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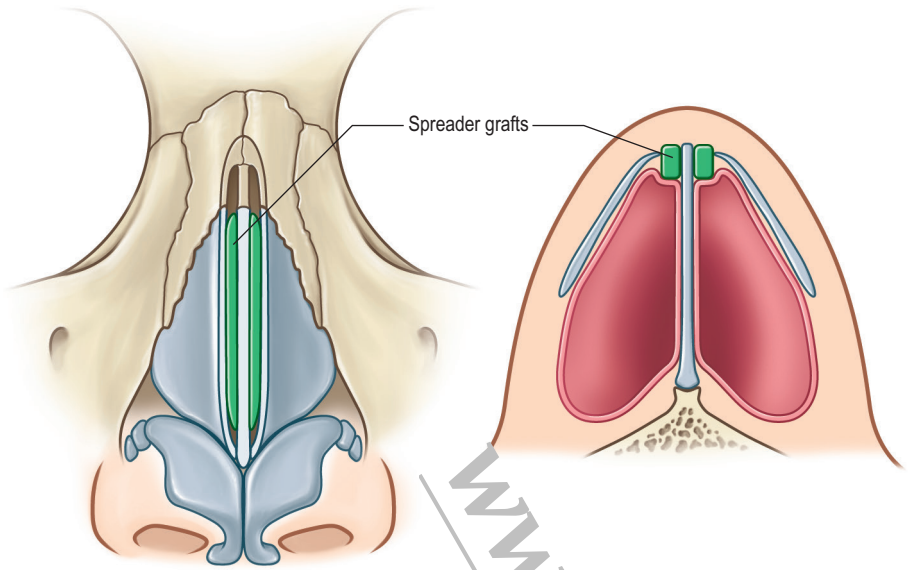

Figure 19.6 Dorsal spreader grafts.

BOX 19.5 Classification of nasal deviations

I. Caudal septal deviation
   a. Straight septal tilt
   b. Concave deformity (C-shaped)
   c. S-shaped deformity
II. Concave dorsal deformity
   a. C-shaped dorsal deformity
   b. Reverse C-shaped dorsal deformity
III. Concave/convex dorsal deformity (S-shaped)

present. Correction of septal deviation is key to improving nasal airflow and correcting the deviated nose.

The following principles are used to correct nasal deviation and perform septal reconstruction: (1) exposure of all deviated structures through the open approach; (2) release of all mucoperichondrial attachments to the septum, especially the deviated part; (3) straightening of the septum, and if necessary septal reconstruction, while maintaining a 10 mm or wider caudal and dorsal L-strut; (4) correction of any caudal septal deviation after the posterior septum has been reconstructed; (5) correction of dorsal septal deviations with cartilage grafting and/or scoring techniques; (6) restoration of long-term support with buttressing caudal septal batten or dorsal nasal spreader grafts; (7) if necessary, submucous resection of hypertrophied inferior turbinates; and (8) precisely planned and executed external percutaneous osteotomies.[43–45]

As opposed to septoplasty, where the septal cartilage is scored in an attempt to straighten it, or submucosal resection, where the majority of the septum is removed other than the L-strut, septal reconstruction differs in that only the portion of the septum causing airway obstruction is removed, with the idea that native cartilage is preserved. It is of critical importance to preserve an L-strut of septal cartilage for structural integrity. The technique for septal reconstruction is similar to that for septal cartilage harvest and is discussed later in this chapter.

