Two layers of conchal cartilage graft were placed on right side of the dorsal septum while one layer of conchal cartilage was placed on left side of the septum. (**d**) Open roof deformity was well corrected after surgery

## Inverted-V Deformity

Inverted-V deformity is an inverted V-shaped indentation between the caudal margin of nasal bones and the upper lateral cartilages (Fig. 3). This deformity can result from removal of dorsal hump, if the upper lateral cartilages collapse inferomedially against the septum. The deformity interrupts dorsal esthetic line and may also cause respiratory dysfunction.

The deformity occurs following a composite hump removal surgery. After hump resection of nasal bone and upper lateral cartilages as one block, the upper lateral cartilages are mobilized medially (Fig. 4). To prevent inverted-V deformity, component resection is more recommended than composite hump removal.

When performing the component resection of the hump, if the lateral wing of dorsal septum is incorporated into dorsal hump resection, it will decrease the dorsal width and result in inverted-V deformity (Fig. 5). The correct component resection preserves the lateral wing of dorsal septum with the upper lateral cartilages.

Even if the lateral wing is preserved through the component resection, the operator should have low threshold for employing the spreader graft to counter any medialization of the upper lateral cartilage.

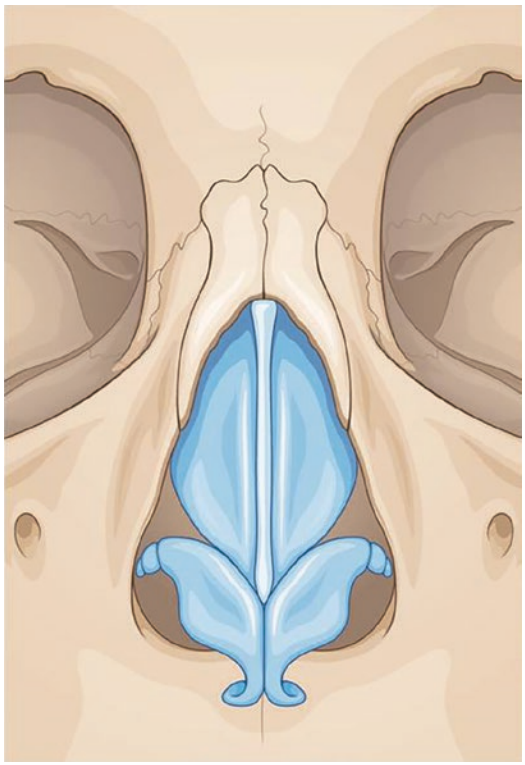

**Fig. 3** Inverted-V deformity

## Correction Technique

### Spreader Graft

Spreader graft is the most commonly performed procedure to correct the inverted-V deformity and internal valve collapse by spread out upper lateral cartilage laterally. The graft is a long piece of cartilage inserted between the dorsal septum and upper lateral cartilages. It can act as a spacer graft to push the upper lateral cartilages laterally and to widen the space between the upper lateral cartilage and dorsal septum (Figs. 6 and 7). The ideal source for the graft is the septal cartilage. It can also be prepared from auricular cartilage or costal cartilage. The prepared graft is 3 mm in height, 1–2 cm in length, and 1–3 mm in width.

After the separation of upper lateral cartilages from dorsal septum, spreader grafts are inserted bilaterally between the dorsal septum and upper lateral cartilages. The grafts span from the nasal bone to the caudal margin of upper lateral cartilages. If the upper lateral cartilage collapse is uneven on both sides, the thickness of spreader grafts is varied to make up for the difference between both sides.

### Splay Graft

The best donor for splay graft is conchal cartilage and this technique is used for severe collapse of lower lateral cartilages (Fig. 8). From the underside of both upper lateral cartilages, the mucoperichondrium is dissected and detached. The graft is placed deep to the left and right upper lateral cartilages and inserted between the undersurface of the upper lateral cartilage and detached mucoperichondrium. The intrinsic spring power of the splay graft elevates upper lateral cartilages with the septum as the fulcrum, which can correct the middle vault collapse (inverted-V

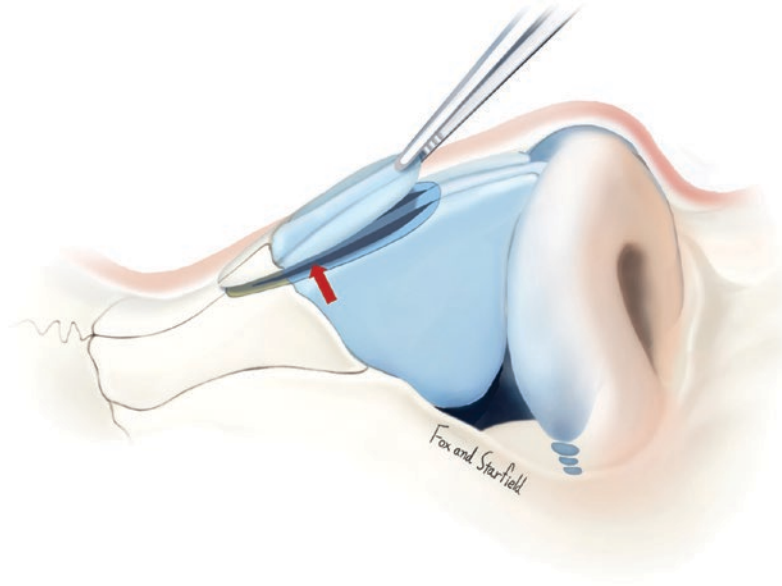


**Fig. 4** Composite resection of hump can result in inferomedial collapse of upper lateral cartilages

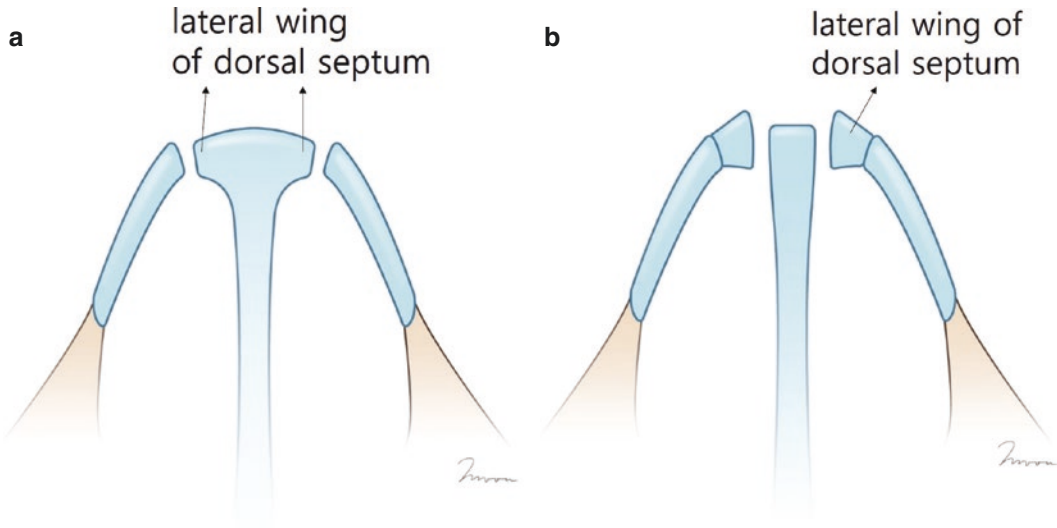


**Fig. 5** Component resection of hump. (**a**) During component resection, if the lateral wing of dorsal septum is incorporated into dorsal hump resection, it will decrease the dorsal width and result in inverted-V deformity. (**b**) The correct component resection preserves the lateral wing of dorsal septum with the upper lateral cartilages

deformity) and open the internal valve. If there is a pre-existing collapse or deficiency in the dorsal septum, the deficient area is augmented using the thickness of splay graft. If the dorsal septum is not low, the splay graft can cause a dorsal hump. As such, the dorsal septum should be lowered before placement of the splay graft.

The powerful splay effect, however, can result in excessive widening of caudal portion of dorsum.

