



Medial Crural Auto-rim Flap in Primary Open Rhinoplasty

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Abstract

Background: Aging significantly affects the nasal tip and columella; thus, weakening of fibroelastic attachments in the scroll area and intercrural suspensory ligaments results in tip ptosis, separation of the medial crural footplates, and expansion of the membranous septum. **Aim:** Thus, we focused on a new technique to maintain tip support without grafting and treat columellar-hanging deformity by folding in the caudal edge of the medial crura as a flap instead of trimming it in patients undergoing open aesthetic rhinoplasty. **Patients and Methods:** In this prospective-observational study, 37 patients were enrolled between July 2020 to January 2022 at Sulaimani Plastic, Burn and Reconstructive Surgery Hospital and Royal Private Hospital in Sulaimani, Republic of Iraq. After asking the age of the patients, all participants were appropriately prepared for the surgery and underwent primary open rhinoplasty for columellar hanging deformity correction. **Results:** We found that all enrolled patients were satisfied with their nasal shape except one patient who complained about the columellar region's appearance but without the need for revision. Also, the objective assessment of the nasal tip support showed good maintenance upon the follow-up time for patients despite the lack of cartilage graft in the tip area. **Conclusion:** In the medial crural auto-rim flap technique, the excess caudal medial crural cartilage could be used as a flap instead of trimming it despite concomitant tip support intercrural augmentation and correction of the columellar hanging deformity.

Introduction

Successful outcomes following rhinoplasty mainly depend on the care and support joint to the aptitude to identify and accomplish difficulties during postoperative retrieval [1]. It is a challenging and exciting process; however, surgeons should execute detailed anatomy of the nasal structures to obtain the desired shape. Even the most experienced surgeon could face difficulties and unexpected results from scar contractures and unpredictable wound healing [2].

Precise preoperative efficient nasal analysis and assessment of the nasal airway and documentation of the patient's prospects and the surgeon's objectives make the background for a desirable prognosis [3]. Intraoperatively, suitable structural contact of the nasal deformity; protection and repair of the normal shape; improvement of the malformation using complete control, preservation and restoration of the nasal airway; and finding the dynamic interplays among the complex manoeuvres are essential [1].

In rhinoplasty, the nasal tip is the region where plastic surgeons show the most significant difference in their work. Although surgeons have grown considerable control over the nose tip area due to the recent progress of open rhinoplasty strategies, innovative techniques should always welcome identifying more specific problems and correcting them accordingly [4].

On the other hand, the nasal tip is supported by alar cartilages or lower lateral cartilages, composed of a pair of lateral crura, a pair of medial crura, and footplates that are separated by the dome. The medial crura work as columns on the footplates to give tip support and projection. The posterior 5 – 6 mm of the medial crura that goes laterally and posteriorly are known as footplates which play a significant role in the aesthetics of the nasal tip and, consequently, in rhinoplasty [5].

Stark contrasts in how different cultures inherently perceive and weigh aesthetic values or what is considered beautiful make it challenging to define an ideal tip based on a uniform set of criteria [6]. Instantly, there are numerous surgical techniques for manipulating the medial crura to maintain tip support and projection, including variable suture techniques or cartilage grafts to achieve the desired results. Additionally, in rhinoplasty surgery, management of the bony vault, cartilages and lateral walls is most often performed with mechanical instruments. These instruments have gradually been refined to minimize damage to the surrounding soft tissues and maximize precision [7].

Therefore, in this study, we assessed a new technique to evaluate whether it is possible to maintain tip support without the need for graft use and treat columellar-hanging deformity by folding in the caudal edge of medial crura a flap instead of trimming it in patients undergoing flap aesthetic rhinoplasty.

Patients And Methods

A. Patients and study setting

This is a prospective observational study of a surgical procedure done at Sulaimani Plastic, Burn and Reconstructive Surgery Hospital and Royal Private Hospital, Sulaimani, Republic of Iraq. Briefly, 37 consecutive patients (33 females and 4 males) were presented to conduct medial crural auto-rim flap by primary open rhinoplasty between July 2020 to January 2022, using transcolumellar stair-step incision.

