

# Chapter 16. Dorsal Augmentation

- **Indications:** Patients who lack adequate height of the bony and/or cartilaginous dorsum may require dorsal augmentation (Figure 16-1). In general, a desirable dorsum for a male patient should be a fairly straight line from the radix to the tip. In women, a slight depression (about 2 mm) below this line (supratip break) may be more appropriate. A “saddle nose deformity” might be a consequence of prior trauma, including necrosis of the supporting septal cartilage secondary to cocaine use. Management requires the addition of supporting material to reconstruct the deficient framework and re-elevate the depressed soft tissues. Historically, a number of replacement materials have been described, but the authors strongly prefer autogenous tissue. Autogenous tissue offers greater resistance to infection than alloplastic material, which is prone to infection and extrusion long term. Cartilage provides a good replacement material since it is autogenous and readily available from the septum, ears, and ribs. In patients who are graft depleted or require greater elevation, bone graft from variable sources (rib, calvarium, iliac crest) can be used. Generally, cartilage is preferred over bone because the latter is hard, brittle, and prone to resorption. In the absence of adequate tissue and/or the desire to avoid donor site morbidity, biocompatible alloplastic materials, such as polyethylene and polytetrafluoroethylene (PTFE), have been utilized.<sup>1,2</sup> The choice of implant is at the discretion of the surgeon and should be based primarily on patient safety.
- **Markings:** No specific markings are required, although the relative contributions of the nasal bones and the septal and upper lateral cartilages should be identified preoperatively. The specific area of deficiency and a rough estimate of the boundaries of the soft tissue pocket should also be noted. External incisions for an open approach are similar to those described previously.

