

Droopy Nasal Tip: Causes and Different Methods for Management

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ABSTRACT

Background: Nasal tip surgery is one of the most challenging procedures due to its several anatomic and pathogenic variations. Droopy nasal tip is a common nasal deformity in which the nasal tip is caudally rotated. The anatomical and pathological basis of droopy nasal tip can be divided into two main categories, extrinsic and intrinsic factors. The aim of our study is to discuss and analyze the different causes of droopy nasal tip and to put the appropriate plan to correct such deformity.

Patients and Methods: During the study period, 50 patients of droopy nasal tip were managed. Meticulous pre and intra-operative assessment of the anatomical and pathological causes of nasal tip drooping was done and according to these causes we decided the proper technique for correction of such deformity.

Results: Postoperative assessment depended on evaluation of the changes in nasal tip rotation and projection which was done by measurement and comparison of the nasolabial angle and Goode ratio (pre-operative and 1 year post-operative). We found significant postoperative improvement of tip rotation and projection coming to an agreement with the patient satisfaction about the final esthetic outcomes.

Conclusion: There is no single technique or procedure through which we can modify or improve nasal tip rotation and projection. So for proper management of this deformity the surgeon must understand the nasal tip support mechanisms with adequate analysis of the underlying causes of such deformity.

Key Words: Droopy – Nasal tip.

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INTRODUCTION

Droopy nasal tip is a common problem in which there is a down or caudal rotation of the nasal tip which gives an impression of elongated nose. Droopy nasal tip is not only an aesthetic problem, also it may cause some sort of functional problem through narrowing of the external nasal valve that may result in decreasing of the airflow [1].

There are many causes that may result in droopy nasal tip. These causes can be divided into 2 main groups:

A- Extrinsic category: In such category there is a normal alar cartilage complex but it gets displaced caudally by multiple extrinsic factors like pulling of the lateral crura by elongated anterior septum or pushing from above by long ULC (upper lateral cartilage). Also pulling of medial crura caudally by overactive depressor septi muscle or thick skin may cause inferior displacement of the nasal tip [2].

B- Intrinsic category: In this category there is an abnormal alar cartilage complex like abnormal long lateral crura which are oriented vertically plus or minus weak medial crura. Also dislocation of the lateral crura from aponeurotic attachments to the septal angle may cause dropping of the nasal tip [3].

Also Konior RJ mentioned that improper rhinoplasty techniques may cause droopy nasal tip and he named it as secondary nasal tip drooping [4].

Adequate knowledge of the normal nasal dimensions and angles is very important for proper assessment of the actual causes of droopy nasal tip. The nasolabial angle and nasal tip projection are commonly used to assess the degree of nasal tip rotation [5]. The nasolabial angle is the angle that lies between two lines, the first one extends from the subnasale to the upper lip vermilion border and the second one runs tangentially from the subnasale to most anterior point on columella. The degree of this angle is nearly between 100°-110° in females and 90°-100° in males [6]. So, when this angle gets decreased beyond these values, it is defined as droopy nasal tip. Regarding assessment of nasal tip projection, the Goode ratio is considered the most common method for such assessment. This is the ratio of the distance between the most anterior point of the nasal tip and alar line. The normal ratio of nasal projection lies between 0.50 and 0.65 [7].

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Being a multifactorial deformity, nasal tip drooping may need different methods or techniques to be corrected. The aim of our study is to discuss and analyze the different causes of droopy nasal tip and to put the appropriate plan to correct this deformity.

PATIENTS AND METHODS

First of all this study is not a comparative study like most of the studies in the literature that discussed or compared certain techniques as a management of droopy nasal tip regardless the cause of drooping. This is because there are multiple factors that may cause drooping of the nasal tip. The plan of management in this study depended on meticulous preoperative and intraoperative assessment of the anatomical and pathological bases that resulted in drooping of the nasal tip.

