




Precision Segmental Preservation Rhinoplasty

Avoiding Widening, Defining New Dorsal Esthetic Lines in Dorsal Preservation Rhinoplasty

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KEYWORDS

- Preservation rhinoplasty • Segmental preservation • Precision rhinoplasty
- Dorsal platform preservation • DAL osteotomies • Tetris concept

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INTRODUCTION

Over the last decade, dorsal preservation rhinoplasty (PR) has regained an impressive popularity and has seen considerable advances in just a few years, as many doctors have improved and developed new ideas on the subject.¹

In dorsal preservation, the initial fundamental goal was to preserve both the keystone area (K-area) and the continuity of the cartilaginous vault. This conservative approach avoids nasal valve collapse, with its adverse effects on respiration and the dorsal esthetic lines (DALs).²⁻⁴

However, despite these “new” advances in the PR concept, we can still face some of the common drawbacks of this technique, such as hump recurrences, radix steps, supra-tip saddling, pyramid broadening, and lateralizations.^{5,6}

Nasal pyramid widening or irregularities can be part of the drawbacks in dorsal PR. Some surgical options to correct a broad upper third (the bony pyramid) and irregularities in the upper/middle third have been described before.⁶

At the middle third (the cartilaginous vault), Stergiou and colleagues show that a widening can be advantageous as it opens the internal valve. They reported that internal nasal valve opening and nasal function can be dramatically improved by PR in a radiological analysis.⁷ However, this condition may cause esthetic drawbacks. Saban and colleagues reported that excising a small strip from the caudal border of the upper lateral cartilages could solve the widening problem.³

The main concept to avoid drawbacks, as much as possible in dorsal preservation surgery, is to

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evaluate and treat the nose by segments and not as a single block, achieving a more predictable, accurate, and esthetically pleasing result.⁶

The segmental preservation approach encompasses five segments: the radix, the bony vault curvature, the rhinion, the pyramid vault curvature, and the supra-tip position, treating them as individual units to obtain a good result avoiding the most common problems in PR surgery.⁶

The use of power instruments such as Piezo and cylindrical burrs widely spread by Olivier Gerbault⁸ and Emre Ilhan (Precision Rhinoplasty), respectively, is an important step in the segmental approach.

These burrs allow us to refine some irregularities in the osseocartilaginous framework, treat the lateral sidewalls bulging and asymmetries after the let-down maneuver, controlling the smoothness of the nasofacial groove, and precisely determine the DALs.

The concept of precision surgery has been described by other investigators,⁹⁻¹¹ but the main idea behind this precision segmental approach is to bring PR to another level of detail and finesse and to include in the PR some former contraindications.

This study also aims to show strategies we use to avoid the middle third widening and asymmetries in PR.

DORSAL PLATFORM PRESERVATION CONCEPT

Several classifications have been proposed for PR. Ferreira and colleagues¹² proposed a classification that would divide PR in foundation techniques and surface techniques. Although we believe conceptually identified with foundation techniques, in most cases we also end up performing procedures on the surface of the pyramid, such as sculpting with the use of burrs, piezo, or eventually rasps and adjustments of the cartilaginous pyramid (**Tables 1 and 2**). Therefore, we consider our work, our dorsal preservation (DP) *opera*, is divided into two acts: (1) the first act that is fundamentally the preparation of all the necessary conditions that make possible the impaction and reformulation of the nasal profile line when necessary (usually transforming convexity into flatness) and (2) the second act that is performed over the new position of the nasal pyramid and is dedicated to sculpt and to refine the bone and cartilage segments of the pyramid, in a precise way.

In some cases, in a smaller percentage, we end up not exposing the platform of the nasal dorsum during our dissection, keeping this area inviolate,

as we achieved the programmed profile only with the first act of deprojection and splaying of the dorsal profile line (**Fig. 1A**). However, in most cases, we need additional maneuvers to improve the nasal dorsum finesse, extending the dissection of the dorsal platform cephalically but avoiding the dissection of the radix as much as possible, a strategy that serves as an additional safety net to avoid a radix step phenomenon (**Fig 1B**). Exceptionally, we also dissect over the radix osteotomy line in cases we need to smooth the transition marked by the osteotomies or eventually to bring down the bone cephalic to the osteotomy for a better nasofrontal angle.

In our concept, our main goal is to maintain the continuity of the natural connection in between the nasal bone and the upper lateral cartilages (ULCs) on the dorsal platform, a platform that is defined laterally on both sides by the DALs, being our disarticulation work performed lateral to these lines. However, sculpture of the dorsal platform using preferably burrs can smooth the bone and cartilage, smoothing irregularities or solving convexities, in a considerable amount, without provoking disruption and therefore continuity impairment in between the bone of the upper third and the cartilage of the middle third, which would destroy the concept of preserving the anatomic continuity.

It was our observation during the years of consultation that, when talking about the nasal dorsum, the patients essentially value what they call the profile (which in reality is the $\frac{3}{4}$ view, because it is the view they evaluate when looking in the mirror) while palpating the dorsal platform. It is therefore essential to approach and define the DAL, which are evaluated in the $\frac{3}{4}$, and to achieve a smooth dorsal platform that on many occasions need precise sculpture and finesse, which allows the desired soft palpation. Our strategy will therefore aim to protect the base of the natural anatomy between these two esthetic lines and transfer the need for greater aggressiveness of the surgical gestures to the side walls lateral to the defined DAL, where healing problems are not usually experienced and where patients do not seem to encounter much displeasure.

PYRAMID REPOSITIONING AND BONE AND CARTILAGE BLOCKING POINTS

To understand the segmental concept when repositioning, the pyramid is paramount to clarify the blocking points of the bony and cartilaginous pyramid.

When performing impaction in foundation PR, two kinds of movements need to be considered

Table 2
Precision segmental preservation rhinoplasty strategies

	Segmental Preservation	Precision Adjustment
Radix	<ul style="list-style-type: none"> • Avoiding radix area dissection when possible • Radix pillar • Step-up maneuver • Oblique radix osteotomy 	<ul style="list-style-type: none"> • Osteotomy borders refinement (burr) • Deprojection the radix • Reduce radix with (burr)
Bony vault	<ul style="list-style-type: none"> • Avoiding dorsal platform dissection when possible • Let down avoiding blocking points • Radix pillar • Step-up maneuver 	<ul style="list-style-type: none"> • Define the dorsal profile line (burr, piezo, rasps) • Define DAL width by reshaping (burr) • New DAL osteotomies (piezo) • Lateral wall reshaping (burr) • Nasofacial groove reshaping (burr)
Rhinion	<ul style="list-style-type: none"> • Septal split (at the highest profile point) • LKA disarticulation • Sutures to counterbalance the spring effect <ul style="list-style-type: none"> ◦ High strip with flap—Tetris flap to stable septum sutures ◦ Low-strip approach—cable/mirror sutures in sub-laminar dissection 	<ul style="list-style-type: none"> • Reshaping bone cartilage transition (burr)
Cartilaginous vault	<ul style="list-style-type: none"> • Wide dissection posterior to the ULC • Scroll complex flap elevation to avoid the lower lateral cartilages (LLC) blocking point • Stabilizing the rotational movement with sutures <ul style="list-style-type: none"> ◦ High strip with Tetris flap—flap to stable septum sutures ◦ Low-strip approach—cable/mirror sutures in septal sub-laminar dissection 	<ul style="list-style-type: none"> • Cartilaginous vault running mattress sutures • Unilateral cartilaginous vault suture • Spreader and camouflage grafts • monopolar cautery reshaping new cartilaginous DALs and convexities
Supra-tip	<ul style="list-style-type: none"> • Supra-tip pillar <ul style="list-style-type: none"> ◦ High strip with Tetris flap—neural caudal septal strut bellow ULC • ULC caudal septal suture 	<ul style="list-style-type: none"> • Supra-tip area burr shaving • Occasionally camouflage graft

(a) the vectorial deprojection movement—the anterior to posterior vectorial movement, when the pyramid is brought down to a new position but with preservation of the same profile contour, after preparing the three walls (two lateral walls and septum) to enable the impaction movement and (b) the rotational divergent movement during the bone/cartilage splaying, when a divergent

movement of the bony and middle third lateral wall is created to flatten the dorsal contour, after creating the split maneuver in the three walls, with special attention to the lateral K-stone area disarticulation (**Fig. 2**)

During the impaction movement, the main *bony blocking points* are located at (1) the cephalic portion of the nasal septum (cephalic to the septal