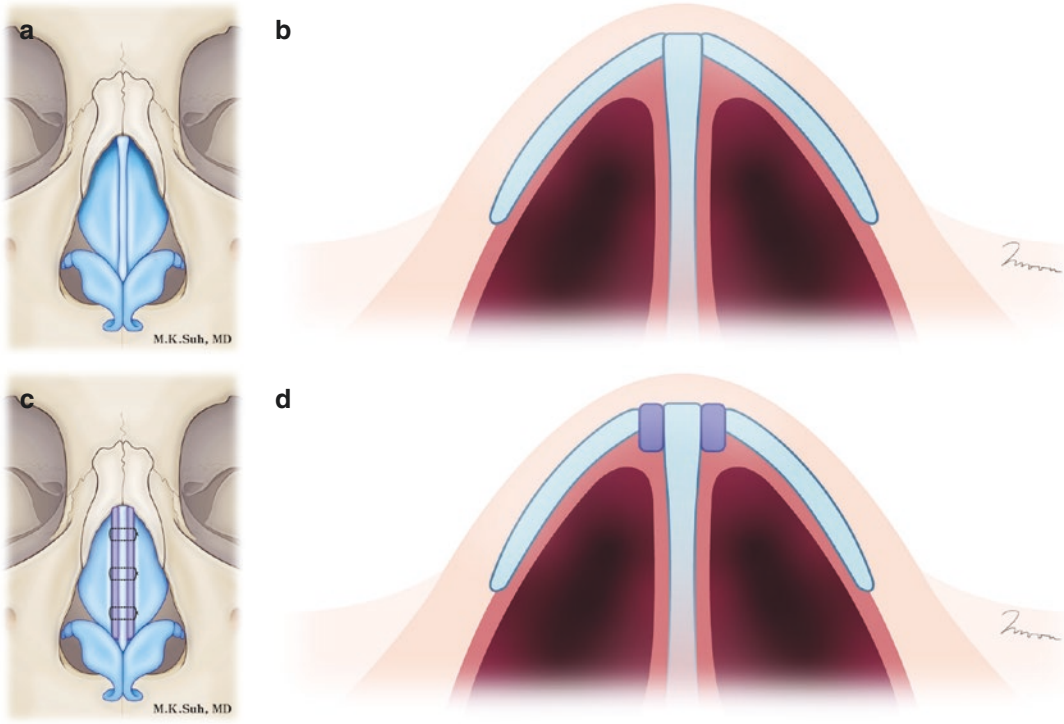


**Fig. 6** Spreader graft to correct the inverted-V deformity. (**a, b**) inverted-V deformity, (**c, d**) Bilateral spreader grafts were placed between the dorsal septum and upper lateral cartilages

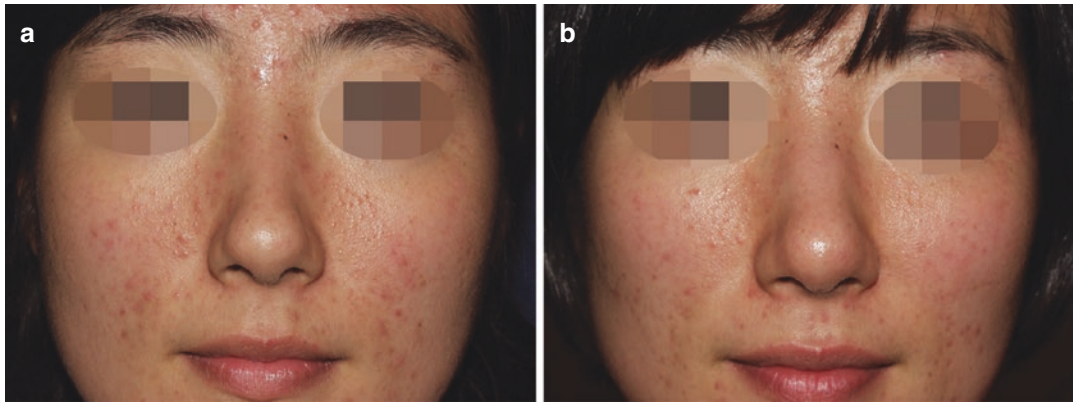


**Fig. 7** Correction of inverted-V deformity using bilateral spreader graft. (**a**) Preoperative photograph, (**b**) Postoperative photograph at 4 months

## Saddle Nose Deformity

As the frequency of using septal cartilage for rhinoplasty increases, the saddle nose deformity becomes an extremely familiar clinical entity for a rhinoplasty surgeon. The deformity refers to sunken nasal dorsum from loss of septal support and/or nasal bone height loss (Fig. 9). It is characterized by mid-vault collapse and involves cartilaginous component and/or bony component of

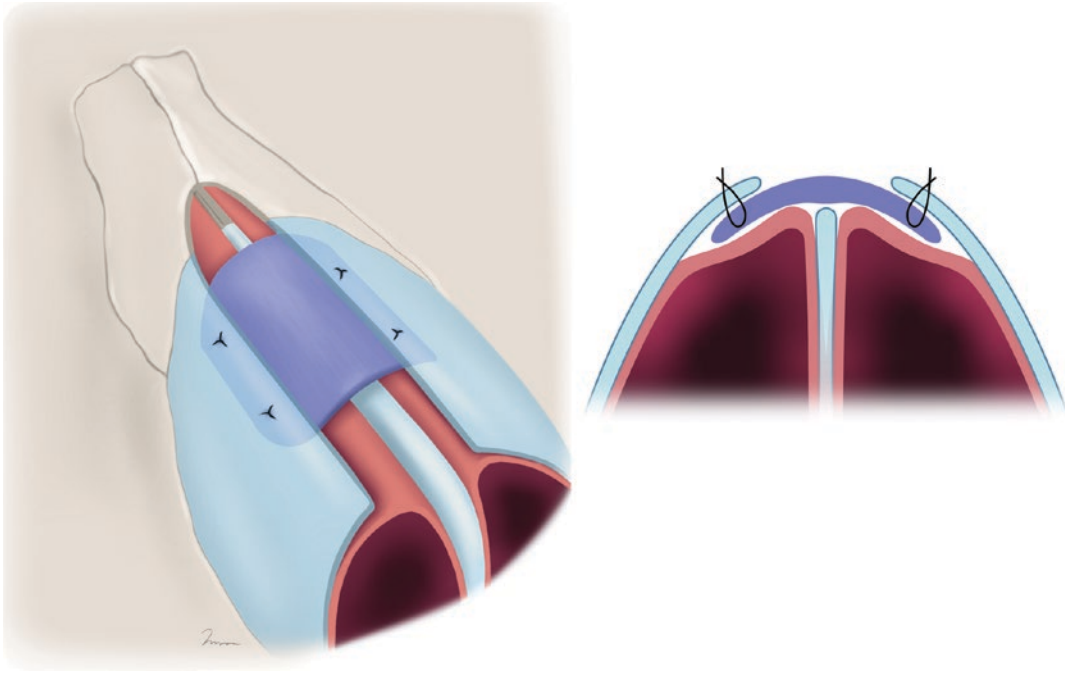

**Fig. 8** Splay graft

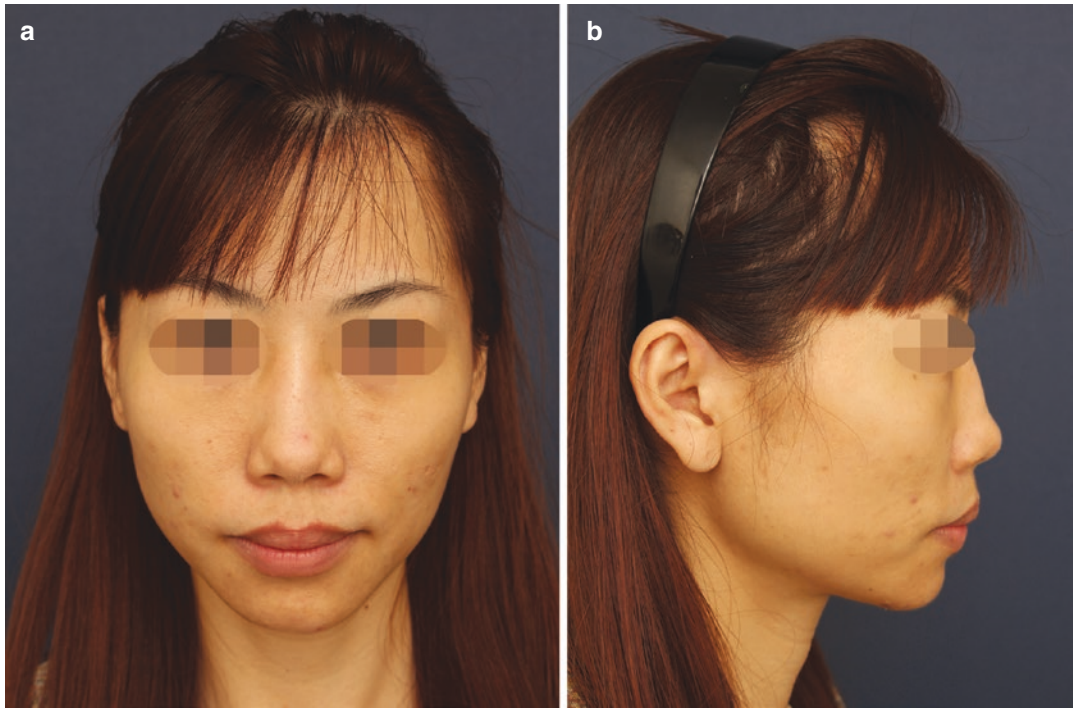


**Fig. 9** Saddle nose deformity after submucosal resection (SMR) (**a**, **b**)

the dorsum. The deformity has various clinical features:

1. Mid-vault depression due to loss of cartilaginous and bony support of mid-dorsum.
2. Tip de-projection.
3. Cephalic rotation of the tip (upturned tip).
4. Columellar retrusion.

