Split hump technique for reduction of the overprojected nasal dorsum - a statistical analysis on subjective body image in relation to nasal appearance and nasal patency in 97 aesthetic rhinoplasty patients.

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Abstract

Objectives

To describe the split hump technique (SHT) and examine its effectiveness for correction of an overprojected nasal dorsum in patients undergoing aesthetic rhinoplasty.

Methods

This prospective study included 97 patients. Objective assessment was performed using a short, practically oriented questionnaire that was designed at our center. Investigation focused on nasal patency and patients perception of body image in relation to nasal appearance using five point Likert scale questions and visual analogue scales in both fields of interest.

Results

The use of the SHT resulted in a highly significant improvement in nasal patency and patients aesthetic nasal perception. The sum scores of the functional questions dropped from 9.154 to 6.351 ($p<0.001$), and of the aesthetic questions from 13.897 to 6.825 ($p<0.001$). There was an improvement on the aesthetic visual analogue scale in all patients, the average score went from 3.346 to 7.782, $p<0.001$. The graphic illustration of this improvement revealed a Gaussian curve of normal distribution around a mean improvement of 4.48 (SD=1.93).

Conclusions

Traditional en bloc humpectomy maneuvers are frequently combined with the use of spreader grafts to avoid postoperative infero-medial repositioning of the upper lateral cartilages (ULCs) and inverted-V deformity. The SHT for correction of the overprojected dorsum creates a paradigm change in this patient group. The transverse segment of the ULCs are saved and repositioned in stead of being resected as a part of an en bloc osseocartilaginous composite hump resection in a transverse plane. Several modifications of the SHT enable the surgeon to deproject the nose, but still keep sufficient strength in the K-area and augment the dorsal width. Using statistical analysis of subjective patient data we could prove a broad acceptance and appreciation for the SHT.

Introduction

The majority of Caucasian and Mediterranean aesthetic rhinoplasty patients complain about a noticeable hump in profile view. This makes adequate reduction of a prominent dorsum a major determinant for success in these patients. Traditional hump reduction maneuvers are based on en bloc resection in a transverse plane, removing the dorsal hump as an osseocartilaginous composite (Figure 1). This method includes excision of the transverse component of the upper lateral cartilages (ULCs), which is often associated with a delicate impairment of the stability within the keystone area (K-area) [Rohrich 2004]. Destabilization of the K-area triggers an infero-medial repositioning of the ULCs, resulting in a conspicuous inverted-V deformity (Figure 2). The appearance of this deformity can be aggravated by overresection of the osseocartilaginous dorsum, especially in patients with short nasal bones (Figures 3 and 4).

To avoid the complications associated with inclining ULCs after traditional humpectomy, surgeons established the importance of spreader grafts or their variations since the 1980s. Submucosal placement of individually fashioned strips of cartilage along the anterior border of the septal dorsum bridges the gap of the open roof, thereby maintaining the horizontal relationship between the septum and the ULCs. Subsequently, an infero-medial repositioning of the ULCs can effectively be avoided, and the function of the internal valve preserved [Byrd 2007, Constantian 1996, Gruber 2007, Gruber 2010, Sheen 1984].

The preventive benefit of spreader grafts or their variations is not the only concept that ensures avoidance of inverted-V deformity. A more logical alternative arises from the question: why resect and replace, when you can preserve original structures? A promising alternative for reduction of an overprojected nasal dorsum would therefore be a corrective approach in two planes instead of a transversely oriented en bloc resection. We performed paraseptal, vertical incisions to separate the entire ULCs from the septum. This exposed a narrow septum, which was deprojected in a transverse plane by taking off a strip of cartilage along its anterior border (Figure 5). By using this specific technique the transversal components of both ULCs could remain fully intact (Figure 6). If indicated, nasal dorsal width was then either reduced by resecting vertically oriented strips of the ULCs or further augmented with well known, above mentioned grafting modalities. Various authors already described this technique using different terms [Walter 1997, Rohrich 2004, Daniel 2010, Kim 2010]. We refer to this technique as the split hump technique (SHT), a term which was introduced by R.K. Daniel [Daniel 2010].

We performed the SHT in 97 patients with an overprojected nasal dorsum. In this article we describe our philosophy of the SHT and report on its aesthetic and functional relationships by using statistically analyzed data, which were collected using a short, practically oriented questionnaire designed in our center [Lohuis 2012].

Materials and Methods

A total of 97 patients who underwent aesthetic rhinoplasty between 2007 and 2011 were included in this study. The inclusion criteria were as follows: (1) patients had to pay for the surgery indicating that the reason for surgery was mainly aesthetic, (2) a significant dorsal hump had to be removed during surgery by means of the SHT, and (3) a complete follow-up with functional and aesthetic feedback pre- and postoperatively had to be collected. All surgical procedures were performed by the first author (PJFML).

