Indications, Techniques, and Postoperative Outcomes of Temporalis Fascia Grafting in Rhinoplasty

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Objectives: To investigate the indication, site, techniques, and complications at the donor and recipient sites of temporalis fascia grafting in rhinoplasty, and patients’ satisfaction with the surgical outcomes.

Methods: This retrospective cohort study was performed at King Abdulaziz University Hospital, Saudi Arabia, between January 2015 and January 2020. The predictor variable was the temporalis fascia in different forms. Reported variables comprised individuals’ satisfaction, dorsal nasal irregularities, and contour definitions. Moreover, further variables were considered, including age, gender, the reason behind surgery, surgical type, and graft size and site. A rhinoplasty doctor, other than a surgeon, has assessed the dorsal augmentation findings by inspecting and palpating the dorsum. Data analyses were achieved through SPSS.

Results: A total of 69 patients were enrolled in this study; 44.9% of them underwent rhinoplasty with the temporalis fascia in cartilage wrapped by the temporalis fascia form, 43.5% in a blanket form, and 11.6% in a ball form. The average subject satisfaction outcome score was 10.44 preoperatively and 19.72 postoperatively ($P = 0.001$).

No dorsal irregularities were detected by inspection in all forms of the temporalis fascia, whereas 3 patients with the blanket and 2 patients with the cartilage wrapped by the temporalis fascia had irregularities, which were detected on palpation.

Conclusions: In rhinoplasty, the temporalis fascia is a favorable choice for nasal reconstruction since it is simple in harvesting and can be made in different forms and shapes for many purposes.

Key Words: Grafts, patients’ satisfaction, rhinoplasty, temporalis fascia

Rhinoplasty is a common and intricate plastic surgery and is difficult-to-perform facial plastic surgery. Nasal trauma or rhinoplasty may cause irregularities at the dorsum of the nose. Dorsal irregularities occurring after rhinoplasty are the most common form of nasal dorsum asymmetry with an associated decreased patients’ satisfaction level and an increased incidence of revision surgery in 7% to 10% of patients.¹

Postrhinoplasty dorsal irregularities are challenging for both patients and surgeons. Of note, several grafts have been used for nasal reconstruction, including the temporalis fascia, diced cartilage, fascia lata, aloderm, homograft, and allograft. These grafts are beneficial for nasal reconstruction as they assist in hiding irregularities, dorsal augmentation, camouflage, and improving nasal contour by establishing a dorsal esthetic line.² Various forms and shapes of autologous, homologous, and allogeneic nasal grafts were utilized in rhinoplasty to reform dorsal irregularities and augment the nasal dorsum. However, unfavorable outcomes, such as infection, rejection, extrusion, and inflammation remain common with the use of alloplastic materials in nasal reconstruction by rhinoplasty.³

The temporalis fascia for nasal reconstruction is usually applied for primary rhinoplasty and revision rhinoplasty. A temporalis fascia graft is less susceptible to infection and has an ideal survival rate; therefore, it is perfect for rhinoplasty.⁴ The temporalis fascia can be used to correct dorsum asymmetry and sharp rims especially in cases with delicate skin. The fascia can also be layered to augment the nasal dorsum and radix, camouflage, and improve the tip definition.⁵

Herein, we provide a descriptive original report of our experience with using a temporalis fascia in rhinoplasty in terms of indication, site, techniques, and complications at the donor and recipient sites. Moreover, we also evaluated the patients’ postoperative satisfaction rates.

METHODS

Study Setting

The present study is a retrospective cohort project carried out at King Abdulaziz University Hospital, Riyadh, Saudi

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Arabia, between January 2015 and January 2020. The project proposal has been accepted and signed by the Research Center and ethics committee at Medical School, King Saud University, Saudi Arabia. All operations were conducted by the same senior rhinoplasty surgeon (A.M.A.). All contributing patients were instructed about the benefits and risks of the surgery as well as the value of applying a graft. Furthermore, written informed consent was provided by all included subjects. The study included all patients who underwent rhinoplasty with temporalis fascia graft to correct irregular nasal dorsum. Our study considered for inclusion (i) only patients ages > 18 years, (ii) with an open approach, (iii) temporalis fascia for grafting, and (iv) a period of ≥ 1 year following a rhinoplasty procedure.

