

Augmentation of Depressed Nasal Dorsum by Diced Cartilage Graft Wrapped with Fascia Lata

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ABSTRACT:

BACKGROUND:

Dorsal reconstruction and augmentation for a saddle nose or generalized under projecting nose (familial) require some type of grafting that increase the volume, raise the radix, raise the entire dorsum, camouflage the osseocartilaginous junction or any irregularity along the dorsum, diced cartilage graft wrapped with fascia lata used to achieve that.

AIM OF THE STUDY :

The purpose of the study was to assess the aesthetic and functional outcome of dorsal augmentation by diced cartilage graft wrapped with fascia lata.

PATIENTS AND METHODS:

Between July 2018 and May 2019. 7 patients included, 4 females and 3 males, their age ranged between 20 to 37 years, 5 were primary and 2 secondary case rhinoplasty, 2 operated by closed approach, 3 open approach and 2 of the them the graft placed by intercartilaginous incision. Subjective evaluation was done by clinical and photographic assessment during postoperative follow up period 3-12 months.

RESULTS:

All the patients were satisfied with the postoperative results. with improvement of aesthetic shape and respiratory function.

CONCLUSION:

Diced cartilage graft wrapped with fascia lata is an effective technique for nasal dorsal augmentation.

KEYWORDS: Diced cartilage, fascia lata, dorsal augmentation, saddle nose

INTRODUCTION:

Saddle nose (structural deficiency of the nasal dorsum) most commonly caused by severe injury to the nose that leads to fracture and splaying of the bones that formed the upper vault. In addition to the bones, cartilages also fractured by trauma and buckled or dislocated from their attachment to the bones. Subsequent deformity is augmented due to the later on fibrosis formation. Other causes of saddle nose include iatrogenic causes (radicle septal operation, infection, chronic inflammatory, tumor, congenital).^(1,2)

Many classification for saddle nose have been suggested including those by Vartanian, tardy et al, Daniel and Brennar and its modification by Snag Min Hyn. Overall, there is no consensus regarding the most suitable classification and according to Sang classification

- Type 1; has minor supratip or cartilaginous dorsal depression.
- Type 2; has moderate to severe cartilaginous dorsal depression, with a prominent lower third.
- Type 3; has pan-nasal defect with severe bony dorsal deficiency, in combination with a lower third deficit.
- Type 4; has pan-nasal defect and a relatively prominent tip projection only by the lower lateral cartilage.⁽³⁻⁶⁾

Nasal dorsal augmentation require grafting which increases the volume, raises the nasal radix, and camouflage the osteocartilaginous junction between the nasal bone and middle vault or any irregularity along the dorsum.⁽⁷⁾

Diced cartilage graft is one of revolutionized method which is used for dorsal augmentation and aesthetically superior to solid cartilage graft without risk of warping, misalignment or K. wire extrusion.⁽⁸⁾

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Autologous fascia, which has optimal tensile strength, and good tissue integration become the preferred material for enclosing diced cartilage, and will confine the graft, smooth any irregularities and act as neoperichondrium^(9,10) In this study we have used diced cartilage graft wrapped with fascia lata to assess the aesthetic and functional outcome of this method in augmentation of depressed nose.

PATIENT AND METHOD:

The study was conducted between July 2018 and May 2019 in Al – Emam ali hospital and Al- Shaheed Ghazi Al- Hariri hospital. Seven patients were included, four females and three males, their age ranged between 20 to 37 years, five were primary and two secondary rhinoplasty.

Patient seeking dorsal augmentation were included in this study, patients who require septal reconstruction were excluded from the study.

Table 1: Patient data.

Rhinoplasty no.	Primary	5
	Secondary ,tertiary	2
Sex	Male	3
	Female	4
Age .y	Mean	32
	Range	23-37
Approach	Closed	4
	Open	3
Deformity etiology	Trauma	4
	Previous	2
	Septorhinoplasty Familial	1
Cartilage source	Septal	2
	Costochondral	4
	Choncal	1
Breathing difficulty	Present	4
	Not present	3
Type of saddle	Type1: 2cases,Type 2: 2 cases Type 3: 1 case,Type 4: 1 case One case was familial	

Pre operative detailed history and analysis was carried including the history of previous trauma or surgery or any disease process, the presence of nasal airway obstruction along with nasal parameters including tip projection, dorsal deficiency, width and support.

