A New Technique in Rhinoplasty: Diced Cartilage with Fascia

by Jay Wynn Calvert, MD, FACS

Rhinoplasty remains one of the most challenging operations in the field of plastic surgery. Reshaping the nose for functional or aesthetic reasons can be frustrating for both surgeon and patient alike. One major aspect of rhinoplasty surgery is reshaping the dorsum (bridge) of the nose. The dorsum needs to be straight, at the correct height, and needs to look natural as though it had never been operated upon. A novel technique using cartilage diced into small cubes and wrapped in deep temporalis fascia has been developed by Drs. Rollin Daniel and Jay Calvert, to help improve outcomes and increase the success rate of many types of rhinoplasty procedures. By placing diced cartilage (Figure 1a) and fascia (Figure 1b) on the dorsum, the results of rhinoplasty can be improved significantly. The plastic surgeon must balance the shape and size of all parts of the nose while ensuring that the nose remains functional. Patients who undergo rhinoplasty expect that the result will be a significant aesthetic improvement. And, when the results are not favorable, they are disappointed and sometimes even angry. The dorsum of the nose is one area of significant disappointment. If the dorsum looks crooked, deviated, or as though there has been surgical intervention, the result is not seen as favorable. The goal with new rhinoplasty techniques is to generate reliable, predictable results that last over time. Diced cartilage with fascia is an example of this type of technique.

Young first described diced cartilage in 1941 in experimental situations. Peer published his work in 1943 about the clinical viability of diced cartilage. He performed extensive experimentation using molds and implanting diced cartilage in the abdomen and transferred the construct to the side of the head in order to reconstruct an ear. Both Young and Peer clearly showed survival of the diced cartilage with the cartilage pieces surviving with fibrous tissue interspersed between the pieces. This initial work allowed neurosurgeons and others to have confidence to begin using diced cartilage in other clinical situations. Neurosurgeons used diced cartilage to perform cranioplasties. The cartilage was diced into small cubes. It was then used to fill defects of the skull by placing it over the dura mater of the brain. The cartilage would then ‘fuse’ together in a firm mass that would protect the brain. Other surgeons used similar techniques using diced cartilage to perform reconstructive procedures of the face, forehead, and skull. Some of these scenarios require discussion for a better understanding of why diced cartilage has withstood the test of time.

Nasal reconstruction with diced...
cartilage was employed to reconstruct saddle nose deformity due to Hansen's disease (Leprosy). Tovey described the procedure in which the posterior nasal cavity was filled with diced cartilage and then the dorsal bone graft was placed on top of it to create the nasal bridge. Several other approaches to saddle nose deformity were taken using diced cartilage based on this early work. However, the technique was then largely abandoned for quite some time. It is not clear why this is the case, but one may speculate that it was due to the enthusiasm of many surgeons' interest in synthetic materials such as hydroxyapatite, PTFe, Gore-Tex, and others. These materials have been abundant, available off-the-shelf, and are easily utilized by competent surgeons. In order to use the diced cartilage technique, one must harvest the cartilage from another part of the body thus creating a separate incision and the possibility of complications at that donor site. Therefore, autogenous cartilage may have fallen by the wayside when the market was flooded with synthetic materials.

In the 1990’s, Dr. Onur Erol picked up the technique of diced cartilage wrapped with Surgicel (DC-S), a synthetic oxidized cellulose cloth used for hemostasis during surgery. He reported on a series of over 2500 cases during a 10 year period with excellent success rates. Erol would dice the cartilage into small cubes and then wrap it in Surgicel and place it on the dorsum of the nose. His results were so spectacular that he inspired Dr. Daniel to try this technique. Unfortunately, Dr. Daniel experienced consistent clinical failure of the technique such that he and Dr. Calvert began to search for the way to correct the problems that were occurring. They simultaneously wanted to find out why the technique was failing.

Daniel and Calvert came up with a plan to go back to the operating room on these failed DC-S patients and take tissue samples while at the same time correcting the problems with autogenous tissue. They chose deep temporalis fascia as the material of choice to wrap the diced cartilage. Together, they published the results of their work with attention to the histologic findings of the tissue removed. In addition, they had to re-operate on a few patients with diced cartilage and fascia (DC-F) as some were over-corrected in the process of repairing the failed DC-S patients. The findings were published in 2004 and many other surgeons have followed their technique and published their results independently.

Today, the diced cartilage with fascia technique is being used in many clinical situations with excellent results. The technique is used frequently in primary (first time) rhinoplasty where dorsal augmentation or contouring is necessary. However, it has become a very reliable method of correcting very significant problems as a result of previous rhinoplasty or trauma. When there are many contour abnormalities and irregularities of the dorsum, the diced cartilage with fascia is a reliable method of creating a beautiful contour that does not absorb or change over time.

The following two cases demonstrate the use of the technique using diced cartilage with fascia.

Case 1 - Primary Rhinoplasty
The patient is a 22 year-old female with no significant history other than the desire for a more cosmetically pleasing nose (Figures 2a and 2b). Her dorsum was the focus of her complaints and specifically the “hump.” She wanted a more aesthetically pleasing nose without the hump and without looking “scooped out.” She brought many photos of classically over-reduced dorsums with low radices and stylized tips that she did not like. Examination of the nose revealed a fairly deep radix with skin stretched over the radix so as to camouflage how low the bones actually were. The concern was that once the “hump” was removed, she would have an overly-reduced dorsum with a low radix take-off and a stylized nose.

Figure 2. Before and after photographs of primary rhinoplasty with diced cartilage and fascia on dorsum. (a) Central views (b) Lateral views.
reduced appropriately, but then the radix was filled with diced cartilage with fascia to make the contour more of a straight-line profile that was attractive to the patient. The tension lip was also released by incising the depressor septi muscles and the upper lip was augmented with a dermal fat graft from her groin.

**Case 2 – Secondary Rhinoplasty**

This is a 36 year-old man who presented with a history of multiple previous nasal operations that left him with a scooped out dorsum, airway obstruction, and a very low radix (Figures 3a and 3b). He felt as though his tip position was acceptable, but he wanted to create a stronger dorsum of his nose. He underwent this secondary rhinoplasty with diced cartilage and fascia to the dorsum of his nose. His results were satisfactory and managed to treat the problems that had plagued him over time.

**Conclusion**

In conclusion, the technique of diced cartilage with fascia has been a useful method of dorsal reconstruction as a stand-alone technique and in concert with other methods of building the dorsum. There are many permutations and variations of the technique and, it is therefore recommended that a clear purpose be assigned to the reasons each graft is being chosen. There is no substitute for pre-operative diagnosis and planning when using the diced cartilage with fascia graft. The technique is safe and easy to use and has a minimal complication rate. It has been a method of addressing difficult problems in dorsal reconstruction.

**Figure 3.** Before and after photographs of secondary rhinoplasty with diced cartilage and fascia on dorsum. (a) Central views (b) Lateral views.

**Biography**

Dr. Jay Calvert is a Board-Certified Plastic Surgeon, certified by the American Board of Plastic Surgery. He practices in Beverly Hills, California and Orange County, California where he performs all types of plastic surgery and specializes in aesthetic surgery. He has a special interest in face lifts, rhinoplasty (nose re-shaping), and breast augmentation.

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