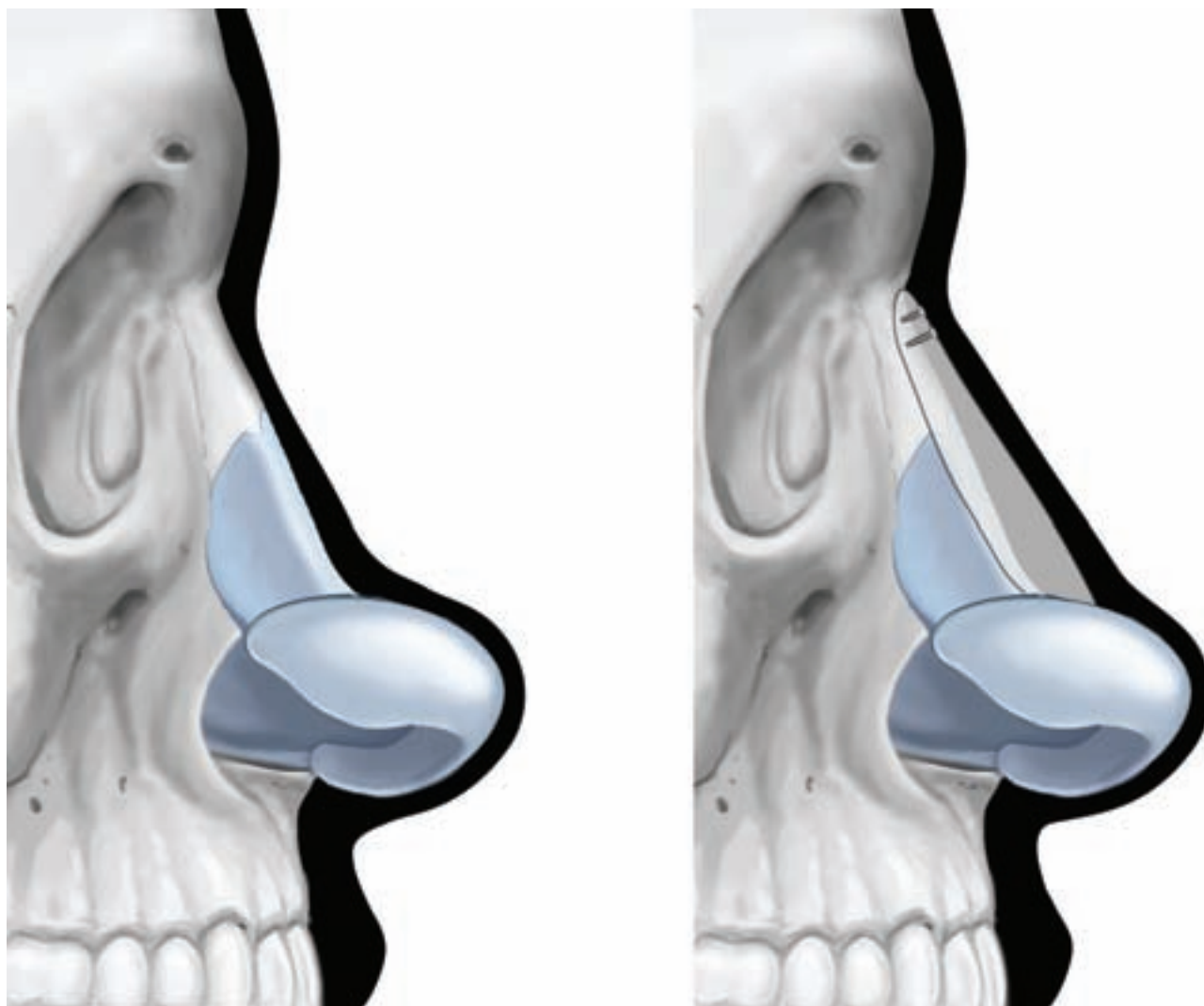


Figure 16-1. Low dorsum and correction by augmentation.

- *Approach:* Modification of the dorsum may be performed via an open or an endonasal approach, but in order to visualize the recipient bed, an open approach is recommended (Figure 16-2). Dissection then proceeds by scissor dissection over the septum to the radix (Figure 16-3). The soft tissue pocket over the dorsum should be made just wide enough to facilitate placement of the graft but not wide enough to permit undesirable malposition. The dorsal aspect of the nose should be sufficiently rasped to create an osseocartilaginous surface to which the graft can incorporate.
- *Several options for graft replacement exist:*
  - *Septal cartilage:* Septal cartilage may be used for augmentation up to 2 mm. However, septal cartilage is frequently used for other grafts or is unavailable. When available, it is easily harvested through a septoplasty approach. It can then be shaped and sutured into its desired position.<sup>3</sup>
  - *Ear cartilage:* For a deficiency of 3–6 mm, ear cartilage is an option. It is easily harvested and its use allows any available septum to be used for other grafts. If the cavum concha and cymba concha are harvested, a straight piece of cartilage can be harvested and smaller pieces can be sutured to the larger piece. If curvature of the ear cartilage is a problem, a polydioxanone foil can serve as a rigid platform to both flatten the ear cartilage as well as serve as a base to which multiple pieces of cartilage can be sutured.<sup>4</sup>
  - *Rib cartilage:* Rib cartilage can be harvested in a multitude of dimensions and is generally abundant in younger and middle-aged patients. There may be some calcification in older patients, and a CT scan can be obtained to identify this calcification preoperatively. The rib is harvested as described above (Chapter 12) and is then carved into the proper dimension. The graft should be shaped like a kayak, narrow cephalically and caudally with its widest dimension at the location of the osseocartilaginous vault. The major problem with rib cartilage is warping. A K-wire can be placed in the graft to resist this tendency. It is recommended to carve the general shape of the graft, then place the K-wire before proceeding to final dimensional detailing. Occasionally, a small detailed graft can fracture during K-wire placement, so it is preferable to place the wire while the graft still has some bulk.
