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Dorsal Augmentation with Diced Conchal Cartilage Wrapped in Retroauricular Fascia

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Abstract
Background Dorsal augmentation is of primary importance to shape an ideal nose. Although costal cartilage is still used for this purpose, diced cartilage grafts wrapped in autogenous fascia became more and more popular in recent decades. In this paper, the authors report their experience with a new combination made by diced conchal cartilage wrapped in retroauricular fascia in primary and secondary cases.
Methods The clinical records of the first 19 patients to undergo dorsal augmentation with this technique were reviewed. The entire concha has been harvested and, once diced, wrapped in a sleeve of retroauricular fascia obtained using the same incision. Quilting reabsorbable sutures closed the mastoid dead space and prevented the risk of hematoma. The graft has been used in all the cases through a closed approach.
Conclusion The use of diced cartilage is nowadays considered one of the best options among the available procedures for dorsal augmentation. Diced conchal cartilage wrapped in posterior auricular fascial graft is a new, simple and safe procedure that eliminates the necessity of a secondary donor site (temple or thorax), speeds up the operation and leaves a well-concealed scar behind the ear. Its main disadvantages toward costal diced cartilage wrapped in rectus abdominis fascia are the minor quantity of cartilage that can be obtained, even in case of bilateral harvest, and compared to temporal fascia a longer postoperative swelling (6–8 weeks).

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Keywords Diced cartilage · Retroauricular fascia · Dorsal augmentation

Introduction

The use of the diced cartilage graft in rhinoplasty was firstly proposed by Peer in 1943 to camouflage cartilage grafts [1]. Subsequently, Erol popularized his technique where diced cartilage grafts were wrapped in Surgicel (Ethicon Inc., Somerville, NJ) [2]. Long-term follow-up showed that the inflammatory process and foreign body reaction induced by Surgicel lead to a significant secondary cartilage loss [3–5]. For this reason, Daniel and Calvert modified the original technique and proposed wrapping the diced cartilage in deep temporal fascia [6]. As this method requires an additional donor site in the temple, Cerkes recently introduced the use of diced costal cartilage wrapped in rectus abdominis fascia that shortens the operation time and eliminates a second scar with its risks, mainly hair loss [7].

The posterior auricular fascia has been used in the past for auricular reconstruction in congenital microtia [8, 9]. In aesthetic surgery, Horlock described a post-auricular fascial flap as an adjunct to Mustardé- and Furnas-type otoplasty to reduce suture extrusion and recurrence rates. Similarly in 2009, Shokrollahi reported the use of the same retroauricular flap to facilitate a new approach to repair prominent ears in 15 cases [10].

Regarding rhinoplasty, Antohi proposed a technique for dorsal augmentation with chondrofascial "open sandwich" grafts consisting of big pieces of conchal cartilage and retroauricular fascia [11]. The concha was cut into 2 to 4 pieces and subsequently sutured to the fascia in different patterns according to the different shapes of the nasal dorsum defect. It is important to note that with this technique the conchal cartilage was not diced and was not wrapped in the fascia. Indeed, the fascia acts simply as a carrier and support for the conchal cartilage.

Hodgkinson recently reported his positive clinical experience with the use of retroauricular fascia as coverage for the tip in secondary rhinoplasties under thin tip skin (camouflage graft), as a filling material, especially for the nasal dorsum, and as an interpositional graft between the dorsum and the tip [12].

In this study, a new combination of diced cartilage and autologous fascia is presented and the advantages and disadvantages of the diced conchal cartilage wrapped in retroauricular fascia technique are discussed.

Material and Methods

Patients

The clinical records of the first 19 patients to undergo dorsal augmentation with diced conchal cartilage wrapped in retroauricular fascia were reviewed. The mean age of the patients was 25 (range 19 to 38 years), eleven women and eight men. The procedure has been used in 6 primary cases and 13 secondary cases. Three cases were post-traumatic deformities, the trauma having occurred 6, 8 and 14 months before. In one case, a silicone implant, previously inserted elsewhere, had been removed and the remaining defect of the nasal dorsum was reconstructed with our technique. Two cases of primary and one of secondary rhinoplasty were performed in patients with a long history of drug abuse (one patient suffered also from a septal perforation). In 7 of the 19 patients, the conchal cartilage has been harvested bilaterally. The closed rhinoplasty technique was used in all the patients. During the postoperative period, the patients were followed up to evaluate the results and possible complications after 1, 6, 12 and 24 months.

