

# Dome Division: A Viable Technique Today?

Armando Bocchieri, MD<sup>1</sup> Sebastiano Sciuto, MD<sup>1</sup> Valerio Cervelli, MD<sup>2</sup> Michele Pascali, MD, PhD<sup>2</sup>

<sup>1</sup> Department of Facial Plastic Surgery, “Nostra Signora della Mercede” Hospital, Rome, Italy

<sup>2</sup> Department of Plastic and Reconstructive Surgery, University of Rome “Tor Vergata,” Rome, Italy

Address for correspondence Michele Pascali, MD, PhD, Department of Plastic and Reconstructive Surgery, University of Rome “Tor Vergata,” Viale Oxford 81, 00133 Rome, Italy (e-mail: mic.pascali@gmail.com).

Facial Plast Surg 2016;32:664–670.

## Abstract

Dome division can still be regarded as a valid surgical procedure today in some particular cases of revision rhinoplasty where the scarring is so extensive as to make precise isolation of the alar cartilages impossible. The presence of asymmetry of the nasal tip, a recurrent feature in the results of rhinoplasty, constitutes the primary indication, as division makes it immediately possible to restore balance between the two domes in such cases. The technique also proves useful in cases of overprojection of the tip as a result of rhinoplasty. Moreover, the procedure has been improved by precise suturing of the cartilaginous stumps so as to avoid its frequently reported complications, arising essentially from the vulnerability of the domal arch to the distorting forces of cicatricial retraction and its resulting lack of stability over time. In this connection, the authors attach crucial importance to direct suturing of the cartilaginous stumps in accordance with a now standardized method that is easy to execute and offers lasting, stable results. This approach makes it possible to re-establish continuity of the cartilaginous domal arch in a form unquestionably closer to the physiological anatomical conformation.

## Keywords

- ▶ dome division
- ▶ revision rhinoplasty
- ▶ nasal tip asymmetry

Vertical dome division is a powerful tool of nasal tip refinement.<sup>1</sup> Put forward for the first time in 1957 by Goldman<sup>2</sup> and since developed with various modifications over the years, the technique was initially greeted with great enthusiasm followed by numerous criticisms and bitter controversy.

The crucial point of discussion is essentially the long-term emergence of unforeseeable consequences as a result of the considerable structural weakening of the alar cartilage.<sup>3–5</sup>

The healing process leads in many cases to disruption of the alar cartilages, no longer joined in a single continuous arch capable of withstanding the deforming pressures active during cicatrization. The resulting collapse of the cartilaginous support generates typical irregularities of the nasal tip, which are particularly evident in patients with thin skin.<sup>3</sup> These include pinching of the lower third, alar notching, and a characteristically pointed or “tent pole” nasal tip.<sup>6–8</sup>

At the same time, brief examination of the literature as regard the modifications made to Goldman’s original technique lead to just one conclusion, namely, that the essential factor in reducing the incidence of its postoperative complications is reconstruction of the normal alar cartilaginous

anatomy.<sup>3</sup> With this in mind, various authors have put forward techniques designed to restore a certain degree of continuity to the domal structure. Examples include the modifications introduced over the years by Ponti<sup>9</sup> and Simons and Greene,<sup>10</sup> which leave the vestibular skin beneath the cartilaginous arch intact, and Adamson<sup>3,11,12</sup> and Kridel and Konior,<sup>13</sup> which seek to restore the continuity of the arch.

In revision rhinoplasty where a greater or lesser degree of structural disruption is often already present, it is still more necessary to preserve or reconstruct anatomical continuity of the domal complex so as to ensure a more stable result over time.

This article seeks to establish whether a precise indication for dome division exists in certain cases of revision rhinoplasty and the technical methods best able to avoid the drawbacks often associated with the original technique.

## Materials and Methods

A retrospective study was performed on 70 patients operated on between January 2012 and January 2014. These were selected via a search of a computerized rhinoplasty database containing

information regarding patient demographics, preoperative analysis, operative techniques, postoperative results, and complications. The database was used to extract a subset population subjected to vertical dome division for which follow-up data for 1 year or more after surgery was available.

Medical records and photographs were also analyzed in this review of results and complications.

