

Bone Dust and Diced Cartilage Combined with Blood Glue: A Practical Technique for Dorsum Enhancement

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Received: 1 March 2012 / Accepted: 3 December 2013

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Abstract The combination of dorsal nasal reconstruction and camouflage of surface irregularities is an important step in rhinoplasty. We hereby present our technique of delivering diced cartilage in combination with bone dust to the nasal dorsum using the patient's blood as a carrier. We advocate use of an autologous material (blood) as a scaffold for graft delivery, dismissing the use of a foreign material or fascial wrapping of the graft. Using the patient's blood for this purpose not only stabilizes the graft into a malleable structure that is easily applicable to the nasal dorsum, it also decreases the potential for reaction against foreign material.

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Keywords Blood glue · Bone dust · Diced cartilage · Nasal dorsum enhancement · Dorsal camouflage

Electronic supplementary material The online version of this article (doi:10.1007/s00266-013-0256-4) contains supplementary material, which is available to authorized users.

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Introduction

The combination of dorsal nasal reconstruction after reduction and camouflage of surface irregularities is one of the important steps in rhinoplasty, with the aim of achieving an aesthetically pleasant and appropriate nasal dorsum. Dorsum irregularities, visible or palpable, after dorsal reduction or dorsal augmentation are among the most common complications following rhinoplasty procedures. Various implants have been used for dorsal augmentation, including both autologous and nonautologous material. Although nonautologous material is easy to obtain, its use carries the risk of infection, extrusion, and allergic reactions due to problems with biocompatibility. On the other hand, autologous grafts are definitely biocompatible; however, they can change over time and undergo unpredictable resorption [3].

Autologous cartilage and bone grafts have been used for dorsum reconstruction. Use of diced cartilage has reduced some of the problems seen with solid grafts by increasing malleability and graft survival [6]. Graft mobility and visibility, however, are unwanted consequences of using diced cartilage, with techniques such as wrapping the grafts with Surgicel (Ethicon, Inc., Somerville, NJ) or temporal fascia presented to stabilize the cartilage fragments [7, 8, 10, 11].

It would be better to use a practical and easily available autologous stabilization scaffold, with minimal inflammatory response, for the diced cartilage and bone dust used in dorsum enhancement and potentially dorsal augmentation. We hereby present a practical technique that meets these requirements.

Surgical Technique

The cartilage graft used for our technique includes any remaining pieces harvested from the nasal septum, rib



Fig. 1 Bone dust from the excised bone fragments prepared using a No. 11 blade scalpel from the excised bone fragments

cartilage, or ear concha during the operation with the patient under general anesthesia. The cartilages are then finely chopped into powder-like fragments using a No. 11 blade scalpel depending on the quality of the harvested cartilage. Bone dust is also prepared from any chiseled or sawed bone fragments from the nasal dorsum or bony septum, again using a No. 11 blade scalpel and added to the cartilage mixture (Fig. 1). Throughout the operation, 3–5 ml of the patient's blood is obtained from a peripheral vein. The blood is then added to the grafts in a slow drop-by-drop manner, which results in blood clotting around the graft fragments, creating a gelatinous framework and hence stabilizing the mixture (video). After 4–5 min, the developed structure is thoroughly stabilized and ready for use. The result is a sheet of stabilized graft paste that can be used for camouflaging dorsal irregularities. It can also be molded to a more bulky shape (Fig. 2) if more volume is required for correcting dorsal irregularities.

The graft mixture is loaded onto a nasal dorsum retractor and gently delivered to the dorsal area (Fig. 3). Upon redraping the skin, the dorsum is manually molded into the desired shape, camouflaging any potential dorsal irregularities, especially in the long term (Figs. 4, 5).

Discussion

Nasal dorsum reconstruction and camouflage is an important step in aesthetic and reconstructive rhinoplasty. A wide variety of graft materials, both autologous and nonautologous, have been used by rhinoplasty surgeons for dorsal



Fig. 2 Application of blood to the bone dust–diced-cartilage mixture. Note stabilization of the structure and the gelatinous graft mixture formed



Fig. 3 Loading the graft mixture onto a dorsum retractor for delivery to the nasal dorsum. Note the stability of the graft-enhancing application to the dorsal area

reconstruction, all with their own benefits and disadvantages.

