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Dorsal Definition in Rhinoplasty Using Onlay Cartilage Graft

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Abstract

Background: Contemporary rhinoplasty demands aesthetic enhancement, concealment of the nasal dorsum, and accentuation of the dorsal aesthetic lines. The procedures utilized included onlay solid cartilage graft, diced cartilage graft, deep temporal fascia, rectus abdominis fascia, and diced cartilage encased in fascia.

Aim and objectives: To assess the dorsal definition in rhinoplasty using an onlay cartilage graft and assessment of its outcome with other common techniques used for this purpose.

Patients and methods: Fifteen patients were included in this prospective investigation within the Al Azhar University Hospitals. An onlay cartilage graft was inserted in these patients to define the dorsal nasal aesthetic lines.

Results: Several anatomical measurements differed significantly among pre-operative and post-operative times: nasolabial angle (NLA) ($p=0.043$), tip projection ($p=0.006$), nasal width ($p<0.001$), nasal height ($p=0.001$), and nasofrontal angle (NFA) ($p>0.001$) and no statistically significant difference as regard nasal length. Regarding the complications, the graft was visible in 3(20%) patients, and warping developed in 2(13.3%) cases; otherwise, there was no extrusion, necrosis of the graft, or postoperative infection.

Conclusion: Our data suggested fruitful outcomes with low complication rates for using an onlay cartilage graft for dorsal definition in rhinoplasty. In order to conduct dorsal augmentation successfully, surgeons must be well-informed about the numerous augmentation materials and operative techniques presently accessible, as well as their respective risks, benefits, and applications.

Keywords: Dorsal Definition, Rhinoplasty, Onlay Cartilage Graft

1. Introduction

Rhinoplasty remains one of facial plastic surgery is most intricate and sophisticated procedures. The debate over the optimal technique and outcomes is still propagating. Reviewing rhinoplasty and nasal dorsum definition is a common topic, with numerous procedures and graft materials used to achieve this.¹

Contemporary rhinoplasty demands aesthetic enhancement, concealment of the nasal dorsum, and accentuation of the dorsal aesthetic lines. Several techniques were implemented, including diced cartilage enveloped in fascia, deep temporal fascia, rectus abdominis fascia, and onlay solid cartilage graft.²

Septal cartilage is an excellent option for dorsal definition that requires only minor to moderate enhancements. It is simple to harvest during rhinoplasty, especially if you are having a septoplasty done simultaneously.³

Auricular cartilage is another good option as an onlay dorsal graft. It is simple to harvest and causes minimal illness at the donor site. Conchal grafts, like septal cartilage, can be utilized as a single-layer implant or can be sutured together to increase girth and rigidity.⁴

Autologous costal cartilage offers an abundance of material to define the severely inadequate dorsum. Possible donor site complications include pneumothorax, pleural tear, visible scar, and pain. When done correctly, however, this approach is quite safe and reliable.⁵

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The diced cartilage wrapped in fascia is one of the most well-known rhinoplasties grafting procedures. Daniel and Calvert were the ones who made this technique. They discovered that diced cartilage was wrapped in Surgical resorbs unanticipatedly. Therefore, they began wrapping the diced cartilage with temporalis fascia.⁶

This work aimed to assess the dorsal definition in rhinoplasty using an onlay cartilage graft and compare its outcome with other common techniques used for this purpose.

2. Patients and methods

This prospective research was performed on fifteen patients at Al-Azhar University Hospitals. Onlay cartilage grain was only inserted in these patients to define the dorsal nasal aesthetic lines.

Inclusion criteria: Both sexes, age ranges from 18 to 45 years, free medical history, and no functional complaints.

2.1.Exclusion criteria: Individuals aged 18 years or younger and older than 45, patients with functional complaints, poor compliance, or unfit for surgery (renal diseases, hepatic diseases, and immunosuppressive diseases)

Ethical approval: The present study was conducted in adherence to the ethical principles outlined in the Declaration of Helsinki and by the Institutional Review Board (IRB). The ethics unit of the Faculty of Medicine at Al-Azhar University in Cairo approved. Consensus was achieved through the inclusion of informed participants.

