

Tubed Temporalis Fascia for Nasal Dorsal Contouring: A Novel Technique

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Keywords

Autogenous grafts · Reoperation · Rhinoplasty · Temporal fascia

Abstract

Introduction: Nasal dorsum irregularities may occur after nasal trauma or as a postrhinoplasty complication. Here, we present a novel technique using temporalis fascia (TF) grafting for primary and revision rhinoplasty to repair the nasal dorsum, hide nasal irregularities, and improve nasal contouring. **Methods:** This prospective cohort study was conducted from January 2019 to June 2019 and evaluated nasal dorsal contouring using the TF in a tubed form. The outcome variables were patient satisfaction, dorsal irregularity, and contour definition. The predictor variable was the use of tubed TF for dorsal augmentation. Other associated variables were age, sex, indication for surgery, surgery type, and graft size. Patient satisfaction was evaluated using the Rhinoplasty Outcome Evaluation questionnaire. A rhinoplasty specialist other than the surgeon who performed the procedure evaluated the dorsal augmentation outcomes by inspection and palpation of the dorsum. All statistical analyses were performed using the SPSS soft-

ware. **Results:** Seventy-four patients (21.6% men and 78.4% women) were treated with the tubed TF. The mean age was 28.97 years. Thin skin was the most common indication (48.6%) for using TF. The graft size was 2–5 cm; inspection and palpation revealed no irregularities. No reception site complications occurred. One patient had a mild hematoma at the donor site. The mean patient satisfaction score was 10.14 preoperatively and 19.95 postoperatively ($p = 0.001$). **Discussion/Conclusions:** Our novel technique of using the TF graft in a tubed form was easy to perform. Furthermore, the tubed TF covers all irregularities, is good for dorsal augmentation, and improves dorsal contouring and definition. © 2021 S. Karger AG, Basel

Introduction

Rhinoplasty is one of the most common facial plastic surgeries. It is considered a difficult surgery. Satisfactory results are obtained when millimeter-sized defects are resolved surgically. Nasal dorsum irregularities may occur after nasal trauma or as a postrhinoplasty complication. Postrhinoplasty dorsal irregularity that needs revision

Table 1. Rhinoplasty outcome evaluation questionnaire

Question/score	0	1	2	3	4
How much do you like the appearance of your nose?	Not at all	Somewhat	Moderately	Very much	Completely
How much can you breathe through your nose?	Not at all	Somewhat	Moderately	Very much	Completely
How much do you think your friends and close ones like your nose?	Not at all	Somewhat	Moderately	Very much	Completely
Do you think your current nasal appearance limits your social or professional activities?	Not at all	Somewhat	Moderately	Very much	Completely
How confident are you that your nasal appearance is the best it can be?	Not at all	Somewhat	Moderately	Very much	Completely
Would you like to surgically alter the appearance or function of your nose?	Always	Usually	Sometimes	Rarely	Never

surgery occurs in 7–10% of patients. The most common risk factor for dorsal irregularities is thin skin [1].

Postrhinoplasty dorsal irregularities are concerning for surgeons and patients, especially for patients with thin skin. Such an irregularity may occur after an inappropriate reduction of a hump and after revision rhinoplasty. Many graft types have been reported: temporalis fascia (TF), fascia lata, alloderm, diced cartilage, homograft, and allograft [2–7]. A graft has many roles in obtaining the best outcome: covering irregularities, dorsal augmentation, camouflage, and nasal contouring by creating a dorsal aesthetic line [2–7]. Different shapes and forms of autologous, homologous, and allogenic nasal grafts are used to prevent or repair dorsal irregularities. The risk of complications, such as infection, extrusion, and inflammation, is high with alloplastic grafts [8].

A TF graft is commonly used for primary and revision rhinoplasty. TF has good flexibility and density, an ideal survival rate, and is less susceptible to infection; thus, it is a good choice for rhinoplasty [9]. TF can be used over the dorsum as a blanket to hide any irregularities or sharp edges, particularly in patients with thin skin. The fascia can also be layered over the dorsum to lightly augment it or over the tip to improve tip definition. TF can also be used in revision rhinoplasty to camouflage any irregularities or defects and can be used in patients who need more dorsal augmentation, such as in fascia over diced or strip cartilage grafts [10]. TF is widely used because it is easy to form, has a high level of tolerance, is easily accessible, and has a low infection rate [11]. In recent years, the use of TF in primary and revision rhinoplasty has increased. We aimed to use TF to cover and hide all dorsal irregularities, augment the dorsum, and improve dorsal contouring and definition by creating narrow, smooth, and unbroken brow dorsal line at the same time. In this article, we present our novel TF grafting technique in which the TF is formed into a tube for use in primary and revision rhinoplasty.