For subjective outcome assessment we used both pre- and postoperatively a short and practically designed questionnaire at the outpatient department. This questionnaire, based on earlier validated quesitionnaires of Alsarraf and McKiernan, was introduced in a former publication [Lohuis 2012]. The questionnaire was subdivided into two fields of interests: functional and aesthetic. The functional subject area investigated patients perception of nasal patency. The aesthetic survey items analyzed perception of body image in relation to nasal appearance. Patients were asked to answer five questions, scored on a five point Likert scale, for both fields of interest (Table 1). The minimum score for each question was 1 point, the maximum score 5 points. The single score of every question, and also the sum scores of the questions in both fields of interest were then analyzed and compared pre- and postoperatively. Furthermore, a visual analogue scale (VAS) was used to investigate nasal patency for each side separately (VAS-F; from 0=”very bad” to 10=”very good”). Patients were also asked to rate their nasal appearance on a VAS appearance (VAS-AE; from 0=”very ugly” to 10=”very nice”), both pre- and postopertively.
For statistical analysis we applied a student’s t-test for paired data using SPSS version 16.0 (Chicago, IL, USA) for Windows.

Surgical technique
The SHT for reduction of the overprojected nasal dorsum can be performed using either a closed or endonasal approach. In our center, we tend to use an open approach as this provides wide exposure of the dorsum thereby allowing additional diagnosis and increasing surgical control (Figure 8).

Step I: Preparation

1. Retraction of the skin soft tissue envelope in the avascular supraperichondrial plane.
2. Meticulous elevation of the mucoperichondrium on both sides of the anterior septum to avoid a mucosal wound when reducing the dorsum. This will result in a more controlled and faster healing process (Figure 5).

Step II: Split hump technique (Figure 6)

3. A vertically oriented #15 blade is inserted underneath the cartilaginous vault, carefully avoiding any traumatization of the mucoperichondrial flaps in this area.
4. The entire ULCs are bilaterally separated from the septum with paraseptal, vertical incisions.
5. The dorsal height is reduced in a transversal plane with straight scissors or a #15 blade.
6. Judicious reduction of the bony dorsum using a rasp rather than an osteotome. Subsequently the underlying cartilage is resected or repositioned in a controlled fashion.
7. For correction of the nasal width each ULC can be addressed separately.
8. The ULCs are aligned adjacent to the lowered anterior border of the septum.
9. Anchorage is performed with at least two 5-0 poly-dioxane-mattress sutures running through the ULCs and the septum. The sutures need to be placed symmetrically to avoid any irregular vectors of pull leading to aesthetic or functional confinement.

Step III: Additional maneuvers (Figures 7 and 8)

In cases of an asymmetric nose, inadequate dorsal width, or functional impairment of the mid-vault the SHT can be combined with additional grafting techniques. The armamentarium includes uni- or bilateral application of additional spreader grafts, the implementation of autospreaders (formed by turning in the ULCs before suture fixation), or a combination.

Results

Our study included 81 women and 16 men ranging from 17 to 66 years (mean age 34.3 years; men: female ratio 1: 5.1). All patients showed an overprojected nasal dorsum, which was in all cases reduced using the SHT. Three patients had previously undergone rhinoplasty in another hospital. The minimum follow-up period was 1 year.

Additional dorsum maneuvers, as described in materials and methods, were introduced in 51 rhinoplasties. Spreader grafts were used in 45 operations either unilateral (27 cases) or bilateral (18 cases). Autospreader grafts were constructed in 6 cases, with unilateral autospreader application in only one case. A combination of spreader grafts and autospreaders was performed in 2 procedures.

Comparison of the pre- and postoperative scores collected from the five functional and five aesthetic Likert scale questions (listed in Table 1) showed a highly significant improvement in every single question. No score remained constant or worsened after performance of the split hump technique (Table 2). Patients subjective evaluation of nasal patency improved significantly in all questioned aspects. The sum score of all functional questions (F1-5 sum) dropped from 9.154 to 6.351 ($p<0.001$). The postoperative perception of body image in relation to patients nasal appearance improved even stronger, with a drop of the sum score of the aesthetic questions (AE1-5 sum) from 13.897 to 6.825 ($p<0.001$).

Analysis of the subjective evaluation of nasal passage for each side using visual analogue scales (VAS-F left, and VAS-F right) revealed a highly significant increase on both sides (VAS-F left: from 6.994 to 8.065, $p<0.001$; VAS-F right: from 7.093 to 8.118, $p<0.001$).

There was an improvement on the aesthetic visual analogue scale in all patients (VAS-AE: from 3.346 to 7.782, $p<0.001$). The graphic illustration of this amendment revealed a Gaussian curve of normal distribution with a mean of 4.48 (SD=1.93) (Figure 9).

Comment

The nasal dorsum is composed of a unified osseocartilaginous composite, which can be subdivided into a cranially positioned bony vault and a caudal cartilaginous vault, which extends under the bony segment. In most cases the hump is far more cartilaginous than bony. The cartilaginous complex is composed of the septum and the ULCs. This complex is not a septum with bilaterally juxtaposed ULCs, but a single anatomical entity from a common embryological origin [Daniel 2010, van Loosen 1988]. The mechanical characteristics of the cartilaginous complex mainly depend on strength and thickness of the cartilage, which can be diverse on the basis of prior trauma (iatrogenic or accidental), gender, age, or ethnicity. The nasal bones, the bony septum, and the cartilaginous complex together establish the keystone area. The term "keystone" is derived from roman arch architecture describing the upmost central stone, which exclusively assures stability to the entire formation. Likewise, the complete keystone area (K-area) in the nose is of critical importance for maintaining the structural stability of the nasal dorsum.

