

# An Overview of Asian Rhinoplasty

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**Abstract:** East Asian rhinoplasty is an expanding topic in the field of rhinoplasty. Although the main principles of various rhinoplasty techniques apply equally to the East Asian nose, East Asian rhinoplasty is unique owing to its different anatomy and ethnicity. In recent years, there have been some noteworthy developments in East Asian rhinoplasty. Traditional techniques using alloplastic implants with endonasal approach are changing due to the advent of new beauty concept, introduction of new techniques, and development of newly improved materials expended polytetrafluoroethylene as an alloplastic material has gained popularity in Asian augmentation rhinoplasty. Soft expended polytetrafluoroethylene sheets as augmentation material provide promise in the future. In this review, we will highlight some of the recent advances of Asian rhinoplasty with emphasis on dorsal augmentation, advances in implant material, and tip surgery using autologous cartilage.

**Key Words:** rhinoplasty, East Asian, alloplastic nasal implant, augmentation, tip surgery

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The term East Asian used here is confined to a people that inhabit most of China, Korea, Japan, and many parts of southeast Asia. These people are identified as the Han majority in China and they follow the cultural heritage of Confucianism. The distinct anatomical features of Asians and their cultural and aesthetic appreciation are vastly different from that of the Westerners. The unique set of aesthetic surgical procedures that were done and sought after among Asians may not be apparent or familiar to Western surgeons. With the increase in intercontinental migration in general, and the improved economy in China in particular, the fast-growing popularity of rhinoplasty among Asians has been remarkable. It is the intent of the author to summarize here the current opinions on some of the most unique rhinoplasty procedures in Asians.

It is generally agreed in the literature that the Asian nose is anatomically different from the white nose. Typically, the Asian nose is characterized by a wide low dorsum, poor nasal tip projection and cartilaginous support, and retracted columella.<sup>1,2</sup> Detailed anatomical studies also revealed thick lobular skin with abundant subcutaneous fatty tissue, small osteocartilaginous frame work, and weak and thin lower lateral cartilages, resulting in poor support and projection of nasal tip.<sup>3,4</sup> Asian patients seeking cosmetic improvement of their noses often demand a higher and narrower nasal dorsum, more projected and well-defined tip, and narrower alar bases. The traditional concept of a beautiful nose and face has changed into a “fusion” concept. Nowadays, an attractive nose in Asian countries is a nose where the nasal dorsum and tip are slightly accentuated, instead of the “natural looking” nose. Therefore, the key features that need to be addressed to accomplish an attractive Asian nose are dorsal and tip augmentation.

## Recent Advances in Dorsal Augmentation

Dorsal augmentation is the most commonly performed rhinoplasty procedure in the Asian nose. The discussion here is therefore restricted to augmentation rhinoplasty, as opposed to individual Asian patients with white-like nasal framework needing reduction rhinoplasty. Due to the amount of tissue required to achieve optimal augmentation, the type of augmentation material has always been debated in the literature. Ideally, autogenous materials carry the least risk and complications.<sup>5,6</sup> However, the amount of tissue required for proper augmentation leaves little choice other than autogenous rib cartilage graft. The drawbacks of a prolonged operation with significant donor site morbidity and scarring have traditionally left this option as a final choice for revision rhinoplasty when alloplastic materials have failed. There are 2 noteworthy advances in dorsal augmentation that needs to be addressed: the use of autologous cartilage and advances in implant materials.

## Dorsal Augmentation Using Autogenous Cartilage

Although the autologous grafts are preferred by most surgeons, autologous grafts also have some shortcomings as dorsal graft material.

## Septal Cartilage

The nasal septum is the most commonly used autologous cartilage for rhinoplasty because it lies within the surgical field and therefore causes no additional donor site morbidity. The relative flatness, thickness, and hardness of the septum make it the optimal choice for rhinoplasty.<sup>7</sup> Reported complications regarding the use of septal cartilage are low.<sup>8</sup> However, the use of septal cartilage is more suitable in septal reconstruction or nasal tip surgery than in dorsal augmentation. In addition, a major limitation in the use of septal cartilage for dorsal augmentation is its limited availability; the amount of harvested septal cartilage is not always enough for simultaneous use in multiple grafting procedures.<sup>9</sup> Furthermore, it is often difficult to carve the cartilage to fit nicely onto the dorsum without irregularity.

