

Combining Rhinoplasty with Septal Perforation Repair

Hossam M.T. Foda, M.D.¹ and Emad A. Magdy, M.D.¹

ABSTRACT

A combined septal perforation repair and rhinoplasty was performed in 80 patients presenting with septal perforations (size 1 to 5 cm) and external nasal deformities. The external rhinoplasty approach was used for all cases and the perforation was repaired using bilateral intranasal mucosal advancement flaps with a connective tissue interposition graft in between. Complete closure of the perforation was achieved in 90% of perforations of size up to 3.5 cm and in only 70% of perforations that were larger than 3.5 cm. Cosmetically, 95% were very satisfied with their aesthetic result. The external rhinoplasty approach proved to be very helpful in the process of septal perforation repair especially in large and posteriorly located perforations and in cases where the caudal septal cartilage was previously resected. Our results show that septal perforation repair can be safely combined with rhinoplasty and that some of the routine rhinoplasty maneuvers, such as medial osteotomies and dorsal lowering, could even facilitate the process of septal perforation repair.

KEYWORDS: Nasal septum, septal perforation, external rhinoplasty

Repair of nasal septal perforations presents a unique surgical challenge because of the associated functional as well as cosmetic nasal problems. Functional problems result from disturbance of the normal mucociliary clearance mechanism that leads to mucus stagnation and chronic nasal obstruction. In addition, the turbulence created by the abnormal airflow through the perforation may lead to whistling in small perforations and to excessive dryness, crusting, and bleeding in larger perforations. The more anterior the perforation is, the more symptomatic it becomes and the more likely it is for the patient to seek medical help.

On the other hand, cosmetic problems associated with septal perforations are due to the loss of the structural support of the nasal septum leading to external nasal deformities, the commonest of which are dorsal saddling, tip drop, and columellar retraction.

Septal perforations may be traumatic, pathological, chemical, or idiopathic in origin. The traumatic septal perforations that constitute the vast majority of the cases usually occur as a complication of septal surgery.^{1,2} The incidence of perforation is significantly higher when the Killian submucous resection technique is used as compared with septoplasty.³ However, the septoplasty procedure does not give complete immunity against the occurrence of such a complication. The most classic cause of septal perforations is a previous septoplasty itself, in which there have been tears in both septal membranes in a contiguous area where the intervening septal cartilage or bone has been removed. However, bilateral mucosal lacerations can still result in septal perforations, even if the intervening cartilage was not excised, as the blood supply to the cartilage comes from the overlying mucoperichondrium and bilateral

¹Division of Facial Plastic and Reconstructive Surgery, Alexandria University, Alexandria, Egypt.

Address for correspondence and reprint requests: Hossam M.T. Foda, M.D., P.O. Box 372 Sidi Gaber, Alexandria, Egypt.

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disruption of that supply may cause the cartilage to necrose and ultimately perforate. The key for preventing corresponding tears in septoplasty is to be sure that one has undermined broadly and elevated the mucoperichondrial flaps away from the deviated cartilage or septal spur area prior to attempting to remove the spur or the deviation. In the case that corresponding tears occurred, closure of the perforation in each flap separately is important, followed by interposing a layer of crushed cartilage in between the repaired flaps. The interposed layer of cartilage acts as a barrier against through-and-through perforation, and even if the implanted cartilage does not survive, it will still add to the degree of fibrosis and strengthen the septal flaps that have been weakened by the removal of cartilage.⁴ Trenite et al⁵ have reported a decreased rate of perforation when autogenous cartilage is used for reskeletization.

The major goal in septal perforation surgery is not only to repair the perforation but also to restore normal form and function to the nose.

Multiple surgical methods for perforation repair have been described using different kinds of grafts and flaps; however, our review of the literature reveals that the most successful techniques have all used bilateral broad-based mucosal advancement flaps with or without a connective tissue interposition graft.⁵⁻¹⁴ In 1970, Fairbanks and Chen⁹ adopted this technique successfully through a closed intranasal approach. Kratz,¹³ in 1973, used an alotomy for added exposure in cases with more posteriorly located perforations. Five years later, Strelzow and Goodman¹⁴ reported using the same repair technique through an open external rhinoplasty approach. The increased surgical exposure provided by the open approach not only facilitates the repair of large and posteriorly located perforations but also allows simultaneous rhinoplasty to be performed in cases with associated external nasal deformities.^{15,16}