Taking down the osseocartilaginous composite includes a resection of the K-area. The consequence is a collapse of the adjacent structures leading to an infero-medial repositioning of the remaining ULCs (Figure 1). As the inclining lateral components of the ULCs are of insufficient length for bridging the gap bilaterally to the dorsal septum, this leads on the outside to a conspicuous inverted-V deformity (Figure 2). This deformity is based on a distinct formation of shadow, which is caused by a difference in height between the caudal margin of the bony dorsum and the lowered infero-medially malpositioned cartilaginous components of the cartilaginous dorsum (Figure 3). Furthermore, the en bloc hump removal can easily result in an overresection of the bony vault, generating an open roof. Such an extensive reduction makes infractures of the bony segments an additional prerequisite for compensation, which further weakens the complete K-area (Figure 4). Especially patients with short nasal bones, and long weak ULCs have no means of compensating for the risk of developing a conspicuous inverted-V deformity after traditional humpectomy.

The best treatment strategy for correction of the overprojected dorsum is *avoidance*. In more specific terms this means avoidance of an open roof, avoidance of extensive destabilization of the K-area, and subsequently avoidance of an inverted-V deformity. The concept of avoidance resulted in a widespread application of diverse preventive techniques, which were combined with the traditional hump removal on a regular basis [Camirand 2004]. Surgeons applied spreader grafts or their variations (e.g. autospreaders) as an integral part of the en bloc hump reduction for the last three decades [Byrd 2007, Constantian 1996, Gruber 2007, Gruber 2010, Sheen 1984]. These techniques have proved to be very helpful in aesthetic corrections of the middle third of the nose or reconstruction of the internal valve after composite humpectomy.

Could there be another manner to reduce the dorsum and avoid the complication of a weakened K-area? A combination of traumatizing resection of the dorsum with the additional imperative of structural grafts might not to be best solution for the challenge of correcting an overprojected dorsum. An alternative concept of avoidance is based on *preservation* of the K-area anatomy. This implies only a judicious reduction of the dorsal height, and optional modifications of the dorsal width in a step-by-step procedure. Approaching an overprojected dorsum by initially saving the entire anatomy instead of resecting the osseocartilaginous composite is a *paradigm change*. Analogous to nasal tip surgery the motto for dorsal surgery should be to "preserve and conserve" instead of "resect and regret". A key benefit of the SHT lies in the fact that no bridges are burned. Because no cartilage is initially excised the stability of the K-area is far less compromised. Reduction of the bony dorsum with a rasp rather than an osteotome avoids an open roof deformity and abundant trauma to the tissue. Rasping exposes the underlying cartilaginous hump that extends underneath the bone and can then be addressed by precise separation from the septum. Such a stepwise approach allows a high level of precision and controlled preservation of the transverse components of the ULCs, avoiding a bilateral gap formation and subsequent infero-medial repositioning of the ULCs. In case of a pre-existing adequate width, reduction of dorsal height is the only procedure necessary, with no modification of the ULCs (Figure 8A). In addition to a measured reduction of dorsal width, the broad spectrum of variations of the SHT (Figures 8A to 8E), using additional maneuvers, allows high precision and control for augmentation of the dorsal width. Application of autospreaders or spreader grafts allows an incremental control of dorsal width (Figures 8B to 8D). Also asymmetries can be addressed properly as a further variation of the SHT (Figure 8E).

In conclusion, the preservation of the ULCs extends the surgeons armamentarium. The SHT is an effective method to avoid inverted-V deformity, and entails the option to use pre-existing tissue for augmentation and strengthening of dorsal width and K-area. The judicious reduction in dorsal height bears only little risk for overresection. The high precision in correction of the dorsal width prevents any infero-medial repositioning of the ULCs. As a consequence on the visible outside of the nose the transition of light and shadow remains smooth within the K-area whereas the dorsal aesthetic lines stay uninterrupted. Furthermore, by preserving the middle vault anatomy, including protection of a intact mucoperichondrial lining, and by adding additional structural grafts to the valve area there is less risk for postoperative pinching and a high chance of an increase in nasal breathing after SHT.

We personally consider the SHT a safe and powerful approach offering multiple solutions for reduction of an overprojected dorsum. In order to substantiate this philosophy, we confronted patients with our subjective outcome assessment (using a short, practically designed questionnaire) to compare patients estimations pre- and postoperatively. All questions

regarding nasal patency or perception of body image in relation to patients nasal appearance improved highly significant ($p<0.001$) after the SHT. The graphics in figure 9 summarize the perioperative improvement of the aesthetic VAS score. The graph highlights patients broad acceptance and appreciation of the cosmetic results, as we could prove by means of statistics. The fact that the curve depicts the shape of a normal distribution around a mean of 4.48 points of improvement on a scale of 10 indicates to a realistic outcome and strengthens our findings. We believe that the SHT could be of benefit to any rhinoplasty surgeon having to deal with the overprojected nasal dorsum.

Conclusion

The adequate reduction of a prominent dorsum is a major determinant for success in most of aesthetic rhinoplasty cases. Traditional en bloc humpectomy maneuvers bear a high risk to destabilize the K-area region. In order to avoid a subsequent infero-medial repositioning of the ULCs, and an inverted-V deformity, additional structural grafts (e.g. spreader grafts) became gradually routine since the 1980's.