2.2.Methods:

All included patients were subjected to Preoperative nasal assessment by photography, history of medications, documentation of allergic disorders and symptoms, previous operative history, anthropometric nasal measures, full laboratory investigations, and preoperative imaging Planning.

2.3.Surgical technique: General anesthesia was administered in every case. During every operation, an open approach was utilized, wherein the soft tissue envelope was elevated above the alar cartilages in the supra perichondrial plane, the upper lateral cartilages in the supra superior musculoaponeurotic system plane, and the bony pyramid in the subperiosteal plane. By protocol, rhinosculpture and osteotomies were executed. Subsequently, the middle vault and apex were managed. Graft harvesting began at this juncture. Septal, coastal, or auricular cartilage was utilized according to the availability of graft material and the need of the case. Following this, the size and contour of the cartilage graft to be utilized in the dorsal definition were determined using a template.

Once a suitable dorsal surface had been created, the retractor gradually raised the skin flap. In order to prevent deformation, the glabella was thinned, and the cranial end of the graft was angled toward the radix. The graft was implanted within a subperiosteal pocket, a sufficiently confined space in the nose that confines the instrument. The septum and upper lateral cartilages were subsequently secured using 5/0 polypropylene sutures. Following the dorsal definition was completed, the snout tip was sculpted. External and internal splints were applied after the skin and mucosa closure. In order to assess the outcomes, photographs taken both before and after the procedure were examined. A chart review was conducted to assess the subjective aesthetic contentment of each patient. Ratings for outcomes included poor, average, good, and excellent. In order to conduct a clinical evaluation of the fifteen cases' surgical outcomes, anthropometric parameters, including nasal tip projection, nasal length, nasal root width, nasal height, nasofrontal angle, and nasolabial angle, were assessed using facial photographs. Two measurements were collected in order to calculate the mean. Each variable's mean and standard deviation were computed. The disparities between preoperative and postoperative anthropometric measurements were examined using the Wilcoxon signed-rank test. A p-value below 0.05 was regarded as an indicator of statistical significance. Additionally, donor site and graft-associated complications were evaluated.

3. Results

Females were more predominant than males (80% vs. 20%, respectively). The age of the patients varied between 27 and 42 years, with an average age of 35.20 ± 5.61 years (Table 1).

Table 1. Case distribution based on demographic variables (n = 15)

DEMOGRAPHIC DATA	NO. (%)
GENDER	
MALE	3 (20%)
FEMALE	12 (80%)
AGE (YEARS)	
<30	3 (20%)
30 – 35	6 (40%)
>35	6 (40%)
MIN. – MAX.	27.0 –42.0
MEAN \pm SD.	35.20 \pm 5.61
MEDIAN (IQR)	35.0 (32.0 –40.0)

A number of anatomical measurements differed significantly among pre-operative and post-operative times: nasolabial angle (NLA) ($p=0.043$), tip projection ($p=0.006$), nasal width ($p<0.001$), nasal height ($p=0.001$), and nasofrontal angle (NFA) ($p>0.001$) and no statistically significant difference as regard nasal length (Table 2).

