

Enbucrilate as Cartilage Adhesive in Augmentation Rhinoplasty

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• Enbucrilate (Histoacryl) as a cartilage adhesive in augmentation rhinoplasty was used in 39 cases. The unique properties of this tissue adhesive enhances the ability to augment the nose during cosmetic and reconstructive rhinoplasty. Enbucrilate interacts superbly well with local tissues, causing no systemic or local untoward effects. Its main attribute stems from its ability to bond cartilage instantaneously and with great reliability, which allows for intricate fabrication of cartilage implant components. Five subcategories of dorsal, tip, and columella augmentation are presented with their technical details outlined. The aesthetic and functional results in 39 cases were deemed excellent, safe, and effective. (Arch Otolaryngol 1985;111:389-393)

A personal clinical experience of 39 cases, using enbucrilate (Histoacryl) as a cartilage adhesive for augmentation rhinoplasty, is presented. The unique properties of this tissue adhesive enhance the ability to augment the nose during cosmetic and reconstructive rhinoplasty.^{1,2} The adhesive interacts excellently with local tissue without causing any local or systemic infection, toxic effects, graft rejection, or tissue reaction. Its ability to bond cartilage almost instantaneously and with great reliability allowed for the fabrication of relatively complex cartilagenous graft components that were then used in five separate categories of augmentation.

Three types of implants were used. Homologous nasal hump³ was used to augment the dorsum and columella. Autogenous and homologous septal cartilage was sandwiched and glued together, then subsequently carved into an appropriate shape for dorsal augmentation. Homologous lower lateral cartilage was fabricated into total tip and subtotal tip grafts. There were no complications and no increase in the healing time in 39 patients followed up between six months and three years. There was also a noticeable decrease in initial graft migration and final graft mobility. There were no clinically detectable aesthetic or functional differences in the results between homologous or autogenous cartilage implant material. The clinical experience is broken down into five

