Homologous Tissue for Dorsal Augmentation

Chang-Hoon Kim, MD, PhD[a,b,*], Sang Chul Park, MD[a]

KEYWORDS

• Asian rhinoplasty • Dorsal augmentation • Homologous grafts • Acellular dermal matrix
• Tutoplast-processed fascia lata

KEY POINTS

- Dorsal augmentation is the most commonly performed procedure in rhinoplasty for Asian patients.
- Homologous grafts derived from human tissues are safe and biocompatible.
- Acellular dermal matrix is a useful graft material owing to its long-term structural integrity and stability as well as low risk of infection or extrusion.
- Tutoplast-processed fascia lata is soft and easy to manipulate, providing a smooth postoperative contour of the nasal dorsum with low risk of infection or displacement.

INTRODUCTION

Dorsal augmentation is the most commonly performed procedure in rhinoplasty for Asian patients. Various materials are used for nasal dorsal augmentation, and surgeons continue to make efforts to find the ideal material. An ideal material is one that is safe and biocompatible with a low risk of complications, such as infection and displacement. Moreover, it should be easy to sculpt and mechanically stable with surrounding tissues.[1–4] Autologous grafts, including costal cartilage and conchal cartilage, have a high degree of biological tolerance; however, they have some drawbacks, such as donor site morbidity, long operation time, and potential difficulty in obtaining sufficient amounts for dorsal augmentation. Alloplastic implants, which are synthetic materials, including silicone, expanded polytetrafluoroethylene (Gore-Tex), and porous polyethylene (Medpor), have some shortcomings such as the risk of infection, contracture, and implant visibility. Therefore, homologous grafts derived from human tissues are recently receiving the spotlight for their high degree of tissue tolerance and low infection risk. Furthermore, there is a limitation in selecting the augmentation materials when autologous grafts had been used in previous surgeries. In this situation, homologous grafts can be ideal graft materials. In this article, the authors describe the acellular dermal matrix (ADM) and Tutoplast-processed fascia lata (TPFL).

ACELLULAR DERMAL MATRIX

Characteristics of Acellular Dermal Matrix

ADM is a biocompatible, nonimmunogenic, off-the-shelf, and readily available material for dorsal augmentation.[5,6] ADM is processed from human cadaveric skin through specialized processing techniques. During its preparation, the epidermis and the cellular components of the dermis that can induce immune reactions are removed before freeze-drying.[1,7] The ADM is highly biocompatible because it preserves the essential structural components of the extracellular matrix, such as collagen and elastin fibers. Collagen and elastin, which are the main

Disclosure Statement: C-.H. Kim and S.C. Park have nothing to disclose.
[a] Department of Otorhinolaryngology, Yonsei University College of Medicine, 50 Yonsei-ro, Seodaemun-gu, Seoul 120-752, Korea; [b] The Airway Mucus Institute, Yonsei University College of Medicine, 50 Yonsei-ro, Seodaemun-gu, Seoul 120-752, Korea
* Corresponding author. Department of Otorhinolaryngology, Yonsei University College of Medicine, 50 Yonsei-ro, Seodaemun-gu, Seoul 120-752, Korea.
E-mail address: entman@yuhs.ac

Facial Plast Surg Clin N Am ■ (2018) ■–■
https://doi.org/10.1016/j.fsc.2018.03.005

components of ADM, provide tensile strength and elasticity. Maintaining the 3-dimensional natural dermal structures induce fibroblast infiltration and neovascularization, which promote tissue regeneration.[8,9] According to histologic analyses of implanted ADM, collagen and elastin fibers become denser, the expression of extracellular matrix proteins increases, and microvessel formation within ADM increases, whereas the thickness of the implanted ADM does not decrease over time.[7,10] These characteristics allow adequate tissue ingrowth and provide long-term structural integrity, which make displacement and exposure rare.