Materials and Methods

Study Design and Patients

This prospective cohort study, which was conducted at King Abdulaziz University Hospital (Riyadh, Saudi Arabia) from January 2019 to June 2019, was designed to evaluate the outcome of nasal dorsal contouring using the TF in tubed form. All surgeries were performed by the same senior rhinoplasty surgeon (A.M.A.). Seventy-four rhinoplasty patients who required TF grafting for dorsal nasal reconstruction were enrolled in this study. Patients were informed of the advantages and risks of the procedure and the necessity of grafting. The inclusion criteria were as follows: age of 18 years or older, an open approach, TF used in a tubed form, and an interval of at least 1 year since a rhinoplasty. The exclusion criteria were as follows: age younger than 18 years, a closed approach, and an interval of <1 year since an earlier rhinoplasty.

Ethical Considerations

This study was approved by the Institutional Review Board, College of Medicine Research Center, King Saud University (Reference No. 19/0808/RB). All the patients who participated in this study provided written informed consent. All the patient data remained confidential and were used for research purposes only. This study was conducted in accordance with the Declaration of Helsinki.

Study Variables

The outcome variables were patient satisfaction, dorsal irregularity, and nasal contour definition. The predictor variable was the use of tubed TF for dorsal augmentation. Other associated variables were age, sex, indication for surgery, surgery type, and graft size. These variables were assessed with regard to the outcome variables. Age was categorized into 4 groups: <20 years old, 20–29 years old, 30–40 years old, and >40 years old. Patient satisfaction was evaluated using the Rhinoplasty Outcome Evaluation (ROE) Questionnaire (scores range from 0 to 24 points; “0” represents the lowest level of satisfaction) (Table 1) [5]. The answers to the questionnaires were obtained by a rhinoplasty specialist other than the surgeon who performed the procedure. The preoperative and 12-month postoperative scores of the enrolled patients were calculated, and the differences were statistically analyzed. Preoperative and 12-month postoperative photographs of the patients were obtained. The outcomes of each dorsal augmentation, based on inspection and palpation of the dorsum, was evaluated by a rhinoplasty specialist other than the surgeon who performed the procedure.

