The conchal cartilage graft in nasal reconstruction

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Summary
Graft selection remains a problem in nasal reconstruction, where the use of autologous cartilage still provides the best resistance to infection and a low degree of resorption. As the nasal septum is often absent or insufficient in such patients, the auricular concha offers a valid alternative.

A group of 53 patients suffering from developmental iatrogenic and post-traumatic nasal pathologies were treated surgically by means of conchal grafts. Detailed examination of the anatomical defects presented by the patients made it possible to plan the removal of grafts from the area of the auricular concha with great precision. Guidelines were developed for the areas of the cymba concha and cavum concha to be used as sources for some types of commonly used graft.

The technique described made it possible to restore the anatomically deficient structures with satisfactory aesthetic and reconstructive results. The use of cartilage grafts also addressed functional breathing problems.

The auricular concha is easy to shape and can provide grafts to reconstruct the various anatomical components of the nasal pyramid. To this end, it proves very useful to save as much cartilage as possible and to pinpoint affinities between some areas of the concha and the structures to be reconstructed.

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Reconstructive rhinoplasty often entails the use of grafts for structural deficiencies due to developmental traumatic or iatrogenic causes. While positive results have been reported recently in the literature for the use of alloplastic materials,1,2 these can hardly offer the flexibility characteristic of the tissues to be replaced and present a greater risk of inflammatory response. At the same time, the major case studies in the literature document the reliability of cartilage grafts, which are recognised as easy to shape and resistant both to infection, and to resorption.3,4 The latter
characteristically manifests itself early in the initial postoperative period and proves short-lived.\(^5\) As regards the donor region, septal, auricular or costal cartilage can be used in order of preference. It should be borne in mind, however, that septal cartilage is often unavailable or insufficient to fill all the structural gaps in the case of reconstructive rhinoplasty. On the other hand, the use of costal cartilage can prove more complex and present greater softness of the donor region. The auricular cartilage is an alternative to the septum as a source of grafts for reconstruction of all the cartilaginous structures of the nasal pyramid.\(^6,7\)

The use of grafts of cartilage, primarily conchal, has won increasing favour over the last few years. The ease of harvest, the absence of softness and visible scars in the donor region, and the large amount of tissue available unquestionably constitute the basic reasons for this preference. The purpose of this article is to develop some guidelines for selection of the most suitable areas of the concha for certain types of graft.

**Materials and methods**

The functional respiratory disorders were assessed by means of a simple preoperative questionnaire where patients were asked to assess their nasal patency on a scale from 0 (complete obstruction) to 10 (optimal airflow).\(^8\) The same patients were also subjected to basal rhinomanometry followed by decongestion in accordance with the method described by Costantian.\(^9\) All the patients underwent nasal endoscopy and preoperative CT scans were used in the case of malformation to examine the skeletal structures.

The removal of conchal cartilage is carried out by means of a retroauricular approach. A vertical median-posterior incision is made and the posterior surface of the auricular concha is completely exposed. Four or five straight needles are then inserted into the anterior surface to map out the shape of the graft, leaving the antihelix fold and helix root intact. It is thus possible to cut into the cartilage of the concha on the posterior surface with no risk of damaging the morphology of the auricular pavilion. Subperichondrial detachment of the anterior surface of the graft is then carried out for the purposes of complete isolation and removal. The cutaneous incision is sutured with 5.0 nylon. A contralateral excision can also be made if necessary.

The conchal cartilage removed can be used to prepare grafts of different shapes and types in accordance with reconstructive requirements (Fig. 1). The shaping required in the case of saddle-nose deformity is easily performed in that it consists of a median incision to obtain two pieces, which are then placed one on top of the other and sutured. Shaping is instead far more complex in the case of the structural reconstruction of a number of anatomical components. Particular importance attaches to the careful planning and rationalisation of the different pieces to be obtained from the concha (Fig. 2). In particular, if a shield graft\(^10\) is required for reconstruction of the nasal tip, it is advisable to use the cartilage of the cavum concha, which proves particularly suitable to correct the definition and projection of the tip by virtue of its shape and stiffness. The cymba concha instead proves more suitable for reconstruction of the lateral crura or for a Peck onlay graft.\(^11\) Given its particular robustness, the median border region between the cavum and the cymba proves the best place to obtain columellar struts\(^12\) (Fig. 3). Two spreader grafts\(^13\) can be obtained from the marginal region of the cavum or the cymba and then sutured to the sides of the dorsal septum, with the concave face towards the centre, in order to reconstruct the middle nasal vault and restore the inner nasal valve (Fig. 4). Alar batten grafts\(^14\) can also be obtained from the cavum or the cymba. These grafts must be inserted in a precise pocket extending from the caudal margin of the triangular cartilage, at the level of the third of the lateral crura, as far as the pyriform aperture. In such cases, the laterally oriented convex face of the graft helps to lateralise the collapsed portion of the nasal wall. For the subtotal reconstruction of the nasal septum, use was made of a conchal graft together with two spreader grafts obtained from the same concha and attached to it in order to straighten its shape and strengthen its structure.\(^15\)