The collapse in upper and lower lateral cartilages can lead to internal and external valve collapse leading to nasal obstruction.

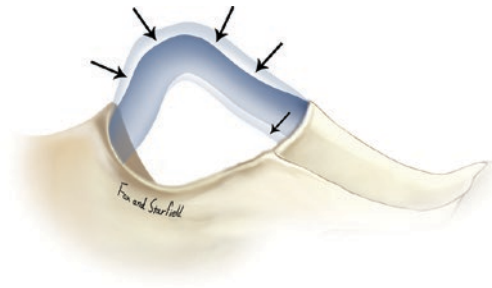

**Fig. 10** Without a robust septal L-strut, the dorsal and caudal septum will gradually collapse with the contracture of scar tissue and aging process

## Causes and Classification

Saddle nose can be caused by prior septal surgery, septal hematoma, septal infection leading to abscess, severe external trauma to the nose, recurrent polychondritis, Wegener's granulomatosis, sarcoidosis, congenital syphilis, leprosy, and cocaine abuse. Even if the most common cause of mid-vault collapse is nasal trauma, the most important cause of saddle nose is insufficient septal L-strut from a prior SMR or septal cartilage harvest. The usual recommendation is to leave a strut with 10–12 mm of width. However, the dorsal strut may need to be up to 12–15 mm wide, depending on the thickness of septal cartilage. An L-strut of inadequate width may appear to be normal during the operation, but can result in dorsal collapse over several years due to contracture of scar tissue and aging process (Fig. 10). Sometimes, even if septal L-strut of appropriate width is left, acute collapse can occur due to external trauma on nasal dorsum.

The classification of saddle nose deformity has been introduced by a number of authors. The classification based on septal condition and tip and columellar deformity is important for correlating the severity of deformity and treatment modality. Daniel and Brenner classified the deformity according to the severity, with treatment modality for each classification.

Each classification has its own advantage, but a new classification is needed to reflect the hidden septal collapse that is not uncommon in Asians. As such, the author uses the following modified classification for Asian saddle nose (Fig. 11).

- Type I: mild supratip depression with/without slight columellar retraction, while tip projection is not affected. Deformity is stable and not progressive.
- Type IIa: mild supratip depression and columellar retraction (like in type I deformity) but supratip depression becomes worse with manual pressure and the deformity is progressive recently. The manual palpation to evaluate for depression is very important in determining the treatment method (Fig. 12).
- Type IIb: advanced deformity with mild loss of tip projection and columella retraction.
- Type III: total loss of cartilage vault integrity, flattening of the nasal lobule, and severely retracted columella.
- Type IV: Type III and loss of bony vault integrity.

## Correction of Saddle Nose Deformity

As described above, the saddle nose deformity exists in a wide spectrum from minimal mid-dorsal depression to severe collapse of whole dorsum. Depending on the severity, the treatment option can range from simple camouflage technique to structural reconstruction.

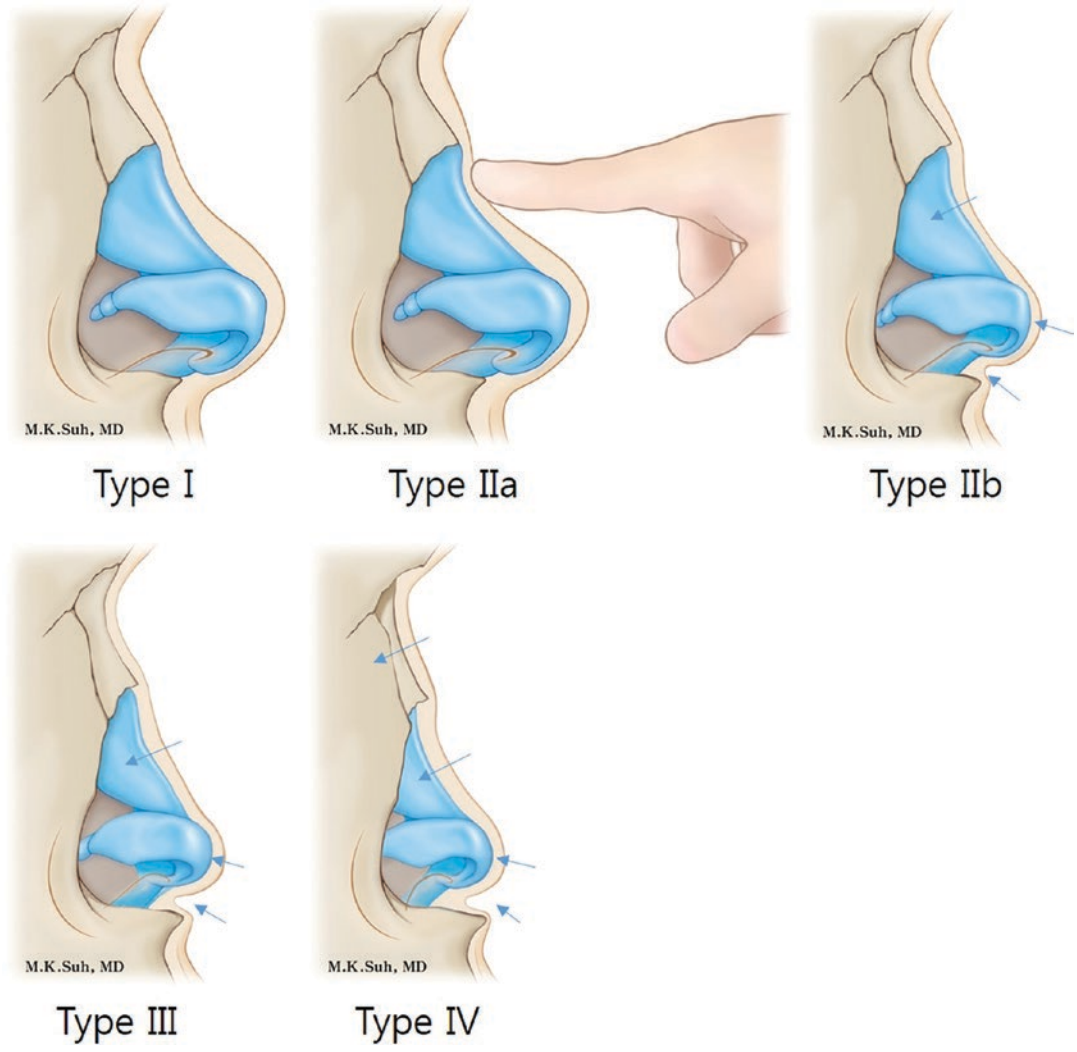


**Fig. 11** Author's classification for Asian saddle nose deformity
Type I: mild supratip depression with/ without slight columellar retraction, while tip projection is not affected. Deformity is stable and not progressive.
Type IIa: mild supratip depression and columellar retraction (like in type I deformity) but with supratip depression with manual pressure with progressive deformity. The manual palpation to evaluate for depression is very important in determining the treatment method (Fig. 16–100).
Type IIb: advanced deformity with mild loss of tip projection and columella retraction.
Type III: total loss of cartilage vault integrity, flattening of the nasal lobule, and severely retracted columella.
Type IV: Type III and loss of bony vault integrity

## Camouflage Operation for Type I Static Saddle Nose

The author believes that camouflage technique can be very useful in type I mild saddle nose. For the camouflage technique to be possible, the most important prerequisite is that the septal support compromise should be static, not progressive without functional problem. To confirm this, it is necessary to obtain information from the patient that supratip sinking has not progressed in recent

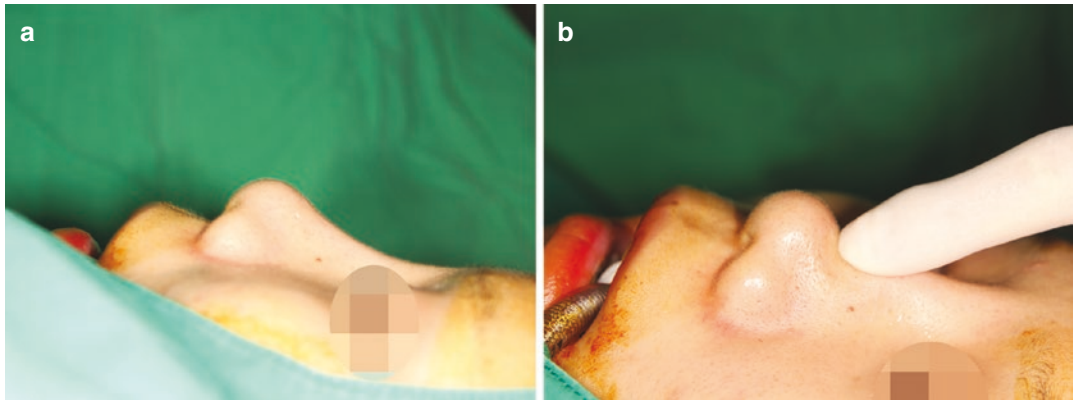


**Fig. 12** An example of Type IIa saddle nose. The saddle is not readily visible (**a**) but becomes apparent with gentle pressure on the dorsum (**b**)

years. A more important factor is: when manual compression is applied to supratip area, sinking should not be more severe and should be stable. This supplies extremely important information regarding stability of supratip and tip support. Cotton swab palpation and rhinoscopy can provide supplemental information.