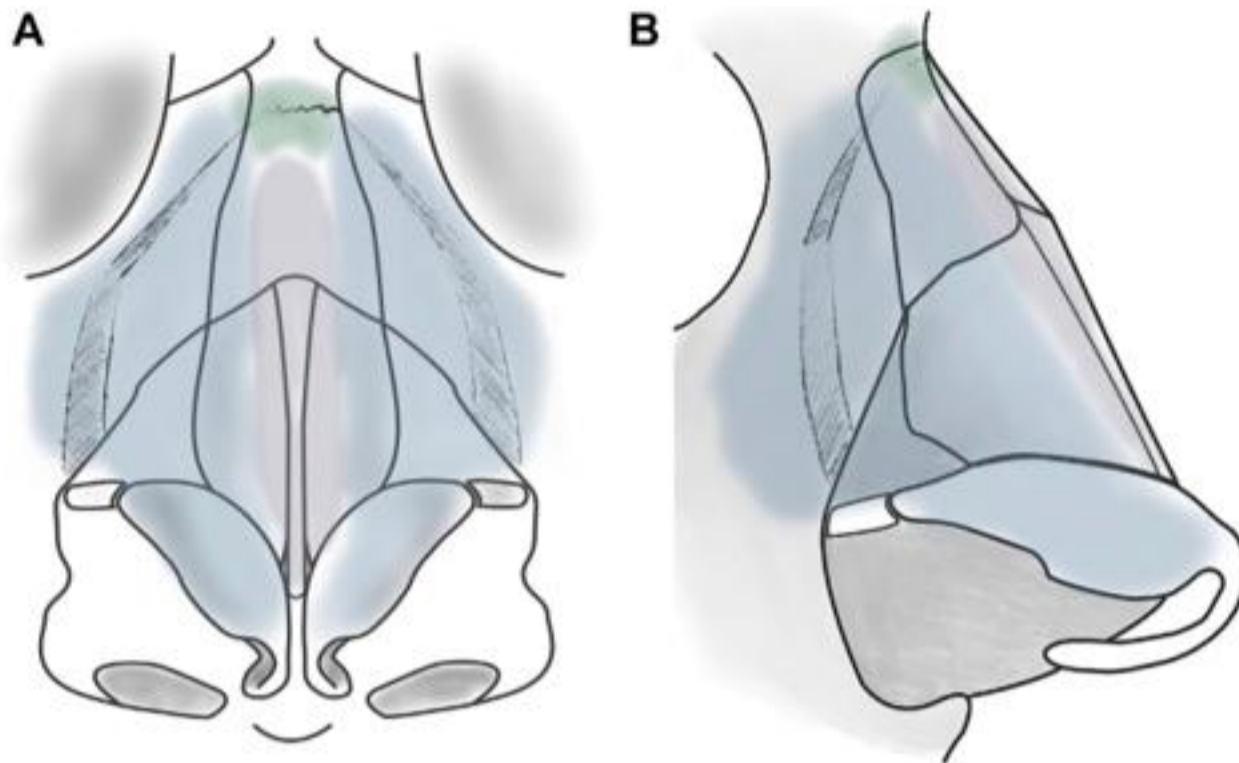


Fig. 1. (A) We always start dissecting the lateral wall reaching the nasofacial groove preserving the dorsal platform (blue); (B) when precision maneuvers are needed at the dorsal platform this region is dissected preserving the radix area (purple gray); exceptionally the radix area is exposed with the radix osteotomy being visible (green). The let-down osteotomies and the radix osteotomy can be seen.

split); (2) the lateral walls osteotomies contact, especially where the transverse and the lateral ones meet, allowing the posterior cephalic rotational movement of the bony pyramid; and (3) the inner lining mucosa must be seen as a possible bony blockage specially in push-down technique; the main *cartilaginous blocking points* are caused by (1) a deficient control of the septal cartilage caudal to the split, (2) the scroll complex, and (3) the soft tissues mass effect posterior to the ULC

posterior border. The widening of the ULCs would not happen if their posterior and caudal borders were completely free. In that case they could move freely with the bony movement. So, it is important to understand the dissection posterior to the ULC posterior border and the role of the scroll by blocking the movement.

When dropping the pyramid down, most of the times, we create a divergence in between the bony wall and the mid-third wall. For that we

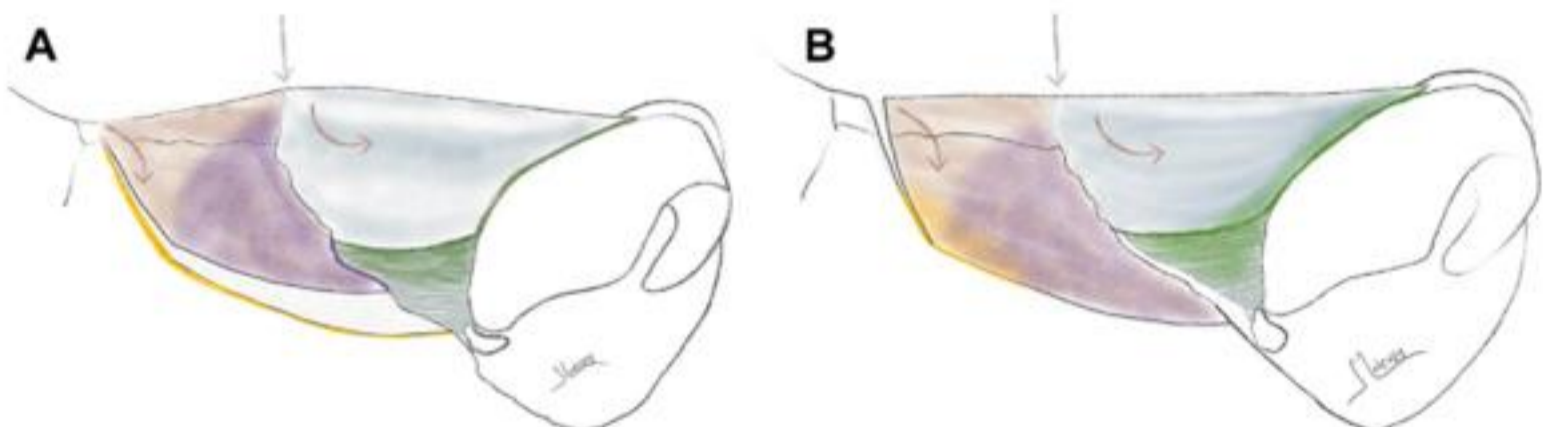


Fig. 2. Bone and cartilage lateral wall blocking points. Gray arrow represents the impaction vectorial force; the brown arrow represents the rotational forces of the pyramid: posterior and cephalic at the bony vault; caudal and anterior at the cartilaginous vault. The yellow line and shadow show where the bone will find the resistance; the green line and shadow represent the cartilaginous movement resistance. **BONE:** (A) the rotational movement happens around a radix stable pivotal point; if the pyramid finds blocking points (with special attention to the transverse osteotomy space and where it meets the basal osteotomies) a nondesired displacement of the radix osteotomy may occur (B); **CARTILAGE:** (A) the rotational movement is posterior and caudal toward the soft tissues posterior to the ULC posterior border and toward the scroll area, respectively. If these structures limit the ULC movement, they will find resistance (green line and shadow) and consequent bulging and widening will be seen (B). Lateral K stone area (LKA) disarticulation: the bone is released in a wide extension from the ULC, mucosa and pyriform ligament (this one the most limiting structure for the splaying effect (purple shadow)).

