

ORIGINAL STUDY

“Non-suture” techniques in nasal tip reconstruction

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ABSTRACT

Nasal tip-plasty is one of the most demanding and complex operations in facial plastic surgery. The operation demands not only creating ideal structural changes in the cartilaginous skeleton of the nasal tip, but also the overlying soft tissue should redrape on the cartilaginous skeleton for the aesthetic outcome to be obvious. In this paper we will describe the non-suture operative techniques of tip plasty, as the primary tool for reconstruction. Non-suture techniques can be used in a variety of ways to achieve nasal tip definition, projection and rotation. Although they are described as non-suture techniques, sutures offer additional secondary support and are indispensable in most techniques. However, in those situations, the technique itself is more relevant in achieving the desired effect than the sutures. We will be describing the most commonly used ones in the senior author's experience (NB), done through an “open approach”.

KEYWORDS: nasal tip reconstruction, non-suture techniques

INTRODUCTION

Nasal tip-plasty is one of the most demanding and complex operations in facial plastic surgery. The operation demands not only creating ideal structural changes in the cartilaginous skeleton of the nasal tip, but also the overlying soft tissue should redrape on the cartilaginous skeleton for the aesthetic outcome to be obvious. Most rhinoplasty surgeons will agree that the most predictable aspect of rhinoplasty is its unpredictable outcome. This is due to various patient- and surgeon-related factors. While the patient-related factors will continue to present a certain degree of variability in the outcome, the surgeon-related factors can be formalized and standardized to a significant extent. This is particularly important in the “non-suture” techniques, as there is considerable potential for the techniques to be standardized. Although there are a myriad of techniques available, we will be discussing some commonly used “non-suture” techniques in the senior author's (NB) practice.

We did describe “suture” techniques in nasal tip reconstruction in the ENT and Audiology News¹, where we mentioned various suture interventions as a primary technique in tip surgery, which would alter, in isolation or in combination, the definition, rotation and projection of the nose. Anderson² has compared the nasal tip to a tripod where the two lateral crura form the lateral legs of the tripod and the conjoined medial crura form the medial leg of the tripod. Various techniques that lengthen or shorten the legs of

the tripod, can affect the projection, definition and rotation of the tip. Adamson et al³ has proposed the M Arch model for a further understanding of tip dynamics. This model allows us to delineate the contribution of each medial and lateral crus and emphasises the importance of the ‘intermediate’ crus.

WHAT ARE NON-SUTURE TECHNIQUES?

In this paper we will describe the non-suture operative techniques of tip plasty, as the primary tool for reconstruction. Although they are described as non-suture techniques, sutures offer additional secondary support and are indispensable in most techniques. However, in those situations, the technique itself is more relevant in achieving the desired effect than the sutures. We will be describing the most commonly used ones in the senior author's experience (NB), done through an “open approach”.

We will describe the following “non-suture” techniques:

1. Cephalic trim of the lateral crus of the alar cartilage

The cephalic border of the lateral crus of the lower lateral (alar cartilage) is excised. There is a considerable variability in the width of the lateral crus between two sides, in both primary and revision surgeries. Hence, leaving behind symmetric rim strips of lateral crus is of paramount importance. *How much to leave*

behind is more important than how much to excise. The cephalic margin of the lower lateral cartilage is identified from the dome to the scroll region.

Surgical technique

The key is to expose adequately both lateral crura, including the caudal and cephalic borders, through an open approach. The cartilage should be devoid of any overlying scar tissue. The amount to be left behind (usually 8mm -10mm) is measured and Adson's tissue forceps is used to hold the lateral crus gently at the measured level. Then, with a 15 blade knife, the cartilage is incised carefully, without going through the mucosa. Afterwards, with a sharp curved scissors, using a technique of "small snips and big spreads", the cephalic portion of the cartilage is separated from the underlying mucosa and excised as shown in figure 1. The cephalic excision line should be parallel to the caudal border, with a gentle convexity leading to the intermediate segment staying 2mm laterally to the dome. When nearing the dome, it is advisable to gently curve the line of excision to prevent unwanted alteration in the tip dynamics. A sharp edge at the junction of the new lateral crus and the intermediate crus will prevent tip rotation. Care should be taken not to damage the mucosa of the alar vestibule.