Of the sample, 41 patients were female and 29 male. The average age was 47 years. Forty-five patients (64.3%) were secondary rhinoplasties, 19 (27.1%) tertiary rhinoplasties, and 6 (8.6%) quaternary rhinoplasties.

The technique of dome division was indicated in cases of residual overprojection combined with marked asymmetry of the nasal tip (► **Fig. 1**). Of the 70 patients, 41 had thin skin, 17 skin of medium thickness, and 12 thick skin.

The decision to employ the technique was based on careful preoperative analysis in 58 cases and on direct intraoperative examination of the alar cartilages in the remaining 12.

## Surgical Technique

The open approach was used to expose the cartilaginous nasal anatomy. In nearly all the cases, the alar cartilages were almost completely covered in scar tissue and hence very hard indeed to uncover and isolate. The deformities remaining after previous operations that involved other nasal structures were corrected where necessary. Lateral osteotomies were thus executed in 22 cases to correct an open roof and/or deviation of the upper third of the nasal pyramid, spreader grafts were inserted in 27 cases (16 unilateral and 11 bilateral) to correct deformations of the middle nasal vault (inverted V deformity and collapse of the internal nasal valve),



**Fig. 1** Intraoperative view showing marked asymmetry with overprojection of the nasal tip.

onlay grafts of auricular/septal cartilage were inserted in the dorsal region to correct residual saddle nose deformities in 19 cases, and alar batten grafts were used to correct failure of the external nasal valve in 43 cases.

The procedure of dome division first involves detachment of the vestibular skin from the surface of the alar cartilages above in correspondence of the domal arch for an area of approximately 7 to 10 mm. The next step is a mattress suture of 4/0 nylon through the lateral and medial crura or their residual stumps so as to ensure temporary solidarity. The medial crura are positioned symmetrically before resecting portions of the tip complex to reduce or even eliminate domal asymmetry in cases of lower lateral cartilage (LLC) malpositioning.

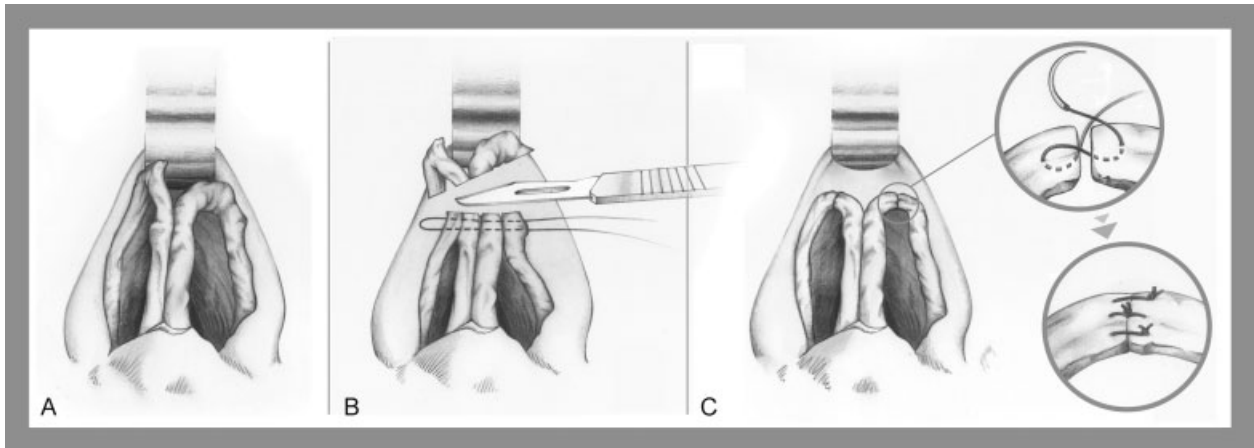
A scalpel with a number 11 blade is then used to detach all of the part above the suture and leave a perfectly symmetrical flat surface. It may prove useful at this point to reposition the cutaneous flap before proceeding with the following steps so as to have some idea of the relations among tip, supratip, and dorsum. The next stage involves restoring the continuity of the domal arch by first removing the suture in 5/0 nylon and performing a “figure-of-8” suture of 6/0 nylon through the center of both the lateral and medial crura. This suture, which constitutes an improvement on the simple realignment of the cartilaginous stumps, makes it possible to avoid any undesired overlapping of the edges in the postoperative period. Two more sutures of 6/0 nylon are made on either side caudally and cephalically with respect to the previous “figure-of-8” suture so as to obtain complete and stable continuity with perfect realignment of the medial and lateral crura (► **Figs. 2 and 3**). The use of nylon sutures in thin-skinned patients is highly controversial because of the potential for delayed foreign-body reaction, suture granuloma formation, and possible fistulization. Infralobular divergence of the medial crura is preserved to prevent lateral crural inversion and “unitip” lobular pinching.