Nakakita's technique\(^16\) was often employed for augmentation

![Diagram of the normal concha.](image-url)
rhinoplasty in the case of nasal malformations. Two superimposed strips of cartilage serving to augment the ridge are combined with an eyelet-shaped strip acting as a columellar strut. The result is an L-shaped framework (Fig. 5). Finally, plumping grafts are easy to obtain through fragmentation of the cartilage residues present in the concha between one graft and another. Particular care was taken in all cases to round off the edges of the grafts.

Results

Grafts of auricular concha of various types were carried out on 53 patients over a period from
February 2000 to June 2003. The group consisted of 34 males and 19 females with ages ranging from 16 to 62 years. Malformations were presented in 21 cases, iatrogenic pathologies in 24, and post-traumatic deformities in the remaining 18. A degree of nasal obstruction was present in 34 patients. The concha was the sole source of graft material. A single harvest of concha was used in 41 cases and bilateral excisions proved necessary in 12. Rhinoplasty was combined in 13 cases with orthognathic surgery to correct malocclusion of malformative or post-traumatic origin.

Surgical revision proved necessary in two cases. A male patient aged 35 with saddle-nose deformity was treated with a second graft of contralateral concha after an interval of nine months. This was probably due to the fact that the graft used was barely sufficient to correct the defect in the first place and subsequently became insufficient through resorption. In the other case, involving a woman of 32 years with a poor outcome from previous rhinoplasty, a second operation proved necessary after an interval of eight months to correct some slight asymmetries and irregularities in nasal shape. The causes were the presence of particularly thin skin and failure to round off the edges of the grafts sufficiently.

The follow-ups carried out at intervals from 18 to 26 months revealed no cases of infection, resorption or displacement of the grafts. Satisfactory aesthetic and reconstructive results were achieved for all the patients in the view of the surgeons present at the follow-up examinations, the family physicians, and the patients themselves, none of whom requested further treatment. In the cases with nasal obstruction, the results of the postoperative self-assessment questionnaire indicated a subjective improvement (Fig. 6). The comparison of preoperative and postoperative rhinomanometric data also showed a decrease in nasal resistance and an increase in nasal functionality, with an improvement in the postoperative mean nasal airflow registered for all of the patients.

We present preoperative and postoperative photographs of two clinical cases treated with multiple grafts taken from the auricular concha (Figs. 7–14).

Discussion

Grafts of auricular cartilage have been the most favoured material for nasal reconstructions from many years now. Material can be removed easily from both the auricular conchae in accordance with reconstructive requirements. 17–19 Strips of cartilage are obtained from the concha and joined together to form a single graft capable of making good structural defects in various sections of the nose. 16,20 The curved shape of the conchal cartilage has also been straightened out by means of techniques involving the use of incisions, sutures and the superimposition of grafts. 15,21–23

An important consideration in harvesting is to cut all the grafts needed for reconstructive purposes from the concha without any waste of tissue. It is also important to use those portions of concha most similar to the nasal anatomical components to be reconstructed. For example, the cymba

![Figure 6](image-url) Black column: preoperative self-assessment of nasal airflow. White column: postoperative self-assessment.
Conchal cartilage graft in nasal reconstruction

Concha is the first choice for reconstruction of the lateral crura because it possesses a curved three-dimensional structure that closely resembles the element to be replaced. The particular flexibility and thinness of the cymba concha also makes it the best source for Peck onlay grafts to correct bosses and/or increase the degree of tip projection. The thickness and particular stiffness of the cavum concha instead make it the best source for shield grafts serving to improve the definition, symmetry, and projection of the nasal tip. The greater robustness of the transitional region between the cavum and the cyma makes it the first choice for the preparation of columellar struts. Both the cyma concha and the cavum concha can be

**Figure 7** Case 1. Revision rhinoplasty. Preoperative view.

**Figure 8** Case 1. Revision rhinoplasty. Postoperative view: reconstruction using dorsal grafts and alar batten grafts.

