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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.

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

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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

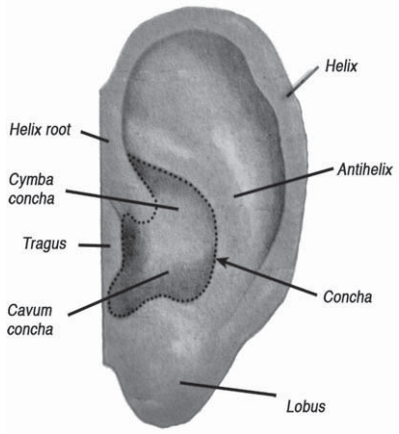

Figure 1 Diagram of the normal concha.

Figure 2 Left concha. (From the top) Harvesting of two alar grafts from the cymba concha, one columellar strut from the border region, one shield graft from the cavum concha, and one plumping graft from cartilage residues.

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

Figure 3 Insertion of columellar strut between the medial crura.

Figure 4 Left concha. Harvesting of spreader grafts from the outer edge of conchal cartilage.

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

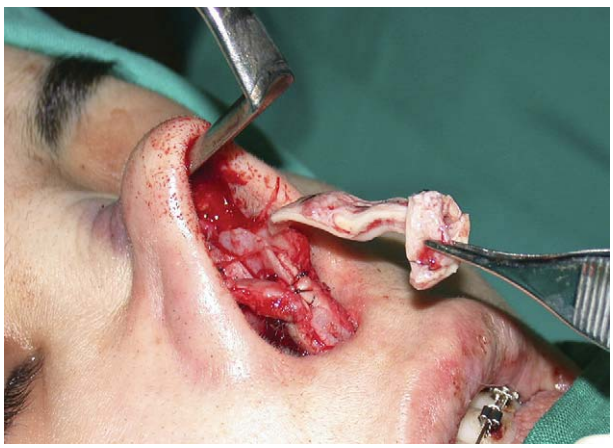

Figure 5 Nakakita technique. Placement of the graft: two sheets in the pocket of the nasal dorsum, one rolled sheet between the medial crura acting as a columellar strut.

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

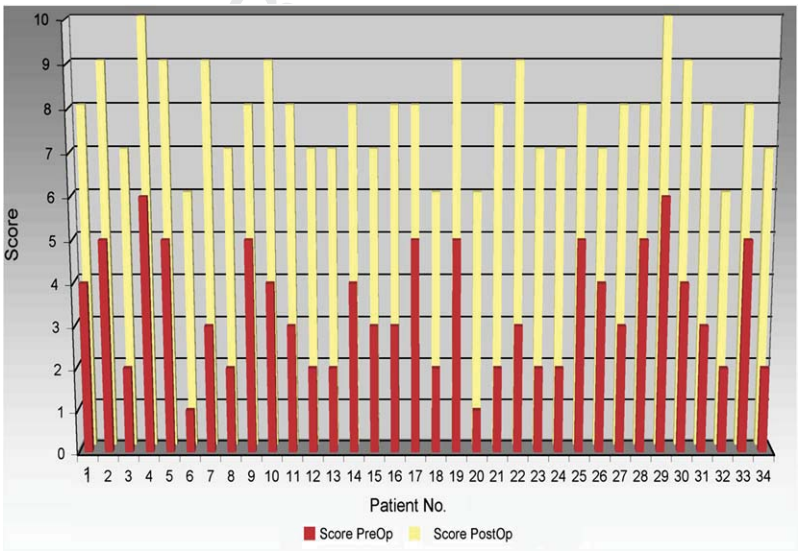

Figure 6 Black column: preoperative self-assessment of nasal airflow. White column: postoperative self-assessment.

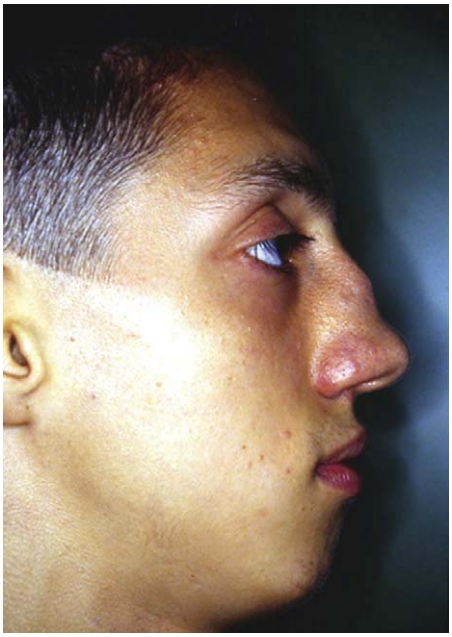

Figure 7 Case 1. Revision rhinoplasty. Preoperative view.