The most commonly used matrices are AlloDerm (LifeCell Corp, Branchburg, NJ, USA) and MegaDerm (L&C BIO, Seongnam-si, Gyeonggi-do, Korea). The main differences of MegaDerm are its cross-linked structure and electron beam (e-beam) irradiation. The cross-linking of the collagen structure is important for long-term durability and strength. It enables reducing resorption and improving fibroblast infiltration into the dermal matrix, which allow MegaDerm to retain its rigidity and shape.[7,8,11,12] Gamma irradiation is used as a sterilization process for AlloDerm, whereas e-beam irradiation is done for MegaDerm. E-beam irradiation, which is a form of ionizing irradiation similar to gamma irradiation, creates more stable dermis tissue cross-link. E-beam irradiation (25 kGy) results in increased tension and elasticity.[7,13]

Types of Acellular Dermal Matrix

Various types of ADM have been introduced since its development in the early 1990s.[14,15] ADM has been used as a soft tissue replacement in reconstructive surgery, such as breast reconstruction, abdominal wall repair, burn management, and in combination with autologous thin split-thickness skin graft. In rhinoplasty, it is used in the nasal dorsum and the tip. For the nasal dorsum, it is useful for dorsal augmentation,[5,6,16,17] correction of dorsal irregularity,[18] and wrapping of autologous grafts or alloplastic implants for decreasing implant visibility, especially in patients with thin skin.[19–21]

There are 3 types of ADM according to characteristics. The carving type (the type generally used in dorsal augmentation) has a boat shape based on the shape of the nasal dorsum. It is 1 × 5 cm

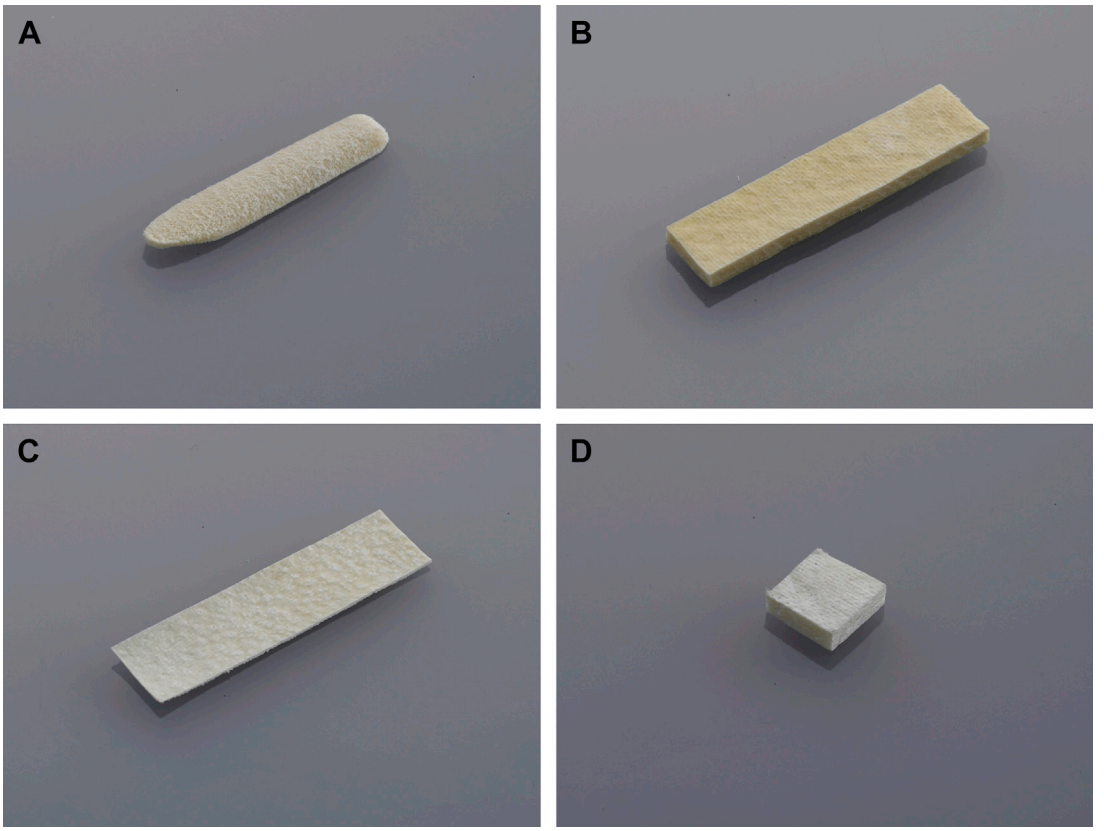

Fig. 1. Types of MegaDerm. (*A*) The carving type and (*B*) the block type are used for dorsal augmentation. (*C*) The block type is used for tip surgery. (*D*) The sheet type is used for wrapping of autologous grafts or alloplastic implants. (*Courtesy of* L&C Bio, Gyeonggi-do, South Korea; with permission.)