A final check, with the cutaneous flap again lowered, proves extremely useful to decide whether it is necessary to attach a graft of crushed cartilage or auricular perichondrium (in cases where material is harvested from the concha). This additional procedure helps where necessary to smooth out any residual underlying irregularities and/or increase the projection of the nasal tip. However, when the domal arch reconstruction is well performed the use of Peck graft is rarely indicated; in this case series, it was used in only two cases, with extremely thin skin.

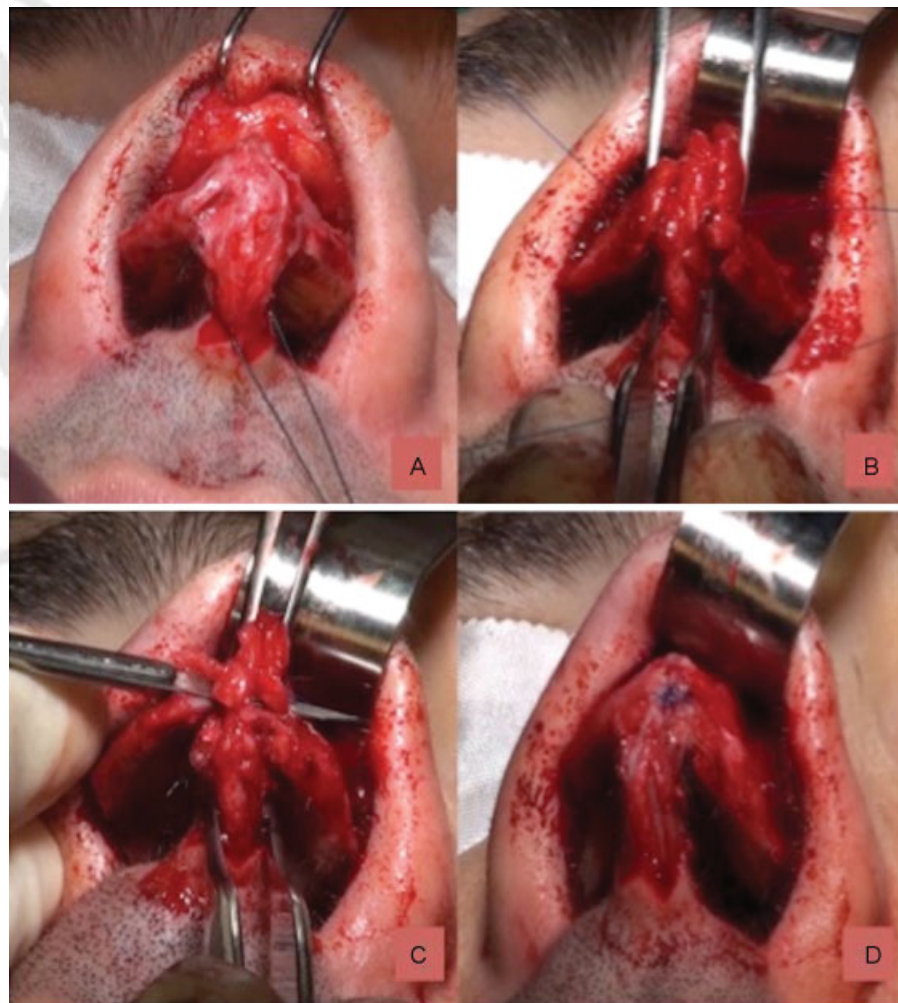
## Results

The criteria used to evaluate the results include patient satisfaction, physician evaluation and examination, and the comparison of preoperative and postoperative photographs of the patients by the authors and two other surgeons. The first method was a self-assessment obtained from patients through a questionnaire, which was submitted at last check performed after surgery (► **Table 1**). A second questionnaire was obtained from the family physicians (► **Table 2**).