A- Patients:

Between July 2020 and March 2022 in Plastic and Reconstructive Surgery Department, Beni-Suef University 50 patients presented by nasal deformity associated with droopy nasal tip were managed:

Inclusion criteria:

Any patient presented by or complained of droopy nasal tip (the nasal tip is caudally or under rotated).

Exclusion criteria:

- Patients who are indicated to undergo revision rhinoplasty.
- Patients who have craniofacial anomalies (like midface or mandibular disproportions).
- Patients less than 18 years old.

Patient counseling and consent:

The study was approved by the Faculty of Medicine Beni-Suef University Research Ethics Committee. Patients were informed and consented about the procedure steps, the possibility for concha or rib cartilage grafts harvesting and about any suspected complications.

B- Pre-operative assessment:

- *Proper history taking:* Like history of previous nasal trauma or nasal surgery, air way obstruction, perforated septum or allergic problems.

- Physical examination:

- Proper facial analysis with exclusion of the patient who have abnormal facial proportions like midface or mandibular disproportions.

- Assessment of the thickness of the nasal skin mainly in the caudal 1/3.
- Assessment of integrity and degree of nasal tip support by palpation and pressing of the tip inferiorly, this gives us an idea about the strength of the septum and LLC (lower lateral cartilage) and the resilience of medial crura.
- Internal nasal examination for assessment of the length of nasal septum, any septal perforations and any hypertrophy of the turbinates.
- Assessment of depressor septi muscle activity and its effect on the tip in both static and dynamic status.

- *Photography:* Standard photographs of the face, including the frontal, basal and lateral views, were taken preoperatively and one year postoperatively. The lateral views were processed preoperatively by an image manipulation program (Autodesk AutoCAD 2018) to assess the nasolabial angle degree (degree of tip rotation) and Goode ratio was used to assess tip projection.

C- Technique:

All the operations were done under general anesthesia by the same surgeon using open rhinoplasty approach. An inverted V shaped transcolumellar incision was completed by an infracartilagenous incision then followed by subperichondrial then subperiosteal dissection in an avascular plane. We started initially by correction of any problem in the septum (involving septal cartilage graft harvesting), dorsum or middle vault (involving spreader grafts).

Then we decided the appropriate technique for correction of nasal tip drooping according to the previous preoperative assessment and the intraoperative findings. So we started to correct the nasal tip drooping according to its underlying anatomical and pathological etiology. By analysis of the causes in each case we found that:

- 7 (14%) cases had excessively long and vertically oriented lateral crura of LLC (Fig. 1A).
- 6 (12%) cases had just weak medial crura with normal sized septum (Fig. 1B).
- 25 (50%) cases had overdeveloped caudal septum (Fig. 1C).
- 12 (24%) cases had overdeveloped caudal septum in combination with weak medial crura.

In few cases we found that they had overacting depressor septi muscle.

Regarding the patients who had excessively long and vertically oriented lateral crura of LLC,

Lateral Crural Modification was done through cephalic trimming of the LLC leaving at least 5mm anteriorly and 6mm posteriorly plus lateral crural overlay technique to shorten and augment the LLC (Fig. 2A).

Regarding the patients who had overdeveloped caudal septum, trimming of the septal caudal end seems to be enough in such cases (Fig. 2B).

Regarding the patients who had weak medial crura with normal sized septum, we used collumelar strut graft to support the medial crura through insertion of a cartilage graft harvested from the septum or the ribs in a pocket between the 2 medial crura. This graft was inserted just above the nasal spine inferiorly and up to interdomal area superiorly and fixed by three mattress non-absorbable sutures [8] (Fig. 2C).

Regarding the patients who had overdeveloped caudal septum in combination with weak medial

crura, tongue in groove technique was done through meticulous harvesting of bilateral mucoperichondrial flaps on both sides of caudal septum with creation of a pocket between the medial crura. Then caudal septum gets invaginated between the 2 medial crura and fixed in place by 2 to 3 septo-columellar sutures (Fig. 2D).