How much to excise is not important, but how much to leave behind is important. It is essential to leave a minimum of 8mm of lateral crural cartilage to prevent external nasal valve collapse and alar pinching. It is important to leave behind symmetric width on both sides. The space created allows the tip to rotate into, thus increasing the rotation. Sometimes, the cephalic border is not definable easily due to being rolled on it-

self. The excess width of lateral crus can cause either a symmetric or asymmetric bulbous tip. Care must be taken to excise this "rolled in" cephalic border in order to achieve tip definition and symmetry. It is all the more important if a degree of rotation is expected from the procedure.

This manoeuvre:

1. Reduces the bulk of the alar cartilages and improves the tip definition in a bulbous tip.
2. It has a marginal effect on upward tip rotation. By excising the cephalic border of both lateral crus, there is a space created in the midline, into which the reconstructed unified tip complex can be rotated into and secured.
3. By leaving symmetric "rim strips" of lateral crus, it also establishes tip symmetry between the two sides.

2. Medial crural columellar strut

Columellar strut, as the name suggests, gives support to the columella that, in turn, is essentially made of conjoined medial crural cartilage. A straight piece of the posterior septal cartilage is an ideal graft material for the columellar strut. In the author's opinion, to call it a columellar strut, the piece of cartilage should be anchored to the medial crus, acting as a stent to strengthen and support the medial crus. Adequate exposure of the medial crus is achieved. The first step is to secure the posterior superior border of the medial crus together with a medial crural fixation suture. This not only brings the two crura together, but also prevents posterior migration of the strut. The columellar strut is then secured between the two medial crus with either 2-3 simple sutures or a single vertical mattress suture (Figure 2).

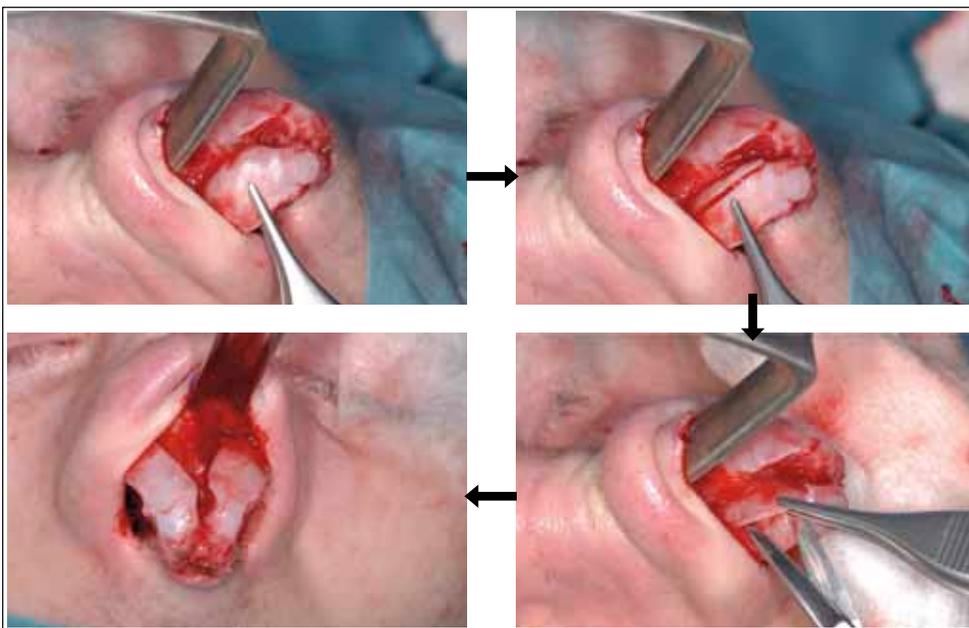


Figure 1 Cephalic trim of the lateral crus

This manoeuvre:

1. Supports the tip complex.
2. Increases the tip projection.
3. Lengthens the nose.

3. Caudal septal shave with or without soft tissue columelloplasty

Caudal septal shave (Figure 3a) is one of the techniques to achieve a degree of de-projection of the nasal tip and shorten the length of the nose. It is usually done as the main step in an over-projected nose, in conjunc-

tion with anterior nasal spine surgery. This is particularly useful in an over-projected "tension nose" pulling on the upper lip and blunting the naso-labial angle.