## Conchal Cartilage

Conchal cartilage is an attractive graft material in secondary or reconstructive rhinoplasty because it is easy to harvest, and there is evidence of long-term positive outcomes.<sup>5,10,11</sup> Anatomical characteristics of the conchal cartilage and the harvest technique are well documented.<sup>12,13</sup> The critical weakness of conchal cartilage as a material for dorsal augmentation is its intrinsic curvature, which will bring about dorsal irregularity when it is used as dorsal implant. In addition, the conchal cartilage is frequently too small to yield a cartilage piece suitable for 1-piece dorsal augmentation. To overcome the intrinsic curvature of conchal cartilage, suturing and layering of the cartilage into a multilaminar structure has been suggested.<sup>14</sup> However, with this technique, the intrinsic irregularity of conchal cartilage becomes noticeable some time after surgery. Another method to evade this problem is the use of conchal cartilage in diced form wrapped with fascia,<sup>15</sup> and this has gained wide acceptance as an ideal dorsal augmentation technique.

## Costal Cartilage

When a large amount of grafting is required, such as in the reconstruction of severe deformities or in graft-depleted revision rhinoplasty, the harvesting of costal cartilage is inevitable. Rib cartilage can

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be harvested in great quantity and carved in a variety of shapes, and has therefore been considered to be the most useful graft material for patients who require major changes in primary rhinoplasty, and patients who have experienced complications with alloplastic implants. However, despite dogmatic teaching and prevailing enthusiasm favoring the use of costal cartilage as a dorsal graft material, there are several limitations that should be seriously contemplated.

Costal cartilage is often overlooked when grafting materials are sought because of its perceived disadvantages, the foremost of which is unpredictable warping, which could jeopardize the aesthetic result in a dorsal graft and necessitate revision.<sup>16,17</sup> Gibson's principles of balanced cross-sectional carving along the long axis of the cartilage have been used conscientiously by surgeons who wish to prevent warping.<sup>18</sup> Typically, this involves symmetrical removal from both sides and using only the central part of the cartilage for augmentation, particularly of midline nasal structures.<sup>8,19–21</sup> Previous strategies included allowing the graft to warp to completion in water or an abdominal pocket for 3 months before use in recontouring.<sup>17</sup> More recent in vitro studies have shown full distortion of cartilage grafts within 15 to 30 minutes of carving,<sup>22–24</sup> but the clinical setting is less predictable, with case reports of noticeable warping of grafts up to 9 months postoperatively.<sup>18</sup> Gibsonian balanced carving with 15 minutes allowed for maximal warping has also been advocated.<sup>25</sup> In his series of 40 costal cartilage grafts for nasal reconstruction in 14 patients followed for an average of 12 months, there were no instances of postoperative graft warping.

It should be noted that costal cartilage should be used with caution in the older patient, as progressive calcification renders it less likely to warp but more difficult to sculpt in many cases.<sup>8,26,27</sup> Perichondrium should be excluded meticulously from grafts because of its chondrogenic potential,<sup>28</sup> which may distort the graft and jeopardize cosmesis. Importantly, careful dissection and preparation of the vascular pocket to limit tension and movement of the inset graft is thought to prevent warping and resorption.<sup>26</sup>

## Alloplastic Implants

Despite concern over complications after the use of alloplastic implant for dorsal augmentation, alloplastic implant thrives as a viable option for dorsal augmentation, especially for the Asian nose.

## Silicone

Silicone is a pliable, elastic solid that causes little tissue reaction<sup>29</sup> and has some advantages as a dorsal graft.<sup>30</sup> Silicone implants are easy to handle, and the various ready-made products make the application convenient. The relative hardness of silicone makes it suitable for fashioning the desired nasal shape, especially for Asians with a thick skin.<sup>31</sup> The fibrous capsule formed around the implant renders removal of the implant technically easy in the case of an infection. For these reasons, silicone is the most commonly used implant material for simple cosmetic augmentation in many Asian countries.<sup>31</sup> The majority of the prefabricated products available can be classified as either L-shaped or I-shaped implants. The use of L-shaped implants carries a higher risk of extrusion, and I-shaped implants are therefore preferred.<sup>31</sup> Critically, silicone is one of the cheapest materials available among the various allografts. However, the lack of pores in silicone precludes surrounding tissue in growth, meaning that the silicone implant can be displaced. Furthermore, asymmetric contracture of the capsule around the implant can deform the implant over time, leading to late unsatisfactory aesthetic results.<sup>32–34</sup> In addition, a recent trend in using silicone implant is using an I-shaped implant at the dorsum only instead of an L-shaped implant extending to the nasal tip.<sup>1,35</sup> It is also the authors' opinion to restrict the use of alloplastic implants if needed only on the nasal dorsum and use autogenous materials for nasal tip augmentation.<sup>36</sup> Whenever an alloplastic material is considered, the benefits and risks should be explained to the patient before the surgery.