Type I saddle nose (mild supratip depression and columella retraction, without tip projection problem with static dorsal septal cartilage) can be treated with camouflage technique using cartilage onlay graft on mid-dorsal sunken area (Fig. 13).

For the camouflage technique to be valid, the surgeon must palpate the mid-vault to confirm that the dorsal septum is stable. One or multiple layers of crushed conchal or rib cartilage can be grafted for camouflage purpose (Fig. 14). The graft can be placed to the sunken area through the intercartilaginous or inframarginal incision. Cartilage graft does not undergo significant resorption, and overcorrection is unnecessary. Camouflage graft for columellar retrusion can be placed through transfixion incision. Diced cartilage can also be used but is not as predictable as solid cartilage grafts due to resorption.

The camouflage technique can be performed with alloplastic implant (Fig. 15). Among implants,

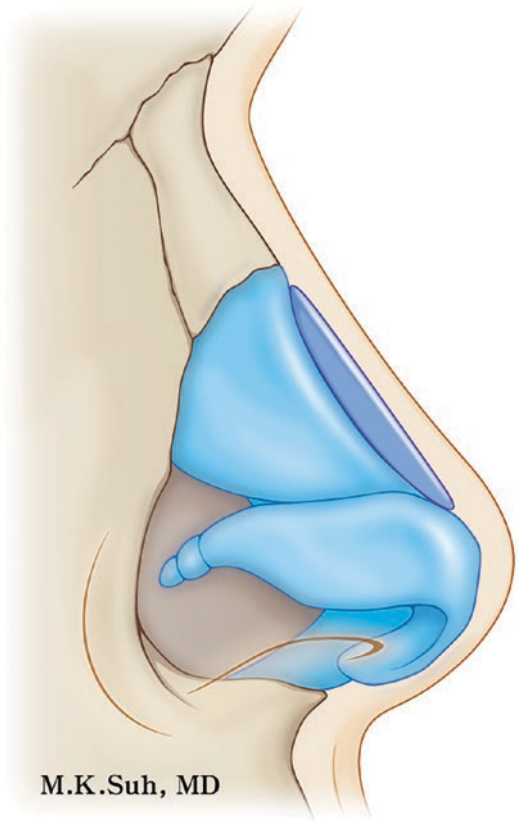


**Fig. 13** Camouflage technique (cartilage dorsal onlay graft) for Type I saddle nose


**Fig. 14** Correction of Type I saddle nose using cartilage onlay graft. (**a**) Preoperative photograph, (**b**) Postoperative photograph at 7 months

e-PTFE implant is more recommended, because when the implant is placed on the supraperichondrial plane, e-PTFE implant is less movable and fixated more firmly compared to silicone implant.

Soft tissue like dermis or fascia graft is less predictable from resorption and is not generally recommended for this camouflage purpose.

Camouflage technique can provide a relatively easy technique to correct the mid-vault depression of a saddle nose with stable septum, while allowing for a soft movable tip. However, patients should understand that it is not without recurrent sunken deformity.

Camouflage technique should be performed only after a sufficient amount of time has passed for a saddle nose to have stabilized. Also, this technique should not be used where a wide dissection is required for additional procedures, in order to minimize the effect of scar contracture. In Asian patients with thick skin, scar contracture can rarely lead to sudden worsening of saddle nose.

## Anatomical Structural Reconstruction

Type IIb and more severe saddle nose type III require anatomical L-strut reconstruction costal cartilage. This reconstruction consists of bilateral extended spreader grafts and a columellar strut (Fig. 16).

The harvested costal cartilage is sliced into thin lengthwise slices and allowed to warp in an antibiotic solution for at least one hour. There are two ways to slice costal cartilage. One is a coronal slicing and the other is a sagittal (anterior-to-posterior direction) slicing (Fig. 17). Which of the two methods is suggested depends on the case. Generally, sagittal slicing is more recommended because it is easier to perform and has less warping. A symmetric pair of warped pieces of sliced

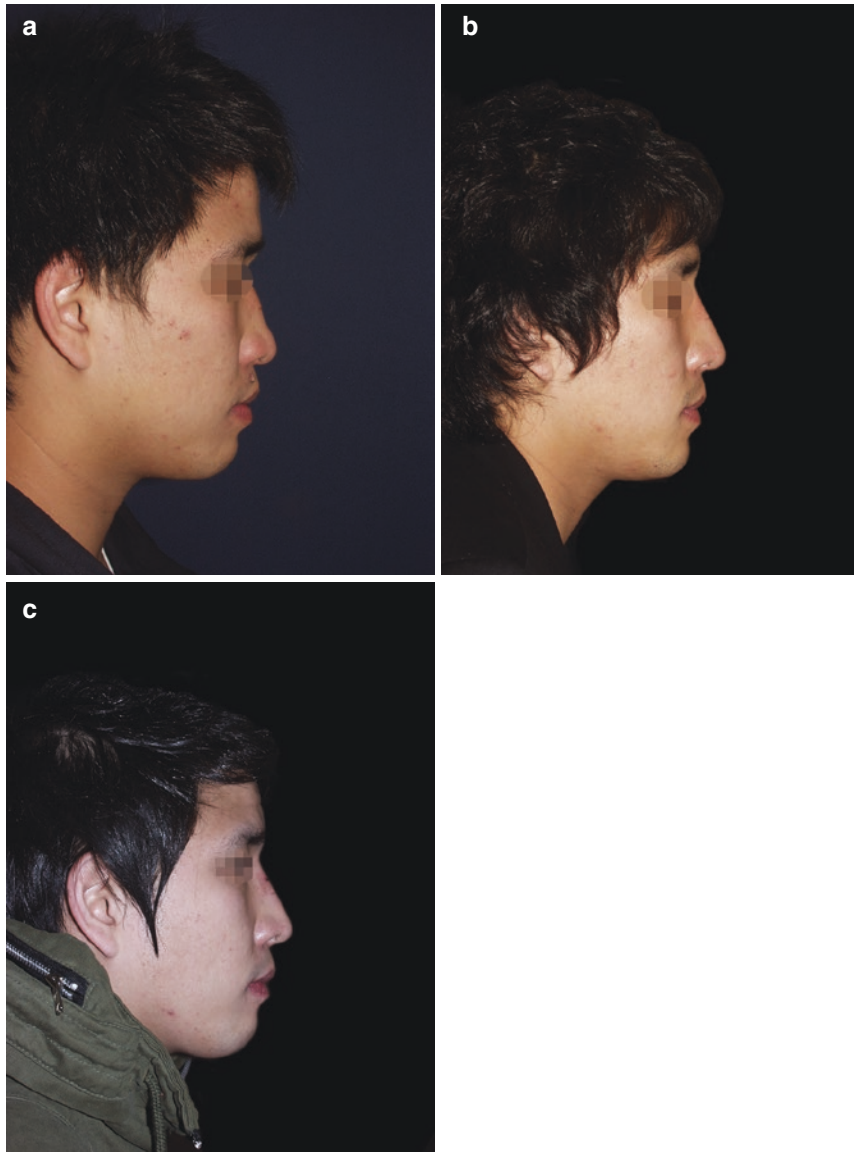


**Fig. 15** Saddle nose correction using an e-PTFE implant. (**a**) In this patient with history of submucosal resection, an episode of nasal trauma onto the weakened septum was the cause of saddle nose deformity, which was addressed with dorsal augmentation (e-PTFE implant) and tip plasty (columellar strut graft using conchal cartilage), (**b**) Postoperative photograph after 1 year. (**c**) At 3 years after the operation, the patient returned to the clinic after an episode of trauma to the nasal dorsum. No deformity is appreciated except for the minor soft tissue trauma

costal cartilage are chosen and placed on both sides of the dorsal cephalic septal stump (Fig. 18).