Surgical Technique

The donor site is infiltrated with a 1.200000-bupivacaine/adrenaline solution, and a 4-cm incision is made in the retroauricular sulcus (Fig. 1). The skin and soft tissues on the posterior surface of the ear are elevated, and the conchal cartilage is exposed. A large single piece of conchal cartilage is harvested taking care to leave an intact strip of concha along the antihelix fold to avoid any deformity of the auricle. Dissection then proceeds through the same incision in the retroauricular area toward the hairline, elevating the skin and soft tissues from the underlying fascia for about 5–6 cm. At this point, a rectangle-shaped piece of retroauricular fascia with a dimension of a maximum of 5.0–3.0 cm width and a thickness of about 1.5–2.0 mm is harvested using the monopolar cautery. No fragments of temporal fascia or periosteum are included in the graft.

The dead space in the post-auricular area is closed using 4–6 reabsorbable quilting sutures, thus preventing the risk of hematoma and fluid collection in the postoperative period. The skin incision is sutured with fast reabsorbable stitches, and a compressive dressing was applied in the concha.

The conchal cartilage is diced into pieces smaller than 0.5×0.5 mm using a no. 11 blade and filled in a 1-cc tuberculin syringe (Fig. 2). The fascial sleeve is then prepared folding it around the syringe and closing it with 5-0 rapide Vicryl running sutures. The distal extreme of the sleeve is closed with the same sutures. After preparation of the fascial sleeve, the syringe is removed and the sleeve is filled with diced cartilage until the desired thickness is obtained. The end of the sleeve is subsequently closed after that any excessive diced cartilage is removed.

Once performed the other steps of the rhinoplasty, two 5-0 rapide Vicryl pull out sutures, with a needle on each one, are placed on each side of the cranial end of the graft. The skin flap of the nasal dorsum is lifted with a retractor, and the diced cartilage wrapped in the retroauricular fascia is placed in the recipient bed using forceps. If necessary, the caudal end of the graft can be fixed to the soft tissues with a couple of 5-0 rapide Vicryl sutures. In some cases, the diced cartilage fills only a part of the sleeve, while the rest is left open, thus using the retroauricular fascia as a thinner filler and/or a camouflage. The composite graft can be shaped intraoperatively, according to the specific necessities of each patient to obtain the best correction of the dorsal defect.

Intranasal incisions are closed, and nasal packages are used in all the patients for 24–36 h (Fig. 3).

Results

A separate, subjective clinical evaluation (inspection, palpation and evaluation of the photographic documentation) was made by the five authors. The patients also performed an independent evaluation of the final result. Dorsal contour of the nose and global nasal balance (tip and dorsum relationship) were evaluated (Fig. 4).

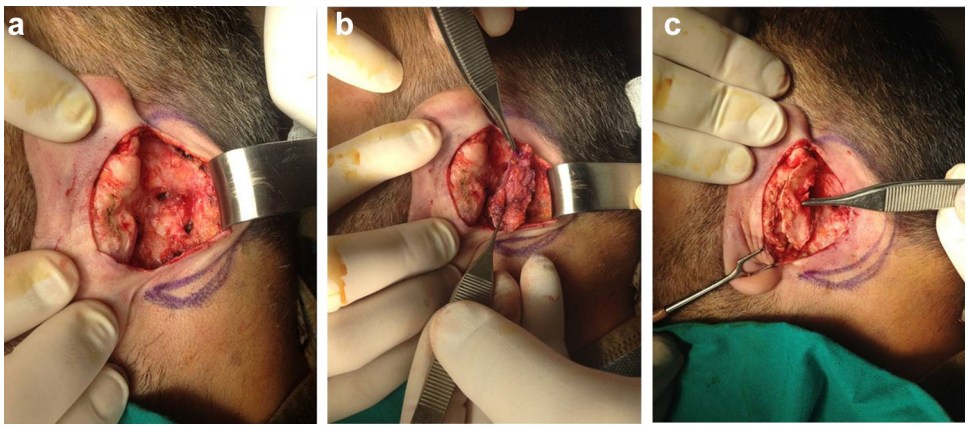

Fig. 1 **a** 4-cm incision in the retroauricular sulcus and preparation of the subcutaneous pocket in the mastoid area. **b** Harvest of a square piece of the retroauricular fascia measuring 5.0 × 3 cm. **c** Harvest of the entire concha from the left auricle