The two questionnaires used are based on those described in a previous article published by the authors in 2010.<sup>14</sup> For each response was assigned a numerical score, from 1 to 3, to



**Fig. 2** Schematic diagram of the operative procedure: (A) exposure of the cartilaginous tip complex; (B) transdomal suture and excision of dome region; and (C) domal arch reconstruction, details of the figure-of-8 suture.



**Fig. 3** Intraoperative views of the patient shown in **Fig. 4**: (A) tip complex before correction showing previous dome division without suturing; it is presently marked asymmetry and overprojection; (B) transdomal suture; (C) excision of the dome region; and (D) suturing of the domal arch.

obtain a statistical validation. The results of patient questionnaire showed that 67 patients have given a score between 28 and 30 out of 30, and the remaining 3 patients have given 27 out of 30 as score. The mean score was 28.9. The second

questionnaire showed that 61 evaluations by physicians have rated between 22 and 24 of 24, and the remaining 9 between 20 and 21 out of 24. The mean score was 22.8. The last judgment was obtained by the operating team and by other

**Table 1** Patient questionnaire

Questionnaire for patients
1. Does the postoperative shape of the nose correspond on the whole to expectations?
Yes (3), More or less (2), No (1)
2. Would you describe the tip as symmetric after the operation?
Right (3), More or less (2), No (1)
3. Do you regard the shape and size of the nose as appropriate on frontal view?
Yes (3), More or less (2), No (1)
4. Would you describe the nose as natural in appearance after the operation?
Yes (3), More or less (2), No (1)
5. Would you describe the nose as in harmony with the rest of the face after the operation?
Yes (3), More or less (2), No (1)
6. Did you immediately feel at ease in interpersonal relations after the operation?
Yes (3), More or less (2), No (1)
7. Has the passing of time since the operation made any difference to the aesthetic result in your opinion?
No (3), More or less (2), Yes (1)
8. Do you see any need for retouching?
No (3), Perhaps (2), Yes (1)
9. How has your breathing been since the operation?
Better (3), The same (2), Worse (1)
10. How would you judge the final aesthetic result?
Good (3), Satisfactory (2), Unsatisfactory (1)

two surgeons, who worked in the same department. The latter were uninformed both on the aim of this study and on the surgical technique. All 70 patients were evaluated by examination of the full face frontal, lateral (right and left), oblique (45 degrees right and left), and basal views. The images were presented on PowerPoint slides (Microsoft Corp., Redmond, WA), with each case lasting 30 seconds.

The observers were asked to give a score from 1 to 4 to evaluate projection, rotation, and symmetry (see ► **Table 3**).

► **Table 4** shows the scores obtained from the six surgeons. Values are the mean of six independent judgments. Data are expressed as mean ± standard error of mean.

The follow-up varied from 12 to 28 months with an average of 18.6 months. As reported in ► **Table 5**, only five patients have a follow-up 1 year after surgery, significantly lowering the average.

In all the cases, long-term follow-up revealed results of lasting stability as regard the shape, projection, and symmetry of the nasal tip. Revision surgery was required for just 2 of the 70 patients (2.9%).

In one case, this was necessitated by the manifestation over time of underprojection of the tip probably due to

**Table 2** Questionnaire for patient's general practitioner

Questionnaire for patient's general practitioner
1. Does the postoperative shape of the nose correspond on the whole to expectations?
Yes (3), More or less (2), No (1)
2. Would you describe the tip as symmetric after the operation?
Right (3), More or less (2), No (1)
3. Do you regard the shape and size of the nose as appropriate on frontal view?
Yes (3), More or less (2), No (1)
4. Would you describe the nose as natural in appearance after the operation?
Yes (3), More or less (2), No (1)
5. Would you describe the nose as in harmony with the rest of the face after the operation?
Yes (3), More or less (2), No (1)
6. Has the passing of time since the operation made any difference to the aesthetic result in your opinion?
No (3), More or less (2), Yes (1)
7. Do you see any need for retouching?
No (3), Perhaps (2), Yes (1)
8. How would you judge the final aesthetic result?
Good (3), Satisfactory (2), Unsatisfactory (1)

excessive correction by means of the technique employed. Use was therefore made of a further Peck onlay graft of material from the auricular pavilion.

