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The New Domes Technique and Its Relation to Nasal Tip Rotation, Projection and Nasal Length- A Cadaveric Study

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Abstract

Objectives: To describe in an anatomical cadaveric model the changes introduced by the "New Domes" technique on nasal tip positioning; allowing the surgeon to predict postoperative rotation, projection and length.

Design: Cadaveric study at the experimental surgery laboratory of the Instituto Nacional de Medicina Legal, using 20 specimens.

Intervention: New domes technique, lateralizing the dome 3, 4, 5 or 6 mm, through a closed rhinoplasty approach.

Main outcome: Direct measurement of nasal tip projection, rotation and nasal length using a ruler and a protractor.

Results: The New Domes technique increases tip rotation in a controlled manner, 3 degrees for each millimeter of lateralization and decreases nasal length approximately 1 millimeter for each millimeter of lateralization. Maneuvers above 4 mm of lateralization showed predominantly rotation improvement with a decrease on projection efficiency.

Conclusion: Changing the lower lateral cartilage distribution by modifying dome location, the New Domes technique allows the surgeon to predict postoperative nasal tip positioning.

Keywords: Nasal tip; Rotation; Projection; Nasal length; New domes; Rhinoplasty techniques

Introduction

Nasal tip surgery is considered the most interesting and difficult part of rhinoplasty. It is the central structure of the face and requires a detailed presurgical analysis to help the surgeon determine the patient's nasal anatomy and the precise changes that should be performed surgically. Several techniques to modify nasal tip rotation and projection have been published, some of them aggressive and disruptive to supporting mechanisms. There are few anatomical studies that describe how to achieve predictable aesthetic results on nasal tip surgery. We have conducted a cadaveric dissection study to objectively evaluate Dr. Pedroza´s [1] New Domes technique, developed in 1979 and published on 2002. The new domes technique, is performed through a closed rhinoplasty delivery approach and places the domes more lateral to the patient's own domes using transdomal sutures, allowing the surgeon to rotate and project the nasal tip in a stable, conservative and predictable manner.

To further explain the dynamics of these techniques, Anderson proposed a very useful concept of a structural tripod. 2 limbs are the lateral crura, the third limb are the two conjoined medial crura, and at the apex of the tripod are the nasal domes. The tripod concept explains the New Domes technique very well because the lateralization of the domes causes a decrease of the lateral limbs and an increase of the medial feet, rotating the nasal tip [2]. Studies based on preop and postop photographs may lack accuracy and computer models have no clinical applicability. In Moubayed´s [3] study the skin was not redraped, studying the effect on the cartilage but eliminating from the results the effect of the patient´s skin. Our strength relies on direct cadaveric

measurements and the additional clinical value of including the envelope in these measurements.

Materials and Methods

We conducted a cadaveric dissection study at the experimental surgical laboratory of the Instituto Nacional de Medicina Legal located in Bogota, D.C. Colombia. Twenty cadaveric specimens were selected, consent provided at the Instituto Nacional de Medicina Legal for postmortem research. Inclusion criteria were: Adults between 20 to 60 years old, unformalized and dead for less than 36 hours. Specimens with traumatic nasal deformity or previous nasal surgery were excluded. The New Domes technique was performed through a closed rhinoplasty approach. Pre and postcartilaginous incisions were made at the caudal and cephalic border of the lower lateral cartilages as previously described by the senior author [1,4]. Using sharp scissors, the alar cartilage was dissected, creating a bipedicled chondrocutaneous alar flap with only their feet remaining connected to the underlying tissues. Alar cartilages are almost totally released, except for the vestibular skin that remains attached to the undersurface of the cartilage.

We measure the width of the cartilage at the level planned for the new dome and perform a conservative cephalic trim, leaving at least 5 mm width at the new dome level and 7 mm at the lateral crus, without extending the resection to its posterior half. New dome position was placed at 3, 4, 5 or 6 mm from the tip defining points bilaterally. With the cephalic cartilage resected, and the distance between the patient´s own dome and the new dome marked, we place a double transfixion suture just below the new dome (Polyglactin - Vicryl 5,0, Ethicon, Somerville, NJ). The tension of the transfixion suture must be controlled without tightening the suture so much that the lateral and the medial sides of the domal cartilage come together. This maintains the natural arch of the cartilage at the level of the new dome.