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 bossae and/or increase the degree of tip projection. The

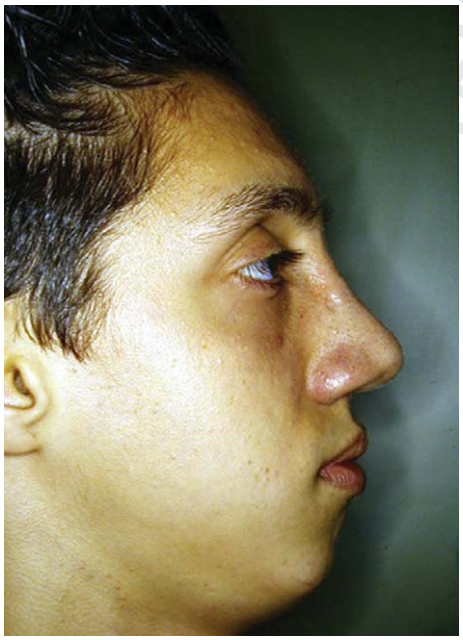

Figure 8 Case 1. Revision rhinoplasty. Postoperative view: reconstruction using dorsal grafts and alar batten grafts.

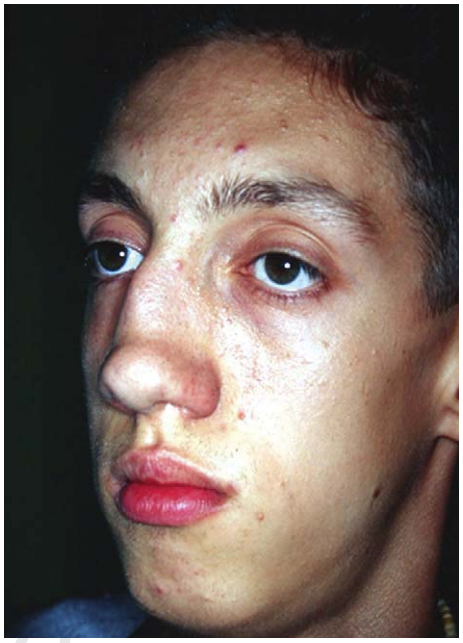

Figure 9 Case 1. Revision rhinoplasty. Preoperative view.

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 cymba makes it the first choice for the preparation of columellar struts. Both the cymba concha and the cavum concha can be

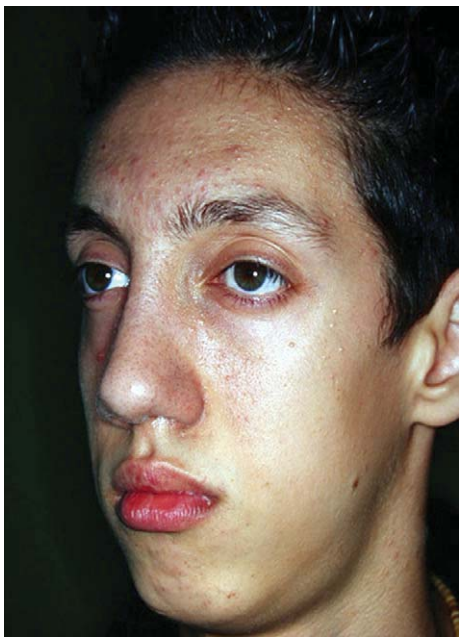

Figure 10 Case 1. Revision rhinoplasty. Postoperative view.

Figure 11 Case 2. Cleft lip nose deformity. Preoperative 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

Figure 12 Case 2. Cleft lip nose deformity. Postoperative view. Reconstruction using columellar strut, shield graft and alar graft.

Figure 13 Case 2. Cleft lip nose deformity. Preoperative view.

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

Figure 14 Case 2. Cleft lip nose deformity. Postoperative view.

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 preoperative 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 removal of auricular cartilage must be carried out with a view to the precise replacement of anatomical 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.

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