The SHT technique is based on preservation of the entire ULCs during deprojection of the nasal dorsum. Dorsal height and dorsal width are addressed separately allowing a high level of precision and control. Additional combination with established structural maneuvers broadens the surgeons armamentarium for augmenting and strengthening dorsal width and K-area. Statistical analysis of subjective patient data strengthened our believe that the SHT is a safe and powerful method, delivering adequate aesthetic and functional results. Equivalent to nasal tip surgery "preserve and conserve" instead of "resect and regret" should lead to a *paradigm change* in nasal dorsum surgery in a larger group of rhinoplasty surgeons.

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Legends

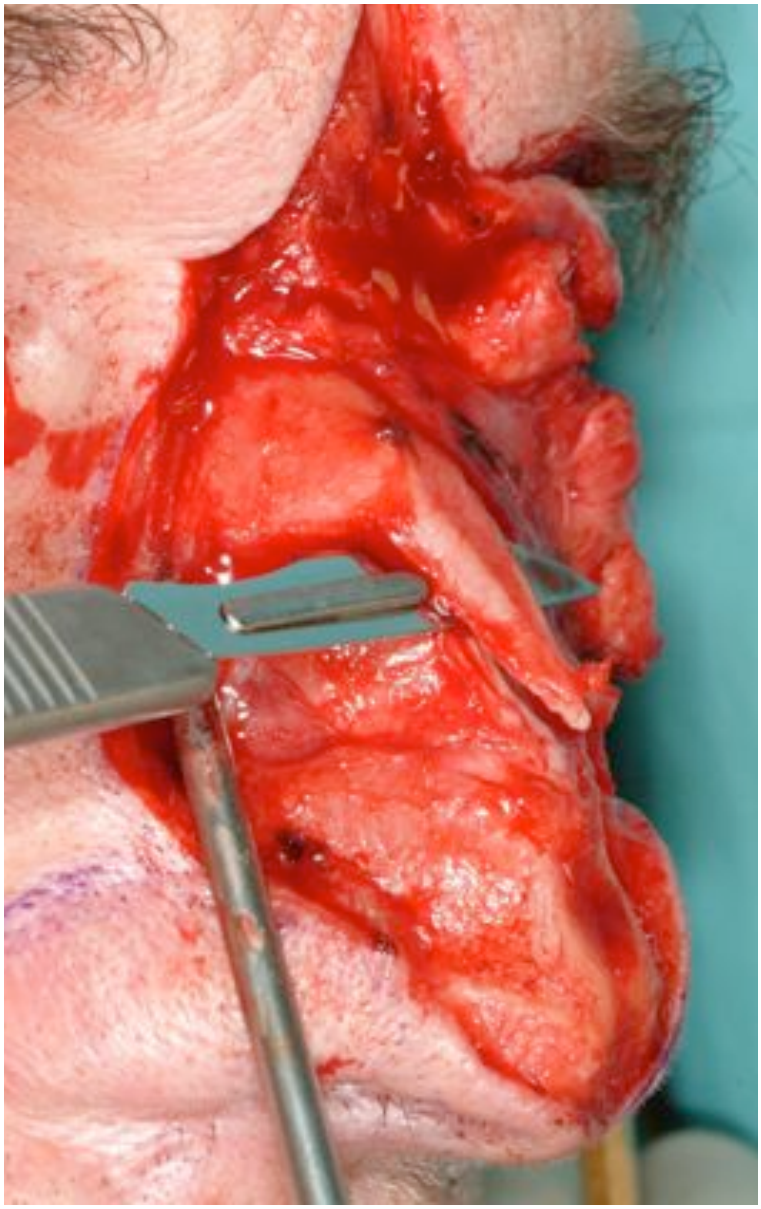


Figure 1

Intraoperative view of a three layers resection of the nasal dorsum as an osseocartilaginous composite with a #10 blade to lower the dorsum. The resection was performed as an adjuvant procedure in a skin cancer patient, but this intraoperative view permits a clear visualization of a traditionally performed en bloc humpectomy maneuver, which is also schematically visualized in Fig. 2.

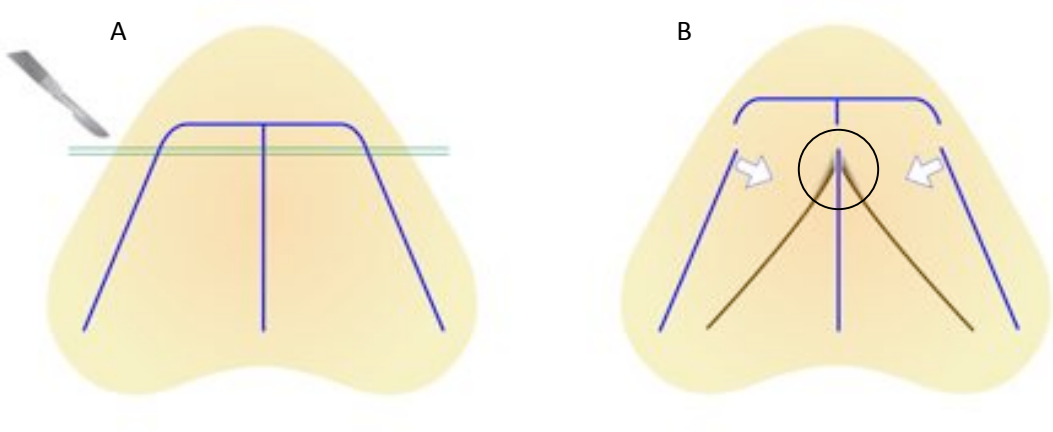


Figure 2

(A) Schematic illustration of the transverse en bloc humpectomy maneuver using a #10 blade (plane of dissection marked by green double rule). The transverse components of the ULCs are completely removed, leading to an open roof deformity. (B) This results in a loss of structural support on both sides of the septum. Destabilization of the junction between the ULCs and the septum leads to an infero-medial repositioning of the ULCs (vectors of pull are indicated by arrows). The inclining lateral components are of insufficient length for bridging the gap. As a consequence a distinct shade formation unfolds (marked by the circle), which can clinically be identified as an inverted-V deformity. The en bloc resection technique leads to a reduction of the dorsal height but also in an unpredictable reduction of the dorsal width.

