Crushed Septal Cartilage Graft in Rhinoplasty and Nasal Septal Surgery: Clinical Outcomes and Complications

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Abstract

Objectives: To assess clinical outcomes and complications with the use of crushed septal cartilage graft in rhinoplasty and nasal septal surgery.

Method: A prospective clinical study has done at a tertiary referral centre included 32 patients who underwent crushed cartilage grafting during rhinoplasty and nasal septal surgery with autogenous septal cartilage as the graft material. Slight or moderately crushed septal cartilage grafts were used to augment nasal dorsum, nasal tip and for septal correction. Photographic and endoscopic assessment was done preoperatively and postoperatively at 10th day, 1, 3 and 6 months to assess clinical outcomes and complications including graft resorption, warping, extrusion and any postoperative deformity.

Result: Among 32 patients, 19 underwent rhinoplasty and rest 13 nasal septal correction. Complications encountered were postoperative deformity in 3 patients of rhinoplasty and persistent septal deviation in 2 patients of septoplasty. There was no graft resorption, rejection, or extrusion.

Conclusion: Crushed cartilage appears to be a good graft material to conceal nasal irregularities and fill nasal dorsal defects in rhinoplasty and to obtain good functional outcomes in septoplasty.

INTRODUCTION

Various graft materials including autograft, homograft and xenograft are used in nasal surgeries primarily to maintain or strengthen the structural framework, provide contour and to restore the nose to esthetic ideal. During rhinoplasty these are used for augmentation of saddle nose deformity and for masking contour irregularities. An ideal implant or graft for such purposes is one which is readily available, well tolerated by the body, nondestructive to local tissues at the implantation site, non resorbable, easily available in adequate quantities and easy to contour to the desired shape [1].

Among these the autograft is widely used because it survives as living tissue due to lack of immune response and it seldom gets resorbed. Among autologous grafting materials, cartilage is the ideal material because of its excellent elasticity, minimum resorption rate, good vitality even with poor blood supply and low infection rate [2].

The source of cartilage graft can be septal, auricular and costal. Autogenous septal cartilage is generally acceptable as gold standard nasal graft material. Auricular cartilage is an excellent alternative to septal cartilage as it is easy to harvest with a relatively low morbidity. Crushed autogenous cartilage grafts may be an option for concealing the irregularities and achieve a smoother nasal surface [3-6].

In case of septoplasty, placing the cartilage back between the mucoperichondrial flaps after being straightened or crushed, creates a barrier against septal perforation by reskeletonizing the nasal septum. Regardless of whether the cartilage survives, the resulting fibrosis between the septal flaps strengthens the areas weakened by the removal of the cartilage. This may prevent a floppy septum syndrome [7].

The degree of crushing applied is also important for long term clinical outcome as slight or moderate crushing of cartilage creates an outstanding graft material for concealing irregularities and provides both excellent long term clinical outcome and predictable esthetic results while severe crushing decreases cartilage viability [8-11].

This study was undertaken to find an answer to the question pertaining to the usefulness of crushed cartilage graft in septal surgeries and rhinoplasty and to evaluate its result.

METHODS

This prospective study at a tertiary referral center undertaken between 2011-13 included 32 patients for rhinoplasty having minimal asymmetry, saddling or irregularity and those for septal correction with deviated nasal septum. The patients of revision surgery or with septal flap tear while undergoing surgery were excluded from the study. A written informed consent was obtained from all patients before surgery explaining the procedure and possible outcomes and complications. Institutional ethics committee clearance was obtained for the study.

Patients were followed up for a period of 6 months. Graft data included the source (nasal septal cartilage), recipient site (nasal dorsum, supratip or nasal septum) and degree of crushing (slight or moderate). For each patient, endoscopic assessment and a standard rhinoplasty series of photographs including frontal view, 90° side views, 45° oblique views, and a basal view were obtained preoperatively and postoperatively at 10th day, 1, 3 and 6 months to assess clinical outcomes and complications including recurrent septal deviation, graft resorption, warping, extrusion and postoperative deformity.

The crushed septal cartilage grafts were prepared as follows. The perichondrial layers and the bony attachments were removed and the cartilage was shaped to the desired size with a No. 15 blade. Crushing was performed with a Cottle cartilage crusher (Figure 1) with clamp 28 mm (Fentex GmbH & Co, Neuhausen, Germany).

The degree of crushing is defined as: a) Slight- moderate force hit to soften the surface without reducing the elastic strength of the cartilage, b) Moderate- moderate force to decrease elastic strength enough to cause minimal bending downward with gravity and twisting with delicate touch, c) Significant- 3-4 moderate force hits the graft to bend moderately with gravity without destroying integrity of the cartilage completely, d) Severe- 5-6 force hits to totally destroy the integrity of cartilage (Figure 2).

After giving intercartilagious incision, pocket was created in the nasal dorsum or supratip area for the graft to be placed for rhinoplasty while in septoplasty crushed septal cartilage was placed back between the mucoperichondrial flaps to reskeletonize the septum (Figure 3,4). The graft was placed as a monolayer or multilayer depending on the depth of the defect in rhinoplasty. The crushed graft placed in nasal dorsum or side walls did not require suturing but the graft placed in the tip/supratip was fixed with absorbable suture. Columellar incision was sutured after completion of grafting and the final contour of the nose was evaluated.