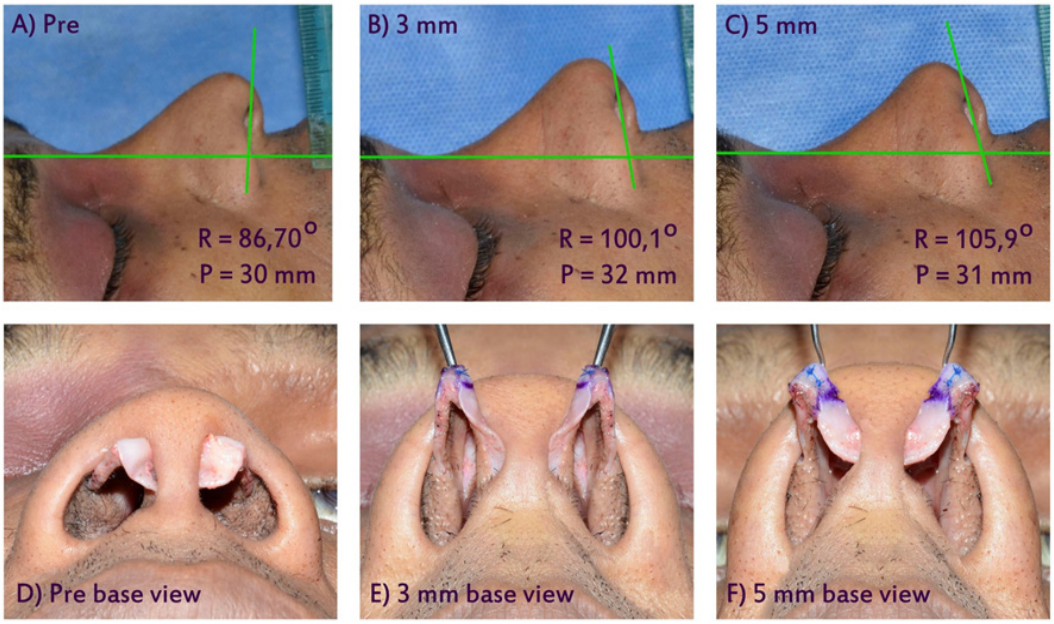

Figure 1: Measurement of rotation and projection. Lateral views A-C a) Preoperative b) 3 mm Postoperative. c) 5 mm Postoperative. Base views D-F. d) Preoperative. e) 3 mm Postoperative. f) 5 mm Postoperative.

Interdomal ligaments were replaced using two single sutures, the first one was placed one millimeter medial to the cephalic border of the new dome and the second one was placed five millimeters medial to the caudal border of the new dome. Nasal tip rotation was analyzed in vivo by assessing the nasolabial angle, which is formed between a straight line crossing through the most anterior and posterior points of the nostril and a vertical line through the radix, perpendicular to Frankfurt´s plane. Nasal tip projection was measured parallel to Frankfurt's plane, from the alar-cheek junction to the tip of the nose. Nasal length was measured from nasal tip to radix (Figure 1).

Results

Twenty cadaveric specimens were dissected. 17/20 was men (85%) while 3/20 were female (15%). Ages oscillated between 20 and 60 years, with an average of 35 years. On eleven specimens (55%) the "New Domes" were marked 3 millimeters lateral to the original dome. On 5 specimens (25%) a 4 millimeter lateralization was performed. A 5 millimeter maneuver was required on 3 specimens (15%) and a 6 millimeter maneuver was selected for one specimen (5%). The average tip rotation preoperatively was 89,65 degrees (8,8 SD) with a 90 degree median. Postoperatively average tip rotation increased to 99,95 degrees (7,78 SD) with a 100 degree median. Tip rotation

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increase was statistically significant (p=0,004). A 9 degree increase on nasal tip rotation was found for 3 mm lateralization maneuvers; 10.4, 13,3 and 16 degrees of rotation were achieved with 4, 5 and 6 mm lateralization maneuvers respectively. Corresponding to a nasolabial angle increased between 2,67 and 3 degrees for each millimeter of lateralization.

Measurement of nasal tip projection preoperatively was 29,4 mm (2,76 SD) with a median of 29 mm. Postoperatively nasal tip projection increased to 32 mm (SD 2,64) with a 32 mm median. A Statistically significant increase on nasal tip projection was encountered (p=0,02). A 2,45 mm increase on nasal tip projection was found for 3 mm lateralization maneuvers; 3,4 millimeters of projection were gained with 4 mm of lateralization. For 5 and 6 millimeter lateralization maneuvers increase in projection was below 2 mm. Hence, placing the new domes three and four millimeters lateral to the original domes increase projection between 0,82 and 0,85 mm for each millimeter lateralized. But, 5 or 6 millimeter maneuvers have a predominantly rotational effect and only achieve a projection increase of 0,33 to 0,4 mm for each millimeter lateralized.

The average nasal length preoperatively was 45,7 mm (SD 3,03) with a 46,5 mm median. Postoperatively nasal length decreased to 42,4 mm (SD 2,01) with a 43 mm median. A median test showed nasal shortening had been statistically significant (p=0,01). A 3,64 mm decrease in nasal length was found for 3 mm lateralization maneuvers; 4, 5,33 and 6 millimeters of shortening were achieved with 4, 5 and 6 mm lateralization maneuvers respectively. Which corresponds to a decrease of 1 to 1,21 mm in length for each 1 mm of lateralization of the domes (Figure 2).