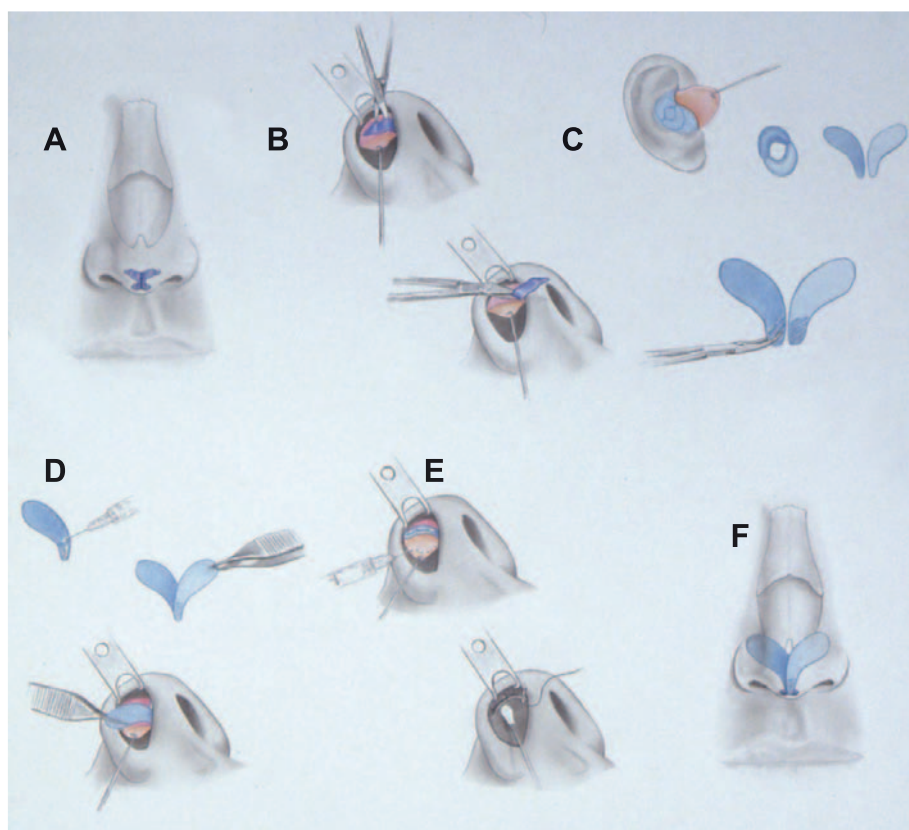


Fig 1. - Overview of total tip graft technique. A. Bilateral tip deformity B. Exposure & dissection of tip cartilages C. Harvesting & design total tip graft D. Fabrication & Placement of total tip graft E. Securement of total tip graft & closure of rim incision F. Corrected Result

functional aspects of augmentation rhinoplasty and the technical aspects of each will be described separately. It should be noted that augmentation rhinoplasty with enbucrilate tissue adhesive, combined with autogenous or homologous graft implant, was performed in only the most difficult and challenging of reconstructive procedures and was not randomly used for implantation. The excellent results obtained with this tissue adhesive, however, will hopefully allow these techniques to become routine in the near future.

Materials And Methods

Three types of graft materials were

used in 39 cases. Homologous nasal hump tissue³ was harvested and preserved in 70% alcohol at a temperature of 4°C, with the solution changed and cultured every six months to assure stability and safety. The nasal hump implant was molded with drill, scissors, and rasp to the appropriate shape before implantation. This implant was used to augment the columella and the nasal dorsum.

The second type of nasal implant used, homologous lower lateral cartilage, was harvested from patients who underwent routine rhinoplasty and was stored in the same manner as the nasal hump implant. These lower lateral cartilages were then fabricated into total tip and subtotal tip implants with the

use of scissors, scalpel, and enbucrilate and then implanted into the recipient nose immediately after fabrication.

The third type of nasal implant used was autogenous or homologous septal cartilage, which was preserved in the same manner as the nasal hump implant. Fabrication of the graft was performed by sandwiching the cartilage together with enbucrilate and waiting 60 s for adhesiveness to be completed. Carving and trimming with a scalpel to the desired size and shape was followed immediately by implantation. Enbucrilate was the only tissue adhesive used in all cases.

In general, homograft tissues were transplanted preferentially to autogenous transplant cartilage. Although most literature suggests increased resorption of allograft tissue, it is my experience that the resorptive capacity is not

Fig 2. - Top, Butterfly shaped total tip graft before placement. Center, Area shaded blue on quadrangular septal cartilage where graft is secured. Bottom, Graft glued to septum.



Fig 3. - Left, Case 1. Preoperative blunt nosed characteristics of minimal lower lateral cartilages. Patient had four previous rhinoplasties over ten years. Right, Three years status-post total tip implant. Increased tip projection and more natural alar contour are evident.

clinically evident when enbucrilate is used. Although it is still too early to predict final results, this hypothesis is currently being evaluated and will be reported on in future literature. Although this particular study used homograft routinely, it does not mean to imply that autogenous cartilage cannot be used in the same manner and, theoretically, with improved long-term results.

The exclusive use of enbucrilate in this study has particular merit. Enbucrilate has been studied extensively since the early 1970s and has been found to have no adverse side effects on local tissues or general toxic physiologic effects. In 1971 Sorensen⁴ used enbucrilate to repair incus stapedial joint disruptions with excellent clinical results and no evidence of toxicity. In 1972 Schneider⁵ also repaired ossicular chains without toxic or inflammatory side effects. In 1974 Kerr and Smyth⁶ assessed enbucrilate in the middle ear space of cats and concluded that enbucrilate was essentially nontoxic. In 1980 Siedentop⁷ applied enbucrilate to baboon ears and concluded that the



Fig 4. - Intraoperative view of patient requiring subtotal tip graft.