The cephalic end of extended spreader grafts is inserted cephalically under the nasal bone and fixed to the remaining dorsal septal stump. If the septal stump is unstable, the cephalic end of rib cartilage is placed under the nasal bone and fixated with a suture through a hole drilled in the nasal bone (Fig. 19). Alternatively, the caudal border of the nasal bone is excised in a wedge

shape, and the proximal end of grafts is secured to the wedge and fixated with a suture through a drilled hole. Extended spreader grafts enhance the function of internal valve.

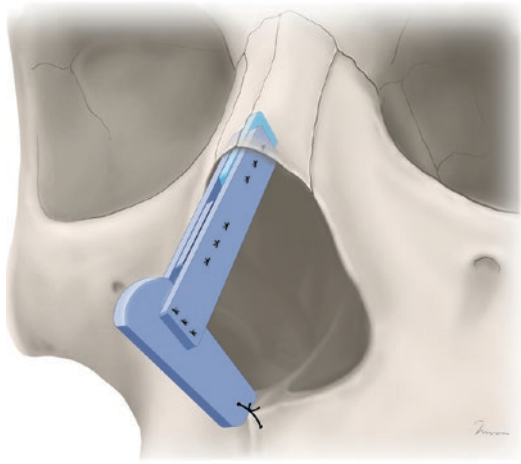

**Fig. 16** Septal L-strut reconstruction using bilateral extended spreader grafts and a columellar strut

Shorter, wider straight piece of sliced costal cartilage is placed between the two caudal ends of extended spreader grafts. This is the fixed type of columellar strut graft, which should be wide enough (10–15 mm) and designed to push down the columellar labial angle and project the tip. This strut graft is sutured to or in front of the anterior nasal spine. Firm fixation of the graft to premaxilla area is critical for stable reconstruction of L-strut. The fixation suture may be easier to fix to the periosteum of anterior nasal spine. However, if that is not possible, drilling a hole in the anterior nasal spine is required. Anterior end and caudal margin of the strut graft should be positioned more anteriorly and caudally, respectively, to the caudal end of spreader graft to project the tip and move the columella caudally (Fig. 18). Upper lateral cartilages are lifted, pulled caudally, and fixated to the strut graft. Additional tip projection or elongation can be achieved by cartilage onlay or shield grafts.

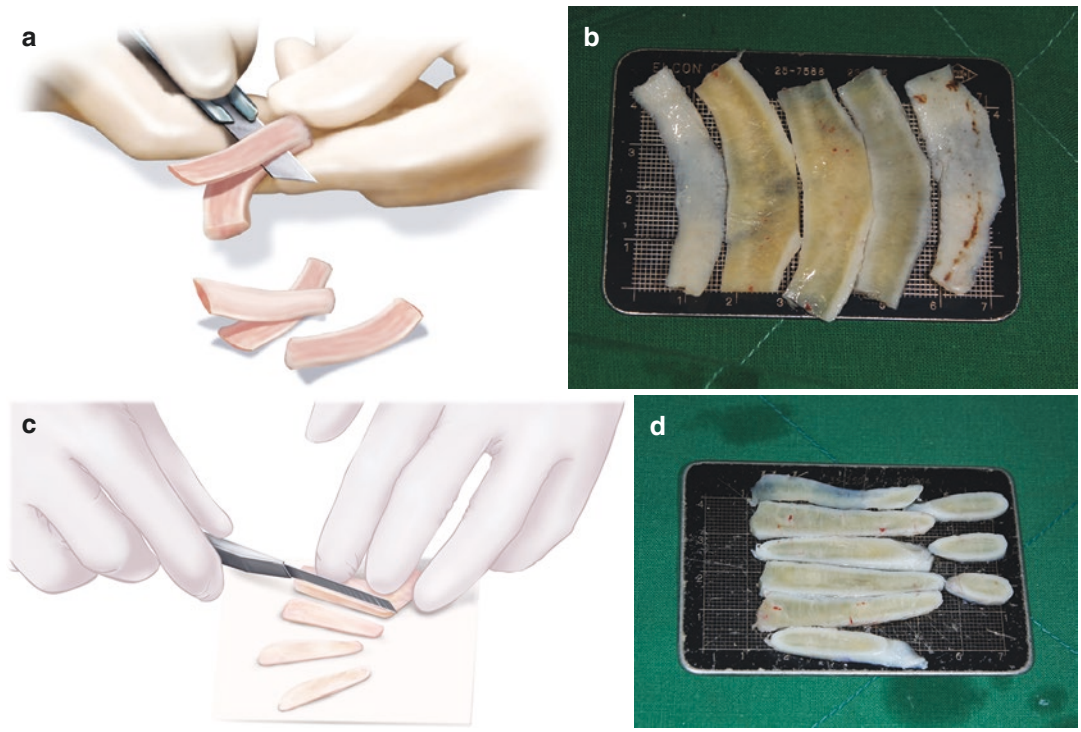


**Fig. 17** Two techniques of slicing costal cartilage. (**a, b**) Coronal slicing, (**c, d**) Sagittal (anterior-to-posterior) slicing

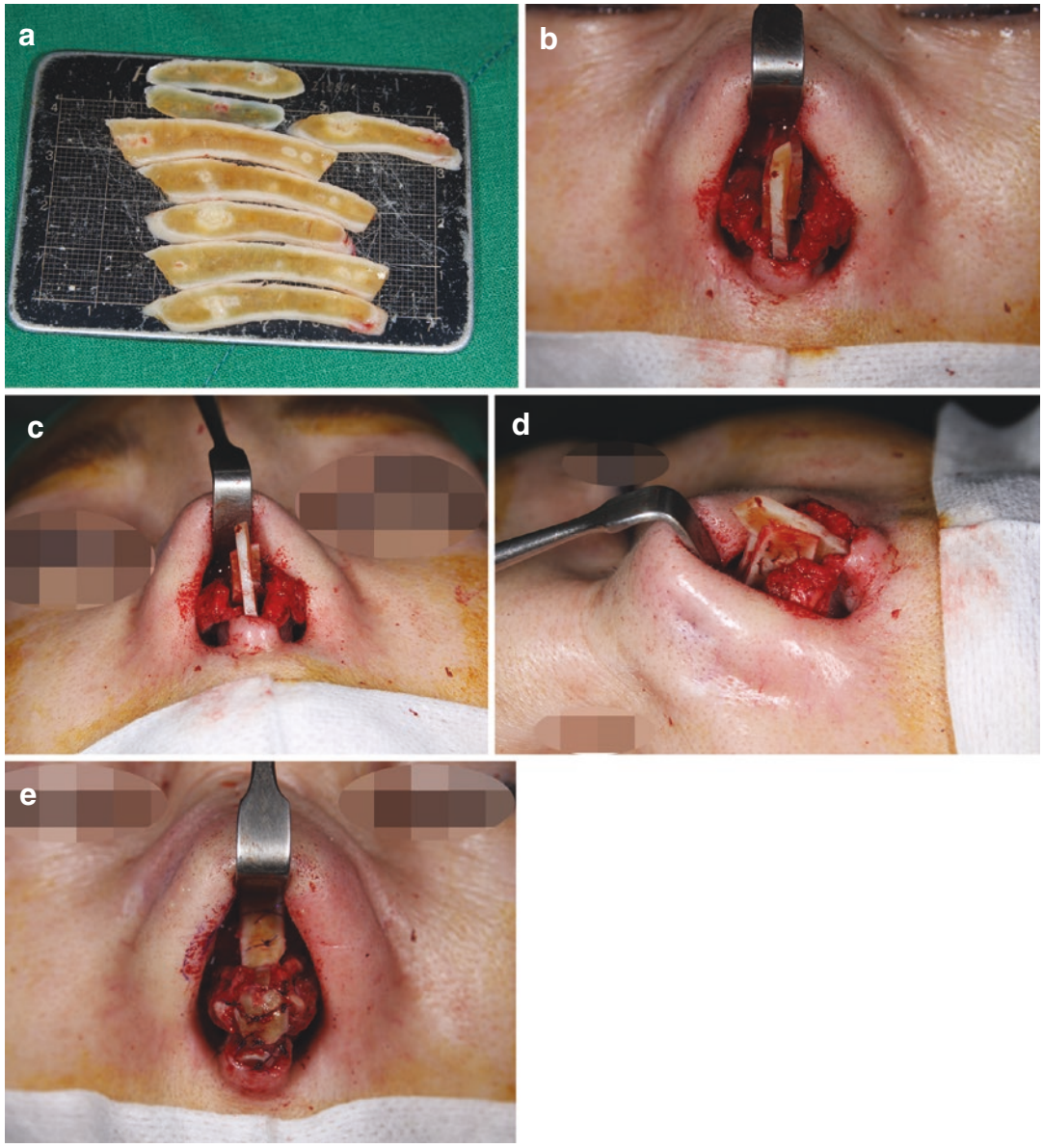


**Fig. 18** L-strut reconstruction using the costal cartilage. (**a**) Sliced costal cartilage, (**b, c, d**) After upper lateral cartilages were detached from the dorsal septum, the collapsed septal L-strut is reconstructed using bilateral extended spreader type of septal extension graft and columellar strut graft using costal cartilage. Caudal margin of the columellar strut graft is positioned more caudally and anterior end of the graft placed more anteriorly to the caudal end of spreader graft to project the columella and nasal tip. (**e**) Lower lateral cartilages are fixed to the strut graft. Tip shield graft, plunging graft, and dorsal onlay graft were performed using costal cartilage