Commonly used nonautologous grafts include high-density polyethylene, silicone, expanded polytetrafluoroethylene, and microfibrillar collagen [3]. Acellular dermal matrix and irradiated costal cartilage are also used for dorsal nasal augmentation. This method of reconstruction has the benefits of immediate availability, lack of donor-site morbidity, better adaptability, and immediate feedback. The drawbacks



Fig. 4 A 27-year-old female with a dorsal hump, wide and convex lateral crura, and underrotated tip. The patient was operated on with the closed approach via the dome delivery technique, with the application of bone dust and diced cartilage in combination with

blood glue for dorsal enhancement. The postoperative views show the patient 2 years after rhinoplasty surgery and 1 month after fat grafting to the forehead

include significant cost added to the surgical procedure and complications such as infection, extrusion, and displacement [1]. Autologous grafts, on the other hand, include bone, fascia, dermis, and cartilage and are readily available from the patient. They do not induce an immune response, do not have biocompatibility problems, and have a lower rate of infection and extrusion compared to nonautologous material [3].

The use of diced-cartilage grafts has become popular for dorsal reconstruction over the past decade [5, 6]. Diced cartilage has been shown to have adequate tissue in-growth [2]. The small fragments of cartilage allow easy manipulation and avoid the complication of warping as seen with a solid-cartilage graft. Revascularization is quicker due to the increased surface area of the graft's fragments [3]. The challenge with the use of a diced-cartilage graft lies in the controlled insertion of the graft onto the nasal dorsum and the postoperative stability of its position.

Temporalis fascia [11], Surgicel (Turkish delight) [9], and AlloDerm (LifeCell Corporation, Branchburg, NJ, USA) [10] have been used for wrapping the diced-cartilage graft [7, 8]. However, these wrapping materials are different from the graft material which increases the inflammatory response as well as delays the graft-take process [3, 6, 7]. Harvesting a fascia graft also causes donor area morbidity. Common complications include erythema, postoperative swelling, and resorption. Surgicel, on its own, appears to incite an inflammatory response with subsequent absorption of the cartilage [2, 4, 8].

An ideal scaffold for the diced-cartilage-bone dust graft would be a carrier that provides adherence, is malleable, does not induce inflammation, and promotes diffusion and hence cartilage growth. The use of tissue glue or, in our hands, the use of the coagulation capacity of blood (blood glue) enables a scaffold for carrying and stabilizing the graft to the nasal dorsum. Although the literature contains



Fig. 5 A 28-year-old female with a left axis deviation, bulbous asymmetric tip, short right lateral crus, convex left lateral crus, and inadequate tip projection and rotation. The patient was operated on with the closed approach via the dome delivery technique, correcting

the axis deviation and creating a fusiform dorsum. Bone dust and diced cartilage in combination with blood glue were applied for dorsal enhancement. The postoperative views show the patient 2 years after surgery

studies on the use of autologous tissue glue for this purpose [3], we believe that our technique is a practical and simple way of delivering the bone dust and diced-cartilage mixture to the nasal dorsum. Using the patient's blood not only stabilizes the graft into a malleable structure that is easily applied to the nasal dorsum, it also does not require any complicated, time-consuming preparation of tissue glue or the harvesting of a wrapping fascia graft. Without wrapping material, revascularization may be quicker, resorption slower, and erythema and inflammation minimal.

The use of diced cartilage or bone dust in rhinoplasty is not new. However, the use of blood glue as a scaffold definitely requires further investigation, with studies evaluating its viability.

The use of this graft mixture in combination with autologous blood as a transport scaffold is a simple and applicable method for camouflage and enhancement of the nasal dorsum in primary rhinoplasties after dorsal

reduction or for camouflage of a reconstructed and augmented nasal dorsum.

Conflicts of interest The authors have no conflicts of interest to disclose.

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