Fig 5. - A. Bilateral tip deformity B. Placement of overlay tip graft C. Corrected results

adhesive was safe for human use. The main advantages of enbucrilate is its safety, lack of inflammatory or toxic reaction, and almost immediate effectiveness in a clinical setting. The use of other tissue glues, namely methyl 2-cyanoacrylate or isobutyl cyanoacrylate, was deemed implausible because of their severe toxic reactions and local systemic effects.

Technique Total Tipgraft

The total tip graft is used in cases of traumatic or iatrogenic injury in which



Fig 6. - Case 2. Intraoperative view of actual subtotal tip graft.



Fig 7. - Top left, Preoperative frontal view as seen in Fig 4. Patient is 14 years status-post multiple rhinoplasties. Top right, preoperative lateral view. Bottom left, Front view of six months status-post subtotal tip graft. Bottom right, Lateral view of C (case 2).

little or no lower lateral cartilage exists. Commonly, these cases occur following repeated cosmetic rhinoplasties. The total tip graft allows for functional reconstruction of the lower lateral cartilages, offering support for the alae and base of nose, as well as cosmetic improvement in tip projection and contour. Figure 1 presents an overview of the technique for total tip grafting, in which homologous preserved lower lateral cartilages are trimmed, glued, and implanted as a complete new tip,

and shape before gluing. Figure 2, top, shows total tip graft before placement. Figure 2, center, shows the area (shaded black) on the recipient septum where the total tip graft is optimally placed. This corresponds to the most anterior superior segment of the septal quadrangular cartilage. Figure 2, bottom, shows model of total tip graft properly glued in place. The final graft placement is secured by gluing the superficial aspect of the tip graft to the underlying skin as well as to the septum. Routine taping and intranasal suturing with a 6-0 chromic gut is performed. Figure 3 shows preoperative and postoperative results of a typical patient requiring total tip grafting.

Subtotal Tip Graft

The subtotal tip graft is used in cases of partial functional or cosmetic damage



to the tip cartilages, but where some residual lower lateral cartilage still exists and can be employed to secure a subtotal tip graft implant. Usually, cases of longstanding or repeated tip-plasties producing pointy, unattractive, or functionally significant tip collapse mandate repair in this manner. Figure 4 shows a typical example of a tip that might require this type of augmentation graft.

The subtotal tip graft is fabricated from homologous preserved lower lateral cartilages, which are glued at their midportion and then subsequently