All patients sent for preoperative CT scan study for evaluation, mainly the septum.

We didn't face a difficulty in deciding whether or not septum reconstruction is required, but if it was difficult to decide, then E.N.T surgeon opinion can be shared

Routine preoperative laboratory evaluation has

been done. Preoperative photography was obtained (lateral, oblique, frontal, basal and on top views). Informed consent was obtained from all patients after discussion about the site of grafting for cartilage and the fascia.

Subjective analysis was adopted as a parameter for patient s perception, surgeon s opinion and third eye (another plastic surgeon) opinion. Visual Analogue Scale from 1 to 10 was used as the following ; 1,2 and 3 indicates poor satisfaction rate , 4 and 5 indicates fair results , 6 and 7 for good results , and >7 indicates very good results .



Figure 1: Visual analogue scale.

Operative technique

All patients were operated under general anesthesia with endotracheal intubation, in supine position, 3 by open approach, 2 closed approach and 2 of them the graft positioned by an intercartilaginous incision only. Prepping and draping done. After marking, Fascia lata harvested from the thigh through

a lazy S incision. The required dimensions of the fascia lata ; the width is equal to the circumference of the syringe that will be used plus 2 to 3 millimeters , and the length depending on the length of the depression to be filled adding few millimeters to ease handling . (Fig. 2)

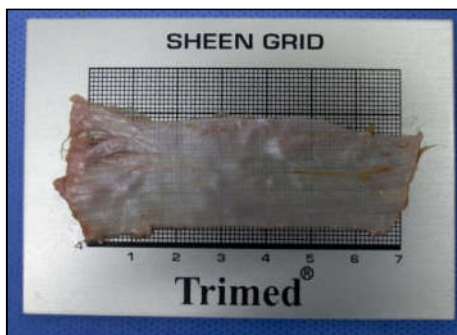


Fig. 2: Harvested fascia lata.

The cartilage graft material can be obtained from the excised parts of lower lateral cartilage and the septum if its condition permits. If it is insufficient, another donor site is required being the ear and the rib as the last choice. On the back table, for most cases an 1cc syringe is used (depending on the width of the patient

nasal dorsum), after cutting the distal end, the syringe is wrapped with the rectangular piece of fascia and secured in its distal end, by a 4-0 vicryl continuous stitches, and interrupted stitches along the length of the tube being made as shown in figure (3).



Fig. 3: Making fascial tube.

The cartilage is diced to about 0.5-1 mm cubes by a no.11 blade ,few drops of peripheral blood

is added to the cartilage before being packed into the syringe . figure (4)



Fig. 4 :Diced cartilage.

Then the graft is pushed into the fascia, and the amount of the graft is adjusted to the depression to be filled, the other end of the tube closed in the same manner figure (5).

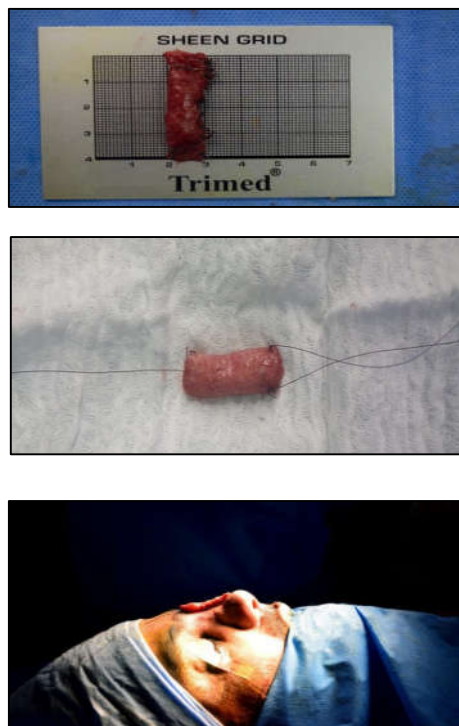


Fig. 5 :Diced cartilage wrapped with fascia.