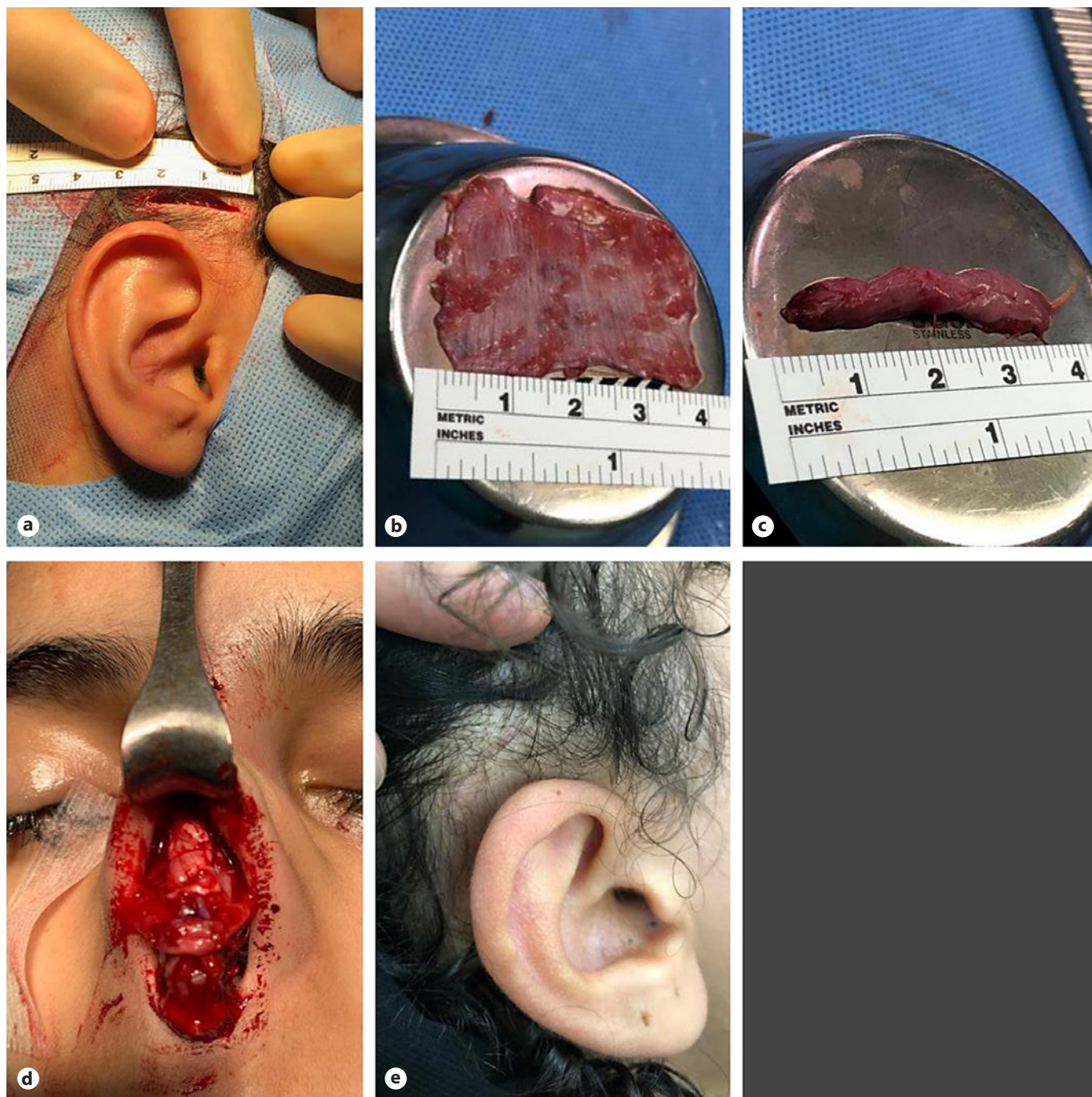


Fig. 1. **a** Harvesting the deep temporal fascia. **b** The temporalis fascia in the blanket form. **c** The temporalis fascia in the tubed form. **d** Placement of the temporalis fascia over the desired site and fixation with sutures. **e** A 1-year-postoperative view of the donor site.

Surgical Procedures

Harvesting of the Deep Temporal Fascia

A curved 2-cm temporal incision was formed above the root of the helix and behind the anterior hairline. The incision was made parallel to the hair follicles to avoid the risk of alopecia. The super-

ficial temporal fascia was incised down to the glistening white surface of the deep temporal fascia. A piece of deep temporal fascia was harvested and placed in saline- and antibiotic-soaked gauze (shown in Fig. 1a).

Table 2. Patient demographics and characteristics of the temporalis fascia graft

Sex, %	
Male	21.6
Female	78.4
Age	
Range, yr	18–45
Mean (SD)	28.97 (4.91)
Size of temporalis fascia graft	
Range, cm	2–5
Mean (SD)	3.26 (0.7)
Type of rhinoplasty, %	
Primary	68.9
Revision	31.1
Indication for using a temporalis fascia graft, %	
Thin skin	48.6
Poor dorsal brow aesthetic line	36.5
Augmentation	6.8
Dorsal irregularities	5.4
As camouflage	2.7
Temporalis fascia graft site, %	
Over the dorsum	82.4
Dorsum and supratip area	14.9
Dorsum and radix	2.7

SD, standard deviation.

Formation of the TF into a Tubed Form

We formed the TF into a tube by suturing the ends together with polyglactin 910 sutures (Vicryl; Ethicon Inc., Bridgewater, NJ, USA). We used the graft to hide any irregularities and give a better definition (shown in Fig. 1b, c).

TF Placement

After elevating the skin flap and removing the dorsal hump, if present, the need for correction was evaluated for each patient. At the end of the surgery, we then applied the tubed fascia over the dorsum and fixed it with Vicryl 4-0 sutures (Ethicon Inc., Bridgewater, NJ, USA) (shown in Fig. 1d).

Statistical Analyses

All statistical analyses were conducted using the SPSS software (IBM, Armonk, NY, USA). Descriptive statistical analyses were conducted to describe the demographic data of the patients. The preoperative and postoperative differences in patient outcomes were evaluated using the Wilcoxon signed-rank tests for continuous variables (e.g., age). Pearson product-moment correlation was used to determine the correlation between variables and outcomes. A p value of ≤ 0.05 was considered statistically significant.

Results

Patient Demographics

The present study included 74 patients treated with a tubed TF graft. The patients consisted of 16 (21.6%) men

Table 3. Clinical outcomes

Irregularities	
Inspection	0 (0)
Palpation	0 (0)
Graft malposition	
Inspection	0 (0)
Palpation	0 (0)
Donor site complication	
Hematoma	1 (1.4)
Alopecia	0 (0)
Agley scar	0 (0)
Recipient site complication	0 (0)
Patient satisfaction (ROE score)	19.95 (1.18)

The data are presented as n (%) and as mean (standard deviation). ROE, rhinoplasty outcome evaluation.

and 58 (78.4%) women with a mean age of 28.97 years (age range, 18–45 years) (shown in Table 2).