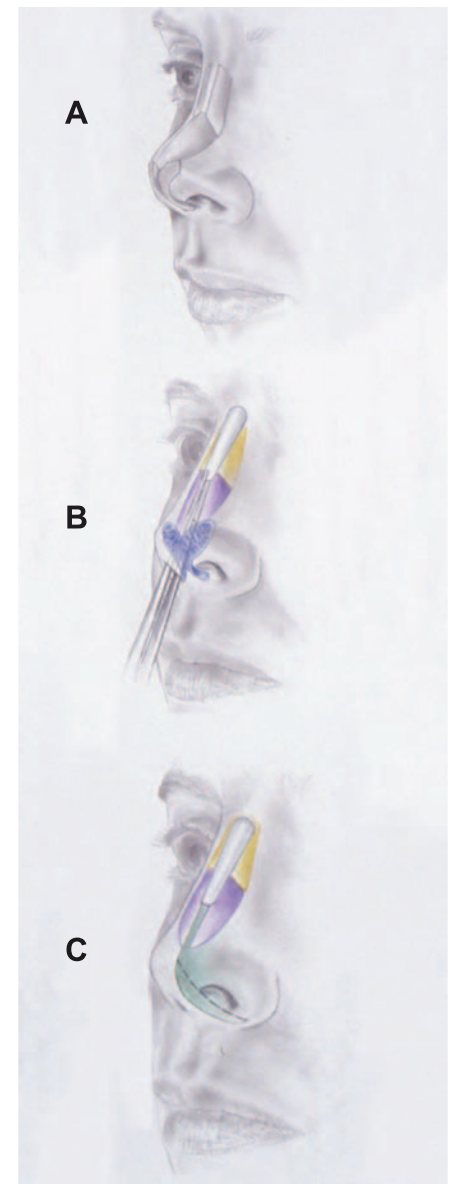


Fig 8. - Overview of hump graft for dorsal augmentation technique. **A**, "Birdlike" deformity due to excessive excision of nasal dorsum. **B**, Hump graft composed of cartilage and bone. **C**, Hump graft (arrow) glued in position

glued to the remainder of the lower lateral cartilages through a delivery technique. Figure 5 presents an overview of the technique. Figure 5, A and B, show a pointy, functionally defective right lower lateral cartilage. Figure 5, C, reveals procurement of the graft components from a homologous lower lateral cartilage, which is trimmed and glued to its final shape, as shown in Fig 5, D. Figure 5, E, shows a frontal view of the onlay graft, which is glued to the superior aspect of the residual lower lateral cartilages as well as to the overlying skin. Figure 6 shows sizing and positioning of graft intraoperatively. Routine closure and taping after delivery technique is employed. Figure 7 shows matched preoperative and postoperative results.

Fig 9. - Top, Case 3. Preoperative view, 14 years status-post cosmetic rhinoplasty exhibiting "birdlike" dorsal deformity. Bottom, Eight months status-post homologous hump graft technique revealing more natural dorsal contour.

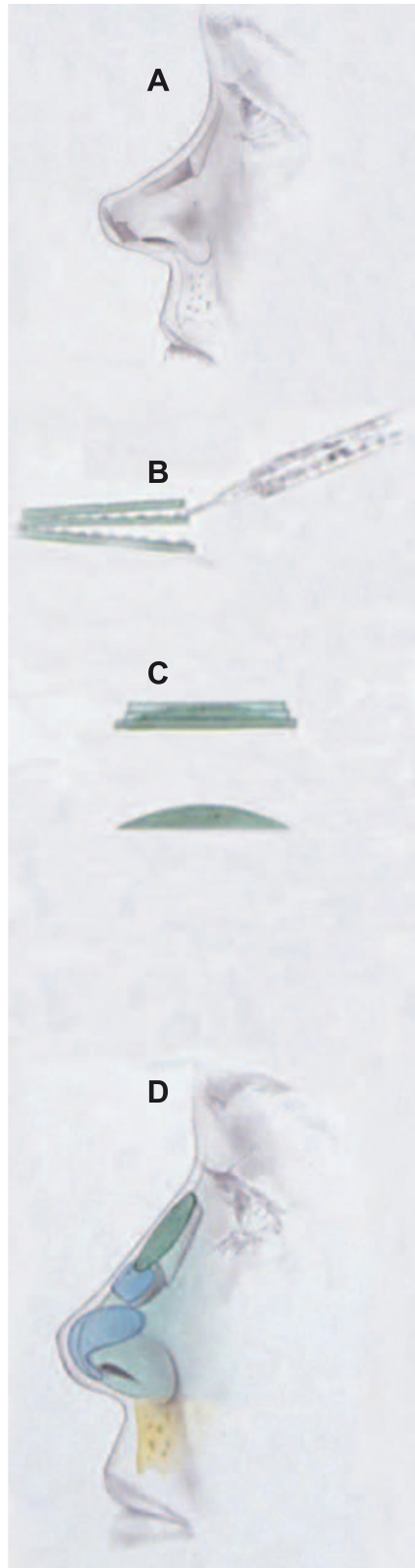


Fig 10. - Overview of septal sandwich graft for dorsal augmentation. **A**, "Birdlike" deformity due to excessive excision of nasal dorsum. **B**, Autogenous of homologous septal cartilage **C**, Cartilages being glued into sandwich graft (arrow) glued into position.