**Study Outcomes**

The outcomes of the present study have reported dorsal irregularity, nasal contour definitions, and patients’ satisfaction scores. The main variable was the form of the temporalis fascia (blanket, ball forms, and cartilage wrapped by the temporalis fascia) that was applied for dorsal augmentation. The remaining variables were age, gender, type of surgery, indication for using a temporalis fascia graft, type of temporalis fascia graft, graft size and site, and the duration of harvesting the temporalis fascia and incision size. Based on age, the patients were divided into the following four groups: < 20 years, 20 to 29 years, 30 to 40 years, and > 40 years. Patient impression was evaluated using the Rhinoplasty Outcome Evaluation (ROE) Questionnaire (scores vary from 0–24 points; “0” represents the lowest degree of contentment) (Supplementary Digital Content, Table 1, http://links.lww.com/SCS/D876). The surveys were administered by a rhinoplasty surgeon different from a responsible surgeon. The preoperation and 12-month postoperation scores were calculated. Preoperative and 12-month postoperative photographs were acquired. The outcomes of every dorsal augmentation were released according to inspection and palpation of the nasal dorsum. Similarly, they were assessed by a rhinoplasty doctor rather than a surgeon.

**Surgical Technique**

**Temporalis Fascia Harvest**

First, a transverse 2 to 3 cm incision was performed posterior to the temporal hairline at the level of the superior helical rim. Then, the deep temporalis fascia was identified and exposed. Finally, the graft was harvested and an incision was closed with absorbable sutures (Fig. 1A).

**Using temporalis fascia in different forms**

The temporalis fascia as a blanket: We used a temporalis fascia graft as a blanket to cover and hide irregularities over the bony cartilaginous framework (Fig. 1B).

The temporalis fascia as a ball-shaped: We formed the temporalis fascia into a ball by suturing it with Vicryl 5-0 and using it over the radix to augment it (Fig. 1C).

Cartilage wrapped by the temporalis fascia: Strips of cartilage were covered by the temporalis fascia, and the fascia was sutured using a 5-0 polyglactin suture. It was also used to augment the radix and dorsum (Fig. 1D).

**Statistical Analyses**

Data were analyzed using SPSS software (IBM, Armonk, NY). Descriptive statistical analyses were performed to describe the basic features of the patients. The pre- and post-operative outcome variations among enrolled subjects were calculated through Wilcoxon signed-rank test for continuous variables. Pearson correlation was considered to examine the association between studied variables and research outcomes. The level of statistical significance was set at P < 0.05.

**RESULTS**

A total of 69 subjects have joined our study; 13 (18.8%) men and 56 (81.2%) women. The age group was classified to be under 20 years old with a total number of 4 (5.8%) patients, between 20 and 29 years old with a total number of 42 (60.9%) patients, between 30 and 39 years old with a total number of 21 (30.4%) patients, and above 40 years old with a total number of 2 (2.9%) patients. The mean age of patients was 27.28 years (Supplementary Digital Content, Table 2, http://links.lww.com/SCS/D876).

**Types of Temporalis Fascia Graft**

31 (44.9%) patients underwent rhinoplasty with the cartilage wrapped by the temporalis fascia form; 30 (43.5%) with the temporalis fascia in a blanket and 8 (11.6%) in a ball form (Supplementary Digital Content, Table 2, http://links.lww.com/SCS/D876).

**Graft Indications and Characteristics**

Primary and revision rhinoplasty were conducted in 42 (60.9%) and 27 (39.1%) patients, respectively. Thin skin was the commonest indication for using the temporalis fascia graft in 47 (68.1%) patients, augmentation in 11 (15.9%) patients, irregularities in 9 (13%) patients, and camouflage in 2 (2.9%) patients. The most common site of the temporalis fascia graft was the nasal dorsum 46 (66.7%) followed by over the dorsum and supratip 11 (15.9%), radix was 8 (11.6%), and supra tip area was 4 (5.8%). The graft size was not constant; from 2 to 5.8 cm (mean size, 3.19 cm, SD 0.78). The size of temporalis fascia graft skin incision ranges from 1.9 to 3 cm (mean 2.53 cm, SD 0.34). The duration of harvesting temporalis fascia graft ranged from 10 to 20 minutes (mean 14.69 minutes, SD 3.41) (Supplementary Digital Content, Table 2, http://links.lww.com/SCS/D876).
Temporalis Fascia in Blanket Form

No irregularity was detected on inspection; however, irregularities were detected in 3 patients on palpation. Mild hematoma at the donor site was observed in 1 case; however, it was resolved by compressive dressing. The average individual satisfaction score was 10.66 preoperatively compared with 19.66 after an operation. Notably, the postoperative ROE scores were markedly more than preoperative scores (P = 0.001) (Supplementary Digital Content, Table 3, http://links.lww.com/SCS/D876).