Three types of shave can be performed:

1. A parallel shave of between 2-4mm extending from the anterior septal angle to the inferior septal angle de-projects the tip, without introducing any variability in rotation.

2. A triangular caudal shave with the base at the inferior septal angle can de-project the tip and at the same time can marginally under-rotate the tip.

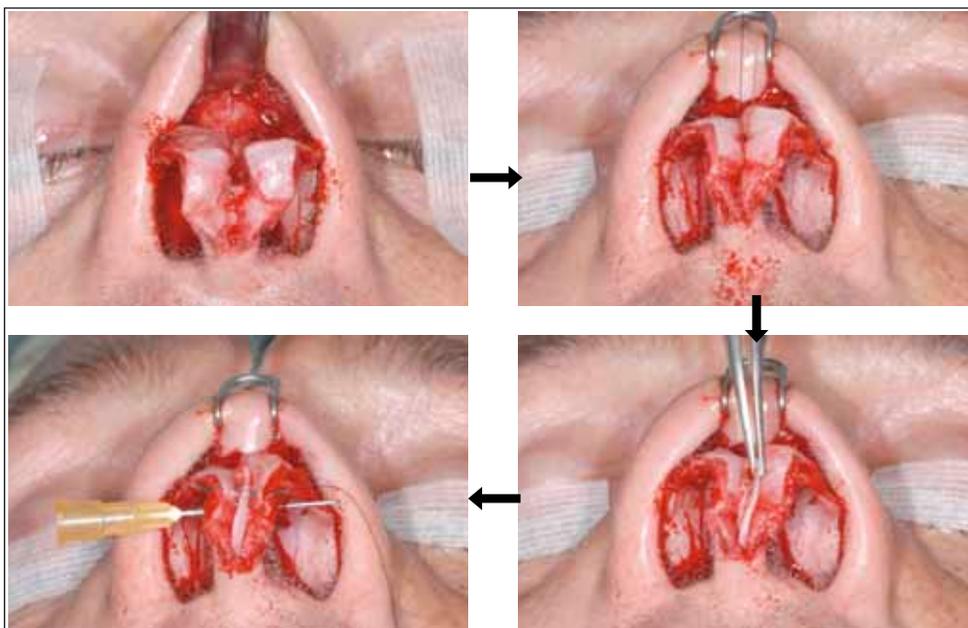


Figure 2 Medial crural columellar strut

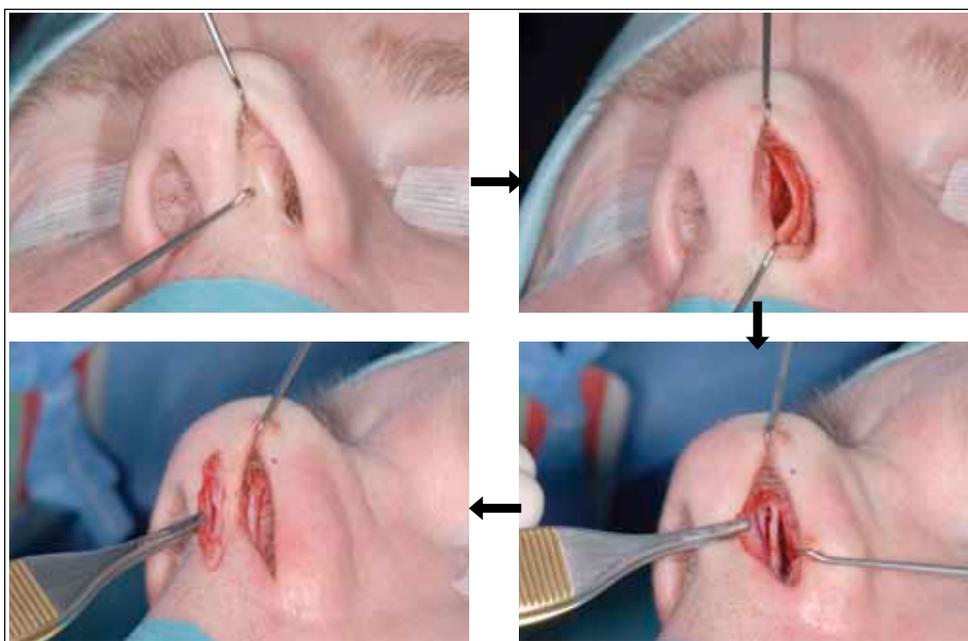


Figure 3a Caudal septal shave

3. A triangular caudal shave with the base at the anterior septal angle de-projects the tip and over-rotates the tip.

Important tip: Do not shave the caudal septum till the end of the operation, as you may sometimes have to consider a “Tongue-in-Groove” posterior advancement of the medial crura towards the caudal septum to de-project the nose. If the caudal septum is shaved early on in the procedure, it becomes difficult to move the medial crus towards the caudal septum without distorting the columella.

Soft tissue columelloplasty (Figure 3b) is indicated in an over-projected nasal tip, with excess columellar skin due to long-standing columellar dislocation. If this excess skin is not trimmed, it can cause thickened columella, narrowing the external nasal valve region. The excess columellar skin is trimmed as a smooth “D” shape, involving only the septal mucosa, but not

the skin of the columella, as this will result in tip distortion.

4. Lateral crural overlap

This is an *incisional technique* not to be confused with any excisional technique. This technique performed alone de-projects the nose, but rotates the tip to a larger extent. It works well for a severely over-projected tip with significant under-rotation, as suggested by Hossam Foda et al⁴. Done along with medial crural overlap, it is a good technique for de-projection without rotation.

An incision is made across the mid portion of the lateral crus on each side. The cartilage incision extends from the cephalic to the caudal margin and results in a proximal and a distal cartilage segment as shown in figure 4. Great care is taken not to cut the underlying mucosa. If this happens, it can result in alar collapse and pinching, which cannot be repaired,