The nose of the patient may require doing median and lateral osteotomy and /or rasping to smooth the dorsal irregularities, tip refinement by stitches, some cases a columellar strut positioned ,while the graft being prepared. A nasofrontal pullout sutures were used as a guide and a cranial point of fixation of the graft, the caudal end of the graft require no fixation in all cases. Figure (6).



Fig.6 :Nasofrontal pullout sutures.



Fig. 7: Positioning the graft in closed approach.



Fig. 8 :Positioning the graft in open approach.

After placement of the graft and redraping of the dorsal flap , incisions sutured by 4/0 vicryl .Alar base excision done if indicated and sutured with

5/0 prolene. Internal nasal packs (paraffin impregnated gauze) inserted , external nasal taping carried out and a dorsal POP (Plaster Of Paris) nasal splint applied.



Before positioning the graft



After positioning the graft

Fig. 9 :Before and after Diced cartilage graft with fascia positioning.

All the patient were discharged home in the following day, internal nasal packs removed after 3 days. Antibiotics were administered perioperatively and continued for one week postoperatively. All patients were instructed to maintain a head – up position while laying down and use physiologic nasal wash solution frequently in the following two post-operative weeks . The patients were scheduled for follow up visits; the first visit was arranged at day five

postoperatively during which the external sutures removed. Furthermore, the second visit was in day ten postoperatively for removal of the external nasal splint, during which molding of the graft done and instruction were given to the patients regarding nasal taping and massaging for the following two to three months, with regular visits every two to three weeks for the first two months then monthly follow up visit for the next months.

Dorsal nasal ultrasound done in the first 1 – 2 months and at the end of the study, to evaluate the graft dimensions.

RESULTS:

Among the patients included in the study only one patient was having generalized under

projecting nose (familial), 2 with previous septorhinoplasty and 4 reported having previous traumatic event to the nose.

According to visual analogue scale, most of the patients gained satisfactory results as shown in the table (2).

Table 2: Results according to visual analogue scale.

Visual Analogue Scale Score	Indicator	Patients' Perception	Surgeon's Perception	Third Eye Perception	Mean
1 - 2 - 3	Poor	0	0	0	0
4 - 5	Fair	0	0	0	0
6 - 7	Good	2(28%)	3(42%)	4(57%)	3(42%)
> 7	Very good	5(71%)	4(57%)	3(42%)	4(57%)

Generally the satisfaction is in the high scores of the scale and by comparing the satisfaction rate of the patients and the surgeon, we can notice slight difference, this is mainly because the surgeon's satisfaction rate is based on a more scientifically sold base of nasal shape analysis. Four of them suffering from breathing difficulties through the nose which is improved significantly after the operation in all of them without placement of spreader graft. The patients have no complain regarding the donor sites (fascia, cartilage).

Regarding irregularities or visible edges, one case noticed to have it at the radix and it disappear with molding, by 2 months postop. It's not noticeable.

Regarding the postoperative complications; one case developed skin sloughing of small areas on the dorsum of the nose, managed with local care with ointment and healed properly and one patient developed infection with collection required drainage from the dorsum at the radix.



Figure 10: A case of iatrogenic saddling (previous septorhinoplasty) A,B,C pre and D,E,F 8 months post op.