In few number of cases we found overacting depressor septi muscle in addition to one of the above mentioned causes. In such cases to achieve long lasting results modification of such problem was done through an intraoral incision in the upper lateral sulcus, then dissecting and releasing the depressor septi muscles from their origin (periosteum), then suturing of their cut ends together with Vicryl 4-0 to prevent the reattachment of cut ends again into orbicularis muscle [9].

As a final step, we routinely performed the intradomal and interdomal approximating and tip defining sutures in all cases.

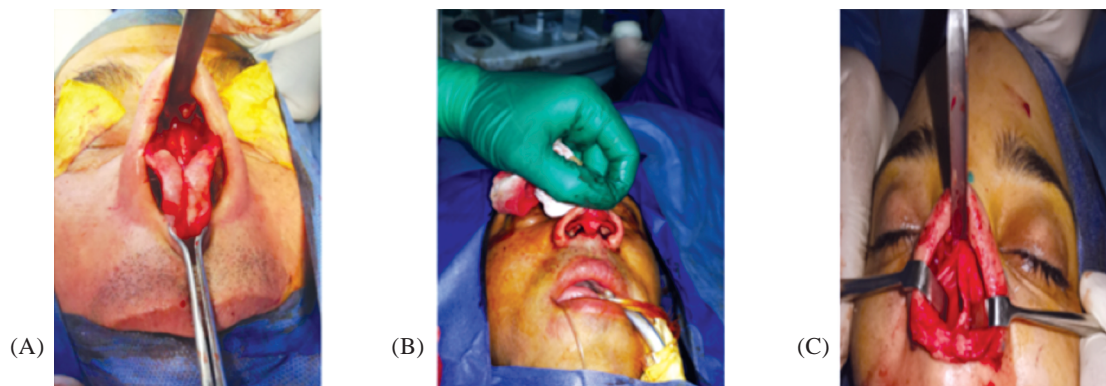


Fig. (1): Shows different causes of droopy nasal tip. (A): Excessively long and vertically oriented lateral crura of LLC. (B): Weak medial crura. (C): Overdeveloped caudal septum.

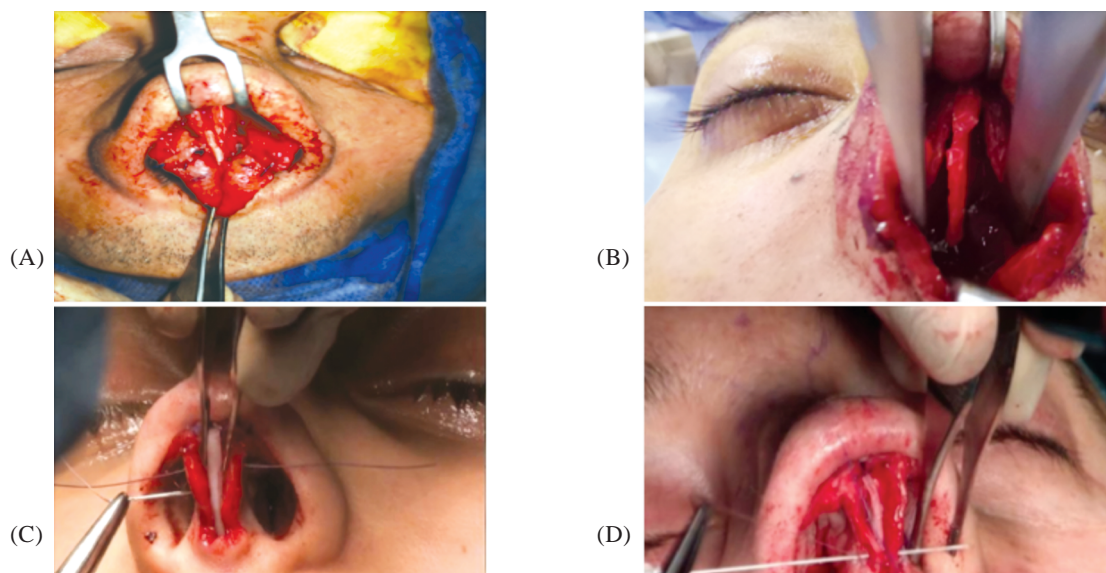


Fig. (2): Shows different techniques for correction of droopy nasal tip. (A): Lateral Crural Modification through cephalic trimming and overlay technique. (B): Trimming of septal caudal angel. (C): Collumelar strut graft. (D): Tongue in groove technique.