Inferior outfracture/limited submucous resection

The turbinates exist as three or four bilateral extensions from the lateral nasal cavity. The inferior turbinate consists of highly vascular mucoperiosteum covering a thin semicircular conchal bone.[47] It is involved in regulation of filtration and humidification of inspired air. In combination with the internal nasal valve, the anterior extent of the inferior turbinate can be responsible for up to two-thirds of the upper airway resistance.[17,48] Posteriorly, the inferior turbinate diverges away from the nasal septum, allowing for reduced upper airway resistance in this area.[17,49]

Inferior turbinoplasty is performed in patients with nasal airway obstruction secondary to inferior turbinate hypertrophy that is refractory to medical management. We prefer a more conservative surgical approach to correct inferior turbinate hypertrophy, as we have found it to be effective with low morbidity.[50] Overly aggressive surgical management may be complicated by bleeding, mucosal crusting and desiccation, ciliary dysfunction, chronic infection, malodorous nasal drainage, or atrophic rhinitis.[17] In most cases, inferior turbinoplasty with outfracture of the inferior turbinate and, in some cases, limited submucous resection, is adequate to achieve significant improvement (Fig. 19.7).[50]

After removal of the previously placed oxymetazoline-soaked cottonoid pledgets, the inferior turbinates are inspected after vasoconstriction of the overlying mucosa has occurred. In cases of inferior turbinate mucosal hypertrophy, a long Vienna speculum is used to outfracture the inferior turbinates.[50] In cases of inferior turbinate bony hypertrophy, limited submucous resection of the inferior turbinate is indicated.[50] Outfracture is performed so that the entire inferior turbinate is microfractured laterally to open the nasal cavity. Limited submucous resection is performed using needle point electrocautery to incise the inferior border of the anterior 1–2 cm of the inferior turbinate down to the conchal bone. A Cottle elevator is used to develop a medially based submucoperichondrial flap to expose the portion of the conchal bone to be resected. Takahashi forceps are used to sharply resect the bone from the anterior third of the turbinate. The mucoperichondrial flap is replaced down over the cut edge of the

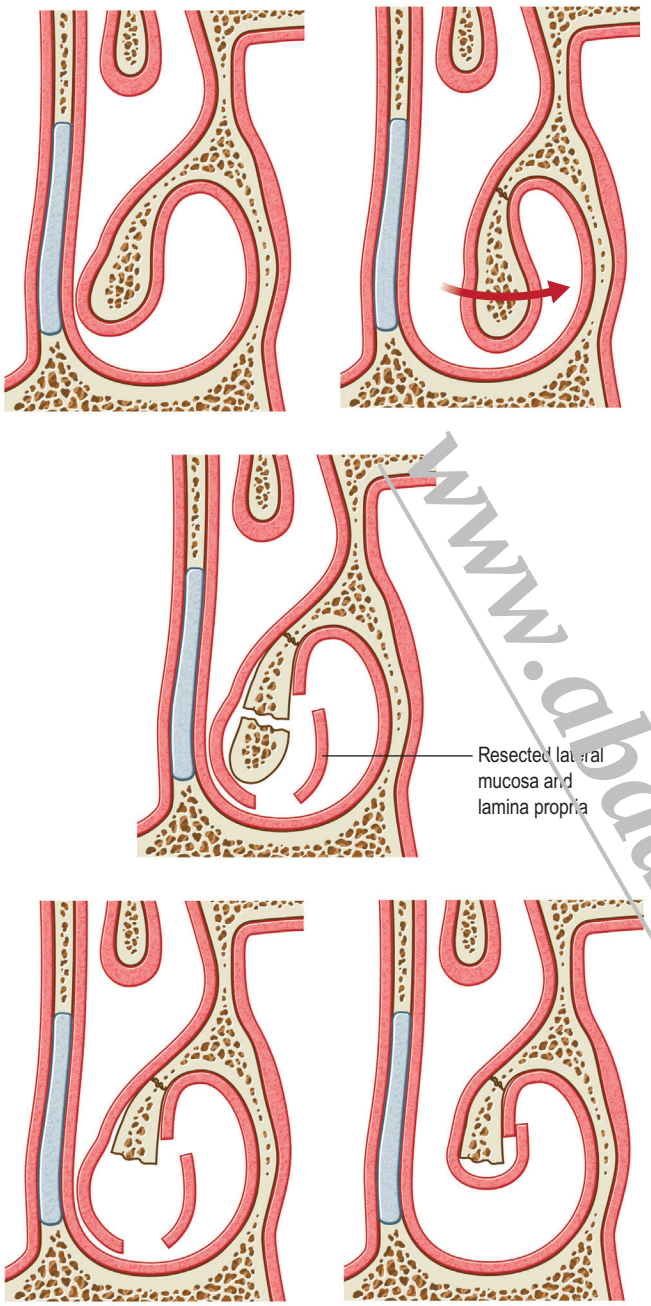

Figure 19.7 Inferior turbinate outfracture and submucous resection.

conchal bone; no suturing is necessary as this will adhere to the raw surface. Replacement of the flap will avoid postoperative hemorrhage or crusting.