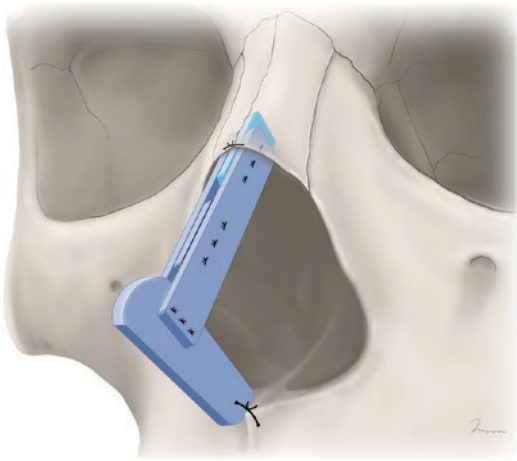

**Fig. 19** Cephalic end of the graft can be fixed to the nasal bone after drilling the holes on the nasal bone

In Fig. 20, a female patient has sunken mid-vault concealed by dorsal implant and upturned tip. She underwent removal of dorsal silicone implant, capsulectomy, lateral osteotomy to reduce nasal bony width, L-strut reconstruction using extended spreader graft and columellar strut graft (costal cartilage), and dorsal augmentation (allograft dermal graft).

A longer and wider slice obtained from coronal section of harvested costal cartilage can used as an alternative to a tongue-and-groove technique (septal extension graft plus columellar strut graft) described above and allow a single block technique (Fig. 21).

The operator is likely to be tempted to correct a Type IIa deformity with a camouflage technique. However, the camouflage technique does not resolve any underlying structural weakness and can result in progressive dorsal collapse, which will require another revisional operation. Operator must fight temptation to correct Type IIa with simple dorsal onlay graft. The author recommends anatomical structural reconstruction for Type IIa, whenever possible.

One of disadvantages of structural reconstruction (L-strut reconstruction) using costal cartilage is very rigid nasal tip. For a soft and mobile tip when performing L-strut reconstruction, the costal cartilage graft for columellar strut supporting the caudal end of bilateral extended spreader graft can be placed in a more cephalic position without contacting the medial crura of lower lateral cartilages, while the columellar strut and derotation grafts using conchal cartilage are placed more caudally for the tip projection.

## Dorsal Augmentation

In Asian patients with low dorsum, dorsal augmentation is necessary in addition to mid-vault reconstruction. The stability of L-strut and tip position are established using the techniques mentioned above. The dorsal augmentation is performed as the last step because strong stable L-strut and firm tip posture is fundamental to dorsal augmentation.

Autogenous tissue is ideal for correction of saddle nose. Among them, choice of autogenous material for dorsal augmentation is costal cartilage. Costal cartilage can be used as block type, multilayered type, or diced cartilage wrapped in temporal fascia.

The typical solid costal cartilage graft technique is the block rib cartilage technique. A graft with balanced intrinsic stress can be obtained by using the core portion of the cartilage (Figs. 2.16 and 2.17). The graft is fixed to the cephalic portion of the upper lateral cartilage and caudal portion of extended spreader graft using PDS 5-0 sutures.

Multilayered costal cartilage grafting developed to minimize the complication of graft warping can be an effective alternative technique of solid costal cartilage graft for nasal dorsal augmentation.

Harvested costal cartilage is sliced into thin pieces and then submerged in a saline-filled container for at least 30 min to expose the warping tendencies. Several pieces of thinly sliced cartilage are piled-up according to the desired height using a 5-0 PDS suture. A block of piled-up, mul-

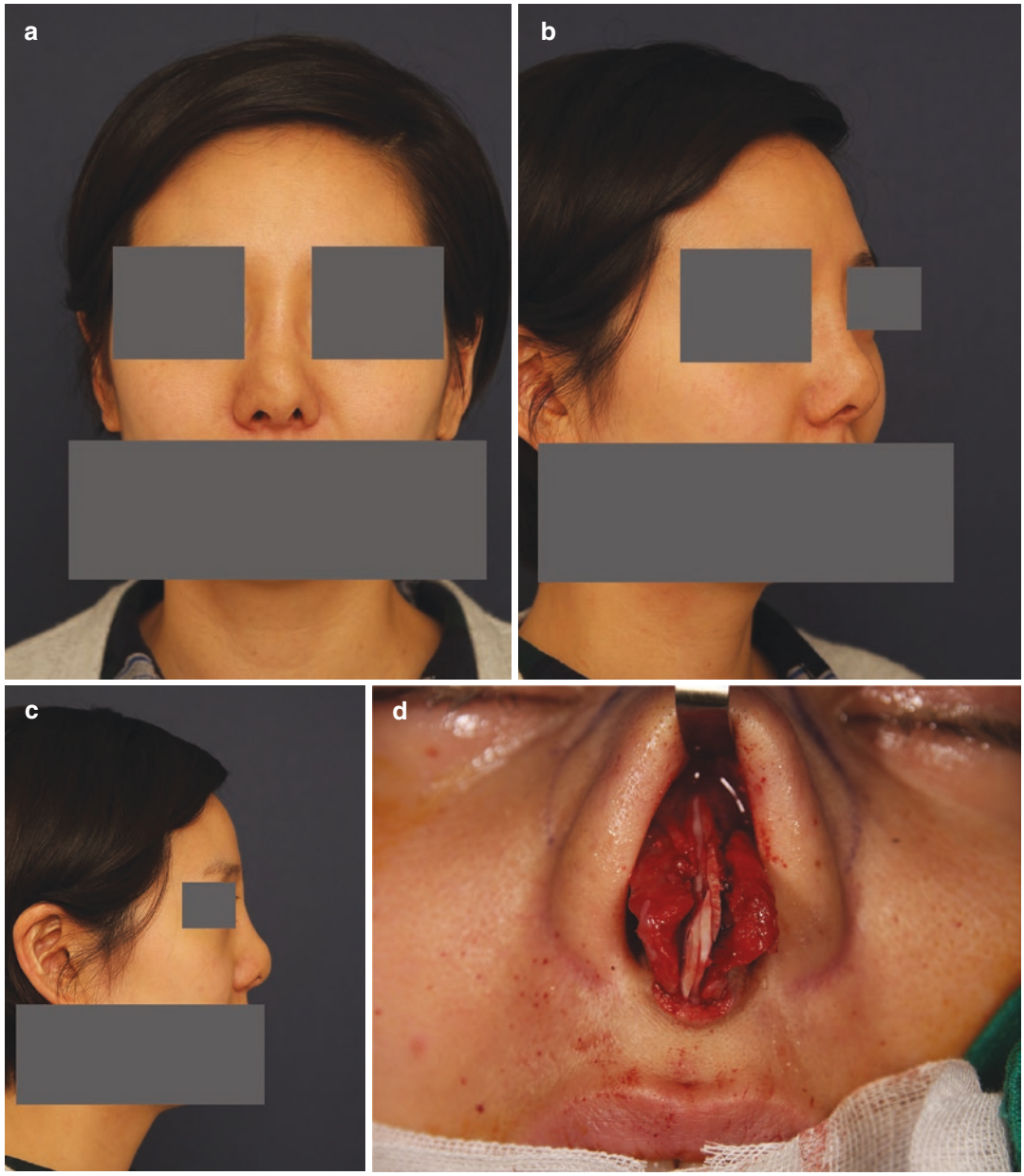


**Fig. 20** L-strut reconstruction for the correction of saddle nose deformity. (**a, b, c**) This patient has Type III saddle concealed by dorsal implant and short nose. (**d, e, f**) She underwent removal of dorsal silicone implant, capsulectomy, lateral osteotomy, L-strut reconstruction using extended spreader graft and columellar strut graft (costal cartilage), and dorsal augmentation (allograft dermal graft), (**g, h, i**) Postoperative photographs after 3 years