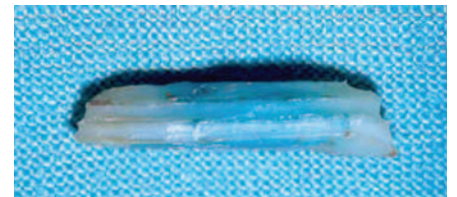
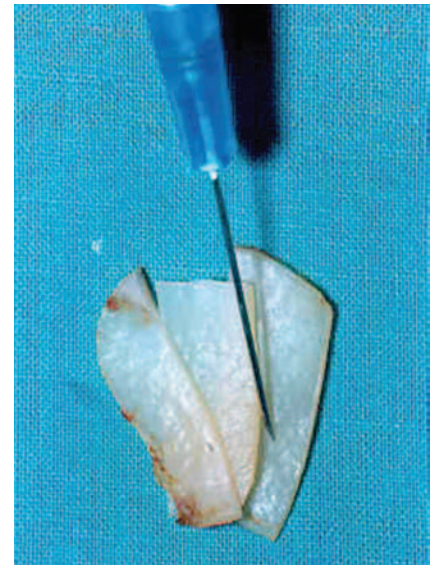


Fig 11. - Top, Gluing of cartilaginous septal components to form sandwich graft. Center, Lateral view of customized graft. Bottom, Top view of **B**.

Hump Graft for Dorsal Augmentation

Figure 8 presents an outline for dorsal augmentation using homologous hump graft material. Figure 8, A, reveals a typically overoperated-on “birdlike” nose, in which excessive dorsal bone, septum, and upper lateral cartilage have been removed. Repair of this deformity can be accomplished with a hump graft or a septal sandwich graft. Figure 8, B, shows the homologous hump graft that is composed of both bone and cartilage. After contouring with air drill, scalpel, and scissors, the graft is placed in a supraperiosteal pocket and is affixed to the periosteum below and to the overlying skin above. This double adhesion decreases the dead space and assures stability. Figure 8, C, shows final placement before routine closure. Figure 9 reveals excellent results at eight months.

Septal Sandwich Graft for Dorsal Augmentation

Figure 10 outlines an alternative method for reconstructing the “birdlike” dorsal deformity as seen in Fig 10, A. In this technique, autogenous or homologous septal cartilage is procured and trimmed to a proper shape (Fig 10, B). The separate pieces are then sandwiched together and glued as in Fig 10, C, and Fig 11, top. It is convenient to use a 25-gauge, 3-cm-long needle attached to a 3-ml syringe for this aspect of the procedure. After 60 s the graft is ready for molding with a scalpel. Figure 11 shows a customized graft before implantation. Figure 10, D, reveals the graft in place. The sandwich is glued into its final position both inferiorly to nasal dorsum and superficially to skin. Routine rhinoplast taping and dressing is then applied.

Hump Graft for Columella Augmentation

The final technical category in which enbucrilate has proved extremely useful is augmenting the columella. Figure 12, A, shows a typical deformity that is successfully ameliorated with a homologous hump graft. The deformity consists of a retracted columella, coupled with a drooping tip.

After contouring, the graft is placed on the nasal spine and under the lower lateral cartilages in a separate tunnel through the membranous columella. The graft serves a dual purpose by increasing tip