PREOPERATIVE EVALUATION

Prior to surgery, each case should be subjected to a full history taking stressing the cause of septal perforation and symptoms related to the perforation, external nasal examination to analyze the associated external nasal deformities, and endoscopic nasal examination stressing the site and size of the perforation; instrument palpation is necessary to evaluate the size of the cartilaginous defect, which may be much larger than the mucosal perforation. Routine preoperative investigations are performed for all patients, and only those with no clear-cut etiology of their septal perforation are subjected to further screening tests including chest radiography, erythrocyte sedimentation rate, urine analysis, tuberculin test, blood serology for syphilis, computed tomographic

scan of nose and sinuses, or finally biopsy from the edge of the perforation.

NASAL PREPARATION

To give the patient the best chance for a successful surgical repair; the repair should be attempted only when the nasal mucosa is in a healthy condition with no evidence of infection. Accordingly, cases presenting with marked crusting or inflammation of the nasal mucosa were given saline irrigations and emollients. If the condition persisted or chronic nasal discharge was found, a short course of systemic antibiotics was started after culture and sensitivity.

SURGICAL TECHNIQUE

With the patient in the supine position and after an adequate level of general endotracheal anesthesia is obtained, the nose and septum are infiltrated with 1% Xylocaine and 1:100:000 units of epinephrine. Careful intranasal examination is done, and any intranasal synechia or hypertrophied inferior turbinates are dealt with at this stage.

A classical external rhinoplasty approach^{17,18} is performed where bilateral alar marginal incisions are started laterally along the caudal edge of the lateral crus and dissection is continued medially down the length of the columella, where they are connected through an inverted V-shaped transcolumellar incision. The columellar skin is elevated off the medial crura and skin dissection is continued upward in the supraperichondrial avascular plane until the nasal bones are reached, where the periosteum is elevated using a Joseph-type periosteal elevator. Dissection is performed between the medial crura to gain access to the caudal septal cartilage, followed by bilateral caudal septal membrane elevation in a strict submucoperichondrial plane. Septal flap dissection is continued until reaching the cartilaginous edge of the perforation, where increased resistance is met during the dissection because of adherence of the septal flaps to each other with no intervening cartilage. At this stage, the dissection is taken downward to elevate the mucosa off the maxillary crest and nasal floor and laterally to reach the root of the inferior turbinate, where a back cut is made with a no. 15 blade (Fig. 1A, incision1), thus developing a bipediced floor flap. This flap can be mobilized medially and upward on both sides of the nasal septum to close the mucosal perforation on each side.

The septal flap elevation is continued dorsally between the superior edge of the perforation and the upper lateral cartilage. The upper lateral cartilage is then separated from the septum extramucosally using a no. 15 blade (Fig. 2A, B). At this stage, one can appreciate the definite advantage of the open approach, as lateral

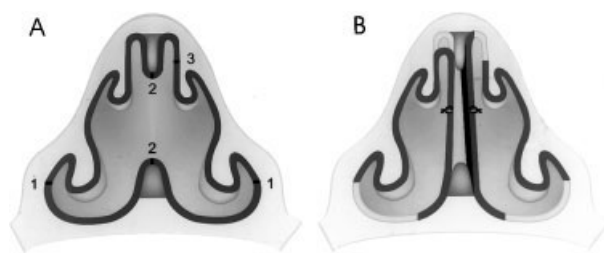


Figure 1 Schematic diagram of the septal perforation repair technique. (A) The sites of mucosal incisions used to create the bipediced flaps; 1, below the root of inferior turbinate; 2, at the edge of the septal perforation; 3, on the undersurface of the upper lateral cartilage (on left side only). (B) Advancement of the created flaps with suturing of the mucosal perforation on each side and insertion of a connective tissue graft (black) between the repaired flaps.

retraction of the upper lateral cartilages provides superb visualization of the dorsal and posterior septum, allowing the flap elevation above and behind the perforation to be conducted under direct vision.