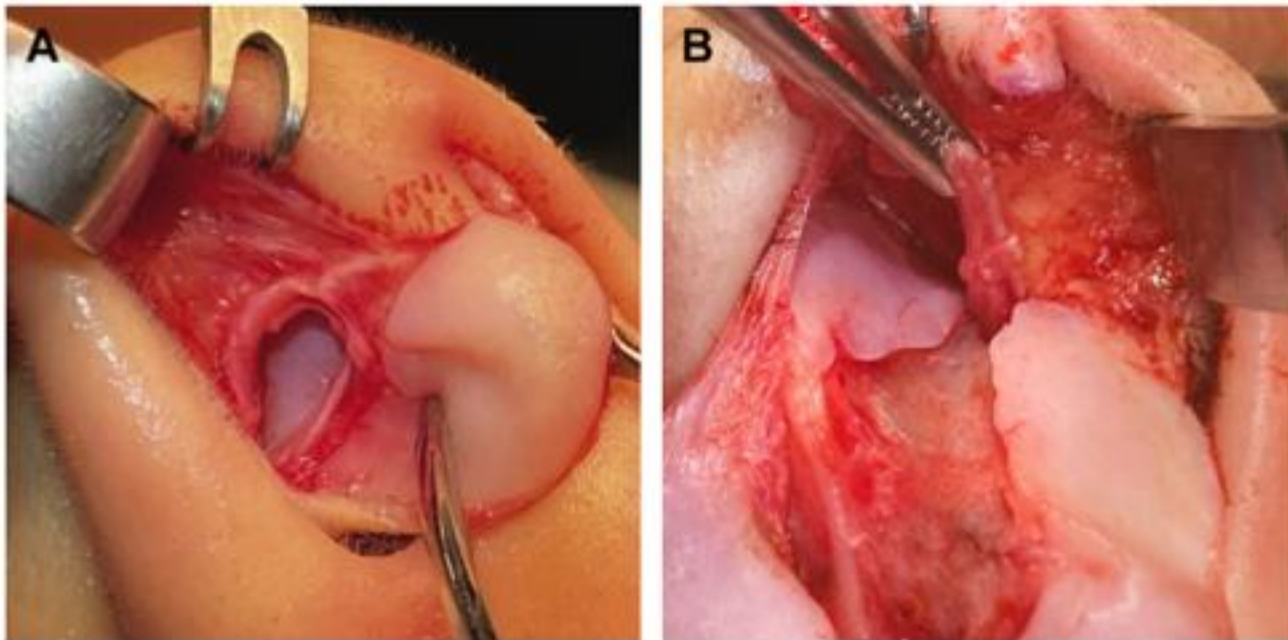


Fig. 3. Elevating the scroll complex with the soft tissues flap. (A) The sesamoid cartilages can be seen in the flap; (B) when both horizontal and vertical scroll ligaments are elevated the mucosa is the only layer left behind. It creates space for the ULC rotational movement.

need to disarticulate the bony nasal wall from the ULC and release the pyriform ligament from the pyriform aperture¹³ (**Fig. 3**). This maneuver allows the caudal and anterior advancement of the middle third promoting some stretching, which works as additional measure for narrowing but it does not work as a blocking point, once the free bony movement brings the cartilage down precisely with the same width, if the other cartilaginous were released.

Materials and Methods

We analyzed retrospectively our 2021 rhinoplasty data. We performed 321 operations, of which 208 were primary and 113 were revision rhinoplasties. The revision ones were excluded. Of the 208 primary rhinoplasties, the ones based in structure concepts (77) were also excluded, remaining the 131 cases operated with PR concepts. We first analyzed the work of the lateral and medial walls that promote the reposition of the pyramid and the remodeling of the dorsal profile based on the segmental PR concept. This is the “act 1” of our PR approach. In some cases, only the lateral wall is dissected avoiding the manipulation of the dorsal platform soft tissues, which can benefit the post-op recovery for inducing less traumas. However, in most cases, we end up dissecting the dorsal platform to perform refinement maneuvers to the profile and precisely define the DAL. These maneuvers at the bony and pyramid vaults that represent the “act 2” were also recorded, to understand the importance of modifying the original characteristics of the nasal pyramid, which allow to include in our PR surgical list former classical contraindication cases.

SURGICAL TECHNIQUE

In our routine, we start approaching the lateral wall, in a subareolar (supra-perichondral) plane in the lower and middle thirds and subperiosteal in the upper third in a wide approach manner,¹⁴ so the nasal facial groove is reached but with no dorsal platform soft tissues elevation. This extended dissection allows us to perform the lateral wall procedures under direct vision and a free movement of all tissues avoiding the mass effect of the soft tissues blockage to the ULCs. The dorsal platform is addressed and dissected if some additional refinement maneuvers are considered in that area, which we frequently do.

We need to properly address why the middle vault widens during PR. If the middle third cartilages were free in space with no contact to other structures, they would not change the form and width when any kind of movement was applied. It means that the potential blocking points are some ULC neighbors. We believe that the scroll areas and all soft tissues posterior to the ULC are important blocking points in the impaction maneuver. (LKAs and pyriform ligaments are limitation structures for the rotational splaying effect but do not cause widening if not released.) Therefore, one must separate these structures; otherwise, they limit the movement holding the middle vault to exhibit a convexity on the outer surface of the upper lateral cartilages, leading to a widening effect, as well as hump recurrences.

In addition, as the cartilaginous vault experiences a caudal and anterior rotational movement, the scroll areas and the supra-tip region may be compressed with a consequent conflict and a possible bulging. To avoid this effect, we elevate and preserve the scroll complex during our

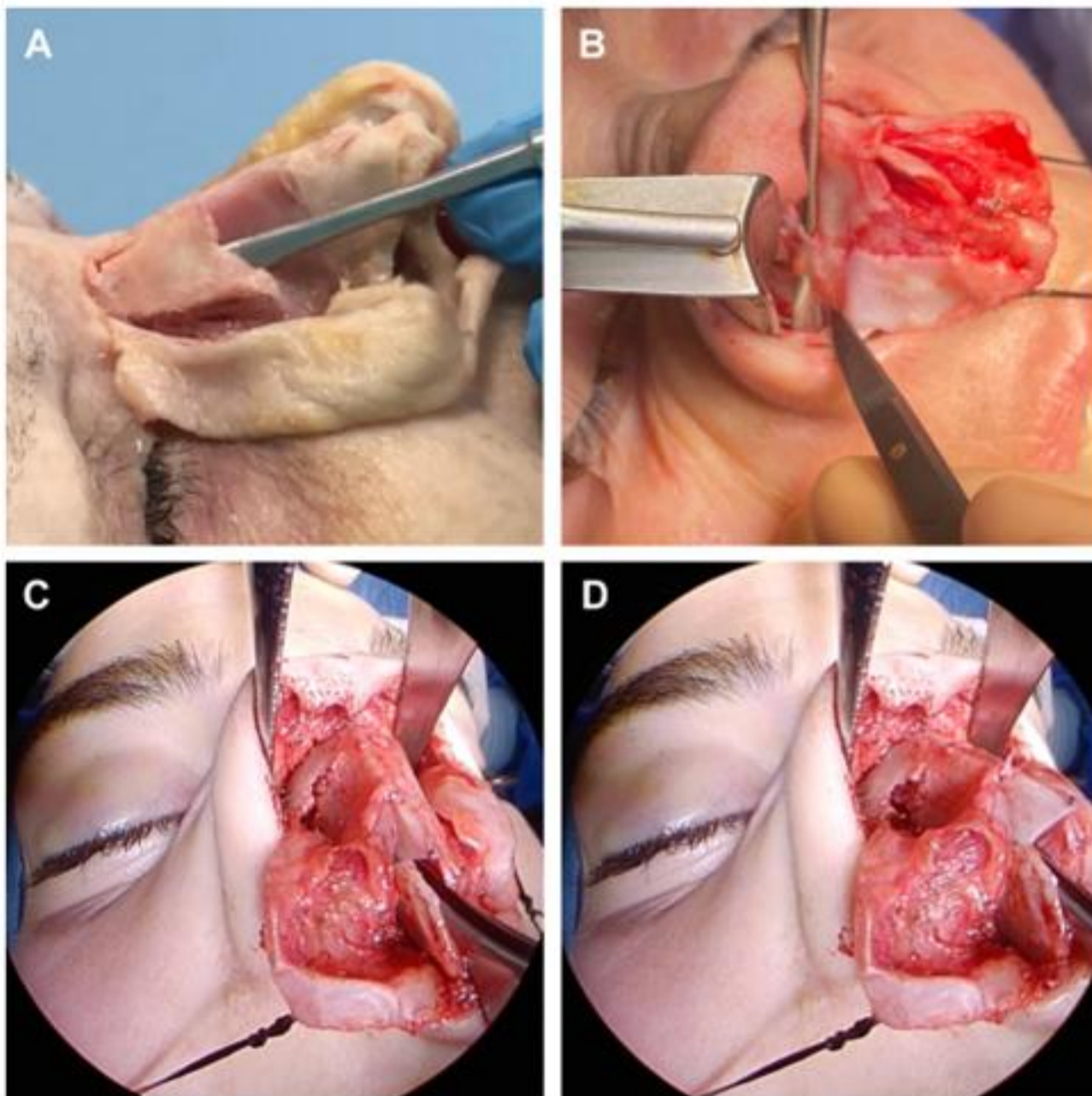


Fig. 4. LKA disarticulation. (A) Wide dissection in a cadaveric specimen; (B) the resistance of the pyriform ligament, the most limiting element for the splaying movement. We use a scissors to cut it from the pyriform aperture. Note the disarticulation area before the rotational movement (C) and the opening of the joint after right after (D) It shows the importance of having this connection released.

dissection, and eventually, a caudal trimming of the ULCs at the end of the surgery is necessary.