Temporalis Fascia in ball form

No irregularities were detected by inspection or palpation. None of the patients reported a reception or site complication. The mean patient satisfaction score was 10.25 preoperatively and 19 postoperatively. The postoperative ROE scores were markedly more than the preoperative scores (P = 0.001) (Supplementary Digital Content, Table 3, http://links.lww.com/SCS/D876).

Cartilage Wrapped by the Temporalis Fascia

No irregularity was detected on inspection; however, irregularities were detected in 2 patients on palpation. Similarly, mild hematoma at the donor site was observed in 1 case and was completely relieved by compressive dressings. The average subjects’ satisfaction score was 10.64 preoperatively and 19.29 postoperatively. The postoperative ROE scores were considerably higher than the preoperative scores, and the difference was statistically effective (P = 0.001) (Supplementary Digital Content, Table 3, http://links.lww.com/SCS/D876).

DISCUSSION

In this study, we present our experience in using temporalis fascia grafts in rhinoplasty. This study found that using, manipulating, and making different forms of temporalis fascia grafts are attainable. They can be used alone or in combination with cartilage. They can be used for hiding irregularities, dorsum and radix augmentation, camouflage, and improving nasal contour by forming a dorsal esthetic line.

Autogenous grafts, which include septal cartilage, auricular cartilage, rib cartilage, the ethmoid bone, temporalis fascia, and fascia lata, are the best choices for rhinoplasty grafting and are better than homografts or allografts. The temporalis fascia is commonly used for dorsal reconstruction in rhinoplasty and has special characteristics, including less susceptibility to infection, easy to manipulate, and a lower resorption rate; therefore, it is optimal for grafting in both first and revision rhinoplasty operations. Harvesting of the temporalis fascia is easy through a simple surgical method that results in a nonvisible scar within the hair.10 Many authors have investigated dorsal irregularities in primary and revision rhinoplasties.2,4,11–13 Erdogan et al studied dorsal augmentation using dermal grafts. They concluded that dorsal reconstruction using a dermal graft is easy and can be utilized to reconstruct irregularities or any small defects, which raises the risk of absorption. This risk requires a repeat augmentation in one-quarter of patients.4

Several studies have assessed dorsal augmentation using diced cartilage grafts. Small cartilage fragments are palpable and cause irregularities.14 To solve this drawback, diced cartilage was enveloped by the temporalis fascia, and an oxidized cellulose polymer has been reported.15,16 Harel and Margulis16 studied the diced cartilage enveloped by the temporalis fascia for dorsal augmentation. They noticed that 3 patients had visible graft swelling; one required revision and the other two had smaller dorsum irregularities. Sheen17 used the temporalis fascia for augmentation of radix. They reported a complication rate of <1%. Besharatizadeh et al18 used the temporalis fascia for radix augmentation. They have observed a small hematoma at the donor site in 1 patient, which was resolved with a simple compressive dressing. Moreover, they reported temporary hair loss at the incision site in 5 patients, which was also resolved. They observed no main adverse events at the donor site, and no graft visibility, irregularity, malposition, constant erythema, or infection at the recipient site, which was consistent with our study.

In the report by Park et al, a total of 175 patients underwent rhinoplasty using deep temporal fascia. Of them, 81% expressed their satisfaction with the performed natural correction whereas 19% reported under correction, which was addressed by further surgery. Notably, no known complications were reported by the authors among the enrolled sample.19

In a previous study that investigated the correction of nasal dorsal contour through a tubed form of temporalis fascia, the results were consistent with our report. The aforementioned study reported an average satisfaction score of 10.14 preoperatively and 19.95 postoperatively, with the difference being statistically significant. Moreover, there was no recipient site adverse events reported.20 Similar findings were noted in those patients who underwent reconstruction using the cartilage wrapped by the temporalis fascia (Fig. 2A) or temporalis fascia in a blanket form (Fig. 2B) or in those who underwent reconstruction using ball form (Fig. 2C).

