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Review Article

Crafting Nasal Contours: A Comparative Study of Diced vs Shaved Rib Cartilage Grafts in Rhinoplasty for Dorsal and Radix Augmentation

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Abstract

Background: Rhinoplasty often uses rib cartilage grafts to improve nasal structure and function, with autogenous rib cartilage being preferred for its durability and low resorption risk. Efficient graft preparation is vital for optimal results, yet there is a need for methods that streamline the process without sacrificing graft quality.

Aim: This study aims to compare the efficacy and preparation efficiency of diced and shaved rib cartilage grafts in augmentation rhinoplasty.

Materials and Methods: This study involved 94 patients undergoing rhinoplasty for dorsal and radix augmentation at our unit. Patients were assigned to receive either diced or shaved rib cartilage grafts. The study evaluated preparation times, nasal aesthetic outcomes, graft integration, and complications. Preparation times were recorded for both methods, and follow-up evaluations were performed at 1 month, 6 months, and 12 months post-surgery to assess clinical outcomes and patient satisfaction.

Results: The final sample included 94 patients, with 47 in each group. The mean age was 29.5 years (SD 8.7, range 24-56) in Group A and 30.2 years (SD 9.1, range 24-56) in Group B. Gender distribution was similar, with Group A consisting of 25 females and 22 males, and Group B comprising 26 females and 21 males. The preparation time for Group A (diced cartilage) averaged 12.5 minutes (SD 2.3), while for Group B (shaved cartilage), it was significantly shorter at 6.8 minutes (SD 1.7), with a P-value of < 0.001. Graft integration rates were comparable between the groups, with Group A achieving a 95.7% integration rate (45 patients) and Group B achieving 97.9% (46 patients), with no significant difference (P = 0.56). Patient satisfaction was also high in both groups, with 93.6% (44 patients) in Group A and 95.7% (45 patients) in Group B expressing satisfaction, resulting in a non-significant difference (P = 0.68).

Conclusion: Both diced and shaved rib cartilage grafts are effective for dorsal and radix augmentation in rhinoplasty, with high rates of graft integration and patient satisfaction. Shaved grafts offer a significant reduction in preparation time, making them a more efficient alternative. This study introduces shaved rib cartilage grafts, potentially enhancing surgical efficiency and outcomes in rhinoplasty.

Keywords: Rhinoplasty; Rib Cartilage Grafts; Diced Cartilage; Shaved Cartilage; Nasal Augmentation

Introduction

Rhinoplasty, a popular surgical procedure aimed at enhancing nasal aesthetics and function, often requires the use of graft materials for dorsal and radix augmentation. Dorsum and radix reconstruction is challenging and necessitates careful pre-operative planning, intraoperative execution, and post-operative management.

Diced cartilage involves cutting the harvested rib cartilage into tiny cubes, typically ranging from 0.5 to 1.0 mm in size. These small pieces are then mixed with a small amount of the patient's blood and wrapped in Surgicel, a hemostatic agent, to form a cohesive graft. The diced cartilage graft is known for its versatility and ease of shaping, allowing surgeons to achieve a natural contour.

In contrast, shaved cartilage preparation involves the use of a surgical blade to shave thin layers of the harvested rib cartilage. These shavings are also mixed with the patient's blood and wrapped in Surgicel to create a graft material. Notably, this is the first-ever study to introduce and evaluate shaved rib cartilage grafts for rhinoplasty, marking a significant advancement in the field.

The viability of diced cartilage graft was initially demonstrated by Young [1]. The clinical trial results were later given by Peer [2], and Erol popularized them [3]. Autogenous cartilage, harvested from the patient's own rib, is a preferred material due to its biocompatibility and reduced risk of rejection. This study compares the efficacy and preparation efficiency of diced and shaved rib cartilage grafts, in rhinoplasty.

Materials and Methods

This comparative clinical study aimed to evaluate the efficacy and preparation efficiency of diced versus shaved rib cartilage grafts for dorsal and radix augmentation in rhinoplasty. The study included 94 patients (47 in each group) undergoing rhinoplasty from June 2021 to May 2022, with a minimum follow-up of one year. Participants were adults aged 18-60 years seeking nasal dorsal and radix augmentation with autogenous rib cartilage grafts, and who were willing to undergo rib cartilage harvesting. Exclusion criteria included autoimmune disorders or conditions affecting wound healing. Ethical approval was granted by the Institutional Review Board and the hospital's ethical committee, with informed consent obtained from all participants. For graft preparation, Group A involved dicing autogenous rib cartilage into 0.5- to 1.0-mm cubes using surgical blade No. 21, which was then submerged in 1 cc of the patient's blood and wrapped in Surgicel to create a cohesive graft as shown in the figure 1. Group B involved shaving rib cartilage (Figure 2) with the same surgical blade No. 21, followed by submersion in 1 cc of the patient's blood and wrapping in Surgicel to form the graft material. Preparation time for each type of graft was recorded. Clinical outcomes, including graft integration, aesthetic results, and patient satisfaction, were evaluated over a follow-up period of 12 months. Data analysis was conducted using t-test and Chi-Square test to evaluate the differences between the two groups in terms of graft preparation time and clinical outcomes.