ACT 1: Releasing and repositioning the nasal pyramid and formatting the dorsal profile line

Scroll Area Dissection

In the closed or open approaches, we start by dissecting the inner surface of both medial crura in a supra-perichondral plane without damaging the soft tissues in between. We proceed toward the domes and reaching the lateral crura. At this stage, we dissect the outer surface of the lateral crura keeping the supra-perichondral subareolar plane with a delicate elevator reaching the cephalic margin of the cartilage. The scroll complex is identified and elevated with the soft tissues flap. The scroll region mucosa is consequently exposed (see **Fig. 3**). Preservation of the scroll complex can be achieved by a sub-perichondral or a subareolar dissection. We believe that the elevation of the scroll ligament complex control is the first step to avoid ULC widening.

Regardless of the dissection philosophy used, the ULC movement should not encounter resistance.

Wide Lateral Wall Dissection

As already described, the wide dissection allows the pyramid to move posteriorly without the compression of the lateral wall tissues, making the lateral wall wide dissection (eventually keeping the dorsal platform soft tissues intact no elevated) important not only for exposure and visibility of the framework structures but also for the free pyramid repositioning movement. We usually dissect laterally to the nasal facial groove. By exposing this area, we can manage not only the shape of the bony lateral wall but also the angle and the softness of the groove with great precision.

Lateral Keystone Area Disarticulation and Pyriform Ligament Release

Before starting the LKA disarticulation, we perform the lateral let-down (occasionally push-down)

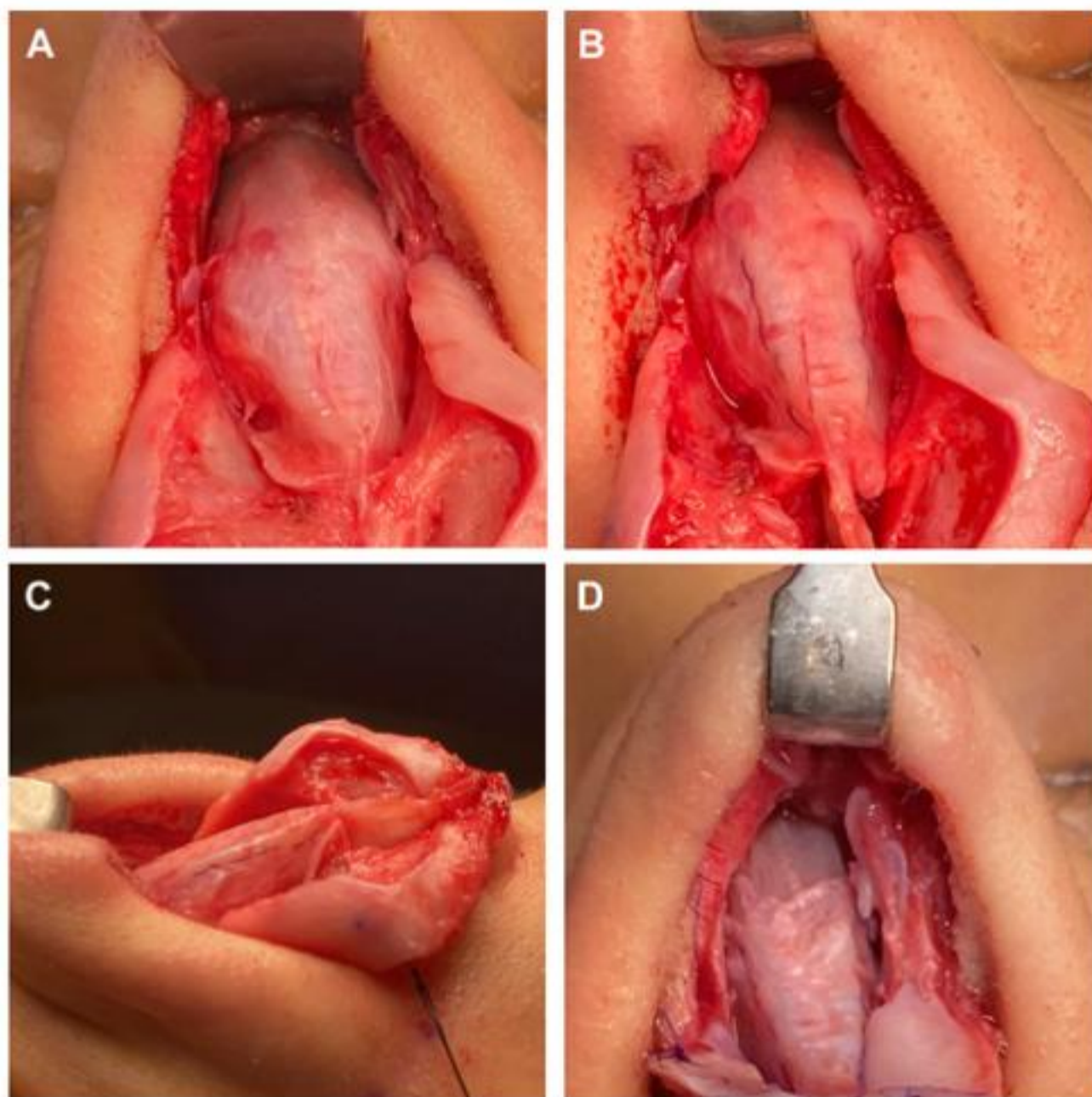


Fig. 5. (A) Broad nasal dorsum; (B) and (C) continuous mattress sutures with reduction of the ULC flaring; (D) new DAL were designed narrowing the bony vault with a cylindrical burr. Note the continuity of bony and cartilaginous esthetic lines. Compare the width in (A) and (D), before and after.

osteotomies and remove the bone wedges by protecting both outer and inner periosteum. LKA disarticulation (lateral split maneuver¹⁵ or Ballerina maneuver¹⁶) refers to elevate the lateral bony wall from the ULC, elevating the inner periosteum of the lateral wall with a Freer, and even more important sectioning the pyriform ligament from all its attachments to the bony pyriform aperture (the most limiting structure for flattening the dorsal profile), with a scissors, always avoiding mucosal damage (**Fig. 4**). At this stage, it is essential to avoid dorsal K-area dissection not to disturb the stabilization.

Now, we are able to move the nasal pyramid to the desired position and flattening the dorsum as predicted.

ACT 2: Maneuvers to prevent residual humps and irregularities and to prevent widening and promote narrowing and definition.

Suturing the Middle Third Roof

The middle third roof suturing goal is to narrow a wide middle third roof and get a precision dorsal

line by preserving nasal functions in rhinoplasty. After the nasal dorsum projection is reduced and stabilization is achieved, the dorsal line harmony should be checked. If there is broadening or asymmetry on the middle third roof despite all the maneuvers, the suturing option should be considered.

Continuous or intermittent 5.0 polydioxanone suture (PDS) sutures can be used starting a few millimeters cephalically from the W-point running cephalically. When a continuous horizontal mattress suture is performed, we turn caudally again and tie the suture at the starting point (**Fig. 5**).

For the patients who have broader cartilages, we need to excise a triangular piece of cartilage at the dorsal T platform starting at the rhinion (the base of the triangle), in between the septum and the thickest aspect of the ULC, going caudally till necessary (the apex of the triangle). The three components, the two ULC and septum, are brought together achieving the ideal width. The suture described above can be applied now if necessary. In other