A

B

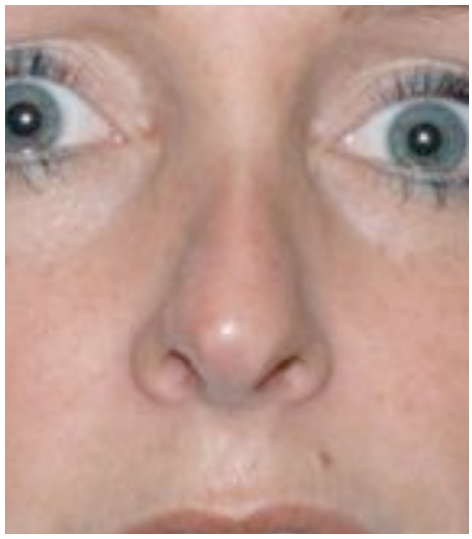
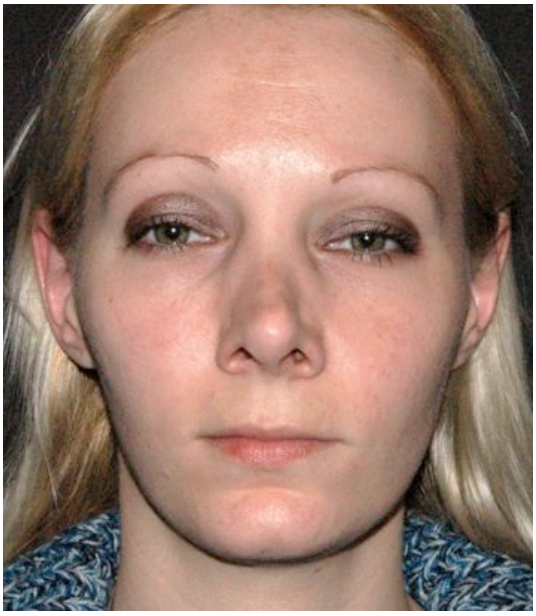


Figure 3

Clinical examples of what can go wrong if a traditional en bloc humpectomy maneuver was performed. (A) The nasal middle third reveals a light reflex in the midline, which is the prominent caudal margin of the bony dorsum. The interrupted course of shadow on the lateral aspects of the nose break the continuity of the dorsal aesthetic lines. Both irregularities indicate the infero-medial repositioning of the cartilaginous complex, which leads to the distinct inverted-V shade formation. (B) Short nasal bones and weak cartilage of the ULCs aggravate the result. Note the visible border of the dorsal septum with bilaterally collapsed ULCs in the K-area, which are positioned underneath the level of the septum (as indicated in figure 2). The shade formation accentuates the minimal dorsal width.

A



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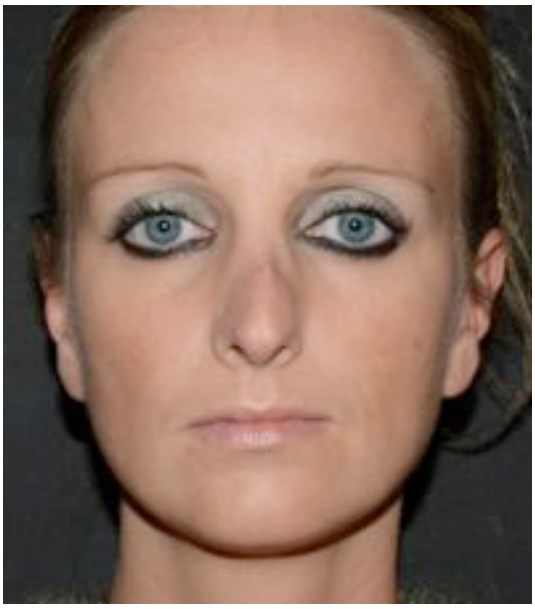

Figure 4

Clinical examples of highly conspicuous inverted-V deformities after traditional en bloc hump resections (second opinions, not included in this study). Both patients had short nasal bones. In both cases the inverted-V deformity is aggravated by overresection and the lack of adequate preventive maneuvers (e.g. spreader grafts). Note the extensive make up of the eyes, by which both patients try to distract the observer's attention from their nose. (A) The distinct change between light and shadow accentuates the difference in height between the bony vault and the collapsed cartilaginous complex. (B) One step worse: palpable and visible open roof deformity.