Fig. 2 **a** Using a scalpel blade 11 the conchal cartilage is diced into pieces smaller than 0.5 × 0.5 mm. **b** A sleeve of retroauricular fascia is created around a 1-cc tuberculin syringe filled with the conchal diced cartilage. The plunger pushes the cartilage inside the sleeve, and at the same time the syringe is removed. **c** The graft made by conchal diced cartilage wrapped around the retroauricular fascia is ready for use. If necessary, larger or thicker grafts can be prepared by harvesting the cartilage concha from both ears. **d** Through a closed approach, the graft is precisely settled and stabilized using two pull out sutures cephalically

According to the authors, excellent results after 2 years of follow-up were obtained in 4 cases, good results in 10 cases, satisfactory results in 4 cases and a poor result in 1 case (Fig. 5).

All the patients except one declared to be very satisfied with the final result of the dorsal augmentation. No revision surgeries were performed in our series. No case of infection, hematoma, seroma or displacement of the graft at the recipient area was revealed. The long-term follow-up (2 years) did not show evident resorption or warping of the diced cartilage (Fig. 6).

Regarding the donor area, there was 1 hematoma (one of the first cases before the introduction of quilting sutures) and 2 cases of poor quality of scar in heavy smoking patients (Fig. 7).

Conclusion

Dorsal augmentation is of primary importance to shape an ideal nose. Through the years, autologous, homologous and alloplastic materials have been used to achieve this purpose with different rates of success. Autologous grafts are unanimously preferred because of their significant advantages, and among them the costal cartilage is considered the best choice. Unfortunately, solid dorsal onlay grafts are associated with high rates of revision because of various problems such as distortion, dislocation, palpability and visibility, especially in thin skin. For this reason, diced cartilage grafts wrapped in fascia have become more and more popular in recent decades.

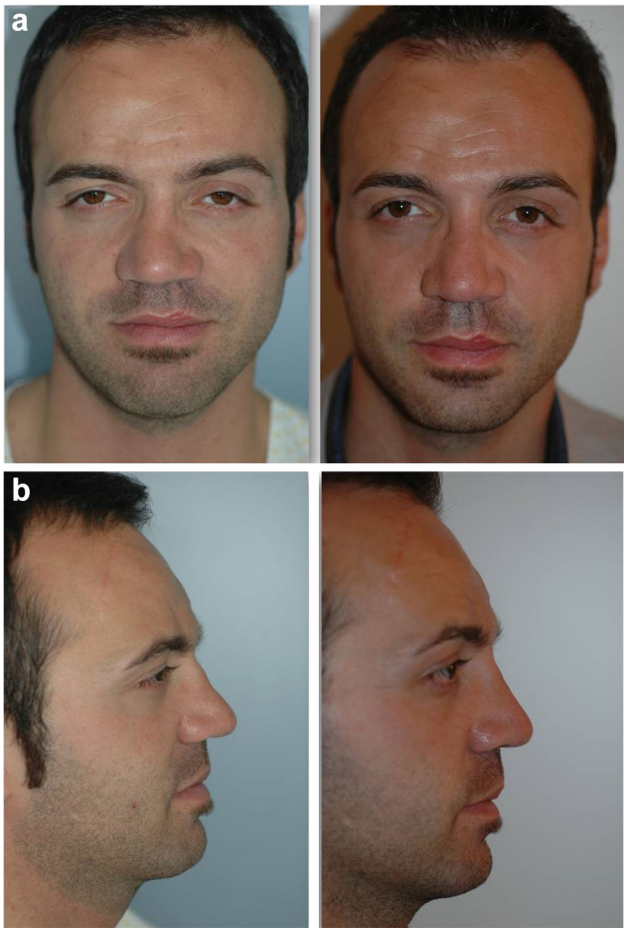

Fig. 3 Preoperative and postoperative view of a dorsal augmentation in primary post-traumatic rhinoplasty

Many variants of the original technique firstly described by Erol have been published in the literature. These techniques are different in the source of the diced cartilage (septum, concha or rib) and in the type of the material that is filled with the diced cartilage. Initially, synthetic materials, such as Surgiderm or Alloderm, were proposed to build the sleeve, but they have been abandoned due to the loss of the diced cartilage following the inflammatory response induced by the foreign body resorption. Temporal fascia is a good alternative, but it requires a second operative field and is associated with a risk of alopecia and hematoma. Recently, Cerkes proposed the use of the rectus abdominis fascia together with costal cartilage to solve these problems.