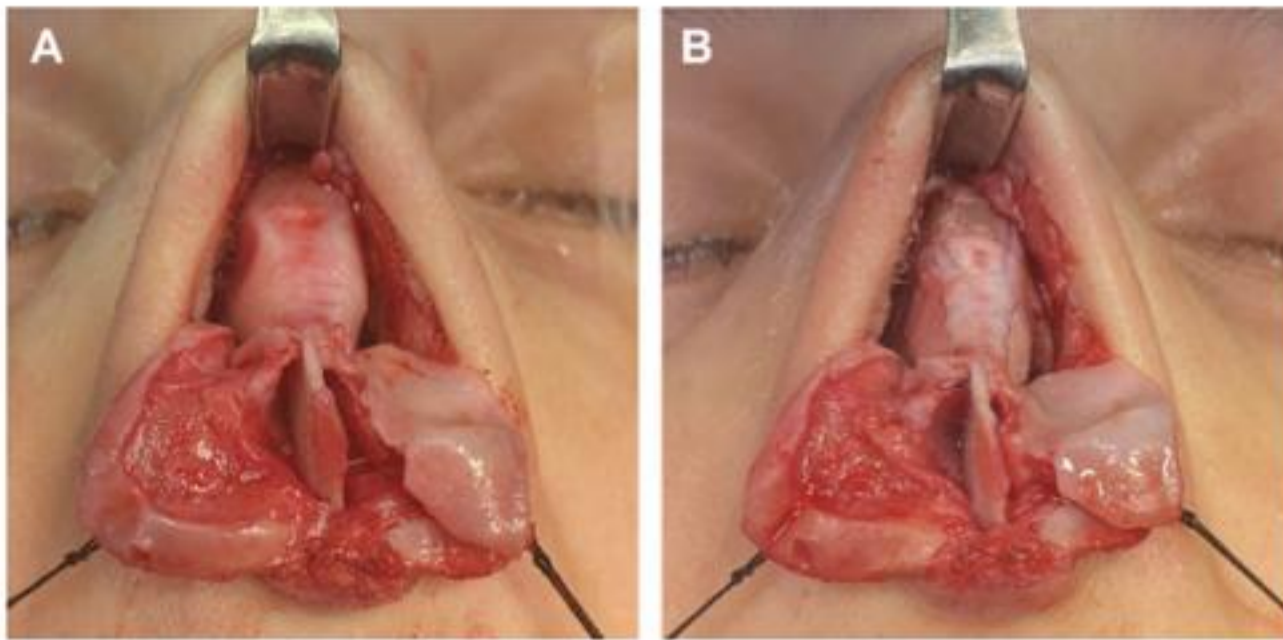


Fig. 6. (A) Wide and irregular middle third; (B) continuous mattress sutures; note the trimming of the ULC edges next to the rhinion area: also new DAL were created with piezo (note the green-stick osteotomy in both sides) and shaved with a cylindrical burr.

cases, trimming the edge of the ULC close to the rhinion may prevent cartilage irregularities (**Fig. 6**). The use of monopolar cautery can also be an interesting option to control these edges. Moreover, its use can reduce some convexity of the ULC lateral wall and still allow to sculpt new cartilaginous DALs.

There are a few critical points to help avoiding drawbacks of the technique. The suture should be placed as more anterior as possible, close to the T platform (see **Fig. 5C**), where the ULC are thicker to avoid collapse of the middle third lateral wall and eventual consequent breathing problems, what can happen if the suture is performed in a more posterior position.

Also, the suture should save a free segment next to the nasal bones to avoid excessive narrowing of the middle third next to the rhinion, which can lead to an apparent pyriform aperture and a consequent inverted V aspect. In addition, the suture should be tightened according to the desired dorsal lines. Too tight or too loose may produce non-ideal esthetic lines. Based on that, in some cases is preferable to use single sutures.

In some cases, only one ULC is bulging, specifically if we are dealing with a crooked nose. A single unilateral suture can be placed using the same concept. The knot can be buried in the depression found in between the septum and upper lateral; it is interestingly well disguised in this area.

Precision Pyramid Sculpting

The precision structure rhinoplasty concepts referring to the use of power instruments to refine the nasal pyramid may play a relevant role to deliver

precise a designed dorsum, esthetic dorsal lines, and smooth lateral walls in PR.

Both ultrasonic devices (the piezo) and burrs may be used to shave the dorsum. Even rasps can smooth some bony dorsum details. We use mainly diamond cylindrical burrs to correct irregular areas while removing the hump and reducing the lateral walls. As demonstrated by Emre Ilhan, the cylindrical burr because of its larger contact area compared with the spherical burr creates a smoother bony surface with less probability to produce grooves or irregularities. Even regarding the piezo scraper, the cylindrical burr shows this advantage.

Reshaping dorsal residual humps

It is common to see after the impaction and splaying maneuvers a residual bony hump, mainly in an S-shape bony dorsum.¹⁷ There has been this discussion regarding indications and algorithms to address kyphotic noses and S-shape bony vaults seen as relative contraindications for foundation techniques. In fact, in most of our cases after our foundation maneuver, we do surface procedures with the burrs being a main character. The residual bony hump created by the S-shape bone is sculpt till the desired level. In some cases, even the cartilaginous vault has some irregularities and some convexity. Even if we need to have in mind not to disrupt the dorsal K-area, this connection is of great stability and we have been pushed it to the limit without ever seen any disruption. This maneuver allows till 2 mm at both bony pyramid and cartilaginous pyramid reduction, which allows a great control and precision of the profile line after the impaction technique. The burr has again a great advantage over the piezo when addressing the

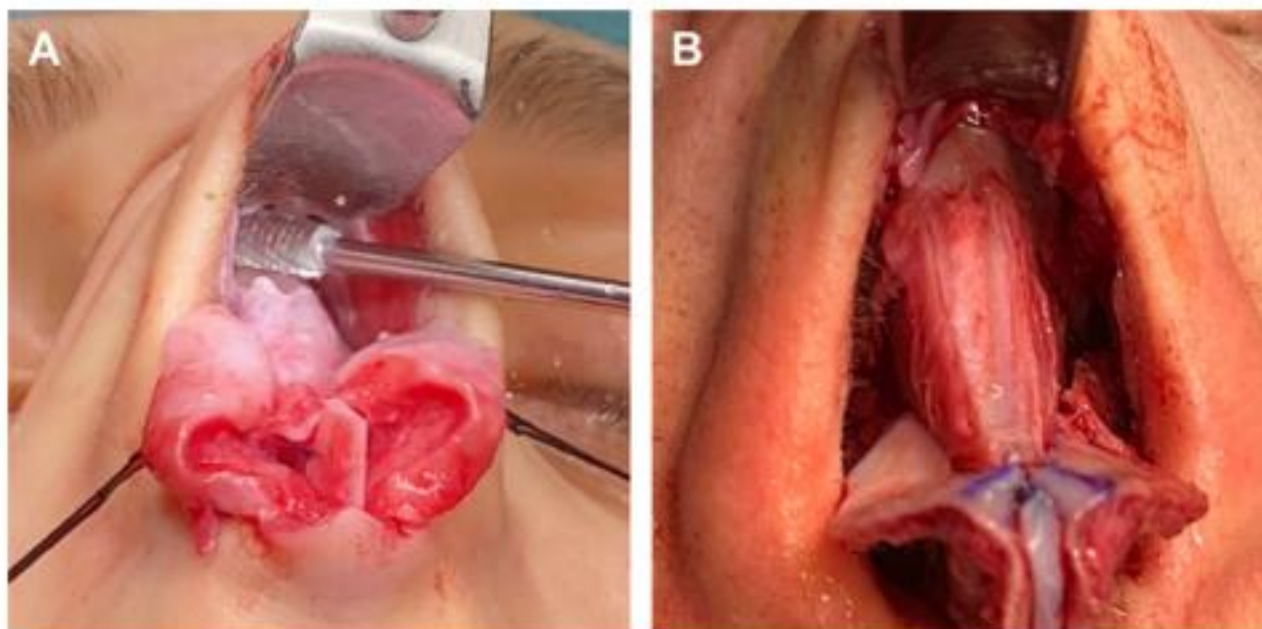


Fig. 7. (A) The cylindrical burrs flatten and smooth the dorsal platform; (B) the ULC perichondrium was partially drilled showing the ULC cartilaginous shoulders; this maneuver can deproject the cartilaginous dorsum till 2 mm.

cartilage. Piezo does not have the ability to modify cartilage, whereas the cylindrical burr can effectively shave perichondrium and cartilage (**Fig. 7**)

Sculpting the lateral wall

The lateral wall can be also sculpted. It is common to see some bulging of the lateral wall at the nasofacial groove. This bulging may be completely or partially corrected by the let-down wedge resection, when some building remains the burr can be used to smooth its convexity. In deviated noses, PR can be real powerful bringing the pyramid to the midline. However, in many cases, the lateral walls remain asymmetric, with convexities or concavities, which can be corrected with the use of power instruments.^{18,19} Both walls can be shaved till the inner cortical of the lateral is observed as a gray granite look. This paper-thin bone can be remodeled by digital compression, a powerful tool to control bony convexities (**Fig. 8**).

The nasofacial groove is also addressed. In many occasions, after the basal osteotomies, some steps can be felt at this point. The use of the burr smooths the basal edge of the osteotomy, creating a gentle transition to the face and helping in reducing the width of the nasal base (**Fig. 9**).

The width is defined, and a new DAL is designed. Its continuity with the cartilaginous vault may be also shaved. In some cases, the shaving limit is reached, leaving only an eggshell thickness of lateral bone but still with some undesired dorsal width. In these cases, we may consider DAL osteotomies.