Surgical procedure

All augmentation rhinoplasties were performed by the same surgical team to ensure consistency. The surgical approach and technique for dorsal and radix augmentation were standardized across both groups, with the only variable being the type of cartilage graft used. Postoperative care and follow-up protocols were identical for both groups to allow for a fair comparison of outcomes.

Results

The final sample consisted of 94 patients, evenly divided into two groups of 47 each. In Group A, the mean age was 29.5 years (SD 8.7, range 24-56), while in Group B it was 30.2 years (SD 9.1, range 24-56). Gender distribution was similar across groups, with Group A comprising 25 females and 22 males, and Group B including 26 females and 21 males. Preparation time differed significantly between the groups, with Group A having an average of 12.5 minutes (SD 2.3) compared to 6.8 minutes (SD 1.7) in Group B ($P < 0.001$). Graft integration rates were high in both groups, with Group A showing 45 patients (95.7%) and Group B 46 patients (97.9%), but this difference was not statistically significant ($P = 0.56$). Patient satisfaction was also comparable, with 44 patients (93.6%) in Group A and 45 patients (95.7%) in Group B expressing satisfaction, and this difference was not significant either ($P = 0.68$). In the study, complications included graft displacement and infection. Graft displacement was significantly higher in Group A (diced cartilage), with 5 cases (10.6%), compared to only 1 case (2.1%) in Group B (shaved cartilage), resulting in a statistically significant difference ($P = 0.04$). This suggests that shaved cartilage provided better stability in graft positioning. Infection rates were low in both groups, with 2 cases (4.3%) in Group A and 1 case (2.1%) in Group B, and this difference was not statistically significant ($P = 0.56$). Overall, the incidence of complications was minimal, but graft displacement was notably more common with diced cartilage.

Demographic and Clinical Characteristics of the Study Sample is shown in the table 1.

Discussion

Cartilage grafts are routinely used in rhinoplasty for the augmentation of radix and dorsum [3,4]. Since rib cartilage is as an autologous graft, it does not induce an immune response; thus, graft rejection and infection are rare [5].

Characteristic	Group A cartilage	Diced	Group B (Shaved cartilage)	P-value
Total number of subjects	47		47	-
Age (years)				
Mean (SD)	29.5 (8.7)		30.2(9.1)	0.67
Range	18-55		19-58	-
Sex				0.84
Female	25		26	
Male	22		21	
Preparation Time (minutes)				<0.001
Mean (SD)	12.5 (2.3)		6.8 (1.7)	
Graft integration				0.56
Successful integration (%)	45(95.7%)		46(97.9%)	
Patient satisfaction				0.68
High satisfaction (%)	44 (93.6%)		45(95.7%)	

Table 1

The purpose of this study was to evaluate the efficacy and preparation efficiency of diced versus shaved rib cartilage grafts in rhinoplasty for dorsal and radix augmentation. The hypothesis was that both graft types would be viable for augmentation, but the preparation time for shaved cartilage grafts would be significantly shorter. The specific aims included comparing graft integration, patient satisfaction, and preparation time between the two methods.

The study confirmed that both diced and shaved rib cartilage grafts are effective for dorsal and radix augmentation in rhinoplasty. Our study showed that shaved cartilage grafts required significantly less preparation time compared to diced cartilage grafts. Both graft types showed high rates of successful integration and patient satisfaction, with no significant differences between the groups. Additionally, this is the first study to introduce the use of shaved rib cartilage grafts, marking a significant advancement in rhinoplasty techniques.

The mean preparation time for diced cartilage grafts was 12.5 minutes, whereas for shaved cartilage grafts, it was 6.8 minutes. Both graft types demonstrated excellent clinical outcomes, with successful graft integration observed in 95.7% of Group A and 97.9% of Group B patients. High levels of patient satisfaction were reported, with 93.6% in Group A and 95.7% in Group B expressing satisfaction with the aesthetic results.

Our findings align with previous studies that have demonstrated the effectiveness of autogenous rib cartilage in rhinoplasty. Studies by Daniel [5], Calvert (2013) and Erol [3] (2000) have shown high success rates with rib cartilage grafts for nasal augmentation. However, this study provides a novel comparison between diced and shaved cartilage, highlighting the efficiency advantage of shaved grafts. In thin nasal skins sometimes that diced grafts can be palpable and visible after Surgicel resorption [6]. The strengths of our study are consistent surgical technique, follow-up protocols across both groups, comprehensive evaluation of clinical outcomes, including graft integration and patient satisfaction.

The drawbacks of our study are limited sample size, which may affect the generalizability of the results, Short follow-up period; longer-term outcomes were not assessed and potential variability in surgical skill and technique, despite efforts to standardize procedures.

Conclusion

Both diced and shaved rib cartilage grafts are viable options for dorsal and radix augmentation in rhinoplasty. Shaved graft preparation is faster than diced graft preparation, offering a more efficient alternative for surgeons. The choice between diced and shaved cartilage should be based on the specific clinical scenario and the surgeon's preference, considering the balance between preparation time and the desired level of contour precision.

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