  - *Costochondral graft:* When a large volume of material is necessary from the radix to the tip, a costochondral graft is very useful. Its proximal portion is bone so it will hold a fixation screw and fuse to the underlying nasal bones. The distal portion is cartilage and will have the natural consistency of the distal two thirds of the cartilaginous nose. Because it is congruous with the bony portion, warping is decreased. Because of the larger size of this graft, it is recommended to deepen the radix so the proximal portion of the graft does not compromise the nasofrontal angle. This graft may also be attached to a columellar strut for more support if indicated.<sup>5</sup>
  - *Diced cartilage:* Cartilage from any site can be harvested and minced into 0.5-mm to 1.0-mm particles, which are stored in dilute antibiotic solution. The minced cartilage is then placed in fascia harvested from the temporalis through a hair-bearing incision. The fascia is sutured into a tube and the cartilage is injected into the fascia with a 1-cc syringe with the tip cut off. This then becomes a tube of fascia-filled cartilage that is inserted into the dorsal pocket. Particulate cartilage can also be injected around rib grafts to smooth the edges. Neither of these methods is prone to resorption, but the uncovered grafts may become palpable or visible. It is not recommended to wrap the cartilage in Surgicel<sup>®</sup> because its use has shown to increase cartilage resorption. This technique works well in that any cartilage source can be used and allows use of any leftover cartilage. Warping is not a concern, and the fascial cartilage complex can actually be molded for 10 to 14 days after the operation to maintain ideal dimensions.<sup>6,7</sup>
  - *Irradiated chondral cartilage:* Irradiated cartilage is abundant and avoids a donor site. Some authors report that irradiated cartilage resorbs and is prone to warping even up to 4 weeks after carving.<sup>8</sup> However, the same study showed no difference in warping between irradiated and nonirradiated cartilage. Other studies have demonstrated long term use with minimal resorption and acceptable warping characteristics.<sup>9,10,11</sup>

