

Use of Cartilaginous Autografts in Nasal Surgery: 8 Years of Experience

[Cosmetic]

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Abstract [TOP](#)

Although the cartilaginous autografts are one of the tissues more utilized in nasal surgery, a comparative study does not exist to determine which are better options and their precise indications. It is for this reason that a histopathologic analysis was carried out comparing the characteristics and properties of the four principal cartilages that are utilized in aesthetic functional surgery of the nose. Considering these particularities, the precise indications for the employment of the different cartilage as nasal autografts were determined. Of 1120 aesthetic functional rhinoplasties during a period of 8 years, 930 (83 percent) required cartilaginous autografts, 86 percent were primary, 11 percent were secondary, and 3 percent had two or more surgeries. Eighty-three percent of the grafts used were from nasal septum, 12 percent from the auricle, 3 percent from alar cartilages, and 2 percent from the rib. The anatomic sites in which they were employed consisted of the following: 64 percent between the medial crura, 28 percent as in Sheen's graft, 19 percent in the nasal dorsum, 8 percent as spreader grafts, 8 percent as in Peck's graft, and 3 percent in the rim to improve alar collapse. We followed at all times the previous indications for obtaining and placing the nasal autografts. Eighty-four percent of the patients were totally satisfied and only 8 percent required a second surgical procedure to achieve the results desired. Based on this study, it is recommended to utilize the cartilaginous autografts in nasal surgery considering three parameters: the physical and histologic characteristics of each cartilage, the anatomic site in which they are to be placed, and the effect desired with their application.

The use of cartilage in nasal surgery is thoroughly accepted. Utilization includes practically all of the nasal region. The first reports of their use are basically for reconstructive surgery,¹ extending at the present time their employment to resolve a great quantity of nasal problems, including aesthetic and reconstructive problems.²⁻⁴ The great majority of authors report excellent long-term results in the utilization of cartilage for nasal surgery,⁵⁻⁷ as this option is the first choice when autologous tissue is required for improvement of the nose. We present our experience in the use of cartilaginous autografts in the nose during a period of 8 years, basing the application on results obtained in previous studies.⁸

Materials and Methods [TOP](#)

During 8 years, from January of 1990 to December of 1997, a total of 1120 rhinoplasties were carried out. The management of each nose was effected according to the patient's own necessities, always utilizing cartilaginous autologous grafts when indicated. The type and form of use of the cartilaginous grafts were done considering criteria established in previous anatomic structure studies.⁸ Based on this, for support and filling, we always resorted to the nasal septum as the first option of use. The alar cartilage was utilized as filling to improve the nasal contour as contralateral alar support or in combined form with another cartilage. The cartilage of the auricle was not utilized for support; its principal indication was for tip projection and tip definition. Cartilage for filling was used considering its elastic characteristics to prevent posterior deformities, and the costal cartilage was used for support and filling with the pertinent cautions to avoid distortion. On some occasions, only a single graft was required within the nasal surgery, but in other cases, two or more grafts were needed in several regions of the nose to obtain the desired effect.

The approach of the nasal tip for the placement of grafts is carried out in a closed form through a marginal incision, or properly in an opened form without incision in the columella according to the approach described by Guerrerosantos.⁹ In all of the cases when septum management or graft taking of this area was needed, it was approached by an incomplete transfixion incision.

The grafts were placed in nasal areas seeking a specific effect. Grafts between the medial crura in the columella were used when a greater nasal projection was desired, or when the support of the tip was inadequate. The Sheen or Peck-type tip graft was used when a better definition or greater projection of the nasal tip was required. Sheen's graft was designed in the same form as employed by its originator, but a little shorter. The spreader graft was used when collapse of the nasal internal

Article Outline

[Abstract](#)

[Materials and Methods](#)

[Results](#)

[Discussion](#)

[Acknowledgments](#)

[REFERENCES](#)

Figures/Tables

[TABLE I Summary ...](#)

[TABLE II Donor Sites...](#)

[TABLE III Associated...](#)

[Fig. 1](#)

[Fig. 2](#)

[Fig. 3](#)

[Fig. 4](#)

[Fig. 5](#)

[Fig. 6](#)

[Fig. 7](#)