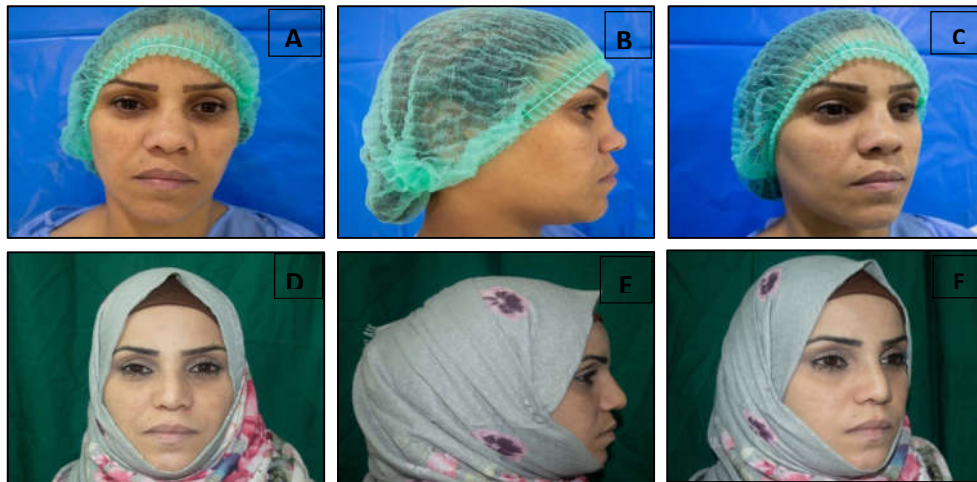


Figure 11: A case of traumatic saddling A,B,C pre and D,E,F 3months post op.

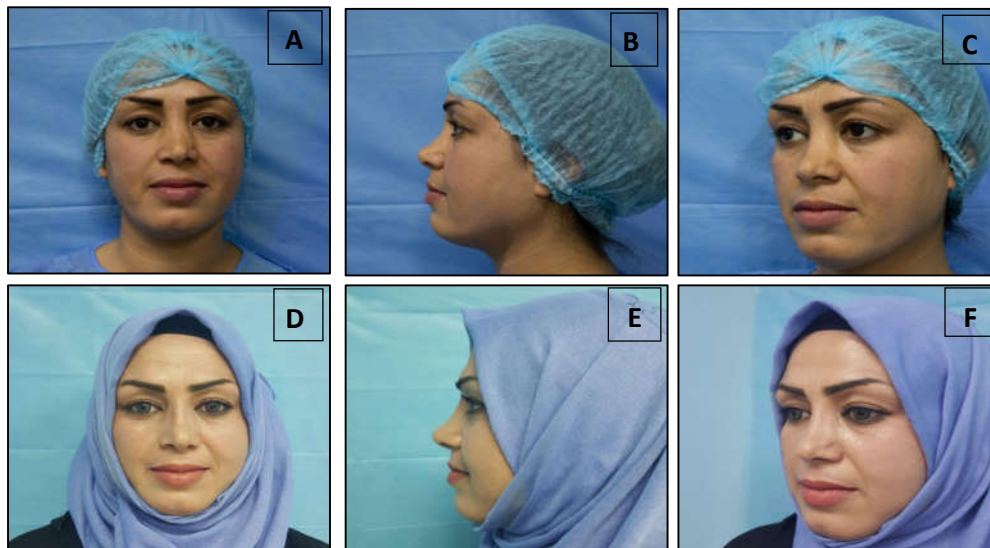


Figure 12: Case of iatrogenic (previous septorhinoplasty) , A,B,C before and D,E,F 5 months after.



Figure 13 :Case of traumatic saddle (RTA) ,A,B,C, before and D,E,F 1 month after.