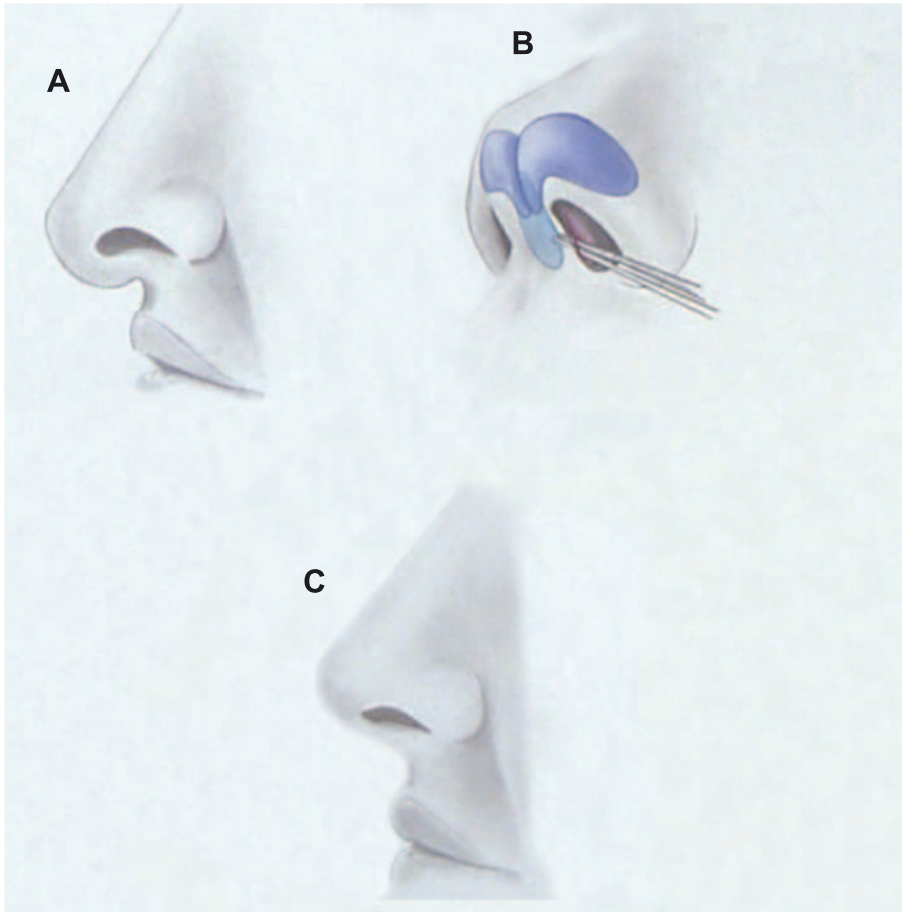


Fig 12. - Overview of hump graft for columella augmentation technique. **A.** Typical deformity aided by graft. Drooping tip coupled with retracted columella. **B.** Base view of graft in place. **C.** Final reconstructive result.



Fig 13. - Left, Case 4. Preoperative view showing typical drooping tip and retracted columella. Right, Nine months status-post hump graft for columella augmentation showing increased tip projection with superior rotation and augmentation of columella base.

projection with superior rotation, and filling in the retracted columella. Figure 12, D, shows final placement of graft, which is glued to the nasal spine directly and also to the undersurface of the lower lateral cartilages approximately at the point where they begin the flare laterally. Figure 13 presents the dramatic results that can be obtained with this graft.

Results

The combined clinical experience includes 39 cases over a three-year period, with the longest follow-up being three years and the minimal follow-up being six months. The theoretical complications included the following: local or systemic infection, toxic effects, graft rejection, graft movement, or adjacent tissue reaction; none of these were evident. The overall functional and aesthetic results were excellent, with emphasis placed on the stability and reliability of the grafts, particularly their lack of migration during the healing phase and their minimal mobility as an end product of reconstruction.

Comment

The excellent results gained from the use of enbucrilate recommend its continued use. It should be noted that the enbucrilate tissue adhesive was not used routinely but only in the most difficult augmentation situations. The particularly excellent results seemed to be related to the meticulous approximation of the graft material to the adjacent tissues such that implant shifting during the initial healing period was minimized thus decreasing seroma formation and subsequent infection and rejection. These desirable healing characteristics of the implant graft material translate into a completely immobile long-term follow-up studies will be performed to evaluate the resorptive potential for grafts as well as any untoward systemic or local effects.

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