[Fig. 8](#)

[TABLE IV Causes of S...](#)

valve existed as a result of previous surgery, when the lateral superior cartilage was very weak, or when the cartilaginous vault was very narrow. The grafts in the dorsal area were utilized to achieve an increase of the same or to close an open roof, where the nasal bones were too small or the base was very narrow and the osteotomies were not suitable. In the alar rim, their utilization was to improve an alar collapse as a result of previous surgery. The grafts were always introduced to their definitive place by means of 5-0 nylon guides, removing these guides after 5 days. In case of graft collocation between the medial crura, the crus was always exposed, and the grafts settled with 5-0 nylon to their own crus. The evaluation of the results was carried out in a subjective form according to the satisfaction of the patient and the necessity of carrying out a second surgical procedure for those problems related to the previous surgery.

Results [TOP](#)

In a period of 8 years, a total of 1120 rhinoplasties were done, 827 primary (73.8 percent), 265 secondary (23.6 percent), and 28 (2.5 percent) with two or more previous surgeries. In 930 rhinoplasties (83 percent), cartilaginous autografts were utilized, whereas in the 190 remaining (17 percent), no graft was placed. Of the 190 rhinoplasties without grafts, 162 (85 percent) were primary and 28 (15 percent) were secondary. Of the 930 rhinoplasties with grafts, 799 (86 percent) were primary, 103 (11 percent) were secondary, and 28 (3 percent) had two or more previous surgeries. The summary of these data is presented in [Table I](#).

	Rhinoplasties	With Grafts	Without Grafts
Primary	827 (74%)	799 (86%)	162 (85%)
Secondary	265 (24%)	103 (11%)	28 (15%)
Teriety of cases	28 (3%)	28 (3%)	0 (0%)
TOTAL	1120	930 (83%)	190 (17%)

TABLE I Summary

The follow-up of the patients was from 3 months to 8 years with a mean of 4 years and 3 months; many of them were evaluated by phone calls 2 years after the surgical procedure. Of the 930 rhinoplasties in which grafts were utilized, 646 were in women and 284 in men; the range of age was from 17 to 62 years with a mean of 27.8 years. The grafts employed were from septum in 83 percent, auricle in 12 percent, alar cartilage in 3 percent, and rib in 2 percent. In 73 percent, they were used in a single form, whereas in 27 percent of the cases two or more grafts were used in the same patient. They were utilized in 64 percent of the cases between the medial crura for tip support, in 28 percent of the cases in the nasal tip in a similar form to Sheen's graft, in 19 percent in the dorsal area, in 8 percent as spreader grafts, in 8 percent like Peck's graft, and in 3 percent in the alar rim. The grafts between the medial crura were taken in their entirety from the nasal septum. Sheen's grafts were taken 59 percent from septum, 32 percent from auricle, and 9 percent from alars. Grafts for the dorsal area were obtained in 82 percent of the cases from the septum, in 7 percent from the auricle, in 7 percent from the rib, and in 4 percent from the alars. Spreader grafts were taken in all the cases from the nasal septum. Peck's grafts were obtained in 68 percent of the cases from the nasal septum and in the remaining 32 percent from alars. The grafts for the alar rim were taken in 53 percent of the cases from septum, in 31 percent from the facing alars, and in 16 percent from auricle ([Table II](#)).

Area	Septum	Auricle	Alar	Rib
Tip	604	103	28	0
Dorsal	76	5	5	4
Alar rim	162	51	31	16
Spreader	76	0	0	0
Peck's	76	0	0	0
Sheen's	284	0	0	0
Other	0	0	0	0
TOTAL	930	164	68	4

TABLE II Donor Sites and Placement

The approach utilized was closed tip in 94 percent of the cases and opened tip without incision in the columella in 6 percent. In 74 percent of the cases, a different functional procedure was carried out to the utilization of grafts; 43 percent consisted in septoplasty, 29 percent in turbinate management, and 2 percent in antrostomy. We also used spreader grafts in 8 percent and alar rim grafts in 3 percent of the patients to improve internal and external valve function, respectively. The antrostomy was carried out only during the 2 initial years of the study ([Table III](#)).