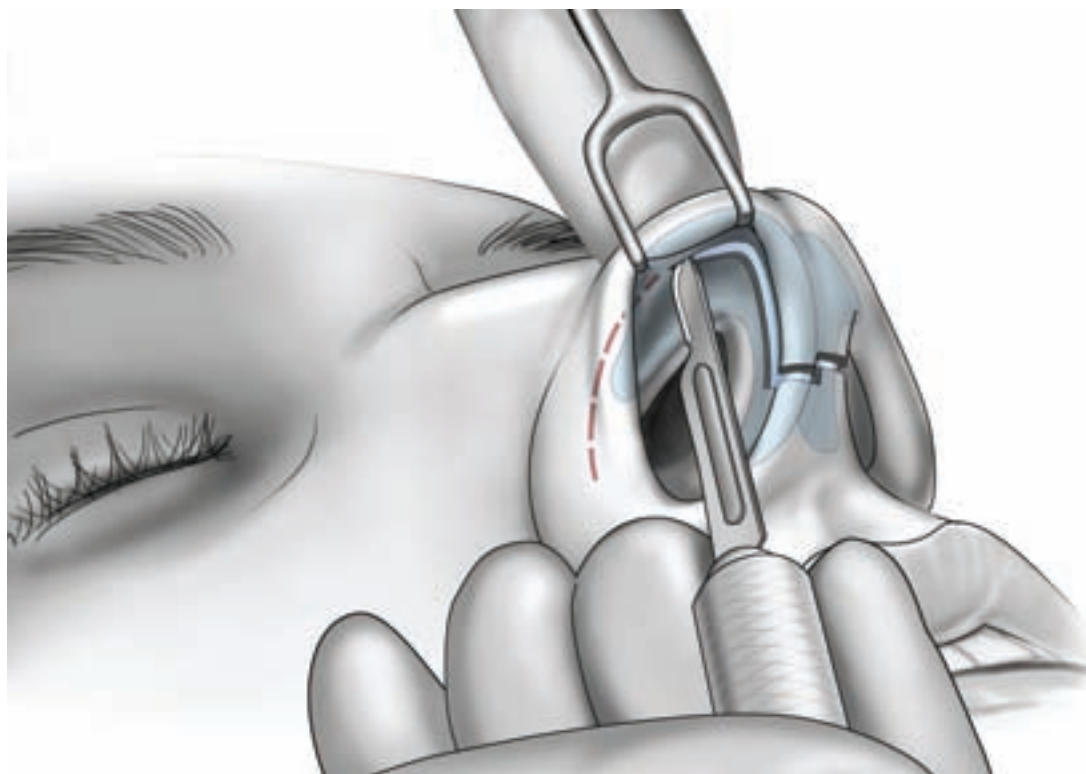


Figure 16-2. Approach to the dorsum via a transcolumellar incision.