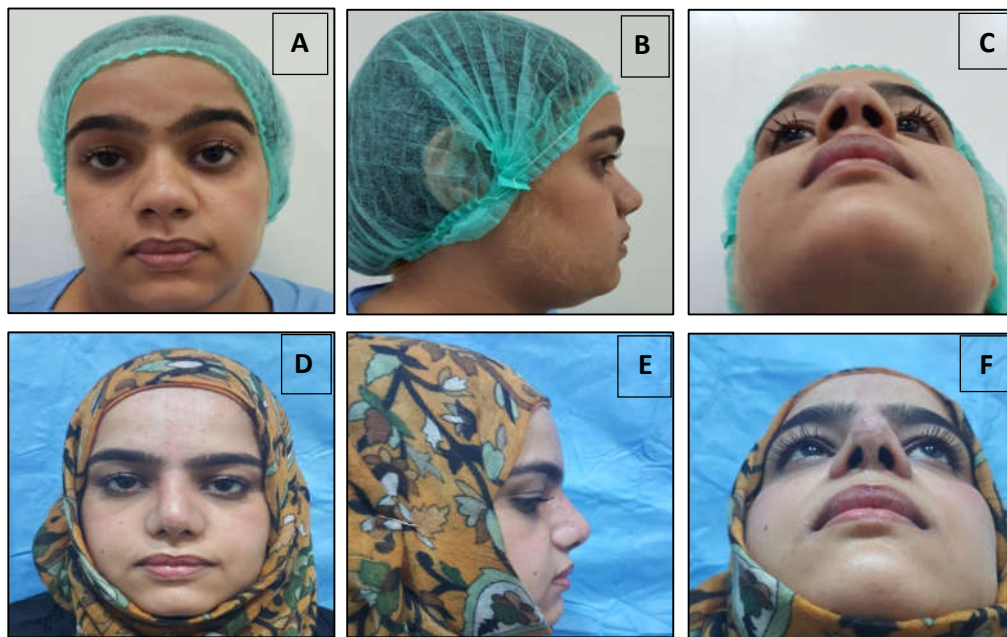


Figure 14: Case of familial generalized under projecting nose ,pre and 40 days post op.

DISCUSSION:

Diced cartilage graft are valuable addition to rhinoplasty surgery ,they are highly flexible and useful throughout the nose ,their use simplifies one of the greatest challenges in all rhinoplasty ; dorsal augmentation ⁽⁸⁾ ,avoiding alloplastic materials , and solid cartilage grafts with superior

aesthetic results and eliminating the possible complication of both .

The viability of the diced cartilage first established by Young in 1941 ⁽¹¹⁾ ,Peer was the first to introduce the technique of diced cartilage grafting in total ear reconstruction in 1944 .

He was struck by the ability of the diced cartilage pieces to be molded into the shape of an ear.^(12,13)

Wilflingseder used it in cranioplasties in 1983 and shows how the diced cartilage will achieve solid fusion to mass with connective tissue filling the interstices.⁽¹⁴⁾

Diced cartilage graft in fascia can be made to fit any length or thickness (to about 1 cm) of the recipient site and its malleable which allows for fine adjustment both intraoperatively and up to 2 weeks post operatively⁽¹⁵⁾.

Wrapping the diced cartilage with a material acting like a perichondrium will decrease the draw backs seen in the use of diced cartilage alone in rhinoplasty including irregularities and visibility (about 10 % in one study⁽¹⁶⁾,

compared to 0 % in this study) and dispersion of the cartilage pieces , crushing or grating the cartilage to minimize these complications by making smooth filler type cartilage graft leading to increase the resorption rate significantly and unpredictably which increases the revision rates.^(17,18)

Erol invent the Turkish delight in 2000 , he used surgicel (a resorbable oxidized regenerated cellulose product) to create moldable graft .⁽¹⁹⁾ , but In 2004 Daniel and Calvert noted a clinical failure using this technique attributed to foreign body reaction related to surgicel ,ultimately leading to graft inflammation and subsequent cartilage resorption ,then they showed how this failure was successfully corrected using diced cartilage wrapped in a deep temporal fascia with excellent long term clinical survival⁽⁹⁾. This is then confirmed by studies including histological analysis, by Cakmak, Calvert, and Brenner et al.⁽²⁰⁻²²⁾

The problem associated with deep temporal fascia is that it may be difficult to precisely assess the final dorsal height due to unintentional over or under correction of the bulk of the fascial graft because of the tendency to shrink,⁽²³⁾ and the tedious demanding dissection in the same surgical field in addition the alopecial scar should be considered, all these issues eliminated by replacing it with fascia lata .

Given the recent use of fascia lata for nasal dorsum to smoothen any irregularity , this will be an additional benefit for its use with the diced cartilage to support the thin skin patients and reduce the incidence of irregularity and visibility as seen in this study (0 %)⁽²⁴⁾ .