B. Inclusion criteria

We included patients with excessively wide and straight medial crura presented to the hospital to correct their columellar hanging deformity regardless of age and sex.

C. Exclusion criteria

Patients with thick skin nose, hanging columella resulting from the excessive caudal septum, excessive membranous septum, downwardly curved medial crus, overlying long lower lateral cartilages, and secondary rhinoplasty were excluded from this study.

D. Ethical approval and patient consent

All patients agreed to participate in this study voluntarily, and all aspects of the technique were clarified to them properly before the surgery. We also received written informed consent from all participants to involve in this study. Although IRB approval was not obtained from the hospital's authority to conduct this study, the procedure was performed following the Declaration of Helsinki. As a result, the Kurdistan Board for Medical Specialists approved this study proposal.

E. Patient preparation and nasal analysis

All presented patients were assessed for inclusive preoperative clinical evaluation, which involves an examination of naso-facial proportions. Also, systematic nasal analysis was done for all of them as it is the most significant first step for an efficacious rhinoplasty [8]. It allows both skilled and young surgeons to assess the face's balance accurately and nasal proportions and ascertain appropriate surgical procedures for each patient. A pleasant aesthetic outcome can only be attained if the patient's nasal structures and critical areas of concern are corrected in a customized fashion. In addition, a systematic assessment of the patient's anterior,

lateral, and basal nasal views allows for recognizing changes in inappropriate measurements and surgical procedures to restore them to the preservation of gender and racial harmony (Table 1) [9].

Table- 1: Shows systemic assessment of nasal view analysis.

Nasal View	Analysis
Frontal	
1. Facial proportions	Height (thirds), width (fifths), symmetry
2. Skin type/quality	Fitzpatrick type, thin or thick, sebaceous
3. Symmetry/nasal deviation	Midline, dorsal deviation, C-, reverse C-, or S-shaped deviation
4. Dorsal aesthetic lines	Straight, symmetric or asymmetric, well or illdefined, narrow or wide
5. Bony vault	Narrow or wide, asymmetric, short or long nasal bones
6. Midvault	Narrow or wide, collapse, inverted-V, saddle deformity
7. Nasal tip	Ideal/bulbous/boxy/pinched, supratip, tip-defining points, infratip lobule
8. Alar rims	Gull-shaped, facets, notching, retraction
9. Alar base	Width
10. Upper lip	Long or short, dynamic depressor septi, upper lip crease
Lateral	
1. Nasofrontal angle and radix	Acute or obtuse, high or low radix, prominent or low nasion
2. Nasal length, dorsum and supratip	Length: long or short; Dorsum: smooth, hump, scooped out; Supratip: break, fullness, pollybeak
3. Tip projection	Over or underprojected
4. Tip rotation	Over or underrotated
5. Alar-columellar relationship	Hanging or retracted ala, hanging or retracted columella
6. Periapical hypoplasia	Maxillary or soft-tissue deficiency
7. Lip-chin relationship	Normal, over or underprojected chin
Basal	
1. Nasal projection	Over or underprojected, well or illdefined tip-defining points, columellar-to-lobule ratio
2. Nostril	Symmetry, long/narrow or short/wide nostril, nostril-tip ratio, concave or convex ala
3. Columella	Caudal septal deviation, flaring of medial crura
4. Alar base	Width
5. Alar flaring	

F. Alar columellar relationship

We inspected the frontal, lateral and oblique preoperative photographs of all studied participants who desired to perform primary open rhinoplasty. They have been counselled about the procedure before undergoing surgery done by the same surgical team, and all photographs have been taken pre and postoperatively.

A normal alar columellar association alongside its related anatomic structures being the caudal septum, membranous septum, medial and intermediate crus. The hanging columella deformity could rise from either extra membranous septum, excess caudal septum, extremely wide medial crura, downwardly curved medial crus, or overlying long lower lateral cartilages (Figure 1) [10].



Figure- 1: A nose with an excess medial crural width.

G. Methodology

Correction of hanging columella should be directed towards the underlying causative factor among the possibilities based on a careful diagnosis of which structure is responsible for the deformity [11]. Thus, we targeted those patients with excessively wide medial crus.