The roof flap, which now bridges between the superior edge of the perforation and the undersurface of the upper lateral cartilage, can be dropped downward to help in closing the mucosal rent on each side. In cases with large perforations, more length could be added to the roof flap by extending the dissection to include the mucoperichondrium of the undersurface of the upper lateral cartilage (Fig. 2A). In rare occasions of huge perforations, a back cut could be made in the mucosa under the upper lateral cartilage (Fig. 1A, incision 3), thus transforming the roof flap into a bipediced flap allowing more downward advancement. However, this maneuver can be used only unilaterally to avoid the risk of developing a superior perforation in the dorsal cartilaginous septum.

Only after completing the roof and floor flaps, the mucosal perforation itself is separated using sharp dissection (Fig. 1A, incision 2) and its edges refreshed. Once enough mucosal laxity has been provided, the created flaps are advanced and the mucosal perforation, on each side, is closed using 5/0 Vicryl interrupted sutures. Closure of the mucosal perforation is started from anterior to posterior and is facilitated by inserting an aluminum suture cover in the septal space to prevent the needle from grabbing the flap on the opposite side (Fig. 2D). After repairing both septal flaps, the suture cover is removed and a connective tissue graft of temporalis fascia autograft or acellular dermal allograft (Alloderm, LifeCell Corporation, Branchburg, NJ) is interposed between the repaired flaps and to one side of the septal cartilage remnants (Fig. 2E), then fixed by three sutures to the dorsal and caudal parts of septal cartilage to prevent its migration. The graft used should be large enough to extend circumferentially beyond the suture line of the repaired mucosal perforations of both flaps. The repaired flaps are then matted together

along with the interposed graft to obliterate the dead spaces and to reinforce the repair.

Before reattaching the upper lateral cartilages to the septum, any necessary hump reduction is performed as well as medial and lateral osteotomies if needed. The upper laterals are then reattached to the dorsal cartilaginous septum using 5/0 polydioxanone (PDS) sutures in a horizontal mattress fashion (Fig. 2F). A strong columellar strut or a caudal septal replacement graft is usually needed to make up for the loss of tip support following the separation of medial crura from each other as well as from the caudal septum.^{19,20} Despite the perforation, one can usually find enough septal cartilage to fashion a strut; however, in cases where septal cartilage was deficient; irradiated cartilage allograft proved to be an excellent alternative.²¹ The cartilaginous strut is inserted in a pocket between the medial crura and fixed in place using 5/0 PDS sutures in a horizontal mattress fashion. In cases with deficient premaxilla, a roll of Mersilene mesh is used for premaxillary augmentation before placing the columellar strut.^{20,22}

At completion of the rhinoplasty part of the procedure, the nasal skin is returned to its normal anatomical position and the external rhinoplasty incisions are closed. The transcolumellar incision is closed using a deep 6/0 PDS suture to take the tension off the skin edges, which are then approximated with interrupted 6/0 Prolene sutures. The marginal incisions are approximated using interrupted 6/0 Vicryl sutures.

To protect the repaired septal flaps during their healing phase, a Silastic sheet of 0.02 inch thickness is fashioned and placed on each side of the nasal septum to cover the whole septum and floor of the nasal cavity. The septal splints are secured in place using three 4/0 Prolene through-and-through sutures, which should not be overly tight to avoid constricting the repair site when the septal membranes swell postoperatively. The nose is lightly packed with Gelfoam soaked with gentamycin cream and routine external nasal taping and splinting are then performed.

POSTOPERATIVE CARE

The Gelfoam packing is not removed at once but is suctioned out gradually over the first postoperative week, aided by the patient's use of intranasal saline drops and antibiotic ointment. During the periodic suctioning of the Gelfoam, the repair site is inspected through the transparent Silastic sheeting, allowing us to monitor the progress of healing on each visit. The external splint is removed 5 to 7 days after the procedure and the septal Silastic sheeting is removed when the mucosal healing is completed, usually 2 to 3 weeks postoperatively. The intranasal ointment application continues for another 3 weeks to prevent postoperative crusting. The patient is