Table 2. Distinction among preoperative and postoperative in accordance with different parameters (n = 15)

	PRE-OPERATIVE	POST-OPERATIVE	TEST OF SIG.	P
PROJECTION				
MIN. - MAX.	0.60 -0.76	0.63 -0.69	t=3.264*	0.006*
MEAN ± SD.	0.70 ±0.06	0.66 ±0.02		
MEDIAN (IQR)	0.71 (0.68 - 0.75)	0.65 (0.64 - 0.67)		
NASAL WIDTH (MM)				
MIN. - MAX.	22.0 -26.0	20.0 -24.0	t	<0.001*
MEAN ± SD.	24.0 ±1.46	22.0 ±1.46	=5.916*	
MEDIAN (IQR)	24.0 (23.0 - 25.0)	22.0 (21.0 - 23.0)		
LENGTH (MM)				
MIN. - MAX.	45.0 -50.0	45.0 -54.0	Z =	0.382
MEAN ± SD.	47.80 ±2.11	48.60 ±3.11	0.875	
MEDIAN (IQR)	48.0 (46.0 - 50.0)	48.0 (47.0 - 49.0)		
HEIGHT (MM)				
MIN. - MAX.	53.0 -56.0	50.0 -55.0	Z	0.001*
MEAN ± SD.	54.60 ±1.06	52.80 ±1.78	=3.460*	
MEDIAN (IQR)	55.0 (54.0 - 55.0)	53.0 (52.0 - 54.0)		
NLA				
MIN. - MAX.	90.0 -100.0	90.0 -100.0	Z=	0.043*
MEAN ± SD.	92.80 ±3.84	94.40 ±4.07	2.025*	
MEDIAN (IQR)	92.0 (90.0 - 92.0)	95.0 (90.0 - 97.0)		
NFA				
MIN. - MAX.	131.0 -140.0	120.0 - 135.0	Z =	<0.001*
MEAN ± SD.	135.2 ±2.96	128.0 ±5.28	3.499*	
MEDIAN (IQR)	135 (135.0 - 135.0)	130 (125.0 - 130.0)		

Z: Wilcoxon signed ranks test, t: Paired t-test, p: p value for comparing between Pre and Postoperative, *: Statistically significant at p ≤ 0.05, IQR: Inter quartile range, SD: Standard deviation

Concerning patient satisfaction assessment, 3 (20%) patients were fairly satisfied, 3 (20%) patients showed good satisfaction, and 9 (9%) patients reported excellent satisfaction (Table 3).

Table 3. Cases analyzed distributed in accordance with patients' levels of satisfaction (n = 15)

PATIENT SATISFACTION	NO. (%)
FAIR (1)	3 (20%)
GOOD (2)	3 (20%)
EXCELLENT (3)	9 (60%)

Regarding the complications, the graft was visible in 3(20%) patients and warping developed in 2(13.3%) cases otherwise no extrusion no necrosis of the graft or postoperative infection (Table 4).

Table 4. Distribution of the studied cases in accordance with complication (n=15)

COMPLICATIONS	NO.
VISIBILITY OF THE GRAFT	3 (20%)
WARPING OF THE GRAFT	2 (13.3%)
EXTRUSION OF THE GRAFT	0 (0%)
POSTOPERATIVE INFECTION	0 (0%)
NECROSIS OF THE GRAFT	0 (0%)