In this regard, the medial crural auto-rim flap operations were done by the same team using the open rhinoplasty technique, through a stair-step transcolumellar incision in which either correction of markedly wide medial crura was done alone or in combination with tongue in groove technique [12], and/or mucosal septal suture technique [13]. Thus, out of 37 patients under general anaesthesia, 10 patients underwent auto-rim flap alone, 4 patients in combination with tongue in groove technique, and 23 patients with mucosal septal suture technique.

Accordingly, the two medial crura were dissected and exposed. Then, we folded in the caudal excess of the crus and fixed the resultant four walls by horizontal mattress sutures instead of excision of the cartilage. In this way, we hoped to achieve better tip support without the need for additional help with other cartilage grafts and concomitant hanging columella correction and intercrural augmentation.

Finally, patients were prescribed to use antibiotics (amoxicillin/clavulanic acid), analgesics (paracetamol) and antihistamine (desloratadine) and also they asked to follow up from the time of surgery to keep recovering and drive positive care outcomes.

Results

In the current study, the mean age of the females was 26.7 years (range, 19 - 45 years) and the mean age of the males was 21 years (range, 20 - 22 years). The mean follow-up time was 13.1 months (6 - 24 months). Quantitative measurements on the patient photos were not performed; instead, the patient's satisfaction rate was evaluated through a survey. All of them were asked about the shape and hanging of the columellar region with or without animation. All operated patients were satisfied with their nasal shape (Figures 2 and 3) except one patient that complained about the appearance of the columellar region but without the need for revision. Intercrural augmentation is also achieved as folding in the excess cartilage piece creates a four-wall pillar to produce more substantial support and better define the columellar area (Figures 4 and 5). Additionally, an objective assessment of the nasal tip support showed good maintenance upon the follow-up time for each patient despite the lack of cartilage graft in the tip area.

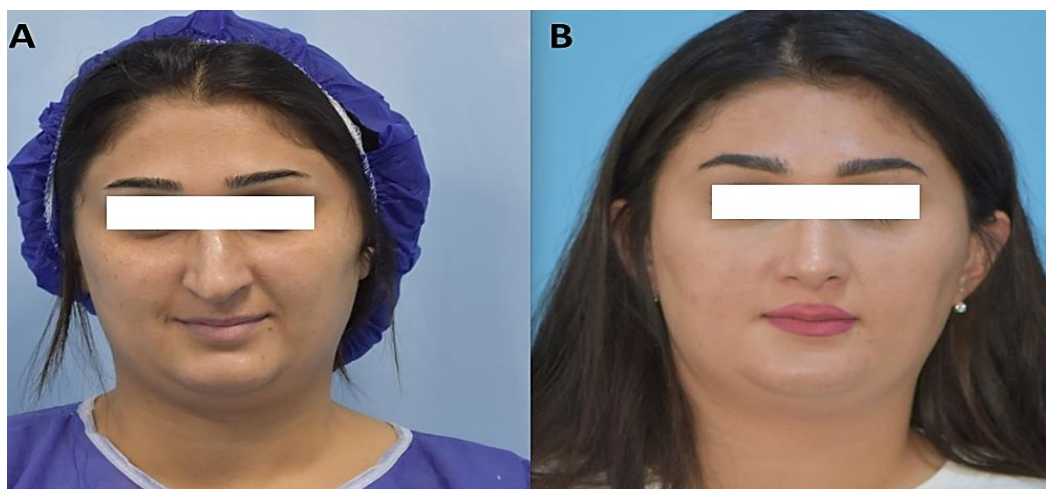


Figure- 2A: (A) Preoperative and (B) Sixteen months' postoperative photos of a 32-year-old woman who underwent medial crural auto-rim flap using open rhinoplasty technique (Frontal view).