Functional Procedure	Percent
Septoplasty	43
Turbinate management	29
Antrostomy	2
Spreader graft	8
Alar rim graft	3

TABLE III Associated Procedures

Multiple combinations of cartilage grafts can be done to improve nasal balance, using them in primary rhinoplasties or when previous rhinoplasties have been done ([Figs. 1 through 8](#)).



Fig. 1. A 25-year-old woman 1 year postsurgery with septal cartilage graft between medial crura and one layer of septal cartilage on the tip as in Sheen's graft.



Fig. 2. A 22-year-old woman 2 years postsurgery with one layer of septal cartilage on the tip as in Sheen's graft, septal cartilage graft between medial crura, chin implant, and buccal fat pad resection.



Fig. 3. A 22-year-old man 6 months postsurgery with three layers of auricular cartilage on the tip as in Sheen's graft and one layer of septal cartilage on the nasal dorsum.



Fig. 4. A 29-year-old woman 1 year postsurgery with bilateral spreader grafts from septum and septal graft between medial crura.



Fig. 5. A 38-year-old woman 8 months postsurgery with three layers of auricular cartilage on the tip as in Sheen's graft and septal graft between medial crura.



Fig. 6. A 24-year-old woman 18 months postsurgery with three layers of auricular cartilage on the tip as in Peck's graft and septal graft between the medial crura. Nothing was done in the nasal dorsum.



Fig. 7. A 26-year-old woman 2 years postsurgery with three previous rhinoplasties: one layer of septal cartilage on the dorsum, three layers of auricular cartilage on the tip as in Sheen's graft, septal spreader graft on the left side, and septal graft between the medial crura.



Fig. 8. A 23-year-old woman 1 year postsurgery with two layers of septal cartilage on the dorsum, two layers of auricular cartilage on the tip as in Peck's graft, chin osteotomy, and buccal fat pad resection.

Of all patients, 84 percent manifested a total satisfaction for the complete surgical procedure, and 16 percent indicated a partial satisfaction. Only in 8 percent of the patients was a second surgery required to correct problems owing to the first procedure. The causes of the second surgical procedure were 1.8 percent for insufficient longitude of the graft in the dorsal area, 1.4 percent for excess of thickness of the graft in the dorsal area (observing it high), 0.8 percent for luxation of the graft between the medial crura, 0.6 percent for a very long intercrural graft with an overprojected nasal tip, and 3.4 percent for causes not related to the placed grafts (Table IV).

Cause	Percent
Short graft in dorsal area	1.8
Excess of graft thickness in dorsal area	1.4
Graft's luxation between medial crura	0.8
Long graft between medial crura	0.6
Other causes not related to grafts	3.4

TABLE IV Causes of Secondary Rhinoplasties

Discussion [TOP](#)

The cartilaginous autografts are employed in multiple manners in nasal surgery, to obtain diverse effects. Improvement of the definition and projection of a nasal tip have been achieved by means of the use of grafts in several methods and forms.^{2,3,6,7,10} In the same manner, they have been utilized in a mashed form to cover or improve irregularities.¹¹ Their use at the level of the dorsal area has given excellent results with reconstructive or aesthetic purposes when it is desired to increase or close an open roof without necessity of osteotomies.^{12,13} The alar region also offers great aid when they are used to improve the respiratory function,⁴ as in spreader grafts, to open the angle of the nasal internal valve.¹⁴ Our conduct in 8 years with rhinoplasties with cartilaginous autografts has been using them under certain important premises. The utilization of the cartilage has always borne in mind the desired effect, considering the characteristics of each cartilage and the nasal area in which it is to be placed. When we desired to offer support to a specific area of the nose, we opted as a first instance for the utilization of the septal cartilage, as it is an excellent cartilage of support. Septal cartilage has been the cartilage of choice for the intercrural graft to offer strength to a poorly projected tip or to a tip with improper support or too short or flaccid a medial crus. The same septal cartilage, for its structural characteristics, has been our cartilage of preference when its utilization is required in the dorsal area, because its straight plane and long configuration conform to an ideal surface of filling in this region. We utilize it as much as an alternative for moderate increase, as well as to close an open