The nasal tip

A graduated approach to nasal tip surgery requires a combination of techniques including the cephalic trim, the use of a columellar strut graft, nasal tip suturing, and nasal tip grafting. Application of these techniques will help to correct tip deformities and improve tip shape while minimizing deformities secondary to loss of support. In addition, compared with the closed approach, the open approach may cause mild loss of tip projection due to disruption of ligamentous support and increased skin undermining.[67] As such, we commonly employ columellar strut graft and nasal tip suturing techniques to maintain nasal tip support during open rhinoplasty.

Cephalic trim

Cephalic trim is commonly performed with the bulbous or boxy tip (Fig. 19.14).[68] Paradomal fullness is secondary to prominence of the cephalic border of the middle and lateral crura of the lower lateral cartilages. Cephalic trim of this area reduces paradomal fullness and helps to define the tip and narrow the distance between the tip-defining points. An alar rim strip of at least 5–6 mm is preserved for adequate support of the external valve. Cephalic trim should be used judiciously. In some cases in which the quality of the lower lateral cartilages is poor, cephalic trim will further weaken the cartilages despite preserving a 5–6 mm alar rim strip, leading to alar rim collapse. In these cases, use of a lower lateral crural turnover flap is a better option to improve tip definition while preserving structural support.[69] Calipers should be used to accurately measure the alar rim strip. The excised cartilage can also be used as a source of autogenous grafts.

A lower lateral crural turnover flap is another useful technique to address paradomal fullness while providing additional support to the lower lateral cartilages.[69] It is beneficial for deformities, weakness, and collapse of the lower lateral crura and can also be used to improve lower lateral crural strength during tip reshaping. However, there must be sufficient lower lateral crura to leave a 5 mm alar rim strip. It can be used in combination with other external valve and alar rim supporting techniques.

Columellar strut graft

An interdomal columellar strut graft is used to maintain or increase nasal tip projection and aids in unifying the nasal tip.[70–72] It can be either floating or fixed (Fig. 19.15). A floating columellar strut graft is used more commonly to maintain tip projection and is positioned between the medial crura and rests in the soft tissues 2–3 mm anterior to the anterior nasal spine. A fixed columellar strut graft is used to increase tip projection and is positioned between the medial crura and rests on the nasal spina. The columellar strut graft is typically fashioned from septal cartilage to measure 3×25 mm. A double hook is placed with a hook in the vestibular apex of each lower lateral cartilage. Upward traction is placed, and scissors are used to dissect a pocket between the medial crura down towards the anterior nasal spine. A 2–3-mm pad of soft tissue is preserved over the nasal spine to keep the graft from moving back and forth over the nasal spine with lip movements.[73] The columellar strut graft is placed in the pocket. With the tip-defining points held at the same level, a 5-0 PDS suture is used to stabilize the medial crura to the columellar strut graft, followed by several additional 5-0 PDS sutures to unify the nasal tip complex. The columellar strut graft is then trimmed as necessary.