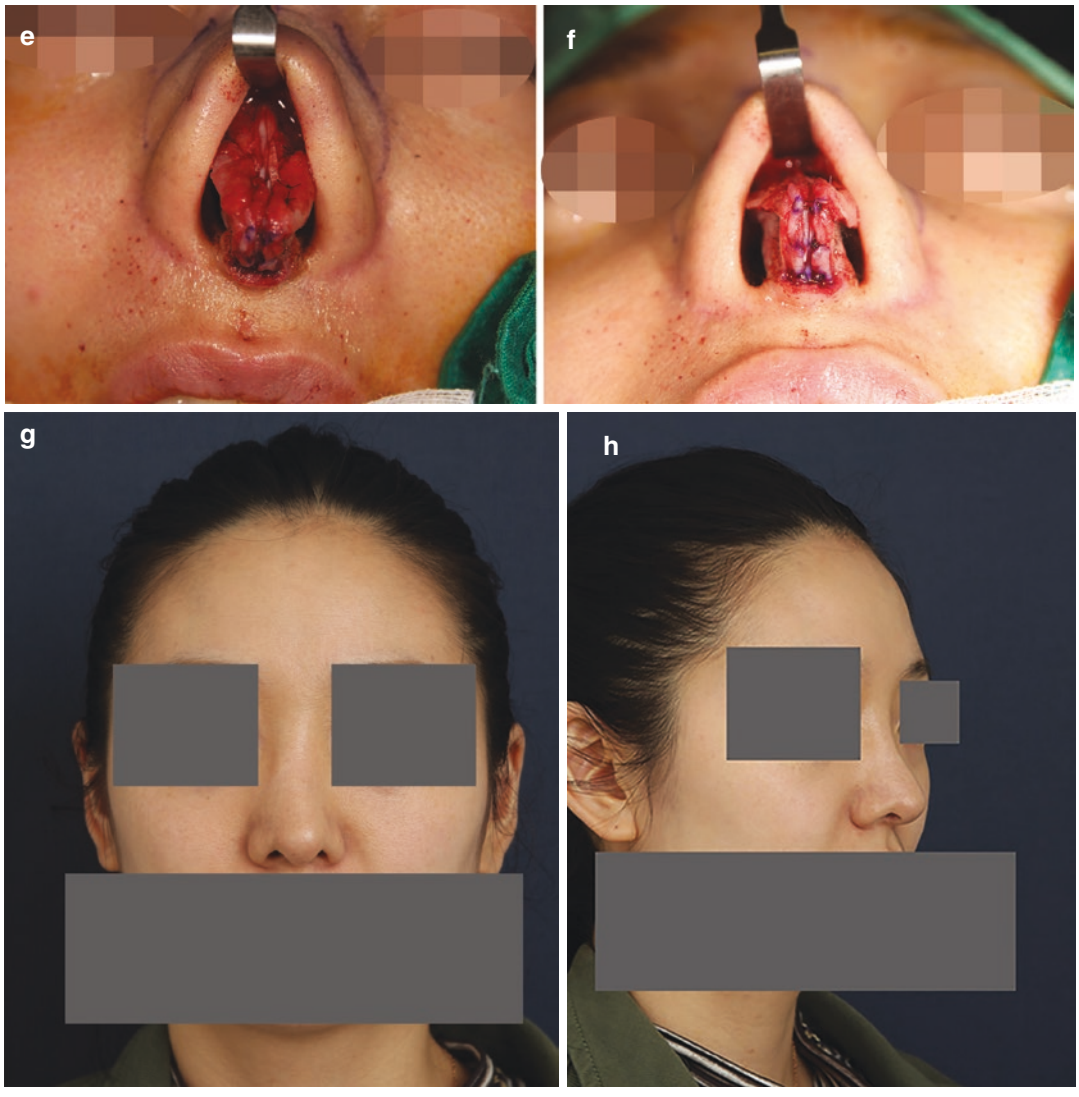


**Fig. 20** (continued)


**Fig. 20** (continued)

tilayered cartilages is trimmed into shape with a No. 15 blade scalpel (Fig. 2.18). Figure 22 is an example of saddle nose correction by L-strut reconstruction using costal cartilage graft and dorsal augmentation with multilayered costal cartilage graft.

The author sometimes considers silicone or e-PTFE implants to be acceptable in selected cases when the autogenous tissue is not available.

## Correction of Type IV Saddle Nose

Type IV saddle nose represents the end stage of septal collapse. Type IV saddle nose is not only accompanied by total collapse of mid-vault but also suffers from bony vault collapse. It is characterized by collapse and flatness of whole nasal dorsum, upturned nasal tip with loss of projection, columellar retrusion and shortening, and occasionally external/internal valvular insufficiency. Reconstructing this type of severe saddle nose usually requires a cantilever dorsal graft with columellar strut graft.

Long and more straight 7th rib cartilage is prepared into a solid block dorsal graft and a columellar strut graft in a tongue-in-groove formation (Fig. 23). The dorsal graft is inserted into a dorsal bed and fixed using a percutaneous K-wire, which is removed after 7 days.

In summary, correction of saddle nose requires a graduated stepwise approach. Reconstruction and stabilization of L-strut is a key to saddle nose correction and provides the foundation necessary for tip and columellar repositioning. And, firm and stable mid-vault and correct tip positioning are fundamental to dorsal augmentation. Stepwise progressive reconstruction of these structures provides stable long-standing esthetic contour and counteracts the contractile forces of scar tissue.

Despite the stepwise reconstruction, a slight mid-vault collapse can occur due to structural instability, aging process, and contractile forces. The first method to reduce the potential for this complication is to apply firm fixation of cephalic portion of the graft and secure premaxilla fixation of the fixed type columellar strut graft. If the fixation of proximal portion of the graft cannot be assured, the nasal bone should be drilled and the graft fixated with a wire. The second method to reduce the mid-vault collapse is to minimize all forms of scarring. The force of scar contrac-

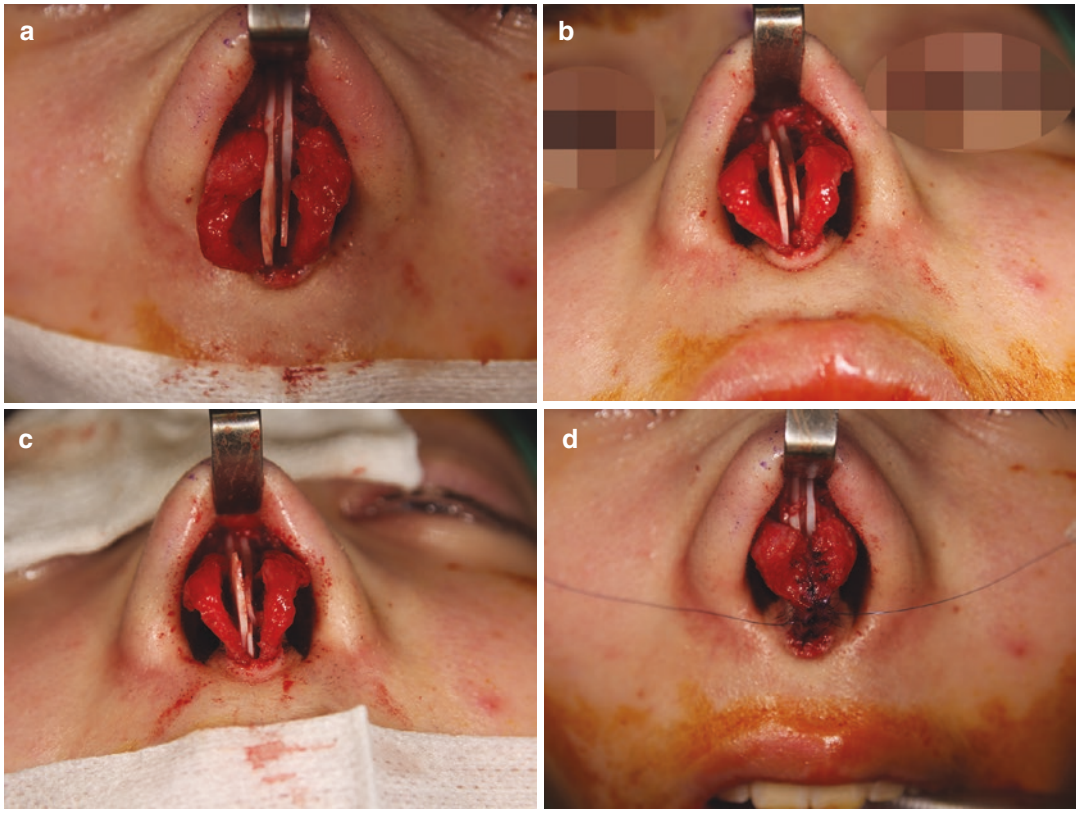


**Fig. 21** L-strut reconstruction using single-piece costal cartilage grafts. (**a, b**) Each of the bilateral grafts is prepared from a single piece of costal cartilage slice. Right graft is placed as spreader graft caudal end reaching anterior nasal spine without the need for columellar strut graft. (**c**) Small graft is placed under left side extended spreader graft for supporting. D: Upper and lower lateral cartilage are fixed to the costal cartilage grafts

ture is extremely high, and the effort to minimize scarring is very important. For this, the operation must be performed at an optimal time, with gentle and minimal dissection, prevention of infection, and postoperative medication to minimize the risk of contracture.