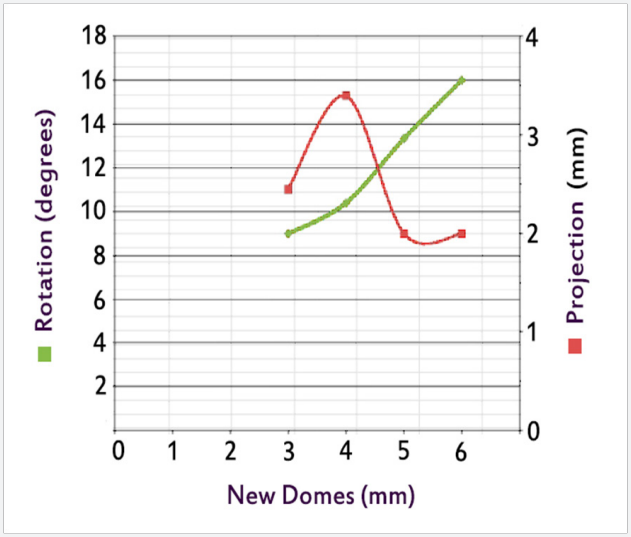

Figure 2: The new domes technique and its relation to rotation and projection. There is a proportional relationship between dome lateralization and nasal tip rotation and projection, however, for 5 and 6 mm lateralization maneuvers there is a decrease in projection effectiveness, dropping from 80 percent to 30-40% for each millimeter of lateralization.

Discussion

The prediction of nasal tip position in terms of rotation, projection and length is a major challenge in rhinoplasty4. Studies based on preop and postop photographs may lack accuracy and computer models have no clinical applicability. In Moubayed´s study the skin was not redraped, studying the effect of the manipulations only on the cartilage, underestimating the importance of the overlying skin. Our strength relies on direct cadaveric measurements and the additional clinical value of including the envelope in these measurements. The new domes technique redistributes the lower lateral cartilage by moving the dome position to a more lateral location, which creates a shorter lateral crus and a longer medial crus increasing nasal tip rotation and projection. There is a proportional relationship between dome lateralization and nasal tip rotation and projection, however, for 5 and 6 mm lateralization maneuvers there is a decrease in projection effectiveness, dropping from 80 percent to 30-40% for each millimeter of lateralization (Figure 2).

Patrocinio [5], evaluated immediate and late postoperative results on 20 consecutive patients in which a 4.2 mm (on average) lateral crural steal (LCS) maneuver was performed, with the addition of a columellar strut. There was a statistically significant increase of nasal tip rotation and a decrease in nasal length. Nasal tip projection increase showed no statistical significance between preop and immediate postop (p=0,09). Hence, when there is a need to substantially increase nasal projection, other maneuvers must be added, such as placement of tip grafts, usually a cap or a shield graft or even a lateral crural auto-strut (6). Ghazipoour [6] (7) demonstrated an increase in nasal projection using the lateral crural steal if vestibular skin was released.

Our study did show a direct relationship between lateral positioning of the domes and tip projection. Placing the new domes three and four millimeters lateral to the original domes increase projection between 0,82 and 0,85 mm for each millimeter lateralized. But, 5 or 6 millimeter maneuvers only achieve an increase between 0,33 and 0,4 mm for each millimeter lateralized. We believe for 5 and 6 mm maneuvers the lateral crural shortening effect is more important, making rotation predominate over projection. Decreased nasal length is also achieved with the New Domes technique, with a 1:1 relationship between millimeters lateralized and nasal length decrease [7,8].

Kridel and Konior (7) described the lateral crural overlay (LCO) technique that achieves a larger increase in nasal tip rotation while reducing tip projection. Hence, LCS is more suitable for patients who have underrotation associated with poor projection; and, LCO is indicated in patients who have severe underrotation associated with overprojection. The new domes technique redistributes the lower lateral cartilage by moving the dome position to a more lateral location, using sutures only. It avoids using vertical cartilage division, which can

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cause alar pinching and inspiratory alar collapse, especially in patients with very thin skin.

We have used the new domes technique on more than 6000 patients over 35 years and found it a precise and natural method to achieve increased projection and rotation of the nasal tip. A columellar strut can improve the strength of the medial crura and a columellar-septal fixation suture can help maintain or even increase nasal tip projection. We have not found any alar retraction or pinching, nor has there been alar inspiratory collapse because we preserve the continuity of the alar cartilage.

Conclusion

Our novel cadaveric study has objectively shown the relationship that exists between the New Domes technique, nasal tip rotation, projection and nasal length. Lateralizing the domes decreases nasal length and increases rotation and projection. Above 4 millimeters of lateralization, the effect of shortening of the lateral crura predominates and translates mostly into rotation with decreased projection effectiveness. Objective measurements on how to control nasal tip position with Dr. Pedroza´s New Domes technique were achieved during this study and are essential for preoperative planning, intraoperative management of tip cartilages and we hope will be the grounds for new research on nasal surgery.

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