American delight on the other hand described by Chad in 2011, by using diced cartilage graft wrapped in Alloderm for dorsal nasal augmentation , however the resorption rate of the alloderm is unpredictable approaching 30 % in this study⁽²⁵⁾ , and 50 % within 3 months in other study ,with its cost and with the theoretical possibility of disease transmission ,all deterred its use .^(1,26)

Tasman technique and the technique described by Bracaglia et al ,and later by Bullocks et al , fibrin glue is used as a scaffold for the cartilage pieces , however as they use bovin thrombin possible side effect are immune mediated reaction, coagulopathy , and temporary erythema of the nose following insertion ,also its not readily available and costly .⁽²⁷⁻³¹⁾

Fascia lata has no resorption after 6 months and slow resorption rate thereafter⁽⁵¹⁾, will be a good choice and it is used previously by Brajendra otolaryngologist ,with an L- shape septal support graft for all of his cases (post traumatic and revisional cases)⁽³²⁾ with good long term results .

The reduction of the graft volume assessed in this study by serial ultrasound examination of the graft shown to be around 1 mm in the first 8 months follow up, and this include the fluid (blood) reduction inside the fascial tube, this give us idea for the preferable long term results and should be confirmed by continuous follow up ultrasound for the graft .

A significant number of patients with a saddle nose deformity also note subjective feelings of nasal obstruction, or difficulty breathing through the nose (4 cases). This is not surprising given the area of collapse involves the internal nasal valve (middle vault). Patients undergoing surgical reconstruction of the deformity by this method noticed improvement in their nasal breathing following the procedure, and this is without placement of spreader grafting. This is most likely due to the fact that re-elevating the bridge height helps to reopen the internal nasal valve much like popping up a collapsed tent.

No complaint regarding the graft and the fascia donor sites apart from mild pain and discomfort in the first few days .

In this study one patient developed skin sloughing might be due to tight outer splint, managed conservatively with wound care and antibiotic ointment and it heals properly.

Other patient developed infection with pus pocket at the radix ,required drainage with antibiotic given according to the result of culture and sensitivity , the possible cause maybe contamination most probably from nasal flora,

and the presence of foreign body (plate from previous facial fracture fixation by maxillofacial surgeons) increase the chance of developing this complication, the infection resolved and the result is satisfying .

CONCLUSION:

Although the follow up period was short , the use of diced cartilage graft with fascia lata seems to be reliable methods to achieve better results.

We recommend a larger sample size and a longer follow up period in order to insure the maintenance of the results.

REFERENCES:

1. Harley S, Dresner ,Peter A . Hilger An overview of nasal dorsal augmentation . *Semin Plast Surg* 2008;22:65-73.
2. Abel-Jan Tasman . Rhinoplasty – indications and techniques. *GMS Current Topics in Otorhinolaryngology – Head and Neck Surgery* 2007,Vol.6, ISSN 1865-1011.
3. Vartanian AJV. Saddle nose rhinoplasty. http://emedicine.medscape.com/article/84091_0_overview#0104. Accessed February 18, 2012.
4. Tardy ME Jr, SchwartzM, Parras G. Saddle nosed deformity: autogenous graft repair. *Facial Plast Surg*. 1989;6:121-34.
5. Daniel RK, Brenner KA. Saddle nose deformity: a new classification and treatment. *Facial Plast Surg Clin North Am*. 2006;14:301-12.
6. Sang Min Hyun, Yong Ju Jang.Treatment Outcomes of Saddle nose Correction. *JAMA Facial Plast Surg*. 2013;15:280-86.
7. Calvert J, Brenner K. Autogenous dorsal reconstruction: maximizing the utility of diced cartilage and fascia. *Semin Plast Surg*. 2008;22:110–119.
8. Daniel RK ,The Role of Diced Cartilage Graft in Rhinoplasty . *Aesthetic Surg J* 2006;26:209-13
9. Daniel RK, Calvert JW. Diced cartilage grafts in rhinoplasty surgery. *Plast Reconstr Surg*. 2004;113:2156-71.
10. Kelly MH, Bulstrode NW, Waterhouse N. Versatility of diced cartilage-fascia grafts in dorsal nasal augmentation. *Plast Reconstr Surg*. 2007;120:1654-59.
11. Young F. Autogenous cartilage grafts. *Surgery* 1941;10:7.
12. Peer LA. Diced cartilage grafts. *Arch Otolaryngol* 1943;38:156–65.
13. Peer LA. Reconstruction of the auricle with diced cartilage grafts in a Vitallium ear mold. *Plast Reconstr Surg* 1948;3:653–66.
14. Wilflingseder P. Cranioplasties by means of diced cartilage and split rib grafts. *Minerva Chir* 1983;38:837–43.
15. Daniel RK. Diced cartilage grafts in rhinoplasty surgery: current techniques and applications. *Plast Reconstr Surg* 2008;122:1883-91.
16. Chang CS, Bergeron L, Chen PK. Diced cartilage rhinoplasty technique for cleft lip patients. *Cleft Palate Craniofac J*. 2011;48:663–69.
17. Manafi A, Hamed ZS, Manafi A, RajabianiA, Rajae A, Manafi F. Injectable cartilage shaving: an autologous and long lasting filler material for correction of minor contour deformities in rhinoplasty. *World J Plast Surg* 2015;4:74-78.
18. Manafi A et al Evidence-Based Efficacy of Autologous Grated Cartilage in Primary and Secondary Rhinoplasty *World J Plast Surg* 2017;6:137-43.
19. Erol O. The Turkish delight: a pliable graft for rhinoplasty. *Plast Reconstr Surg* 2000;105:2229–41.
20. Cakmak O, Bircan S, Buyuklu F, Tuncer I, Dal T, Ozluoglu LN. Viability of crushed and diced cartilage grafts: a study in rabbits. *Arch Facial Plast Surg* 2005; 7:21–26.
21. Calvert JW, Brenner K, DaCosta-Iyer M, Evans GR, Daniel RK. Histological analysis of human diced cartilage grafts. *Plast Reconstr Surg* 2006;118:230–36.
22. Brenner KA, McConnell MP, Evans GR, Calvert JW. Survival of diced cartilage: an experimental study. *Plast Reconstr Surg* 2006;117:105–15.
23. Ma JG, Wang KM, Zhao XH, Cai L, Li X. Diced Costal Cartilage for Augmentation Rhinoplasty. *Chin Med J* 2015;128:2679-81.
24. Alireza Mohebbi et al .Cenoderm vs. Fascia Lata for the Prevention of Dorsal Nasal Irregularities in Rhinoplasty.Iranian J of Otorhinolaryngology,2016;28:241-48.
25. Chad R Gordon et al . Diced Cartilage Grafts Wrapped in Alloderm for Dorsal Nasal Augmentation. *J Craniofac Surg* 2011;22:1196-99.
26. Davis RE, Wayne I. Rhinoplasty and the nasal SMAS augmentation graft. *Arch Facial Plast Surg* 2004;6:124–32.
27. Baker SR. Diced cartilage augmentation: Early experience with the Tasman technique. *Arch Facial Plast Surg*. 2012;18:1-5.

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28. Tasman AJ. Advances in nasal dorsal augmentation with diced cartilage. *Curr Opin Otolaryngol Head Neck Surg.* 2013;21:365–71.
 29. Tasman AJ, Diener PA, Litschel R. The diced cartilage glue graft for nasal augmentation: Morphometric evidence of longevity. *JAMA Facial Plast Surg.* 2013;15:86–94.
 30. Bracaglia R, Tambasco D, D’Ettorre M, Gentileschi S. “Nougat graft”: Diced cartilage graft plus human fibrin glue for contouring and shaping of the nasal dorsum. *Plast Reconstr Surg.* 2012;130:741e–3e.
 31. Bullocks JM, Echo A, Guerra G, Stal S, Yuksel E. A novel autologous scaffold for diced-cartilage grafts in dorsal augmentation rhinoplasty. *Aesthetic Plast Surg.* 2011;35:569–79.
 32. J Atkins. Nasal airway studies, Saddle nose deformity. *Journal of the Royal Society of Medicine;* 1979 ; 72: 846-47.