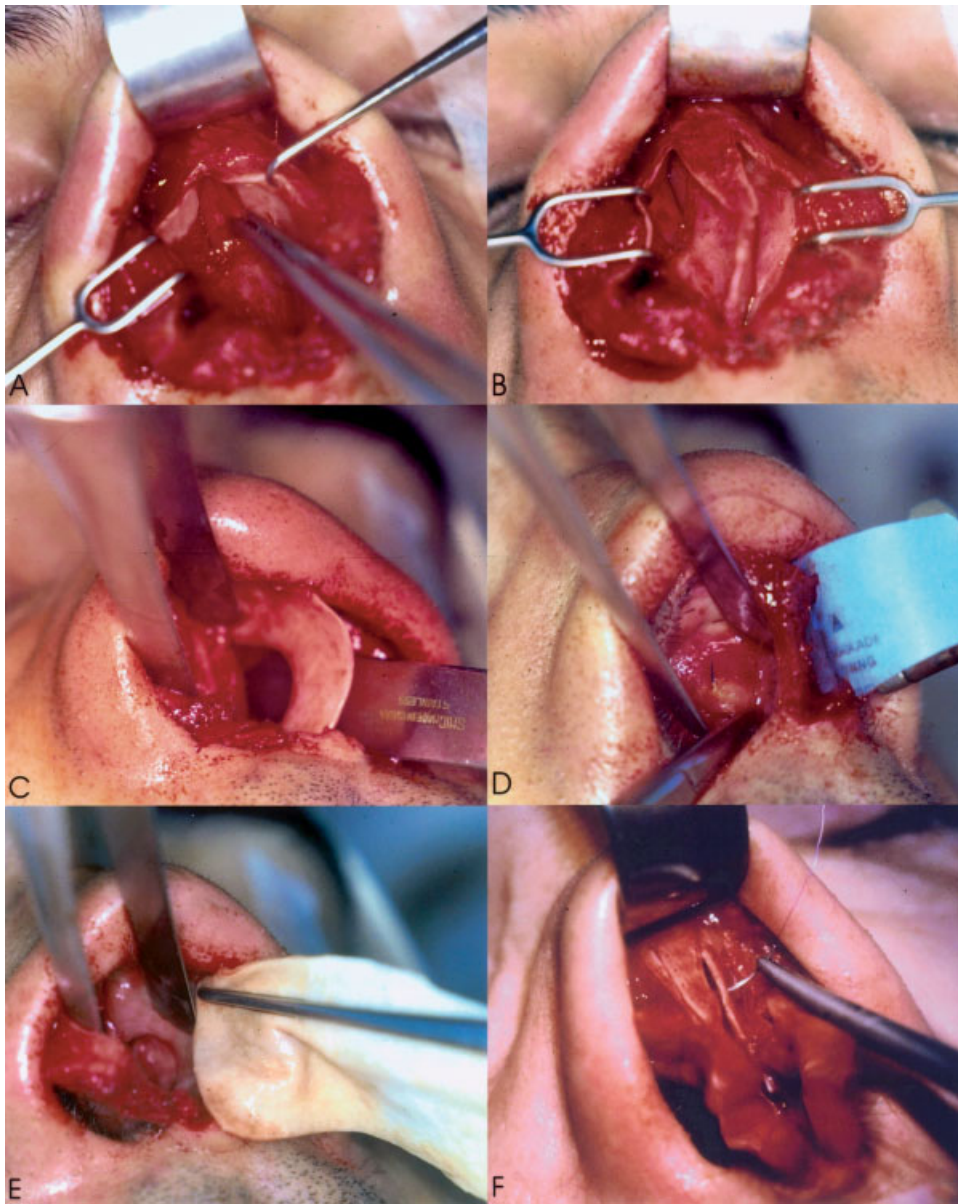


Figure 2 Intraoperative photographs. (A) Separation of right upper lateral cartilage from the septum extramucosally followed by dropping of the intact mucosal flap downward. (B) Repeating the procedure on the opposite side. (C) Opening the mucosal perforation. (D) Suturing the mucosal perforation while placing an aluminum suture cover behind it to prevent the needle from grabbing the mucosa of the opposite side. (E) Insertion of an Alloderm graft between the repaired mucosal flap and the septal cartilage. (F) Reattaching the upper lateral cartilages to the septum.

instructed to avoid smoking, vasoconstrictive drops, nose blowing, and closed mouth sneezing for at least 3 months postoperatively.

SURGICAL OUTCOME

The previously described technique was used in 80 cases with perforations ranging from 1 to 5 cm. Complete closure of the perforation was achieved in 90% of perforations of size up to 3.5 cm and in only 70% of perforations larger than 3.5 cm. Even in cases with huge perforations, where it was not possible to achieve complete closure, a good functional improvement was ob-

tained by making sure to seal the anterior part of the perforation leaving a small residual perforation in the posterior segment of the nasal septum, which was asymptomatic in most patients.