Defining dorsal esthetic lines osteotomies

In wider bony vaults, the reshape of the DALs can also be achieved with power instruments,²⁰ performing DAL osteotomies that should be placed

immediately lateral to where we would like to see the new DAL, so the dorsal platform has the adequate width and continues smoothly with the cartilaginous vault. This is the main goal of our approach in dorsal PR to preserve the dorsum in between the (new) DAL leaving the main trauma (that necessarily exists) to the lateral wall where really few complications must be seen and almost never irregularities are palpated. These DAL osteotomies should not traverse the entire thickness of the bone, but rather create a groove along the fracture line allowing for a greenstick fracture that aids in the stability of the lateral bone wall. Because after the let-down maneuver the nasal pyramid has some instability, here the use of piezo is for sure of a high value by creating a precise cut. Sometimes by fragilizing this area with the burr, the bone becomes paper thin as already mentioned and the lateral wall fractures in at the defined DAL (see **Fig. 8** and **Fig. 10**). Thus, we defined precisely the width of the dorsal platform, control the surface of the lateral wall and fracture it in to narrow the bony nasal base. With these technical possibilities, the contraindication for PR is at least only a partial contraindication if any.

Grafting the Middle Third

It is commonly seen, especially in deviated pyramids, that the middle third may show asymmetric ULC with eventual concavity of their outer surface. Like in structure rhinoplasty, some grafts can be placed to help solving these problems. In crooked noses, the ULC contralateral to the deviation is often observed concave. On many occasions, when the pyramid is centered in the midline and the septum is straight, this concavity solves naturally. In other occasions, the concavity remains

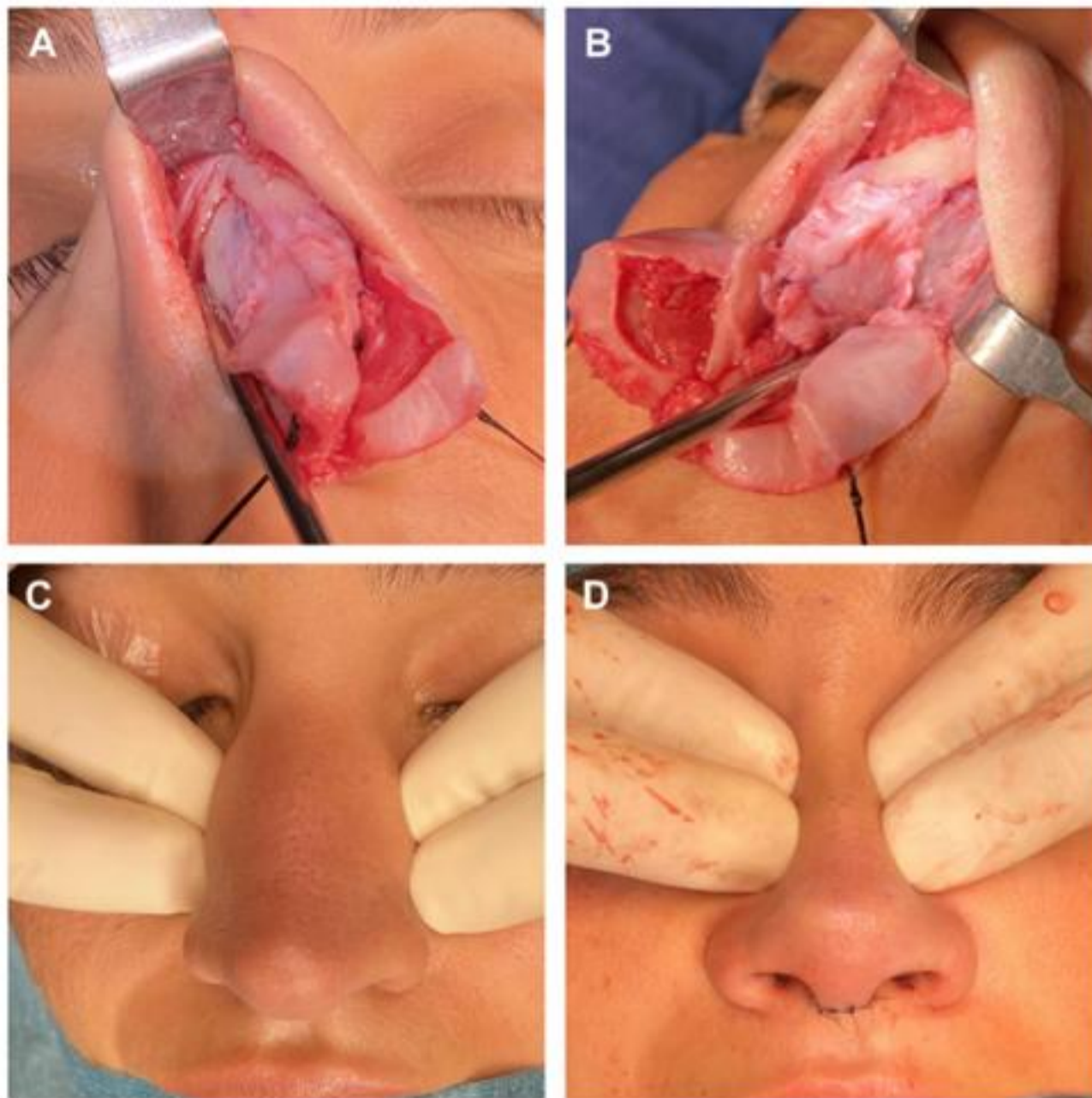


Fig. 8. (A) and (B) In this case, the lateral bony wall was shaved till a gray granite look is observed; the bone is paper-thin in some regions. The width of the dorsal platform was reduced to the ideal measurement creating a new DAL; the piezo helped creating a green-stick fracture; a continuous mattress sutures was place at the cartilaginous vault; (C) pre-op dorsal width; (D) immediate post-op width.

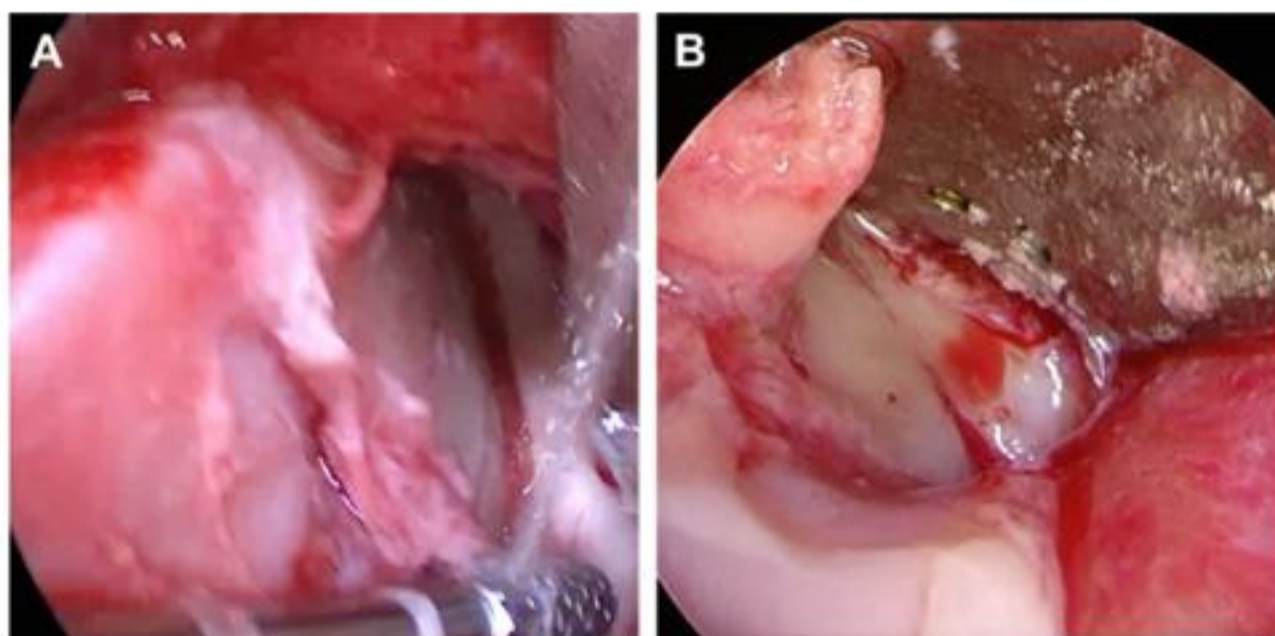


Fig. 9. (A) Left lateral nasal wall, where it is visible the gap left by the let-down technique. The edge of the basal osteotomy border is sharp. Even if the osteotomy is very low at the nasofacial groove it can eventually be palpated; (B) after smoothing the transition with the cylindrical burr.