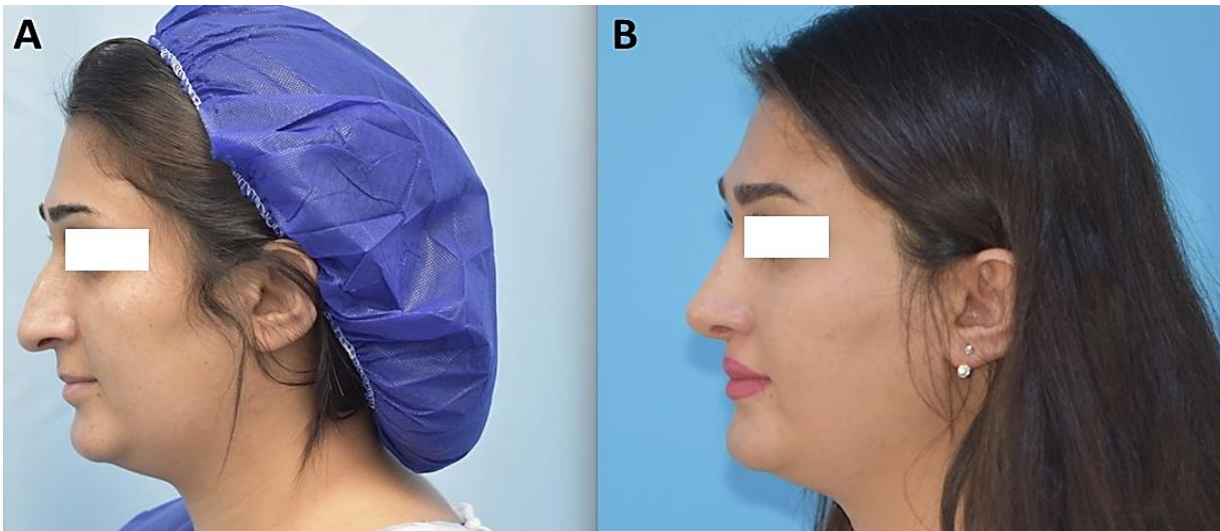


Figure- 2B: (A) Preoperative and (B) Sixteen months' postoperative photos of a 32 years-old woman who underwent medial crural auto-rim flap using open rhinoplasty technique (Lateral view).

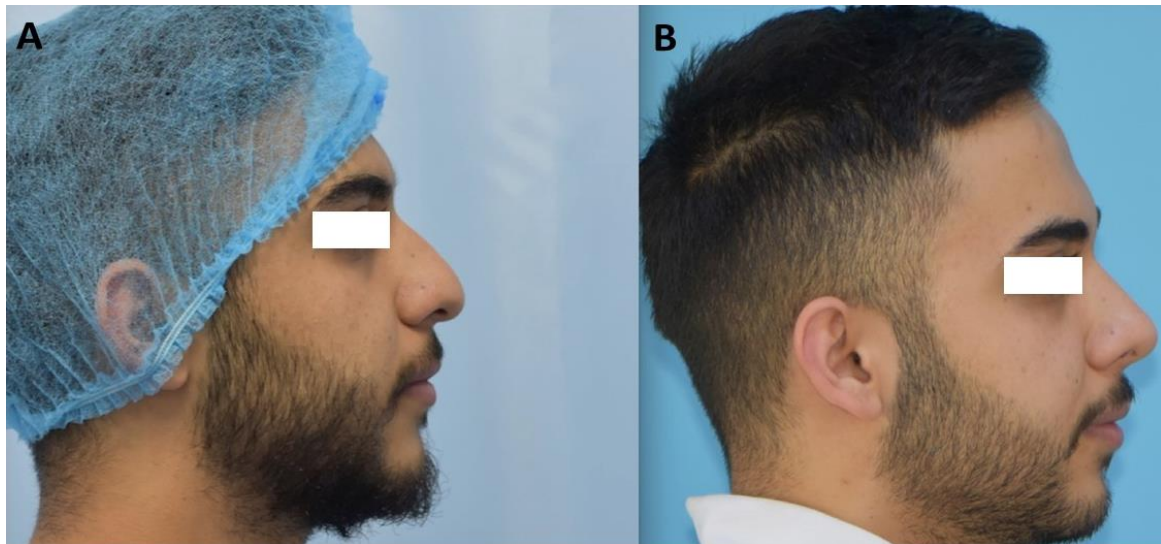


Figure- 3: (A) Preoperative and (B) Fourteen months' postoperative photos of a 20 years-old man who underwent medial crural auto-rim flap using open rhinoplasty technique (Lateral view).