Cosmetically, 95% of the patients were very satisfied with the correction of their external nasal deformities, whether these deformities were related (Fig. 3) or unrelated (Fig. 4) to their septal perforations.

DISCUSSION

On reviewing the literature, the highest success rates in septal perforation closure were all associated with the use

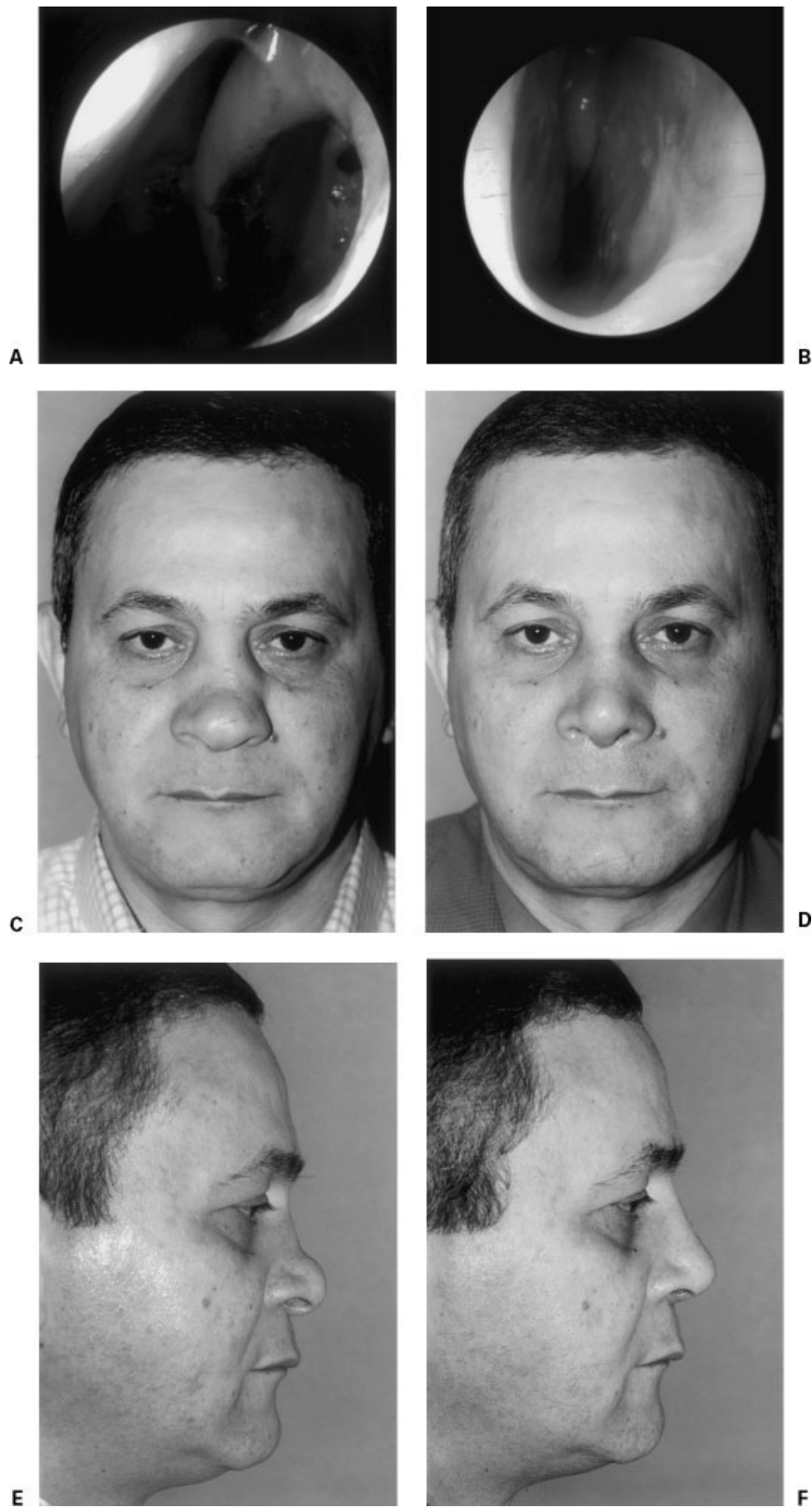


Figure 3 (A) A 45-year-old male with a huge (3 cm) septal perforation. (C, E) Preoperative views showing secondary dorsal saddling and tip drop due to the loss of septal support. (B, D, E) Postoperative views of the same patient 2 years after having a one-stage rhinoplasty and septal perforation repair. (Courtesy of Hossam Foda, MD, Alexandria, Egypt.)



