

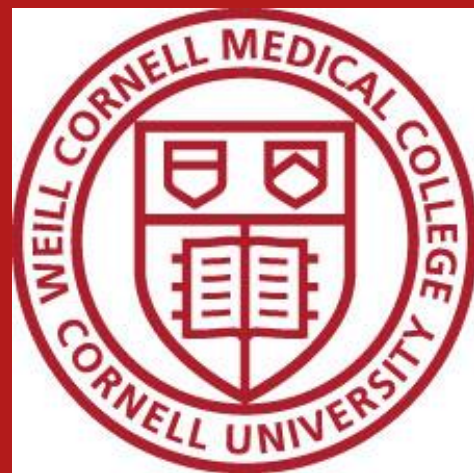
Fresh Frozen Costal Cartilage in Rhinoplasty

A 5-Year Experience

NewYork-Presbyterian

Richard J. Lu, MD MBA MSc¹, Daniel Gamboa, BA¹, Kwasi Enin, MD MBA¹, Alex Cheng, BA¹, David J. Phillips, MD FACS¹

¹Department of Otolaryngology – Head & Neck Surgery, Weill Cornell Medical Center, New York, NY



Abstract

Background/Objective:

Cartilage grafts are a mainstay of modern open structure rhinoplasty in order to achieve the desired structural and aesthetic outcomes. When sufficient septal cartilage is unavailable - in the setting of prior surgery, trauma, or a patient’s anatomic limitations – an alternative source of cartilage is often necessary. While autologous rib cartilage is an excellent source of abundant, sturdy grafting material, its use is often limited by patient age and is associated with longer operative times and donor site morbidity. Fresh-frozen costal cartilage (FFCC) is an excellent alternative, though few studies exist regarding its outcomes. This study evaluates one surgeon’s 5-year experience with fresh-frozen costal cartilage from M.T.F. Biologics for use in rhinoplasty.

Methods:

We conducted a retrospective cohort study analyzing rhinoplasty procedures performed by a senior surgeon (D.J.P) over the past 5 years at tertiary academic center. Cohorts were defined by whether FFCC was used in rhinoplasty grafting. Primary outcomes assessed included postoperative infection rates and the rate of revision surgery. Data are controlled for patient factors such as age, gender, BMI, revision rhinoplasty, and type of grafting used.

Results:

Among 304 rhinoplasty cases, postoperative infection occurred in 1 of 49 patients with fresh frozen cartilage (2.0%) and 4 of 255 patients with autologous septum (1.6%), with no significant difference (OR 1.31, 95% CI 0.14–11.95, p=0.59). Revision surgery was required in 2 of 49 patients with fresh frozen cartilage (4.1%) and 11 of 255 patients with autologous septum (4.3%), also with no significant difference (OR 0.94, p=1.00).

Conclusions:

The use of FFCC in rhinoplasty procedures demonstrates comparable rates of infection and need for revision surgeries when compared to autologous cartilage grafts and cases without grafts. These findings suggest that FCCC allograft is a viable alternative to autologous cartilage, offering similar safety and efficacy profiles.

Overview of Cartilage Grafting for Rhinoplasty

Autologous septum: Straight cartilage with excellent strength, stability, and biocompatibility. May be limited in cases of secondary rhinoplasty, prior septoplasty, prior trauma, or by patient’s anatomy.

Autologous ear: Easy access with limited donor site morbidity. Good for contour grafting, lateral crural replacement, or butterfly grafting. Insufficient strength for use as a columellar strut or septal extension graft for tip support.

Autologous rib: Abundant supply with excellent strength. Inherent risk of warping. Use may be limited by patient age and calcification. Associated with longer operative times and donor site morbidity.

Allogenic irradiated rib: A devitalized cartilage matrix that integrates with fibrosis; no donor site morbidity; may be more brittle and prone to resorption

Allogenic fresh-frozen rib: Frozen cartilage with biomechanical properties more similar to autologous rib cartilage compared to irradiated rib; no donor site morbidity. Increased cost.

Alloplastic implant (silicone, ePTFE, Gore-Tex, medPor): pre-shaped, predictable implant, though higher risk of infection or extrusion.

Methods

Study Design: Retrospective cohort study of primary or revision rhinoplasty

Setting: Single senior surgeon at a tertiary referral center

Study Period: March 2020 – June 2025

Population: 304 consecutive rhinoplasty cases

Exposure: Use of fresh frozen costal cartilage (Musculoskeletal Transplant Foundation) vs. autologous cartilage (septal or ear)

Outcome: Postoperative surgical site infection, defined as clinical evidence of infection requiring antibiotics or intervention, within the follow-up period

Statistical analysis:

- Absolute infection rates were compared between groups
- Fisher’s exact test was used given the low number of events
- Logistic regression was performed with infection as the dependent variable and cartilage type as the exposure, yielding an odds ratio
- Due to the rarity of infection events, penalized logistic regression was applied to stabilize estimates

Results

FFC protocol: All fresh frozen cartilage grafts were thawed in three sequential 10-minute baths of room temperature normal saline, following manufacturer guidelines. The final bath contained 180mg of Gentamycin. The grafts were then carved to the desired size and shape and used in standard rhinoplasty techniques.

Postoperative infection was defined as the presence of a localized fluid collection in the surgical site. Diagnosis required microbiologic confirmation with positive bacterial cultures obtained from the collection. Cases were considered infections only if they necessitated needle aspiration or operative washout for definitive management.

Revision rhinoplasty was recorded when the secondary procedure was performed by the senior surgeon (DJP) during the study period. Revisions performed by other surgeons or at outside institutions may not have been captured, and thus the reported revision rate may underestimate the true incidence.

Table 1. Demographic Characteristics

Characteristic	No	%
Sex		
M	154	51%
F	150	49%
Age		
Median	32	
Range	14-76	
Surgery Characteristics		
Endonasal	23	8%
Combined FESS	22	7%
Revision Case	59	19%
Graft		
FFC	49	16%
Other Graft	9	3%
Follow-up time	27.7 mo	

Table 2. MTF Usage by Rhinoplasty Case Type

Category	MTF	No MTF	Total
Primary	6 (2.4%)	240 (97.6%)	246
Revision (DJP Primary)	11 (84.6%)	2 (15.4%)	13
Revision (Other Surgeon Primary)	33 (71.7%)	13 (28.3%)	46
Total	49 (16.1%)	255 (83.8%)	304

Table 3. Infection Rates by MTF Usage

Category	MTF	No MTF	Odds Ratio
Infection Rate	1/49 (2.0%)	4/255 (1.6%)	1.31 (p = 0.59)
Revision Rate	2/49 (4.1%)	11/255 (4.3%)	0.94 (p = 1.00)

Conclusions

In this single-surgeon, retrospective cohort of 304 rhinoplasty patients, postoperative infection occurred in 1 of 49 patients with fresh frozen cartilage (2.0%) and 4 of 255 patients with autologous septum (1.6%), with no significant difference (OR 1.31, 95% CI 0.14–11.95, p=0.59). Revision surgery was required in 2 of 49 patients with fresh frozen cartilage (4.1%) and 11 of 255 patients with autologous septum (4.3%), also with no significant difference (OR 0.94, p=1.00). These findings suggest that fresh frozen cartilage is a safe graft option in rhinoplasty with infection rates comparable to autologous septum.

Contact

Richard Lu, MD MBA MSc
Department of Otolaryngology Head and Neck Surgery
New York-Presbyterian Hospital/Weill Cornell Medical Center
1305 York Avenue, 5th floor
New York, NY 10021
E-mail: ujo9003@nyp.org

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