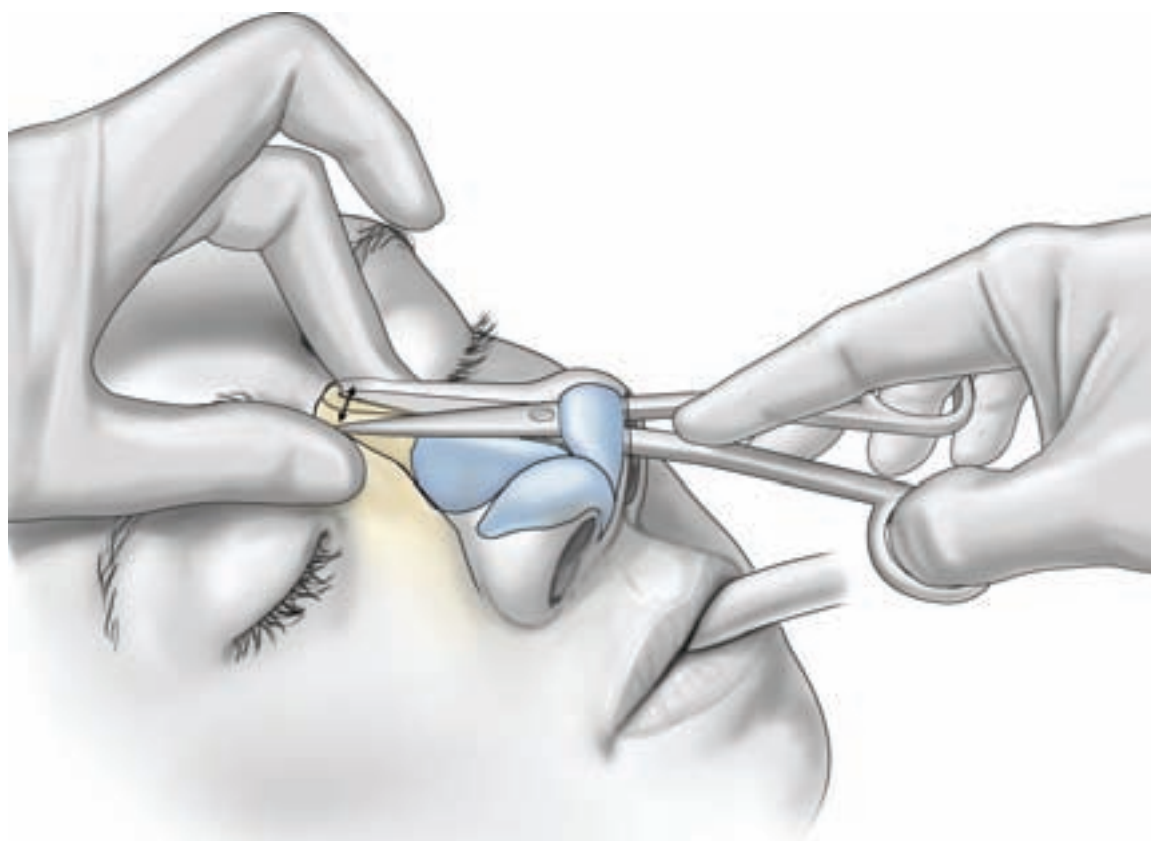


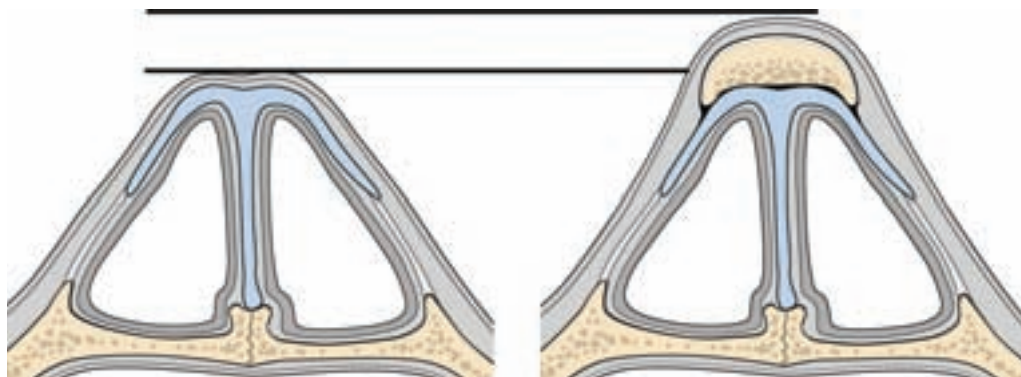
Figure 16-3. Creation of a dorsal overlap just above periosteum for placement of a graft.

- **Technique:**
  - **Graft contouring:** Following harvest, the graft can be manipulated by cutting it or contouring it with a scalpel or burr to the desired size. Fine rhinoplasty files are also useful in smoothing and contouring grafts. A concavity may be created on the inferior surface to stabilize the graft and maximize contact to the underlying dorsum. The edges can be beveled to allow the graft to better blend into the surrounding soft tissues (Figure 16-4). Several pieces of cartilage can also be stacked to create greater height.
  - **Graft placement:** The graft can be guided into place with a transcutaneous suture tied over a bolster and removed after 1 to 2 weeks. The suture is started through the skin just superior to the pocket for the graft and retrieved through the access incision. Suture on a straight needle works well for this purpose. It is passed through the skin, then through the graft, and then again supraperiosteally back up the dorsum and out of the skin just lateral to the opposite end of the suture. It is tied over a bolster of petroleum gauze for fixation. If any irregularity is palpable or visible after graft placement, the graft can be removed and modified or minor irregularities may be covered with small pieces of fascia. Occasionally, a piece of AlloDerm™ may be placed over the dorsum to smooth the final contour.
  - **Graft fixation:** Additional fixation of the graft can be performed in any of several ways.<sup>12</sup> The least invasive is a simple external tape dressing over the skin. While not the most secure option, it will hold the graft in place if the pocket offers little mobility. Temporary fixation of the graft to underlying bone can be performed with either one or two K-wires or one or two titanium screws. The K-wires are passed percutaneously into graft and into the underlying frontal bone being careful not to pass the tip too far. A small-gauge 8-mm or 10-mm length screw can also be placed through a small vertical incision in the region of the glabella over the superior portion of an osseous graft (Figures 16-5 and 16-6). The incision does not have to be long and will usually heal without a perceptible scar. A hole is drilled through the graft and into the underlying bone. The screw is then placed along the same trajectory without directly visualizing the hole. A second screw may be placed through the same incision and into the graft slightly inferior to the first.
  - **Postoperative management:** A splint of either plaster or moldable plastic should be placed over a standard tape dressing over the dorsum. It is kept in place for approximately 2 weeks to allow for healing of soft tissue around the graft.
- **Pitfalls:**
  - Grafts of cartilage may be placed either too low or too high in relation to the glabella and nasion.
  - Postoperatively, the graft may also migrate if dissection of the pocket is too extensive.
  - Dorsal augmentation may make the nose look narrower and cause the tip to rotate inferiorly. The tip may need a tip rotation suture after dorsal augmentation.
- **Tips:**
  - Dissection of the pocket should be directly over the bone to minimize any soft tissue between the graft and the underlying bone and to maximize the blood supply of the skin flap over the graft.
  - The pocket for the graft should be limited to the size of the graft to minimize the risk of malposition.
  - The edges of the graft, whether cartilage, bone, or alloplast, should be “softened” by beveling so that they taper into the surrounding nasal sidewalls and soft tissues. Sharp edges will be seen especially beneath a thin skin envelope.
  - A suture may be anchored to the end of the graft, brought through the skin in the region of the nasion, and tied over a bolster to help position the graft and minimize postoperative malposition.