This study has been affected by a few limitations such as being a single-center design and short follow-up duration (1 year). Thus, future multicenter reports with extended follow-up durations are needed.

CONCLUSIONS

The temporalis fascia is a favorable choice for nasal reconstruction in rhinoplasty, as it is easy to harvest and can be formulated into different forms and shapes for many purposes, such as hiding irregularities, dorsum and radix augmentation, camouflage, and improving nasal contouring. Further, it can be used at different sites, such as the dorsum, radix, supra tip, and tip area.

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REFERENCES

1. Çöloglu H, Uysal A, Tiftiççıoğlu YÖ, et al. Comparison of autogenous cartilage, acellular dermis, and solvent-dehydrated pericardium for the prevention and correction of dorsal nasal irregularities: an experimental study. Aesth Plast Surg 2012;36:732–741
2. Erol OO. The Turkish delight: a pliable graft for rhinoplasty. *Plast Reconstr Surg* 2000;105:2229–2241
3. Baker TM, Courtiss EH. Temporalis fascia grafts in open secondary rhinoplasty. *Plast Reconstr Surg* 1994;93:802–810
4. Erdogan B, Tuncel A, Adanali G, et al. Augmentation rhinoplasty with dermal graft and review of literature. *Plast Reconstr Surg* 2003;111:2060–2068
5. Jackson IT, Yavuzer R. Alloderm for dorsal nasal irregularities. *Plast Reconstr Surg* 2001;107:555–558
6. Gryskiewicz JM, Rohrich RJ, Reagan BJ. The use of alloderm for the correction of the nasal contour deformities. *Plast Reconstr Surg* 2001;107:561–570
7. Gajiwala K, Lobo Gajiwala A. Use of banked tissue in plastic surgery. *Cell Tissue Bank* 2003;4:141–146
8. Lin G, Lawson W. Complications using grafts and implants in rhinoplasty. *Oper Tech Otolaryngol Head Neck Surg* 2007;18:315–323
9. Daniel RK, Sajadian A. Secondary rhinoplasty: management of the overresected the dorsum. *Facial Plast Surg* 2012;28:417–426
10. Xavier R. Pectoralis major fascia in rhinoplasty. *Aesthetic Plast Surg* 2015;39:300–305
11. Kelly MH, Bulstrode NW, Waterhouse N. Versatility of diced cartilage-fascia grafts in dorsal nasal augmentation. *Plast Reconstr Surg* 2007;120:1654–659
12. Velidedeoglu H, Demir Z, Sahin U, et al. Block and Surgicel-wrapped diced solvent-preserved costal cartilage homograft application for nasal augmentation. *Plast Reconstr Surg* 2005;115:2081–2097
13. Reich J. The application of dermis grafts in deformities of the nose. *Plast Reconstr Surg* 1983;71:772–782
14. Celik M, Halioglu T, Baycin N. Bone chips and diced cartilage: an anatomically adopted graft for the nasal the dorsum. *Aesthetic Plast Surg* 2004;28:8–12
15. Guerrerossantos J, Trabanino C, Guerrerossantos F. Multifragmented cartilage wrapped with fascia in augmentation rhinoplasty. *Plast Reconstr Surg* 2006;117:804–816
16. Harel M, Margulis A. Dorsal augmentation with diced cartilage enclosed with temporal fascia in secondary endonasal rhinoplasty. *Aesthet Surg J* 2013;33:809–816
17. Sheen JH. The ideal dorsal graft: a continuing quest. *Plast Reconstr Surg* 1998;102:2490–2493
18. Besharatzadeh R, Ozkan BT, Tabrizi R. Complete or a partial sheet of deep temporal fascial graft as a radix graft for radix augmentation. *Ear Arch Otorhinolaryngol* 2011;268:1449–1453
19. Park SW, Kim JH, Choi CY, et al. Various applications of deep temporal fascia in rhinoplasty. *Yonsei Med J* 2015;56:167–174
20. Hudise JY, Aldhabaan SA, Alqabbani AA, et al. Tubed temporalis fascia for nasal dorsal contouring: a novel technique. *ORL J Otorhinolaryngol Relat Spec* 2021;83:979–103