CASES PRESENTATION

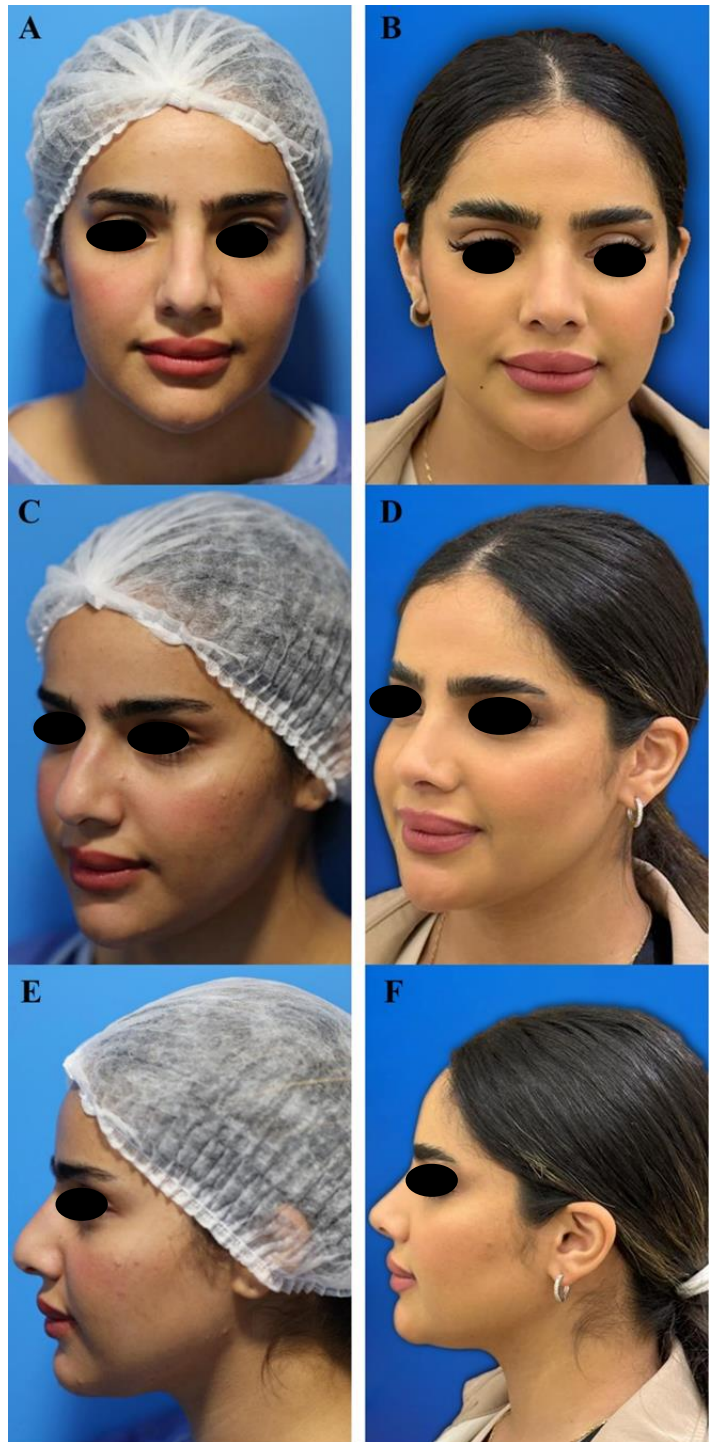


Figure 1. A 26-year-old woman's views before and six months after her surgery.

These are the preoperative views seen in (A), (C), and (E). The use of a dorsal onlay cartilage graft improves the nasal dorsal aesthetic lines, as seen in six months' postoperative views (B), (D), and (F).



Figure 2. Images taken before surgery and 6 months after a 24-year-old woman's operation.

(A), (C), (E), and (G): Photos taken before surgery. Pictures taken six months after surgery (B), (D), (F), and (H) reveal that the dorsal aesthetic lines of the nose have improved..



Figure 3. Intraoperative view of dorsal onlay

cartilage graft (A, B) with good definition of the nasal dorsum and improvement of dorsal aesthetic lines (C).

4. Discussion

In the current study, females were more predominant than males (80% vs. 20%). This may be attributed to the fact that females are more seeking cosmetics than males.

This was consistent with Golpayegani et al.⁷, who evaluated Dorsal projection and width as aesthetic outcomes of various dorsal augmentation techniques utilizing divided cartilage in rhinoplasty. They reported that among 98 patients, females were more than males (81.6% vs. 19.3%).

Also, Zholtikov et al.⁸, who employed divided cartilage within the fascia (DC-F) and utilized fascia in primary and secondary cases for aesthetic dorsal definition, reported that among 146 patients, there were 133 women and 13 men.