**Figure 9** Case 1. Revision rhinoplasty. Preoperative view.

**Figure 10** Case 1. Revision rhinoplasty. Postoperative view.
used for the preparation of alar batten grafts, which are frequently required in secondary rhinoplasty for problems regarding the excessive resection of lateral and/or triangular cartilages with weakening and retraction of the lateral nasal wall. Spreader grafts can easily be obtained from the marginal region of the cavum and the concha, thus leaving the central part of the concha available for the rest of the reconstruction. The curved shape of all the conchal cartilage makes it suitable for the correction of saddle-nose deformities of various degrees. To this end, various layers of cartilage can be sutured together depending on the scale of the deformity. Finally, the unused cartilage left between one graft and another or after the further
shaping of the various grafts can be used as
plumping grafts to adjust the nasal labial angle
or provide the finishing touches in rhinoplasty.

It is considered useful in practical terms to
schematise the reconstructive grafts obtainable
from the concha in major and minor structural
subunits. Spreader grafts, grafts replacing lateral
crura, and alar batten grafts, which are generally
removed in pairs, belong to the first group. Shield
grafts, Peck onlay grafts, struts, and plumping
grafts belong to the second. Our experience is
that each concha can supply at most five mixed
subunits (including elements from both groups) or
four subunits from the major group, after which it
becomes necessary to use the other concha. In the
case of saddle-nose deformity, the use of one or
two conchae will obviously depend on the scale of
the problem.

It should finally be stressed that careful pre-
operative assessment of the structural problems
presented by the patient is essential in every case
of nasal reconstruction. This assessment can also be
carried out with still greater clarity during the
operation, when use of the open approach permits
a direct view of the patient’s problems. The re-
moval of auricular cartilage must be carried out
with a view to the precise replacement of anatom-
ical structures that are missing or hypoplastic. The
shape and form of the grafts taken from the
auricular concha must be tailored to the specific
situation presented by the case in question. In
addition to the schematic and abstract planning of
grafts, it is thus always necessary to take into
account the specific situation to be resolved.

References

1. Romo T, Sonne J, Choe KC. Revision rhinoplasty. Facial Plast
2. Jongwook H, Miller PJ. Expanded polytetrafluoroethylene
implants in rhinoplasty: literature: review, operative tech-
3. Endo T, Nakayama Y, Ito Y. Augmentation rhinoplasty:
S.r.l.; 1999.
6. Quatela VC, Jacono AA. Structural grafting in rhinoplasty.
7. Becker DG, Becker SS, Saad AA. Auricular cartilage in revi-
8. Sciuto S, Bernardeschi D. Upper lateral cartilage suspension
over dorsal grafts: a treatment for internal nasal valve
9. Costantini MB, Claridy RB. The relative importance of septal
and nasal valvular surgery in correcting airway obstruction
in primary and secondary rhinoplasty. Plast Reconstr Surg
10. Sheen JH. Achieving more nasal tip projection by the use of
a small autogenous vomer or septal cartilage graft. Plast
Reconstr Surg 1975;56:35–42.
11. Peck GC. The onlay graft for nasal tip projection. Plast
deformities of the lower cartilaginous vault. Arch Otolar-
yngol 1951;54:467–72.
13. Sheen JH. Spreader graft: a method of reconstructing the
roof of the middle nasal vault following rhinoplasty. Plast
graft for correction of nasal collapse. Arch Otolaryngol
15. Boccieri A. Subtotal reconstruction of the nasal septum us-
oplasty using an L-shaped auricular cartilage framework
combined with dermal fat graft for cleft lip nose. Aesthetic
17. Hage J. Collapsed alae strengthened by conchal cartilage
(the butterfly cartilage graft). Br J Plast Surg 1965;18:
92–6.
19. Muenker R. The bilateral conchal cartilage graft: a new
technique in augmentation rhinoplasty. Aesthetic Plast
20. Dyer WK, Yune ME. Structural grafting in rhinoplasty. Facial
22. Neu BR. Combined conchal cartilage—ethmoid bone grafts
23. Farrrior EH. Revision rhinoplasty for monographs in facial
plastic surgery contemporary rhinoplasty. Facial Plast Surg
24. Lui MA, Choe KC. Structural cartilage grafts in facial