In this paper, a new combination of diced cartilage and autogenous fascia is presented. One or two conchal cartilages, according to the size of the dorsal defect, have been harvested and wrapped in a sleeve of retroauricular fascia. This composite graft has been used in primary or secondary cases, through a closed approach, but it is also suitable for open rhinoplasties.

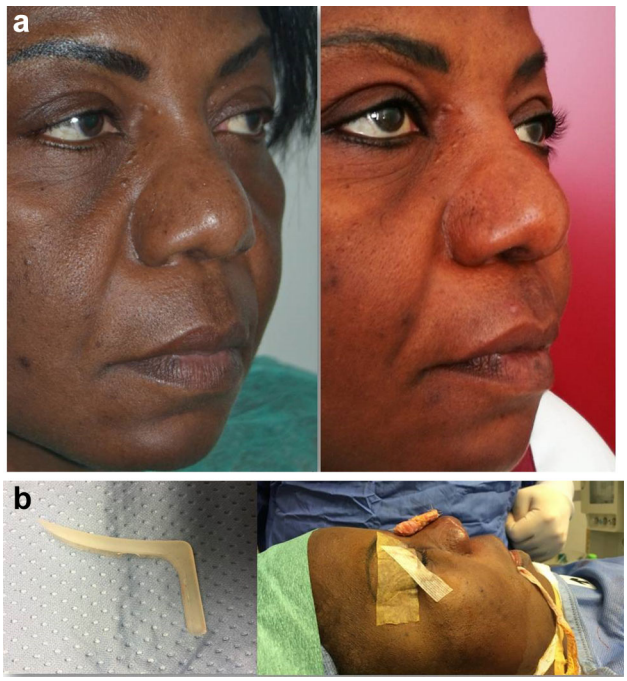

Fig. 4 **a** Preoperative and postoperative three-quarter views in a case of chronic infection of a silicone prosthesis previously implanted elsewhere. The designed graft has maintained the contour of the nose following removal of the implant. **b** The L-shaped implant removed during the operation and the intraoperative view with the diced cartilage wrapped in retroauricular fascia. Note the significant size of the graft that can be obtained when both the auricular cartilages are harvested

In our series, a satisfying dorsal augmentation has been obtained with this technique in all the patients except one and this result has been maintained in the 2 years of follow-up. Conchal cartilage is easy to harvest, can be well diced and has a great survival rate. Retroauricular fascia harvest is also easy and fast and has few simple potential complications such as hematoma in the mastoid area which is also simple to prevent and treat. Compared to temporal fascia, it eliminates the need for a second donor source, thus speeding up the operation and the risk of a visible scar in the temple that is aesthetically very important in women or bald men. With respect to temporal fascia, mastoid fascia is thicker which can be considered an advantage as it increases its filling effect (when needed) and masks better any irregularity of the larger cartilage fragments or of the recipient site. The postoperative swelling is longer than the temporal fascia (6–8 weeks), and patients have to be informed in advance about that.

If we compare our technique with the Cerkes technique, they both share the same advantages with respect to temporal fascia, but the harvest of concha and fascia from the ear and mastoid area is much safer, simpler and has not potential serious complication such as pneumothorax. On the other hand, the main disadvantages comparing to