Indications for the Graft, Graft Size, and Graft Site

Fifty-one (68.9%) patients underwent primary rhinoplasty, and 23 (31.1%) underwent secondary rhinoplasty. Thin skin was the most common indication for using TF, in 36 (48.6%) patients, followed by poor dorsal brow aesthetic line in 27 (36.5%), augmentation in 5 (6.8%), irregularities in 4 (5.4%), and camouflage in 2 (2.7%). The dorsum was the most common site (82.4%) for a TF graft. The graft size varied from 2 to 5 cm (mean size, 3.26 cm) (shown in Table 2).

Clinical Outcomes

No irregularity was detected by inspection or palpation. No patient had a reception site complication. However, 1 patient had a mild hematoma at the donor site, which was resolved by applying compression dressing. The mean patient satisfaction score (based on the ROE questionnaire) was 10.14 preoperatively and 19.95 postoperatively. The postoperative ROE scores were significantly higher than the preoperative scores ($p = 0.001$) (shown in Table 3).

Study Variables versus Outcome Variables

The mean postoperative ROE score for patient satisfaction was 20.25 in men and 19.87 in women. Regarding age, the highest patient satisfaction score was in patients >40 years old (20.5), and the lowest was in patients <20 years old (18.66). The mean postoperative ROE score was 20.5 for patients receiving a tubed graft over the dorsum and radix, 20 for patients receiving a

Table 4. Effect of various variables on patient satisfaction

	Patient satisfaction (ROE)	<i>p</i> value
Age		
<20 years old	18.66 (1.52)	0.254
20–29 years old	20.02 (1.15)	
30–40 years old	19.96 (1.2)	
>40 years old	20.5 (0.7)	
Sex		
Male	20.25 (1.12)	0.272
Female	19.87 (1.2)	
Size of temporalis fascia graft	19.95 (1.18)	0.547
Type of rhinoplasty		
Primary	20.49 (0.88)	0.001
Revision	18.78 (0.9)	
Indication for a temporalis fascia graft		
Thin skin	20.22 (1.07)	0.003
Poor dorsal brow aesthetic line	19.81 (1.11)	
Augmentation	20.6 (0.89)	
Dorsal irregularities	19 (1.41)	
As camouflage	17.5 (0.7)	
Site of temporalis fascia graft		
Over the dorsum	20 (1.21)	0.528
Over the dorsum and supratip area	19.63 (1.12)	
Over the dorsum and radix	20.5 (0.7)	

The data are presented as mean (standard deviation). ROE, rhinoplasty outcome evaluation.

tubed graft over the dorsum, and 19.63 for patients receiving a tubed graft over the dorsum and supratip area. No significant relationship existed between the variables (i.e., age, sex, TF graft site, and size) and patient satisfaction (based on the ROE score) ($p > 0.05$) (shown in Table 4).

The mean postoperative ROE score was 20.22 for patients who underwent rhinoplasty because of thin skin, 19.81 for patients who underwent rhinoplasty because of a poor dorsal brow aesthetic line, 19.0 for patients who underwent rhinoplasty because of irregularities, 19.0 for patients who underwent rhinoplasty because of the need for augmentation, and 17.5 for patients in whom the TF was used as camouflage. The mean postoperative ROE score was 20.49 for patients who underwent primary rhinoplasty and 18.78 for patients who underwent secondary rhinoplasty. The type of rhinoplasty and indication for rhinoplasty were significant variables as regards patient satisfaction (based on the ROE scores) ($p < 0.05$) (shown in Table 4).



Fig. 2. Postoperative improvement of the dorsal contour. **a** Preoperative frontal view. **b** Postoperative frontal view. **c** Preoperative lateral view. **d** Postoperative lateral view.

Discussion/Conclusion

In this study, we described a novel technique of forming the TF into a tube to cover the osseocartilaginous framework to simultaneously hide irregularities, augment the dorsum, and improve dorsal definition (Fig. 2). With our technique, no reception site complications or irregularities occurred, and only 1 patient had a mild hematoma at the donor site, which was resolved with a compression dressing.