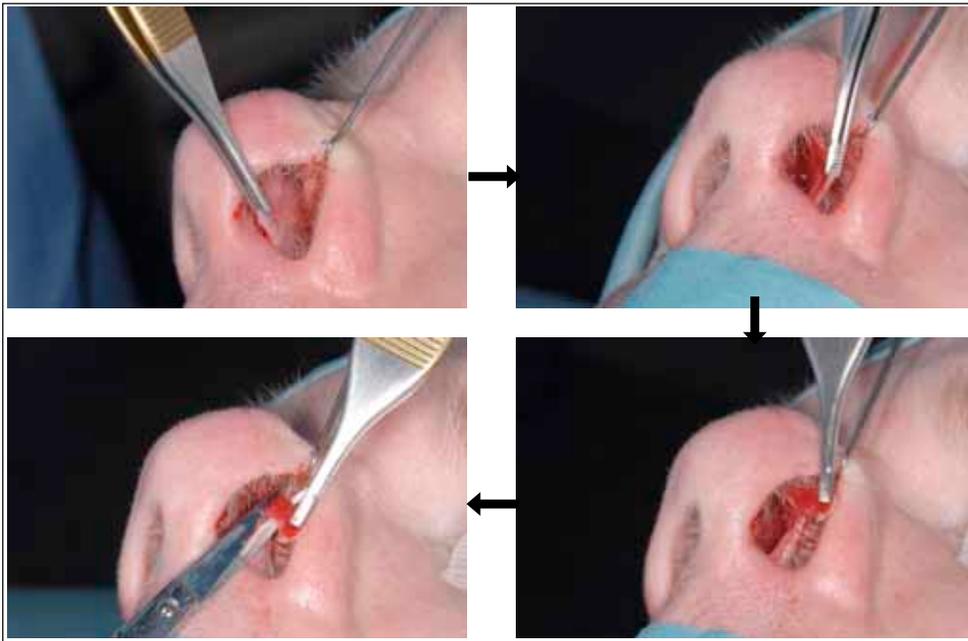


Figure 3b Soft tissue columelloplasty

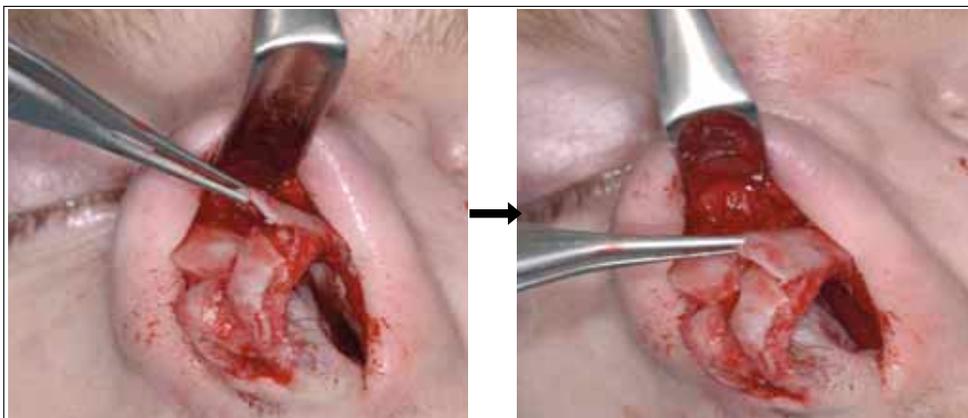


Figure 4 Lateral crural overlap

a complication akin to dead ear in stapedotomy as per the senior author (NB). The proximal or distal end can be advanced over the other and secured with a horizontal mattress suture to achieve the desired effect. There are always some mucosal folds underneath, which will settle over time. Where to incise and how much to overlap in order to be tailored to the desired effect goes with experience. As a general rule of thumb, the maximum advancement should be no more than 4 mm to avoid distortion.

Points to remember

A. The incision line must be placed symmetrically on both sides.

B. Skin thickness must be considered. In people with thin skin, the cartilage overlap may not produce a cosmetically favourable result.

C. The site of incision is very important. It should be well lateral, although the exact placement is governed by the site and shape of the LLC. Too lateral an incision fails to achieve an adequate result in terms of de-projection and rotation, and too medial an incision results in a loss of tip definition.

Thus, this manoeuvre helps to:

1. not only de-project, but also over-rotate the tip, when done alone.
2. de-project the nose without any element of rotation, when done in conjunction with bilateral medial crural overlap.

5. Septal extension graft

Septal extension grafts are ideally indicated for a grossly retracted nasal tip, columellar shortening with secondary over-rotation of the tip (Figure 5). This can

be done through the open approach or hemi-transfixation incision. The graft is harvested either from the posterior part of the septal cartilage or rib cartilage. The graft to be used should be straight. Caudal septal dislocations and deviations should be corrected before any form of septal extension can be considered. The graft is sutured to the caudal end of the septal cartilage. There should be about 3-4mm overlap between the graft and the caudal end of the septum. This will ensure that the graft is placed securely. Make sure that the edge of the graft does not protrude beyond the caudal edge of the medial crura. One disadvantage with this technique is that the patient will have a relatively stiff nasal tip with very limited tip recoil. This should be explained to the patient before the surgery. Sometimes, it is worth doing a shield graft to avoid an excessively pointed nasal tip⁵.

This procedure will:

1. Increase the tip projection
2. Improve definition of tip
3. Under-rotate the tip
4. Increase the length of the nose.

6. Medial crural "tongue-in-groove" cephalic advancement

This technique helps to reduce an over projected tip, particularly with an excess "caudal show" and overhanging columella. It recedes both the medial crura cephalically towards the face and anchors it to the caudal septum as shown in figure 6.