D- Post-operative observation index:

1- Evaluation of the changes of nasal tip rotation and projection by measurement and comparison of the nasolabial angle and Goode ratio (pre-operative and 1 year postoperative). This was done

by processing of the lateral view photos by the AutoCAD program (Fig. 3).

2- Assessment of patient satisfaction regarding the final results with an analogue scale as not satisfied, moderately satisfied, well satisfied.



Fig. (3): Shows the methods used to measure the nasolabial angle using Autodesk AutoCAD 2018 program. (A): Pre-operative, (B): One year post-operative.

RESULTS

This study included 50 cases with plunging nasal tips (33 male and 17 female) with a mean age of 25 years. The nasolabial angle average was 92.8 while the nasal projection index average was 57.5.

Among these patients, 7 (14%) cases were managed by lateral crural overlay, 6 (12%) cases were managed by collumelar strut, 25 (50%) cases were managed by trimming of the septal caudal end and 12 (24%) cases were managed by tongue in groove technique. We analyzed the pre and post-operative data to assess the impact of each technique on nasal tip rotation and projection.

Statistical analysis:

Categorical variables were presented as number and percent. Numerical variables as mean and standard deviation. Correlation between two numeric variables was done using Pearson's correlation. *p*-value was considered significant at less than or equal 0.05.

Effects on nasal projection:

By using Goode ratio, we didn't find a real difference between the different groups (Patients

that were managed by a certain technique were considered a group) regarding the preoperative nasal projection index ($p=0.661$). Post-operatively we found increase in the nasal projection in all groups with significant results in groups that were managed by tongue in groove and collumelar strut techniques (Table 1).

Effect on nasal tip rotation:

There was no a big difference between the different groups regarding the preoperative nasal tip rotation ($p=0.433$). Comparing the pre and the postoperative changes regarding the nasolabial angle, we found improvement of the nasal tip rotation in all operated groups (Table 2).

Regarding patient's satisfaction:

The patients were asked about their satisfaction regarding the aesthetic outcome. 46 (92%) patients were well satisfied by the esthetic outcome, 3 (6%) were moderately satisfied as they noticed slightly over rotated nasal tip and just 1 (2%) patient was not satisfied as the nasolabial angle was markedly rotated and so the nose appeared to be artificial so he underwent revision rhinoplasty.

Table (1): Shows the changes between the pre-operative and post-operative nasal projection Index in each group.

Group	Pre-operative Projection index	Post-operative Projection index	p-value
Lateral crural overlay	0.58 (0.53-0.64)	0.63 (0.55-0.69)	0.065
Collumelar strut	0.55 (0.50-0.65)	0.66 (0.59-0.79)	0.025*
Trimming of the septum	0.56 (0.53-0.65)	0.61 (0.58-0.67)	0.067
Tongue in groove	0.62 (0.52-0.68)	0.68 (0.65-0.76)	0.028*

*p-value is significant.

Table (2): Shows the changes between the pre-operative and post-operative nasolabial angle in each group.

Group	Preoperative Nasolabial angle	Postoperative Nasolabial angle	p-value
Lateral crural overlay	87 (71-105)	98 (86-116)	0.026*
Collumelar strut	92 (70-107)	105 (98-127)	0.007*
Trimming of the septum	93 (91-110)	111 (101-132)	0.017*
Tongue in groove	95 (80-111)	117 (115-130)	0.026*

*p-value is significant.