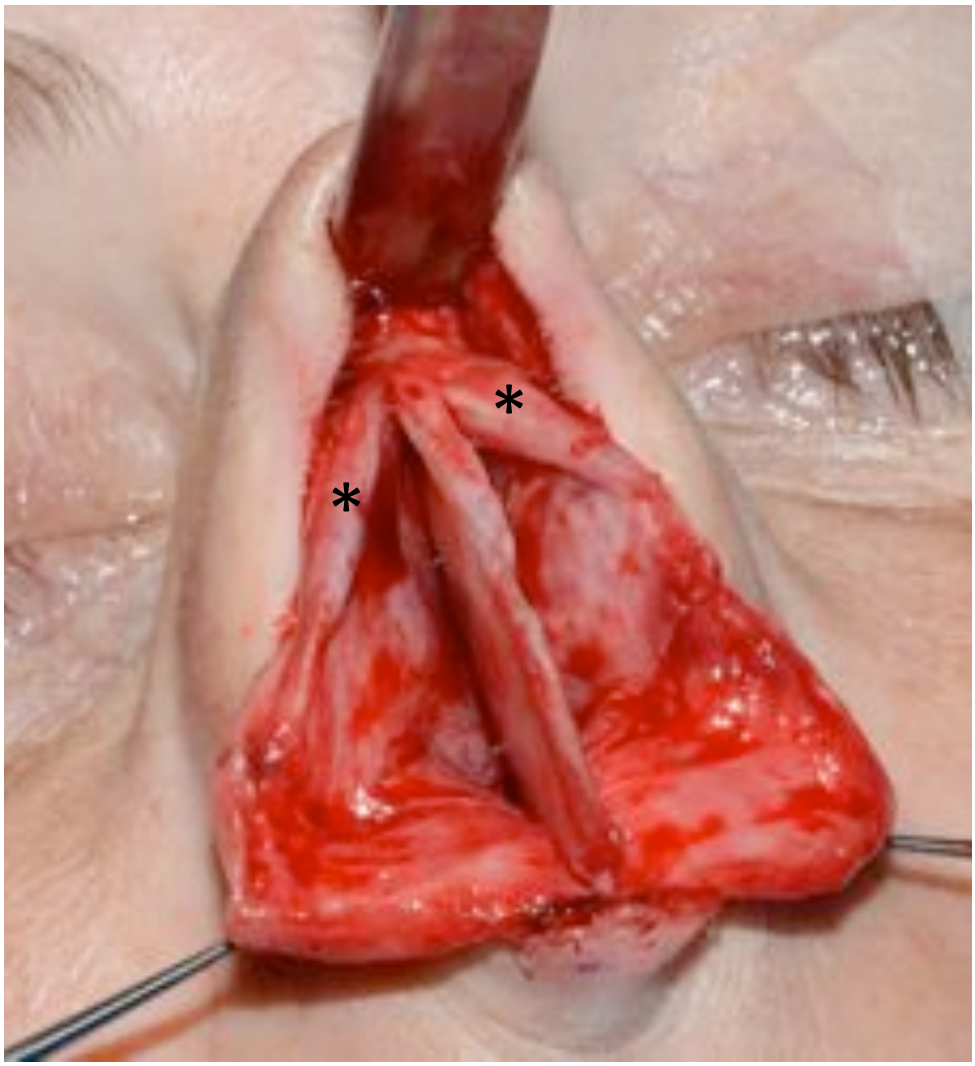

Figure 5

Intraoperative view of the SHT after separation of the ULCs from the septum. The asterisks indicate the completely preserved transverse components of the ULCs. Note the bilaterally released mucoperichondrium to avoid any traumatization to the mucosal inner lining, which could lead to postoperative cicatrical web formation or narrowing of the internal nasal valve.

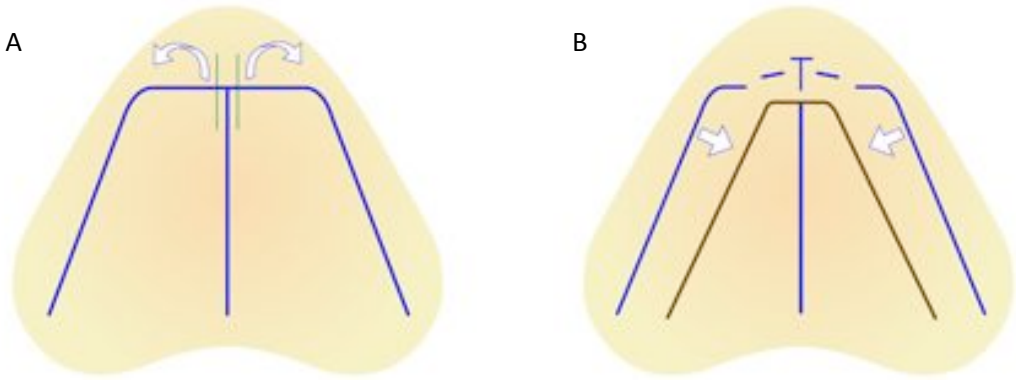

Figure 6

Schematic visualization of the SHT. Infero-medial repositioning of the ULCs is omitted successfully by preserving the transverse components of the ULCs. (A) The ULCs are separated by means of paraseptal, vertical incisions on either side of the septum. This produces a narrow septum with two completely preserved ULCs. (B) Next, the height of the septum is corrected by a transverse excision of the dorsal septum. This may be combined with vertical excision of the ULCs to reduce the dorsal width or additional maneuvers to increase the dorsal width. These maneuvers are visualized in figures 7 and 8.