The first step is to straighten the caudal septum. Then, the medial crura is exposed and mobilised from the overlying skin. The direction of the medial

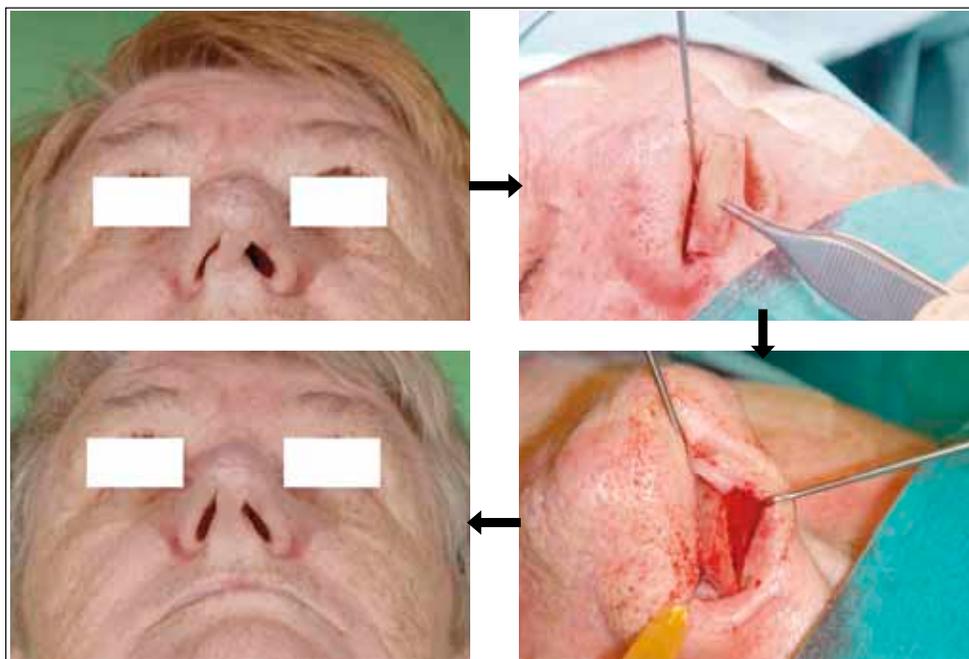


Figure 5 Septal extension graft

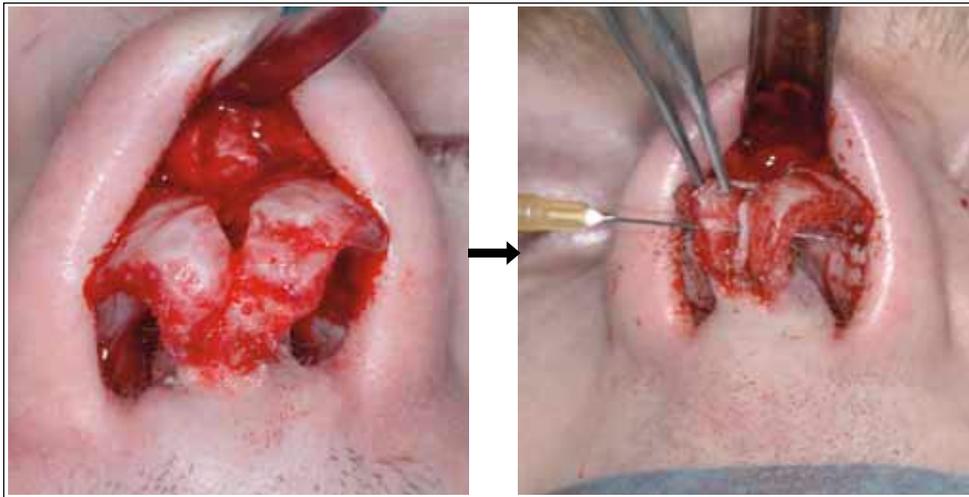


Figure 6 Medial crural "tongue-in-groove" advancement

crus is changed from the coronal plane to the sagittal plane if necessary. The freed medial crura are advanced in a cephalic direction on either side of the caudal septum and sutured to the caudal border of the septum to create a "Tongue and Groove Complex".