In the current study, statistically significant differences before and after surgery in terms of tip projection ($p=0.006$), nasal root width ($p<0.001$), nasal height ($p=0.001$), nasolabial angle ($p=0.0431$), and nasofrontal angle ($p>0.001$). However, no statistically significant difference before and after surgery regarding nasal length ($p=0.382$). Through the restoration of nasal length using cartilage onlay transplants, our findings indicate a rise in the dorsal aesthetic lines. In the substantial majority of instances, this method assisted us in attaining outstanding and predictable outcomes. Significantly enhancing the aesthetic proportions of the nose, we could emphasize dorsal aesthetic lines in predetermined locations.

Concerning patient satisfaction assessment, most patients (9 patients) reported excellent satisfaction, three patients showed good satisfaction, and three patients were fairly satisfied.

Lee et al.⁹ in a retrospective analysis, dorsal augmentation with divided autologous costal cartilage was performed on 38 patients undergoing rhinoplasty. Facial plastic surgeons assessed the aesthetic outcomes in 15 cases (39.5 percent), 18 cases (47.4 percent), 5 cases (13.1 percent), and 0 cases (0.0%) as exceptional, good, fair, or poor, respectively. The patient satisfaction levels were as follows: moderately dissatisfied (16 cases, 42.1 percent), extremely dissatisfied (15 cases, 39.5 percent), and dissatisfied (6 cases, 15.8 percent). After undergoing surgery, there was a significant increase in the heights of the dorsum and radix ($p < 0.05$).

In Park et al.¹⁰, Deep temporal fascia (DTF) was utilized in dorsal augmentation for primary rhinoplasty cases to enhance the curve of depressions and hump nostrils and for secondary

rhinoplasty cases to enhance implant demarcation and transparency. Of the 175 patients, 124 underwent combined grafts, 51 underwent free grafts, 7 received wrappings with divided cartilage, and 44 received combination grafts with cartilage. It was observed that among the 175 patients, 81 percent expressed satisfaction with the attained natural correction, while 19 percent expressed dissatisfaction with the under-correction that required additional surgical intervention to resolve.

Regarding the problems, the graft was visible in 3(20%) patients, and warping developed in 2(13.3%) cases. Otherwise, there was no extrusion, graft necrosis, or postoperative infection.

Kelly et al.¹¹ assessed 20 instances of unrestricted cartilage slicing with a mean follow-up duration of 18 months (ranging from 6 to 34 months). He listed three problems: overly full supra tips due to diced cartilage leaking, a small contour distortion, and an infection leading to graft loss. Except for the severe infection, the volume and shape of the grafts were preserved in the remaining nineteen cases.

On the contrary, Lee et al.⁹ reported that using diced cartilage grafts in 38 patients resulted in a high complication rate, including complications on the dorsum (11 patients), surface irregularities (4 patients), resorptions (5 patients), and short nose deformity (2 patients).

In a retrospective study, Guerra¹² reviewed ten cases of rhinoplasty that included postauricular fascia augmentation of the nasal dorsum and radix. Problems arose for two patients. A hematoma at the donor site necessitated drainage in one patient. One year following surgery, a second patient with fascia utilized for radix augmentation needed a revision tip rhinoplasty due to tip asymmetry. This series exhibited no signs of infection, displacement, extrusion, or resorption. Two individuals needed corticosteroid injections into the supra-tip region to alleviate swelling that lasted for an extended period.

The La Padula study noted no infection or significant resorption of the posterior auricular fascia graft.¹³ Furthermore, there was no apparent postoperative scarring at the donor's site.

The strength point of our work is comparing our work with the others in the literature regarding outcomes and complications. The primary constraints of this research pertain to the restricted follow-up period and the small sample size.

4. Conclusion

Our data suggested fruitful outcomes with low complication rates for using an onlay cartilage graft for dorsal definition in rhinoplasty. In order

to execute dorsal augmentation successfully, surgeons must possess a comprehensive understanding of the various augmentation materials and operative techniques presently accessible, as well as the associated risks, benefits, and intended applications of each.

Disclosure

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Authorship

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