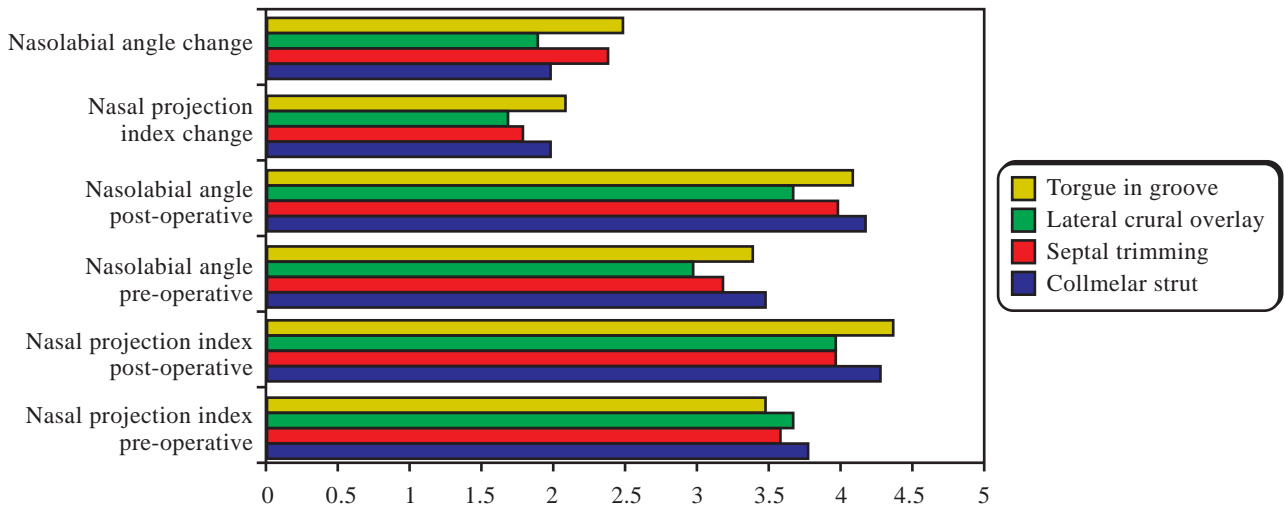


Fig. (4): The figure shows the nasal projection indices and nasolabial angles both before and after surgery and the percent changes at these parameters in all the study groups. Nasal projection was given in % and nasolabial angle in °.