Important tip: You can only recede the medial crus by about 3-4 mms maximum without distorting the columella. If you are planning a tongue-in-groove de-projection (which is also a technique to de-project the tip), *do not perform a caudal shave of the septum early on*, as this will increase the distance you have to move the medial crus, resulting in columellar distortion.

This technique:

1. Done along with lateral crural overlap, is quite a powerful technique to de-project a tip without affecting the rotation.
2. If done alone, there is a risk of shortening the columella and under-rotating the tip.
3. It also helps in providing tip support similar to a medial crural columellar strut.
4. This also results in a slight decrease in columellar show. Therefore, in people with increased prominence of the caudal edge of the septum and in people with an increased columellar show and bulky columella, the tongue-in-groove technique can deliver a very good result. Kridel et al have shown the importance of this technique in the management of the bulky columella with excess columellar flare⁶.

7. Vertical dome division (VDD)

Collectively, vertical dome division (VDD) refers to one of many methods of vertically dividing the lower alar cartilage at or near the dome to modify nasal tip aesthetics. The Classic "Goldman tip" is an *Incisional technique*⁷ (not to be confused with any excisional techniques), including complete division of the lateral

crural cartilage along with the underlying mucosa and turned towards each other, to achieve tip projection without the use of columellar struts. This was an interrupted strip technique and fell into disrepute due to minor irregularities, and also, sometimes, lateral alar collapse. However, the principle of VDD has seen a resurgence, with the exception being to preserve the underlying vestibular skin. This should be also called *Lateral crural steal*. Care must be taken to preserve the underlying mucosa. Cutting the mucosa and cartilage results in loss of the lateral crural arch, causing devastating alar pinching and collapse, which is very difficult to treat. The senior author's (NB) paradigm is to compare this with "dead ear" in stapedotomy.

This technique is primarily used for improving the definition and increase in both projection and rotation in a bulbous amorphous tip. Essentially, the medial crural height is increased by stealing from the lateral crus. To achieve this, the vestibular skin is undermined from the undersurface of the LLC, for at least more than 5-7 mm, to allow for mobilisation of the cartilage. Then, the direction of the medial crus should be changed from the coronal to the sagittal plane, if necessary, using medial crural flare control sutures as shown in the figure 7 below. The lateral crus is then divided sparing the underlying mucosa and advanced on to the medial crus (*without dividing the integrity of the alar mucosa*). This procedure is then repeated on the contra-lateral side and a new dome is created at a higher level than the existing dome using a horizontal mattress suture. It is advisable to use a shield graft in front of the new tip to camouflage any sharp edges.

This technique is performed for moderate to severe under-projected nasal tip with suboptimal definition and rotation. VDD is a versatile technique, which has undergone several modifications since its first description by Goldman. One such modification (Lipsett) involves making the incision medially