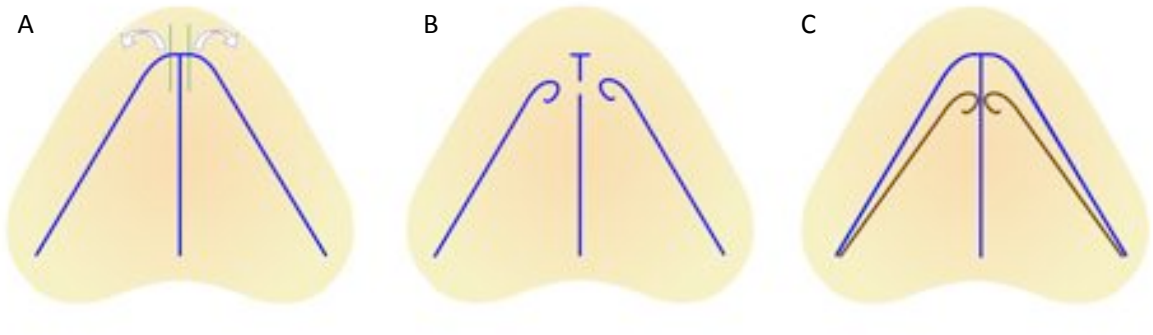

Figure 7

Schematic illustration of the SHT combined with autospreader grafts. This corrective modality can be applied in patients with moderate insufficiency of dorsal width, and adequate stability of the cartilage (as shown in Figures 8B). (A) Paraseptal, vertical incisions on either side of the septum separate the ULCs from the septum. (B) Transverse excision of the dorsal septum lowers the dorsal height. (C) The lateral segments of the ULCs are turned in and sutured to the new edge of the dorsal septum.

A

B

C

D

E

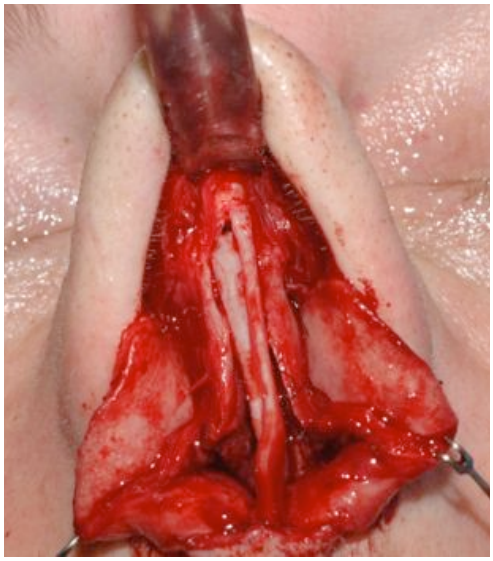

Figure 8

Clinical examples of possible variations of the SHT:

(A) Patients with an adequate dorsal width only need an incremental reduction of the dorsal height. A strip of cartilage is resected from the septum. The unaltered ULCs can then be aligned and sutured to the new anterior border of the septum.

(B) Congenital absence of both transverse components of the ULCs. Patient showed a very narrow mid-nasal third and a compromised airway. Opening of the internal valve and adequate dorsal width was established with bilaterally placed spreader grafts.

(C) Reduction of a high narrow dorsum allows application of the ULCs for increase of dorsal width. In accordance with Fig. 6 both lateral components of the ULCs were turned in and anchored as autospreaders. This variation enables the augmentation of dorsal width in patients with adequate length and stability of the transverse components of the ULCs.

(D) Combination of both additional maneuvers (intraoperative view of case 1): in order to ensure an continuous dorsal width we combined cephalically formed autospreaders with caudally placed spreader grafts on both sides of the septum.

(E) In case of an asymmetric nose the necessary extend of augmentation can vary on both sides of the septum. Alternative combination of both additional maneuvers: unilateral placement of a spreader graft (right side) and contralateral application of an autospreader.

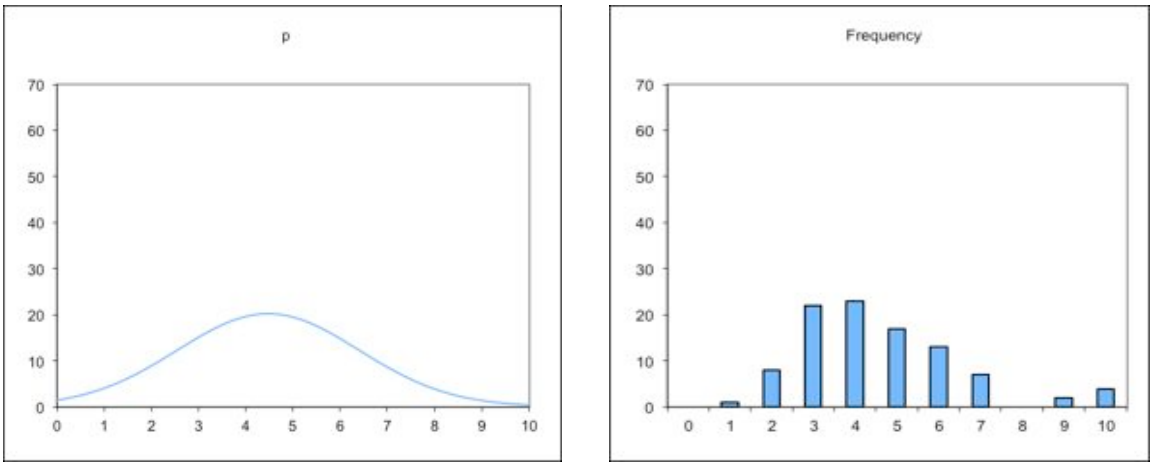

Figure 9

To substantiate our philosophy of the SHT, we performed statistical analysis of information gathered by set of questions and a functional and aesthetic VA, comparing the pre- and postoperative situation. Figure 9 is a graphic illustration of the postoperative improvement of the aesthetic VAS score. It reveals a Gaussain curve of normal distribution around a mean improvement score of 4.48 points (SD= 1.93) after rhinoplasty.