Clinical cases

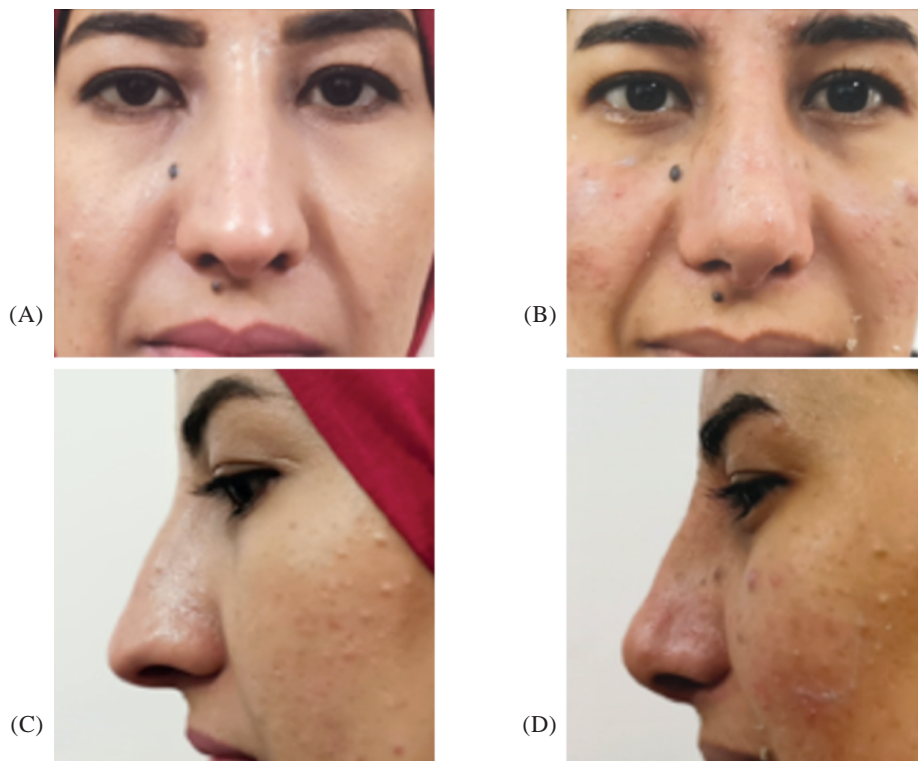


Fig. (5): A 32 years old female with a droopy nasal tip. (A): Pre-operative frontal view, (B): 13 months post-operative frontal view, (C): Pre-operative lateral view, (D): 13 months post-operative lateral view.

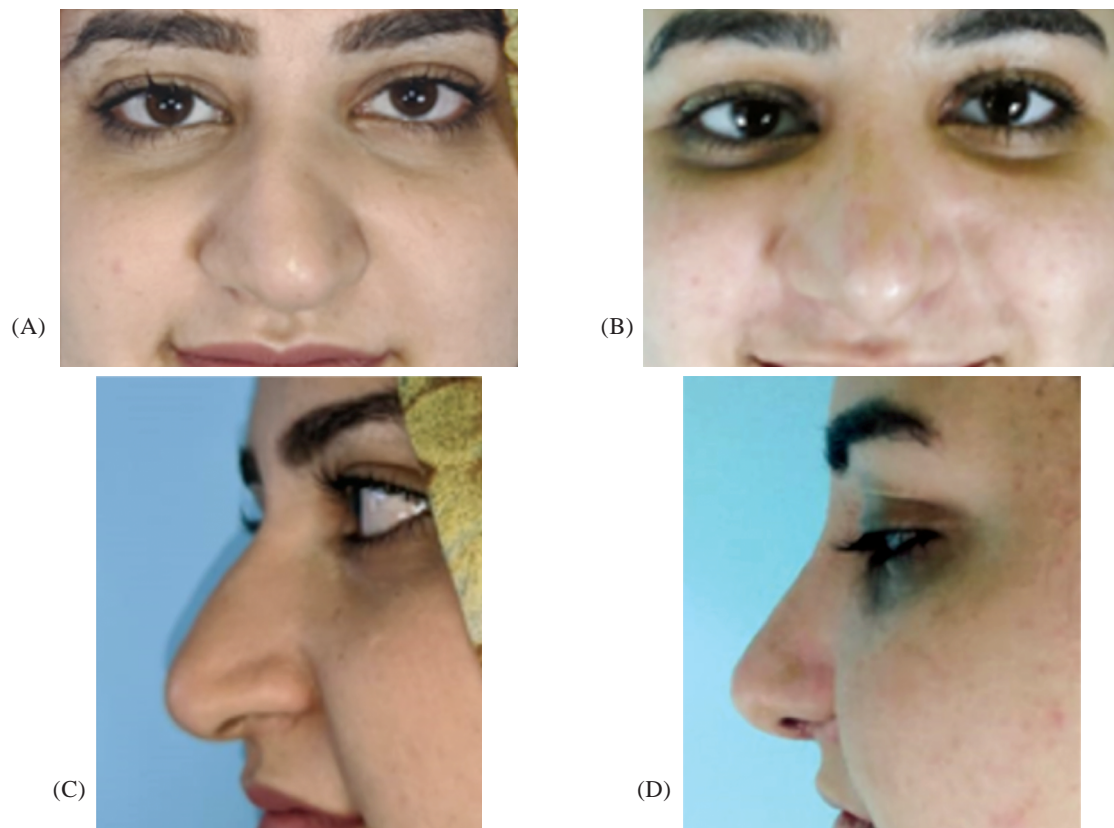


Fig. (6): A 21 years old female with a droopy nasal tip. (A): Pre-operative frontal view, (B): 12 months post-operative frontal view, (C): Pre-operative lateral view, (D): 12 months post-operative lateral view.