RESULTS

Of the thirty two patients studied, 25 were males (78%) and 7 females (22%). The age of patients in our study ranged from 16-45 years with mean age of 24.68±6.96 and maximum number of patients was predominantly in the age group 16-25 years. After complete evaluation and detailed informed
time, especially in patients with thin nasal skin or scars. Crushed cartilage is a better alternative to overcome these problems [12].

In our study the crushed septal cartilage was used as a graft material for augmentation of dorsum or supratip and also for nasal septal correction while earlier studies on crushed cartilage mainly emphasized its use for augmentation rhinoplasty and not for septal correction. The placement of crushed cartilage in the septum after septrhinopectomy was undertaken so as to reskeletonize the nasal septum, thus decreasing the probability of possible septal perforation or flappy septum in the post operative period.

Slightly crushed septal cartilage was used for septal correction and moderately for dorsal or supratip augmentation. In our study out of 32 cases, crushed septal cartilage graft was used to augment nasal dorsum in 15 (46.8%) cases, supratip in 4 (12.5%) and for correction of nasal septum in 13 (40.6%) cases.

In a study done by Cakmak et al. [12] eight hundred nine cartilage grafts comprising of 5% slightly crushed, 80% moderately crushed, and 15% significantly crushed were used in 462 patients of rhinoplasty. The primary areas of crushed cartilage graft placement in their study included the dorsum in 73% patients, the lateral side walls in 60%, the radix in 8%, the supratip in 10%, and the tip region in 24% patients. Their ninety three percent patients received grafts by means of an open rhinoplasty while in our study all rhinoplasty patients were treated with a closed approach. In their study crushed cartilage grafts were harvested primarily from septum but also from auricula and costa while we used septal cartilage solely as a graft material in all the cases.

DISCUSSION

This study was undertaken to evaluate the usefulness of crushed cartilage graft in septal surgeries and rhinoplasty and we found crushed cartilage a good graft material to conceal nasal irregularities, fill nasal dorsal defects and for nasal septal correction to get satisfactory esthetic and functional outcomes.

Autogenous cartilage is widely accepted as an ideal graft material for use in rhinoplasty. However, when solid-carved pieces of cartilage are used to conceal residual deformities, the edges of the on lay graft may cause unsightly irregularities with consent, 13 patients underwent septal correction and 19 dorsal or supratip augmentation. Slightly crushed septal cartilage was used for septal correction and moderately for dorsal or supratip augmentation.

The patients were followed at 10th day, 1, 3, 6th month. Out of 13 septrhinoectomy patients, only 2 (15.4%) patients had complication in postoperative follow up period in the form of recurrent septal deviation while 11 patients were satisfied with outcome (Figure 5,6,7). There was no graft extrusion, flappy septum and septal perforation. Out of 19 rhinoplasty patients, 1 patient had overcorrected nose and 2 minimal saddling in postoperative follow up period. There was no graft extrusion and columellar retraction.

Figure 5
Crushing of septal cartilage as slight or moderate.

Figure 6
Showing grafting sites of crushed cartilage.

Figure 7
Showing (a), (b), (c) preoperative and (d), (e), (f) postoperative photographs of a patient after 6 months of augmentation rhinoplasty using crushed cartilage graft.
The study done by Guyuron and Friedman [14] showed a correlation between the degree of crushing applied and the resorption rate of the crushed graft. Their resorption rate was zero in slightly crushed grafts, 2.1% in moderately crushed grafts, and 13.1% in significantly crushed grafts.

In our study all cases were followed up in post operative period on 10th day, 1, 3, 6 months to assess final clinical outcomes and complications. Out of 13 septoplasty patients, only 2 (15.4%) patients had complication in postoperative period while remaining patients were satisfied with outcome. The recurrent septal deviation could be due to overlapping and angulation between the original septal cartilage and the graft or as a result of bending of the cartilage graft itself which could have been reduced by combining the crushed cartilage with a PDS (Polydioxanone) foil as shown by the study done by Boenisch et al. They opined that it supports the graft as a guide and prevent recurrent septal deviation in the postoperative period [13]. There was no evidence of graft extrusion, septal perforation and flappy septum in our study.

Out of our 19 rhinoplasty patients, 1 showed overcorrected nose and 2 minimal saddling at 1 month in postoperative follow up period and that could be due to incorrect correction at the time of surgery or due to mild resorption of moderately crushed cartilage in case of saddling. Surgical benefits in these 3 patients were less than satisfactory.

CONCLUSION

The results of our study and comparable previous studies show that slight or moderate crushing of the autogenous septal cartilage produces a good graft material that is effective in concealing irregularities, filling defects, and creating a smoother surface, with good clinical outcomes. However less number of patients and limited follow up period were limitations of this study to assess long term clinical outcomes of crushed septal cartilage graft.

REFERENCES