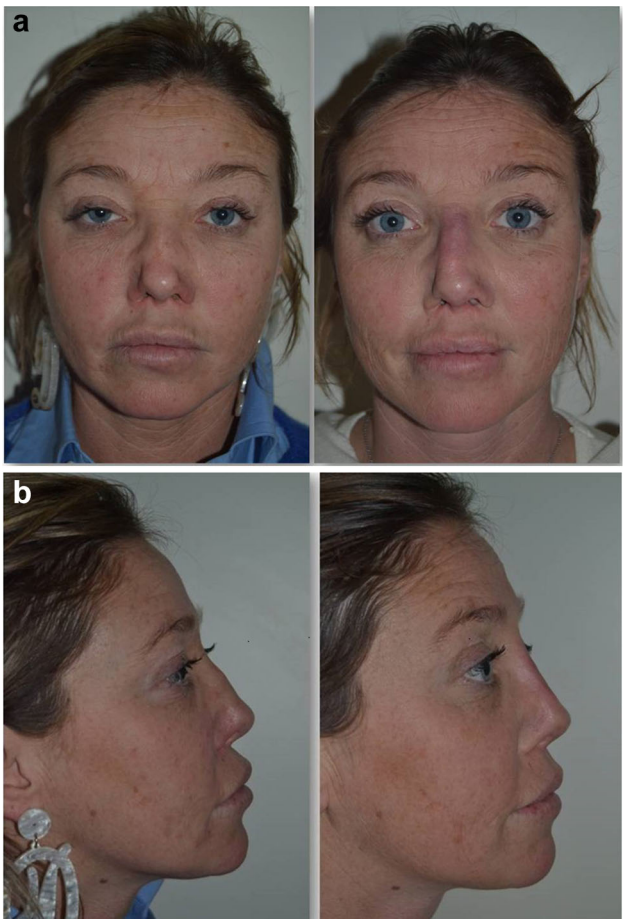

Fig. 5 Preoperative and postoperative lateral view of dorsal reconstruction in a secondary case

Cerkes technique is the paucity of cartilage that can be harvested, even in case of bilateral harvest. Indeed, costal cartilage can provide laminated segments for spreader grafts or other structural grafts.

In conclusion, we think that diced conchal cartilage wrapped in the retroauricular fascia is a new excellent combination and a simple and safe alternative for dorsal augmentation, especially in cases in which the defect is not too severe and there is no need of more cartilage for other purposes (tip, columella, etc.), and differently rib cartilage is a preferable solution.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflicts of interest to disclose.

Human and Animal Rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent For this type of study, informed consent is not required.

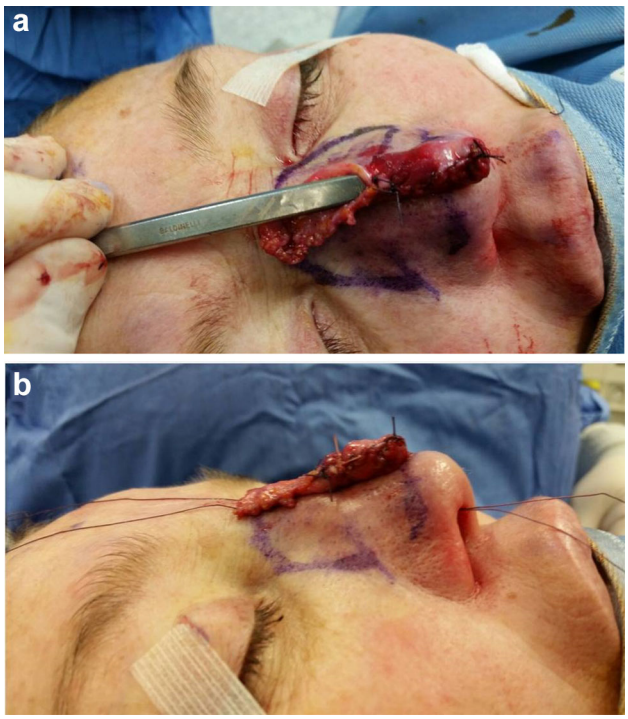

Fig. 6 **a** In some cases, the diced cartilage fills only a part of the sleeve, while the rest is left open, thus using the retroauricular fascia as a thinner filler and/or a camouflage. **b** The graft is in the right position, and the dorsal profile of the nose is properly augmented. Some modifications of the shape and size of the graft are still possible in the operating room and even in the first postoperative days

Fig. 7 Harvest of the conchal cartilage and retroauricular fascia leaves a well-concealed scar in the post-auricular sulcus and does not cause any deformation of the auricle, such as floppiness or lack of projection

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