Septal extension grafts

The septal extension graft is a versatile graft that effectively controls tip projection and rotation, whereas a columellar strut

Harvesting autologous grafting material

The trend over recent decades in rhinoplasty has shifted away from ablative techniques involving over-reducing the osseocartilaginous framework to conserving the native anatomy and augmentation of deficient areas to correct contour deformities and restore structural support. As such, certain situations require harvest of autologous cartilage for graft material. Autologous grafts are preferential to homografts and alloplastic implants because of their high biocompatibility and low risk of infection and extrusion.[51] Their disadvantages include donor site morbidity, graft resorption, and unavailability of sufficient quantities for graft material.[41] Autologous cartilage grafts are most commonly obtained from septal, ear, and costal cartilage. Other donor sites for autologous grafts include calvarial and nasal bone, and the olecranon process of the ulna.[51] Concerns regarding donor site morbidity, graft availability, and graft resorption will necessitate the use of homologous or alloplastic implants.[52] Recently, temporal fascia grafts have found utility as an autologous graft material in rhinoplasty for camouflage or as composite grafts such as diced cartilage grafts wrapped in temporal fascia. Temporal fascia can be harvested with minimal donor site morbidity and an inconspicuous scar located in the temporal scalp.[53–55]

Septal cartilage

Septal cartilage is the primary choice for autogenous grafts in rhinoplasty. It can be used in all areas including tip grafts, dorsal onlay grafts, columellar strut grafts, and nasal spreader grafts.[53] It is easily harvested, leaves minimal donor site morbidity, and is available in the operative field. Septal cartilage harvest is performed as previously described for septal reconstruction.

Open rhinoplasty allows for ease of septal cartilage harvest with improved exposure and visualization. Septal cartilage harvest is performed only after component dorsal hump reduction is complete as it is essential to preserve an L-strut that is at least 10 mm for nasal support. However, this width will depend on the strength of the septal cartilage, and in many instances a width of 15 mm or more may be required to ensure long-term support. Dorsal reduction of the septum after septal cartilage harvest may leave an L-strut that is too narrow to provide adequate nasal support. Septal cartilage harvest is performed after the lower and upper lateral cartilages have been separated from the quadrangular cartilage. A No. 15 blade scalpel is used to score the mucoperichondrium of the septal angle, and then a Cottle elevator is used to develop the submucoperichondrial pocket on both sides of the septum (Fig. 19.8). Once in the correct plane, the denuded septal cartilage has a gray–blue hue, the septal cartilage has a gritty texture, and there should be little resistance elevating the mucoperichondrium off of the septal cartilage until the dissection reaches the osseocartilaginous junction between the quadrangular cartilage and the vomer. Dissection of the submucoperichondrial pocket is done towards the floor of the nasal cavity to the maxillary crest and posteriorly to the vomer (Fig. 19.9). During development of the submucoperichondrial pockets, care is taken to avoid perforations of the mucosa. Unilateral mucosal perforations generally do not cause any problems. However, bilateral opposing mucosal perforations should be repaired with 5-0 chromic gut sutures to prevent formation of a septal perforation postoperatively. A dorsal and caudal L-strut is created using a No. 15 blade scalpel to incise the septal cartilage parallel to the dorsal edge of the septum from the perpendicular plate of the ethmoid and is curved to parallel the caudal edge of the septum (Fig. 19.10). This incision is then continued posteriorly and parallel to the caudal edge of the septum until the crest of the maxilla. A Cottle elevator is then used to elevate the septal cartilage from the maxillary crest and vomer, liberating the septal cartilage. Any bony septal deviation of the perpendicular plate of the