## Gore-Tex (Expanded Polytetrafluoroethylene)

Gore-Tex is the second most widely used alloplastic implant, after silicone, and its use is on the increase. Unlike silicone, Gore-Tex is a porous implant and is composed of carbon and fluorine molecules with pores, allowing for in-growth of the connective tissue, such as fibroblast, capillary, and collagen.<sup>19</sup> This increases the stability of implant, but also increases the possibility of infection. The soft texture of Gore-Tex reduces the patient discomfort and the occurrence of unnatural visible implant contours through the skin. However, an important disadvantage of Gore-Tex is that it decreases in volume after insertion.<sup>37</sup> In addition, it is more difficult to remove Gore-Tex implants than silicone implants. In the opinion of most surgeons, infection or delayed inflammation is the primary Gore-Tex–related complication. The pros and cons of silicone versus Gore-Tex have been heatedly debated by proponents of each. The author believes that silicone implants potentially give the most aesthetically pleasing results because they are easily carved into shapes and sizes that best fit an augmentation rhinoplasty. They, however, can cause capsule contraction and higher frequency of migration.<sup>30</sup> On the contrary, Gore-Tex implants are less likely to form capsules and less likely to migrate, but the operation is technically more difficult and has a slightly higher chance of infection.<sup>38</sup>

## Recent Advances in Nasal Tip Surgery

Nasal anatomy in Asian patients is different from that in white patients. The weaker alar cartilages render their tips structurally inadequate, and the nasal tip depends more on ligamentous and soft tissue support than alar cartilage.<sup>39</sup> Actually, the septum is more important in Asian nasal tip support. A large thick septum can render adequate support to the nasal tip<sup>39</sup>; however, in Asian noses, the septum is weaker, thinner, and smaller; the dorsal and caudal borders of the septum are of then retracted; the anterior septal angle is over obtuse; and the septum cannot provide sufficient support to the nasal tip.

The typical anatomic structures of the Asian nasal tip have popularized the use of L-shaped silicone implants for combined dorsal and tip augmentation.<sup>40</sup> However, long-term complications by the implant, heightened expectations of the patient, popular use of an open approach, and a concept of structural grafting using autogenous cartilage led to a change in practice. Recently, more conservative techniques have become increasingly recognized including suture techniques, tip grafting, and subcutaneous tissue resection. However, the characteristics of the Asian nasal tip including the bulbous appearance, flared nostrils, and restriction of the nasal tip attributable to an underdeveloped medial crus of the alar cartilage and a short columella have made such procedures difficult. A recent trend in controlling tip projection and rotation using autogenous cartilage is the use of septal extension graft.

Controlling and reshaping the nasal tip are important parts of rhinoplasty procedures. Byrd et al<sup>41</sup> first reported that the septal extension graft could control the projection, shape, and rotation of the nasal tip. There are 3 basic types of septal extension grafts: spreader, batten, and direct caudal. In addition, many modified techniques for septal extension graft are described in rhinoplasty, including unilateral or bilateral septal extension graft and symmetrical or asymmetrical septal extension graft.<sup>31,39,42–48</sup> They all have advantages and disadvantages. Bilateral spreader grafts may be the most stable septal extension grafts, but bilateral spreader grafts need much more cartilage and can be only applied in a few noses in Asian people because of the limitation of useful septal cartilage.<sup>9</sup> Batten grafts or direct caudal grafts are less stable and may not render adequate and long-term stable strength for nasal tip in patients with weak and thin septum and alar cartilages. The grafts used for the septal extension procedure are septal cartilage,<sup>48</sup> conchal cartilage, and<sup>49</sup> homologous costal cartilage.<sup>50</sup> In addition, structural onlay grafts using cap grafts or shield grafts are used when patients have moderate tip support and need minimal to moderate augmentation of the tip. Often, a columellar strut is used to add strength to the nasal

tip support in these patients. A long shield graft is effective in increasing tip projection. However, the thin septal cartilage in Asians may bend or rotate cephalically, making the nose look short and over-rotated. This can be prevented by a buttress graft behind the shield graft or by placing a cap graft in a position that offsets the rotation while achieving the projection.