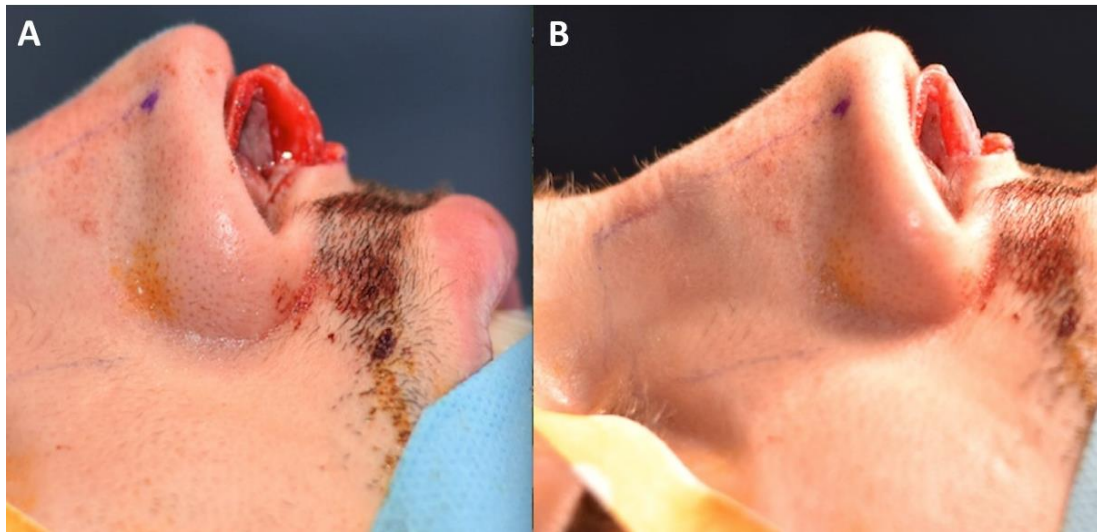


Figure- 4: Intraoperative lateral profile showing (A) Excessive wide medial crura and (B) Medial crura after application of auto-rim flap using open rhinoplasty technique.



Figure- 5: Intraoperative picture of a 22 years-old man after applying a medial crural auto-rim flap to create a four-wall pillar.

Discussion

Ageing changes on the nasal tip and columellar and bone recession in the premaxillary area decrease the nasolabial angle and shorten the columella with a hanging columella anteriorly and a retraction posteriorly that significantly accentuate the presence of an already existing columellar show [14,15].

One of the most significant parts of tip support and contour is the projection and support of the medial crura of the alar cartilage. The medial crural auto-rim flap application seems to have a good effect on the nasal tip support and decrease postoperative unsatisfactory results on the lower nasal third polygons [16].

There are many methods for maintaining tip support [17]. One of the most popular options is columellar strut graft, which has been practised universally in rhinoplasty [18]. However, despite being an effective technique, one might think of the possible lack of donor cartilage in some patients, as in our study, we only opened the septum in two patients. In addition, a cartilage graft might be visible on animation or simply palpable and cause discomfort for some individuals [18,19].

Hanging columella is another complaint that many patients seek rhinoplasty for in our locality; thus, in this study, those patients were selected with wide medial crus. The decision was made based on direct intraoperative visualization of the cartilage, which seemed excessively wide and lacked cartilage to be used as a graft [20]. Furthermore, we observed that the cartilage should also be straight in addition to excess in width to create well-balanced strong support without producing deviation in this area.

Conclusions

The medial crural auto-rim flap technique benefits from the excess caudal medial crural cartilage to be used as a flap instead of trimming it; hence, there is no need for harvested cartilage grafts to be taken and reshaped for this purpose. In addition, concomitant tip support, intercrural augmentation, and correction of columellar hanging deformity can be achieved through this approach. Moreover, with extensive exposure, surgeons can diagnose cartilage deformity accurately and safely contour the cartilages to achieve proper size and shape. Stable chondrectomy can be performed under direct vision with precise mobilization and control; hence, the rhinoplasty is no longer shrouded in mystery. However, some limitations include the expense, increased operative time, risk of soft tissue injury, more extensive exposure, and difficulty performing chondrectomy.

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Conflicts of interest

The authors declare no conflict of interest in this study is available.

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