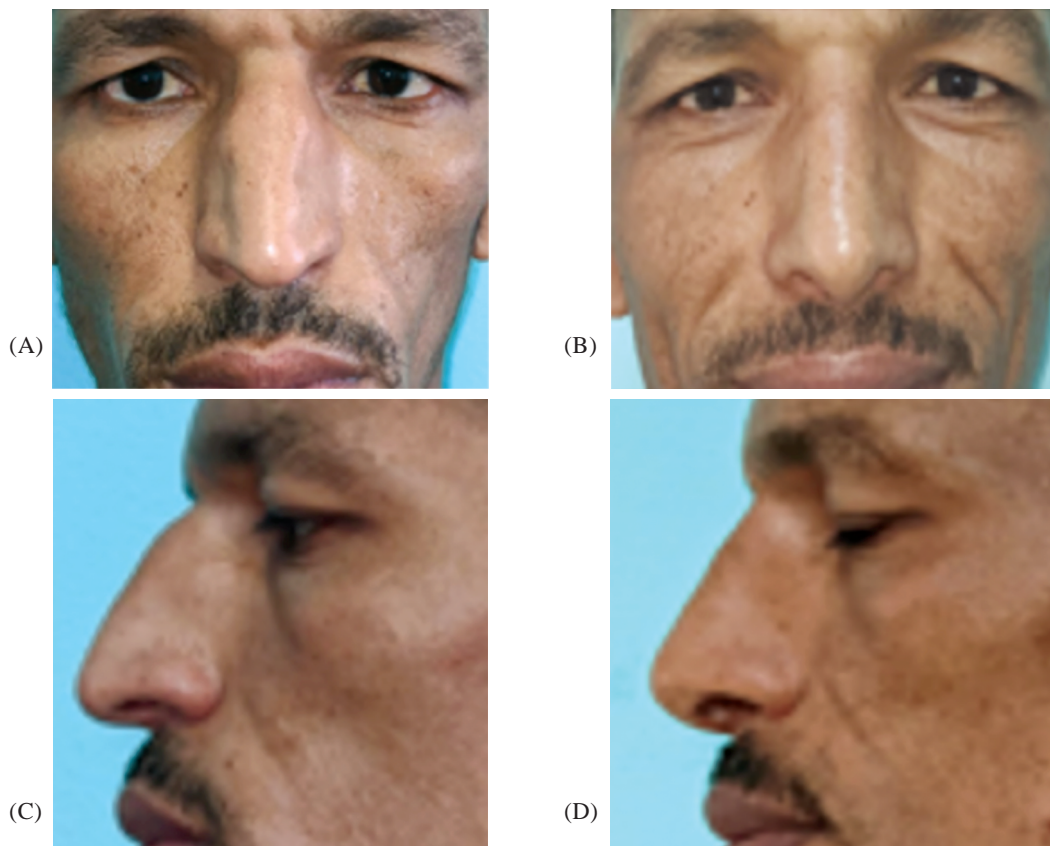


Fig. (7): A 38 years old male with a droopy nasal tip, (A): Pre-operative frontal view, (B): 13 months post-operative frontal view, (C): Pre-operative lateral view, (D): 13 months post-operative lateral view.