roof in the case of very short or straight nasal bones in which osteotomies are not recommended. In the same form, we use the septal cartilage in the tip and alar region, as it adapts and conforms in an adequate manner in these areas. The auricle cartilage is excellent as filling or contour cartilage, taking advantage of its structural characteristics. Our use has been precisely in areas needing to give contour or filling. Auricular cartilage can be employed in any nasal area in which an important support is not required and in which the contour of the auricle adapts to the profile we desire; but using the auricle in a situation for which it is ill-suited could lead to significant postsurgical deformities. For this reason, we did not employ it between the medial crura to give support to a nasal tip; also, we did not utilize it in the dorsal area to fill all the length, as its size and form do not fulfill the requirements. However, it has worked very well at the tip level to improve projection and definition, as in Sheen's or Peck's graft, or to fill small depressions in the dorsal area. The alar cartilage, although it is a cartilage of support, is quite thin, for which its use has been basically for the contralateral alar rim. We also employed it in other nasal areas to give filling and contour whenever its thickness is important. In the nasal tip, its employment generally is combined with cartilage of another part, either septal or auricular. The costal cartilage is seldom utilized by us; our only indication is when an important filling of the dorsal area owing to a very low or depressed nose is required. Its use has the great disadvantage of possibly suffering postsurgical deformation owing to the forces of tension that compose it. The remaining cartilages practically cover all of the requirements with satisfactory results, for which we have not needed to displace ourselves to the costal region to get the cartilage. We use this alternative when a cartilage is required and does not exist in the septum or concha, always being careful in its shaping and configuration to avoid deformities after the surgery. Before placing the cartilage in its definitive site, we eliminate all the evident deformities or edges by cutting and smoothing them. We always try not to modify its original structures, such as by crushing or rolling it. With this method we seek to take maximum advantage of its own characteristics. To avoid crushing or rolling it, we try to obtain the cartilage from a site that is adequate for the particular use according to previous studies.⁸ We consider that by crushing the cartilage its physical properties and basic structural characteristics would be eliminated. This does not imply that good filling or outline results cannot be obtained by a crushed cartilage, but we prefer to use a noble structure such as the cartilage according to precise indications and not destroy it and use it as a filling mass. The possibility of having outline irregularities using crushed cartilages and the difficulty in maintaining them in the exact desirable position always exist. In all of our cases, the placement of the chosen cartilage has been by means of 5-0 nylon guides, repeating the maneuver until we have the cartilage in its proper site. These guides are left for a minimum of 5 days, removing them in the first redress of the patient. In the case of graft between the medial crura, this is always attached to both crura with 5-0 nylon, previous exposition, and complete liberation of them.

Our experience with the use of cartilaginous autografts in nasal surgery is comparable with the experience of other authors for the versatility and benefits that they could obtain upon employing them.^{5,6} One of the greatest advantages of using cartilage in the nasal area is the possibility of leveling the nasal balance, as has been pointed out by Constantian¹⁵ and Sheen.⁶ Without modifications made in other nasal structures, we were able to harmonize the nose by means of a graft in the appropriate site. In the female patient shown in [Figure 6](#), an adequate dorsal/tip relation was obtained by adding only three cartilage layers in the tip without making any modification to the nasal dorsum. In the female patient in [Figure 7](#), we were able to eliminate a very prominent supratip effect by balancing the nasal dorsum and tip with combined grafts. In the female patient in [Figure 8](#), an apparently shortened nose was observed by increasing the nasal dorsum with septal grafts. This nasal harmony has been widely studied and analyzed by the previously mentioned authors, and the use of cartilage is one of the better options to obtain these changes.

We always suggest that cartilage be employed with consideration of its physical and histologic characteristics. It will always be necessary to determine the function that is required, as well as the nasal area where it is going to be placed, to determine the best alternative. We have to remember that although cartilage has chondrocytes and intercellular substance as main tissues, the intercellular substance differs considerably⁸; although they all are categorized as cartilage, their functions within the body are quite different. Some serve basically to give support and mainstay, like the costal and septal cartilage, whereas others serve mainly to give form, like the auricular cartilage. Always following these recommendations and carrying out fixation and adequate placement of the cartilage has had few postsurgical complications with very satisfactory results, both for the patient and for us.

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Acknowledgments [TOP](#)

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