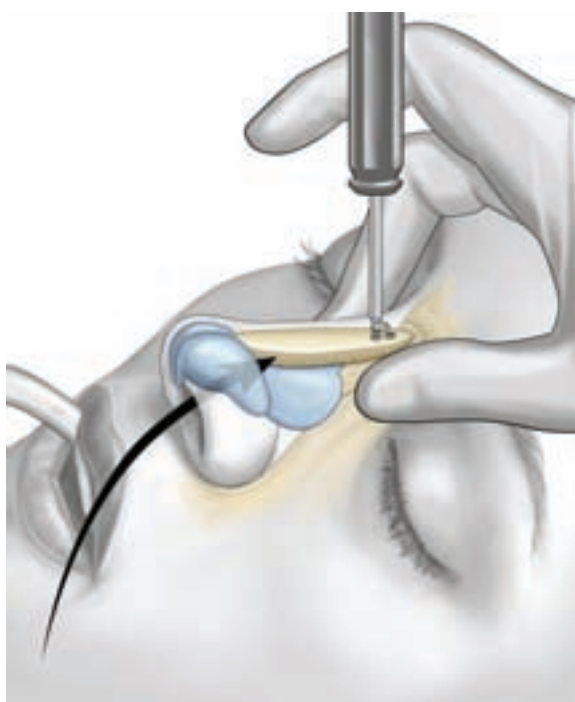
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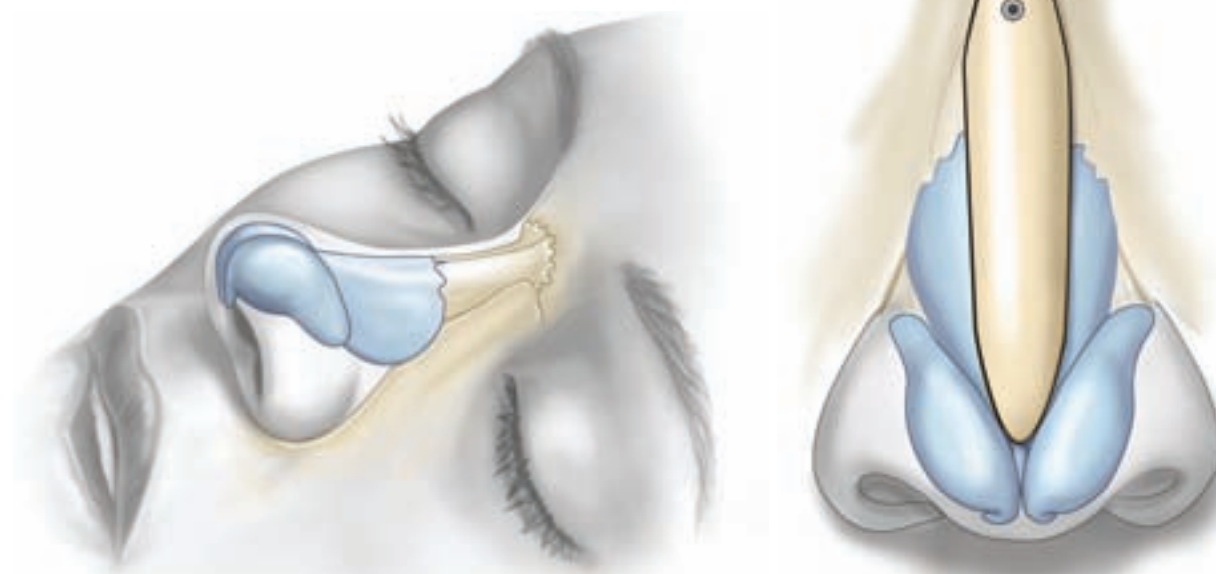




**Figure 16-4.** Augmentation of the dorsum with a graft. Note the slightly hollowed undersurface of the graft to minimize mobility & maximize surface contact.



**Figure 16-5.** Fixation of a nasal dorsal bone graft with microscrew.



**Figure 16-6.** Dorsal graft in place, fixed at the radix and covered distally by the lower lateral cartilages.