The best material for grafting in rhinoplasty is an autogenous graft, which includes septal cartilage, auricular cartilage, rib cartilage, ethmoid bone, TF, and fascia lata. Autogenous grafts are better than extrinsic materials used for grafts such as homografts or alloplasts. TF is frequently used in rhinoplasty because its elasticity and density are ideal for use in primary and revision rhinoplasty. The reasons for choosing TF for rhinoplasty are that it is less susceptible to infection, has a lower resorption rate, and is easy to manipulate, form, and shape, suture, and fix at a particular site [10]. TF harvesting is easy and requires a straight simple surgical technique. The procedure does not last longer than 10 min and leaves no visible scar because the scar is hidden within the hair [10]. Many investigators have studied dorsal irregularities in primary and revision rhinoplasty cases and described how to prevent and manage irregularities using TF grafts, surgical-

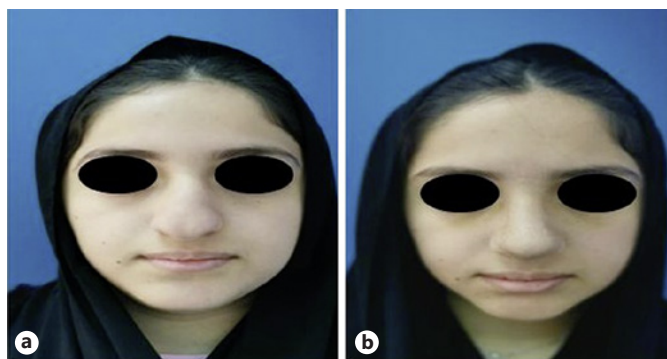


Fig. 3. Improvement of the dorsal contour in a patient with thick skin. **a** Preoperative frontal view. **b** Postoperative frontal view.

wrapped diced cartilage grafts, and dermal grafts [2, 4, 12–14]. Erdogan et al. [4] used a dermal graft for dorsal augmentation in rhinoplasty. They reported that its advantages are that the graft is easy to obtain and form and can be used to correct irregularities and any small defects; its disadvantage is an increased risk of resorption, which requires reaugmentation in one-fourth of patients.

Many authors have studied diced cartilage grafts for dorsal augmentation. In these grafts, the small cartilage fragments are palpable and cause irregularities [15]. To overcome this disadvantage, a technique of enveloping the diced cartilage graft with TF and an oxidized cellulose polymer (Surgicel; Ethicon Inc., Bridgewater, NJ, USA) has been described [2, 16]. Harel and Margulis [17] studied dorsal augmentation with diced cartilage enclosed with TF. They reported that 3 patients had visible swelling of the graft in the rhinion. One of these 3 patients required revision; the other 2 patients had smaller dorsum irregularities that were managed by puncturing the grafts with a needle. Miller [18] used TF for contour augmentation in primary and revision rhinoplasty. Sheen et al. [19] used TF for radix augmentation. They reported a complication rate of <1% and were more concerned about long-term resorption than graft visibility. Therefore, Sheen advises a 25% overcorrection when using the TF. Besharatzadeh et al. [20] investigated the use of TF for radix augmentation. They reported a minor hematoma at the donor site in 1 patient, which was managed with a simple compression dressing. In addition, they reported temporary hair loss at the incision site in 5 patients, which also resolved. They reported no major complications at the donor site, as well as no graft visibility, irregularity, malposition, and persistent erythema or infection at the recipient site.

In the present study, thin skin was the most common indication for using TF. Other indications for using TF in a tubed form are to correct fascia dorsal irregularities, poor dorsal brow aesthetic line, contouring, radix and dorsal augmentation, and as camouflage. We report that only 1 patient had a mild hematoma at the donor site, which was resolved by dressing compression; however, no other complications occurred, such as alopecia or infection (shown in Fig. 1e).

The present technique was chosen for several reasons. We found the technique easy to perform; it involves forming the TF graft into a simple tube that covers and hides all irregularities and sharp edges. It can be used for augmentation; it also provides good dorsal contouring and definition by creating a narrow, smooth, and unbroken brow line, especially in patients with thick skin (shown in Fig. 3).

This study was conducted at a single center, and patients were followed up for 1 year only. These are 2 of the main limitations of this study. Future multicentric studies with longer follow-up periods are needed.

In conclusion, TF is widely used in rhinoplasty because it is easy to harvest, has a high level of tolerance, and has a low infection rate. We described a novel, easy to perform technique of forming the TF into a tube for grafting. The tubed TF covers all irregularities, is good for dorsal augmentation, and improves dorsal contouring and definition.

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Statement of Ethics

The Institutional Review Board of the King Saud University (Riyadh, Saudi Arabia) approved the study. All the patients who participated in this study provided written informed consent. All the patient data remained confidential and were used for research purposes only.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Jibril Hudise: formal analysis, methodology, software, and writing the original draft. Saud Aldhabaan, Almaha Alqabbani, and Raad Nassar: data collection. Ahmed Alarfaj: conceptualization, reviewing, and supervision.

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