Figure 10 Preoperative (A, C, E) and postoperative (B, D, F) views in case 1.

Figure 11 Preoperative (A, C, E) and postoperative (B, D, F) views in case 2.

Figure 10

Case 1

45-year-old patient with an overprojected nose, a high nasal dorsum, and a septal deviation to the right. The operative goals were to improve nasal patency, re-create symmetry of the dorsal aesthetic lines, decrease projection of the dorsum and the tip, and reduce the degree of columella show. The surgical correction of the dorsum involved incremental reduction of the dorsum using the SHT, and augmentation of the nasal width in the middle one third of the nose by sandwiching the septum between cranially formed autospreaders and caudally placed spreader grafts using autologous septal cartilage (see also Figure 8D).

Preoperative score: F: **3-1-3-4-2**; AE: **4-4-4-4-4**; VAS-F left: **5**; VAS-F right: **4**; VAS-AE: **2**

Postoperative score: F: **2-1-1-1-1**; AE: **1-1-1-1-1**; VAS-F left: **9**; VAS-F right: **9**; VAS-AE: **8**

Figure 11

Case 2

40-year-old patient with a prominent dorsal hump, an accentuated supra-tip break, an overprojected nasal tip, fullness of the lateral crura, and a rightward deviation. The operative goals were to reduce the dorsal hump, de-project and refine the tip, and establish symmetry of the dorsal aesthetic lines. The surgical correction of the dorsum included separation of the ULCs in accordance to the SHT, reduction of dorsal height by resecting a strip of septal cartilage without any modification to the witdth of the ULCs (see also Figure 8A).

Preoperative score: F: **3-1-1-1-1**; AE: **4-4-3-4-3**; VAS-F left: **7**; VAS-F right: **7**; VAS-AE: **1**

Postoperative score: F: **2-1-1-1-1**; AE: **2-1-1-1-1**; VAS-F left: **8**; VAS-F right: **8**; VAS-AE: **8**

Tables

Please answer the following questions concerning nasal breathing and appearance.	not at all/ never				very much/ often
F1 Do you feel a swelling inside in your nose?	☐	☐	☐	☐	☐
F2 Do you feel a nasal blockage or obstruction?	☐	☐	☐	☐	☐
F3 Have you got difficulties with nasal breathing?	☐	☐	☐	☐	☐
F4 Have you got difficulties with sleeping?	☐	☐	☐	☐	☐
F5 Have you got problems getting enough air through your nose during physical exercise?	☐	☐	☐	☐	☐
AE1 Are you concerned about the appearance of your nose?	☐	☐	☐	☐	☐
AE2 Does this concern bother you often?	☐	☐	☐	☐	☐
AE3 Does this concern affect your daily life (e.g. your work)?	☐	☐	☐	☐	☐
AE4 Does this concern affect your relationship with others?	☐	☐	☐	☐	☐
AE5 Do you feel stressed by the appearance of your nose?	☐	☐	☐	☐	☐

Table 1

This table lists all Likert scale questions that we used in our short, practically oriented questionnaire to compare patients pre- and postoperative evaluations. Five functional questions examine patients nasal patency (F1 to F5) and five the aesthetic questions investigate about the subjective perception of body image in relation to nasal appearance (AE1 to AE5). Each question is scored on a scale from 1 (on the far left) to five (on the far right).

Questions	pre	post	p value
F1	1,773	1,1329	2,22*10^(-5)
F2	1,721	1,206	8,27*10^(-6)
F3	1,989	1,319	7,07*10^(-8)
F4	1,67	1,175	9,41*10^(-8)
F5	2	1,299	8,22*10^(-9)
F1-5 sum	9,154	6,351	3,03*10^(-9)
AE1	3,464	1,649	1,58*10^(-28)
AE2	3,268	1,557	1,49*10^(-25)
AE3	2,536	1,237	1,24*10^(-17)
AE4	2,247	1,216	1,22*10^(-13)
AE5	2,392	1,216	5,82*10^(-16)
AE1-5 sum	13,897	6,825	4,15*10^(-24)
VAS-F left	6,994	8,065	1,27*10^(-7)
VAS-F right	7,093	8,118	1,22*10^(-7)
VAS-AE	3,346	7,782	5,35*10^(-41)

Table 2

The table reflects the pre-and postoperative scores that were gathered using the short, practically oriented questionnaire. The corresponding p-values of every question are presented in the right column. The two fields of interest were functions and aesthetics. Five functional questions investigated patients perception of nasal patency (F1 to F5). Five aesthetic questions analyzed patients perception of body image in relation to their nasal appearance (AE1 to AE5). (Score range for each question: 1 to 5). Statistical analysis was performed on each single question and the sum scores of each field of interest. Additionally we asked patients to rate nasal patency on the left and on the right side (VAS-F left, VAS-F right), and appearance of their nose (VAS-AE) using 10-point visual analogue scales.