In summary, because of the Asian nasal tip's innate qualities, including weak cartilages and abundant subcutaneous tissue, success with nasal tip procedures for Asians depends on the combined application of appropriate suturing, grafting, and defatting, with grafting techniques contributing the most. Augmenting nasal tip projection in Asians can be effectively achieved using autogenous cartilage grafts. Techniques to increase the tip projection are chosen based on the degree of the tip support and the amount of the tip projection desired. In the majority of Asian patients, structural onlay grafts with or without strengthening of tip support with a columellar strut can achieve successful results. The septal extension graft is a reliable and effective technique in patients who need a substantial augmentation of the tip when the tip support is poor.

## REFERENCES

- Ahn JM. The current trend in augmentation rhinoplasty. *Facial Plast Surg*. 2006;22:61–69.
- Matsuga RS. Augmentation rhinoplasty of Asian noses. *Facial Plast Surg Clin North Am*. 1966;4:75–85.
- Wu WT. The Oriental nose: an anatomical basis for surgery. *Ann Acad Med Singapore*. 1992;21:176–189.
- Han SK, Lee DG, Kim JB, et al. An anatomic study of nasal tip supporting structures. *Ann Plast Surg*. 2004;52:134–139.
- Araco A, Gravante G, Araco F, et al. Autologous cartilage graft rhinoplasties. *Aesthetic Plast Surg*. 2006;30:169–174.
- Gendeh BS, Mallina S. Graft selection in rhinoplasty: indications and limitations. *Med J Malaysia*. 2008;63:35–38.
- Sajjadian A, Rubinstein R, Naghshineh N. Current status of grafts and implants in rhinoplasty: part I. Autologous grafts. *Plast Reconstr Surg*. 2010;125:40e–49e.
- Tardy ME Jr, Denneny J 3rd, Fritsch MH. The versatile cartilage autograft in reconstruction of the nose and face. *Laryngoscope*. 1985;95:523–533.
- Kim JS, Khan NA, Song HM, et al. Intraoperative measurements of harvestable septal cartilage in rhinoplasty. *Ann Plast Surg*. 2010;65:519–523.
- Boccieri A, Marano A. The conchal cartilage graft in nasal reconstruction. *J Plast Reconstr Aesthet Surg*. 2007;60:188–194.
- Hsu CH, Lee JC, Wang HW, et al. Augmentation rhinoplasty with bilateral auricular cartilage in Asian patients: how we do it. *Clin Otolaryngol*. 2009;34:572–576.
- Lee M, Callahan S, Cochran CS. Auricular cartilage: harvest technique and versatility in rhinoplasty. *Am J Otolaryngol*. 2011;32:547–552.
- Mowlavi A, Pham S, Wilhelm B, et al. Anatomical characteristics of the conchal cartilage with suggested clinical applications in rhinoplasty surgery. *Aesthet Surg J*. 2010;30:522–526.
- Daniel RK. Rhinoplasty: dorsal grafts and the designer dorsum. *Clin Plast Surg*. 2010;37:293–300.
- Daniel RK. Diced cartilage grafts in rhinoplasty surgery: current techniques and applications. *Plast Reconstr Surg*. 2008;122:1883–1891.
- Agaoglu G, Erol OO. In situ split costal cartilage graft harvesting through a small incision using a gouge. *Plast Reconstr Surg*. 2000;106:932–935discussion 936–937.
- Maas CS, Monhian N, Shah SB. Implants in rhinoplasty. *Facial Plast Surg*. 1997;13:279–290.
- Gibson T, Davis WB. The distortion of autogenous cartilage grafts: its cause and prevention. *Br J Plast Surg*. 1958;10:257–274.
- Vuyk HD, Adamson PA. Biomaterials in rhinoplasty. *Clin Otolaryngol Allied Sci*. 1998;23:209–217.
- Daniel RK. Rhinoplasty and rib grafts: evolving a flexible operative technique. *Plast Reconstr Surg*. 1994;94:597–609.
- Gunter JP, Rohrich RJ. External approach for secondary rhinoplasty. *Plast Reconstr Surg*. 1987;80:161–174.
- Gunter JP, Clark CP, Friedman RM. Internal stabilization of autogenous rib cartilage grafts in rhinoplasty: a barrier to cartilage warping. *Plast Reconstr Surg*. 1997;100:161–169.
- Adams WP Jr, Rohrich RJ, Gunter JP, et al. The rate of warping in irradiated and nonirradiated homograft rib cartilage: a controlled comparison and clinical implications. *Plast Reconstr Surg*. 1999;103:265–270.