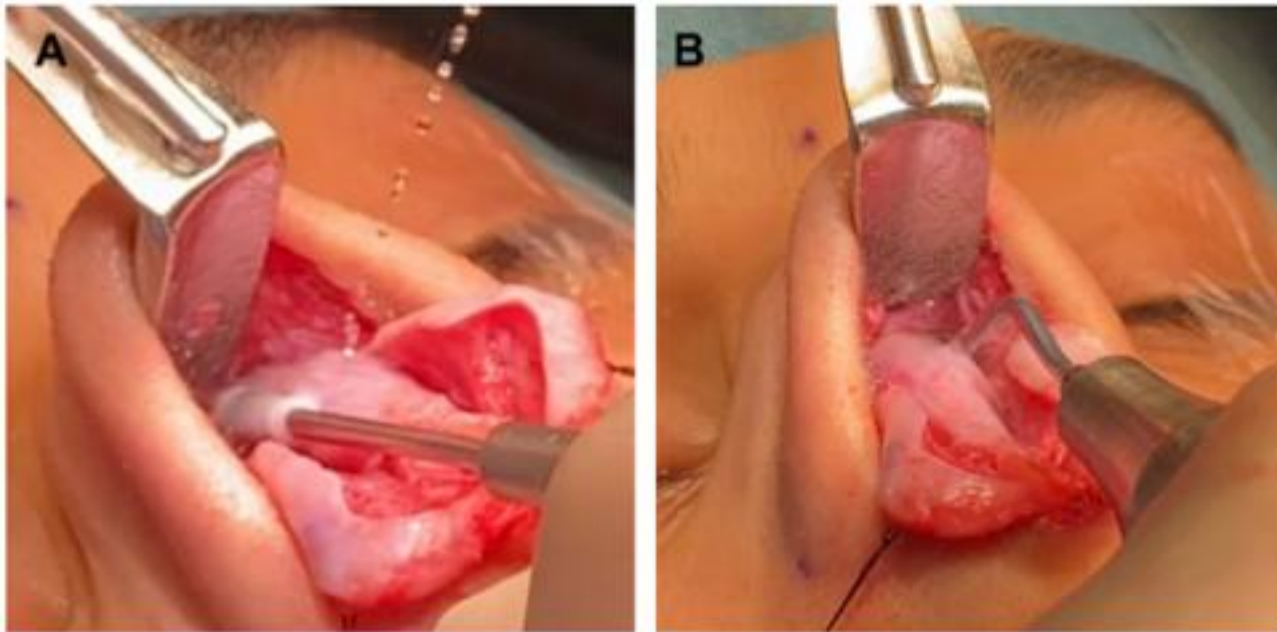


Fig. 10. (A) Reshaping the DAL with a drill; (B) defining the new DAL with a piezo.

with the need of correction to adjust the esthetic line and the lateral wall depression. For this, we have two options:

Use of spreader graft

A submucosal pocket can be defined to place the spreader graft in place to pop out the concave ULC; other option is to separate caudally the ULC from the septum and insert a spreader to define precisely the mid-wall DAL (Fig. 11).

Use of camouflage graft

In some cases, it is easier to use a camouflage graft that is made of cartilage, perichondrium, fascia, or other option. The graft should recreate the continuity of the DAL and/or give volume to the concave ULC. When this approach is chosen, attention to functional details of the mid-third is important.



Fig. 11. Left side spreader graft.

DISCUSSION

In 2018, the first author had the opportunity of sharing some surgical techniques concepts in a cadaveric laboratory with the coauthor Emre Ilhan. Precision rhinoplasty referring to the use of burrs in structure rhinoplasty produced a brainstorming that would definitely import new tools to PR that would change indications and quality of the results. Dorsal platform preservation and DAL design are a strategy that aims to achieve the best natural result without the need for reconstruction, avoiding eventual numerous problems that rebuilding the sectioned dorsum may eventually show during the long run.

However, as with dorsal structure surgery, preservation of the nasal dorsum can result in stigmata, characteristic of the technique, when not properly performed or without due care in detail, as already stated.

As any other surgical procedure or technique, PR has its own relative and absolute contraindications. It is also surgeon-dependent, what makes the approach variability truly wide. As an example, Yves Saban published his personal very well elaborated algorithm²¹ that does not overlap in many concepts our logic of approach. This range of options, personal indications, and variability of noses make this article of rhinoplasty really challenging.

In our series of PR in 2021 (see Table 1), we performed let-down technique in all patients and except four patients (3.5%) that presented marked deviated pyramids, and we performed a push-down maneuver in the ipsilateral wall of the deviation to tilt the pyramid to the contralateral side where a let-down created space and facilitates the movement, all the other patients had a bilateral let-down.

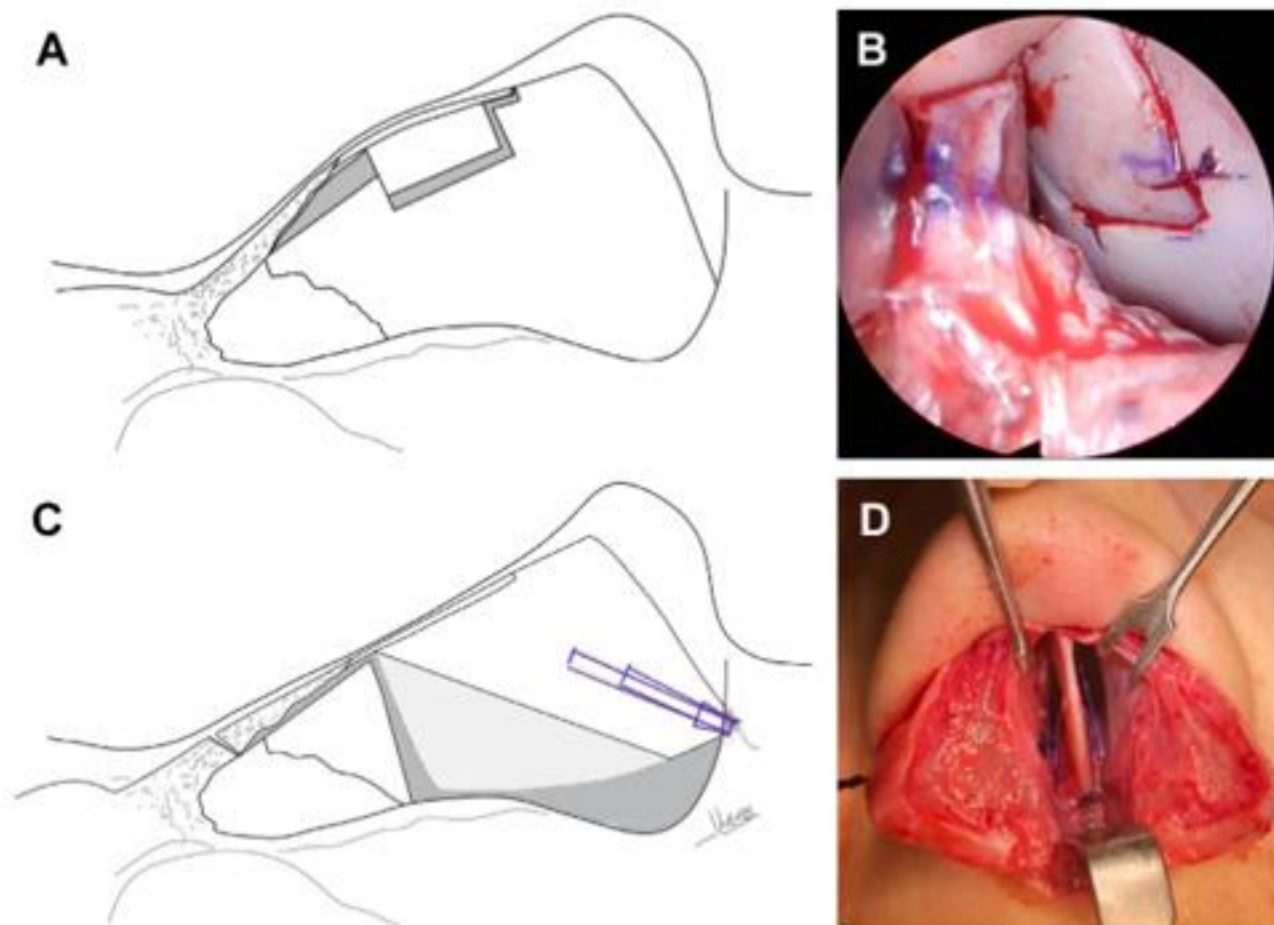


Fig. 12. (A) and (B) High-strip with Tetrís cartilaginous flap; (C) and (D) low-strip with cable sutures (mirror sutures).

Only in two patients that presented a high straight dorsum we did not disarticulate the LKA. In 98.5% of the cases, it was performed to promote effectively the splaying effect in between the upper third and middle third lateral walls.