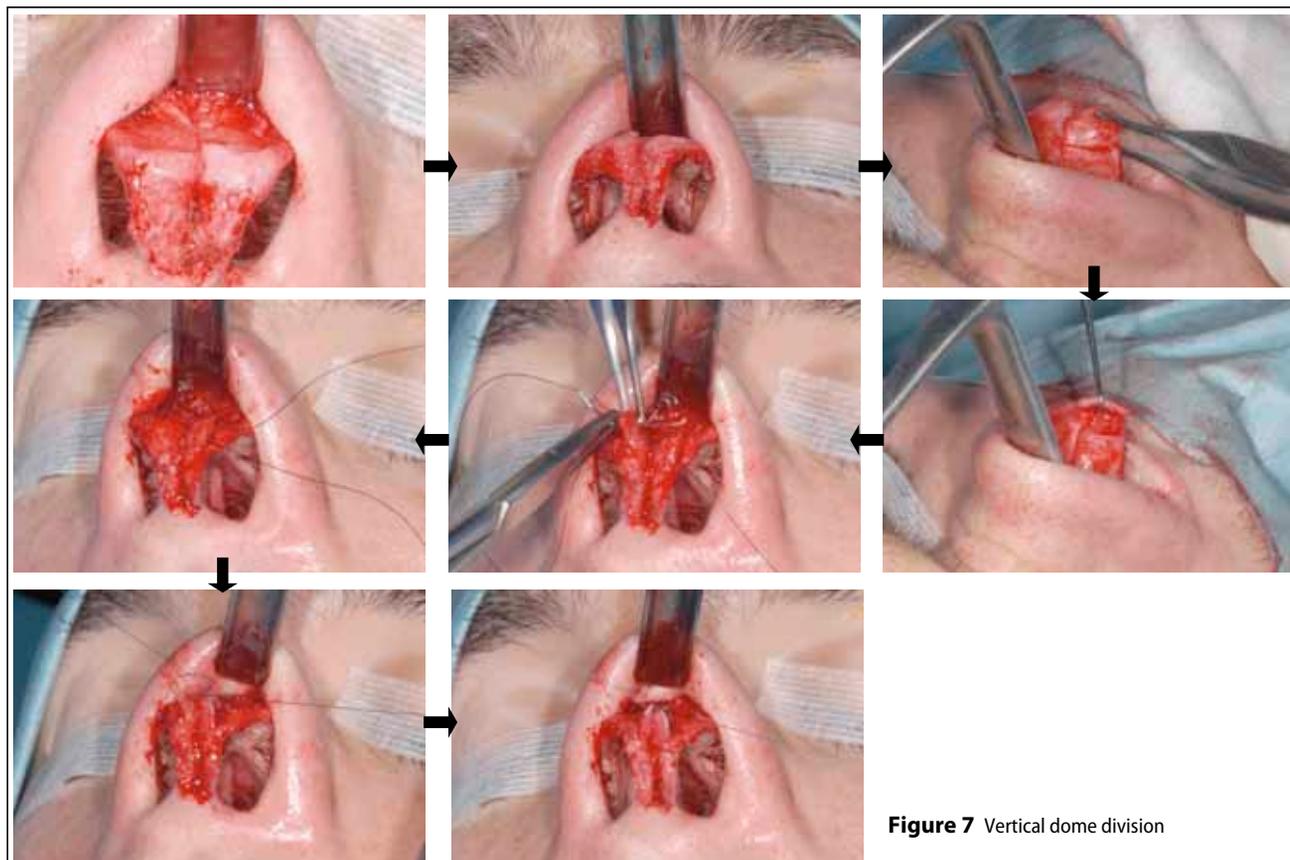


Figure 7 Vertical dome division

to the dome in the medial crus. This would result in decreasing tip projection. Another modification (Simon) involves making the incision laterally to the dome over the lateral crus⁸. This would result in an increase in projection of the tip. These modifications do not produce consistent results in the senior author's view (NB).

CONCLUSIONS

Thus, non-suture techniques can be used in a variety of ways to achieve nasal tip definition, projection and rotation. We suggest the use of the following algorithm for the appropriate non-suture techniques in nasal tip plasty: Table 1.

Declaration

Please note that the photographs were taken with written consent from the patients and are the property of NHS Lanarkshire, Scotland and should not be used for any publication, lectures or be reproduced in any form without the consent of the author.

Acknowledgement

We thank Ross Milligan and his team, particularly Eric and John, from the medical illustrations depart-

Table 1
Non-suture technique algorithm for nasal tip reconstruction

To correct the tip bulbosity and improve definition	➔	Cephalic trim of LLC
To increase the projection and create definition in a wide amorphous tip	➔	Vertical dome division (VDD) Septal extension graft Columellar strut
To reduce the tip projection without affecting rotation	➔	Parallel caudal septal shave Soft tissue columelloplasty
To reduce tip projection and under rotate the tip	➔	Medial Crural "Tongue in Groove" advancement
To reduce tip projection and over rotate the tip	➔	Lateral Crural Overlap

ment at Monklands hospital for their help and support in taking pictures at any time we want! We would also like to thank all our patients for allowing us to use their clinical photographs for teaching and training purposes.

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