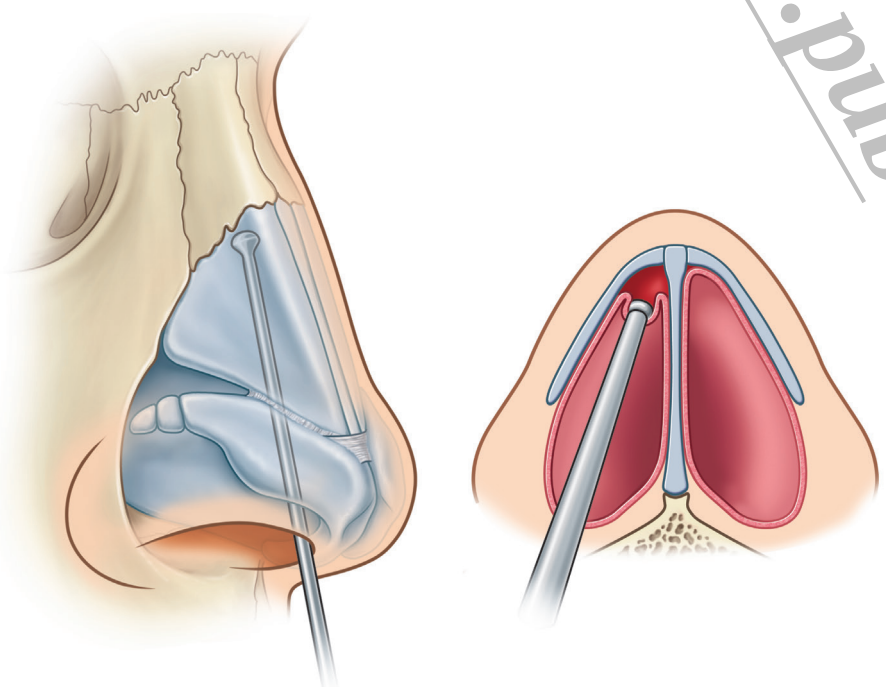

Figure 19.8 Submucoperichondrial dissection.

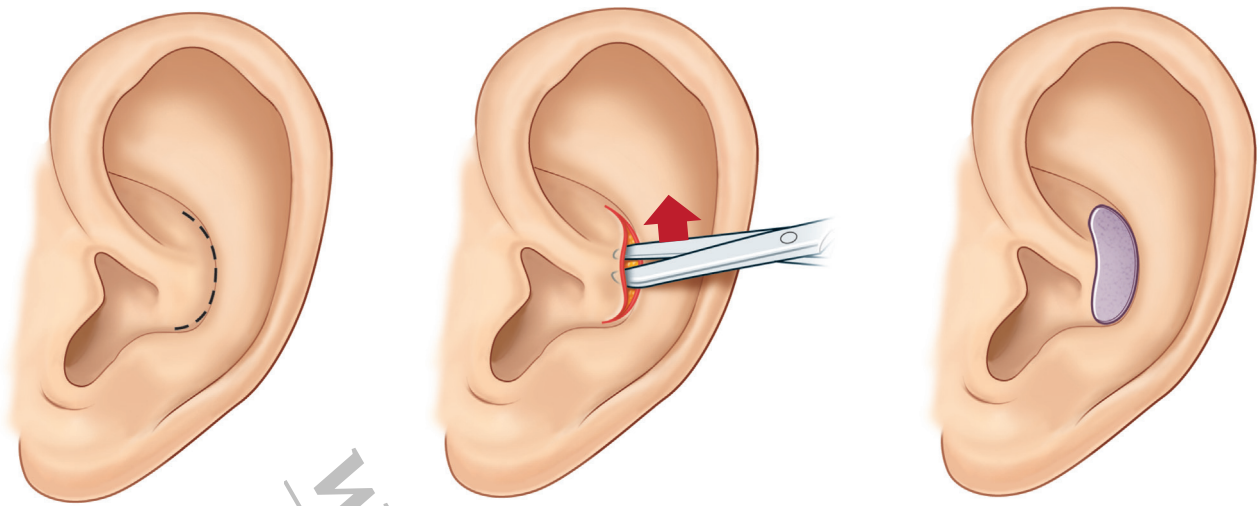

Figure 19.11 Harvesting ear cartilage.

inferiorly at the incisura intertragica, preventing donor site deformity. The outlined ear cartilage is then incised using a No. 15 blade scalpel, and fine dissecting scissors are again used to dissect the anterior auricular skin off of the anterior aspect of the conchal cartilage in the subperichondrial plane. Once the desired amount of cartilage has been dissected away from the anterior and posterior auricular skin it is excised with a No. 15 blade scalpel. Hemostasis is obtained and the incision is closed with a 5-0 plain gut running suture, followed by placement of a tie-over petroleum gauze bolster as previously described.