Figure 4 (A) A 34-year-old female presenting with a 2-cm septal perforation and (C, E) coexisting external deformities that are unrelated to the septal perforation in the form of a markedly deviated nose with a large dorsal hump. (B, D, E) Three-year postoperative views of the same patient after combining septal perforation repair with a corrective rhinoplasty. (Courtesy of Hossam Foda, MD, Alexandria, Egypt.)

of bilateral mucosal advancement flaps together with a connective tissue interposition graft. Using this method of septal perforation repair, many authors^{8,9,11,12,15,23} reported closure rates between 80 and 90%. Fairbanks,¹⁰ in 1980, reported an exceptionally high success rate of 95% but only in cases with perforations less than 3 cm in diameter.

It is generally accepted that the major factor affecting the success rate in septal perforation repair is the size of the perforation, which, in turn, is inversely proportional to the amount of mucosa available for perforation closure.

In the current study, complete closure of septal perforation was achieved in 90% of the cases with perforations up to 3.5 cm and in only 70% of cases with perforations larger than 3.5 cm.

In cases where complete closure of mucosal flaps was possible on one side only, the connective tissue interposition graft, which was routinely used in all cases to strengthen the repair, provided a scaffold for the mucosa to creep on and epithelialize the raw surface of the graft. Different types of connective tissue grafts were used successfully in the repair of septal perforations; these included mastoid periosteum,²⁴ temporalis fascia or pericranium,^{8,10} septal bone or cartilage,²⁴ fascia lata,²⁵ and, most recently; acellular dermal allografts.²⁶ In the current study we used either temporalis fascia or the preserved dermal allograft. The success rate using both types of grafts was similar; however, the dermal allograft, although costly, was easier to handle and had the advantage of being readily available, thus saving operative time and eliminating any donor-site morbidity.

In the late 1970s, the external rhinoplasty approach was used successfully for the repair of septal perforations.¹⁴ This approach not only provided the needed exposure for large and posteriorly located perforations but also allowed corrective rhinoplasty to be performed simultaneously for cases with associated external nasal deformities.

Technically, we found that the exposure provided by the external approach helped in performing surgical maneuvers that are extremely difficult or virtually impossible to do using the intranasal approach. As an example, in cases in which the caudal septal cartilage was previously resected, the external approach allowed the surgeon access to the septum from the dorsal aspect, where proper dissection planes could still be found, instead of caudally, where fibrosis often obliterated the normal dissection planes. This dorsal access to the nasal septum also facilitates very much the dissection of flaps posterior to the perforation.

In addition, in cases with large perforations, the exposure provided by the external approach allows the dissection and advancement of the mucosa lining the undersurface of the upper lateral cartilage, which is technically very difficult with the endonasal ap-

proach. Finally, at the point of suturing the mucosal rent in the septal flaps, the external approach allows the surgeon to work from both sides of the flap, through the nasal cavity caudally and the septal space dorsally, which gives a better chance for complete closure of the perforation.

In the current study, combining rhinoplasty with septal perforation repair did not compromise the perforation repair. On the contrary, some of the rhinoplasty maneuvers that were used proved to be very helpful in the process of septal perforation repair. The bilateral cephalic trim of the lateral crura, which is performed to narrow the supratip lobule, helps in increasing the surgical exposure to the dorsal cartilaginous septum.

In cases of large or posteriorly located perforations, performing medial osteotomies followed by lateral traction of the nasal bone and upper lateral cartilage allows mucosal flap elevation to be continued both superior and posterior to the perforation. After separating the upper lateral cartilages from the septum, lowering of the nasal dorsum allows the upper lateral cartilages to be reattached to the nasal septum at a lower level, thus providing more mucosal redundancy, in the vertical plane, to complete the perforation closure under no tension. In some cases of large perforations, even in the absence of a dorsal hump, dorsal lowering can still be performed with reattachment of upper lateral cartilages at a lower level followed by dorsal augmentation using a dorsal onlay graft.

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