- Harris S, Pan Y, Peterson R, et al. Cartilage warping: an experimental model. *Plast Reconstr Surg*. 1993;92:912–915.
- Sherris DA, Kern EB. The versatile autogenous rib graft in septorhinoplasty. *Am J Rhinol*. 1998;12:221–227.
- Brent B. The versatile cartilage autograft: current trends in clinical transplantation. *Clin Plast Surg*. 1979;6:163–180.
- Allcroft RA, Friedman CD, Quatela VC. Cartilage grafts for head and neck augmentation and reconstruction. Autografts and homografts. *Otolaryngol Clin North Am*. 1994;27:69–80.
- Skog T, Johansson SH. New articular cartilage from transplanted perichondrium. *Lakartidningen*. 1975;72:1789–1792.
- Costantino PD, Friedman CD, Lane A. Synthetic biomaterials in facial plastic and reconstructive surgery. *Facial Plast Surg*. 1993;9:1–15.
- Deva AK, Merten S, Chang L. Silicone in nasal augmentation rhinoplasty: a decade of clinical experience. *Plast Reconstr Surg*. 1998;102:1230–1237.
- Jang YJ, Yu MS. Rhinoplasty for the Asian nose. *Facial Plast Surg*. 2010;26:93–101.
- Shirakabe Y, Shirakabe T, Kishimoto T. The classification of complications after augmentation rhinoplasty. *Aesthetic Plast Surg*. 1985;9:185–192.
- Shirakabe Y, Shirakabe T, Takayanagi S. A new type of prosthesis for augmentation rhinoplasty: our experience in 1600 cases. *Br J Plast Surg*. 1981;34:353–357.
- Jung DH, Kim BR, Choi JY, et al. Gross and pathologic analysis of long-term silicone implants inserted into the human body for augmentation rhinoplasty: 221 revision cases. *Plast Reconstr Surg*. 2007;120:1997–2003.
- Ahn J, Honrado C, Horn C. Combined silicone and cartilage implants: augmentation rhinoplasty in Asian patients. *Arch Facial Plast Surg*. 2004;6:120–123.
- Jin HR, Won TB. Nasal tip augmentation in Asians using autogenous cartilage. *Otolaryngol Head Neck Surg*. 2009;140:526–530.
- Jung YG, Kim HY, Dhong HJ, et al. Ultrasonographic monitoring of implant thickness after augmentation rhinoplasty with expanded polytetrafluoroethylene. *Am J Rhinol Allergy*. 2009;23:105–110.
- Godin MS, Waldman SR, Johnson CM Jr. Nasal augmentation using Gore-Tex. A 10-year experience. *Arch Facial Plast Surg*. 1999;1:118–121.
- Kang JG, Ryu J. Nasal tip surgery using a modified septal extension graft by means of extended marginal incision. *Plast Reconstr Surg*. 2009;123:343–352.
- McCurdy JA Jr. The Asian nose: augmentation rhinoplasty with L-shaped silicone implants. *Facial Plast Surg*. 2002;18:245–252.
- Byrd HS, Andochick S, Copit S, et al. Septal extension grafts: a method of controlling tip projection shape. *Plast Reconstr Surg*. 1997;100:999–1010.
- Seyhan A, Ozden S, Ozaslan U, et al. A simplified use of septal extension graft to control nasal tip location. *Aesthetic Plast Surg*. 2007;31:506–511.
- Han K, Jin HS, Choi TH, et al. A biomechanical comparison of vertical figure-of-eight locking suture for septal extension grafts. *J Plast Reconstr Aesthet Surg*. 2010;63:265–269.
- Hubbard TJ. Exploiting the septum for maximal tip control. *Ann Plast Surg*. 2000;44:173–180.
- Byrd HS, Salomon J, Flood J. Correction of the crooked nose. *Plast Reconstr Surg*. 1998;102:2148–2157.
- Pham AM, Tollefson TT. Correction of caudal septal deviation: use of a caudal septal extension graft. *Ear Nose Throat J*. 2007;86:142–144.
- Kim JS, Han KH, Choi TH, et al. Correction of the nasal tip and columella in Koreans by a complete septal extension graft using an extensive harvesting technique. *J Plast Reconstr Aesthet Surg*. 2007;60:163–170.
- Ha RY, Byrd HS. Septal extension grafts revisited: 6-year experience in controlling nasal tip projection and shape. *Plast Reconstr Surg*. 2003;112:1929–1935.
- Ponsky DC, Harvey DJ, Khan SW, et al. Nose elongation: a review and description of the septal extension tongue-and-groove technique. *Aesthet Surg J*. 2010;30:335–346.
- Koch CA, Friedman O. Modified back-to-back autogenous conchal cartilage graft for caudal septal reconstruction: the medial crural extension graft. *Arch Facial Plast Surg*. 2011;13:20–25.