In the other case, the cause was asymmetry of the dorsum manifested 6 months after the operation due to the displacement over time of a graft of auricular cartilage used to correct a saddle nose deformity, the visibility of which was unquestionably increased by the presence of extremely thin skin. This was remedied by reshaping and repositioning of the graft.

In all the cases, long-term follow-up revealed results of lasting stability as regard the shape, projection, and symmetry of the nasal tip. Collapse of the external nasal valve was not reported in any cases. Revision surgery was required for just 2 (2.9%) of the 70 patients. In one case, this was necessitated by the manifestation over time of underprojection of the tip probably due to excessive correction by means of the technique employed. Use

**Table 3** Surgeon questionnaire

Questionnaire for surgeons
1. Overall nasal tip projection
Excellent (4), Good (3), Satisfactory (2), Unsatisfactory (1)
2. Overall nasal tip rotation
Excellent (4), Good (3), Satisfactory (2), Un satisfactory (1)
3. Nasal tip symmetry
Excellent (4), Good (3), Satisfactory (2), Un satisfactory (1)

**Table 4** Surgeon evaluations

Nasal tip projection	3.91 ± 0.01
Nasal tip rotation	3.94 ± 0.01
Nasal tip symmetry	3.87 ± 0.02

**Table 5** Follow-up period

12 mo	5 patients (7.1%)
13–18 mo	19 patients (27.1%)
19–24 mo	35 patients (50%)
24–28 mo	11 patients (15.7%)

was therefore made of a further Peck onlay graft of material from the auricular pavilion. In the other case, the cause was asymmetry of the dorsum manifested 6 months after the operation due to the displacement over time of a graft of auricular cartilage used to correct a saddle nose deformity, the visibility of which was unquestionably increased by the presence of extremely thin skin. This was remedied by reshaping and repositioning of the graft. The use of nylon sutures in thin-skinned patients is highly controversial because of the potential for delayed foreign-body reaction, suture granuloma formation, and possible fistulization.

On the contrary, as other authors,<sup>3,12,13,15,16</sup> we did not observe these complications in our cases and in this specific procedure not absorbable sutures may provide stability to the stumps over time.

Preoperative and postoperative photographs of two representative cases illustrate the results to be obtained with dome division in revision rhinoplasty (→ Figs. 4 and 5).

## Discussion

Dome division has been widely employed and described by many authors since 1957, when the technique was first put forward by Goldman.

It is unquestionably a powerful and versatile tool for modifying the configuration of the nasal tip.<sup>3,12</sup> The result is aesthetically pleasing and lasting when the tip complex heals symmetrically.<sup>11</sup> In thin-skinned patients, however, even slight asymmetries in the final medial cartilage unit can lead to visible bossa when the overlying soft tissue thins and contracts. Notching and alar retraction may result if the lateral cartilage segments rotate cephalically.<sup>11,13</sup> These eventualities in wound healing are unpredictable and have the effect of deterring many surgeon from the use of techniques that involve division of the alar cartilages.<sup>11</sup> For these reasons, the last few years have seen almost complete abandonment of dome division in favor of techniques involving the use of sutures and/or cartilaginous grafts but invariably avoiding any interruption of domal continuity.

Although the procedure was at first widely used in primary and secondary rhinoplasties, its indications have therefore



**Fig. 4** (A, C, E, G) Preoperative views of male patient showing overprojection with asymmetrical tip. (B, D, F, H) One year after the operation.