As mentioned, we base our work in foundation techniques being the high strip with a cartilaginous flap (the Tetrís block) (Fig. 12A, Video 1) and the low strip our choices when adopting PR. We performed 78 Tetrís flaps (59.5%) with its variations, our favorite choice whenever possible because

of the stabilization and definition of the position of the pyramidal segments over a stable basal septum, and 53 low-strip approaches (40.5%) (Fig. 12C) always a choice in more severe pyramid or septal deviations where the Tetrís flap technique may limit the capacity of correction. To increase the stability of our free low-strip flap, we perform a sub-laminar (supra-perichondral) (Fig. 13) nasal septum dissection to increase the resistance to the cheese-wired effect produced by the sutures settled to the anterior nasal spine

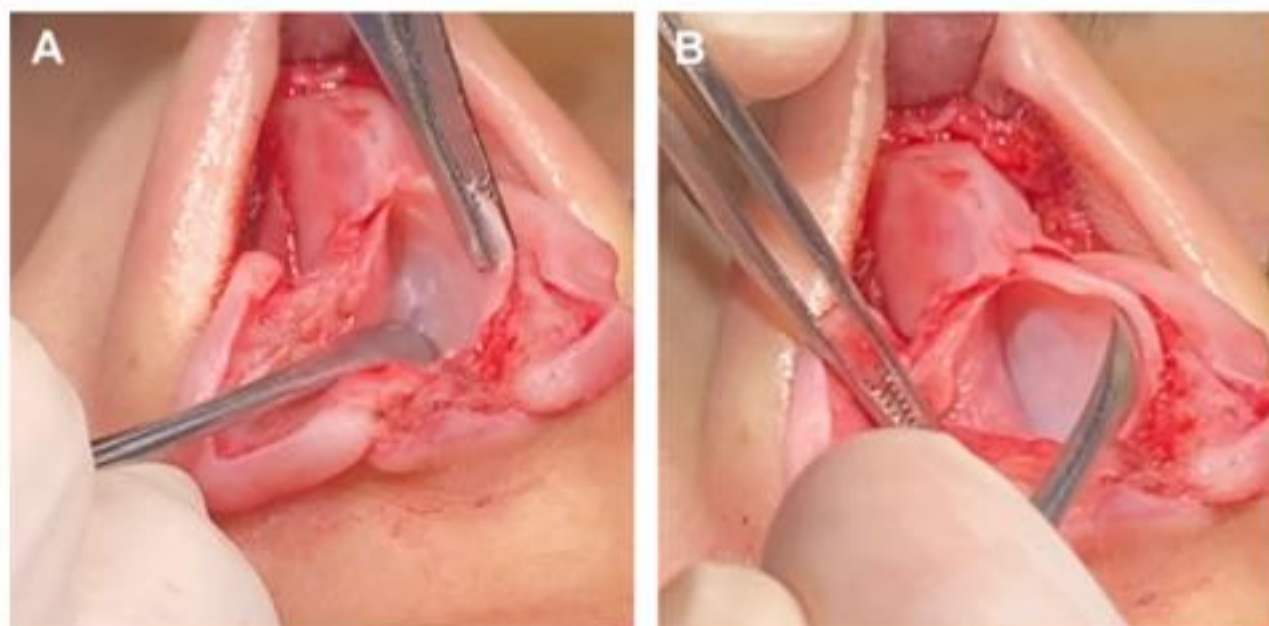


Fig. 13. Sub-laminar nasal septum dissection. (A) The perichondrium over the septum is observable as well as the dissection plane elevation the lamina propria; (B) the bloodless fields shows clearly the perichondrium and the lamina propria.



Fig. 14. Refining the cartilaginous surface with a cylindrical burr.

(ANS). The increase of resistance is dramatic (Video 2). To add another level of pyramid position accuracy, we block the septal wall using cable sutures that are placed in both sides of the ANS (mirror sutures when symmetric) that stabilize in a 3D perspective and oblique cables oriented from the ANS to the rhinion that following the counterbalance force concept developed in the subdorsal Tetris will stabilize effectively the rhinion position (see Fig. 12C, D).

We start our dissection of the lateral nasal wall after elevating the scroll complex sparing at this moment the midline dorsal platform. However, because what really matters is the finesse of the result in 87.2% of the patients we decided to perform other additional direct maneuvers and elevated the dorsal soft tissues as well. Yet, avoidance of the radix was the rule. Only in 11 cases (8.4%) it was exposed, to sculpt it with burrs in seven cases and to place a radix graft in eight cases, two of which were to correct an iatrogenic step-down deformity.

The use of power instruments and specifically the use of burrs have changed considerably the indications for PR. In our casuistic, we used the burr to flatten a still convex bony vault in 94 cases (71.6%). It shows that if this area is not addressed in a high percentage of patients, we will contraindicate foundation PR in some cases (like kyphotic noses) or will end up with residual bony humps or irregularities. The cartilaginous pyramid was also shaved to a more refined profile line in more than half of the patients (76 patients, 58%) what shows how this segment can be more convex than we eventually value and proves the effectiveness of the burr working in cartilage (see Fig. 7B; Fig. 14).

Based on the review of the literature, a wide nasal pyramid is one of the most important contraindications for dorsal preservation surgery. Moreover, it was previously emphasized that this



Fig. 15. Pre op (A,C,E,F), Post op (B,D,F,H).



Fig. 16. Pre op (A,C,E,F), Post op (B,D,F,H).

technique could be performed in patients with a wish to widen the vault. However, we show strategies that can avoid widening of the middle vault and even more can make them narrower without disruption of its stability. Understanding the cartilaginous blocking points is paramount. Free the posterior and caudal borders of the ULCs and disarticulate it from the bone at the LKA allows the middle vault to rotate anterior and caudal and assume its new position without distortion. Nevertheless, in some cases, we started from an already wide or irregular dorsum that depends mostly in the ULCs flare. In those cases, dorsal cartilaginous platform sutures can correct this deformity. Bilateral mattress sutures (27 patients) and unilateral sutures (6 patients) were used effectively in one-quarter of the patients. More rarely some cartilage trimming was done specifically around the rhinion area, as we prefer to use the burrs in cartilage irregularities. Other option is to use a monopolar cautery burning the prominent cartilage which leaves no depression or irregularity. In asymmetric pyramids, in a clear association with the low-strip approach, a control of the cartilaginous DAL was achieved by using a unilateral spreader graft or a camouflage graft (17 patients both).

Probably the most exciting tool that we add to the bony dorsum control is the definition of new DAL following the principle that we preserve the nasal dorsal platform and transfer the work to the nasal lateral wall. Therefore, we frequently work

on the lateral wall with burrs to define the surface and to smooth the nasofacial groove (90% of the cases). These two surfaces, lateral wall and bony vault, are now starting to define the DAL. This DAL can be shifted to a more central position (narrowing the dorsum) by thinning the bone with burrs that may eventually provoke a paper-thin bone that fractures-in (we performed it half of our patients) or by designing it using a piezo, which also creates a green-stick in-fracture (16.8%). These power instruments can design with great precision the width of the dorsum, the drawing of the DAL, the position of the lateral wall, and the smoothness of the nasofacial groove.

It is another perspective of foundation PR that allows us to control the width of the nasal pyramid, preserving the dorsal platform and designing precisely where the DAL ideally will be seen, conditions that focus our patients' concerns, observing a precise $\frac{3}{4}$ view and palpating a smooth dorsum with no transition areas or surface interruptions. Strategically, a great amount of the surface work is transferred to the lateral wall where it is very difficult to point relevant problems.

CLINICAL CASES

Case Study 1

Dorsal PR work: let-down technique and LKA disarticulation; right side overlap lateral Tetrus flap; lateral wall sculpted with 5 mm cylindrical

burr; DAL refined by piezo, green-stick osteotomy; continuous mattress suture at the cartilaginous platform, 5.0 PDS (Fig. 15A–H).

Case Study 2

Dorsal PR work: let-down technique and LKA disarticulation; septal subdorsal Tetrís flap; lateral wall and bony dorsum sculpted with 5 mm cylindrical burr; cartilaginous continuous mattress suture, 5.0 PDS (Fig. 16A–H).

SUMMARY

The dorsal preservation surgery, which has been popular in recent years, is increasing its magic. Despite its reputation, the drawbacks of this technique should not be ignored. To avoid the nasal pyramid widening and irregularities and achieve precise DAL in PR, we need to consider additional maneuvers apart from impacting and splaying. Following this principle in a considerable number of our patients, we end up performing surface procedures, additional osteotomies as DAL osteotomies, sutures, and grafts to the mid-third. It leads to the question: what are we really preserving? The answer guided the logic of this article: the nasal dorsal platform continuity with precisely defined DAL.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at <https://doi.org/10.1016/j.fsc.2022.08.011>.

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