

## Diced Cartilage Versus Solid Grafts in Rhinoplasty

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The use of diced cartilage grafts in reconstructive surgery was first described by Peer [1] in 1943. A number of additional reports describing diced cartilage have followed since then, but the technique has never achieved widespread use. In recent years, however, an interest in using diced cartilage for rhinoplasty procedures has resurfaced. As aesthetic and reconstructive surgeons revisit this technique, it is important that we critically assess the various materials, approaches, and indications applied by clinicians using diced-cartilage augmentation.

The use of diced cartilage rather than a solid piece of cartilage graft is an attractive concept because it offers greater flexibility, carries a minimal risk of warping, and obviates the need for a long and straight cartilage graft donor site. Diced cartilage also may be particularly advantageous by enabling the use of residual septum in cases of secondary and revision rhinoplasty or by proving to be a more effective method for delivering conchal cartilage that as a single piece may be inadequate.

To prevent problems of palpability and visibility of diced grafts, surgeons have described the use of autogenous, synthetic, or alloplastic wraps to camouflage the cartilage construct. A great deal of controversy currently exists about the various techniques that have been advocated, and the optimal substance or scaffold for delivering diced cartilage has yet to be determined.

In 2000, Erol [2] introduced the concept of a “Turkish Delight,” whereby diced cartilage wrapped in Surgicel was used as an adjunct to rhinoplasty. The report by Erol describes the use of Surgicel-wrapped diced cartilage in

more than 2,000 rhinoplasty cases, with successful long-term follow-up evaluation.

On the other hand, others have had far less success using this approach during rhinoplasty. Daniel and Calvert [3] reported their experience using Surgicel-wrapped diced cartilage for 22 patients involving 14 radix grafts, 4 upper dorsum grafts, and 4 full-length grafts. In all cases, this technique failed to correct the problem due to complete resorption by about 3 months. As a result, Daniel and Calvert abandoned Surgicel and instead used fascia to wrap diced cartilage. In contrast, this patient cohort of fascia-wrapped diced cartilage ( $n = 20$ ) did not demonstrate any notable resorption but rather required removal of excess amounts of cartilage in one-third of patients due to overcorrection for anticipated volume loss. A recent follow-up article of 79 patients with diced cartilage and fascia demonstrated adequate results at 1- to 2-year follow-up evaluations [4].

In this article titled A Novel Autologous Scaffold for Diced Cartilage Grafts in Dorsal Augmentation Rhinoplasty, Bullocks et al. present an innovative approach to rhinoplasty using diced cartilage combined with autologous tissue glue (ATG: platelet-rich plasma + fibrin glue). The authors report the use of ATG-diced cartilage constructs for 68 rhinoplasty patients requiring dorsal augmentation. During a mean follow-up period of 15 months, no major complications (extrusion, displacement, or infections) were reported, but 11 patients did experience an erythematous reaction lasting 1–4 weeks. The authors report maintenance of dorsal height in all cases, but this was not objectively studied.

We believe Bullocks et al. should be congratulated for their work. If diced cartilage is a preferred method of reconstruction, these authors have introduced a novel technique for delivering diced cartilage that may minimize negative factors (i.e., elevated costs, additional donor sites,

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and complications) associated with other methods. Although this approach does offer potential benefits, the work of these authors also raises a number of important questions for the reader.

A critical issue for all autogenous or nonautogenous materials used in rhinoplasty is the risk of resorption. In cases of dorsal augmentation, it is important that the surgeon account for possible resorption and incorporate this into his or her treatment algorithm. For instance, when using Surgicel and diced cartilage, Daniel and Calvert [3] delivered approximately 20% overcorrection to account for anticipated loss of volume. However, when using diced-cartilage wrapped in fascia, they found that they overestimated resorption rates and thus overcorrected by too much for 50% of patients who had radix grafts.

In the following study by Bullocks et al., 1 year is too short a time frame for conclusive determination of resorption rates. Studies with other materials such as AlloDerm and collagen–blood constructs have shown delayed absorption at 23 years (20–30 and 16%, respectively) [5]. Although the 1 year follow-up data from this paper are encouraging, they remain inconclusive in terms of long-term survivability.

The authors point out that 11 patients (16%) experienced redness of the overlying nasal skin, and speculate that bovine thrombin is the causative agent. Although the authors provide strong references as to the possible link of thrombin and erythema, this relationship was not verified in their study.

Man et al. [6] recently reported their experience with 20 patients using an identical composition of platelet-poor and platelet-rich plasma but did not report any episodes of erythema. As the authors move forward with animal studies to evaluate the efficacy of various methods for delivering diced cartilage (as discussed in Future Directions), perhaps it would be worthwhile to introduce thrombin as an additional factor to study in their experimental design. Histologic examination also will help to resolve this important clinical question.

Another point left unanswered by this initial report of ATG-cartilage constructs is the extent of dorsal augmentation that can be achieved. For instance, the maximum augmentation achieved with materials such as AlloDerm is

reported to be 3 mm [5], whereas diced cartilage wrapped in fascia can yield augmentations up to 8 mm thick [4]. Unfortunately, the amount of dorsal augmentation achieved in this study was not addressed.

Based on our experience, we believe solid cartilage grafts should remain the preferred method for dorsal augmentation in rhinoplasty. In our hands, solid pieces allow for better control of shape, contour, and creation of a supratip break.

Sculpting and small adjustments often are required during the final stages of the operation, which may mean the difference between a successful and an unsuccessful result. It is unclear from this report whether ATG-cartilage constructs can be fine-tuned after insertion. As more surgeons become familiar with this type of augmentation technique, it will be interesting to learn whether carving can be done in situ after the construct is laid down. Nevertheless, for circumstances in which solid grafts are not available, the techniques highlighted in this report offer a good alternative.

We commend Bullocks and colleagues for their important contribution to the literature. We look forward to future studies that will help better to define the role of this novel technique in rhinoplasty procedures.

**Conflict of interest** All authors have no conflicts of interest to disclose in relation this article.

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