**Fig. 5** (A, C, E, G) Preoperative views of woman patient showing overprojection with asymmetrical tip. (B, D, F, H) One year after the operation.

become far more restricted and selective over the years. It has in particular been applied more limitedly to cases requiring marked narrowing of a very broad domal arch or the correction of hanging infratip lobule, retrodisplacement, and asymmetry.<sup>3,11</sup>

It is currently regarded as particularly suitable in cases of revision rhinoplasty with extensive structural disruption caused by scarring and the presence of asymmetry and overprojection of the nasal tip. Paradoxically enough, it is also indicated in correction of the results of previous operations of dome division where the discontinuity of the unsutured domal arch has led to evident deformities over time (→**Fig. 3A**). A major step forward in the techniques involving resection of the alar cartilage is in fact the combination of this with the overlapping and/or suturing of the two cartilaginous stumps.<sup>3,11,12,15,17–23</sup>

Overlapping can prove difficult, however, when it is necessary to address the results of previous rhinoplasties with complete disruption of the anatomical structures of the alar cartilages, which are embedded in a single conglomerate of scar tissue. As it can prove very difficult to isolate the alar cartilages in such cases, the only procedural possibility remaining is to recreate the structures of both domes by means of a suture and then cut and remove their deformed upper sections.<sup>13</sup>

This procedure makes it possible to restore symmetry to both sides of the tip quickly and easily. At the same time, however, it should be noted that it inevitably leaves cartilaginous stumps with sharp edges that necessitate use of a graft of crushed cartilage to harmonize and soften the shape of the tip.<sup>13</sup>

Moreover, dome truncation leads in any case to a considerable decrease in the projection of the nasal tip. In cases where this is not particularly indicated, it has to be balanced by means of a thick onlay graft. It should also be borne in mind that the crushed cartilage can manifest a certain degree of resorption in the long term, thus impairing the stability of the result.<sup>24</sup>

The technique put forward here, which combines dome truncation with precise suturing of the cartilaginous stumps, constitutes a useful modification and development designed to restore the physiological anatomical continuity of the alar cartilages. At the same time, the overlapping and suturing of the cartilaginous stumps in accordance with the M-arch model<sup>23</sup> can prove difficult due to cicatricial anatomical disruption as a result of rhinoplasty and lead to an inevitable excessive decrease in projection.

To avoid these problems, the present authors prefer to bring the two edges of the cartilages together with no overlapping. In particular, the already established technique of direct suturing of the stumps with separate stitches of 6/0 nylon is combined with a special “figure-of-8” suture in the middle so as to avoid any undesired and unforeseeable overlapping of the stumps. When the edges are very thin, as in the case of the alar cartilages, it is in fact very difficult to maintain a direct and precise join with no overlapping when tying the suture knot. Moreover, the pressure of cicatricial contraction can lead over time to displacement of the stumps if they are not perfectly joined. Confirmation is provided by the fact that this undesirable complication never arose in any

of the cases in this study, where the length of the average follow-up is 18.6 months. Although no indication of crural stump malposition was observed in the initial stages of wound healing following suture reconstitution of the LLCs, further long-term evaluation of this technique is needed.

It proves far more important to restore the precise anatomical continuity of the alar cartilages in the presence of thin skin such as to make even the slightest irregularity in the cartilaginous contours immediately evident.

In the new procedural protocol used by the present authors, the initial mattress suture made beneath the domus before performing dome division serves solely to offer an approximation of the domal structures and serve as a temporary guide to establish the correct position of the subsequent incision. The suture is removed immediately afterward and replaced by another of greater precision that may even not require the use of any further cartilaginous onlay grafts if the reconstruction of the domal arch enhances the curve of the nasal tip and causes it to regain a certain degree of projection.

In cases where a further increase in tip projection is required, a graft of crushed cartilage can in any case be employed for the purposes of millimetric correction.<sup>13,22</sup>

## Conclusion

Examination of the most recent literature shows an increasingly limited use of dome division, as borne out by the present authors' own experience. It is argued here, however, that the procedure does prove highly effective in cases of revision rhinoplasty where the asymmetry and disruption of the structures are such that identification of their anatomical boundaries would be impossible.

The possibly innovative and useful aspect of the article lies precisely in its reevaluation of the technique of dome division, now generally regarded as outmoded, but still indicated and viable for particular cases in which it still proves precious and indispensable. Moreover, crucial importance is attached here to the reconstruction of an anatomical situation as close as possible to the original by restoring the continuity of the cartilaginous arch by means of a precise and specific suture such as to ensure lasting stability of the result.