Costal cartilage

Costal cartilage provides abundant autogenous graft material. It can be used for tip grafts, columellar strut grafts, nasal spreader grafts, alar cartilage grafts, and dorsal onlay grafts. Given the size, amount, and intrinsic qualities, costal cartilage lends itself well to use as a dorsal onlay graft and where structural support is required. It can be carved into any shape. However, allowing at least 30 minutes to pass prior to carving allows initial warping to occur, minimizing late deformity.[60] In addition, utilizing centrally over peripherally located cartilage may help to minimize late deformity.[60,61] Some authors advocate the use of internal stabilization of costal cartilage grafts with Kirschner wire to prevent warping, but this can be associated with long-term complications, including extrusion of the Kirschner wire.[62]

Various authors[63–66] have described harvesting costal cartilage from different ribs, but it is our preference to harvest the 9th rib because it is straight medially and provides 4–5 cm of autogenous graft material (Fig. 19.12). The 9th rib is a floating rib and can be located by palpation. A 2-cm incision is made on the anterolateral aspect of the chest wall. Since the skin overlying the rib is mobile in this area, a long segment of rib can be harvested through this relatively small incision. The perichondrium is lightly scored and is dissected away from the underlying rib cartilage using both a dental elevator and a Joseph elevator. When freeing the cartilage away from the deep perichondrium, care is taken to avoid damaging the parietal pleura and creating a pneumothorax. After the amount of cartilage needed is determined, it is harvested by incising through the rib using a No. 15 blade scalpel. Slightly more cartilage should be harvested than what is needed because cartilage is lost secondary to carving. Hemostasis is obtained, and the perichondrium is closed using 3-0 Vicryl. The wound is closed in layers using 4-0 Vicryl followed by a 5-0 Monocryl intradermal suture. Injection of 0.25% bupivacaine into the donor site for postoperative pain control is followed by application of Steri-Strips (3M, St. Paul, MN).

If there is concern for pneumothorax during costal cartilage harvest, the wound is filled with saline and positive pressure ventilation can be performed by the anesthesia provider to ensure that there are no gas bubbles escaping from the chest cavity. If the parietal pleura has been violated, the tip of a red rubber catheter is inserted into the defect and a 3-0 Vicryl purse-string suture is performed around the catheter. The anesthesia provider performs a Valsalva maneuver while suction is applied to the red rubber catheter. As the catheter is withdrawn, the purse-string suture is tied to seal the parietal pleural defect, followed by wound closure. An upright chest X-ray should be performed postoperatively to confirm resolution of the pneumothorax.

Temporal fascia

The anterior limit of the incision is made in line with the tragus (Fig. 19.13).[53–55] A posteriorly pointing, V-shaped incision is used as this gives the widest exposure for the subcutaneous dissection. The incision is approximately 5 cm in craniocaudal dimension and spans approximately 2.5 cm in anteroposterior dimension. The skin of the scalp is infiltrated with 5 mL of 1% lidocaine with epinephrine. The skin is incised down through the temporoparietal fascia to expose the deep temporal fascia. A needle tip electrocautery is used to dissect the areolar tissues off the superficial surface of the deep temporal fascia. An attempt should be made to harvest the largest piece of temporal fascia possible. This involves incising the temporal fascia close to the temporalis muscle's attachments to the skull periosteum superiorly and posteriorly and where it begins to divide into deep and superficial layers anteriorly. The temporal fascia should be harvested inferiorly to the level of the ear.