The surgeon and patient should understand the complexities of saddle nose correction and the unexpected problem of nasal frame weakness caused by aging and scar contracture. Both parties must acknowledge that revisional surgery may be needed down the road, and the need for revision should not be regarded as failure of previous operation but as a consequence of unpredictability in the complex healing process.


**Fig. 22** Multilayered costal cartilage graft for saddle nose. (**a, b, c, d**) This female patient who has dorsal silicone implant shows a Type III saddle nose combined with columellar retrusion and deviation. (**e, f**) L-strut was reconstructed with costal cartilage, (**g**) Lower lateral cartilages are sutured to the L-strut. H: Multilayered costal cartilage graft is ready for dorsal augmentation. (**h**) This three-piece costal cartilage graft is ready for dorsal augmentation. (**i, j, k, l**): Postoperative photographs after 3 months

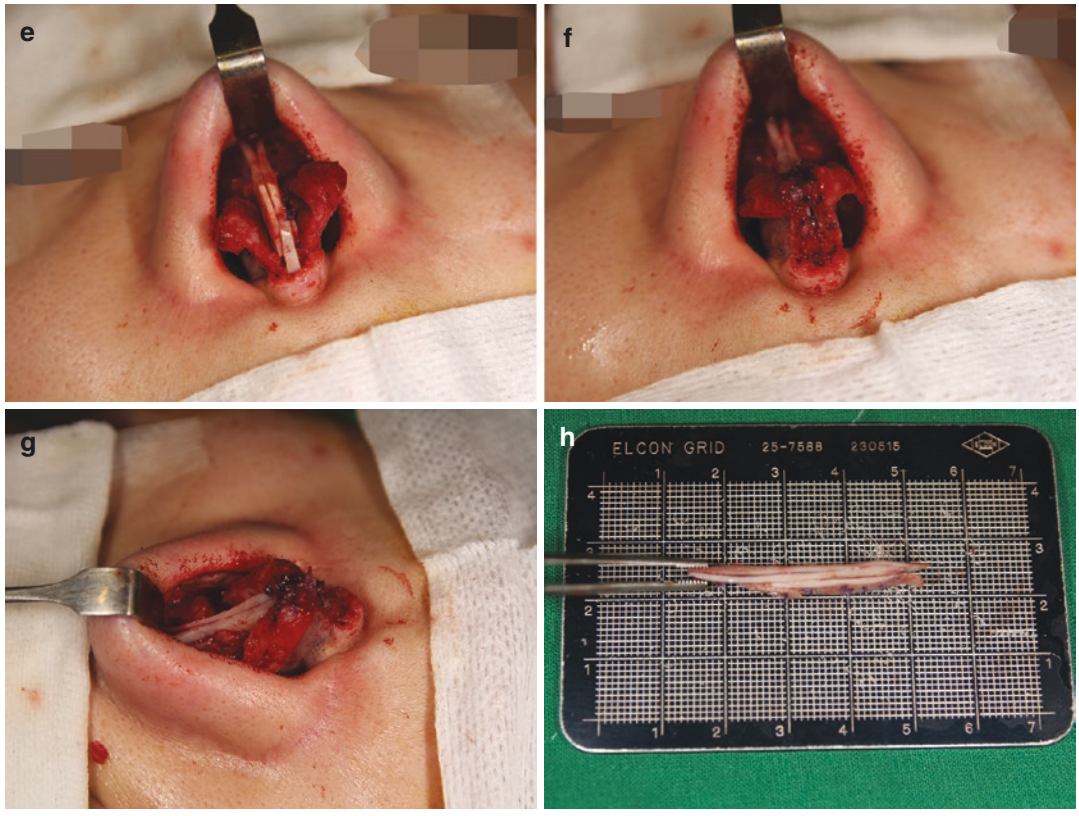


**Fig. 22** (continued)


**Fig. 22** (continued)


**Fig. 23** Correction of Type IV saddle nose. (**a, b, c**) This patient suffered a significant midface injury during a motor vehicle collision. The patient presented with saddle nose, collapsed nasal bone, and upturned nasal tip in spite of multiple rhinoplasties. (**d**) The lower lateral cartilages are released from scar tissue and rotated caudally. Septal support is lost. (**e**) Costal cartilage has been harvested. (**f**) Two-layer carved costal cartilage is ready for dorsal augmentation of about 10 mm in height. To lengthen the upturned nasal tip, a small piece of costal cartilage graft is attached to the caudal end of dorsal graft in the tongue-in-groove pattern. (**g, h**) Graft is placed in position. (**i**) Lower lateral cartilages are sutured to the end of graft. (**j, k, l**) Postoperative photographs at 2 years after reconstruction

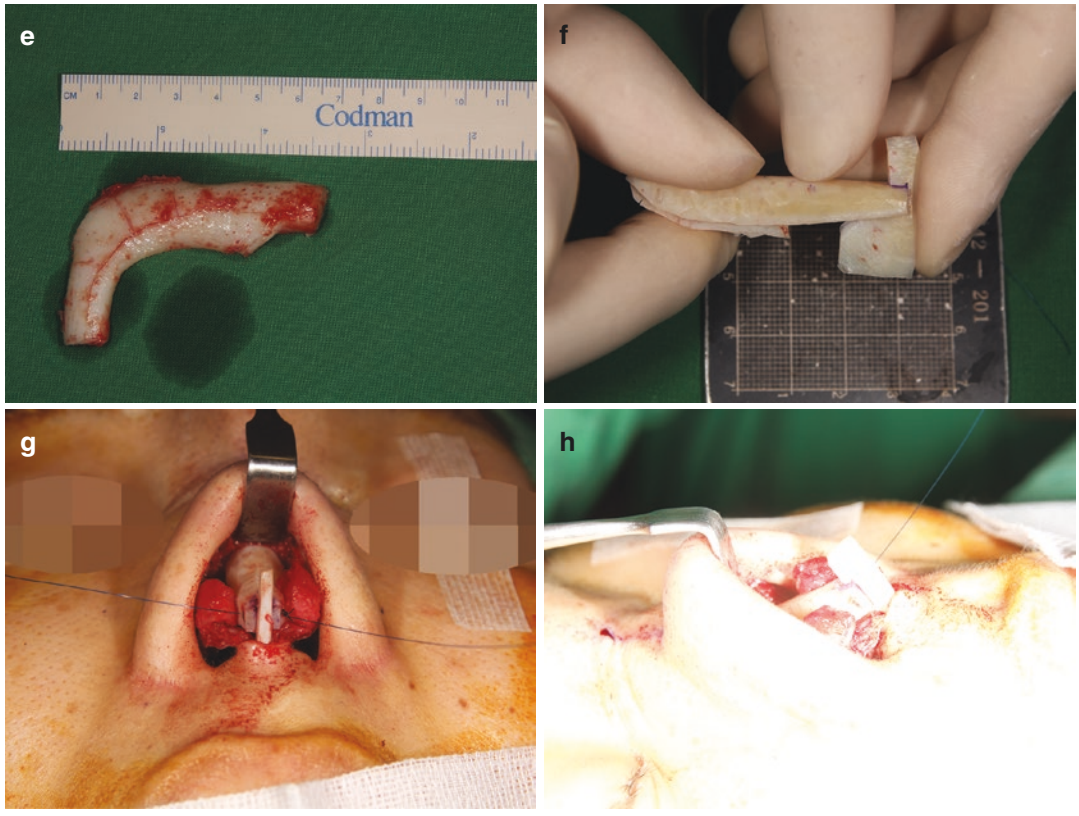


**Fig. 23** (continued)


**Fig. 23** (continued)

## Further Readings

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