## References

- 1 Conrad K, Solomon P, Chapnik JS. Impact of vertical dome division on nasal airflow. *J Otolaryngol* 2000;29(3):162-165
- 2 Goldman IB. The importance of the mesial crura in nasal-tip reconstruction. *AMA Arch Otolaryngol* 1957;65(2):143-147
- 3 Adamson PA, McGraw-Wall BL, Morrow TA, Constantinides MS. Vertical dome division in open rhinoplasty. An update on indications, techniques, and results. *Arch Otolaryngol Head Neck Surg* 1994;120(4):373-380
- 4 Simons RL. Vertical dome division in rhinoplasty. *Otolaryngol Clin North Am* 1987;20(4):785-796
- 5 Williams JE. Pinched nasal tip. *Clin Plast Surg* 1977;4(1):41-45
- 6 McCurdy JA Jr. Surgery of the nasal tip: current concepts. *Ear Nose Throat J* 1977;56(6):238-248
- 7 McCollough EG. Surgery of the nasal tip. *Otolaryngol Clin North Am* 1987;20(4):769-784
- 8 Simons RL, Fine IJ. Evaluation of the Goldman tip in rhinoplasty. In: *Plastic and Reconstructive Surgery of the Face and Neck: Proceedings of the Second International Symposium*. New York, NY: Grune & Stratton; 1977:39-46
- 9 Ponti L. Diagnostic problems and suggestions in the functional and aesthetical nose surgery. *Proceedings of the Ninth International Congress, Mexico, D.F., August 10-14, 1969*
- 10 Simons RL, Greene RM. Rhinoplasty pearls: value of the endonasal approach and vertical dome division. *Clin Plast Surg* 2010;37(2):265-283
- 11 Constantinides M, Liu ES, Miller PJ, Adamson PA. Vertical lobule division in open septorhinoplasty. *Arch Facial Plast Surg* 2001;3(4):258-263
- 12 Funk E, Chauhan N, Adamson PA. Refining vertical lobule division in open septorhinoplasty. *Arch Facial Plast Surg* 2009;11(2):120-125
- 13 Kridel RW, Konior RJ. Dome truncation for management of the overprojected nasal tip. *Ann Plast Surg* 1990;24(5):385-396
- 14 Bocchieri A, Marianetti TM. Barrel roll technique for the correction of long and concave lateral crura. *Arch Facial Plast Surg* 2010;12(6):415-421
- 15 Gandomi B, Arzaghi MH, Rafatbakhsh M. The effectiveness of modified vertical dome division technique in reducing nasal tip projection in rhinoplasty. *Iran J Med Sci* 2011;36(3):196-200
- 16 Lavinsky-Wolff M, Dolci JE, Camargo HL Jr, et al. Vertical dome division: a quality-of-life outcome study. *Otolaryngol Head Neck Surg* 2013;148(5):758-763
- 17 Lipsitt EM. A new approach surgery of the lower cartilaginous vault. *AMA Arch Otolaryngol* 1959;70(1):42-47
- 18 Kridel RW, Konior RJ. Controlled nasal tip rotation via the lateral crural overlay technique. *Arch Otolaryngol Head Neck Surg* 1991;117(4):411-415
- 19 Adamson PA, Litner JA. Applications of the M-arch model in nasal tip refinement. *Facial Plast Surg* 2006;22(1):42-48
- 20 Adamson PA, Litner JA, Dahiya R. The M-Arch model: a new concept of nasal tip dynamics. *Arch Facial Plast Surg* 2006;8(1):16-25
- 21 Wise JB, Becker SS, Sparano A, Steiger J, Becker DG. Intermediate crural overlay in rhinoplasty: a deprojection technique that shortens the medial leg of the tripod without lengthening the nose. *Arch Facial Plast Surg* 2006;8(4):240-244
- 22 Chang CW, Simons RL. Hockey-stick vertical dome division technique for overprojected and broad nasal tips. *Arch Facial Plast Surg* 2008;10(2):88-92
- 23 Sands NB, Adamson PA. Nasal tip deprojection with crural cartilage overlap: the M-arch model. *Facial Plast Surg Clin North Am* 2015;23(1):93-104
- 24 Cakmak O, Buyuklu F. Crushed cartilage grafts for concealing irregularities in rhinoplasty. *Arch Facial Plast Surg* 2007;9(5):352-357