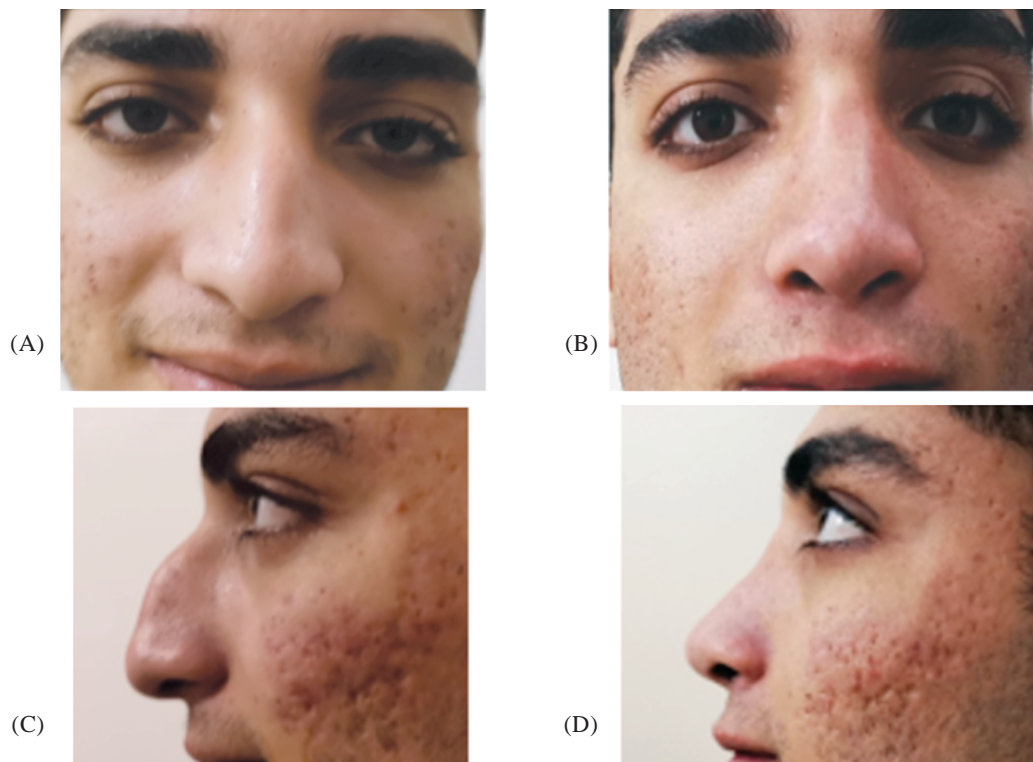


Fig. (8): A 20 years old male with a droopy nasal tip, (A): Preoperative frontal view, (B): 18 months postoperative frontal view, (C): Preoperative lateral view, (D): 18 months postoperative lateral view.

DISCUSSION

Nasal tip projection and rotation represent some of the main factors that affect aesthetic and functional results of rhinoplasty operations. The LLC represents the most important component of tip supporting mechanisms, but if it appears to be markedly elongated it causes droopy nasal tip. Other less effective factors for droopy nasal tip are elongated ULC and high anterior septal angle [1,10].

Control of nasal tip projection and rotation occurs commonly through manipulation of the medial and lateral crura of the alar cartilage and this is known as the tripod concept [11]. According to this concept, procedures that shorten the lateral crura or lengthen the medial crura can rotate the tip superiorly [7].

Many of the previous researches discussed a certain technique for correction of droopy nasal tip whatever the anatomical or pathological causes of this drooping, but we think that meticulous preoperative and intraoperative analysis of such causes is the only successful method to reach a satisfactory esthetic result.

In this research we used 4 different techniques to correct nasal tip drooping (lateral crural overlay, collumelar strut, caudal trimming of the septum and tongue in groove) according to the actual problem we found during pre and intraoperative analysis. We tried not to combine more than one technique during the operation to ensure proper assessment of the efficacy of each technique to solve our problem.

We found that all this techniques actually improved nasal tip projection and rotation with more significant increase of nasal tip projection by using collumelar strut or tongue in groove techniques. Also 92% of the patients were highly satisfied by the aesthetic results.

Conclusion:

In this study we tried to say that droopy nasal tip is considered a multifactorial problem that has many intrinsic and extrinsic causes and so there is no single technique or procedure through which we can modify or improve nasal tip rotation and projection. So for proper management of this deformity the surgeon must understand the nasal tip support mechanisms with adequate analysis of the underlying causes of such deformity.

Study limitations:

One of our study limitations was that the images were not properly standardized, also we worked on small sample size of patients. This makes further studies are inevitable.

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