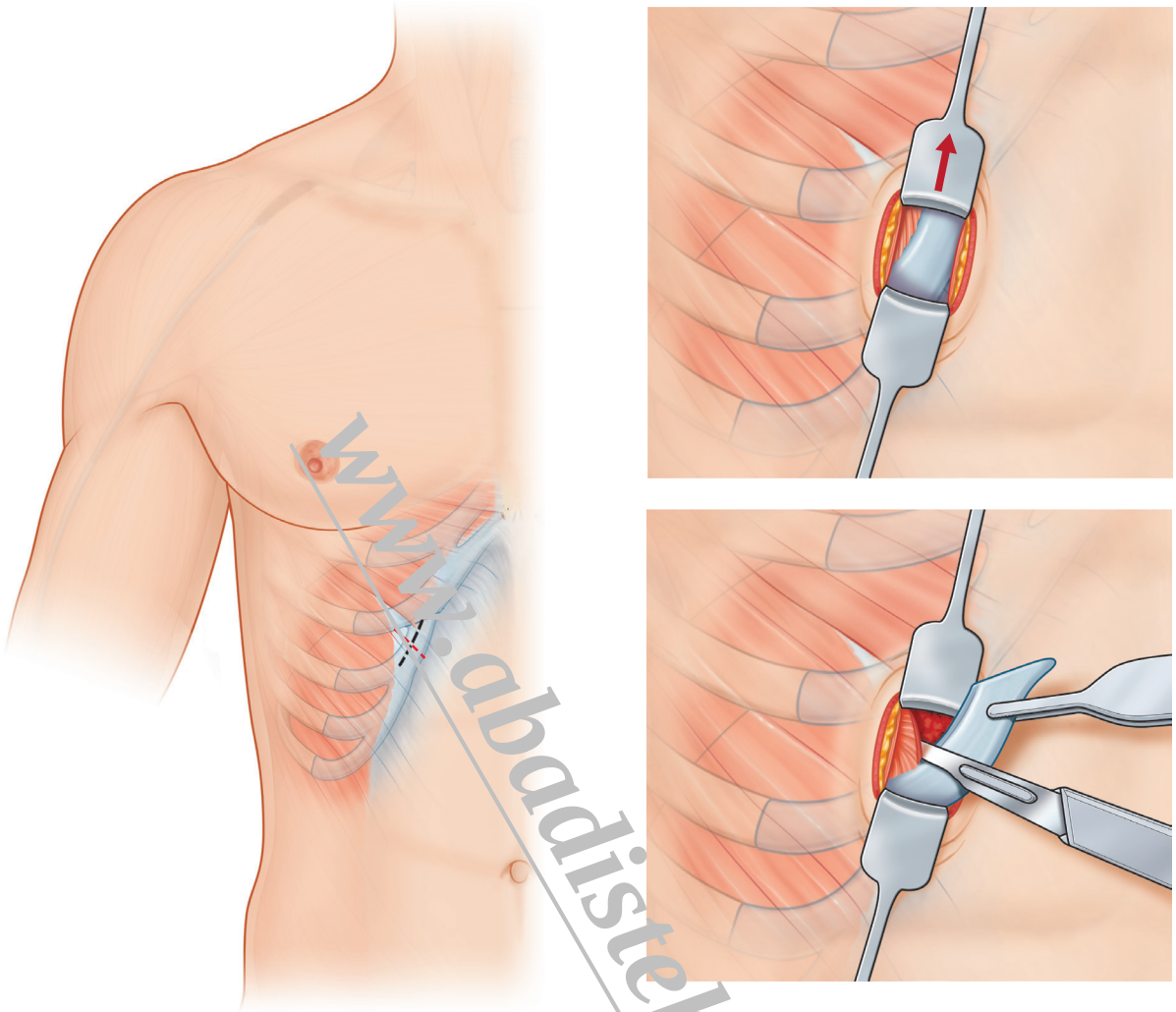

Figure 19.12 Harvesting costal cartilage.

Figure 19.13 Harvest of temporal fascia.

Although this area is about 8×6 cm in dimension, temporal fascia contracts significantly and this generally yields a temporal fascia graft that is about 5×4 cm in dimension. The deep temporal fascia is incised with the needle tip electrocautery and then swept off the underlying temporalis muscle. Muscle fibers should not be harvested with the temporal fascia graft. Hemostasis is obtained, and the skin is closed in layers with 3-0 Vicryl inverted deep dermal sutures followed by a running 4-0 chromic gut suture.